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Contact Information:

Editor: editor@ijsrp.org

Website: <http://www.ijsrp.org>

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A Comparative Study of Level of Stress due to Menstruation Cycle among physically active and Non Active females at DRC College

Dr. Kavita Sharma

Associate Professor, Daulat Ram College, University of Delhi

Abstract- The purpose of the study was to identify the level of Stress due to menstruation cycle among physically active and non-active females in DRC College, University of Delhi. The research pattern being used was descriptive survey research comparing chosen active and non-active females. The study was delimited to the age group 20 to 25 years. By applying simple random sampling a total of 100 females (50 active + 50 non active) were selected, the physically active group consist of females doing at least 2-4 hour daily physical activity besides the daily work, whereas the non-active group consist of females with no physical activity in the daily routine. The variable for the study was stress; Adrenal Stress Questionnaire developed by Dave Hompes was used for the collection of data. The statistical techniques employed were descriptive statistics followed by independent 't' test. The results revealed that the active females with majority of 44% were below stress level, whereas 28% falls in the category of average adrenal burnout, 22% were in the category of good health, and at the last 8% were above average adrenal burnout, whereas no was found with severe adrenal burnout, whereas the 34% non active females were in the average adrenal burnout category, on the other hand 22% were in the above average adrenal burnout category, with 18% found to be under some stress, and at the last only 8% were having good health and 18% under severe adrenal burnout, and finally the stress level of females (Both active and non active), showed that a majority with 31% were in average adrenal burnout category, with a total of 31% were found under some stress, 14% were having above average adrenal burnout, and only 15% were having good health, and at last 9% were found to be having severe adrenal burnout and lastly the mean of the active group was 35.14 when compared to the non active group with a mean of 46.64, the standard deviation of the active group and the non active group was 8.00 and 10.65 respectively, the result indicates a significant difference between the stress level of active and non active females due to menstruation cycle occurred, as the value was found to be 6.105 against the tabulated value of 1.96 at 0.05 level. It can be concluded from the means of both the groups that the level of stress due to menstruation was more in physically non active group when compared to physically active group. It was also concluded that Daily physical activity can reduce the stress level among the female section, which will ultimately lead to their physical, physiological and psychological well being.

Index Terms- Stress, Menstruation Cycle

I. INTRODUCTION

Modern life is full of hassles, deadlines, frustrations, and demands. For many people, stress is so commonplace that it has become a way of life. Stress isn't always bad. In small doses, it can help you perform under pressure and motivate you to do your best. But when you're constantly running in emergency mode, your mind and body pay the price. If you frequently find yourself feeling frazzled and overwhelmed, it's time to take action to bring your nervous system back into balance. You can protect yourself by learning how to recognize the signs and symptoms of stress and taking steps to reduce its harmful effects.

What is stress?

Stress is a normal physical response to events that make you feel threatened or upset your balance in some way. When you sense danger – whether it's real or imagined – the body's defenses kick into high gear in a rapid, automatic process known as the "fight-or-flight" reaction, or the *stress response*.

The stress response is the body's way of protecting you. When working properly, it helps you stay focused, energetic, and alert. In emergency situations, stress can save your life – giving you extra strength to defend yourself, for example, or spurring you to slam on the brakes to avoid an accident.

Stress is seen as modern society's illness by professionals from different sectors. Stress has effects on people's behaviors, communications and efficiency. Stress is not only a factor in working places; it is also common factor in educational environments experienced by students. Stress is first defined by **Hans Selye (1977)** while searching for female hormones. Before Selye, the term "stress" was used to describe a mental strain or unwelcome happening. Selye demonstrated that stress weakened rats' immunity. Stress has become a universal explanation for human behaviour in industrial societies (**Viner, 1999**). Walter defined stress as "an external factor affecting bodily homeostasis". Cannon, introducing the term "homeostasis" and "fight or flight" response to stress is believed to do the first researches about stress (**Sahin, 1998; Viner, 1999**). Although the term stress has first shown up in physiology, today, there are many definitions of stress in many areas.

Why do some experts feel that women are particularly susceptible to stress?

Women are socialized to be the caretakers of others. More women than men have both a career outside the home and

continue to try to juggle traditional responsibilities after hours. Over 70% of married women with children under the age of 18 are employed outside the home. Sociologists describe women as struggling to achieve the "male standard" at work, while trying to maintain the perfect wife and mother standards at home. Women are also less likely to be in as powerful positions as men to change their environment. Women find it harder to say no to others' requests and often feel guilty if they can't please everyone. They often spend less time nurturing their own emotional and physical needs, as that might be perceived as selfish. In addition, relationship alterations or the loss of loved ones can produce empty nest or other separation syndromes. As women progress through life's stages, hormonal balance associated with premenstrual, post-partum and menopausal changes can affect chemical vulnerability to stress and depression together which consequently results in severe headache and irritability. Women may also have irregular monthly cycle, high blood pressure, stomach ulcers, etc., due to stress

(<http://my.clevelandclinic.org/healthy>)

Menstrual Period and the Power of Stress

Even though you may not be planning an adventure around the world, stress and anxiety can still take a toll on you – and your period. Although some stress can be good and even help us challenge ourselves, too much can negatively impact health. The body is sensitive to any unexpected disruptions. Excessive worrying can put the digestive system into overdrive, causing stress symptoms like diarrhoea, frequent urination, and abdominal pain; the pulmonary system may respond with rapid breathing. The female reproductive system can be affected, too. In fact, for some women, stress may play a role in causing irregular or missed periods. As stress levels rise, there's a chance that your menstrual period will temporarily stop, a condition known as secondary amenorrhea.

How Stress May Affect Menstruation

Not much is known about the relationship between stress and periods. However, stress certainly plays a role in suppressing the functioning of the hypothalamus, which controls the pituitary gland — the body's master gland — which, in turn, controls the thyroid and adrenal glands and the ovaries; they all work together to manage hormones. Ovarian dysfunction may lead to problems with estrogens production, ovulation, or other reproductive processes. Estrogens are important hormones that helps build the uterine lining and prepares the body for pregnancy. If the ovaries aren't working properly, side effects may involve the menstrual cycle, including missed periods or irregular periods.

Regular exercise is important for girls and women of all ages. Exercise significantly reduces the risk for many diseases and conditions including heart disease and many types of cancer. Getting regular exercise can significantly reduce the severity of the symptoms of conditions such as premenstrual syndrome or PMS, or menstrual cramps. Exercise affects our bone health. Regular exercise helps to reduce the risk of developing osteoporosis.

(http://pms.about.com/od/fitnessnutritionperiods/a/exercise_mens_tr.htm)

There are many benefits to exercising during your period.
Working out can help:

- Decrease the pain of cramps by releasing endorphins (the body's natural painkillers), increasing blood flow, and by loosening muscles in your lower abdomen, back, and thighs.
- Rid your body of excess water so you aren't bloated.
- Improve and stabilize your mood, making you less anxious, angry, or depressed.

Of course, there are even more benefits to a regular exercise program. By exercising consistently, you may be able to achieve a lighter and shorter menstrual flow, a lower incidence of mood swings, and a stronger pelvic floor, which can better support your reproductive organs

(<http://babyfit.sparkpeople.com/articles.asp?id=882>) The following suggestions will help you develop a synergy between menstruation and exercise, so you can optimize your workouts, and your periods.

- If you are just beginning an exercise program, and you suffer from cramps and other period-related issues, then start out slowly. Make sure you're listening to your body and not overdoing it.
- Increase exercise around your period, which will improve oxygen circulation throughout the body.
- Eat lots of fresh fruits and vegetables, whole grains, and lean protein.
- Avoid lots of salt (but use spices, especially spicy ones, liberally).
- Avoid refined sugars and fried foods.
- Avoid caffeine—it can make cramps worse.
- Get plenty of sleep.
- Use heat to relieve cramps so you can get to the gym and stick to your workouts.

Keeping in mind the above facts and extensively reviewing the literature the research scholar was intended to Study of Level of Stress due to Menstruation Cycle among physically active and Non Active females.

Objectives and Hypothesis:

- To identify the level of stress experienced by physically active females
- To identify the level of stress experienced by physically non active females
- To identify the difference of stress levels between physically active and non active females.

Hypothesis of the study:

- It was hypothesized that the stress level of active females will be low.
- It was also hypothesized that the stress level of non active females will be high.
- It was hypothesized that there would be a significant difference between the stress level of physically active and non active females.

II. PROCEDURE AND METHODOLOGY

The research pattern being used was descriptive survey research comparing chosen physically active and non active females in DRC College. The study was delimited to the age group 20 to 25 years. By applying simple random sampling a total of 100 females (50 active + 50 non active) were selected, the physically active group consist of females doing at least 2-4 hour daily physical activity besides the household work, whereas the non active group consist of females with no physical activity in the daily routine. The variable for the study was stress; Adrenal Stress Questionnaire developed by Dave Hompes was used for the collection of data. The statistical techniques employed were descriptive statistics followed by 't' test.

III. RESULTS AND DISCUSSIONS

A number of 100 active and non active females of DRC College were involved in this research. For calculating mean and standard deviation descriptive statistics was employed, whereas to compare the level of stress among active and non active females 't' test was employed. The result has been shown in tables from 1 to 4.

Table No. 1: Stress Status among Physically Active Group

Category	Score	F	%
Good Health	0-30	11	22%
Under some Stress	31-40	22	44%
Average Adrenal Burnout	41-50	14	28%
Above Average Adrenal Burnout	51-60	3	06%
Severe Adrenal Burnout	61+	0	0%

Good Health	0-30	11	22%
Under some Stress	31-40	22	44%
Average Adrenal Burnout	41-50	14	28%
Above Average Adrenal Burnout	51-60	3	06%
Severe Adrenal Burnout	61+	0	0%

Table No. 1 indicates the stress level of physically active group, which shows that a majority with 34% were below stress level, whereas 31% falls in the category of average adrenal burnout, 29% were in the category of good health, and at the last 4% were above average adrenal burnout, whereas no was found with severe adrenal burnout.

Table No. 2: Stress Status among Physically Non Active Group

Category	Score	F	%
Good Health	0-30	04	08%
Under some Stress	31-40	09	18%
Average Adrenal Burnout	41-50	17	34%
Above Average Adrenal Burnout	51-60	11	22%
Severe Adrenal Burnout	61+	09	18%

Table No. 2 indicates the stress level of physically non active group, which shows that a majority with 34% were in average adrenal burnout level, whereas 22% falls in the category of above average adrenal burnout, 18% were in the category of severe burnout, on the other hand 18% were found be under some stress and finally only 8% were found with good health.

Table No. 3: Comparison of Level of Stress among Physically Active and Non active females

category	N	Mean	Std. Deviation	Std. Error Mean	df	't'
females	active	50	38.64	7.876	1.114	98
	non active	50	48.20	11.261	1.593	4.91

Table no.3 indicates the values of descriptive statistics and independent 't' test for physically active and non active females, which shows that the mean and SD values of physically active and non active females were found to be 38.64 ± 7.87 and 48.2 ± 11.26 respectively, also a significant difference was found between the level of stress due to menstruation among physically active and non active females as the value was found to 4.91 which was found to be significant at 0.05 level.

IV. CONCLUSIONS

- It can be concluded that the level of stress was more in physically non active females when compared to the physically active group.
- It was concluded that physical exercise is a mean for minimizing the stress level.
- Daily physical activity can reduce the stress level among the females section of DRC College which will

ultimately lead to their physical, physiological and psychological well being.

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AUTHORS

First Author – Dr. Kavita Sharma, Associate Professor, Daulat Ram College, University of Delhi

Braill-e-Book: An Innovative Idea for an Economical, User-Friendly and Portable eBook Reader for the Visually Impaired

Moumita Dey*, Virag Doshi*, Sarvesh Patkar*, Vinayak Joshi*, Hardik Shah*

* Electronics Engineering Department, Vivekanand Education Society's Institute of Technology, Mumbai, India

Abstract- This paper aims at presenting the prototype for Braill-e-Book, a portable and user-friendly device that converts the large ocean of e-knowledge into the Braille format for the blind to access easily. The Braill-e-Book makes use of USB flash drives that contain several books in text format. It has a speech recognition system using which the user can search for the file name or its author, which when selected will be displayed on a refreshable display. Furthermore, the Braill-e-Book is equipped with the audio notifications to enable the user to navigate through the entire process easily. It is an innovative upgrade to the presently available electronic Braille display devices which are either not portable or have a PC dependency.

Index Terms- Braille literacy, Braille eBook reader, speech recognition, text to Braille conversion, USB flash drive

I. INTRODUCTION

The visually impaired, who make up a large section of the population [1], face many problems when it comes to accessing one of the most widespread means of knowledge - books. There are a very few books that exist in the Braille format for the visually impaired to read. And with one page in a normal book taking up to three pages in a Braille book [2], they are very large and heavy. If this medium of access to knowledge and entertainment could be made less cumbersome, cheaper and simpler, a large section of the blind population would have an easier access to education, thus increasing their currently poor literacy rate [3]. The best way to tackle this would be to take the help of technology [4].

Owing to this, several companies came up with the solution of audio books, text-to-speech converters, Braille displays and printers [5]. There are a very few audio books available in the market, and though text-to-speech converters can solve this problem, by converting any book into an audio format, the resulting audio can be extremely monotonous and devoid of expressions. The Braille displays are very expensive (a few thousand USD) [6] and have a PC dependency. 'TactoBook' [7] is one such example of a portable Braille eBook reader, however it requires a software on the PC to convert normal books into a Braille format. Braille printers also cannot work without a PC and as the paper used for printing is similar to that used in normal Braille books, these printed books are not at all portable. This problem, thus, sparked the idea of creating a stand-alone, portable, cheaper and lighter device that will be more accessible by the visually impaired, acting as a medium of education and entertainment for them.

Braill-e-Book aims at overcoming the drawbacks of the existing solutions by integrating the Braille conversion, the file selection process and the display unit together. Thus, it enables the user to read any book or even some notes in the pen drive which are in the text format on the tactile Braille display, by just speaking its name, or that of its author. This will open the gates for the visually impaired to an immense wealth of e-knowledge.

II. MODULE DEFINITION AND OPERATION

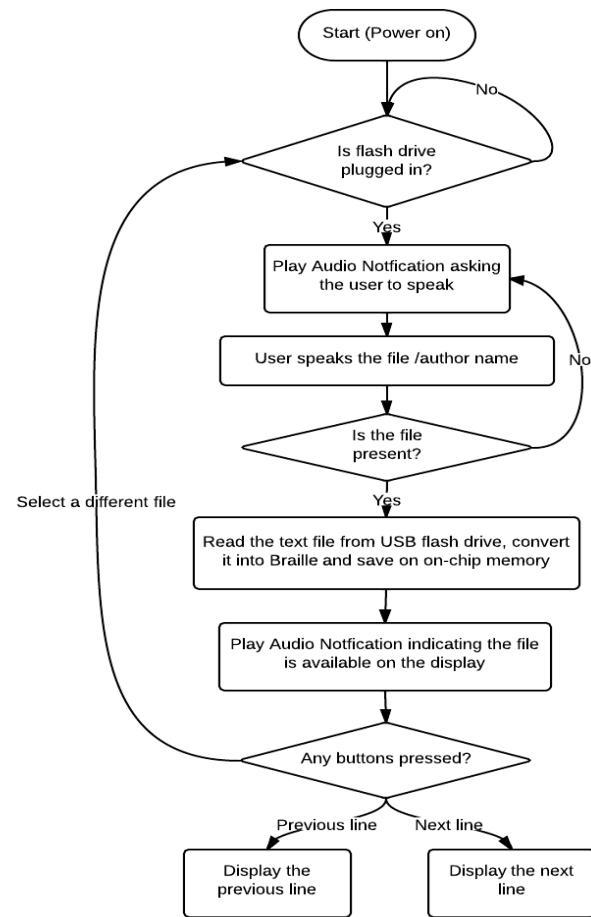


Figure 1: Flowchart of working of device

The Braill-e-Book comprises of different modules, which deal with the functioning of its different features. The device has a

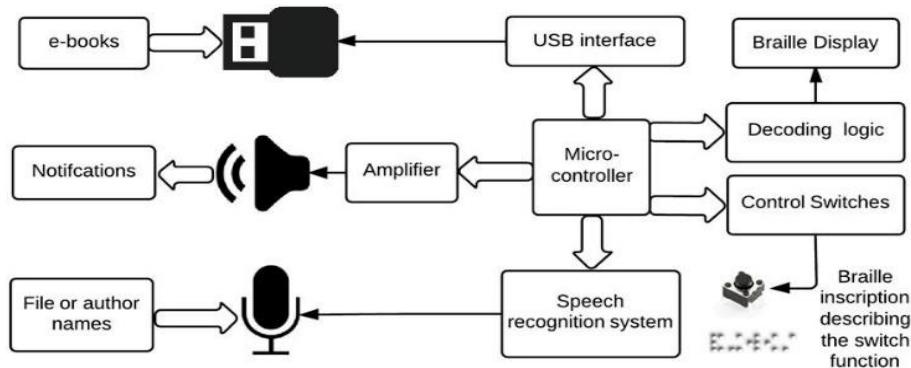


Figure 2: Block diagram of different modules on the device

USB host port, which enables the user to insert a USB flash drive containing eBook files. Once detected, the device plays an audio notification and then, the user can speak the name of either the file or the author. The speech input, when recognized, is used to search for the file in the pen drive. If a file is found, which has the same name as what the user spoke, it is said to be ‘match’ and the device plays another tone indicating that the file has been found successfully and the display is now active for the user to access. This file is also saved onto the device memory, so that it can be read even with the pen drive removed. If though, the speech input does not match any file present in the pen drive, a notification will be played indicating that the user should repeat the query, or that the file is not available in the memory. The user is also provided with three buttons having a text inscribed in Braille near them to indicate their functionality: one for choosing another file to read, one for reading the previous line and another for reading the next line. If the visually impaired user wishes to read another file, it can be done so at any point of time by using the button provided and repeating the entire process again. Figure 1 shows the basic flow of the device operation. The different modules are illustrated in Figure 2.

III. HARDWARE DESIGN AND DEMONSTRATION

A. Control

A prototype of the system was made on a smaller scale [8]. This prototype was based on the Texas Instruments Ultra Low Power MSP430F5659 microcontroller [9] which was programmed using the Code Composer Studio software by TI. The same microcontroller can be used further during the actual implementation of the system.

B. Braille Display

A dynamic Braille display can be implemented using shape memory alloy (SMA) actuator coils [10] that moves the pins up or down depending on the input signal. Each Braille character comprises of 6 dots, and for driving each dot, one actuator is required. Hence for a 10-character display, 60 actuators are required. Thus, this means that 60 pins of the controller would be utilized for displaying the ten characters.

However, a decoding logic has been designed, as shown in Figure 3, which reduces the number of pins from 60 to just 10,

thereby drastically reducing the required data lines from the controller. As each character is of 6 dots, 6 data lines are used for carrying the data required to display each character and the remaining 4 lines are used for selecting a particular character out of the 10 characters on the display.

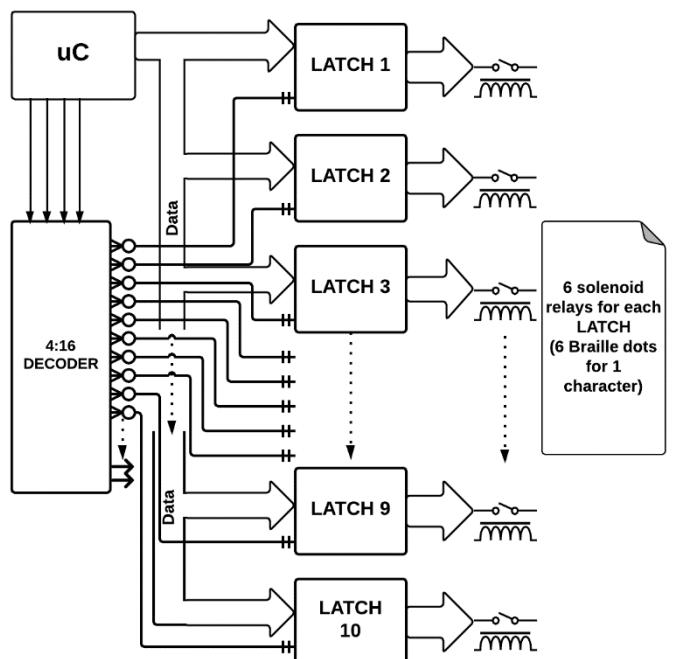


Figure 3: Decoding logic for the refreshable display

While testing the display logic prototype, a five character LED Matrix was used. The decoding logic comprised of CMOS to TTL logic level converter ICs HCF4050, a 3:8 Decoder IC 74138 to select the character, latch ICs 74LS573 to hold the character values and buffer ICs 74LS245 to drive the LED display (see Appendix).

For the actual implementation, the LED matrix will have to be replaced by the SMA coil actuators. Also, the logic will be slightly modified to accommodate 10 characters instead of the currently 5 characters. Figure 4 shows the display showing a file from the pen drive.

C. Speech recognition and audio notifications

The device has a speech recognition system, in which the user speech input is used in an intelligent search algorithm which compares the recognized terms with the names of the books, or its authors to give the best match.

In this prototype, the HM2007 IC by HMC [11] was used for speech recognition. Though this decreased the complexity of the circuit, in the final implementation, a DSP can be used for a better voice recognition system [12].

To aid the user in the process, Braill-e-Book can have several audio notifications. For this purpose, the microcontroller generated monotones, which were then given to a speaker driven by the audio amplifier IC LM386 [13] (see Appendix). The notifications had different combinations of monotones to make them sound distinct. In the final implementation, prerecorded voice notifications will replace the monotones.

D. USB Interface

The Braill-e-Book is equipped with a USB host slot wherein the user can insert the USB flash drive containing books in text (.txt) format. The USB flash drive was chosen for this purpose as it is one of the most commonly used mass storage devices. The selected file is then converted to the Braille format and given to the decoding logic for displaying.

For reading the files from a USB flash drive, the VDrive2 Module unit by FTDI [14], which is based on the Vinculum VNC1L chip [15], was used for converting the USB protocol into UART. In the final implementation, the printed circuit board can incorporate the VNC1L IC circuit instead of using VDrive2. This will enable us to use the SPI protocol instead of UART to make it faster and also reduce the size and cost of the system.

E. DC Distribution Box (DCDB)

The various components of Braill-e-Book need to be powered as per their voltage and current requirements, and being a portable device, this is accomplished by using a battery as a voltage source. For this, a DCDB was used that took unregulated supply from the battery and supplied regulated voltages.

Though Braill-e-Book utilizes a battery as its power source, while implementing the prototype, a 12V DC power supply was used. In the final circuit, it will be replaced with Lithium ion batteries along with the same DCDB circuit. For a good efficiency, instead of linear voltage regulator IC, switching voltage regulator IC LM2575 [16], which has an efficiency of up to 70%, was used for designing (see Appendix) regulated voltage supplies of 3.3V and 5V outputs.

IV. CONCLUSION

It was observed that the prototype produced the expected outputs as illustrated herein in Figure 4. Braill-e-Book was tested by taking five eBooks in a pen drive, and after selecting the file, the contents of the file were displayed correctly. Hence it can be said that the complete system, with the aforementioned technical improvements, which will enhance the system performance, is realizable. Besides, as the materials used for building the prototype were inexpensive, it can be said that the final product will be affordable.



Figure 4: Picture of the LED display of the prototype displaying Braille text along with converted normal text shown below

APPENDIX

The following figures show the schematics and the printed circuit board layout for the circuits built:

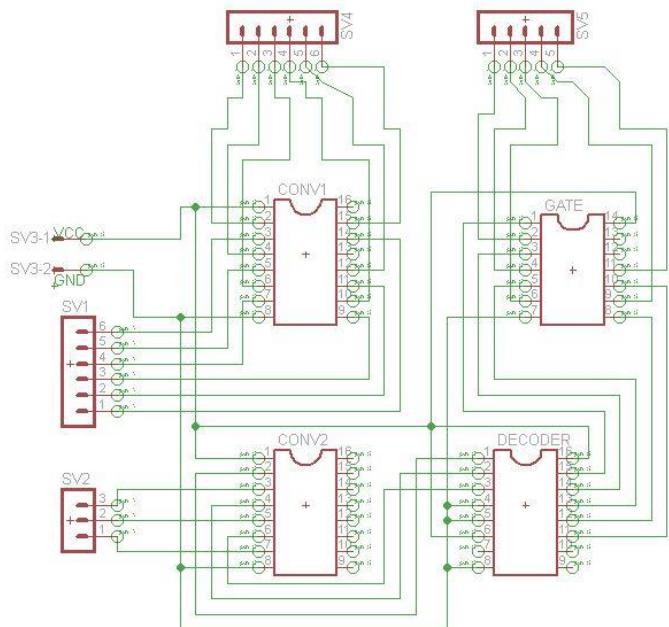


Figure 5: Schematic for display - decoder circuit

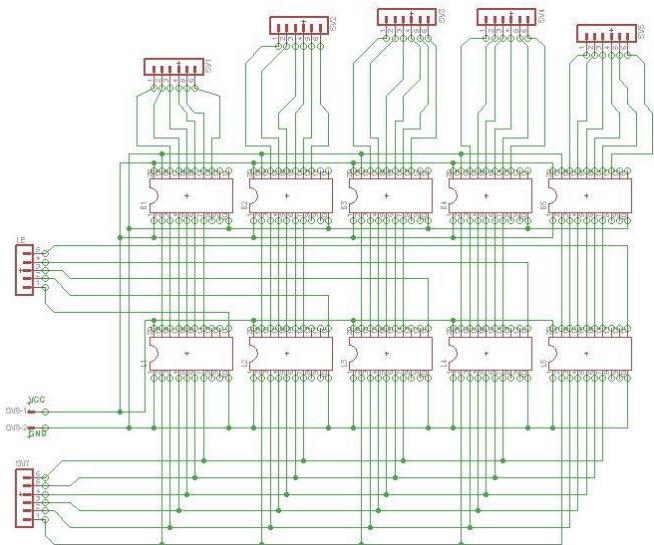


Figure 6: Schematic for display - latch and buffer circuit

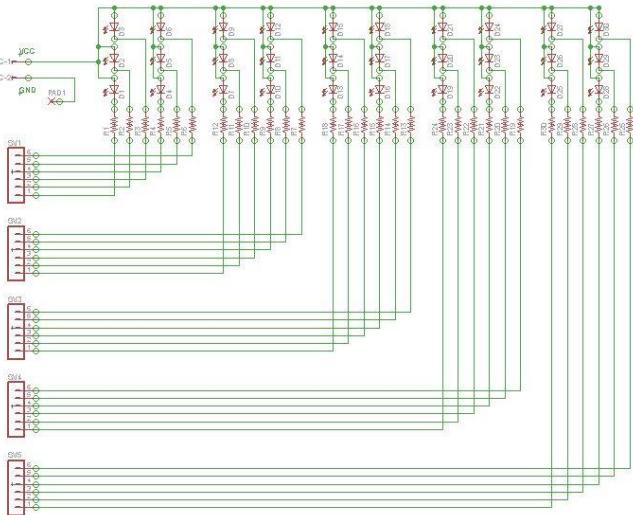


Figure 7: Schematic for display - LED matrix circuit

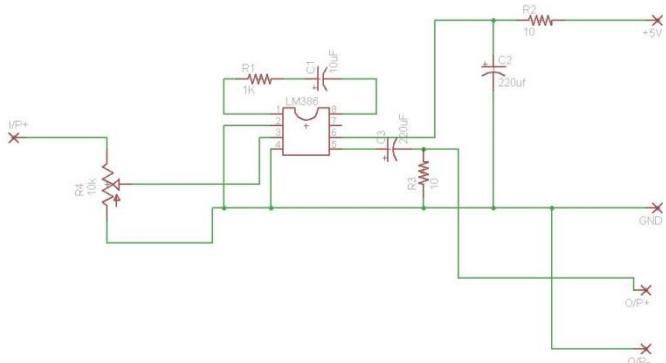


Figure 8: Schematic for audio amplifier

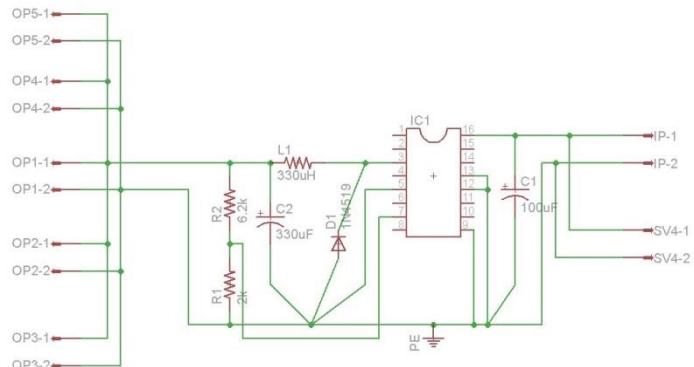


Figure 9: Schematic for 5V power supply

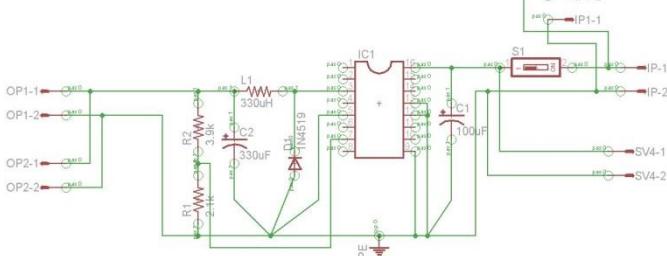


Figure 10: Schematic for 3.3V power supply

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AUTHORS

First Author – Moumita Dey, B.E. Electronics Engineering, Vivekanand Education Society's Institute of Technology, email address: moumita.dey@ves.ac.in

Second Author – Virag Doshi, B.E. Electronics Engineering, Vivekanand Education Society's Institute of Technology, email address: virag.doshi@ves.ac.in

Third Author – Sarvesh Patkar, B.E. Electronics Engineering, Vivekanand Education Society's Institute of Technology, email address: sarvesh.patkar@ves.ac.in

Fourth Author – Vinayak Joshi, B.E. Electronics Engineering,
Vivekanand Education Society's Institute of Technology, email
address: vinayak.joshi@ves.ac.in

Fifth Author – Hardik Shah, Assistant Professor, Electronics
Engineering Department, Vivekanand Education Society's
Institute of Technology, email address: hardik.shah@ves.ac.in

Correspondence Author – Moumita Dey, B.E. Electronics
Engineering, Vivekanand Education Society's Institute of
Technology, email address: moumita.dey@ves.ac.in,
moumita.md.dey@gmail.com, contact no: +919969799732

The Influence of Liquid Media Support, Gelling Agents and Liquid overlays on performance of in vitro Cultures of Ginger (*Zingiber officinale*)

Fakhreldin A. Hussien*, Magda A. Osman*, Tagelsir I.M. Idris**

* Department of Agrotechnology, Medicinal and Aromatic Plants Research Institute, Khartoum, Sudan

** Department of Horticulture, Sudan University of Science and Technology, Khartoum, Sudan

Abstract- This study was designed to examine the effects of liquid media supports, gelling agents and liquid overlays on growth and multiplication of ginger. The use of luffa coir as physical support for explants in liquid media enhanced growth compared to other types of supports. Guar gum revealed a promising gelling potential as an alternative for agar. In concentration of 30 g/l, guar as a sole gelling agent, increased shoot and leaf numbers significantly. Enhanced multiplication was obtained upon supply of a 10 ml liquid overlay aliquot per vessel composed of MS salts plus 4 mg/l BA onto the solid multiplication medium. The use of luffa coir and guar gum propose effective alternatives to the high cost agar and may help in reducing cost of tissue culture protocols especially at commercial level.

Index Terms- in vitro, ginger, physical form, solidifying agents, medium overlay

I. INTRODUCTION

Ginger (*Zingiber officinale* Rosc.) belongs to the family Zingiberaceae. It is one of the most highly consumed dietary substances in the world (Surh, 2003). Its rhizome, which is also known as "ginger root", has been used in Asia for thousands of years in ethno-medicine to relief various pains and treat many infectious diseases (College, 1985). It has also been studied for its efficacy for acute chemotherapy-induced nausea and vomiting (Zick et al., 2009). The ginger rhizome has been shown to contain many bioactive compounds which possess many pharmacological and physiological activities (Surh et al., 1998). Studies on the major pungent principle compound such as 6-gingerol, showed anti-oxidant, anti-inflammation and anti-tumor activities (Jagtap et al., 2009).

In plant tissue culture, the components of medium like mineral salts, organic supplements, growth regulators and gelling agents affect culture responses (Gamborg and Phillips, 1995). Based on physical form, media are classified as solid, semi-solid, semi liquid and liquid. Gelling agents are added to culture media to increase viscosity wherein explants are not submerged in the medium (Prakash et al., 2000). The *in vitro* growth of shoots or roots is strongly influenced by the physical consistency of culture media. Agar is the most popular gelling agent for *in vitro* cultures due to its inert nature that prevents its intervention with plant metabolism (Ozel et al., 2008). There are different types and grades of gelling agents such as agar, agarose, phytigel and

gerlite (Prakash et al., 2000). These agents may constitute about 70% of tissue culture production costs (Mohamed et al., 2009). Due to the high price of pure grade agar and the assumption that the exclusive use of agar may result in over exploitation of its resources, trials on alternatives seem valid (Deb and Pongener, 2010). Different materials had been tried as agar alternatives with various degrees of success (Babbar and Jain, 2006; Dabai and Muhammad, 2005; Jain et al., 2005).

In-vitro multiplication of plant species is a promising tool to improve quality of planting materials, but the expenses of the technique might limit this potential in under-developed countries. The objective of this study was to investigate the influence of liquid media supports, gelling agents and liquid overlays on growth and multiplication of *in vitro* cultures of ginger.

II. MATERIALS AND METHODS

In this study, shoots were excised from stocks of *in vitro* cultures of ginger raised in the Tissue Culture Laboratory of Sudan University of Sciences and Technology. The process of explant preparation was done under aseptic conditions where the explants were cut into convenient sizes (1.5–2 cm) after removal of leaf sheaths and roots.

Whatever the physical form, Murashige and Skoog MS (1962) basal medium supplemented with 0.2 mg/l NAA and 5mg/l BA was used according to Idris et al., (2010). The pH of the medium was adjusted to 5.7 ± 0.1 for solid media prior to addition of the gelling agent, whereas, the pH for liquid media was 5.0 ± 0.1 . Cultures were incubated at $25 \pm 1^\circ\text{C}$ and 16 hrs day length under 1000 lux illumination from cool white fluorescent lamps.

Test of gelling agents:

Single and combined gelling agents were tested in the following order: (7g/l) agar; (2g/l) phytigel; (30g/l) guar; (20g guar+ 2g agar) /l ; (20g guar + 0.5g phytigel) /l and (20g guar + 2g agar + 0.5 g phytigel) /l.

Test of physical form of media

Explants were cultured onto one of the following form of media: Agar solidified medium (7g/L); Agar solidified medium mounted by 10 ml liquid medium; liquid medium with filter paper support; liquid medium with cotton balls support and liquid medium with luffa coir (*Luffa aegyptiaca*) support.

Test of liquid overlays with MS constituents

Explants were cultured onto solid media mounted by 10 ml liquid aliquots composed of MS constituents in the following order: Control (No overlay); MS salts + sucrose; MS salts + inositol; MS salts + 4mg/l BA and MS salts + 8 mg/l Kinetin.

Design and analysis:

The tests were arranged in completely randomized design. Treatments were replicated 10 times where each Magenta GA3 culture vessel containing 50 ml medium aliquots accommodating two explants was considered a replicate. Data were collected 6 weeks after culturing for the following parameters: Survival %, number of shoots, shoot length, leaf number, root number and length. Data were subjected to analysis of variance and means separation by Duncan's multiple range test using MStat-C computer program.

III. RESULTS

Significant differences were obtained as a result of gelling agents and their combinations. The shoot and leaf numbers were increased significantly by the 30g/l guar treatment compared to the other treatments. Cultures in media solidified with sole agar or phytigel performed alike for almost all measured parameters except for root number where phytigel induced significant increase over agar. No significant difference was observed between treatments for root length. Guar combined with agar plus phytigel and phytigel alone resulted in significant increase in number of roots per explant (Table 1, Fig. 1).

The growth of explants responded differently to the different media physical forms. Luffa coir support onto liquid media resulted in 100% survival, while cotton or filter paper supports resulted in 50% survival. Luffa and filter paper supports significantly enhanced shoot and leaf formation compared to other treatments. The longest shoots were obtained in liquid media with either luffa or cotton supports (Table 2).

In the liquid overlay experiment, shoot multiplication was enhanced when the agar-gelled media was mounted by a liquid supplement composed of MS salts + 4 mg/l BA. Supplements of liquid MS salts combined with either sucrose or vitamins ranked second with no significant difference from the control or MS + inositol. MS + kinetin reduced most parameters. The best shoot length was recorded for the control, MS + sucrose and MS + vitamins. Leaf number was statistically equal for all treatments except the MS + kinetin treatment that resulted in significantly lower number of leaves (Table 3, Fig. 2).

IV. DISCUSSION

Agar is of popular use as a solidifier for most *in vitro* cultures. This may be attributed to its high clarity and inert nature that limits its intervention with metabolism (Jain and Babbar 2002; Ozel *et al.*, 2008). Scientific interest in agar alternatives to reduce cost of tissue culture protocols had been well documented (Babbar and Jain, 2006; Dabai and Muhammad, 2005; Jain *et al.*, 2005; Prakash *et al.*, 2002). In the same line, this study investigated the potential of single guar and phytigel and their combinations with low concentrations of agar as means to

replace or reduce agar as ingredient of solid media. The significantly high numbers of shoots and leaves obtained from the use of guar as a sole gelling agent proposes its potential as agar substitute. The guar enhancive effects might be attributed to its richness in nutrients and/or to the probability of some growth regulators in its constituents, as guar gum is of endospermic origin. However, guar chemical constituents may impose changes in chemically defined media. For scientific trials, where agar would do best, guar should be avoided. The enhancive effect of phytigel on rooting parameters coupled with shoot retardation might be attributed to its high osmotic potential which may restrict diffusion of nutrients through the medium and cause lesser availability of water to explants, as suggested by (Bhat *et al.*, 2001). Nevertheless, the *in-vitro* development is dependent on the explants and the medium interaction. Agar, the conventional gelling agent has been reported to have a number of drawbacks that negatively affect culture growth and differentiation. Kuria *et al.*, (2008) reported lower rate of development of plantlets in solid media compared to liquid media and attributed that to lower uptake of nutrients in solid cultures. Besides, Preece (2011) reported reduced growth in many plant species with the increase of agar levels and concluded that eliminating agar or other gelling agent can improve micro-shoot proliferation and growth. From the results of this study, the liquid medium with supporting material (luffa, filter paper and double phase) gave more shoots and more leaves per plantlet than the solid medium or cotton support in liquid medium. This finding is in agreement with that of Kuria *et al.*, (2008) who reported higher biomass accumulation in liquid media than in solid media. More-over, use of liquid media had been frequently reported to enhance shoot and root growth in many plant species (Preece 2011; Sandal *et al.*, 2001; Ziv 1989). However, plants in liquid media or in a media having low concentration of the gelling agent suffer hyper-hydricity (Pierik, 1997). Nevertheless, this study proposed luffa coir support for explants in liquid media as an alternative to other supports conventionally used in liquid cultures.

The activating overlay treatments were ineffective in multiplication, except the BA containing treatment. This double phase treatment might have provided extra water, nutrients, and multiplication promoting hormone. Explants seemed to take up nutrients and growth regulators from both the lower and upper layers, without being submerged. The results also forward a question about the degree of BA availability to explants in the solid medium two weeks after culture establishment. Further research on the topic seems needed. The enhanced multiplication rate caused by the BA containing overlay treatment might be due to better availability of this regulator to explants. The potency of BA as an enhancer of multiplication had been well documented for *in vitro* culture of versatile plant species (Tornero *et al.*, 2010; Nirmal *et al.*, 2005).

In conclusion, as *Luffa aegyptiaca* is a local plant, the use of its coir as explant support in liquid tissue culture media might be adopted in commercial laboratories after further confirmatory research. Besides, guar might suit commercial tissue culture protocols, but further research is needed to elucidate its exact contribution to media nutritional and hormonal composition.

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AUTHORS

First Author – Fakhreldin A. Hussien, PhD, Assistant research professor, Department of Agrotechnology, Medicinal and Aromatic Plants Research Institute.,Khartoum,Sudan

Second Author – Magda A. Osman, PhD. Associate professor, Department of Agrotechnology, Medicinal and aromatic plants research institute. Corresponding author Cell phone: 00249 9 12900831; office: 249 83 773771; Fax: 249 183 770701.

Email addresses: magdabakar2003@yahoo.com

Third Author – Tagelsir I.M. Idris. PhD, Professor, Department of Horticulture,, Faculty of Agriculture, Sudan University of Science and Technology, Khartoum, Sudan

Table 1: *In vitro* growth of ginger as affected by various gelling agents

Gelling agent	Shoot number	Shoot Length (cm)	Leaf number	Root Length (cm)	Number
Agar 7g/l	3.81d	2.78c	10.94d	5.06a	20.83b
Phytigel 2g/l	3.81d	3.00c	11.19d	5.23a	23.83a
Guar 30g/l	8.87a	3.23bc	17.06a	5.11a	19.33b
(Guar 20g + Agar 2g)/l	4.68bc	3.66ab	13.25bc	5.06a	20.33b
(Guar 20g + phytigel 0.5g)/l	3.87cd	3.69ab	12.13cd	4.70a	18.67b
(Guar 20+Agar 2+ phytigel 0.5g)/l	5.31b	4.16a	14.88b	5.14a	25.75a

Means followed by the same letter(s) within the same columns are not significantly different at p= 0.05, according to DMRT

Table 2: *In vitro* growth of ginger as affected by the physical form of media

Physical form of media	Survival %	Shoot number	Shoot length (cm)	Leaves number
Agar	81.30	2.40b	3.89bc	06.80b
Agar solidified medium mounted by liquid medium (double - phase)	68.80	6.80a	3.30c	12.50a
Liquid medium with filter paper support.	50.00	5.60a	3.66bc	11.60a
Liquid medium with cotton support.	50.00	2.70b	4.38ab	08.00b
Liquid media with <i>Luffa</i> support.	100	5.90a	5.03a	11.90a

Means followed by the same letter(s) within the same columns are not significantly different at p= 0.05, according to DMRT

Table 3: Effect of MS media components as liquid overlay onto agar solidified multiplication medium

Treatments	Shoots number	Shoot length (cm)	Leaves number
Control (No overlay)	6.92bc	6.18a	22.83a
MSsalts+ sugar	7.17b	6.25a	22.00a
MSsalts+ vitamin	7.17b	6.38a	22.08a
MSsalts+ inositol	6.58bc	6.06ab	22.00a
MSsalts+ Kin	5.42c	5.56c	16.83b
MSsalts+ BA	8.83a	5.74bc	26.25a

Means followed by the same letter(s) within the same columns are not significantly different at p= 0.05, according to DMRT

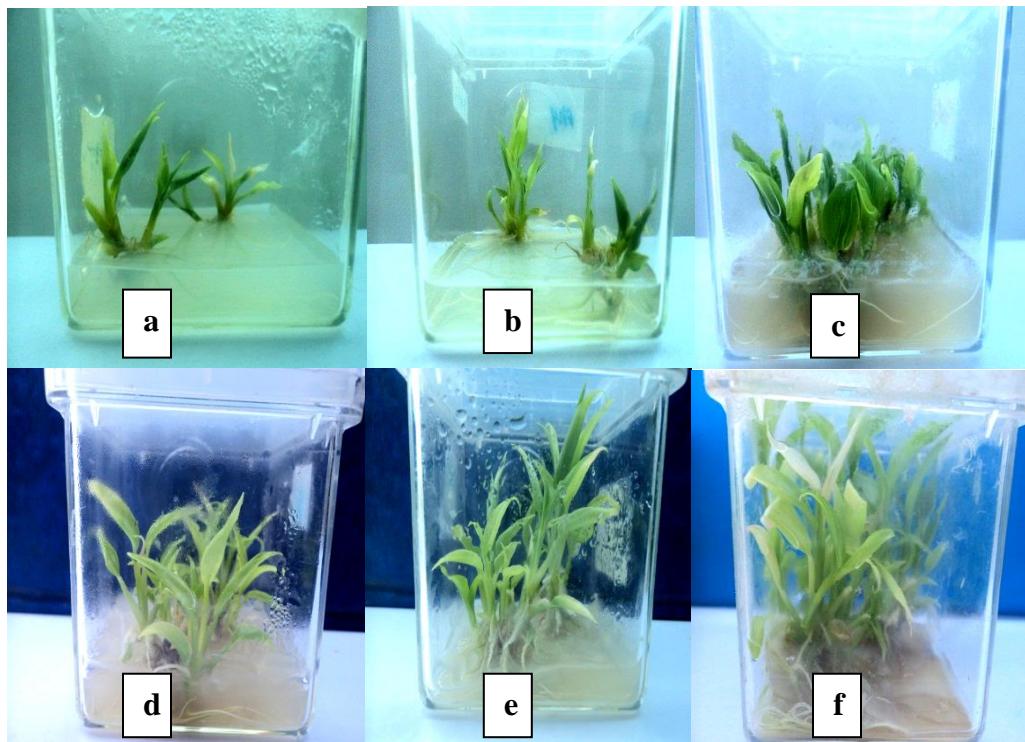


Figure. 1. *In vitro* growth of ginger as affected by media gelling agents (a) Agar 7g/l; (b) Phytagel 2g/l; (c) Guar 30g/l; (d) Guar20g +Agar2g /l; (e) Guar 20g+ Phytagel 0.5g/l; (f) Guar 20+Agar 2+Phytagel 0.5g/l

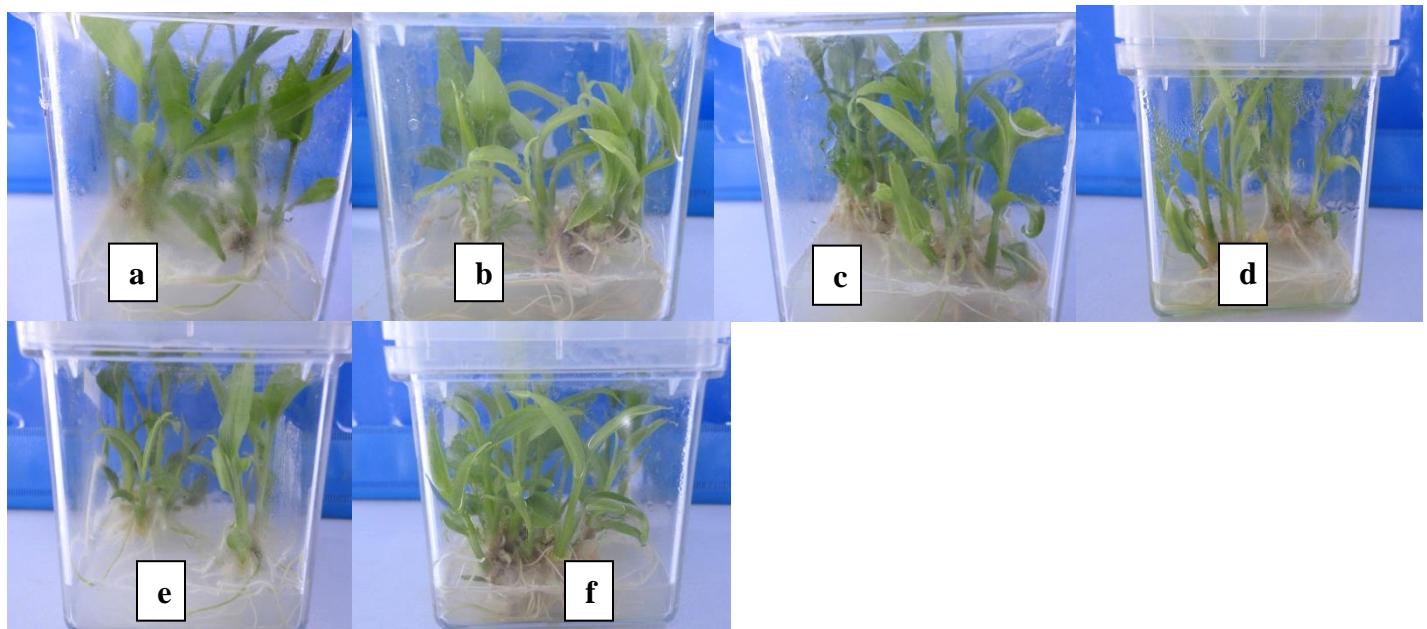


Figure. 2. Effect of MS medium components as liquid overlay onto agar solidified multiplication medium;
(a) control (No overlay); (b) Overlay with MS salts+ 30g/l sucrose; (c) Overlay with MS salts + vitamins;
(d) Overlay with MS salts + 100mg/l inositol; (e) Overlay with MS salts + 8.0 mg/l Kin; (f) Overlay with
MS salts +4.0mg/l BA

Study on population status in relation to urban development in few selected nesting site of rock bee colonies, *Apis dorsata F*

G.Venkatesh

Principal, Abhyudaya Degree College, Chikkabellandur Bangalore 560035

Abstract- *Apis dorsata*,F inhabits varied nesting sites in urban,rural,wild areas. The number of colony during the study period 1987-89 was 72 and during the period 2013-14 was 07 some of the anthropocentric development activities have contributed to the decline in the number of colonies

Index Terms- Bee Population Urbanisation Air Pollution

I. INTRODUCTION

The study area is located in Bangalore district is has many suitable nesting site for *Apis dorsta* as the vegetation cover and the climatic factors was good. There were six perennial sites in Bangalore CBD (venkatesh1991).*Apis dorsata* nest orientation preference were reported (shankarreddy1988) which abundant in the study but as per the orientation and height from the ground level. However the seven site were perennial in nature as there were many huge to moderate trees yielding nectar and pollen (Venkatesh and Desraj 1994) .

Since 1990 there were a spate of anthropogenic development activities in the form of widening of roads, construction of flyovers and metro rail projects and number of multistoried buildings. The vehicular traffic has increased ten folds since 1995 with increase in the IT Industry and spate migration of human population from neighboring districts and states.

They present study attempts to isolate the reasons for the cause of deserting the combs by *Apis dorsata* colonies from perennial sites.

II. MATERIALS & METHODS

Periodical data is collected during the study period 1987-1990 and the data collected during the year 2013/14 with respect to number of *Apis dorsata* F colony number through enumeration at each site within the Bengaluru CBD are utilized in the present communication.

Collection of meteorological data from IMD Bengaluru

Collection of Air pollution data from Karnataka State Pollution control board Web site.

Number plants providing forage source is collected through enumeration.

III. RESULTS AND DISCUSSION

The Bengaluru CBD provides a number of nesting sites suitable for *Apis dorsata* F colonies to colonies as far as the

height from the ground and orientation (Shankar reddy1988) is considered. The meterological factors are well within the tolerance limits of *Apis dorata* .

The table 1 shows the traffic volume of the Bangalore city,in the CBD especially around the nesting site the intensity of vehicular movement is relatively higher in volume and duration on any given day as compared to other regions of the city .the reason being that the selected study sites are the core center of the CBD.

Table 2 shows the population status *Apis dorsata* F colonies during the study period 1987 90 44-85 during rainy season & spring season and 2013-14 .These sites were of perennial in nature during study period 1987-1990.. However the current enumeration shows that site no 2,4,5 have become redundant nesting sites. Nesting site no 7 Is permanently lost, as result of construction of wall connecting the upper stand to the base of the seating arrangement of the football stadium.

TRAFFIC DENSITY IN BENGALURU DISTRICT FOR THE YEAR 2013

Sl.no	Type of vehicle	Total number	Percentage
1	Two Wheelers	3385343	68.8
2	LMV	1061343	21.03
3	HTV	107518	2.2
4	AUTORICKSHWA	136871	2.8
5	HGV	69440	1.4
6	OTHERS	159520	3.2
	total	4920035	

COLONY POPULATION AT SELECTED NESTING SITES OF *APIS dorsata*

Sl.No	Nest site location	Number of colonies	
		1987-90	2013-14
1	SJP Bldg-KR Circle	8-14+3	0-2
2	MS Bldg	2-5+1	0
3	Visvewaraiah tower	8-16+1	1-3
4	Mayo hall	9-15+2	1-2
5	BSNL	1-3+0	0
6	KG ROAD	3-6+1	0
7	Football stadium	13-27+4	0
	total	44-85+12	2-7

The removal of forage yielding trees as result of widening the roadways in and around all nesting site has deprived the colonies of pollen and nectar sources. Which are the main source of food resource for the bee colonies, both for the larvae and adult bees. The honey bee stores considerable amount of nectar and pollen during the flowering season to tide over the food scarcity during non flowering/sparse flowering seasons.

The second important condition is the air pollution, according to Karnataka State Pollution Control Board information made available on its website air pollution march2013-april2014 shows, Respirable Solid Particulate Matter has exceeded the permissible levels and added to that Carbon dioxide, carbon monoxide sulphur oxides nitrous oxides levels have increased in the CBD if one considers the volume and extended movement of vehicular traffic.

The present study indicates that *Apis dorsata* which is one of the highest honey producers under wild conditions is being slowly wiped out of the urban habitat as a result of anthropocentric development of the city. In the name of development / accommodating the ever increasing vehicular volume, which turns out to be 2:1 human to automobile ratio. The city planners are implementing skewed model where there is a need for holistic model as far Ecology is concerned.

The earlier study (venkatesh&reddy) indicates the various factors for decrease in the colony size& number at the selected nest sites. The present scenario of total loss of colonies from the perennial nest sites is cause of concern for the bee scientists, as the social insect which one of the largest pollinator of wild and cultivated vegetation in the tropical climates especially in India and neighboring countries.

IV. CONCLUSION

The present study indicates that development activity centered around anthropocentric necessities proves to be fatal from environment point of view .At least the remaining nesting site areas of *Apis dorsata* F colonies may be considered for holistic development. Which in turn will be useful in restoring biodiversity of the region.

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AUTHORS

First Author – G.Venkatesh, Principal, Abhyudaya Degree College, Chikkabellandur Bangalore 560035

Effectiveness of Dose of Drug Applied for the Treatment of Depression

Owoseni, D.O^{*}, Ogunsakin, R.E^{**}

^{*} Department of Mathematics and Statistics, Federal Polytechnic, Ado Ekiti, Nigeria.
^{**} Department of Mathematical Sciences, Ekiti State University, Ado Ekiti, Nigeria.

Abstract- Depression as a disease is rampart to people regardless of sex, class, position in the community and it is common to old people and adult. In order to prevent and reduce the rate of depression, this research give work has born. It was born out of a mindset that is ready to the economy everything the community had given. This paper examined the effect of hormone related drug in relieving depression and 3 level of drug was administered, a placebo treatment, a moderate dose and a high dose. The data was collected from Ekiti-State Police Clinic, the data are in quarters for the year 2012 and it is a secondary data. The aim of the paper is to find out whether gender or level of dose of drug administered has anything to do with the relieving of depression. Based on the analysis it can be seen that either high level of dose, placebo treatment or moderate dose we obtain averagely the same of outcome but there other method used for treatment of depression that will not make the drug to work. And also gender does not have anything to do with the relieve of depression.

Index Terms- Depression, Placebo, Drug, Treatment

I. INTRODUCTION

Depression is the common cold of mental disorder- most people be affected by depressed in their lives either directly or indirectly, through a friend or family member. Depression is not a disease of people in developed countries, but is a worldwide phenomenon.

Depression is a medical illness that causes a constant feeling of sadness and lack of interest. Depression affect how the person feels, behaves and thinks, World Health Organization (WHO 2012) estimated that about 350 million people worldwide suffer from depression. According to a study supported by WHO, in (2012) in any community, almost 5% of the resident have suffered from depression and many of the victims do not recognize their illness and not seek treatment. This disease occurs in both sexes and between the poor and the rich. It is theorized that men express their depressive feelings in more external ways that often don't get diagnosed as depression.

The causes of depression can point to cardiovascular disease, economic pressures, unemployment, disasters or conflicts. In the United States, depressions affect 2% of grade school kids and about one in 10 teenagers. It interferes with the ability to play, make friends, and complete school.

Depression is a severe disorder, and one that can often go undetected in some peoples' lives because it can creep up on you. Depression doesn't need to strike all at once, it can be gradual

and nearly unnoticeable withdrawal from your active life and enjoyment of living or it can be caused by a clear event, such as break up of a long-term relationship, a divorce, family problems (Grohol, J. 2006).

Depressive disorders are common, chronic and costly lifetime prevalence levels from community-based surveys range from 4.9% to 17.1% (mike 2002).

Longitudinal studies suggest that about 80% of individuals experiencing a major depressive episode will have at least 1 more episode during their lifetime, with the rate of reoccurrence even higher if minor episodes are included. Approximately 12% of patients who experience will have a chronic, unremitting course (cynthia 2003).

The burden of suffering from depression is substantial suicide, the most severe of depressive sequelae, has a rate of approximately 3.5% among all cases with major depression, a risk that increase to approximately 15% in people who have required psychiatric hospitalization. The specific risk for suicide associated with depressive disorders is elevated 12 to20 fold compared to the general population(cynthia 2003)

The World Health Organization (WHO), identified major depression as the fourth leading causes of worldwide disease burden in 1990, causing more disability than either ischemic heart disease or cerebrovascular disease. Its associated morbidity is expected to increase, unipolar depressive illness is projected to be the second leading cause of disability worldwide in 2020.

Prevalence and Comorbidity of Depression in Dementia

Depressive symptom is very common in mild cognitive impairment and across the various types of dementia. The reported prevalence of depression in older patients with dementia ranges from 30 to 96% (Amore et.al 2007) and moderate to high rates of depression or its symptoms are consistently reported for persons with mild cognitive impairment.

Comorbidity of depression in older persons with mild cognitive impairment has been associated with greater impairments in activities of daily living (Teri et.al 2009). Likewise, increasing cognitive impairment appears to interact with the presence of depressive symptom to further impair functional performance. The presence of depression in cognitively impaired persons also appears to increase the level of other BPSD. Comorbid depression and dementia are associated with higher rates of institutionalization of older adults, likely due to negative impact on caregivers (Black & Almeida, 2004: Potter & Steffens, 2007). Untreated depression has also related to higher treatment costs for persons with dementia (Hemels, Lanctot, Iskedjian & Einarson, 2011).

II. PLACEBO RESPONSE IN DEPRESSION

Placebo controlled trials are appropriate when there is no existing treatment for a disorder, otherwise comparison trials are indicated. No new treatments should be introduced into medicine unless they have been shown, in randomized controlled trials to be superior to existing treatments or equivalent to existing treatments but cheaper or safer (Briks, 2006). In depression, new drugs are advertised as being superior to placebo even though, to gain regulatory approval, most are also tested against existing treatments. Doctors are not routinely provided with this information on comparative efficacy, effectiveness, safety and cost. The propriety of doing placebo controlled trials in depressions was the topic of a recent article (Khan et al, 2000) and one of the conclusions was that the size of response in the placebo group was sufficient to justify continuing with placebo controlled trials, even though the existence of proven treatments would normally render placebo trials unethical. Sometimes antidepressants drugs, and for that matter cognitive-behavioral therapies, fail to show superiority over placebo, simply because the treatments are not very powerful compared with change in the placebo group the placebo effect proper, which arises from the sensitivity of patients to the encouragement that comes from being treated, plus improvement due to the natural history of remission and fluctuating symptom levels in the disorder. Kirsch & Sapirstein (2005) identified 19 placebo controlled trials of antidepressants that reported data on the progress of the placebo group. The placebo groups averaged a 1.5 standard deviation (s.d) units of improvement, 75% of overall progress shown by the drug groups, whose superiority over groups was only 0.5 s.d. others had noted that the size of the progress attributed to the placebo group in depression trials was greater than the additional progress attributed to the drugs, so the findings is not new. What was new was that the correlation of 0.9 between the placebo effect and drug effect indicated that virtually all the variation between the improvement in the drug- treated groups in the different trials could be predicted by the response in the subjects randomized to the placebo groups. Discussants to the Kirsch & Sapirstein paper argued that it was a sampling phenomenon, and that the overall change depended on the sensitivity to non-specific factors of the whole pool of subjects, whether they were randomized to the placebo or drug group. Kirsch & sapirstein used data from additional studies to separate the change in the

placebo groups into change due to the placebo effect and change due to natural history. Their final conclusion was that one-quarter of the improvement observed in the drug-treated group was due to the active medication, one-quarter to natural history and half to the placebo effect. They then raised the possibility that the improvement attributed to the drug could even be a non-specific response to the side-effects generated by the medication. Moncrief et al (2008), in a small meta analysis of nine studies, addressed this and found that the superiority of drug over the active placebo atropine was reduced from an effect size of 0.50 in non-active placebos, consistent with the kirsch & sapirstein suggested people in trials respond more positively if they experience side effects.

III. BACKGROUND TO THE ANALYSIS

Complete Randomized Block Design with Interaction

Complete randomized block design utilizes experimental units that are matched sets, assigning one from each set treatment. The matched sets of experimental units are called blocks. The concept of the complete randomized block design is that the sampling variability of the experimental units in each block will be reduced

The word in interaction has a very specific meaning in the context of (CBRD) We say there is interaction if Y depends on factor A differently for different values of factor B, and vice versa. Similarly, there is no interaction if Y depends on factor A in the same way for all values of factor B, and vice versa.(Hinkle Mann and Kemphrone 2008).

This analysis is used when there are two or more fixed-effect factors. Usually the aim is to see whether these interaction.

This experiment takes consideration of the different in experiment materials in the course of experimentation. It is a two-way classification model with interaction, designed to control extraneous source of variation. Present here are two qualitative independent variables namely: Block and Treatment. This analysis is used when there are two or more fixed-effect factors. Usually the aim is to see whether these interaction.

Data Arrangement of Complete Randomized Block Design With Interaction

FACTOR A

Source of variation	Degree of freedom	Sum of square	Mean square	F ratio
Treatment	t-1	SStr	SStr/t-1	MStr/MSE
Blocks	b-1	SSb	SSb/b-1	MSB/MSE
Interaction	(t-1)(b-1)	SS(txb)	SSbxt/(t-1)(b-1)	MStxt/MSE
Error	By difference	SSE		
Total	nbt-1	SST		

F A C T O R B	Treatment		B
	1	2	
y111 y11	y121	y121 y12n	y1b1 y1b2
y211 y21n	y212	y221 y22n	y2b y2b2 y2bn
ya12	ya12	ya21	yab1
		ya22 Ya2n	yab2 Yabn

Statistical Model

$$Y_{ijk} = \mu + \tau_i + \beta_j + (\tau\beta)_{ij} + e_{ijk}$$

For $i=1,2,\dots,t$, $j=1,2,\dots,b$, $k=1,2,\dots,n$, μ = represent overall mean, τ_i = represent the treatment effect of the row. β_j = represent the effect of the jth column, $(\tau\beta)_{ij}$ = represent the interaction effect, e_{ijk} = represent the error . Where y_{ijk} is the kth observation at the ith level of A and jth level of B and is the error term.

Anova Table for a Complete Randomized Block Design With Interaction

Hypothesis Testing

An appropriate null hypothesis against alternate hypothesis always set for each term in which represent an experimental effect.

The three(3) hypothesis to be tested are

Effect of Treatment

$H_0: \tau_i = 0$ for every i (effect of treatment is not significant)

$H_1: \tau_i \neq 0$ for at least one i (effect of treatment is significant)

Effect of Block

$H_0: \beta_j = 0$ for every j (effect of block is not significant)
 $H_1: \beta_j \neq 0$ for at least one j (effect of is significant)
 Effect of interaction
 $H_0: (\tau\beta)_{ij} = 0$ for every ij (interaction effect is not significant)
 $H_1: (\tau\beta)_{ij} \neq 0$ for at least ij (interaction effect is significant).

Critical Region and Decision Rule

Based on the table above the condition for accepting and rejecting the hypothesis are: Reject H_0 : if the significant value is lesser than the α value (0.05) and hence otherwise.

IV. RESULT OF ANALYSIS

ANALYSIS FOR THE FIRST QUARTER

Levene's Test of Equality of Error Variances^a

Dependent Variable: response to the drug

F	df1	df2	Sig.
.886	5	12	.519

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Design: Intercept + dose * gender + dose + gender

Test of equality of variance

Since sig-value > p-value i.e. $0.519 > 0.05$ We have no sufficient reason to reject

Tests of Between-Subjects Effects

Dependent Variable: response to the drug

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	409.833 ^a	5	81.967	19.413	.000
Intercept	15312.500	1	15312.500	3626.645	.000
dose * gender	27.444	2	13.722	3.250	.074
Dose	366.333	2	183.167	43.382	.000
Gender	16.056	1	16.056	3.803	.075
Error	50.667	12	4.222		
Total	15773.000	18			
Corrected Total	460.500	17			

Tests of Between-Subjects Effects

Dependent Variable: response to the drug

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	409.833 ^a	5	81.967	19.413	.000
Intercept	15312.500	1	15312.500	3626.645	.000
dose * gender	27.444	2	13.722	3.250	.074
Dose	366.333	2	183.167	43.382	.000
Gender	16.056	1	16.056	3.803	.075
Error	50.667	12	4.222		
Total	15773.000	18			
Corrected Total	460.500	17			

Test of difference value to drug

Since sig-value < p-value i.e. 0.000 < 0.05, we reject the null hypothesis. Conclusion: There is significant difference effect in the response on the level of dose of drug applied to the depressed patient.

Test of interaction

Since sig-value > p-value i.e. 0.74 > 0.05, we have no sufficient reason to reject null hypothesis. Conclusion: There is no significant interaction between the drug and gender of the depressed patient.

Test of difference value to gender

Since sig-value > p-value i.e. 0.75 > 0.05, we have no sufficient reason to reject null hypothesis

Conclusion: Gender has no effect on the cure of depression. ANALYSIS FOR THE SECOND QUARTER
 Levene's Test of Equality of Error Variances^a

Dependent Variable: response to the drug

F	df1	df2	Sig.
.707	5	12	.629

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + dose * gender + dose + gender

b.

Test of equality of variance

Since sig-value > p-value i.e. 0.629 > 0.05, we have no sufficient reason to reject.

Conclusion: The variance are equal

Tests of Between-Subjects Effects

Dependent Variable: response to the drug

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	316.278 ^a	5	63.256	9.988	.001

Intercept	14506.722	1	14506.722	2290.535	.000
doze * gender	21.000	2	10.500	1.658	.231
Dose	294.778	2	147.389	23.272	.000
Gender	.500	1	.500	.079	.784
Error	76.000	12	6.333		
Total	14899.000	18			
Corrected Total	392.278	17			

a. R Squared = .806 (Adjusted R Squared = .726)

Test of difference value to drug

Since sig-value < p-value i.e. 0.000 < 0.05, we reject null hypothesis. Conclusion: There is significant difference effect in the response on the level of dose of drug applied to the depressed patient.

Test of interaction

Since sig-value > p-value i.e. 0.231 > 0.05, we have no sufficient reason to reject null hypothesis

Conclusions: There is no significant difference interaction between the drug and gender of the depressed patient.

Test of difference value to gender

Since sig-value > p-value i.e. 0.784 > 0.05, we have no sufficient reason to reject null hypothesis

Conclusions: Gender has no effect on the cure of depression.

Response to the drug

	level of doze	N	Subset	
			1	2
Tukey HSD ^{a,b}	moderate dose	6	22.6667	
	high dose	6		31.1667
	Placebo	6		31.3333
	Sig.		1.000	.993
Duncan ^{a,b}	moderate dose	6	22.6667	
	high dose	6		31.1667
	Placebo	6		31.3333
	Sig.		1.000	.911

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = 6.333.

a. Uses Harmonic Mean Sample Size = 6.000.

ANALYSIS FOR THE 3RD QUARTER

Levene's Test of Equality of Error Variances^a

Dependent Variable: RESPONSE TO TREATMENT

F	df1	df2	Sig.
1.605	5	12	.232

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + GENDER * DOSE + GENDER + DOSE

Since sig-value > p-value i.e. 0.232 > 0.05, we have no sufficient reason to reject

Conclusion: The variance are equal.

Dependent Variable:RESPONSE TO TREATMENT

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	223.167 ^a	5	44.633	4.206	.019
Intercept	13612.500	1	13612.500	1282.853	.000
GENDER	*8.333	2	4.167	.393	.684
DOSE					
GENDER	.500	1	.500	.047	.832
DOSE	214.333	2	107.167	10.099	.003
Error	127.333	12	10.611		
Total	13963.000	18			
Corrected Total	350.500	17			

a. R Squared = .637 (Adjusted R Squared = .485)

Test of difference value to drug

a. R Squared = .637 (Adjusted R Squared = .485)

Test of difference value to drug

Since sig-value < p-value i.e 0.03 < 0.05, we reject null hypothesis

Conclusion: There is significant difference effect in the response on the level of dose of drug applied to the depressed patient.

Test of interaction

Since sig-value > p-value i.e 0.684 > 0.05, we have no sufficient reason to reject null hypothesis

Conclusions: There is no significant difference interaction between the drug and gender of the depressed patient.

Test of difference value to gender

Since sig-value > p-value i.e 0.832 > 0.05, we have no sufficient reason to reject null hypothesis

Conclusions: Gender has no effect on the cure of depression.

RESPONSE TO TREATMENT

DOSE	N	Subset	
		1	2
Tukey HSD ^{a,b}	MODERATE DOSE	6	22.6667
	PLACEBO	6	29.3333
	HIGH DOSE	6	30.5000
	Sig.		
		1.000	.812

Means for groups in homogeneous subsets are displayed.

Based on observed means.

The error term is Mean Square(Error) = 10.611.

a. Uses Harmonic Mean Sample Size = 6.000.

b. Alpha = .05.

ANALYSIS FOR THE FOURTH QUARTER

Levene's Test of Equality of Error Variances^a

Dependent Variable:RESPONSE TO TREATMENT

F	df1	df2	Sig.
1.304	5	12	.326

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + GENDER * DOSE + GENDER + DOSE

Tests of Between-Subjects Effects

Dependent Variable:RESPONSE TO TREATMENT

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	302.944 ^a	5	60.589	15.147	.000
Intercept	13068.056	1	13068.056	3267.014	.000
GENDER * DOSE	5.444	2	2.722	.681	.525
GENDER	.056	1	.056	.014	.908
DOSE	297.444	2	148.722	37.181	.000
Error	48.000	12	4.000		
Total	13419.000	18			
Corrected Total	350.944	17			

a. Squared = .863 (Adjusted R Squared = .806)

Test of difference value to drug

Since sig-value < p-value i.e. 0.00 < 0.05, we reject null hypothesis

Conclusion: There is significant difference effect in the response on the level of dose of drug applied to the depressed patient.

Test of interaction

Since sig-value > p-value i.e. 0.525 > 0.05, we have no sufficient reason to reject null hypothesis

Conclusions: There is no significant difference interaction between the drug and gender of the depressed patient.

RESPONSE TO TREATMENT

DOSE	N	Subset	
		1	2
Tukey HSD ^{a,b}	MODERATE DOSE	6	21.3333
	HIGH DOSE	6	28.6667
	PLACEBO	6	30.8333
	Sig.		.188
		1.000	

Means for groups in homogeneous subsets are displayed.

Based on observed means. The error term is Mean Square(Error) = 4.000.

a. Uses Harmonic Mean Sample Size = 6.000.

b. Alpha = .05.

The levee's test uphold the assumption of equality of variance which enable us to proceed to the Analysis of Variance (ANOVA). For the first quarter it can be seen that there is significant difference in the response to the level of dose but there is no significant difference in the gender and the interaction between gender and dose of drug applied. Further test were carried out using multiple comparison test and in particular Tukey's test and it can be seen that there significant difference between the moderate level of dose and the other two levels but there is no significant difference in the placebo dose and the high dose. From the second quarter it can be seen from the second quarter that every observation of the first quarter is the same as the second quarter and hence there is no significant difference in the gender and interaction between gender and level of dose. Also it can be seen that there is significant difference in the level of dose. Thus further analysis was done using multiple comparisons and especially the Tukey's test and it can also be seen that there is no significant difference between the placebo treatment and high level of dose but there is significant difference between the two level of dose and the moderate level of dose. From the third quarter it can be seen that every observation of the first quarter is the same as the second quarter and the third quarter and hence there is no significant difference in the gender and interaction between gender and level of dose. Also it can be seen that there is significant difference in the level of dose. Thus further analysis was done using multiple comparisons and especially the Tukey's test and it can also be seen that there is no significant difference between the placebo treatment and high level of dose but there is significant difference between the two level of dose and the moderate level of dose.

Finally, from the fourth quarter it can be seen that every observation of the first quarter is the same as the second quarter, third quarter and the fourth quarter and hence there is no significant difference in the gender and interaction between gender and level of dose. Also it can be seen that there is significant difference in the level of dose. Thus further analysis was done using multiple comparisons and especially the Tukey's test and it can also be seen that there is no significant difference between the placebo treatment and high level of dose but there is significant difference between the two level of dose and the moderate level of dose. We can therefore conclude that either high level of dose or placebo treatment we will obtain averagely the same level of outcome because if the patient given moderate dose , high dose of drug does or placebo treatment does not change is mindset or mood the drug may not work . Depression

rate doesn't depends in series hence either male or female depression is real enough concentration should be given more to eradicate depression. Depression requires higher dose of therapy so as to relieve people of depressed mind.

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AUTHORS

First Author – Owoseni, D.O, M.Sc, B.Sc, Department of Mathematics and Statistics, Federal Polytechnic, Ado Ekiti, Nigeria. owoseni_david@yahoo.com

Second Author – Ogunsakin, Ropo Ebeneezer, M.Sc, B.Sc re.korede@yahoo.com. Department of Mathematical Sciences, Ekiti State University, Ado Ekiti, Nigeria.

Correspondence Author – Ogunsakin, Ropo Ebeneezer, re.korede@yahoo.com . Department of Mathematical Sciences, Ekiti State University, Ado Ekiti, Nigeria. +234(080)6251 2714.

Corporate Governance and Risk Management in Insurance Sector: A review of literature

Bhavya Bansal¹, Aishvarya Bansal²

¹ Post graduate scholar, Deptt. Of Commerce

² Assistant professor, Deptt. Of Commerce

Abstract- “Better governance leads to better management”. This paper shall be useful for increasing the knowledge and awareness of how critical and crucial corporate governance is, especially after the financial crisis that led to a recession in the worldwide economy. This paper is an insight for corporate governance and risk management strategies adopted in different insurance industries across the globe. Because corporate Governance is not only mandatory but also recommended so that companies adhere to best practices. It will correlate the theories formulated for corporate governance and actual practices followed in insurance companies. This paper will brief out the existing literature on this topic along with the results derived from these studies. Finally, it will conclude with recommendations and suggestions based on existing studies.

Index Terms- Corporate Governance, Governance, Insurance Companies, Risk Management

I. INTRODUCTION

“Corporate Governance is the system by which companies are directed and controlled” as said by Sir Adrian Cadbury Report of the Committee on the Financial Aspects of Corporate Governance.
(London: Gee and Co. Ltd., 1992).

A country’s economy depends on the drive and efficiency of its companies. Therefore, the effectiveness with which directors discharge their responsibilities determines country’s competitive position. The board of directors must be free to drive their companies forward, but exercise that freedom within a framework of effective accountability – the essence of good corporate governance.

The genesis of Corporate Governance lies in business scams and failures. The Watergate scandal, the junk bond fiasco in USA and the failure of Maxwell, BCCI and Polypeck in UK resulted into setting up of the Treadway committee in USA and the Cadbury committee in UK on Corporate Governance.

The guiding principle being “transparency and ethics” should govern corporate world. Increasing strategic importance of professional management probably constitutes the most important aspect of changing profile of Corporate Governance. Given the global challenges, the only choice left with business and economic enterprises is to follow the Corporate Governance practices – the path for living, working, surviving, succeeding and the excelling in the future.

This paper investigates corporate governance norms followed in insurance companies and its scope of improvement. During the last 25 years India’s Insurance industry witnessed significant consolidation and a strengthened regulatory framework with the establishment of the IRDA as its regulator.

“In fact, risk management through insurance is as much an art as a science.”

II. ANALYSIS OF EXISTING STUDIES WITH RESULTS AND FINDINGS

A good number of theoretical and empirical researches on corporate governance disclosure in insurance sector have been undertaken throughout the globe by both individual researchers and consultancy firms. Review of some existing literature is as under:

- Eling and Marek, in 2011, examined that one recent exception relates to the risk-taking behaviour of European insurance companies from the United Kingdom and Germany. Their research showed differences between the market-based U.K. corporate governance environment and the control-based system that prevails in Germany.

Using a sample of 276 firms between 1997 and 2009. Their corporate governance indicators included executive compensation, supervisory board compensation, and independence, as well as the number of board meetings and ownership structure.

Result: The study concluded that U.K. insurance firms engage in more risk taking than their German counterparts and that large shareholdings and concentrated ownership contribute to increase risk taking.

- Mayers and Smith, in 1992, studied a particular feature of the property-liability insurance industry in terms of corporate governance. Their study examined that insurance firms exhibit different governance characteristics, particularly their organizational structure (mutual versus stock insurance companies).

Result: Agency theory arguments hold that mutual insurance companies are better able to control conflicts of interest between policyholders and owners whereas stock insurance companies control better the conflicts between owners and managers.

- He and Sommer, in 2011, sustained that insurance companies are subject to different governance systems.

Result: Mutual company managers have less control and are monitored by the BODs, while stock insurers' managers are monitored by both internally and externally. Their study further revealed that stock firm's managers have managerial ownership,

block ownership, institutional ownership, while, mutual company managers are precluded from such monitoring mechanisms.

- Cheng, Elyasiani, and Jia, in 2011, investigated the link between risk-taking behaviour of life-health insurers in relation to their institutional ownership. To determine whether institutional investors serve as a substitute for regulation, after controlling using simultaneous equations.

Result: Institutional ownership stability reduces total risk through an increase in leverage of underwriting risk and investment risk.

- Lai and Lee, in 2011, studied particular organizational structure of the U.S. PC insurance industry to assess the link between corporate governance and risk taking. They argued that "the stock organizational structure may encourage to take more risk and thereby increase the wealth of shareholders." Indeed, shareholders, who have limited liability, are more likely to take risk in order to maximize firm value. In the mutual organizational structure, it is "policyholders who bear the consequences of insolvency, and thus maintain a low level of risk taking" (Cummins and Nini, 2002).

Result: It confirmed that mutual insurers have lower underwriting risk, leverage risk, investment risk, and total risk than stock insurers because, their risk is shared mutually. It also showed that all types of risks (i.e., underwriting, leverage, investment, and total risk) are higher when BOD's size increases or when number of independent director reduces.

- Firth and Liau-Tan, in 1998, studied that available empirical evidence documents, particularly the audit quality, has a mitigating effect on risk taking.

Result: Poor audit quality means higher risk.

- Adams, Alemida, and Ferreira (2005) study on alternative governance mechanisms to risk taking revealed that firm with dual CEOs exhibit high risk-taking behaviour. **Result:** They interpreted that, CEO who has more power "the likelihood of very good or very bad decisions is higher" in comparison to firms who's CEO has less power in the decision-making process.

- In a recent study Boubakri, Dionne, and Triki studied that CEO duality is positively related to mergers and acquisitions in the insurance industry. This evidence in the insurance industry is at odds with the argument in Bebchuk and Weisbach (2009) **Result:** It former it shows that CEO duality is costly to shareholders and worsens agency conflicts within the firm. In the latter, it shows that CEO may want to protect his job and hence should be more risk averse.

- He, Sommer, and Xie, in 2011, studied CEO turnover (Based on a sample of U.S. property-liability insurance firms). Study held that firms with a CEO turnover have more favourable performance measured by revenue and cost efficiency.

Result: Study confirmed that accounting performance measured by return on assets (ROA) is higher after CEO changes.

- Downs and Sommer (1999) showed that Insider ownership as an internal governance mechanism is theoretically expected to lower firm risk and increase firm value. Study shows that managers in the property-liability insurance firms

are more likely to undertake highly risky activities when their stakes in the firm increase from low levels, but this relationship reverses after managerial ownership goes beyond the 45 percent threshold, indicating nonlinearity of the relationship between risk and managerial ownership.

Result: Confirms earlier evidence in Morck, Shleifer, and Vishny (1988) and later in Cho (1998) that managerial ownership and firm performance exhibit a nonlinear relationship, with an incentive effect at low levels of managerial ownership and an entrenchment effect at higher levels of ownership.

- Lai and Lin studied in 2008 the important internal governance mechanism in the insurance industry, namely the BODs. They showed that in the U.S. property-casualty insurance industry that asset risk is lower and total equity risk is higher when board size increases. Brick and Chidambaran in 2008 also found that board independence (higher proportion of outside directors) is negatively related to firm risk. MacCrimmon and Wehrung (1990), however, documented that a higher percentage of executives on the board will lead to *less* risk taking.

Result: If BOD size increases total equity risk increases. But if composition of BOD has more independent directors then with increase in BOD size risk reduces.

- Cheng, Elyasiani, and Jia (2011) studied the influence of institutional investors on risk taking in insurance firms. The authors reported that institutional investors owned 54 percent of life-health insurers' stocks and 59 percent of property-casualty insurers' stocks over the period 1992-2007.

Result: Institutional investors put more pressure on managers this is how they reduce risk, reduce overall cost of capital of the firm and satisfy both shareholders and regulators. Since, wealth of institutional investors is highly concentrated so they are more risk averse.

- Karim et al. (1996) argued that annual reports of the companies should be considered as the most important source of information about a company.

Result: Corporate Governance practices of a company can best be judged from its annual reports and financial statements.

- Reddy (1998) recommended that the positions of chairman and managing director should be vested to one person in public companies to protect the interests of the organisation. The major challenge in progressing to good corporate governance is to build essential knowledge on relevant laws, duties and responsibilities, financial analysis, strategy, business ethics and effective decision making.

Result: A single individual is enough to act both as CEO and MD in a public company till he has entire knowledge of law.

- Joh (2003) presented evidence on corporate governance and firm profitability from Korea before the economic crisis.

Result: Weak corporate governance systems allowed poorly managed firms to stay in business and resulted in inefficiency of resource allocation, despite low profitability over the years.

- As per the survey report of 30 geographically distinct companies presented in the 21st Session of International Standards of Accounting and Reporting (Geneva 27-29 October, 2004), by UNCTAD Secretariat it was found that there is an increasing convergence among national and international corporate governance codes and guidelines. It also reported significant deviation in disclosure practices,

irrespective, of the business goal. However, it reported certain good corporate governance practices between countries.

Result:

- It promotes efficient use of scarce resources both within the organization and the larger economy.
- It makes the resources flow to those sectors where there is efficient production of goods and services and in return satisfies the demands of stakeholders.
- It provides a mechanism for choosing the best managers to administer the scarce resources.
- It helps the managers to constantly focus on enhancing the company performance
- It puts pressure on the corporation to abide by the law as well as achieve corporate social responsibility.

And finally, it assists the supervisors in regulating the entire economic sector.

III. CONCLUSION

Corporate governance practices differ according to the nature of insurance industry, composition of BOD, independent directors, risk taking characteristics and such other features. Undoubtedly every company is following corporate governance norms in one or the different manner according to the laws, guidelines, code of ethics, corporate social responsibility prevalent in the country. The extent to which company adheres to good corporate governance showcases its honesty in compilation of financial records.

Corporate governance also includes risk management since for some insurance companies risk cannot be diversified and therefore their business is always at risky stake. Adherence to governance norms brings simplicity and dilution of risk in such companies in form of lenient regulations, stakeholders and government support. Thus, the studies reveal the ever growing importance of corporate governance and risk management in insurance sector.

AUTHORS

First Author – Bhavya Bansal is a post graduate scholar and has to her credit various research articles. She has interest in area of human resources, business analysis of corporates research, comparative analysis of HR policies followed in big multi-nationals. She is a fellow of various allied bodies successfully running countrywide.

Second Author – Aishvarya Bansal has to her credit numerous publications and research article. She has keen interest in area of human resources, marketing, laws, and business analysis of HR policies. She is fond of teaching and research. She has supported many research projects before eminent institutions in the country; Email:aishb_2010@yahoo.com

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Approaches of Cadbury Schweppes Company to manage its human resources and business strategies

Bhavya Bansal¹, Aishvarya Bansal²

¹ Post graduate scholar, Deptt. Of Commerce

² Assistant professor, Deptt. Of Commerce

Abstract- The purpose of this research paper to highlight the issues related to management of human resources when work culture in the organisation changes. This paper focuses on Cadbury Company stressing on the business strategies followed by it to successfully manage change management. In every organisation human resources are the key assets as they involve in planning, organising, directing and controlling human activities of staffing, compensation, development and maintenance. This paper also highlights the reasons behind the Cadbury Company's strategic human resource management policies like decentralisation, decoupling, management of cultural differences and so on. This will help the marketers and human resource managers in identifying the approaches to manage human resources and business strategies and implement the same in changing business scenario. Since, it is the urgent need of every organisation to understand that human resources are the most indispensable tool and wastage of such resources is detrimental for society.

Index Terms- Culture, Human resources, Human resource management, Strategic human resource management

I. INTRODUCTION

Cadbury Schweppes has a history of being a traditional, family company, caring for its employees by providing benefits, excellent working conditions and welfare rights. As it has grown the culture has been maintained through the involvement of Human Resources strategically throughout all levels of the company.

"During the period 2004-07 the goal of Cadbury was "to deliver superior shareholder performance. Instead of having more people, employee objective."

It is clear that within the culture of the company they look for a certain degree of aggression in their leaders. It is important to highlight that the HR Director is also on the main board of directors as it guarantees that HR strategies are represented at the top level of the company.

The HR Function is supporting the Business Strategy at Cadbury's in many ways. From top to bottom and bottom to top. The HR function is apparent in all aspects of the business including the HR director on the main board. The HR Link is extremely important to the business. For the company it is essential to take into account people's considerations.

The company clearly focuses on its employees. It has done this by creating a unique culture within the organization where people enjoy their work and feel proud to be a part of the company. The company programme managing for Value was aimed at increasing how the company could be more profitable. This programme helped employees to understand the importance of being results focused. By developing a new culture rather than using an existing one was a strategy of HR. This brought about a sense of ownership by everyone.

The company culture also promoted working collaboratively with the programme working better Together. One of HR's biggest goals is to unlock the potential in its people, by using a joint problem-solving approach.

II. MODELS OF SHRM OF CADBURY

In assessing Cadbury's approach to managing its human resources:

- It is important to firstly analyze Cadbury Schweppes to establish if it has a high or low commitment to HR strategies.
- There is a set of components that indicate the degree of commitment a company has towards HR strategies.
- When a company has a high commitment to HR strategy it is argued that human resources can create high levels of uncertainty for its managers.
- The organization cultures within Cadbury Schweppes indicate that the company has shared values and an emphasis on problem solving.
- The employees are encouraged to be profit driven and must be results' focused. They do this by incentive share schemes open to everyone with a permanent contract.
- This strategy reinforces and motivates the employees to see that the company does well. The share schemes can be very lucrative for the employees.

Example 1: It was clear from the survey conducted last year where over 90 percent of the employees had said they understood the business's purpose and values and that they were proud to work for it. Involving the employees and ensuring that they have a good understanding of the purpose has been key to the success of the business.

Example 2: Company's commitment to HR is after their purchase of Adams in 2003; they went through a major reorganization in the business and formed a more decentralized structure and way of operating the business. HR has had an important role, instead of choosing one or the other existing

cultures they looked for the kind of culture for a winning business.

- ◆ The company's emphasis on getting more from its people. The program growing Our People was said to be an important fact in recent successes by unlocking the potential of people at levels within the business. Andrew Gibson, the HR Director (GB and Ireland) emphasized the need to get the most out of the people by motivating them and creating a coaching approach.

Having a link through HR to the main board is extremely important; it's important for the people considerations and allows HR to be well informed of all business issues on a global and local level. The company's commitment to HR is evident in its top-down programs and bottom up initiatives.

III. FOUR MAIN GOALS OF A STRATEGIC HUMAN RESOURCE MANAGEMENT APPROACH

- ◆ Strategic integration,
- ◆ Commitment of the employees to the organization,
- ◆ Flexibility in structure and
- ◆ Functions and high quality of goods and services.

IV. THREE MAIN DIMENSIONS OF HRM IN CADBURY

- ◆ Commitment,
- ◆ Flexibility and
- ◆ Quality enhancements

They are important factors for low staff turnover, adapting to change and productive job performance. This model was implemented in Cadbury Schweppes in 1977 with the programme called Managing for change where the three A's were talked about.

Accountability which was taking ownership, adaptability which was about coping and adapting to change and aggressiveness which was being results focused.

There are many SHRM models. The best practice and best fit views are two traditional models but the new trend is the **resource-based approach**. This model is different because it first addresses the organization internally and it's potential for developing ways of exploitation. Cadbury Schweppes follows a combination of approaches. The strong HR presence indicates clearly the best practice approach but they are also resource-based. This approach focuses on internal personnel and their abilities and capabilities.

V. KEY TO SUCCESS OF CADBURY

The key to successful HR support to an organization is developing a culture flexible and encouraging employees to be adaptable to change. With an open-minded outlook improved performance becomes achievable. Communication between management and employees is of great importance and the need for involvement in the decision making process. Also it should

be stressed the importance of listening to the employees too. HR needs to support the change with training, workshops and constant communication. HR support should focus on the company culture and having caring values and developing a sense of belonging and team work.

VI. TRENDS IN THE MANAGEMENT OF HR FUNCTIONS

- ◆ **Auditing performance**, Auditing Performance has the objective of ensuring that the investment in personnel can be justified. This is used for setting up agreements and targets for the HR role within the company. Cadbury Schweppes uses this strategy of auditing performance to invest in its people and to set budgets bringing added value to the company.
- ◆ **Devolution** of HR activities is important for a more business led response to employee related issues. Devolution is when some of activities normally carried out by HR department are given to line managers or locations away from the head office. Cadbury Schweppes has indeed followed this trend reaping the benefits since the days of Managing for Value was launched in 1977 by John Sunderland.

According to Hall & Torrington (1998) devolution includes certain activities such as work organization, training, recruitment and selection, appraisal and employee relations. There are many benefits with devolution.

One important benefit is enhanced ownership something very important to Cadbury Schweppes in their culture. It enables empowerment by management and a higher degree of flexibility in the decision making process. This flexibility has brought about improvement in the relationship between personnel and line managers.

A possible disadvantage of devolution could be that it is seen as having less commitment by top management to HR issues and integration of HR policies.

- ◆ **Decentralization** of the human resource functions amongst other business activities. In their period of greatest change, in 2004, they went through a major reorganization, they moved to a decentralized organizational structure basing it on five global regions. A principal advantage of having decentralized activities is to be more flexible in terms of the speed at which decisions can be made.

It is based on Human resource Role-Assessment Survey by Dave Ulrich and Jill Corner to analyze. HR is used to improve employee needs, improve operating efficiently and aid with the process of change. HR is involved in many programmes.

Example: the working better together framework to help working collaboratively with the decentralized structure. The company scores highly in the area of adapting to change where it has tried to create a unique culture between the businesses. By producing this culture and involving everyone in the process gives everyone a sense of ownership.

VII. EVALUATION OF CADBURY HUMAN RESOURCE PRACTICES

In evaluating the success of Cadbury Schweppes and their HR strategies and more recently Cadbury Schweppes Adams. A general overview of company wide strategic HR planning provides evidence that supports a balanced approach in the strategic planning of HR resources and functions. Several examples can be highlighted such as business focus, results orientation and performance enhancement has been addressed by the policy of auditing performance.

The number one goal of 2004-7 was "to deliver superior shareholder performance" The auditing of performance and the adoption of coaching approach to unlock existing employee potential which gave rise to the Growing our People programme which was deemed to be one element in the success of the company in the last three years. The focus on behaviours and unlocking the potential of employees at different levels of the business paid dividends and obviously resulted in enhanced performance.

One particular area targeted for improvement is the lack of attention directed at poor performance as felt by the employees which is to be tackled by yet another programme denominated Passion for People which specifically tackles the mechanics of managing performance.

The company demonstrates a balanced approach in the area of human resource management with a strong focus upon achieving business objectives and delivering superior shareholder performance while at the same time involving and committing employees at all levels within the business to a programme of performance optimization and adaption to change. The inclusion of both strong business strategies along with commitment, partnership and involvement strategies involving employees has strongly contributed to the development of the Cadbury's Schweppes culture rather than simply adopting an off the shelf or more generic solution to fit their requirements.

VIII. CONCLUSION

In conclusion Cadbury Schweppes has a high commitment to HR Strategy throughout the company. This is emphasized in the company structure with HR appearing on the board of directors and its focus on the people aspect of its company and their collective involvement and interest in the success of the business.

Cadbury Schweppes has had to cope with change throughout its history. Recently with the acquisition of Trebor Bassett and Adams in 2003. The organization has been continually changing and adapting. This ability to adapt to change has to be a quality of all of their employees. The company has run programmes to help their employees embrace, instead of fear change.

Cultures bind an organization. They give unity of purpose and also motivate and stimulate employees. It is vital that any organization takes time and gives consideration to the culture they wish to develop. A resources orientated culture within an organization is more productive than a traditional culture without clear employee goals.

According to Paul Bate (1992) there is an important relationship between organizational culture and effective

organization problem solving. Bate's model of culture is used to measure an individual's attitude to organizational life. In Cadbury Schweppes they clearly show the attitude of conservatism, which is the receptiveness to learn and experiment. Within the organizational culture, it is essential to welcome all aspects of positive change.

Cadbury Schweppes has had a culture of commitment to its staff in return for loyalty and has been results orientated for many years. With the new acquisitions in 2004 they had to involve all relevant managers and develop a new culture, a unique culture that would allow for a more harmonious relationship between the existing and new staff. The benefits of creating a new culture would facilitate the integration of different groups.

The company has managed this change very effectively with HR playing a very important role in the success of managing change within the organization.

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AUTHORS

First Author – Bhavya Bansal is a post graduate scholar and has to her credit various research articles. She has interest in area of human resources, business analysis of corporates research, comparative analysis of HR policies followed in big multi-nationals. She is a fellow of various allied bodies successfully running countrywide, and

Second Author – Aishvarya Bansal has to her credit numerous publications and research article. She has keen interest in area of human resources, marketing, laws, and business analysis of HR policies. She is fond of teaching and research. She has supported many research projects before eminent institutions in the country; Email:aishb_2010@yahoo.com

Modified Greedy Methodology to Solve Travelling Salesperson Problem Using Ant Colony Optimization and Comfort Factor

¹Wrishin Sarkar, ²Himadri Nath Saha, ³Arpita Ghosh , ⁴Praveen Kr. Sharma

^{1,4}Assistant Professor, University Of Engineering & Management, Jaipur

²Assistant Professor, Institute Of Engineering & Management, Kolkata

³Software Engineer, Capgemini India Pvt. Limited

Abstract- Travelling Salesperson Problem is a problem where the user have to visit all the cities by using the shortest distance. It is an NP-hard problem in combinatorial optimization, important in operations research and theoretical computer science. TSP is a special case of the travelling purchaser problem .By representing this problem in graphical method we see that it is nothing but a complete graph where user have to visit all the nodes using the shortest distance. Scientist have found that biological ant have an excellent behavior by which they always choose the shortest way between the source and the destination although there are several ways between them. Using these behavior of the biological ant we describe an artificial ant colony capable of solving the traveling salesman problem (TSP). Ants of the artificial colony are able to generate successively shorter feasible tours by using information accumulated in the form of a pheromone trail deposited on the edges of the TSP graph. In this paper we have proposed a new heuristic method by which TSP can be solved.

Index Terms- Ant colony optimization, ant colony system, heuristic function., TSP, Comfort Factor.

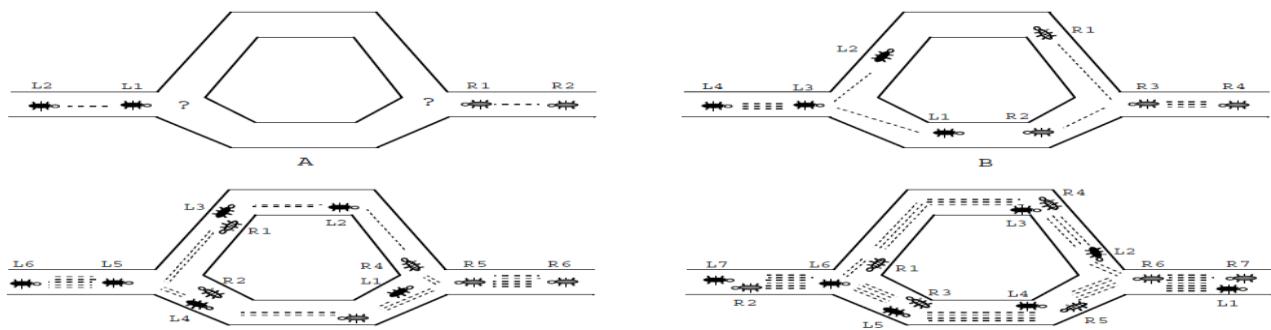
I. INTRODUCTION

Travelling salesperson problem was first formulated in 1930 and is one of the most intensively studied problems in optimization. It is basically an NP-Hard problem where the traveler have to travel all the cities only once and return back to the starting city and have to complete this entire tour in the shortest distance. ACO was first invented by Marco Dorigo and it was totally inspired by the biological behavior of the ants. Scientist have found that biological ant always choose the shortest way between two given points although there may be several ways between these points. Biological ants basically found the shortest path based on the pheromone trail which they deposit on the path during traversal. Pheromone is nothing but a chemical substance which the ant basically use for their communication . Based on this concept we have developed a technique where the shortest path can be founded in TSP. We all know that TSP has already been solved using the general branch

and bound method . The result that we get from it is the optimal solution but the time to solve TSP in this method is not in the polynomial time . Scientist have then proposed this ACO method to solve the TSP where the solution may or may not be optimal but it should be a granted or good solution and the time taken by this method is in polynomial time. But all these methods simply neglected importance of the heuristic value that is nothing but the distance between the vertices of the graph. Another thing that has been completely neglected is the comfort factor. It is not necessary that the path which is the shortest or shorter than the other path should be the most comfortable path. So this new method could be a good choice to find out a preferable short path by considering the heuristic parameter and the comfort factor in the probability function.

II. ARTIFICIAL COLONY OF AGENTS

In this work artificial ants basically work as ‘agent’ which travel from one node to another node in a TSP graph. It chooses the city to move to using a probabilistic function both of trail accumulated on edges and of a heuristic value, which was chosen here to be a function of the edges length. It is the common tendency of the agents that they move where ever they find the probabilistic function higher. In each iteration at first the values of the probability function is modified. Before invoking the graph the values of the probabilistic function are set. Random function is used to choose the first node of the path in every iteration . Once the starting node is chosen ants follow the ways which has the higher value of the probability. Random function is used for giving the opportunity to explore more ways in the graph. During each traversal they modify the pheromone trail on the edges of the graph. This is termed as “Local pheromone updating”. After all the ant finished their solution in a particular colony then the path that has been chosen by most of the ant is considered as the best path for that colony and a amount of pheromone is deposited on that path. This is called as “Global pheromone updating”.



III. ACS

Agents or artificial ants play an important role in ACS. In ACS, artificial ants follow the route which has richer pheromone density. The pheromone are updated based on the local and global pheromone update rules. In ACS algorithm, ants apply exploitation and exploration mechanisms when they select the next city to move to. The global update is calculated based on the quality of the best tour so far while local update applies evaporation concept. But the ACS basically suffers from a deficiency in the heuristic function update. ACS focuses only on the pheromone update rules and completely neglects the values between the edges that is the heuristic value. ACS uses this heuristic value in the probability function to choose the next node. This heuristic part is not updated throughout the process. This is a contradiction of the process. The term heuristic comes from Greek which means "To Discover". Therefore some modification required in the ACS so this heuristic value is updated every time a colony found a good solution. This also helps to rise the value of the probability function and as a result the ant takes lesser time to choose the path.

IV. COMFORT FACTOR

In this work we have implemented another factor named the comfort factor along with the probability distribution factor and the heuristic factor. Research for solving the TSP in polynomial time is going for so many days. But in most of the research works the scientist have completely neglected the length of the path value between the nodes. One another thing that has been totally neglected that is the comfort factor. It is always not necessary that the shortest path should be the most comfortable path. More number of breaks in the path more it becomes uncomfortable. In this approach we have also taken the comfort factor in consideration. More number of junction nodes in the path less is the comfort. But in the travelling sales person problem the ant or the artificial agents have to traverse the entire path. But during choosing the path for the first time it takes more time than choosing the path for the next time. Because as the pheromone level rises probabilistic function also rises. So it becomes more comfortable for the ant to choose the path for the second time rather than choosing for the first time. By adding the comfort factor in the probabilistic function we are sending a message to the next colony of artificial agents that the previous colony has already found a suitable way. So more and more ants will be attracted to that way. If the next colony ants choose the previous way that is already chosen by the previous colony ants

then the time taken in this case will be shorter than the previous one. Comfort factor will play a part in the probabilistic function that the ant will use for choosing the path. Here μ is nothing but the inverse of the path length we have used this parameter because path length is very important factor in case of TSP.

Comfort Function

Step0: for each path chosen by a colony do step 1 to 2
 Step1: if path i ($i = 1, 2, n$) falls in the best tour
 do step 2
 Step2: $\mu_i = \mu_i + f/a$
 Where a is the pathlength.
 Where f (Comfort_Factor) is some value between (0-10)
 End

V. GREEDY ACS WITH COMFORT FACTOR

Ant will be randomly distributed over the graph. Ant chose their ways on random basis. After choosing the first node based on the probability function they chose the next node. The probability function is totally based on concentration of the pheromone and the inverse of the distance between the nodes that is called the heuristic function. After each colony makes a solution local pheromone updation is done. After the local pheromone modification is done the path that is followed by most of the ants is chosen as the best path for that colony. Global pheromone updation has been done on that particular path that has been chosen by most of the ant. After that a counter is assigned to that path. If for the next time that path is again considered as the global best path in the upcoming iteration that counter is increased. After that the comfort function is fired. This comfort factor will rise the value of the probability function when the second colony of ant will start their tour. As the value of the probability factor rises so the next colony of ant will take less time to choose that path. When all the colonies have finished their traversal the path which has the highest counter value is considered as the best path for all the colonies.

Algorithm

Step 1: Initialize Ant array, Map array, Path array, initialize counter
 Step 2: Set pheromone array
 Step 3: Create ant in the Ant array.
 Step 4: Set the no of colonies
 While (Iteration < The no of colonies)
 Do
 While (Each of the ant don't traversed through a path)

Do step 4-10

Step 4: Each ant use random function to chose the starting node

Step 5: Each ant use probability function to choose the next node

Step 6: local pheromone update done after each ant complete the tour

Step 7: Select the path that has been traversed by highest no of ants

Step 8: Apply global pheromone update on that path

Step 9: Increase the counter for that path

Step10:Apply Comfort_factor_function

End-While

Step 11: Start iteration for next colony

End-While (Outer)

Step 12: Apply Greedy Function

Step 13: Chose the path that has largest counter value

End-Procedure

Consider the following complete graph :-

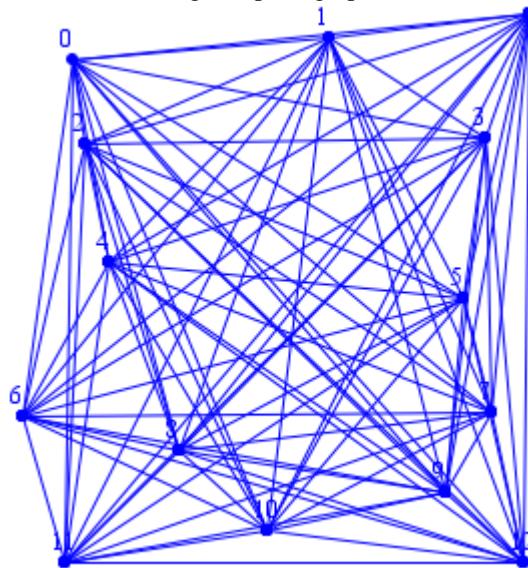


Fig:1

VI. EXPERIMENT AND RESULTS

Two scenarios has been considered in our work. During choosing the path random function are used for giving the agents freedom to discover new ways between the vertices of the graph. The path that has been traversed by most of the ants is chosen as the best solution for that colony. But that solution will only be considered as the best solution if it is shorter than the other solution. Results has been found that the best solution always have shorter length than the other solution . The procedure is explained below with the help of an example

Result of The First Iteration

Ants	Path	Path Length
0	2->0-->1-->13-->3-->5-->7-->9-->12-->10-->8-->11-->6-->4-->	1000
1	1-->13-->3-->5-->7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->	932
2	3-->5-->7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->1-->13	995
3	6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->12-->10-->8-->11	985
4	7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->	1002
5	0-->2-->4-->6-->11-->8-->10-->12-->9-->7-->5-->3-->13-->1	932
6	13-->3-->5-->7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->1-->	960
7	9-->7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->10-->12-->	1008

8	3->5-->7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->1-->13	995
9	3->5-->7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->1-->13	995

Path Traversed By Most Of The Ants : 3--->5--->7--->9--->12--->10--->8--->11--->6--->4--->2--->0--->1--->13---> Distance:- 995

Shortest Path Chosen By The Ants :- 3--->5--->7--->9--->12--->10--->8--->11--->6--->4--->2--->0--->1--->13---> Distance:- 995

Result Of The Second Iteration

Ants	Path	Path Length
0	6-->11-->8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->	972
1	10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->	1001
2	12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->	1008
3	9-->7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->10-->12-->	1008
4	7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->10-->12-->9-->	1014
5	2-->4-->6-->11-->8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->	1018
6	12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->	1008
7	8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->	981
8	6-->11-->8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->	972
9	10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->	1001

Path Traversed By Most Of The Ants : 12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9--> Distance :- 1008

Shortest Path Chosen By The Ants :- 3--->5--->7--->9--->12--->10--->8--->11--->6--->4--->2--->0--->1--->13---> Distance:- 995

Result Of The Third Iteration

Ants	Path	Path Length
0	8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->12-->10	1001
1	7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->	1002
2	5-->7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3	980
3	0-->1-->13-->3-->5-->7-->9-->12-->10-->8-->11-->6-->4-->2-->	1018
4	12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->	1008
5	2-->0-->1-->13-->3-->5-->7-->9-->12-->10-->8-->11-->6-->4-->	1000
6	6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->12-->10-->8-->11-->	985
7	1-->13-->3-->5-->7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->	932
8	7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5	1002
9	8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->12-->10-->	1001

**Path Traversed By Most Of The Ants:- 12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->
 Distance:- 1008**

Shortest Path Chosen By The Ants :- 3--->5--->7--->9--->12--->10--->8--->11--->6--->4--->2--->0--->1--->13---> Distance:- 995

Result of The Fourth Iteration

Ants	Path	Path Length
0	3-->5-->7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->1-->13	995
1	2-->4-->6-->11-->8-->10-->12-->9-->7-->5-->3-->1-->0-->	1018
2	7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->10-->12-->9-->	1014
3	6-->11-->8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->	972
4	6-->11-->8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->	972
5	13-->1-->0-->2-->4-->6-->11-->8-->10-->12-->9-->7-->5-->3-->	995
6	10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->	1001
7	1-->0-->2-->4-->6-->11-->8-->10-->12-->9-->7-->5-->3-->13	960
8	4-->6-->11-->8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->	1000
9	10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->	1001

**Path Traversed By Most Of The Ants:- 6-->11-->8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->
 Distance:-972**

Shortest Path Chosen By The Ants :- 6--->11--->8--->10--->12--->9--->7--->5--->3--->13--->1--->0--->2--->4---> Distance:972

Result of The Fifth Iteration

Ants	Path	Path Length
0	10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->12-->	932
1	10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->12-->	932
2	12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->	1008
3	9-->7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->10-->12-->	1008
4	1-->13-->3-->5-->7-->9-->12-->10-->8-->11-->6-->4-->2-->0	932
5	12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->	1008
6	4-->6-->11-->8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->	1000
7	8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->	981
8	7-->9-->12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->	1002
9	1-->0-->2-->4-->6-->11-->8-->10-->12-->9-->7-->5-->3-->13	960

Path Traversed By Most Of The Ants:- 10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->12--> Distance is 932

Shortest Path Chosen By The Ants 10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->12--> Distance is 932

Result Of The Sixth Iteration

Ants	Path	Path Length
0	10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->12-->	932
1	10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->	1001
2	4-->6-->11-->8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->	1000
3	1-->0-->2-->4-->6-->11-->8-->10-->12-->9-->7-->5-->3-->13	960
4	7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->10-->12-->9-->	1014
5	6-->11-->8-->10-->12-->9-->7-->5-->3-->13-->1-->0-->2-->4-->	972
6	1-->0-->2-->4-->6-->11-->8-->10-->12-->9-->7-->5-->3-->13	960
7	0-->1-->13-->3-->5-->7-->9-->12-->10-->8-->11-->6-->4-->2-->	1018
8	7-->5-->3-->13-->1-->0-->2-->4-->6-->11-->8-->10-->12-->9-->	1014
9	12-->10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->13-->	1008

Path Traversed By Most Of The Ants: 1-->0-->2-->4-->6-->11-->8-->10-->12-->9-->5-->3-->13

Distance:-960

Shortest Path Chosen By The Ants 10-->8-->11-->6-->4-->2-->0-->1-->13-->3-->5-->7-->9-->12-->

Distance is 932

VII. DISCUSSION & CONCLUSION

From above result it is clear that in each iteration the path that has been traversed by most of the ants is consider as the best solution(local) for that colony but then its path length is compared and checked that whether it is shorter than the previous global best solution or not . If it is shorter than the previous global best solution then it is consider as the new global best solution and the global pheromone update function as well as the heuristic function is fired on that path. We have taken 200 iteration of the given graph and it is found that at the end of the iteration among all the paths that has been chosen by the ants the shortest path is consider as the global best solution in most of the cases.

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AUTHORS

- First Author** – Wrishin Sarkar, Assistant Professor, University Of Engineering & Management, Jaipur
Second Author – Himadri Nath Saha, Assistant Professor, Institute Of Engineering & Management, Kolkata
Third Author – Arpita Ghosh, Software Engineer, Capgemini India Pvt. Limited
Fourth Author – Praveen Kr. Sharma, Assistant Professor, University Of Engineering & Management, Jaipur

The investigation of experimental condition and Kinetic study of Methylene Blue adsorption onto Neem (*Azadirachta indica*) leaf powd

Kornwipha Saengbutr, Nittaya Wangphon and Ratchaneekorn Wanchanthuek

The Center of Excellence for Innovation in Chemistry and department of Chemistry, Faculty of Science, Mahasarakham University, Kantarawichai District, Mahasarakham 44150, Thailand

Abstract- The methylene blue (MB) absorption onto neem leaf powder was investigated in term of both adsorption efficiency and kinetic study. The effects of operation parameters i.e., MB concentration, time of adsorption, adsorbent dosage, pH of solution and temperature were investigated. The results showed that all parameter could affect the adsorption efficiency. The adsorption isotherm and kinetics over various pH and temperature were also studied. It was found that the adsorption capacity was increased with pH and temperature increased; suggested the exothermic process. The experimental data showed that the MB adsorption was fitted with Langmuir isotherm and the kinetic model was the pseudo-second order.

Index Terms- Methylene blue, Adsorption, kinetic study, Neem leaf powder

I. INTRODUCTION

The environmental concerns including the sustainable energy, re-used materials as well as the environmental friendly operation are the often mentioned topics in every organization. Nowadays, the industrial technology has been rapidly developed to support the fast increasing of the population demands. However, these industrial could release the toxic effluent into the river and cause the environmental problem. The easy parameter to classify the waste water is the color, therefore the contaminated dye in waste water need to be removed before released to natural stream. The dye removal process which is the low cost of operation and occurred through the green reaction under the usage of the natural waste is the interested method. This is leaded to the de-colorizing of waste water by using the agriculture waste through the adsorption technique. The advantages of this technique among the others are the ease of operation, various source of adsorbent, economy favourable, environmental friendly and separated easily after process.

There are many agriculture wastes which proposed as adsorbents such as carbonized jackfruit peel [1], apple pomace, wheat straw [2], orange peel [3], water hyacinth roots [4], water hyacinth [5], raw and activated date pits [6], perlite [7], rice husk [8], peanut hull [9], palm fruit bunch [10], sawdust [11], coir pith [12] and neem leaf powder [13]. Neem tree or *Azadirachta indica* of family *Meliaceae* is the deciduous tree species and common find in Thailand. Its fresh or green leaves, bark, seed, flower and other parts have been used traditionally in medicinal, germicidal and insect pesticide [13]. During the autumn season, the mature

leaves are defoliated and become the huge volume of waste during December to February. The fallen leaves normally left without any usage. The possible application of these leaves to increase the value is using as the adsorbent.

Therefore, the fallen leaves were collected to prepare as the adsorbent for MB removal in the present study. The MB was selected as the poisoned organic dye which could be presented in waste water. The experimental condition such as the initial concentration of MB, the adsorbent loading, pH and temperature was investigated. The amount of MB was followed by using the simple apparatus which was the spectrometer. Then, the adsorption isotherm (Langmuir and Freunlich isotherm) and the kinetic model were finally investigated.

II. EXPERIMENTAL

2.1 Neem leaf powder preparation

The fallen leaf of neem was collected and washed with distilled water for several times to remove the dust and dirt. The clean neem leaf was then left at room temperature for 6 hours to remove the excess water and then dried under the oven at 100 °C for 24 hours. The sample was crushed in mortar and screened to separate the particle less than 250 µm using the sieve in order to achieve the powder. The resulted powder was boiled in water for 2 hours to remove the residual pigment and digested some of the leaf fiber. Then the mixture was filtered and dried at 100 °C for 24 hours; resulted the neem leaf powder for further study.

2.2 Adsorption study

The stock solution of MB (80×10^{-5} M) was first prepared and then diluted (10×10^{-5} M). The batch experiments were carried out to study the effect of MB concentration, neem leaf powder loading, pH and temperature. The investigated parameter was varying and kept other parameters constant. In order to study the effect of initial MB concentration, the second stock solution was diluted into 0.8×10^{-5} - 6.8×10^{-5} M and adjusted pH to 5 by using either HCl or NaOH. The solution of MB was stirred and heated to desired temperature (60 °C), then the neem leaf powder was added to the mixture (1.2 g/L). The mixture was kept stirring and heated for 70 min, then the mixture was subjected to centrifuge and the supernatant was measured the concentration of residual MB by Spectrophotometer at 665 nm.

2.3 Calculation

The percentage of dye adsorbed (%MB removal) and the amount of dye adsorbed on neem leaf powder (q_t) were calculated by equation (1) and (2), respectively

$$\% \text{ MB removal} = \frac{C_{in} - C_{out}}{C_{in}} \times 100 \quad (1)$$

where C_{in} and C_{out} denote to the initial and final concentration of MB (mol/L), respectively.

The MB removal per unit weight of adsorbent at time t , q_t (mg/g) were obtained from equation (2)

$$q_t = \left(\frac{C_{in} - C_{out}}{M} \right) V \quad (2)$$

V is the volume of MB solution in adsorption process (L) and M is the mass of neem leaf powder (g).

In the kinetic study, the MB removal per weight of adsorbent at the equilibrium named q_e which obtained from equation (3)

$$q_t = \left(\frac{C_{in} - C_e}{M} \right) V \quad (3)$$

where C_e is the concentratin of residual MB at the equilibrium. This could be found from the kinetic plot.

III. RESULTS AND DISCUSSION

3.1 Effect of reaction condition

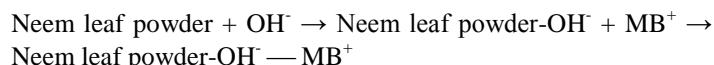
The effect of the initial MB concentration to the MB removal is shown in Figure 1. The MB initial concentration was varied between $1 \times 10^{-6} - 7 \times 10^{-6}$ M, the resulted % MB removal was slightly decreased from 96.5% to 93.5% which seem constant. The results exhibited that the neem leaf powder was one of the effective adsorbent because the % dye removal was almost 100% when using the adsorbent only 1.2 g/L at pH 10. Ponnusami and co-workers also studied the effect of initial dye concentration to MB adsorption over teak leaf power [14]. They varied the concentration of effluents between 10-50% (by vol.) and correlated the dye removal to the COD level. They found a similar result to ours that at high initial dye concentration less MB removal was observed. Moreover, various studied also found that at low concentration of initial dye concentration resulted in the high percentage of dye removal [15-17]. This indicated that the lack of active sites for dye adsorption at high dye concentration which resulted in decreasing percentage of dye removal at high dye concentration. Therefore, to increase the % of dye removal, the adsorbent contained high active site was required. However, the actual amount of dye absorbed per unit of adsorbent mass were increased with the increased of initial dye concentration [14-17] with in agreement with our results.

The percentage of MB removal was increased with the neem leaf powder increased and reached almost 100% dye removal when using adsorbent only 2 g/L. The dosage of neem leaf powder was varied between 0.5-2 g/L and the resulted removal power was 80-100% when adsorption study was run at pH 10 and MB concentration was 4×10^{-5} M. This finding could be due to the increasing of the surface area and the active sites for dye

adsorption when increasing the dosage and the results were in the agreement with [17-18]. However, there was the optimum value because the initial dye concentration was fixed. The resulted in Figure 2 still suggested that the neem leaf powder was the good adsorbent for MB removal.

The adsorption of the target dye over the surface of adsorbent is the key reaction in MB removal. The MB is the cationic dye, therefore, the adsorption of MB is strongly depend on the surface charge of adsorbent. The consideration of the surface charge of adsorbent is related directly to the pH of solution. Thus, the effect of the pH to the dye removal efficiency was taken into account. Figure 3 showed the effect of pH which varied between 3-10. The percentage of MB removal was increased from 50 to 80% at the studied pH range. The results showed that the pH in basic range is favour for the MB adsorption over neem leaf powder. The similar findings were exhibited in Sharma and K. G. Bhattacharyya [19] and Gusmao et al. [20]. The Cd^{2+} removal by using neem leaf powder was studied [19]. The effect of pH was also investigated and showed that at acidic pH between 2-3.5 exhibited no Cd^{2+} removed. When pH changed to 4, about 9% of Cd^{2+} eliminated and pH 9.5 could remove about 94%. They explained that at low pH there was the competition between H^+ and Cd^{2+} to adsorb at the active site whereas the phenomena was reduced at alkaline pH and facilitated the Cd^{2+} adsorption by OH^- . Gusmao et al. [20] also studied the adsorption of cationic (MB) dye and anionic dye (gentian violet, GV) over sugarcane bagasse. The pH was varied between 2-10 and the results were showed that at acidic pH was suitable for the anionic dye and alkaline pH was favour for cationic dye adsorption. This was supported that the H^+ at low pH could decorate the surface of adsorbent and resulted in the decorated adsorbent suitable for anionic dye. On the other hand, the OH^- in alkaline pH was modified the adsorbent surface and facilitated the adsorption of cationic dye.

According to our finding, the possible adsorption of MB in alkaline region could expressed as;



The temperature is also the important factor to interfere the adsorption efficiency. The various temperatures were operated in the MB adsorption onto the neem leaf powder and the results were expressed in Figure 4. The obvious results were found as the higher temperature was facilitated the adsorption efficiency; when the temperature increased from 30-70 °C the adsorption was growth from 70-90%. Therefore, it could be implied that the MB adsorption over neem powder was the exothermic process. The effect of temperature of the Brilliant green adsorption on the neem leaf powder was also studied and in agreement with our present study [21]. They suggested that high temperature the activation of the surface groups such as alcoholic, carboxylic and phenolic groups were found and these was raised the interaction of these surface groups and the OH^- in solution. Therefore, the higher negative surface charge of adsorbent was achieved, leaded to the higher adsorption capacity to MB. Moreover, the mass transfer coefficient was also increased at higher temperature which pushed more dye molecules to be closer to the adsorption site.

3.2 Adsorption isotherm

Langmuir and Freundlich isotherms were applied to determine the adsorption model of MB onto MgO. These isotherms have been selected to be a model for investigation the phenomena of MB adsorption over the neem leaf powder because the Langmuir isotherm is illustrated the monolayer adsorption. This model basically assumed that the adsorption occurred on homogeneous surface and the surface contained the identical adsorption sites. Moreover, each of adsorption site can adsorbed only 1 adsorbing molecule (related to monolayer adsorption) and there is no interaction between the adjacent of adsorbed molecule.

The Langmuir equation is shown in equation (3-4) [22]:

$$q_e = \frac{Q_0 K_L C_e}{1 + K_L C_e} \quad (3)$$

The reciprocal equation of equation (3) can be expressed as follows and illustrated in linear form:

$$\frac{C_e}{q_e} = \frac{1}{Q_0 K_L} + \frac{1}{Q_0} C_e \quad (4)$$

Q_0 (mg/g) is the maximum adsorption capacity of the dye (monolayer formation) per gram of adsorbent. K_L is a Langmuir constant related to the affinity of the binding sites (l/mg) or the free energy of adsorption. The plot of C_e/q_e vs. C_e was showed in Figure 6 (a).

The Freundlich isotherm is exhibited the multilayer adsorption over the adsorption sites. This model is the extention of the assumptions in Langmuir isotherm for achieving the

$$\frac{1}{n}$$

imperfection of the surface morphology by the factor of $\frac{1}{n}$. The assumption was mentioned in the surface roughness, inhomogeneity and adsorbate-adsorbate interactions which describing reversible adsorption. Thus, this could be implied that the adsorption could be the physical adsorption. The empirical Freundlich isotherms is also shown in equation (5) [23]

$$q_e = K_f C_e^{1/n} \quad (5)$$

The logarithmic form of this equation can be expressed as:

$$\ln q_e = \ln K_f + \frac{1}{n} \ln C_e \quad (6)$$

where K_f and n are the Freundlich constants which related to the adsorption capacity and the adsorption intensity of adsorbent.

The relationship between $\ln q_e$ and $\ln C_e$ is a linear plot according to equation (6) shown in Figure 6 (b). The correlatin coefficient (R^2) could be used to indicate well fitted of experimental data.

The relationship between percentage of MB removal and reaction time known as kinetic plots were shown in Figure 5 (a) and (b); under the dependence of pHs and temperatures, respectively. The results confirmed that the alkaline pH was

enhanced the MB removal and high temperature was the favor condition for the MB adsorption process over neem leaf powder. From these plots, the data was further analyzed to classify the type of adsorption isotherm and reaction order.

According to equation (4), the curve of C_e/q_e vs. C_e was plotted to examine the Langmuir isotherm which showed in Figure 6 (a). The level of well fitting to Langmuir isotherm was consider with respected to the correlation coefficient value (R^2) as the plotted relationship was the linear type: referred to equation (4). Figure 6 (c) showed linear equation and R^2 of Langmuir plot of the adsorption process operated at pH 10. Similarly, the curve in Figure 6 (b) was the Freunlich isotherm plot as refered to equation (6) and Figure 6 (d) also showed the linear fitted equation and R^2 of the reaction at pH 10. The comparison of R^2 in Figure 6 (c) and (d) showed that R^2 of Langmuir isotherm was higher than Freunlich isotherm; indicated that this process fitted well with Langmuir isotherm. The R^2 of adsorption isotherm investigation (in both the effect of pH and temperature) showed in Table 1 and 2. The results were in agreement that R^2 of Langmuir isotherm was higher than Freunlich isotherm, therefore, clearly confirmed that the MB removal by neem leaf powder was followed the Langmuir isotherm

From the slope of Langmuir plot, the maximum adsorption capacity (Q_0) of neem leaf powder could be calculated. The Q_0 was calculated from the optimum condition (at pH 10 and 70 °C) and showed $Q_0 = 16.67$ mol/g. Table 3 showed Q_0 of MB on various natural adsorbent. However, the Q_0 over neem leaf powder was studied before [13]. The comparison Q_0 in 2 studies were compared which showed clearly different; 2.35×10^{-5} mol/g [13] and 1.67×10 mol/g (this study). The different of these 2 adsorption processes was the reaction condition such as pH and temperature. Therefore, it suggested that the condition during the adsorption process played the vital rule in the removal capacity of this kind of adsorbent.

The similarly results were also found in the previous studies such as Han et al [12] and Awwad et al [29]. The adsorption isotherm of MB onto lotus leaf powder was examined [12] and Langmuir isotherm was found to be fitting well with the adsorption system by expressed high R^2 (0.9910). Moreover, The Cd^{2+} bioadsorption over loquat leave powder was also studied and the experimental data was related to the Langmuir adsorption at $R^2 = 0.9999$ whereas R^2 of Freunlich isotherm was only 0.9765.

3.3 Adsorption kinetic study

The Pseudo order approximation used to explain the reaction which contains at least one excess component and the adsorption rate of the excess component is constant. Pseudo-first-order kinetic model assume that the adsorbate uptake to the surface with time was directly proportional to difference in saturation concentration and the adsorbent amount [24]:

$$\frac{dq_t}{dt} = k_1 (q_e - q_t) \quad (7)$$

q_e and q_t are the amount of dye adsorbed (mg/g) at equilibrium and at time t , respectively. And k_1 is the rate constant of Pseudo-first-order (min^{-1}).

Equation (7) was integrated with the boundary condition at $t=0$, $q_t = 0$ and at $t=t$, $q_t=q_e$ and rearranged the equation to obtain equation (8)

$$\log(q_e - q_t) = \log q_e - \frac{k_1 t}{2.303} \quad (8)$$

Similar with

$$q_t = q_e (1 - e^{-k_1 t}) \quad (9)$$

When the experimental data was plotted between q_t and t and the shape of the expressed relationship is in exponential curve as shown in equation 9. This indicated that the adsorption is followed the pseudo-first order. The resulted curved was shown in Figure 7 (a).

In term of the Pseudo-second-order model with proposed by McKay and Ho in 1999 [25] was:

$$\frac{dq_t}{dt} = k_2 (q_e - q_t)^2 \quad (10)$$

where k_2 is the equilibrium rate constant of Pseudo-second order adsorption (g/mg min).

Similarly to pseudo-first-order, equation 10 was integrated with similar condition boundary to obtain equation (11):

$$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{t}{q_e} \quad (11)$$

The substantiation of the Pseudo-second order kinetic model

$$\frac{t}{q_t}$$

was the plot of $\frac{t}{q_t}$ and t . If the trend is followed the linear relationship of equation 11, it suggested that the adsorption process is the pseudo-second order.

The kinetic model was investigated by using the curves in Figure 7 (a) and (b). The relationship of q_t and t (Figure 7 (a) and (c)) was the pseudo-1st order plot and the obtained plot was not followed the exponential as type of equation (9). This could be implied that the adsorption process was not the pseudo-1st order

$$\frac{t}{q_t}$$

reaction. In other hand, the plots of $\frac{t}{q_t}$ and t (in Figure 7 (b) and (d)) were the pseudo-2nd order plot which was the linear relationship. Similarly, the well fitting was considered by R^2 . The obtained R^2 of the pseudo-2nd order which studied the effect of pH and temperature effect were reported in Table 1 and 2. They were all in agreement and found that R^2 was closely to 1 (0.987-0.997). This was indicated that adsorption was fitted well with the pseudo-2nd order.

Refer to equation 11, the interception of pseudo-2nd order plot could be calculated to obtained k_2 and it showed $k_2 = 1.19 \times 10^5$ g/mg min. The obtained k_2 could be suggested that the adsorption is favor occurred.

IV. CONCLUSIONS

The optimum condition of MB removal using neem leaf powder was investigated. The results found that the removal was favour at low MB concentration, higher pH and higher temperature. The optimum loading of adsorbent was 1.2 g/L. The experimental data was fitted with Langmuir isotherm better than Freudlich isotherm in both pH and temperature dependences. This was suggested that the adsorption was monolayer adsorption with the chemisorptions. Moreover, the kinetic analysis in both the pH and temperature effect was in agreement; showing that the pseudo second-order process was fitted with the data.

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AUTHORS

First Author – Kornwipha Saengbutr , The Center of Excellence for Innovation in Chemistry and department of Chemistry, Faculty of Science, Mahasarakham University, Kantarawichai District, Mahasarakham 44150, Thailand

Second Author – Nittaya Wangphon, The Center of Excellence for Innovation in Chemistry and department of Chemistry, Faculty of Science, Mahasarakham University, Kantarawichai District, Mahasarakham 44150, Thailand

Third Author – Ratchanekorn Wanchanthuek, The Center of Excellence for Innovation in Chemistry and department of Chemistry, Faculty of Science, Mahasarakham University, Kantarawichai District, Mahasarakham 44150, Thailand, Tel./ Fax. +66 43 754 246, E-mail address: ratchanekorn.p@msu.ac.th

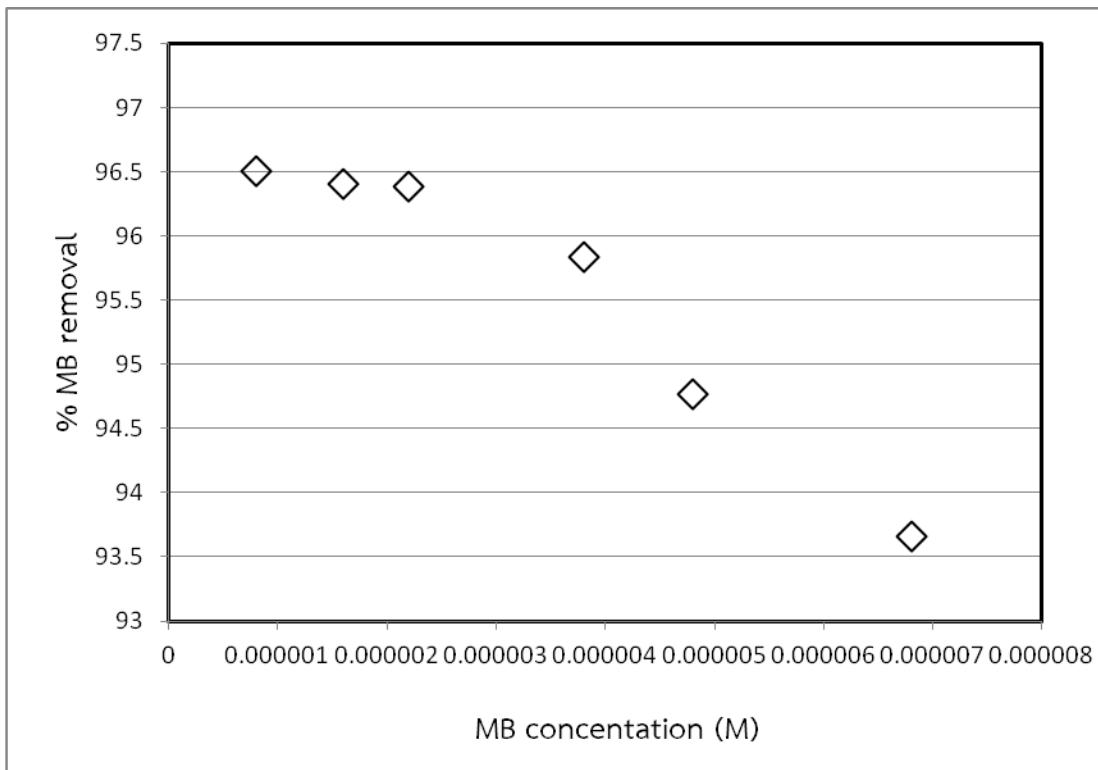


Figure 1 Effect of the initial MB concentration in MB adsorption onto neem leaf powder

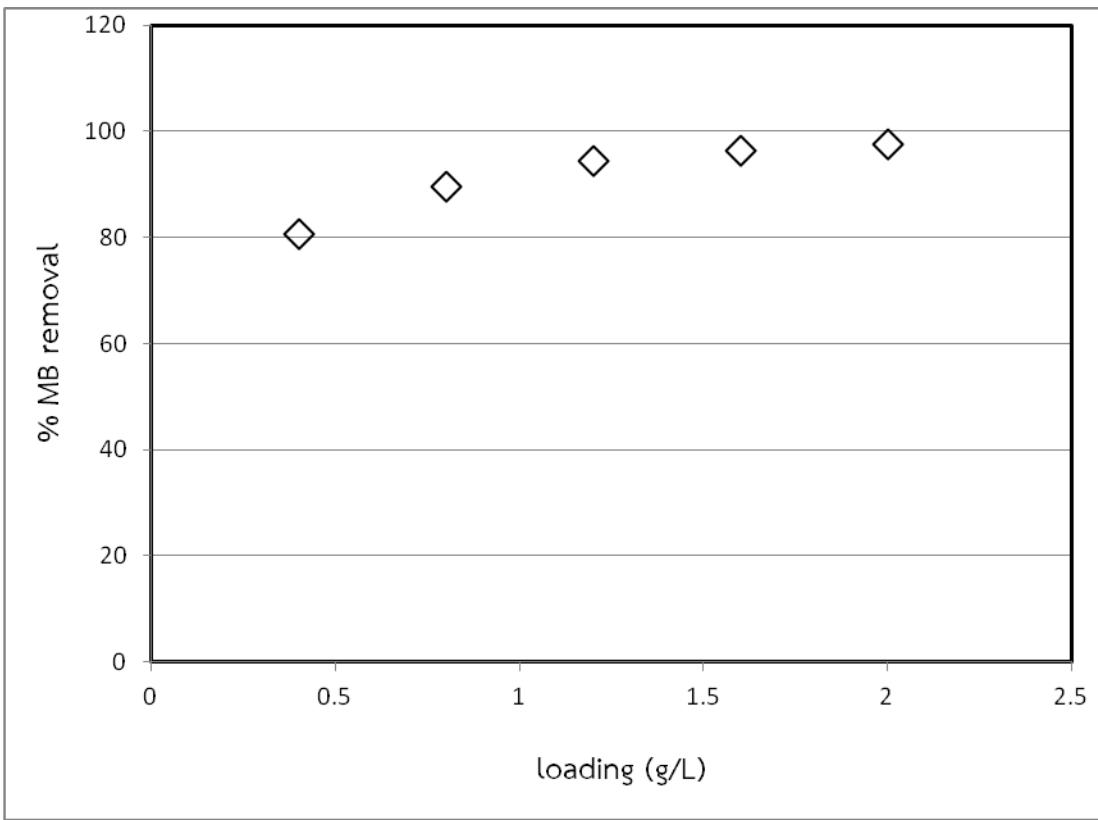


Figure 2. Effect of adsorbent content in MB adsorption onto neem leaf powder

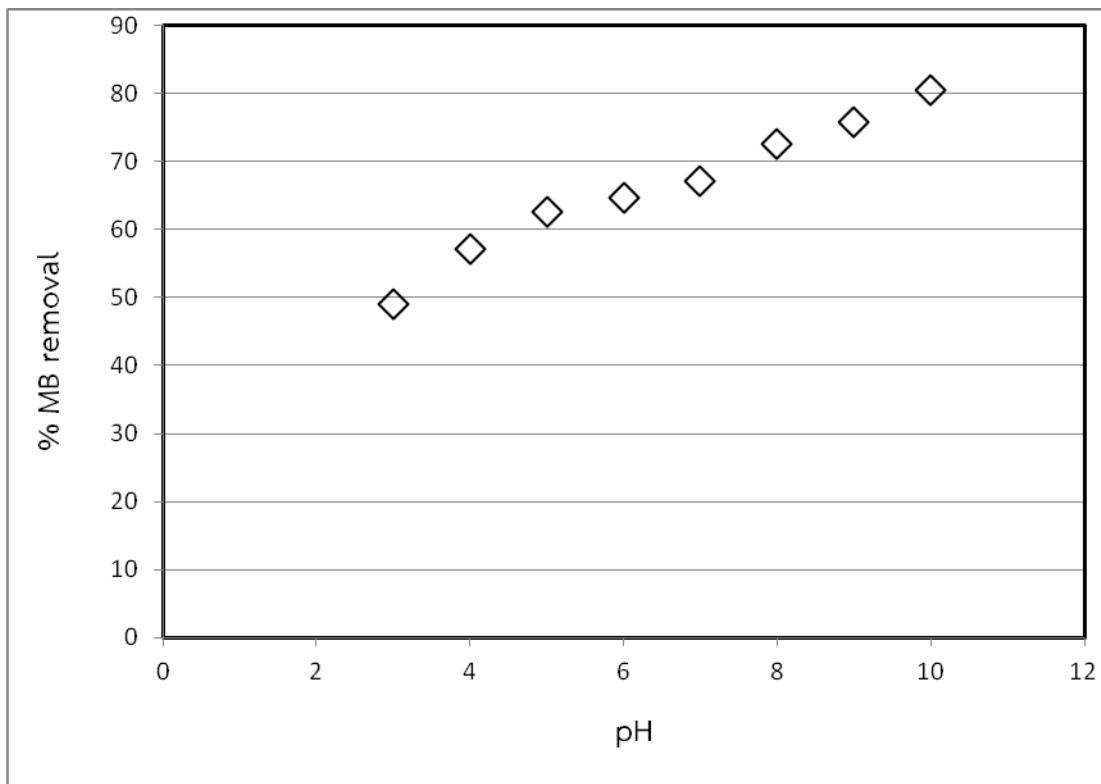


Figure 3. Effect of pH in MB adsorption onto neem leaf powder

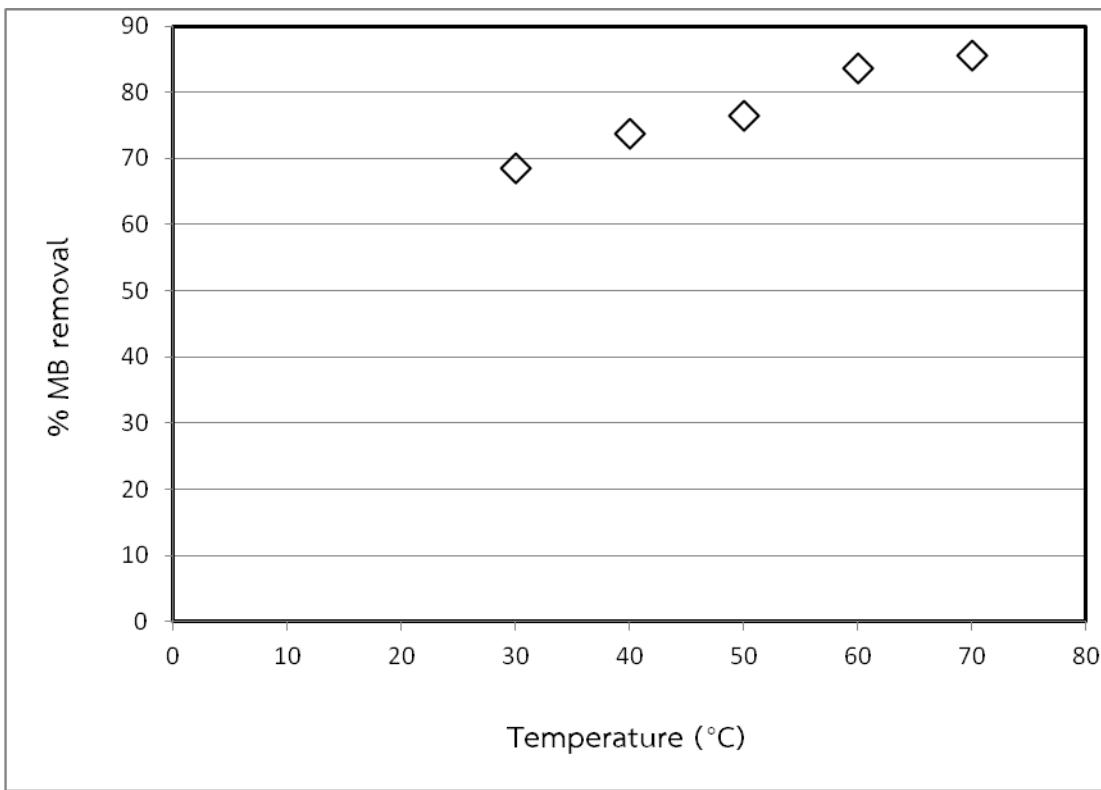


Figure 4. Effect of temperature in MB adsorption onto neem leaf powder

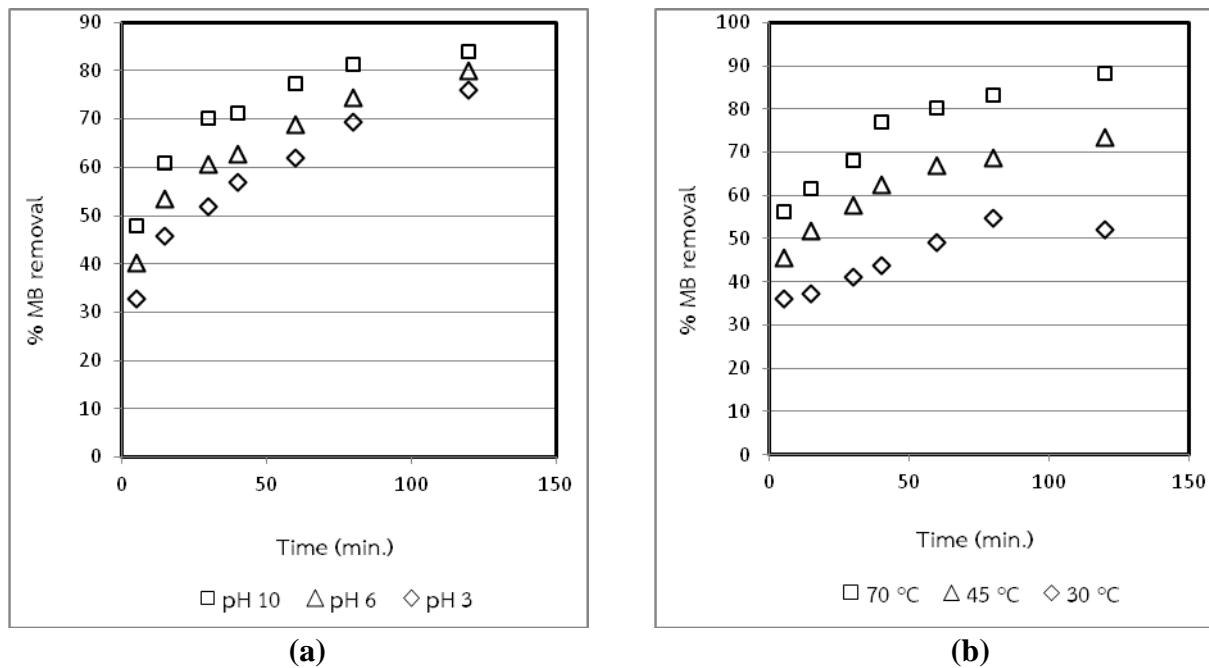
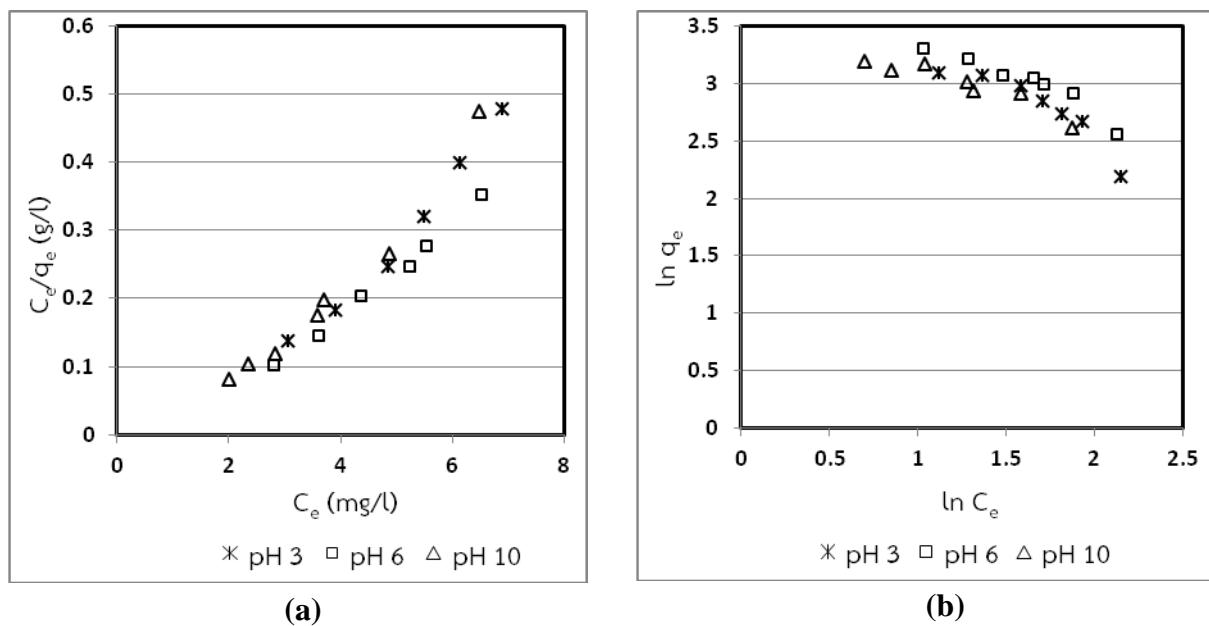


Figure 5. Kinetic plot of the MB removal over neem leaf powder as (a) pH and (b) temperature dependence.



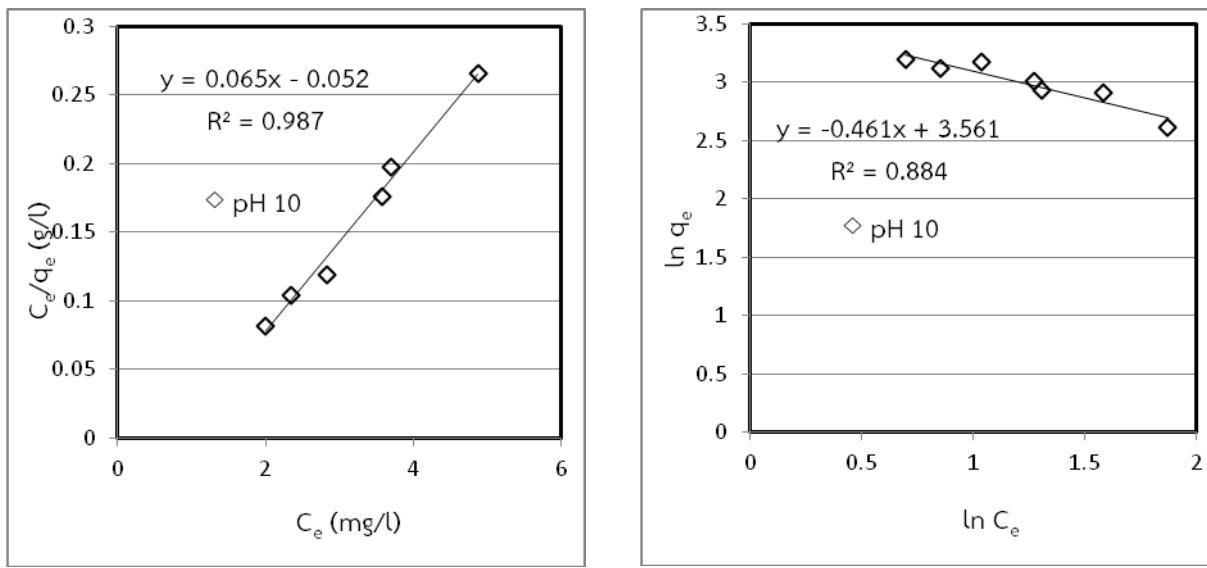
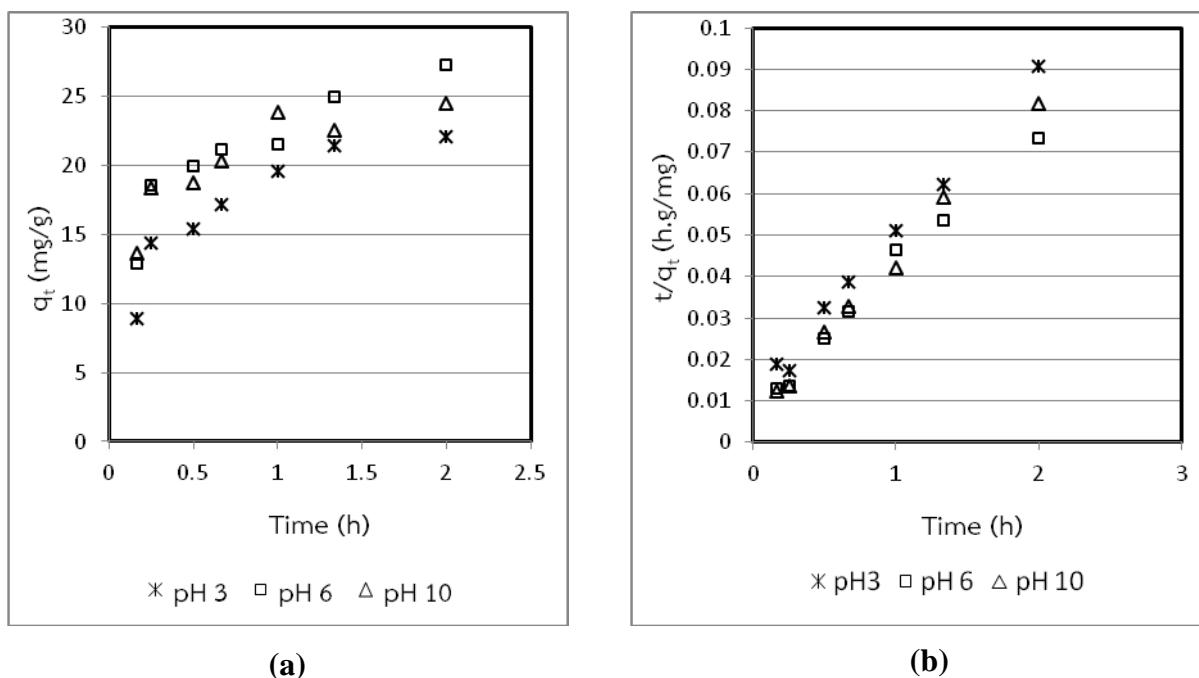


Figure 6 The adsorption isotherm study of the MB removal, at MB concentration = 3.8×10^{-5} M and temperature 45 °C (a) Langmuir, (b) Freundlich adsorption isotherms over various pH, (c) Langmuir and (d) Freundlich adsorption isotherm at pH = 10.



(a)

(b)

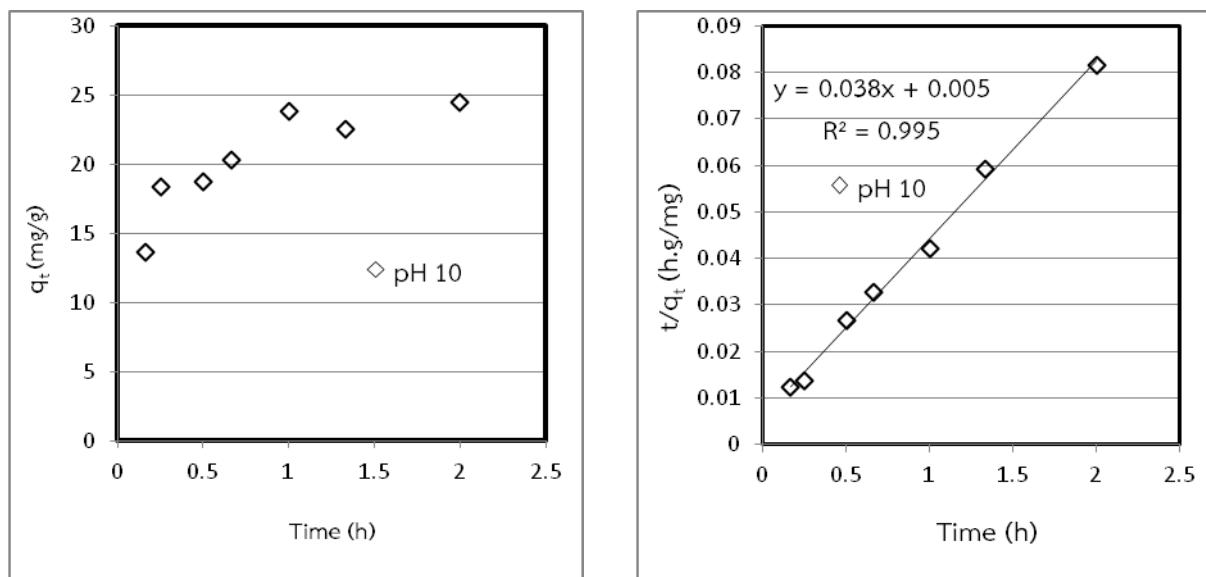


Figure 7 The kinetic study of the MB removal, at MB concentration = 3.8×10^{-5} M and temperature 45 °C (a) Pseudo-first order, (b) Pseudo-second order over various pH, (c) Pseudo-first order and (d) Pseudo-second order at pH = 10.

Table 1 Effect of pH in adsorption isotherm and kinetic model fitting

pH	R^2		Psuedo-1 st order	R^2	Psuedo-2 nd order
	Langmuir	Freundlich			
3	0.884	0.829	-	-	0.994
6	0.936	0.904	-	-	0.987
10	0.987	0.884	-	-	0.995

Table 2 Effect of Temperature in adsorption isotherm and kinetic model fitting

Temperature (°C)	R^2		Psuedo-1 st order	R^2	Psuedo-2 nd order
	Langmuir	Freundlich			
30	0.979	0.937	-	-	0.994
45	0.985	0.943	-	-	0.997
70	0.989	0.924	-	-	0.989

Table 3 Comparison of adsorption capacity of MB on various natural adsorbent

Adsorbents	surface area (m ² /g)	pH	Temp. (°C)	Q_0 (mol/g)	Refs.
Pineapple leaf powder	5.236	7.5	24	8.88×10^4	[26]
Rice husk	NA	NA	20	8.36×10^4	[27]
Cotton waste	NA	NA	20	7.44×10^4	[27]
Peanut hull	72.35	5.0	20	1.82×10^4	[9]
Orange peel	22.1	7.2	30	5.51×10^{-5}	[28]
Neem leaf powder	NA	NA	27	2.35×10^{-5}	[13]
Neem leaf powder (yellow leaf) study	NA	10	70	1.67×10^{-5}	This

Contraception: Perceptions and practices of women in an urban slum community of Delhi

Bani Tamber Aeri and Santosh Jain Passi

Department of Food and Nutrition, Institute of Home Economics, University of Delhi, New Delhi, India

Abstract- Aim: This paper aims to highlight the contraception related perceptions and practices of the women from an urban slum of Delhi. **Methods:** Data were gathered from a total of 201 pregnant women (belonging to lower income group) enrolled from a government run maternity clinic by the interview technique . **Results:** Data revealed that, at the time of conception, as high as 34% of the pregnancies were unwanted. Although the subjects had knowledge of contraception, the usage was very low (33%); and they considered contraception only as a means of limiting the family size which should be adopted once the family is 'complete'. Son preference, ignorance regarding importance of child spacing, limited control over personal lives and inhibitions/ fallacies regarding contraception were the main reasons behind far lower usage of the contraceptives. Also, lack of knowledge regarding the appropriate methods of contraception, their side-effects (if any), and the authentic source of obtaining also emerged as the hindering factors. **Conclusions:** It seems that education, even the basic family life education, is the key to solve many of the problems relating to reproductive behaviour of women as it will empower them to make decisions governing their lives. Efforts to change the behaviour, knowledge and attitude of men are also integral to the reproductive health status of women.

Index Terms- contraception, unwanted pregnancy, family planning, education, women's empowerment, Delhi

I. INTRODUCTION

The estimated population of India is 1·21 billion individuals and is projected to be 1·48 billion by 2030, surpassing China as the world's most populous nation (1). India was one of the first countries in the world to have initiated the family planning programme soon after its independence (in 1952). Thereafter, the promotion of maternal and child health through safe motherhood programmes within the wider context of reproductive health and reducing the fertility levels have been the agenda of India's Family Planning Division (2).

Currently, the total fertility rate in India is 2·1 (replacement level) in urban areas, and 3·0 in rural areas; down from 3·4 (1998 – 99), implying that women are bearing lesser number of children (3,4). They are also adopting more contraceptive measures. In 2005 - 06, 56% of the married women were using contraception (3) as compared to 41% in 1990 - 92 (4) and 48% in 1998—99 (5). Though these are encouraging figures, the unmet need for contraception, among young married women, both for child spacing and termination, is still higher; it being 27% and 21% for women aged 15—19 years and 20—24 years, respectively (3).

Despite emphasis of the reproductive and child health programmes being on client choice and use of non-terminal methods, female sterilization accounts for about half of the contraception rates in India, a proportion that has not changed ever since 1990 (2). Perhaps, this could be one of the reasons for the high proportion of unwanted births in our country because women do not like to opt for this terminal method till the time they feel that their families are complete (3, 6).

In the present paper an attempt has been made to gain an insight about the family planning practices of the women residing in an urban slum of Delhi, with an emphasis on their opinion, perceptions and the methods of contraception adopted by them. The data presented here are part of a larger study conducted on pregnant women and the factors affecting their pregnancy outcome.

II. MATERIALS AND METHODS

This cross-sectional study was carried out in an urban slum of South Delhi.

Locale: The study was carried out in the **Srinivaspuri Maternity Center** (a government run maternity center), which was randomly chosen out of the eight Government centers in South Delhi. This center acted as the nodal point for enrolment of the subjects residing in the four slum clusters in its vicinity.

Sampling: Purposive sampling was used to identify and enrol the subjects. Thus, pregnant women (between 16-20 weeks of gestation without having any obstetric complications) belonging to poor economic status and residing within 5 kms of the Center who were expected to attend the ANC clinics and deliver the baby at the Center were enrolled for the present study. In case of the primipara, though the Centre was providing all the maternity services, for delivery, these women were referred to the Safdarjung Hospital (a major Government Hospital in South Delhi); and, therefore, they were not included in the study as data collection could have some posed problems.

All pregnant women who complied and were willing to participate in the study constituted the sample. A total of 201 pregnant women residing in the selected slum clusters and were registered at the maternity centre for antenatal services were enrolled for the study.

Only those subjects who gave their informed consent for participation were included in the study. In case of the women staying in joint families, consent was also obtained from their husbands and mother-in-laws. Anonymity of the subjects has been preserved throughout the study. Permission was also sought from the concerned authorities of the Maternal and Child Welfare section at the Municipal Corporation of Delhi Office.

Data collection involved interaction with the women whose literacy level was considerably low. Hence, interview method was used for eliciting information and a structured proforma was developed for this purpose. To elicit quality data, most of the questions were left open-ended. Interactions with senior gynecologists and pediatricians as well as social scientists helped to provide the technical inputs in the development of the schedule. It was pre-tested on a set of pregnant women (not included in the sample) and necessary modifications made, where required. Data were gathered on opinion of the subjects about the then ongoing pregnancy, their perception regarding the number of children they would like to have, knowledge, usage/non-usage and reasons for non-usage of contraception.

Statistical analysis: The data were analysed using Statistical Package of Social Sciences (SPSS, version 12). Statistical measures such as frequency, percentage, mean, range, standard deviation and Chi-square were employed to analyse and interpret the data.

III. RESULTS

Socio-demographic profile of the subjects: A majority of the subjects were rural migrants from the neighbouring states of Delhi (mainly Uttar Pradesh/Bihar/Rajasthan) and belonged to nuclear families. About 82 % were young mothers (aged 20 to 29 years), usually second or third gravidae (since, the primi-gravidas were not enrolled for the study). More than half of the respondents (59.3%) were illiterate and had never gone to school; about 9 % were just literate, who again had non-formal education but could read and write (a little). Most of these women were Muslims and had picked up their basic reading and writing skills at home and were thus better versed in Urdu than in Hindi. 14.8 % of the subjects had gone to school but dropped out before or after reaching class V. Even among this group of women, it was observed that though they had attended school, their level of literacy was equally low as that of the non-school goers. They could not read complete sentences (such as road-side banners or messages) and could barely sign their name in broken handwriting. Many had even forgotten to write and were using their thumb impressions. Thus, more than three-fourth of the subjects were effectively illiterate or just barely literate.

Data revealed that the subjects' mean age at marriage was 17.8 ± 1.83 years. 53 % of them were reportedly married before attaining the age of 18 years; and as many as 22 % were married at or even before the age of 15 years. The data further indicate that the mean age at first pregnancy was 18.9 ± 1.48 years; and as many as 37 % of the subjects had conceived their first child in their teenage.

Opinion regarding the ongoing pregnancy:

Data revealed that a little more than one third of the subjects (34%) reported that the then ongoing pregnancy was 'unwanted'; another, 2% were unsure and opined that they are no one to 'want' or 'not want' a baby,it is not in their 'hands'.26.5% subjects (18 out of 68), who did not want the ongoing pregnancy, had actually taken steps for termination, though they were unsuccessful!

However, the ideal number of children as perceived by the majority (65%) was two children – one boy and one girl.

Though not statistically significant, the birth order of the baby did affect the mother's desire for current pregnancy. While among the second gravida, 28 percent did not want the child; in the case of sixth gravida, it progressively increased to 50 percent – (Table 1).

Table 1: Respondents opinion regarding current pregnancy viz parity and number of male / female children

	Opinion regarding current pregnancy			Total
	Not wanted	Wanted	No idea	
Parity				
2	20 (28.2) (29.4)	50 (70.4) (39.1)	1 (1.4) (20.0)	71(100) (35.3)
3	16 (29.09) (27.9)	37(67.2) (26.6)	2 (3.6) (40.0)	55 (100) (27.4)
4	18 (40.9) (26.5)	25 (56.8) (19.5)	1 (2.3) (20.0)	44 (100) (21.9)
5	10 (43.5) (14.7)	12 (52.1) (9.4)	1 (4.3) (20.0)	23 (100) (11)
6+	4 (50) (1.5)	4 (50) (5.5)	-	8 (100) (4)
Live Male child(ren)				
1	42 (46.6) (61.7)	48 (53.4) (37.5)	-	90 (100) (44.7)
2	11 (68.7) (16.2)	2 (12.5) (1.5)	3 (18.7) (60)	16 (100) (7.9)
3	3 (100) (4.4)	-	-	3 (100) (1.5)
No male child	12 (13.1) (17.6)	78 (84.8) (60.9)	2 (2.2) (40)	92 (100) (45.7)
Total	68 (33.8) (100)	128 (63.7) (100)	5 (2.5) (100)	201 (100) (100)
Chi-square = 4.74*, P<0.05				
Live Female child(ren)				
1	28 (37.8) (41.2)	46 (62) (35.9)	-	74 (100) (36.8)
2	23 (53.4) (33.8)	19 (44.1) (14.8)	1 (3.3) (20)	43 (100) (21.4)
3	9 (60) (13.2)	4(26.6) (3.1)	2 (13.3) (40)	15 (100) (7.5)
No female child	8 (11.6) (11.7)	59 (85.5) (46.1)	2 (2.9) (40)	69 (100) (34.3)
Total	68 (33.8) (100)	128 (63.7) (100)	5 (2.5) (100)	201 (100) (100)
Chi-square = 3.52*, P<0.01				
Survival of last child				
Not surviving	1(3.2) (1.5)	30 (96.8) (23.4)	-	31(100) (15.4)
Surviving	67 (39.4) (98.5)	98 (57.6) (76.6)	5 (3.0) (100)	170 (100) (84.6)

Total	68 (33.8) (100)	128 (63.7) (100)	5 (2.5) (100)	201 (100) (100)
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Chi-square = 9.03*, P<0.05

(numbers in parenthesis indicate percentage)

Opinion of the woman regarding her ongoing pregnancy also seemed to be influenced by the number of live male or female children. Data revealed that 85 percent of women who did not have a single male child wanted the ongoing pregnancy as against only 12 percent of those who had two live male children (Chi-square = 4.74*, P<0.05).

In contrast, where the family had two/more live daughters, almost 44 percent wanted the ongoing pregnancy; highlighting that in such cases a greater number of women wanted the ongoing pregnancy irrespective of the number of children, hoping that they may be 'lucky' to bear a son (Chi-square = 3.52*, P<0.01). The data, thus, re-endorses the prevailing tilt towards son preference in the Indian society. Even the women themselves felt that they should bear at least one son in order to maintain their social status in the family/relatives and the society.

Family planning practices

Data revealed that 84 percent of the subjects heard of some method of family planning, the most common being 'operation' or female sterilization. In-depth probing, however, revealed that many of the subjects just knew/ reported of 'operation' as one of the methods, but its exact implications were known to very few. There were still 16 percent who had never ever 'heard' of any method of contraception; these were mainly the women who had just migrated to Delhi and had limited knowledge/exposure.

However, regarding the usage of any method of contraception, it was noted that only 30.8 percent had used some method of Family Planning, six percent though had adopted, but, discontinued the usage after some time; 63 percent had never used any method of contraception. Thus, nearly one third of the subjects (30.8 % users and 5.9% who had discontinued the usage) had ever used some method of contraception.

Reasons for not using contraceptive measures:

Of the non-users, 20.6 percent stated that they had not 'heard' of any method and thus expressed lack of awareness of any methods (Fig.1). About 33 percent of the subjects stated that they had not adopted any family planning method so far, as a majority of them were second or third gravidae and had not yet felt the need to limit their families. 20.6 percent of the subjects wanted another child (son) to complete their families and therefore, had not adopted contraception. These women reported that immediately after the birth of a son, they would get 'operated'. The remaining 12.2 percent were themselves not motivated – they were scared to use any method because of certain misconceptions.

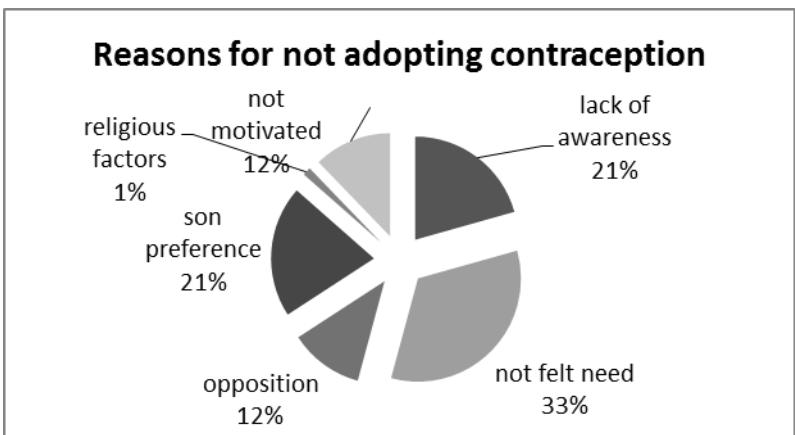


Fig 1 Distribution of subjects according to their reasons for not adopting methods of contraception

However, 12 percent of them expressed that although they themselves were aware and wanted to adopt contraceptive methods, they faced strong opposition from their husbands and therefore they could not do so.

The most common method of contraception used by the subjects who had adopted family planning (or discontinued) was the intra-uterine device (IUD), commonly referred to as 'copper T'. Among the male contraceptive measures, the use of condoms (usually referred to as 'nirodh', the brand name itself) was the most prevalent method.

Many women confided that IUD was a method of choice because their husbands could not get to know about its adoption, unless they disclosed; moreover, they did not have to follow any daily regimen in its case (like the daily ingestion of pills, which one could forget) and lastly, it was not a permanent method. The usage of contraceptive pills was minimum with only nine percent consuming these. Further probing revealed that most women 'believed' that if one consumes 'pills', it reduces (or rather stops) the chances of a woman to conceive and only those women should use pills who do not plan to have a baby again!

The subjects were also asked as to who advised or motivated them to adopt family planning. In a majority of the cases (28.3%) it was the doctor at the maternity center, husbands (24 %), mother / sister-in-law (19.5%); health worker and neighbour (8.7% each) and self (11 %).

Further probing revealed that the sources (persons) from whom the subjects had heard about family planning had not advised about any other method except the one that they were aware of. The women had adopted the single method advised to them – maybe based on the personal experiences of the 'advisor'.

Problems associated with the use of contraceptive methods

Discussions revealed that among the regular users of IUD, 15 percent were dissatisfied or experienced discomfort, while the remaining 85 percent did not suffer from any problem. However, of those who discontinued, a majority either experienced pain in abdomen (16%) or excessive bleeding during periods (50%). The remaining 37 percent although did not have any problems discontinued usage anyway. Besides the problems or side-effects experienced, data indicate that many women had certain misconceptions regarding the various contraceptive methods. For example many complained about "loss of appetite" due to IUD

and that pills are ‘harmful’ and may cause “permanent sterilization”. Many of the subjects (58.7%) reported that when they started using the method, they had not been told of the side effects that could occur because of the method used. Only 17 percent reported that they were aware of any discomfort caused by the method and hence maybe could handle it better (For 24%, it was not applicable, as their husbands had adopted the family planning technique). It was further learnt that a majority of the subjects who discontinued, did so within the **first three months** of adoption.

Adoption of family planning methods viz age, education and religion: It was observed that women in the age group of 23-25 years were the highest users of contraception (41.4% users and 12.8% who discontinued) followed by women aged 26-28 years (Table 2) Older women aged 28 years and above and younger ones less than 22 years of age had significantly lower adoption of contraceptive methods (chi square = 22.43*; p<0.01).

Further, the level of education seemed to be influencing the contraceptive use significantly (Chi-square = 23.11*, P<0.01). Because of the lack of knowledge and awareness among women who were illiterate or low levels of education, only a quarter had used (or discontinued using) any method of family planning. Women who had gone to school and studied up to class VIII had a higher usage (34.6% used and 7.7 % discontinued). In case of those who had studies beyond class VIII, the level of contraceptive was significantly higher (60.7 % used and 10.7% discontinued).

[30]

Table 2: Distribution of subjects by the adoption of family planning methods viz age, education and religion.

Factor	Adopted family planning methods			Total
Age (Years)	No	Yes	Discontinued	
< 22	26 (60.4) (20.5)	16 (37.2) (25.8)	1 (2.4) (8.3)	43 (100) (21.4)
23-25	32 (45.7) (25.2)	29 (41.4) (46.7)	9 (12.8) (75)	70 (100) (34.8)
26-28	43 (76.8) (33.8)	12 (21.4) (19.3)	1 (1.8) (8.3)	56 (100) (27.8)
>28	26 (81.2) (20.5)	5 (15.6) (8.1)	1 (3.2) (8.3)	32 (100) (15.9)
Total	127 (63.2) 100	62 (30.8) 100	12 (5.9) 100	201 (100) 100

Chi-square value 22.438; p<0.01

Education				
Illiterate	78 (74.3) (61.4)	24 (22.8) (38.7)	3 (2.8) (25)	105 (100) (52.2)

Func. Literate	11 (68.75) (8.6)	3 (18.7) (4.8)	2 (1.25) (16.6)	16 (100) (8.0)
Upto class VIII	30 (57.7) (23.6)	18 (34.6) (29.03)	4 (7.7) (33.4)	27 (100) (13.4)
VIII and above	8 (28.5) (6.3)	17 (60.7) (27.4)	3 (10.7) (25)	25 (100) (12.4)
Total	127 (63.2) 100	62 (30.8) 100	12 (5.9) 100	201 (100) 100

Chi-square value 23.11; p<0.01

Religion

Hindu	108 (61.7) (85.1)	57 (32.6) (91.9)	10 (5.7) (83.3)	175 (100) (87.0)
Muslim	19 (67.1) (14.9)	5 (19.2) (8.1)	2 (7.7) (16.7)	26 (100) (12.9)
Total	127 (63.2) 100	62 (30.8) 100	12 (5.9) 100	201 (100) 100

(Figures in parenthesis indicate percentage)

Future intentions of using contraception

While a quarter of the subjects (24%) said that they would definitely use some method of contraception after the birth of the current child; 29 percent were not sure and they said that they ‘might’ adopt any family planning technique, while almost a third of the subjects (32.8%) stated that, the decision of future contraceptive use was not in their hands.

Of those who wanted to adopt a family planning technique or expressed a desire to do so in the future, a majority (40.5%) said that they would adopt female sterilization. Other methods were IUD (14 %) and contraceptive pills(8.5 %). Many (37%) were not sure regarding which method to be used.

Even though many of the subjects said that they intend to use contraception in the future but 64 percent later reported that they had not discussed it with anyone. Since the decision regarding family planning is governed more by ‘others’ than the woman herself, it can be assumed that the actual adoption would be much less.

IV. DISCUSSION

The data thus revealed that in case of the subjects of the study, a third of the pregnancies were unwanted at the time of conception. In many developing countries, unwanted births constitute a substantial proportion of all births. NFHS-3 data indicate that about 21 percent of the pregnancies in India are unwanted at the time a woman conceives (3). However, here it may also be highlighted that data on unwanted pregnancies is mostly based on the recall of their intentions about past pregnancies. In a follow-up survey in four Indian states in 2002-2003 of rural woman originally interviewed in the 1998-99 National Family Health Survey-2 (5), it was demonstrated that

there was a pronounced tendency for births prospectively classified as **unwanted** to be retrospectively described as having been wanted or mistimed. The main reason seems to be either that mothers adapt to the reality of a new birth or are reluctant to describe an existing child as having initially been **unwanted**. In other words, retrospective accounts of the ‘wantedness’ of a birth, such as those obtained by current Demographic and Health Surveys, may actually be significant underestimates of true levels of **unwanted** childbearing (7).

Reducing the level of unwanted births has important social, health and demographic consequences. At the individual level, preventing unwanted births enhances the well-being of women and their children. Further, the mother would have a more positive attitude towards her pregnancy and consider it an enriching experience rather than a burden. Unwanted children are more likely than wanted children to not receive all recommended vaccination, to be stunted or even die during the neonatal, post-neonatal and early childhood periods (8).

The subjects' mean age at marriage was 17.8 ± 1.83 years and as many as 37 % of the subjects had conceived their first child in their teenage. NFHS-3 data also reveals that 44.5% of the women aged 20-24 years were married before the age of 18 years, 22.6% before the age of 16 years, and 2.6% even before the age of 13 years. Child marriage is significantly associated with non-usage of contraceptives before first childbirth, high fertility rates (three or more child births), repeat childbirth within 24 months, multiple unwanted pregnancies, pregnancy termination and female sterilization (9).

As far as the use of contraceptive measures is concerned, the study revealed that the contraceptive usage was much lower than the NFHS-3 data wherein, 56.3 percent of the married women had used some contraceptive method at any time. It may be argued that a majority of the women from the current study were either second or third gravida and thus had not felt the ‘need’ to use any contraception and (as per them) their fertility goals had as yet not been met. According to NFHS 3 also, the desire for another child was the main reason for the low adoption of family planning (3). This clearly indicates that many women consider contraceptive measures as a means of limiting families and not as a method of child spacing.

Further, a majority of the subjects had recently migrated from U.P, Bihar and Rajasthan, where due to widespread illiteracy and ignorance the contraceptive usage as such, varies between 34-43 percent only (3). The Annual Health Survey data also reveals that contraceptive usage in Bihar and Uttar Pradesh is as low as 37 to 49% as a result of which the Total Fertility Rate is still as high as 3.6 in Uttar Pradesh and 3.7 in Bihar (10).

In a study from Uttar Pradesh, it was shown that although, 87% of the subjects were aware of contraceptive methods, the usage was barely 36% (11). In another study carried out in the urban slums of Calcutta, it was seen that although the subjects were aware of methods of contraception, but, they also tried to provide for the future (by having at least one son) before adopting family planning methods (12). A recent study from Uttar Pradesh also indicated low usage of contraception and that women in slum areas were even more less likely to use these methods (13).

It was also observed from the data that in case of those who adopted contraception, many had discontinued usage essentially

because of method related reasons. Further, it also seemed that the subjects had nobody with whom they could discuss such matters. All their ‘knowledge’ (or rather lack of it!) depended on information gathered from casual/chance conversations with friends/neighbours. The authenticity of this knowledge in most cases was very doubtful.

In India, other studies among the low-income urban population also have revealed that people are aware of the importance of limiting the family size and have family planning facilities yet have less contraceptive usage because of low level of education, increased rate of discontinuation, misconceptions, perceptions that family planning services are of poor quality ,lack of proper knowledge of the use of contraception, all options available to them and potential side-effects of each (13 -17).

The data thus indicated that the *subjects decision to adopt any method of contraception was overshadowed by a number of factors, including their husband's permission and his desire to limit a family, decision of other family members, preference for a son and also their own inhibitions etc.*

There is thus a great need to reach out to the women in the reproductive age group and expose them to all the available methods of family planning, to *enable them to make the right choices suitable to their needs*. Unless **misconceptions surrounding the various methods** are removed and both partners are educated regarding the appropriate method of family planning, the usage rate will continue to remain low. It is also important to educate women that contraception also means ‘child spacing’ and not necessarily ‘no children’; explaining them the benefits of child spacing and making them aware of the possible ways to achieve it as well as remove the fallacies and ignorance associated with contraceptive methods. For that to happen, temporary methods have to be made available to advance fertility. Data from NFHS 3 also reveals that a majority of women prefer female sterilization to any other method of contraception. Perhaps this is the only method they have knowledge about!

India's family planning programme has evolved since its inception and is currently being repositioned to not only achieve population stabilization but also to promote reproductive health and reduce maternal, infant & child mortality and morbidity (2) . The fact is there's a huge unmet need for contraception in India and 18 per cent fertility is due to this unmet need. Also access to contraceptives must be improved. The government's decision of home-delivery of contraceptives may help in countering this problem (2). Considering that the current study was conducted in Delhi, the capital of the country, there should be no problems of access at all.

It is possible that many illiterate women who would want to limit their families, are not able to do so because they do not know how to or whom to turn for help. It is important to note that most women in north India have limited personal control over their lives and are dependent on their husbands and other family members for health related decision-making. Therefore the behavior, knowledge and attitudes of men are integral to the reproductive health status of women.

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University of Delhi, F-4, Hauz Khas Enclave, New Delhi - 110016

Second Author – Dr. Santosh Jain Passi, Former Director, Institute of Home Economics, University of Delhi, F-4, Hauz Khas Enclave, New Delhi -110016

Correspondence Author – Dr. Bani Tamber Aeri, Assistant Professor, Department of Food and Nutrition, Institute of Home Economics, University of Delhi, F-4, Hauz Khas Enclave, New Delhi -110016, baniaeri@yahoo.co.in, 9810271147

AUTHORS

First Author – Dr. Bani Tamber Aeri, Assistant Professor, Department of Food and Nutrition, Institute of Home Economics,

Festivals of Cholistan, Punjab Pakistan

Mohammad Shafeeq

Graphic Designer & Photographer Bahawalpur, Punjab Pakistan

Abstract- Cholistan is the charming desert, locally known as "Rohi", starting some 30km from Bahawalpur and is spread over an area of some 16,000 sq. km. which is mainly the part of **Bahawalpur, Bahawalnagar** and **Rahim Yar Khan** districts and extended up to the Thar Desert in Sindh Province. Darawar fort is the major landmark of Cholistan Desert, located 48km from Dera Nawab Sahib and 100km from beautiful city Bahawalpur. Cholistan is presently inhabited by 100,000 semi-travelers moving from one place to another in search of water and fodder for their animals. The nomads belong to different tribes, though most of them are descended from settlers who came from Balochistan at least 200 years ago. Cholistan has very harsh climate with a very low rain fall annually and this has resulted the most of its part to remain barren. The people of Cholistan speak **Saraiki** language and their main wealth is their livestock. The livestock breeding helps to overcome the need of the milk and meat of the surrounding region. However, the Cholistani people have some other professional activities like clay pottery, weaving, creating the wool products and leather works. Sculpturing and pottery is actually the gift from the nearby Indus civilization to the people of Cholistan. Although the people of Cholistan are suffering from the fundamental necessities of life for centuries, they have amazing richness in their culture. Their life is full of colors as they use bright colors not only in formal but in normal wear. Their customs and traditions are also very unique and attractive for the outer world. The Colors of Cholistan are outstandingly prominent in the festive occasions where many musical and dancing theatres are organized. Special traditional food like "Saag" and "Khunmbi" are prepared. Camel Dancing and Snake Charming are also very enticing for the visitors. The craftsmanship of the artisans at work is very distinctive and it is expressly admired. Today Cholistan is inhabited by tribes of poor nomads who breed camels & cattles. They are peaceful & friendly people living in mud huts & sheep skin tents. Although they frequently face droughts & dry spells they still love the deserts & their animals around which rotate most of their tales & songs. The only way to travel in this spread of sand dunes & dry bushes is on camel back. When the camel men return to their villages at sunset after a hard & hot day in the desert they are greeted with the sound of the flute & the distant bells of returning cattle which create an enchanting atmosphere. The tired men sit in the centre of the village around the fire on Camel hair durries, sip tea & watch the sun go down over their beloved land of beauty & wilderness. To explore this area of mysterious beauty in the most natural way festivals of Cholistan for you to have deep experience of this desert & people that will touch soul. This tour will take you the enchanting Cholistan desert a desert that is full of life and culture. You will enjoy the music from the bells of cows of the desert and ride camels to the villages in the desert. You will also visit the historical places like Derawar fort, Channan Peer, Mujghar Fort, and meet people of the desert and learn the culture of the desert folks of Cholistan.

Now i come to the point a festival is a special event of feasting or celebration, usually with a religious focus. There are many festivals here the land of Cholistan, such as Channan Peer Urs, Camel Journey, Camel Agony, Camel Dance, Ox Running, Jeep Rally, Cultral Night programme (folk music programme) and Firework Show etc

I. INTRODUCTION

Now let's review the festivals of Cholistan. **Channan Peer:** Channan Peer is a big festival of Cholistan and southern Punjab festival. Channan Peer is located 27km from Yazman Tehsil and 59 km from beautiful city Bahawalpur region. Channan Pir was the saint of desert. His place of burial has been marked in a small village named after him as Channan Pir. There is an annual festival at Channan Pir when people from different distant places comes to the place. The place becomes full of life and colourful in these days, especially now after being connect by metalled road. The festival starts from the last Thursday of February (Hindu month of Chaytra) and last for seven repeated Thursdays. Every year thousands of people arrive in the Cholistan desert, this barren land of saints and mystery, to celebrate the life of Channan Peer and to have a seriously good time. There are as many stories about the life of Channan Peer as there are festival goers but the following story is generally accepted. Just after the birth of Islam in the 7th century the Sufi Saint Jalaludin Surkh Bukhari of Uch Shareef travelled to the area which in those days was governed by a Hindu Raja called Sadharan. Sadharan had a ideal life with one problem he had no children. His wife Rani Nainoo found out about Jalaludin's visit tracked him down and asked him to pray for her to have a son. The Sufi did this and even foresaw that the son would be born a Muslim. A child was really born and tumbled into this world reciting the kalima. The Raja was, shall we say, a little peeved and gave the order to have his son killed. The boy's mother pleaded for the baby's life. Ultimately, the ruler agreed that Channan Peer would be left alone in the desert in a wooden cot. After a few days, Hindu pilgrims found the baby being fed by a mother deer. The Raja was informed and again demanded the death of his son. The Rani then came to the desert and looked after him, until she was forced to desert her child again. Finally, the fairy story says, Channan Peer went on to preach Islam throughout the desert, inspiring poets and converts and many others, before he eventually merged into the sand and was never seen again. The fifth Thursday is the most popular day and also experiential as a local holiday. There are some photographs of Channan Peer festival:



(fig 1-2 Channan Peer Urs, Southern Punjab,Pakistan)



(fig 3-4-5-6 Channan Peer Urs, Southern Punjab,Pakistan)



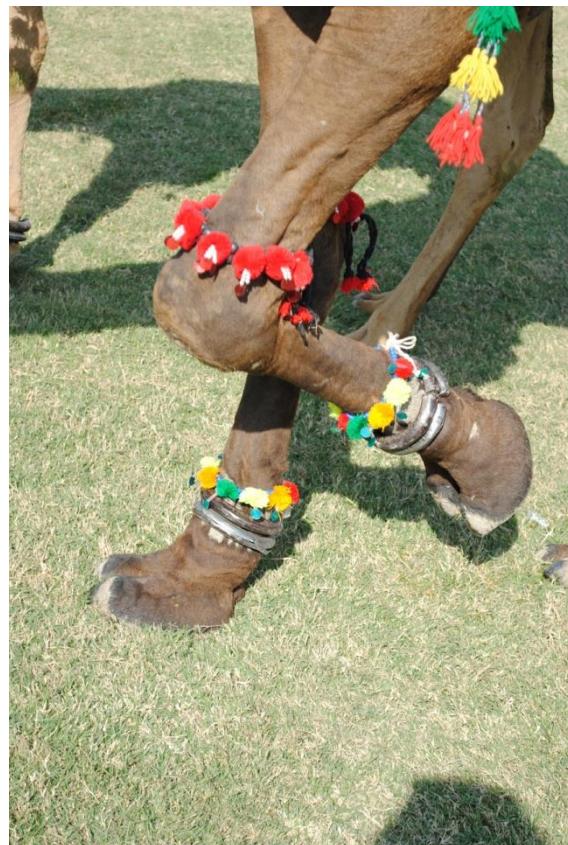
(fig 7-8-9-10 Channan Peer Urs, Southern Punjab,Pakistan)

Camel journey: Camel journey is the famous festival of the Cholistan Desert in which two or more camels run in a specific distance. Camel journey are the ideal way to spend time exploring rustic Thar and Cholistan. A camel journey moves through the golden sands of the savage. No fixed time for this event but people of the Cholistan are decided before the Channan peer Urs in every year. Here, Camel Safari is also organized in this area time period of camel safari is (9days,12days). Some photographs of this event are such as:



(fig 11-12 Camel Journey/Ranning, Southern Punjab,Pakistan)

Camel Dace: Camel Dace is most interesting event held in many times a year in cholistan, Southern Punjab. This event is organized in this areas in Cholistan like Derawar Fort, Channan Peer, Lattan Singh and Mittra etc. There are some photo graphs of this event like as:



(fig 13-14 Camel Dance in Cholistan, Southern Punjab,Pakistan)



(fig 15-16-17-18 Camel Dance in Cholistan, Southern Punjab,Pakistan)

Camel Fighting: Camel fighting originated among the different districts of Pakistan especially Cholistani tribes and is considered part of Cholistani culture. This festival held in these areas of Cholistan like Fatuwali near Sama Satta Bahawalpur, Lattan Singhar, Feroza near Rahim Yar Khan, Kanda Fareed Cholistan, Liaquatpur, Derawar Fort, and Marrot etc. There are some photographs of this event like as:



(fig 19-20-21-22-23-24-25-26 Camel Fighting in Cholistan, Southern Punjab, Pakistan)

Bull Cart Race: A bull cart or ox cart is a two-wheeled or four-wheeled vehicle pulled by oxen. It is a means of transportation used since ancient times in many parts of the world. They are still used today where they also used for running in cultural festivity like as:



(fig 27-28-29-30 Bull Cart Race in Cholistan, Southern Punjab,Pakistan)

Firework Night: Fireworks take many forms to produce religious celebrations. A fireworks event is a display of the effects produced by firework devices. Fireworks event is also regularly held at Derawar Fort every year during the Jeep Rally like as:



(fig 31-32-33 Fireworks Night in Cholistan,Southern Punjab,Pakistan)

Cultural Night: It is also organized in different parts of the Cholistan. People of the Cholistan sing and enjoy full night with the pure Cholistani folk music. Especially held during Jeep Rally event and Channan Peer Urs etc like as:



(fig 34-35 Cholistani Folk Music, Southern Punjab,Pakistan)

Jeep Rally: is known as Cholistan Jeep Rally. TDCP Cholistan Jeep Rally is a [rally raid](#) type of [off-road race](#), organized by the [TDCP in Pakistan](#). The event is annually run in the [Cholistan Desert](#) venue. It was first introduced in 2005 by Tourism Development Corporation of Punjab (TDCP). The event is run by the [Government of Punjab](#). The rally holds near the [Derawar Fort](#) in [Bahawalpur](#). Above 100 drivers and teams from all over Pakistan participate in the jeep rally and about 100,000 visitors witness the jeep rally every year. The rally is held almost in Feb month. It is a big cultural event of southern Punjab of Pakistan. Some shots are given below like as:



(fig 36-37-38-39 Cholistan Jeep Rally, Southern Punjab,Pakistan)

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AUTHORS

First Author – Mohammad Shafeeq, Graphic Designer & Photographer from Bahawalpur, Punjab Pakistan,
Email:shafiqgway2012@gmail.com, Contact no: 0092 03017769792

Error analysis of dynamics model for satellite attitude estimation in Near Equatorial Orbit

Nor Hazadura Hamzah^{*}, Sazali Yaacob^{*}, Hariharan Muthusamy^{*}, Norhizam Hamzah^{**}

^{*}School of Mechatronic Engineering, Universiti Malaysia Perlis, Perlis, Malaysia
^{**}Astronautic Technology Sdn. Bhd., Selangor, Malaysia

Abstract: Satellite attitude estimation is one of the important processes in accomplishing a satellite mission. All the state estimation process requires dynamics model and filtering algorithm to estimate the state. Most of the estimation algorithm such as well-known Kalman filter and its variation assume the underlying noise in the dynamics model is Gaussian white noise. Hence, the objective of this paper is to investigate whether the noise in satellite attitude dynamics model in Near Equatorial orbit is Gaussian white noise process or not. This is important because if the assumption regarding the noise is incorrect, this will lead to unreliable and inaccurate estimation. In this paper, the noise is analyzed using normality characterizations and autocorrelation function. The result shows that the noise in the attitude dynamics at Near Equatorial orbit is not Gaussian white noise process.

Index Terms- Satellite attitude; Estimation; Dynamics; Gaussian; White noise

I. INTRODUCTION

Attitude of a satellite is defined as its orientation in the space. Attitude analysis of a satellite is constantly being computed in attitude determination and control subsystem (ADCS) throughout in space for mission accomplishment. Examples of satellite mission are Earth observation, communication, scientific research and many other missions. One of the attitude analysis processes is satellite attitude estimation, a process to estimate the attitude under the noise presence. Its role is to provide the estimate of the current attitude to be fed back into the controller for attitude control purpose. The accuracy of the estimated attitude is very important since it will be used for the attitude control purpose, which determines the successful of a specific satellite mission.

Early applications relied mostly on the Kalman filter for attitude estimation. Kalman filter was first applied for attitude estimation in 1960s for the Apollo space program [1]. Since these applications, several new approaches have been developed that have proven to be superior to the Kalman filter. Several of these approaches maintain the basic structure of the Kalman filter, but employ various modifications in order to improve other performance characteristics such as extended Kalman filter (EKF) and unscented Kalman filter (UKF) [2]. EKF is developed to estimate the state of the nonlinear system whereby the nonlinear equation is approximated by linearized equation through Taylor series expansion. However, for highly nonlinear model, the linearization of the underlying model can lead to particularly poor performance and may diverge [3]. A new approach called unscented Kalman filter (UKF) that has been introduced by Julier et al [4] is shown as an alternative to the EKF. UKF uses a deterministic sampling technique known as the unscented transform to pick a minimal set of sample points called sigma points to propagate the non-linear functions. This approach removes the need to explicitly calculate the Jacobians which is a daunting task [3]. UKF was first implemented in satellite attitude problem by Crassidis and Markley [5] and the simulation results indicated the performance of the UKF exceeds the standard EKF for large initialization case. However, these approaches assume the noise in the system model is Gaussian white noise process. Other approaches that do not require this assumption is particle filter which is developed by Gordon et al [6].

All the estimation algorithms mentioned above require dynamics model to estimate the state [3]. It is well-known that Kalman filter and its variation such as EKF, UKF etc assume the nature of the noise or errors in the dynamics model is Gaussian white noise [3]. However, in real application this is not always true [7]. Hence, it is the intention of this work to investigate whether the noise in the satellite attitude dynamics is Gaussian white noise or not. This is important because if the assumption regarding the noise is incorrect, this will lead to unreliable and inaccurate estimation [7]. Kalman filter has been found as most widely used algorithm for state estimation due to its simplicity for implementation and theoretically attractive in the sense that minimizes the variance of the estimation error. Hence, with advantage of having real attitude data from the world first remote sensing satellite launched into Near Equatorial Orbit (NEEqO), RazakSAT, the purpose of this work is to analyze the type of noise inherent in the dynamics model for the attitude estimation. With the knowledge regarding the underlying noise of the system, a more accurate estimation can be implemented for the next mission.

The rest of this paper is organized as follows: Section II is about the methodology including the detail descriptions of data collected, dynamics model of satellite attitude and Gaussian white noise; Section III is the result and some discussion; and lastly the conclusion is drawn in Section IV.

II. METHODOLOGY

A. Data of RazakSAT

RazakSAT is a Malaysian satellite and was successfully launched in 2009. It is the world first remote sensing satellite launched into Near Equatorial Orbit (NEqO) at 685 km altitude and 9 degrees inclination. It is a small satellite with mass of 180 kg. RazakSAT's mission was carrying a high resolution camera to provide images of Malaysia that can be applied to land management, resource development and forestry [8]. Figure 1 shows the structure of RazakSAT.



Figure 1: Structure of RazakSAT

RazakSAT was in normal sun pointing mode most of the times for maximum power generation and attitude maneuvers are required for the imaging mode as shown in Figure 2.

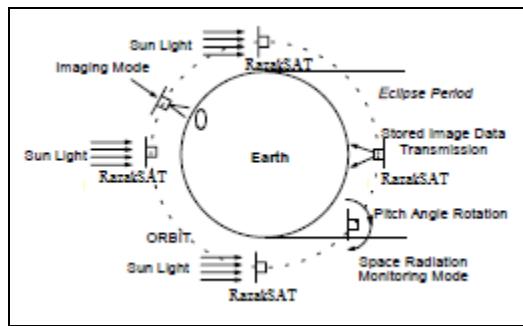


Figure 2: Operation modes of RazakSAT

During this mode operation, the angular velocity of the satellite is intended to be zero so that all its three solar panels face towards the sun for maximum power tracking. However the satellite is exposed to the environmental space disturbances that disturb its equilibrium state. The environmental space disturbances could arise from gravity gradient, aerodynamic, Earth magnetic, solar radiation pressure, etc. In practice, the angular velocity is measured by gyroscopes, and the measurement is feedback to the controller and hence input the commanded control torque to the actuator so that the actuator will counteract the exerted disturbances.

The data used in this work is during sun pointing mode about six consecutive orbits. The orbital rate of RazakSAT is 97 minutes per orbit. The data was provided by Astronautic Technology Sdn Bhd (ATSB), the Malaysian company that responsible for RazakSAT's mission.

B. Dynamics model of satellite attitude

The mathematical model of satellite attitude dynamics is given by Euler moment equation [9]

$$I\dot{\omega} + \omega \times I\omega = T \quad (1)$$

with $I = \text{diag}[I_x, I_y, I_z]$, $\dot{\omega} = [\dot{\omega}_x, \dot{\omega}_y, \dot{\omega}_z]$, $\omega = [\omega_x, \omega_y, \omega_z]$, $T = [T_x, T_y, T_z]$ represent satellite's moment of inertia, angular acceleration, angular velocity and total external torque respectively.

From the theory of differential equation, a system will remain in its equilibrium state unless external inputs, T exerted on the system and disturb the motion. In RazakSAT case during sun tracking mode, the angular velocity ω is intended to be zero and it will remain in its equilibrium state unless the disturbance torque disturb its motion. Hence it the intention of this work to analyze the disturbance torque that exerted on RazakSAT using the obtained angular velocity data.

C. Gaussian white noise

In this paper, the disturbances which represent the noise are analyzed whether they are Gaussian white noise or not. This is because if the underlying noise is not Gaussian white noise process, but the filtering designer insists to use Kalman filter due to its simplicity for implementation, this will lead to the inaccurate or unreliable estimation.

Gaussian or normal distribution is always being assumed as the underlying model in many applications such as engineering and economics areas. A Gaussian distribution is symmetric and bell-shaped. There are several techniques to assess the normal distribution of the data such as through a normality test, histogram plot, or normal probability plot (some refer as Normal Q-Q plot).

While, a process is called a white noise process if it is serially uncorrelated [10]. To test whether the data series is white or not is by using autocorrelation. For a given time series $\{x_1, x_2, \dots, x_n\}$ the autocorrelation function, ρ_k is defined as [10]

$$\rho_k = \frac{\text{Cov}(x_i, x_{i+k})}{\sqrt{\text{Var}(x_i)} \sqrt{\text{Var}(x_{i+k})}}, k = 1, 2, 3, \dots \quad (2)$$

It is white noise process if autocorrelation values are near zero statistically [3] which show there is no correlation between the series. Autocorrelation function of a data series can be computed and plotted with aid of SPSS or Minitab software.

III. RESULT AND DISCUSSION

Figure 3 shows the angular velocity measurements of RazakSAT during sun tracking mode. Instead of having zero values of angular velocity, some excitation of non-zero values are observed from the figure.

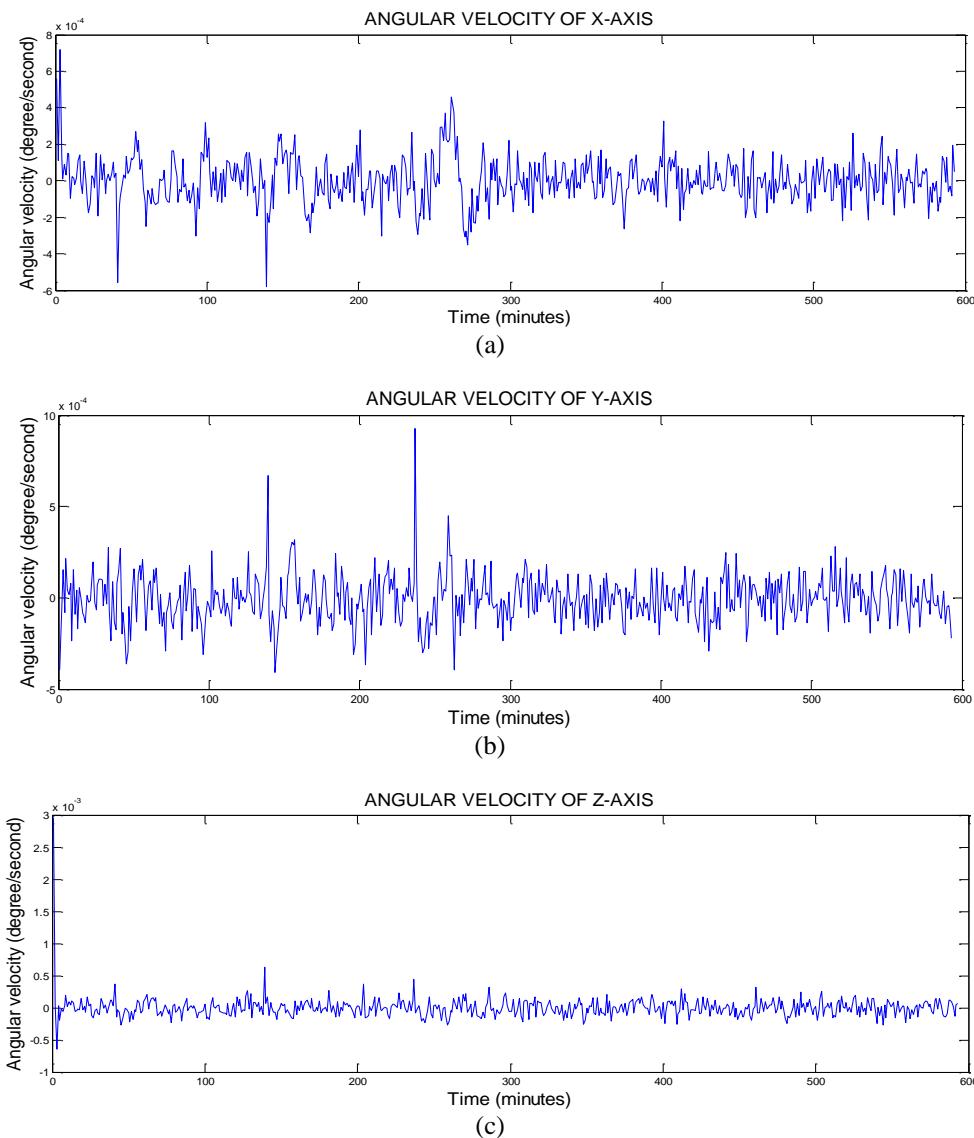


Figure 3: Angular velocity of RazakSAT during sun tracking mode for (a) X-axis, (b) Y-axis, (c) Z-axis.

In this work, Kolmogorov-Smirnov test is used to test for normality of the disturbance. The result of the test is shown in Table 1. From the table, the Sig. value is less than 0.05 for each axis, suggesting non-normality of the distribution.

Table 1: The results of Kolmogorov-Smirnov statistic.

	Kolmogorov-Smirnov test
--	-------------------------

	Statistic	df	Sig.
Angular velocity X-axis	.263	594	.000
Angular velocity Y-axis	.417	594	.000
Angular velocity Z-axis	.448	594	.000

The actual shape of the distribution for each axis can be seen in the histogram plot in Figure 4. For all axes, the disturbances appear to be non-normal distributed. This is also supported by an inspection of the normal probability plots (labeled as Normal Q-Q Plots) in Figure 5. In these plots the observed value for each axis is plotted against the expected value from the normal distribution. A reasonably straight line suggests a normal distribution. However in the plot for each axis they do not lie along the straight line, hence suggest the disturbances do not follow Gaussian distribution.

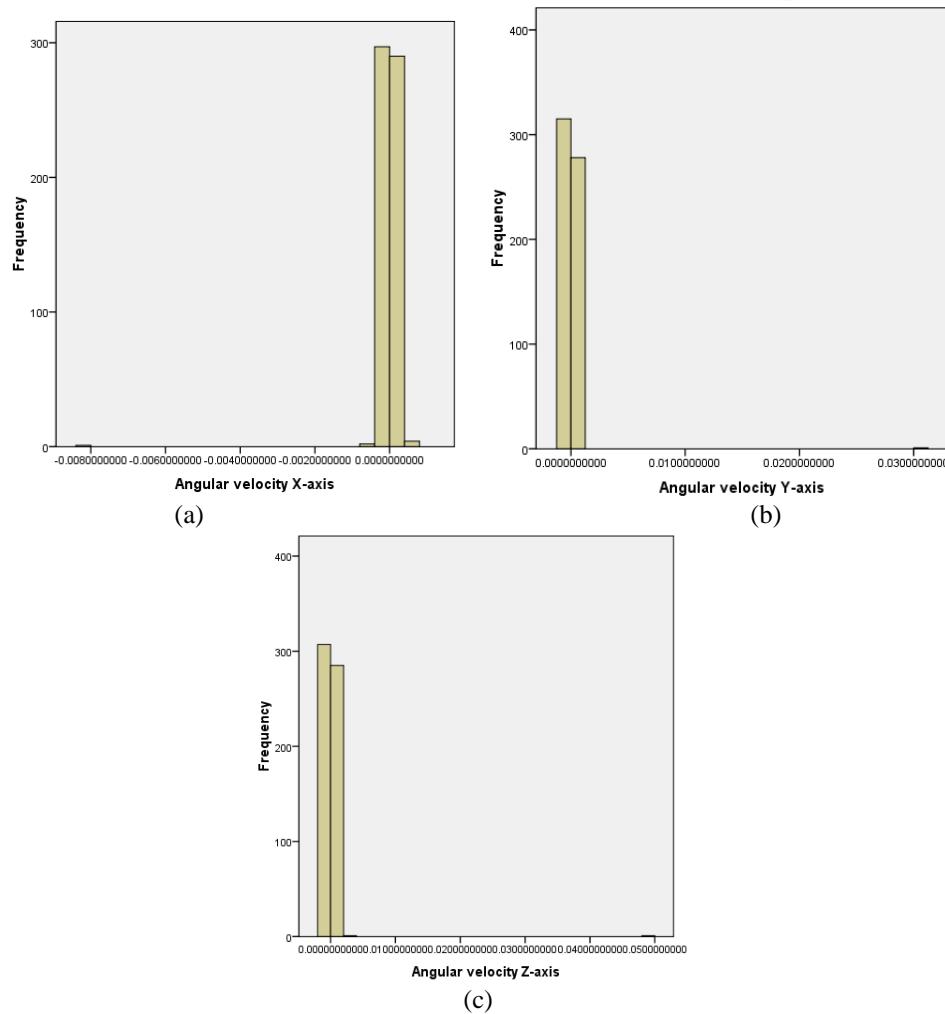


Figure 4: Histogram plot of the angular velocity (a) X-axis, (b) Y-axis, (c) Z-axis.

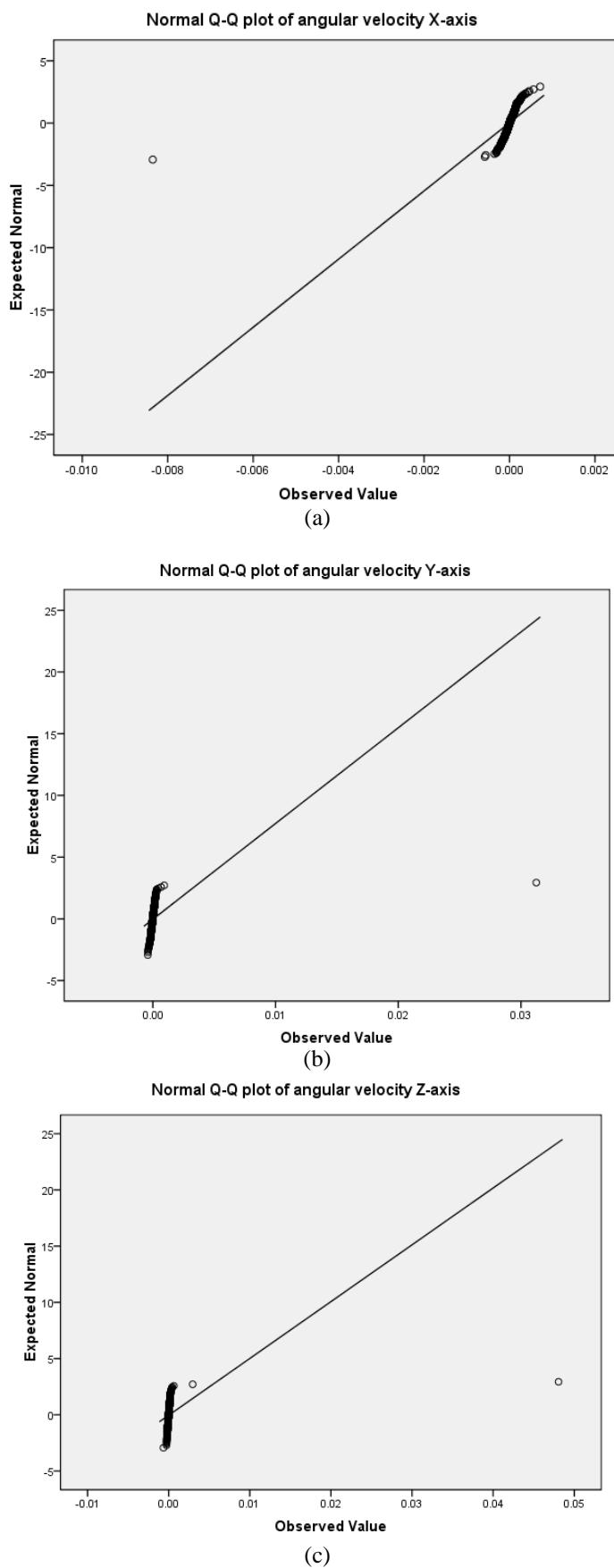


Figure 5: Normal Q-Q plot of the angular velocity (a) X-axis, (b) Y-axis, (c) Z-axis..

While the whiteness or randomness of the disturbance is assessed using autocorrelation function. The plot of autocorrelation function is shown in Figure 6. The figures show that most of the autocorrelation values lie in the rectangular dashed box, hence it can be said that all autocorrelation are approximately zero at 95% confidence interval. It is concluded that the dynamics model noise is random white noise process.

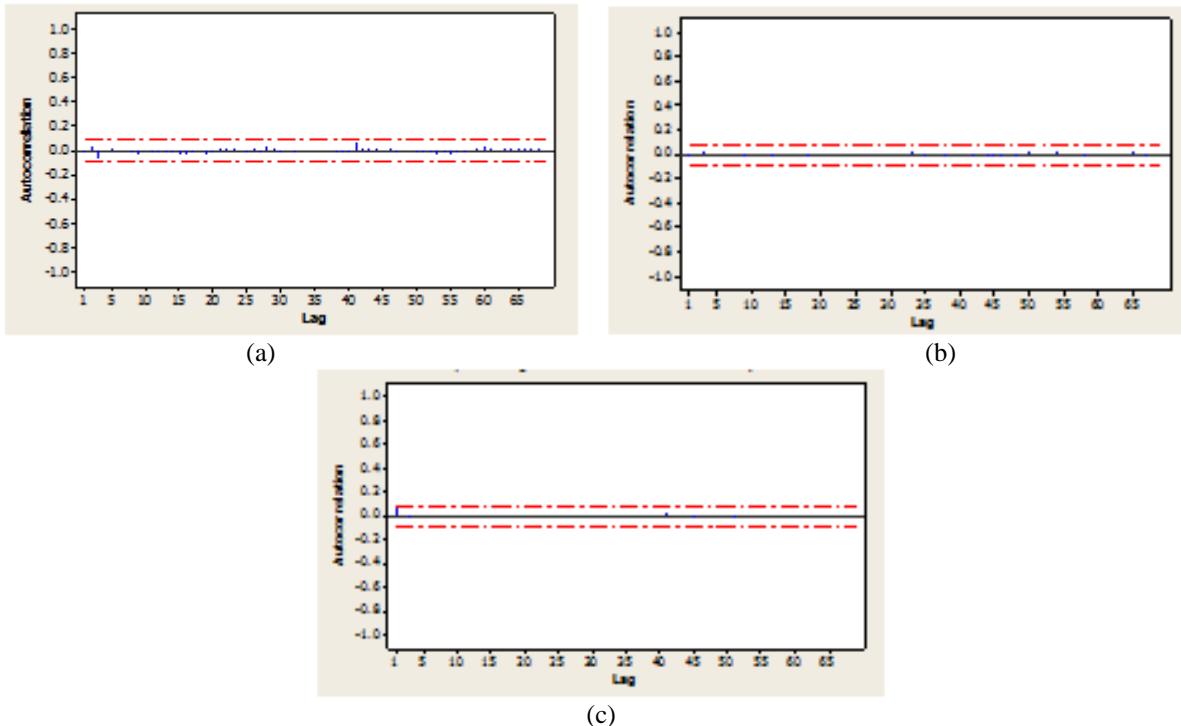


Figure 6: Autocorrelation function plot of angular velocity (a) X-axis, (b) Y-axis, (c) Z-axis.

IV. CONCLUSION

In this paper, the type of noise in dynamics model for satellite attitude estimation problem is investigated using real attitude data of Malaysian satellite. The mathematical model for satellite attitude dynamics has been presented and analysis of the error or noise has been assessed using normality characterizations and autocorrelation function. The results show that the noise in the satellite attitude dynamics model is not Gaussian white noise process. As implication, if Kalman filter is used in the ADCS for estimation algorithm, the estimation is not performing in optimal fashion because the assumption regarding the noise in the process is incorrect. Hence, for subsequent work a study on suitable filter which does not assume the underlying noise is Gaussian white noise is required.

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AUTHORS

First Author (Correspondence Author) – Nor Hazadura Hamzah received his MSc in Mathematics from Faculty of Sciences, University of Technology Malaysia, Malaysia in 2007. She is currently enrolled in the PhD programme in Mechatronics Engineering at University Malaysia Perlis, Malaysia. Her research interests include non-linear systems, observers, and spacecraft guidance, navigation and control systems. (hazadura@gmail.com)

Second Author – Prof. Dr. Sazali Yaacob received his MSc in System Engineering at University of Surrey and PhD in Control Engineering from University of Sheffield, UK in year 1987 and 1995, respectively. He is currently a Professor at University Malaysia Perlis. His research interests are in control, modelling and signal processing with applications in the fields of satellite, bio-medical, applied mechanics and robotics. (sazali22@yahoo.com)

Third Author – Dr. Hariharan Muthusamy, received his PhD in Biomedical Engineering from University Malaysia Perlis. He is currently a lecturer at University Malaysia Perlis. His research interests are in control, modelling and signal processing with applications in the field of bio-medical system. (hari@unimap.edu.my)

Fourth Author- Norhizam Hamzah, currently is a Senior Vice President at Astronautic Technology Sdn. Bhd. a Malaysian company under Government Linked Corporation, that responsible for Malaysian satellite missions. (hizam@atsb.my)

Acid fast staining in formalin-fixed tissue specimen of patients with extrapulmonary tuberculosis

Mohammad Nassaji¹, Ramin Azarhoush², Raheb Ghorbani³, Fateme Kavian⁴

¹Associate professor of Infectious diseases Research Center for Social Determinants of Health, Semnan University of Medical Sciences, Semnan, Iran

²Associate professor of Clinical Pathology, Department of pathology, Golestan University of Medical Sciences, Gorgan, Iran

³Professor of Biostatistics, Research Center for Social Determinants of Health ,Department of Community Medicine, Faculty of Medicine, Semnan University of Medical Sciences, Semnan, Iran

⁴Medical students, Students' Research Committee, Semnan University of Medical Sciences, Semnan, Iran

Abstract- Diagnosis of extrapulmonary tuberculosis (EPTB) is difficult owing to low number of bacilli in the specimens, lack of adequate sample and non-uniform distribution of bacteria in tissues. The aim of this study was to investigate the utility of acid-fast bacilli (AFB) staining in biopsy specimens with typical granulomatous inflammation in patients with extrapulmonary tuberculosis and some related predictors. This study included 226 tissue biopsies of patients with EPTB showing typical granulomatous inflammation. Ziehl-Neelsen staining was performed for acid fast bacilli on paraffin embedded sections of tissue blocks. The most common site of involvement was pleura followed by vertebral and lymph nodes. Past history of pulmonary tuberculosis was positive in 46% of patients. The overall AFB positivity in specimens was 26.1%. The most positivity was in pleural TB (35.2%) and the least was in bone and joints TB (4.8%). There was significant association between site of involvement and AFB positivity ($p=0.042$). In multivariate logistic regression model, previous history of pulmonary tuberculosis was strongly associated with AFB positivity. Our study showed somewhat higher rate of smear positivity for acid fast bacilli in tissue specimen with typical pathology in some types of EPTB especially in patients with history of pulmonary tuberculosis. Despite low sensitivity, this method should be performed in patients suspected to EPTB especially in developing countries where new modality is not routinely available.

Index Terms- Acid-fast bacilli, Extrapulmonary tuberculosis, Formalin-fixed tissue, Ziehl-Neelsen staining

I. INTRODUCTION

Tuberculosis (TB) remains one of the most important infectious diseases affecting human. Despite longstanding intense efforts to conquer tuberculosis, this disease still is an important global health problem and is a major cause of death worldwide.¹

Extrapulmonary tuberculosis (EPTB), like pulmonary TB is a significant health problem in both developing and developed countries. Over the last several years, the number and proportion reported cases with EPTB was increasing.² Human immunodeficiency virus infection has been identified as a major risk factor that is associated with increase in EPTB incidence.³ EPTB accounts for 15-20% of tuberculosis cases in areas with low HIV prevalence. It can increase up to 50% in patients with

concurrent AIDS and tuberculosis. The frequencies of different clinical sites affected by tuberculosis vary from one to another population.⁴ Clinical manifestations of EPTB are so protean that diagnosis is often delayed and depends on the physician considering the possibility of disease in patients. Laboratory diagnosis of EPTB is also difficult owing to low number of bacilli in the most specimens, lack of adequate clinical sample and non-uniform distribution of bacteria in tissues.⁵

Several methods are used for the diagnosis of EPTB such as imaging, pathological examination, smear microscopy, mycobacterial culture and nucleic acid amplification tests.⁶ Culture is the standard method for diagnosing of mycobacterial infection from tissue, but still require many weeks for final results. The first step in the diagnosis of mycobacterial infection is microscopic examination of a smear prepared from a specimen and stained for acid-fast bacilli (AFB). The stained smear is the easiest and quickest procedure that can be performed for diagnosis of TB and is economical especially in developing countries.⁷ The Ziehl-Neelsen (ZN) staining method has commonly been used for AFB demonstration in smears around the world. In this method, a fixed smear covered with carbolfuchsin is heated, rinsed, decolorized with acid-alcohol, and counterstained with methylene blue.⁸

In EPTB pathological findings and histological detection of acid-fast bacilli (AFB) in tissue is two way to support or confirm the presence of disease.⁹ Despite widely use of smear microscopy in the diagnosis of EPTB, it has limitations due to low and variable sensitivity and specificity values. Various studies reported different sensitivity for this method.¹⁰

Another way for diagnosis of EPTB is by histopathological examination of tissue sample for the presence of granulomatous inflammation and caseous necrosis. Typical granuloma of TB infection consisting of central, infected macrophages, surrounded by epithelioid macrophages, foam cells, and multinucleated giant cells of the Langhans type, with peripheral fibrous capsule.¹¹

Several previous studies have examined the utility of AFB staining in EPTB. However, these studies reported different rate of smear positivity. Some of the studies included only cytology smear specimens especially in patients with tuberculosis lymphadenopathy. On the other hands most previous study conducted on small number of patients and or on one type of EPTB.¹²⁻¹⁶

The purpose of this study was to evaluate demonstration of acid fast bacilli in tissues section showing typical histopathological features of tuberculosis (highly suggestive) in

patients with EPTB using ZN staining method. Another aim was to evaluate some probable predictors of staining positivity in these patients.

II. MATERIAL AND METHODS

The study material comprised tissue specimens from patients with EPTB collected during the period from 2003 until 2012. The study was performed in a university affiliated hospital in Golestan province north-east of Iran that is referral center for EPTB. This province has high prevalence of tuberculosis. Diagnosis of EPTB was based on clinical, imaging, typical histological findings (highly suggestive) of TB in tissue and response to treatment in accordance with WHO diagnostic criteria.⁴ All histological tissues that showed the presence of granulomatous inflammation with epithelioid cells, Langerhans type giant cells, and caseation necrosis were considered as typical (highly suggestive).

The clinical and demographic records were also retrieved about patients included age at diagnosis, gender, co-morbidity, site of involvement by EPTB and previous history of pulmonary tuberculosis. Previous co-morbidities variables included in study were diabetes, malignancy, collagen vascular diseases and chronic renal failure.

Formalin-fixed, paraffin-embedded tissue blocks from patients with EPTB and typical pathologic findings were included in this study. All samples were obtained from the patients before treatment with anti-tuberculosis drugs.

Ziehl-Neelsen staining (Merck, Germany) was performed for acid fast bacilli on sections of tissue blocks. All ZN-stained smears were examined under a conventional light microscope (oil immersion objective) by one pathologist. Cases with any missing information or inappropriate tissue specimen were excluded.

The study protocol was approved by Research Council and Ethical Committee of the Semnan University of Medical Science.

III. STATISTICAL ANALYSIS

Data were analyzed by using Chi-square test and logistic regression analysis using SPSS Version 16.00(SPSS, Inc., Chicago, IL). The p-value less than 0.05 were considered statistically significant.

IV. RESULTS

We finally studied 226 blocks of formalin-fixed, paraffin-embedded tissue from same numbers of patients with diagnosis of EPTB. From all patients that fulfilled inclusion criteria 105 (46.5%) were male. The mean (\pm SD) age of patients was 38.9 \pm 19.5 years (range 4-85years). Co-morbidities were found in 48 (21.8%) patients.

Previous history of pulmonary tuberculosis was positive in 104 (46%) of patients. History of TB was more common in patients with peritoneal (71.4%, 161/226), spinal (60.5%, 136/226) and pleural (50.8%, 114/226) involvement. The least history was positive in patients with gastrointestinal TB (18.8%, 42/226).

Pleura was the most common site of involvement followed by vertebral. Table 1 outlines the various sites of involvements for the patients with EPTB. The overall AFB positivity by ZN staining in specimens was 26.1% (95% CI: 20.4%-31.8%). The most AFB positivity was in pleural TB (35.2%) and the least was in bone and joints TB (4.8%). There was significant association between site of involvement and AFB positivity ($p=0.042$).

In patients with previous history of pulmonary tuberculosis AFB was positive in 50% (113) of samples. Whereas, in those without history only in 5.7 % (13) was positive ($p<0.001$). Table 2 shows AFB positivity and its correlation with patients' characteristics.

After adjustment for potential confounders in a multivariate logistic regression model, previous history of pulmonary tuberculosis remained strongly associated with AFB positivity ($OR=15.77$, 95% CI: 6.68-37.26, $p<0.001$).

V. DISCUSSION

The diagnosis of EPTB is a challenging problem for clinicians. In most types of EPTB conventional diagnosis of mycobacterial infections is based on the detection of acid-fast bacilli in histological specimens. But, searching for tubercle bacilli in tissue sections is laborious because the numbers of bacilli are usually few.¹⁷ Positive smear results in conjunction with clinical and radiologic findings can be used for presumptive diagnosis of tuberculosis, which is the common practice in many developing countries.⁹

The distribution of various types of EPTB has varied among different populations and countries. In our study among the patients that selected by typical pathology the most common site of involvement was pleura followed by vertebra and lymph nodes. In contrast to our finding most previous studies reported that tuberculous lymphadenitis is the most common type of EPTB.¹⁸⁻²¹ Others studies reported different results. In a study on Turkish patients the most commonly seen types of EPTB were genitourinary (27.2%) and meningeal TB (19.4%).²² Another study performed on 85 culture-proven EPTB cases in Arkansas showed that bone and/or joint tuberculosis was the most common type of extrapulmonary tuberculosis (27.1%).²³ Methodological differences, such as the difference in the inclusion criteria and type of sample selection can be possible reasons for the various distribution of EPTB in different population. We only included tuberculosis lymphadenopathy that was detected by excisional biopsy and typical pathology. But most other researcher used fine needle aspiration for diagnosis of tuberculous adenitis in their study.

Previous history of pulmonary tuberculosis was positive in 46% of our patients. Cagatay et al in their study reported that of 252 patients, 55 (21.8%) had a previous history of pulmonary tuberculosis.¹⁹ In another study that conducted on 312 patients with EPTB, 15.4% of patients had history of pulmonary TB.²⁴

Various studies conducted in the past have shown different sensitivities for ZN staining in diagnosis of EPTB. The overall AFB positivity in our specimens was 26.1%. Most previous studies reported lower rate of AFB positivity in patients with EPTB. In a study on 252 immunocompetent adult patients with extrapulmonary tuberculosis, staining was positive in 17.8% of patients.¹⁹ In another study the overall sensitivity of conventional

smear microscopy was only 3.9% (three of 76) for detecting EPTB.⁵ Salian et al have shown 25% (15/60) positivity by acid-fast staining of histological specimens.²⁵ A study conducted on 182 samples from suspected EPTB cases for testing of M. tuberculosis by different methods. Results showed that ZN staining was positive in 3.3% of samples.²⁶

Few studies reported somewhat higher sensitivity. Mahaisavariya et al evaluated one hundred and thirty-one tissue blocks with AFB staining and PCR. The causative organisms were identified by AFB staining in pathologic sections in 31.29% of specimens.²⁷ Another study conducted on the archival formalin fixed paraffin embedded tissue sections of patients with EPTB showed that AFB positivity was observed in 36.1% of tissue with tuberculous granulomas.²⁸ Different sample selection can be a reason explaining this varied results.

Our study illustrated that site of involvement is significantly associated with rate of AFB positivity. The AFB staining was more positive in specimens of pleural TB (35.2%) and least in bone and joints (4.8%). In Cagatay et al study the most positivity was in pleural TB (33.3%) and the least in peritoneal (10%).¹⁹ more previous studies reported lower sensitivity for pleural TB. Chakravorty et al in their study evaluated 99 extrapulmonary specimens collected from 87 patients with different methods. Pleural tissue smear was positive in 12.5% of specimens.⁵ In another study from 36 patients with pleural TB, 9.3% had positive direct examination.²⁹ Hasaneen et al reported that ZN staining results of biopsy specimens were positive in only 1 of 26(3.8%) patients with pleural tuberculosis.³⁰

Second rate of positivity in our study was lymph node biopsy (31%). This finding is compatible with some previous studies. In Patwardhan et al study, biopsies of 65 patients with tubercular lymphadenopathy were evaluated for comparison of various laboratory diagnostic modalities. Twenty (30.7%) of tissue samples were positive on ZN staining.¹⁴ In a retrospective study clinical and laboratory data of 141 patients with EPTB were evaluated by authors. Acid-Fast Stain staining was positive in 30% of Lymph node samples.³¹ In contrast in a study conducted on 100 patients with diagnosis of lymph node tuberculosis by histopathology, only 3% of biopsies were positive in the ZN staining.¹³

Vertebral biopsy showed AFB in 30.2% of ours cases. Similarly, in a study that included patients with tuberculous spondylitis, 30% of biopsies were positive for acid-fast bacilli on staining.³² In another study 25% of surgical biopsies compatible with vertebral tuberculosis were positive for AFB.³³

In cutaneous specimens AFB was positive in 12.5% of our cases. In comparison with this finding, one study on skin specimens demonstrated that 13.8% of biopsy specimens from patients with lesions compatible with tuberculosis of the skin had a positive AFB.¹⁵ Other authors reported 5.8%, 15.8% and 25.8% AFB positivity in patients with cutaneous tuberculosis.^{34, 16, 35}

One striking finding in our study was the significant association of previous history of pulmonary tuberculosis with AFB positivity. Half of the samples from patients with this history were positive in staining. Also multivariate analysis showed statistically significant association between AFB positivity and history of pulmonary tuberculosis. This may be to immunological status of patients that experienced two episode of

tuberculosis. More research about this finding is recommended in future studies.

The strength of study was the selection of tissue compatible with typical tuberculosis histology. In this study, culture was not used as a reference for comparison of sensitivity and specificity of AFB staining. This is one limitation of this study.

VI. CONCLUSION

Although our study showed somewhat higher rate of smear positivity for detecting AFB in tissue specimen with typical pathology in some types of EPTB, nevertheless, it is low when compared with culture and PCR. Past history of pulmonary TB may be considered as predictor factor that increase the sensitivity of AFS. Despite low sensitivity, acid-fast staining should be performed on all tissue in patients suspected to EPTB especially in developing countries where new modality like PCR and mycobacterial culture is not routinely available. Another reason for use of the acid-fast staining is the rapid time and low cost compared with culture and PCR. A positive AFS helps the clinician for initiating treatment much earlier while waiting for culture results. Finally, it is better to utilize a combination of all the available tests for the diagnosis, which provide maximum useful information to the clinicians.

ACKNOWLEDGEMENT

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Table 1. Distribution of organ involvement in patients with extrapulmonary tuberculosis

organ	Number	Percentage
Pleural	65	28.8
Vertebral	43	19.0
Lymphadenopathy	29	12.8
Bone and joints	21	9.3
Gastrointestinal	16	7.3
Cutaneous	8	3.6
Peritoneal	7	3.2
Genital	5	2.3
breast	4	1.8
Urinary	3	1.4
Others	25	11.0

Table 2. Acid fast bacilli positivity and its correlation with patients' characteristics.

Characteristic	n	Acid fast		p-value
		Positive	n (%)	
Gender				
Male	105	25(23.8)	NS(0.464)	
Female	121	34(28.1)		
Age(year)				
<20	33	8(24.2)		
20-29	51	15(29.4)		
30-39	37	11(29.7)	NS(0.464)	
40-49	25	4(16.0)		
50-59	37	7(18.9)		
60-69	24	5(20.8)		
70≥	19	9(47.3)		
TB History				
+	104	52(50.0)	< 0.001	
-	122	7(5.7)		
Co-morbidity				
+	48	17(35.4)	NS(0.098)	
-	178	42(23.6)		
TB Location				
Pleura	65	23(35.2)		
Vertebral	43	13(30.2)		
Lymph node	29	9(31.0)		
Bone & Joint	21	1(4.8)	0.042	
Gastrointestinal	16	1(6.2)		
Cutaneous	8	1(12.5)		
Peritoneal	7	2(28.6)		
Other site	37	5(13.5)		

NS: not significant

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AUTHORS

First author-Mohammad Nassaji*, Associate professor of Infectious diseases, Research Center for Social Determinants of Health, Faculty of Medicine, Semnan University of Medical Sciences, Semnan, Iran.

Second author- Ramin Azarhoush, Associate professor of Clinical Pathology, Department of pathology, Golestan University of Medical Sciences, Gorgan, Iran.

Third author- Raheb Ghorbani, Professor of Biostatistics, Research Center for Social Determinants of Health, Department of Community Medicine, Faculty of Medicine, Semnan University of Medical Sciences, Semnan, Iran.

Fourth author- Fateme Kavian, Students' Research Committee, Semnan University of Medical Sciences, Semnan, Iran.

Corresponding Author: Mohammad Nassaji, Kowsar Hospital, Basij Blvd, Semnan, Iran, hnassaji@yahoo.com, mnzmohammad@gmail.com

Tel: +98 2333437821, Mobile: +98 09121318640

Modeling & Testing of Automatic Pneumatic Sliding Door Using Sensors & Controllers

Ashis Mohapatra, Aman Anand

¹(Department of Mechanical & Manufacturing Engineering, Manipal University , India)
²(Department of Mechanical & Manufacturing Engineering, Manipal University , India)

Abstract- Automatic Pneumatic Door Using IR Sensors, serves to automate the mechanism of door operation using Pneumatic, Arduino microcontroller and infrared sensor technology.

The methodology applied in the project is divided into three parts, firstly designing and fabrication of the door with the calculated dimensions, secondly, developing a program on the Arduino for door operation and thirdly, interfacing the different components to work together in a cohesive manner.

When an object comes in or goes out of the range of the sensor, a signal is sent to the Arduino which controls the electro-pneumatic circuit to open or close the door. The significance of this system is automation of the door which can be customized according to the industrial, commercial or domestic requirements.

Based on the results obtained a small prototype was designed and a suitable code was developed taking into account the ambient light conditions

Index Terms- Automatic Sliding Door , Arduino Controlled Door, Electro-Pneumatics , IR Proximity sensor applications , Mechatronics Application in Home & Industry

I. INTRODUCTION

Automation, as defined by the Automation Federation, is “the creation and application of technology to monitor and control the production and delivery of products and services.” With respect to doors, Automation is generally reserved for two purposes, accommodating high flows of pedestrian traffic and providing accessibility for people with disabilities. In this chapter, we will briefly discuss the various fields incorporated in our project, objectives, motivation, the work schedule and the organization of the report. The automatic pneumatic door consists of a sliding mechanism which is pneumatically operated, uses IR proximity sensors to serve as input and a microcontroller to provide the required logic. The project incorporates the various fields, viz., Pneumatics, Microcontrollers, Sensor Technology and Carpentry, to ensure smooth and hassle free door operation. Pneumatics is a branch of technology that deals with the study and application of pressurized gas to effect mechanical motion. In this system a centrally located and electrically powered compressor is used that powers cylinders and other pneumatic devices through solenoid valves. A microcontroller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. An infrared proximity sensor is a sensor able to detect the presence

of nearby objects without any physical contact. This sensor uses infrared light wave to detect the object in front .

1.1 MOTIVATION

The main reason which motivated us to take up this project is the growing demand of automation in the industrial and commercial space. But these needs can't be fulfilled at the cost of degrading the environment. In keeping up with the idea of a green industry, pneumatic systems provide a far better alternative. Pneumatic systems are cleaner, more efficient and require lesser maintenance as compared to their traditional counterparts. Also, as stated earlier, automatic doors help reduce congestion and aid people with disabilities. These doors can also be installed with different security measures for enhanced safety.

1.2 OBJECTIVE

The objective of this project is to design and fabricate an automatic pneumatic door using IR proximity sensors. The door is to open automatically upon detecting a person standing in front of it, and after the person has passed through, should close automatically. The door opens only after the person is present for a stipulated amount of time. If, after detecting a person in front of it, the person does not cross the door and goes in some other direction, then the door should close after a preset “timeout” limit. We are using microcontroller/Arduino to provide the logic for the operation of the door. One major advantage of using the microcontroller/Arduino is that we can use the same door for different applications just by altering the programming logic without any change in the hardware. In this project we are designing a basic prototype of the automatic pneumatic sliding door which can be modified for various industrial and commercial purposes.

II. METHODOLOGY

The door is designed to slide on appropriate slider and works on pneumatic air pressure. It consists of two IR proximity sensors which sense the presence of obstacle in their way. Each sensor consists of an emitter and receptor unit. When the signal from the emitter is obstructed it signifies the presence of an obstacle. The signal from IR sensors is the input of the Arduino .This signal goes to the Arduino which has a specific program written for it. The pneumatic actuator works according to the set of codes in Arduino .The cylinders retract when the obstruction is detected by the IR sensors thus opening the door and expands when the obstacle has been detected by the second IR sensor located on the other side. This pneumatic operation is controlled

by suitable electro-pneumatic circuit. The 2nd IR sensor is installed at the other end of the door. It senses whether the object which came in through the door has passed out of it successfully. This signal is sent to the Arduino and it has set of codes to control this operation.

2.1. MAKING OF THE SLIDING DOOR

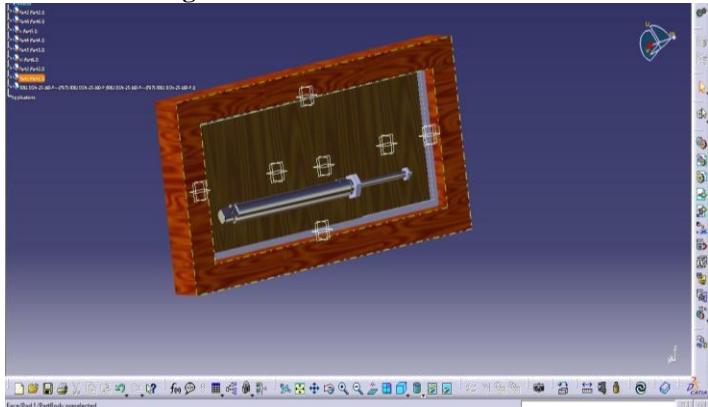
2.1.1. WOODEN FRAME

The wooden frames are made up six different wood pieces which are initially cut into approximate length and planned to get a smooth and parallel surface. The four pieces are joined in such a way that it forms a rectangular shape in order to accommodate two doors. Two more pieces of wood are used as stand so that the door frame can be clamped inside it and the door doesn't topple. The four frames are joined together using four dovetail joints. Then glue and nails are used to clamp the joints together and increase the strength of the dovetail joints.

2.1.2 SLIDING DOOR AND GLASS SLIDING CHANNEL

The doors are made in such a dimension that it suits the wooden frame slot. The door is made of plywood according to the required dimension. Glass sliding channels (E-channels) are fixed in the inner side of the rectangular frame using nails so that the plywood sheets can easily slide on them.

Fig 2.1 CATIA 3-D model of the Door



2.1.3. MOUNTING OF THE CYLINDER

The door consists of a fixed part and a movable part. The pneumatic cylinder is mounted on the fixed part using bolts and nuts. The piston is clamped to the movable part using a 2 inch L clamp and using suitable dimension of nuts and bolts. By clamping this movable part of the door moves according to the movement of the piston i.e. the door closes when the piston expands and the door closes when the piston retracts.

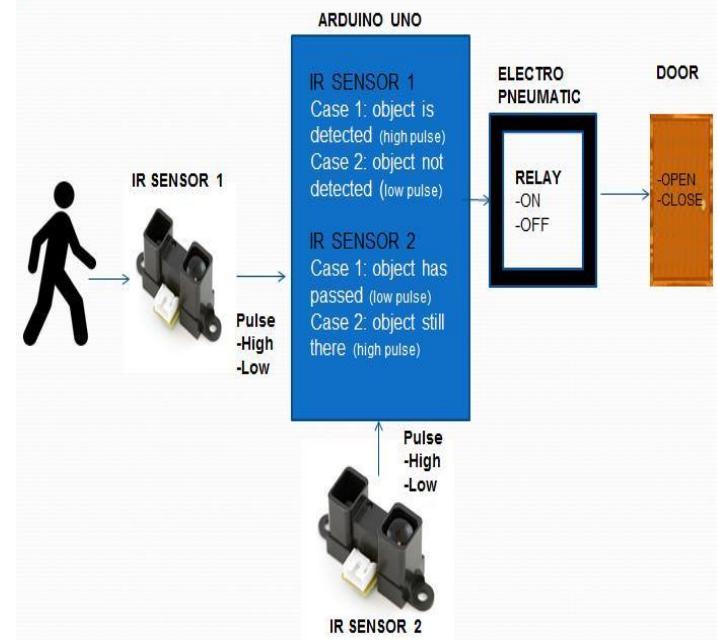
2.1.4 MOUNTING OF IR PROXIMITY SENSORS

There are two infrared sensors mounted on the both sides of the door. The sensor consists of an emitter and receptor unit. When the signal from the emitter is received by the receptor it signifies the presence of an obstacle. The signal from IR sensors is the input of the Arduino. This signal goes to the Arduino which has a specific program written for it.

2.1.5. DEVELOPING ALGORITHM AND CODES FOR ARDUINO

The basic setup for the programming consists of two IR proximity sensors mounted on either side of the door.

fig 2.2 Schematic diagram depicting the logic of program



- The sensor gives different output signals to the Arduino depending upon the presence or absence of an object, the value of which differs in different ambient light conditions.
- If no object is present in front of the IR sensor then it gives a value ranging from 0-100 (subject to ambient light conditions). When the object is detected by the IR sensors then this value increases to 250-400 (subject to ambient light conditions).
- The Arduino has a condition written for values which are greater than 300 and values which are less than the 300 mark. (subject to ambient light conditions)
- When there is no object present in front of the IR sensor 1 (which is mounted on the entry side of the door), a signal whose value ranges from 0 to 100 is sent to the Arduino.
- When the IR sensor 1 detects an object in front of it and the object stays there for minimum of 20 milliseconds, a signal is sent to the Arduino whose value is greater than 300 (subject to ambient light conditions).
- When a signal of value less than 300 is received by the Arduino, it generates 0V output to the relay.

- When a signal of value greater than 300 is received by the Arduino, it generates a 5V output which is sent to the relay.
- A 5 V output by the Arduino actuates the solenoid which in turn causes the piston of the cylinder, thereby opening the door.
- On the other hand a 0V output causes no change in the position of the piston cylinder.

The same logic is applied to IR sensor 2 mounted on the exit side of the door

2.1.6. ARDUINO PROGRAM FOR THE ABOVE LOGIC

```

int opened=0;

int outerSensor=0; int innerSensor=0; int countIn=0;

int countOut=0; int inSense=0; int outSense=0; int entering=0;
int exiting=0; int cycleLock=0; int timeout=0;

int delayLoop=0;

void setup(void) { Serial.begin(9600); pinMode(2, OUTPUT);
pinMode(3, OUTPUT); pinMode(4,OUTPUT);
digitalWrite(4,HIGH);

}

void loop() { outerSensor=analogRead(A1); //delay(500);
innerSensor=analogRead(A0); Serial.println("a0");
Serial.println(innerSensor); //delay(1000); //Serial.println("a1");

// Serial.println(outerSensor);

// If outer sensor detects something, wait for 20 positives
// before setting flag

if (outerSensor > 300) { countOut++;

if (countOut > 20) { outSense=1;

}

} else { countOut=0;

}

// Same again for the inside sensor, but with different sensitivity
if (innerSensor >300) {

countIn++;

if (countIn > 20) { inSense=1;

}

} else { countIn=0;

}

}

if (timeout > 0) { timeout--;

}

// If the sensor is triggered for the first time, open the door
if ((outSense == 1) && (timeout == 0)) {

entering=1;

openDoor();

} else if ((inSense == 1) && (timeout == 0)) { exiting=1;

openDoor();

}

// This one is for entering from outside to inside - wait
// until the inner sensor is triggered before closing...

if (entering > 0) {

entering++;

if (inSense == 1) { closeDoor(); timeout=200; entering=0;
exiting=0;

}

}

// Or until the timeout is reached if (entering > 1000) {

entering=0;

exiting=0;

```

```

closeDoor();

timeout=200;

}

// Same again but the other way around...

if (exiting > 0) { exiting++;

if (outSense == 1) { closeDoor(); timeout=200; exiting=0;
entering=0;

}

if (exiting > 1000) { exiting=0; entering=0; closeDoor();
timeout=200;

}

inSense=0;

outSense=0;

}

```

// The open and close door routines - these trigger a relay which in turn supplies 24V to the pneumatic solenoids...timings are slightly different and tuned to the door characteristics

```

void openDoor() {

digitalWrite(3, HIGH); delay(1100); digitalWrite(3, LOW);

}

void closeDoor()

{

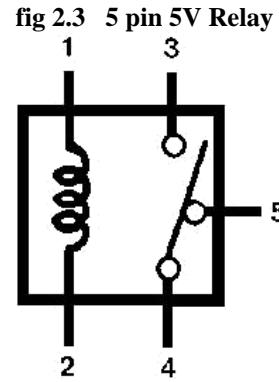
digitalWrite(2, HIGH); delay(750); digitalWrite(2, LOW);

}

```

2.1.7. INTERFACING ARDUINO WITH ELECTRO-PNEUMATIC SYSTEM

Arduino is a microcontroller which generates an output of 5V dc, but the solenoid requires 24V dc to get actuated. The main challenge faced was to operate the solenoid with 5V dc supply. This was solved by using 5 pin 5V relay.

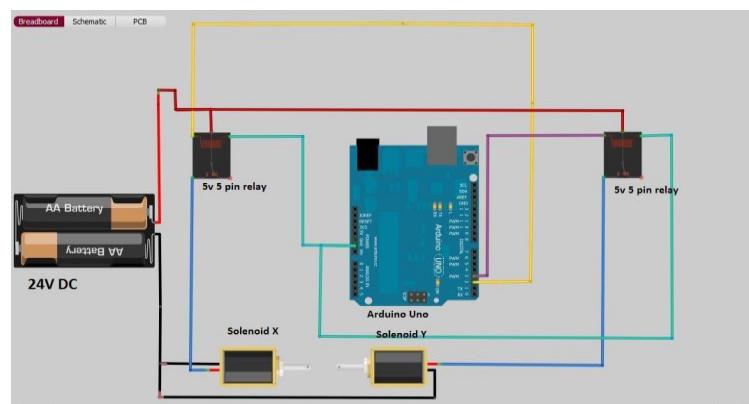


A 5 pin 5V relay is a switching device consisting of 5 pins. Pin no. 1 is connected to the 5V power supply from Arduino; pin no. 2 is connected to the ground of Arduino. Pin no. 5 is left open as it is normally closed, pin no. 5 is connected to 24V dc power supply and pin no. 3 is connected to the solenoid.

When a 5V signal is sent from Arduino to the pin 1, an electromagnetic field is generated which attracts the contact to the pin no. 3. Thus the normally closed circuit becomes open and 24V power supply passes through the solenoid. Due to this the solenoid gets activated and further the pneumatic cylinder gets actuated.

When a 0V signal is sent from the Arduino to the pin 1 the electromagnetic field is depleted and the contact switches from pin 3 to 5, and power supply to the solenoid is switched off.

fig 2.4 Electrical Schematic Showing the Logic and the Components used



2.1.8. JUSTIFICATION FOR THE MATERIALS USED

Pneumatic systems provide power in a cheaper, safer, more flexible, environment friendly and more reliable way than the orthodox [electric motors](#) and [actuators](#).

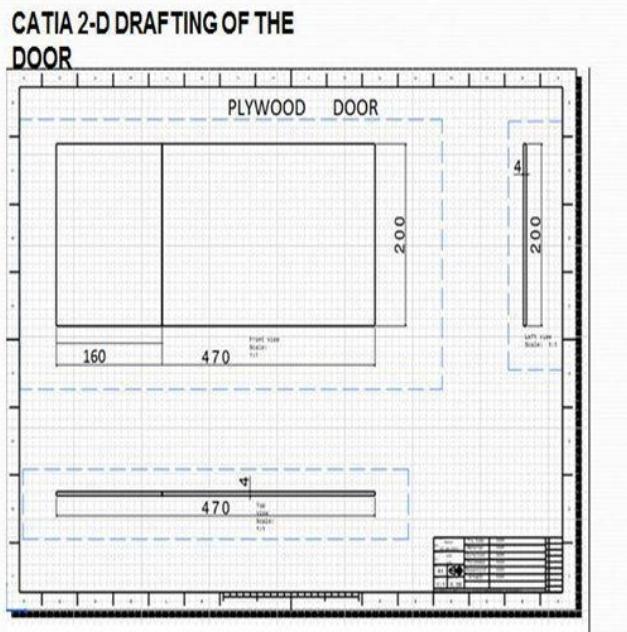
We are designing a pneumatically operated automatic door using infrared proximity sensors as these are cheaper, responsive and have a greater range of application compared to other variety of sensors. Moreover it is cheaper and effective compared to other sensors.

We are using Arduino to provide the logic for the operation of the door. One major advantage of using the Arduino is that we can use the same door for different applications just by altering the programming logic without any change in the hardware. Using an Arduino simplifies the amount of hardware and

software development one needs to do in order to get a system running. Using an Arduino simplifies the amount of hardware and software development you need to do in order to get a system running. On the software side, Arduino provides a number of libraries to make programming the microcontroller easier. The simplest of these are functions to control and read the I/O pins rather than having to fiddle with the bus/bit masks normally used to interface with the Atmega I/O. More useful are things such as being able to set I/O pins to PWM at a certain duty cycle using a single command or doing Serial communication.

There is an overlapping of 10mm between the moving and the fixed panels.

fig 3.1 CATIA 2-D drafting of the door with dimensions



Interfacing was done between the Arduino and electro pneumatic components. When an object was kept in front of the IR sensor 1, the solenoid responsible for opening of door, got activated which led to actuation of the pneumatic cylinder and the door was open. Then the object was kept in front of the IR sensor 2, the solenoid responsible for closing of the door got activated and the door was closed.

In this project we are designing a basic prototype of the automatic pneumatic sliding door which can be modified for various industrial and commercial purposes.

We have used double acting cylinder instead of single acting cylinder. A double acting cylinder can be controlled in both extended and retracted conditions, while a single acting cylinder can be controlled in only one direction. Also, a double acting cylinder needs air supply only once to maintain its position whereas a single acting cylinder needs continuous supply of air to remain in extended mode.

The Arduino can give only 5 V power supply, but we need 24 V power supply to activate the solenoid. For this we have used 5V 5 pin relays. By using relays we can provide 24V power supply to the solenoids indirectly.

2.1.9. TOOLS REQUIRED

2.1.9.1 MECHANICAL & PNEUMATIC TOOLS AND COMPONENTS

1. Pressure source
2. Pneumatic cylinder
3. Pneumatic compressor
4. 5/2 solenoid valve
5. Connecting pipe
6. Wooden reaper-planed ben teak wood
7. Glass sliding channels
8. Plywood sheets
9. Carpentry equipment
10. Drill bit

2.1.9.2. ELECTRICAL COMPONENTS

1. Arduino/ microcontroller
2. Two IR proximity sensors
3. Two 5V 5pin relay switches
4. Soldering equipment
5. Jumper wires
6. Single core connecting wires
7. 24 V dc supply
8. Banana pin
9. Bread board

III. RESULT ANALYSIS

3.1 RESULT

The door was fabricated in the carpentry workshop and was tested in the automation laboratory. The piston length of the cylinder is 160 mm. Keeping this in consideration; the following dimensions were decided for the door:

- Length of the frame: 500mm
- Height of the frame: 210mm
- Width of the frame: 60mm
- Length of fixed panel: 320mm
- Height of the fixed panel: 200mm
- Width of the moving panel: 4mm
- Length of moving panel: 160mm
- Height of the moving panel: 200mm
- Width of the moving panel: 4mm

3.2. READINGS

Following readings are obtained on the serial monitor

1. *Case 1:* when no object is present in front of sensor 1 and sensor

```
a0
34
a1
40
a0
45
a1
50
a0
45
a1
68
a0
50
```

fig3.1 Arduino Reading of Case-1
a0- Reading of IR sensor-1
a1- Reading of IR sensor-2

```
a0
398
a1
56
a0
432
a1
45
a0
395
a1
65
a0
419
```

fig3.3 Arduino Reading of Case-3
a0- Reading of IR sensor-1
a1- Reading of IR sensor-2

2. Case 2: when the object is in front of the sensor on the entry side and there is no object in front of sensor on the exit side

```
a0
51
a1
420
a0
47
a1
389
a0
64
a1
438
a0
45
a1
393
```

fig3.2 Arduino Reading of Case-2
a0- Reading of IR sensor-1
a1- Reading of IR sensor-2

Case 3: when the object is in front of the sensor on the exit side and there is no object in front of sensor on the entry side

IV. CONCLUSION

The objective of this project was to design and fabricate an automatic pneumatic door using IR sensors. Pneumatic systems provide motive power in a cheaper, safer, more flexible, and more reliable way than the orthodox electric motors and actuators. We have designed a pneumatically operated automatic door using IR sensors and Arduino.

The door will open whenever the IR proximity sensor 1 (mounted on the entry side of the door) senses the object and it will close only if that object has passed through the door and the IR sensor 2 (mounted on the exit side of the door) senses it. The whole phenomenon is controlled by a set of codes which we have written in the Arduino. The Arduino basically provides the logic for the entire operation which can be modified according to the user's requirement.

The door was tested in the automation laboratory and the program was modified according to the ambient light conditions in the laboratory. The opening and closing of the door was smooth and the IR sensor sensed each and every object without any flaw. The prototype and the program can be modified according to the requirement and this project can be applied in industrial, commercial and domestic sectors.

As the whole world is switching towards automation, the automatic pneumatic sliding door has a huge role to play in future industries, malls and shopping centers, buses, airports, educational institutions, hospitals and also in domestic usage. It can be enhanced by adding techniques like face detection, retina detection etc. and can be used to increase the security of important places. The pneumatic part will ensure that the door is cheaper and has smooth operation compared to other automatic doors.

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Last but not the least we would like to thank our parents and friends for directly or indirectly helping us in the completion of this project. It has been a pleasant learning experience.

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AUTHORS

First Author – Ashis Mohapatra, Department of Mechanical & Manufacturing Engineering, Manipal University , India

Second Author – Aman Anand, Department of Mechanical & Manufacturing Engineering, Manipal University , India

Prevalence of dysmenorrhoea in College Students

Nidhi Sharma *, M. Benjamin Sagayaraj **, Balamma Sujatha ***, Abdul Rahman A. M. ****, Abirami M. *****,
,,Adhil Khan M. H. *****, Aditya. K. *****, Ajantha P. ****

* Nidhi Sharma, Associate Professor, Department of Obstetrics and Gynaecology, Saveetha Medical College, Saveetha University
** M. Benjamin Sagayaraj, Associate Professor, Department of Paediatrics, Saveetha Medical College, Saveetha University
***Balamma Sujatha, Assistant professor, Department of Paediatrics, Saveetha Medical College, Saveetha University
Abdul Rahman A. M., Abirami M., Adhil Khan M. H., Aditya. K. & Ajantha P.
MBBS students, Saveetha Medical College, Saveetha University

Abstract- Background: Knowledge of physiology of reproduction is important for teenage girls to practice menstrual hygiene. We have estimated the prevalence of dysmenorrhoea and menorrhagia in adolescent population. The participants were given free medical care, sexual health education and counselling.

Aim: This study was designed to find the burden of Dysmenorrhoea and menorrhagia. We also assessed the factors related to gender disadvantage.

Methodology: This observational cross-sectional study includes the female students of Saveetha University. Inclusion criteria was all adolescent girls who had reached menarche, in the age group of 17-20 years, with no diagnosed pelvic pathology and those who gave consent to participate in the study. Girls with known organic pelvic pathology, bleeding disorders and hypothyroidism were excluded. The sample size was calculated as two hundred and fifty two. This was based on demographic percentage prevalence of dysmenorrhoea.

Results: The median age of menarche was 13-14 years. Regular menstrual cycles were apparent in 77.4% of our young adults. Irregular periods were present in 22.6% of teenage girls although the burden of dysmenorrhoea was estimated to be 70.4%. Menstrual cycle duration was more than 7days in 13.9% of individuals. Severe dysmenorrhoea was present in 9.5% of girls while 24.6 % and 36.5% experienced moderate and mild dysmenorrhoea respectively. Although 70.4% of girls experienced dysmenorrhoea only 3.6 % used pharmacotherapy due to fear of side effects. Dysmenorrhoea was assessed to be a part of a broader somatoform syndrome for which no discernable pathology could be identified.

Conclusion: The burden of dysmenorrhoea was found much more than menorrhagia and irregular cycles in our university. A large proportion of young girls suffer from dysmenorrhoea, though only a few seek treatment .High prostaglandin levels, psychosocial factors, young age at menarche, oppressive relationships, menorrhagia and premenstrual syndrome are found associated. However, there is little evidence to explain the aetiology of dysmenorrhoea. Dysmenorrhoea is not a trivial complaint, as a result of high prevalence and adverse impact on mental health. It should be considered a target for reproductive health programme

Index Terms- Adolescence, Dysmenorrhoea, Etiology, Epidemiology, Prevalence.

I. INTRODUCTION

There is a rising incidence of premarital sex in both rural and urban settings. Young people start sexual activity early without adequate knowledge of reproductive issues. They are at a high risk of negative consequences like unwanted pregnancies, sexually transmitted infections and unsafe abortions. Nearly 50% of new HIV¹ infections occur in 15-24 age groups. The adolescent fertility is very high with 20% girls giving birth by the age of seventeen. The total fertility rate has 19% contribution by girls of 15-19 years. This early childbearing age contributes to high morbidity and mortality .

Dysmenorrhoea is a painful or cramping sensation in the lower abdomen often accompanied by other biological symptoms , including fatigue, dizziness, sweating, headache, backache, nausea, vomiting, diarrhoea, all occurring just before or during the menses. It also leads to loss of important classroom

hours during the formative teenage years of a young girl. National health policy (2002) has defined adolescent as an underserved vulnerable group that needs to be addressed especially by the provision of information on reproductive health. Adolescent reproductive health is especially important for our country where there are 331 million adolescents.

Between 1 and 10% of all abortion seekers are adolescents. Many of these are married adolescent. At least 50% of unmarried girls seeking abortions are adolescents and amongst these many are below 15 years of age. Hygiene related practices of adolescents during menstruation are of considerable importance as it has a health impact in terms of increased vulnerability to infection. Thus, the formal instruction is an important source of accurate information.

Formalized curricula for sexual education is much less common in developing countries than in developed ones and they are typically not implemented at national level.

There is often a strong religious and political opposition to sexuality education. This comes out of fear that it will encourage sexual activity. Data indicates, however , that sexual education does not encourage young people to engage in sex. Most studies show that education about reproductive and sexual health

contribute to postponement of sexual activity and to the use of contraceptives among sexually active teens. The aims of the present study were

- a) To assess the knowledge of reproductive health behaviour in the adolescent population in urban and rural areas
- b) To investigate the attitude of reproductive health behaviour among the adolescent girls
- c) To assess the knowledge on menstrual hygiene practise among the adolescent girls
- d) To estimate the prevalence of dysmenorrhoea in adolescent girls To assess the use of drugs for dysmenorrhoea

II. BACKGROUND

Population projections by the registrar general of India state that there are 331 million young people in the age group of 10 to 24 years whose need for sexual and reproductive health information and services remain high(1). The Family welfare department, Government of India has introduced a strong adolescent reproductive and sexual service delivery component through the RCH II programme and the National Rural Health Mission (NRHM). UNFPA has introduced Family life education in school curricula in 79 countries over past three decades, with technical assistance from UNESCO.

The National AIDS Control Organization (NACO) has introduced a family health education for the adolescent girls. Adolescent Friendly Health Services are going to be set up in District Hospitals, to deliver Adolescent Reproductive and Sexual Health measures on a standard laid down by World Health Organisation. In a 2009 report ,Human rights Watch found that 1 out of 70 girls who reach reproductive age die of pregnancy, child birth, or unsafe abortion in comparison to 1 in 7300 in developed countries. The National statistics shows the importance and need for concentrating and delivering Adolescent reproductive and Sexual Health services in our country. Adolescent sexual activity is generally impulsive and unplanned initiated without adequate knowledge of sexual and reproductive issues and seldom with a practice of safe sex .More than 50% of new cases of HIV /AIDS are in the age group 13-19 years.

UNICEF has recommended 45 kg and 145 cm as the minimal prepregnancy weight and height of girls. Pre pregnancy weight and height are now well recognized important determinants of

birth weight of future progeny. One iron tablet per day is recommended to prevent anaemia in menstruating young girls.

Especially in the present era, when adolescents are increasingly at a risk of STDs and AIDS, it is crucial that governments, educators, parents and community leaders recognize the reality and risks of premarital sexual activity among young people. It is imperative to work together to provide the sexual education to young people who need protection. Sexual education will not only warn teenage

population against AIDS/HIV but also encourage young people to plan their impulsive sexual behaviour.

There is an increased demand of reproductive and sexual health programmes for young people. However, little scientific based evidence exists about knowledge of reproductive anatomy and physiology in teenagers.

The approaches which will be effective in shaping healthy sexual behaviors need to be studied.

Health professionals have an important role in ensuring that the adolescents learn the correct information related to the consequences of unhealthy sexual behavior and lifestyle. We should encourage parents to be role models to reinforce good menstrual hygiene and sexual health in young girls through the Parent –Adolescent Relationship Education (PARE) programme (2).

The Sexual and Reproductive Health problems among unmarried adolescent girls are increasing. Early marriages, premarital sexual activity, unmarried adolescent pregnancy, unsafe abortions and menstrual problems are rampant in young girls (3). The adolescent girls are unaware of the dangers these problems and they do not adequate knowledge about sexual and reproductive health.

III. MATERIALS AND METHODS

We articulated the research work with ideas gathered in above steps by studying the prevalence in our institute:

Types of dysmenorrhoea

Dysmenorrhoea may be categorized into two distinct types: primary and secondary. Primary dysmenorrhoea is defined as painful menses in women with normal pelvic anatomy, usually beginning during adolescence. Primary dysmenorrhoea is seen only in ovulatory cycles usually developing within 6 to 12 months after menarche with no pathology or organic basis. The pain of primary dysmenorrhoea and the associated symptoms are due to high serum prostaglandin levels. Prostaglandins start accumulating in the endo-myometrium a few days before menstruation starts. The levels of prostaglandin F2 alpha ,Vasopressin and Leukotriene concentrations have been found to be higher in women with severe menstrual pain as compared to women who experience no or little menstrual pain.

Secondary dysmenorrhoea is a menstrual pain, associated with underlying pathology, and its onset may be years after menarche. It may be caused by a dozen or so disorders as endometriosis, pelvic inflammatory disease, intrauterine devices, infertility, ovarian cysts, adenomyosis, uterine myomas or polyps, intrauterine adhesions or cervical stenosis.

Premenstrual syndrome

Premenstrual syndrome is a recurrent variable, somatic, psychological and emotional symptom that develops 7 to 14 days prior to the first day of menstrual period in women who are mostly aged 20-30 years. Over 150 different symptoms have been linked to premenstrual syndrome but the most common ones are bloating, breast pain, cyclical weight gain, fatigue, headache, aggressiveness, depression, irritability and inability to concentrate. . The symptoms in premenstrual syndrome are

thought to be due to variation in ovarian sex steroids and low circulating serotonin levels.

Both Primary dysmenorrhoea and Premenstrual Syndrome have no organic basis but the patho-physiology of each is different.

Drug therapy for dysmenorrhoea

Non -steroidal anti-inflammatory drugs, which inhibit the synthesis of prostaglandins, are highly effective in treating primary dysmenorrhoea, especially when they are started before the onset of menses and continued through the day 2. Emotional and behavioral problems may exacerbate menstrual cycle problems and dysmenorrhoea. Furthermore, dysmenorrhoea is a common cause of sickness absenteeism from both classes and work by the female student community. The aim of the present study was to evaluate the prevalence of dysmenorrhoea, knowledge of menstrual hygiene and use of drugs for pain relief. This observational cross-sectional study includes the female students of Saveetha University. Inclusion criteria was all adolescent girls who had reached menarche, in the age group of 17-20 years, with no diagnosed pelvic pathology and those who gave consent to participate in the study. Girls with known organic pelvic pathology, bleeding disorders and hypothyroidism were excluded. The sample size was calculated as two hundred and fifty two. This was based on demographic percentage prevalence of dysmenorrhoea.

Assumptions

1. There is dismal lack of knowledge about menstrual hygiene practises in adolescent population.
2. Adolescent girls do not have adequate knowledge about reproductive health behaviour
3. Mother lacks knowledge and is embarrassed to talk about reproductive health behaviour
4. Knowledge of menstrual physiology and hygiene practise will prevent reproductive tract infections and help in diagnosing adolescent anaemia.

Ethical Considerations

The study proposal received ethical approval (Appendix 1) from the ethical committee of the Saveetha University .There were no risks and no invasive tests involved the subjects. Confidentiality was maintained and informed written consent was obtained (Appendix 2).

Study design

An exploratory cross-sectional study was undertaken to analyze knowledge of reproductive anatomy and physiology in college students' .Sample size was calculated using the formula $Z^2 \cdot (P) \cdot (1-P)/C^2$ with confidence interval of 95%. A written informed consent was obtained from 252 subjects after a brief explanation about the study. The self administered questionnaire (Appendix 3) was given to all .They students were asked to complete the questionnaire in the presence of a member of research team. All students were told that participation in the study is strictly voluntary, and the data collected will not be used for anything except for the research study. The duration of completing the questionnaire was estimated to be 35-40 minutes per subject.

In the first part of the questionnaire, students were asked to state their socio-demographic and medical characteristics, menstrual characteristics and dysmenorrheal status and habits. The second part of the questionnaire includes visual analogue scale (VAS) questions and Multidimensional Scoring system (MSS) to assess the severity of dysmenorrhoea. The research setting was University campus and the project lasted for six months from June 2013 till November 2013.

Multi dimensional Scoring system (MSS)

Grading of pain

Grade 0: Menstruation is not painful and daily activities are not affected.

Grade 1(mild): Menstruation is painful but seldom inhibits normal activity. Pain killers are rarely required.

Grade 2 (moderate): Menstruation is moderately painful and it affects daily activities. Pain killers are required; however they give sufficient relief so that absence from class is unusual.

Grade 3(severe): Menstruation is extremely painful and associated with vegetative symptoms (headache, fatigue, vomiting and diarrhea).Daily activities are clearly inhibited .Pain killers provide no relief.

Observations

Two hundred fifty two cases were studied. The median age at menarche was found to be 13-14 years (Table 1) .Seventy seven (77.4%) percent of students had regular menstrual cycles. The remaining (22.6%) had irregular periods (Table 2)

Table 1: Median age of menarche in subjects is 13-14 years

Age at menarche	Percentage
≤12 years	47
13-14 years	69.8
≥14 years	11.5
Total	100

Table 2: The total prevalence of dysmenorrhoea is 70.4%. Severe dysmenorrhoea is experienced by ten percent (9.5%) of subjects

Menstrual pain	Prevalence percentage
Mild	36.5
Moderate	24.6
Severe	9.5
No pain	29.4

Table 3: Regular cycles were present in 77.4 % of subjects

Menstrual regularity	Percentage
Regular	77.4
Irregular	22.6
Total	100

Table 4: Duration of menstrual flow was more than six days in 13.9% percentage of subjects

Menstrual bleeding	Percentage
≤ 6 days	86.1
> 7 days	13.9
Total	100

Table 5: NSAID usage for pain relief was limited only 3.6% of subjects

Use of drugs	Population percentage
Yes	3.6
No	96.4

Menstrual flow lasted for more than six days in 13.9% of students (Table 3). Twenty nine percent (29.4%) of students experienced painless menstrual cycles .Thirty seven percent (36.5%) had mild pain which did not affect daily class room attendance. Twenty five percent (24.6%) had moderate pain. Ten percent of students (9.6%) suffered severe dysmenorrhea leading to loss of class hours (Table 4). The total prevalence of dysmenorrhea was found to be 70.6%. Despite a 70.6 % prevalence of dysmenorrhea only 3.6 % of students used Non steroidal anti-inflammatory drugs (NSAIDS) to alleviate pain (Table 5). The percentage prevalence of dysmennorrea in various strata of the menarche age was also evaluated. (Table 6).

Table 6: Dysmenorrhoea prevalence with age of menarche

Age at menarche	No pain	Mild	Moderate	Severe	Total
≤12 years	4.8	7.1	4.8	2	18.7%
13-14 years	22.2	26.2	16.7	4.8	69.8%
≥15 years	2.4	3.2	3.2	2.8	11.5%
Total	29.4%	36.5%	24.6%	9.5%	100

IV. DISCUSSION

The most common menstrual disorder in adolescent girls is dysmenorrhoea scoring over vaginal discharge or low abdominal pain. In our population of women aged 17-20 years, we found a high prevalence rate of dysmenorrhoea .This was reported by about 70.6% of our subjects. Moderate and severe intensity dysmenorrhoea was reported by thirty four percentages of patients. A number of studies have determined the prevalence of dysmenorrhoea with estimates ranging from 20-90% depending on the measurement tool used (4, 5). In this study the prevalence of dysmenorrhoea was found to be 70.6s vs. 74.4% by a survey of teenagers in Ghana (6), and 72% from Nigeria (7, 8). In a large study in Goa 73.6% of women report restrictions in their daily activities during the menstrual period although dysmenorrhoea was present in 54.6 % of women and menorrhagia only in 9.7 % (9). In our study 13.6 % of teenager had menorrhagia .We propose a conceptual framework based on our study (Figure 1).



Figure 1: Conceptual Framework of Psycho-somatisation (social determinants resulting in dysmennorrhea and menorrhagia)

Given the magnitude of problem it becomes imperative that we rise to the growing needs of our adolescent girls. This symptom should form an important target in our reproductive health programmes

The main limitation of our study is that we did not collect data on the possible causative factors of dysmenorrhoea, i.e. the prostaglandins .On the other hand our study being observational received full participation and consent and is well representative and generalisable. Other studies for investigating the cause may result in high dropout rates and selection bias. Since our study is a cross-sectional survey we cannot make definitive interpretations

APPENDIX

APPENDIX 1: ETHICAL APPROVAL

1. This project is to be undertaken as a Part of previously approved program grant, Grant Number, project title and Director. No

2. Does the project involve the administration of personality tests, inventory, or questionnaire? If YES, (provide the name of the standard tests or 3 copies of the proposed tests)
No
3. Does the project involve the use / drawing of human blood products, tissue or body fluids? No
4. Does the project involve administration of Ionizing Radiation to subjects for other than Clinical purpose? No
5. Does the project involve the testing of Investigational drugs or devices? If YES, Provide Name of the drug or device, Name of the manufacturer, if the protocol involves. The administration of medications to humans for research. Purposes (not part of general clinical practice), You must obtain an authorization: No
6. Human subjects involved in the proposed activity would be either-minors, foetuses, abortuses, pregnant women, prisoners, mentally retarded, Disabled, HIV positive subjects, others specify. :No

APPENDIX 2: CONSENT FORM

I -----agree to take part in the research, Prevalence of **dysmenorrhea among college students** conducted by the project investigators, been explained to me.

I acknowledge that the research has been explained to me and I understand that agreeing to participate in the research means I am willing to participate in the analysis of the program

- Make myself available for further analysis if required.
- I have been informed about the purpose, procedures and measurements involved in the research and my queries towards the research have been clarified.

I provide consent to the researcher to use the details obtained for research and educational purposes only. I understand that my participation is voluntary and can withdraw at any stage of the research.

Contact address:

Phone number:

Signature:

Date:

APPENDIX 3: QUESTIONNAIRE

DEMOGRAPHIC DETAILS

1. Age -
2. Education -
3. Family income (monthly)
4. Family type - (Nuclear / Large)
5. Marital status –

MENSTRUAL DETAILS

1. Age at menarche ($\leq 12 / 13 - 14 / \geq 15$)
2. Menstrual regularity (Regular / Irregular)
3. Menstrual cycle duration ($\leq 20 / 21 - 34 / \geq 35$) days

4. Menstrual bleeding duration ($\leq 6 / \geq 7$) days
5. Grading of Menstrual pain
6. What do you do at the time of painful menstruation? Use of drugs / medicines

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We acknowledge the work of Dr V. Patel on the Prevalence and determinants of dysmenorrhoea in Goa. With the help of his work we were able to calculate our sample size and estimate the burden of dysmenorrhoea and menorrhagia in our university. We were also able to educate the teenage population of our institution regarding sexual hygiene.

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AUTHORS

First Author – Nidhi Sharma, MBBS, MS, Saveetha University

drbonuramkumar@yahoo.co.in

Second Author – Benjamin M Sagayaraj, MBBS, MD, Saveetha University getdrben@yahoo.com

Third Author – Balamma Sujatha, MBBS, MD, Saveetha University suja1973@gmail.com

Correspondence Author – Nidhi Sharma, MBBS, MS, Saveetha University drbonuramkumar@yahoo.co.in
+ 919445560392

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Hypervitaminosis D presenting as Hypertensive Encephalopathy

Dr. Dinesh Joshi¹, Dr. Nidhi Thula², Dr. Asha N. Shah³, Dr. Jay Dadhania⁴, Dr. Kartik Kachhadia⁴

¹ M.D.(Medicine), 4th year resident, Department of Medicine, B.J. Medical college, Ahmedabad

² 3rd year resident, Department of Medicine, B.J. Medical college, Ahmedabad

³ M.D.(Medicine), Prof. & Head, Department of Medicine, B.J. Medical college, Ahmedabad

⁴ 2nd year resident, Department of Medicine, B.J. Medical college, Ahmedabad

Abstract- Vitamin D deficiency is quiet prevalent in India. This makes many Practitioners to prescribe Vitamin D supplements Empirically. Though there is a significant gap between Vitamin D therapeutic doses and toxic doses, in predisposed individuals excessive intake of Vitamin D can lead to some serious and life endangering side effects.

Here we present a case of 80 year old male patient who was a known case of **diabetes** and **hypertension**. The patients was taking oral supplements of Vitamin D daily which lead to patient presenting to us with Hypertensive Encephalopathy and ultimately Death. This emphasises the need to judiciously use Vitamin D supplements and to remain Vigilant for its side-effects in high risk individuals.

Index Terms- Vitamin D, Hypercalcemia, Hypertension

I. INTRODUCTION

Vitamin D is an important pro-hormone and besides playing an important role in calcium homeostasis and bone mineral metabolism is also important for various fundamental biological functions like cell differentiation ,inhibition of cell growth as well as immune modulation. Daily requirement of Vitamin D is 200-600 Units and skin produces 10,000 units after total body exposure of UV rays. No toxicity occurs till 10,000 units daily and prolonged intake. Toxicity is noted after prolonged daily intake of about 50,000 units. Thus because of this wide therapeutic range Vitamin D is prescribed empirically and unjudiciously. However older individuals or those with renal impairment or PHPT could be predisposed to its toxicity and so care needs to be taken while prescribing Vitamin D in such individuals.

Here we present a case of 80 year old male diabetic and hypertensive who was taking more than normal requirement of Vitamin D daily for almost 6 weeks. Patient developed Hypercalcemic arteriosclerosis which ultimately led to Hypertensive Encephalopathy.

II. CASE REPORT

Mr.BabubhaiParmar, 70 yr old male patient presented with GTCS one episode in morning followed by altered sensorium. There was no history of fall, trauma, fever, focal neurologic deficit, weakness in limbs, loss of bowel bladder function.

Patient was a known case of diabetes, hypertension and benign prostatic hypertension on T.velmisartan OD, T. veltam OD.

III. EXAMINATION

On examination patient was conscious, disoriented, irritable.

The other findings were as follows: Pulse: 90/ min, BP: 220/140 mm hg, Temperature: normal. Respiratory system: normal , Cardiorespiratory system: normal, Abdominal system : normal.

Central nervous system: conscious, disoriented.

- irritable

- pupils :B/l normal reacting to light

- plantar: bilateral flexor

- moving all 4 limbs

NCCT Brain: NAD

MRI Brain: NAD

MR Angiography+ venography: NAD

CXR (PA): NAD

XRAY SKULL: NAD

Laboratory investigations revealed following results: Hb:11.5 , WBC: 8230, polymorphs:85. Lymphocytes:12, monocytes: 2. Eosinophils: 1, basophils: 0. MCV: 85, platelet count: 2.02 lakh. PS-Normochromic, normocytic picture.

Urea : 40.38--following HD--->41.6,

Creat: 2.07---following HD--->2.51,

Sodium: 138--following HD---->141,

potassium: 3.25---following HD--->2.52.

Plasma Glucose-223,

S.Acetone-normal.

Bilirubin: Total-1.10,S.G.P.T-23.7, S.G.O.T-27.7, Protein:Total-7.2, Albumin-4.43.

PT: Test-10.7, INR-1.00

S.Amylase:1851

S.Lipase: 163

CPK Total-162----->4104

CPK-MB:11

Calcium: 14.5---following HD--->12.70

S.Uric Acid-3.95

S.Magnesium-1.57

phosphorous:2.15

Trop-I: negative
Vit D(25-OH) : >150
Parathyroid hormone: 14.2
hs CRP:55.7
TSH : 1.888
Urine for Bence jones proteins: negative
Protein Electrophoresis: normal
Urine for myoglobin: >1200
ECG: LVH, T inversion in V1-V6.
2D ECHO: EF:55%, RVSP: 28 mm hg, Grade I diastolic dysfunction.
USG ABDOMEN+ NECK: NAD.

Course in Hospital:

An 80 yr old Male was admitted in civil with history of convulsion. On admission the BP of patient was 220/110 Patient was given IV Labetalol to lower down the BP. Patient was irritable for which he was given IV Seranase. Routine investigations revealed raised Creatinine suggesting renal failure. S.calcium was done in view of raised creatinine which turned out to be 14.1. Urine was negative for Bence Jones Protein, normal Protein Electrophoresis. This ruled out multiple myeloma.one cycle of HD was done due to raised creatinine.

IV. DISCUSSION

Clinical presentation of Hypervitaminosis D is mainly due to Hypercalcemia and Hyperphosphatemia. Most of the patients usually present with nausea, vomiting, diarrhoea, polyuria, renal failure. Hypercalcemia can also lead to Hypertension and coronary artery disease as in case of our patient. The initial presentation of the patient pointed towards a cerebrovascular accident which was ruled out by imaging studies. Second likely cause of raised calcium in old patients like him can be Multiple myeloma or any occult Metastasis which was ruled out by further investigations. Also PPTH was also ruled out by normal PTH . On proper history taking it was found that patient was taking daily oral supplements of Vitamin D in form of oral sachet.

This case highlights Pragmatic but safe approach while using empirical Vitamin D supplements to avoid any serious adverse effects. Serum Calcium and Renal Function Test should be regularly monitored in high risk patients.

V. KEY MESSAGE

- Vitamin D deficiency is widespread in India. Empirical use of modest doses in low risk individuals is safe.
- Hypervitaminosis D is uncommon but can occur in high risk and elderly patients. Thus regular monitoring of Serum Calcium and Serum Creatinine should be undertaken.
- Avoid high dose supplements in elderly, those with Renal Failure, or those patients with PPTH.

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AUTHORS

- First Author:-** Dr. Dinesh Joshi M.D.(Medicine), 4th year resident, Department of Medicine, B.J.Medical college, Ahmedabad
Second Author:- Dr. Nidhi Thula, 3rd year resident, Department of Medicine,B.J. Medical college, Ahmedabad
Third Author:- Dr. Asha N. Shah M.D.(Medicine), Prof. & Head, Department of Medicine,B.J. Medical college, Ahmedabad
Fourth Author:- Dr. Kartik Kachhadia, 2nd year resident, Department of Medicine,B.J. Medical college, Ahmedabad
Fifth Author:- Dr. Jay Dadhania, 2nd year resident, Department of Medicine,B.J. Medical college, Ahmedabad

- Correspondence Author:-** Dr. Nidhi Thula, 3rd year resident, Department of Medicine,B.J. Medical college, Ahmedabad. E-mail ID:- nidhi_doctor2002@yahoo.com

Leaving an Organization to pursue an MBA: An empirical study of the Driving Factors

Dr Parveen Prasad

Associate Prof, M U College of Commerce, Pimpri, Pune

Abstract- The concept and implication of an employee turnover has been an area of interest among researchers. The phenomenon of Employee turnover can be traced to misalignment of expectations and aspirations of the employees with the organization. In the current study, I sought to understand this phenomenon through a sample of MBA students, who were in full employment, before leaving the organization, in pursuit of an MBA. Results reveal that although areas of job satisfaction and employee engagement were high in the previous organizations, employees left to pursue a brighter career or an aspirational role change.

Index Terms- Turnover, leaving, aspirations, MBA, role change

I. INTRODUCTION

The spectre of leaving an organization or turnover has been an area of interest to researchers from different disciplines for several decades. The definitions of turnover vary widely among studies (Hayes et al, 2006) .Mobley et al (1978) developed a framework for the precursors of turnover and therefore gave a way to organize leaving preconditions conceptually. High turnover rates of employees are known to lead to high staffing costs (Hinkin and Tracey, 2000); (Hillwer et al, 2005), an erosion of the company's implicit knowledge base (Coff, 1997), a decrease in organizational competencies (Walton, 1985).

Price (1977) proposed that interaction between job satisfaction and job opportunities is the immediate antecedent of an employee's leaving an organization. Moreover turnover studies often include education as a control variable (Trevor, 2001) and assume that it increases turnover opportunities for employees. However the evidence for the college degree and turnover is mixed. Lynch (1991) found that employees who participated in some form of company sponsored classes outside the workplace were more likely to turnover. Benson et al (2004) found that employees were more likely to turnover when they gained degrees through tuition reimbursement.

An area that has received considerable interest among the workforce nowadays is career pathing or recycling. Organizations can better respond to the needs of individuals who are reexamining and changing their chosen career paths. The term career recycling reflects a new, growing segment of workforce describing individuals who are reexamining and changing their career paths. Boundaryless career literature suggest that today's employees are travelling career paths that are discontinuous and go beyond the boundaries of a single firm.(Arthur, 1996).

Employees desirous to climb the career ladder proactively fast track the process by taking an MBA. Indeed, such has been one of the strategies to enhance career success. (Breher & Ryan, 2002). Studies on the impact of MBA have reported mixed results. Some studies have found that the knowledge and competences gained from the MBA make graduates attractive to other employers, thus facilitating such job hopping. (Mayer & Schoorman, 1998).

March & Simon (1988) identified job satisfaction as an important factor in deciding whether or not to stay in the organization. Job satisfaction is defined as a positive feeling towards a job.

II. BACKGROUND

Since the early 1990s the common wisdom has been that mergers, reengineering and downsizing have led to uncertain job security for employees. As the phenomenon of an implicit promise of job security is no longer possible, firms need new ways of retaining workers and inspiring commitment among employees. Labour economics predicts that workers with upgraded general skills are likely to turnover. Some companies and scholars have advocated that "employability" might supplant long term job security as the basis for reciprocal commitment from employees.(Fagano, 1993).Employability is a concept that emerged through the 90s along with a growing perception among employees that they cannot count on their employers for long term employment.(Baruch, 2000).Employability has been considered a promise to employees that they will have the skills to find new jobs quickly if their jobs end unexpectedly. Human Capital Theory suggests that developing general skills that are useful across a wide range of firms increases external job opportunities and the likelihood that employees will market their skills elsewhere. (Becker, 1968). The importance of earning that credential for potential salary growth and career advantage means that the marketability of the skills gained through post graduate studies like an MBA, will drive employees to look outside their current organization regardless of their affective attachment towards their present organization. The present study is an investigation of the drivers of employees, who are interested in their own career development and so, wish to leave their organizations in pursuit of a full time MBA.Turnover literature, has not considered the specific motives underlying a quit decision. (Rosin & Korabik, 1990).Not much is known about the specific motives for voluntary managerial turnover. The Policy Studies Institute Report Britain in 2010 reports that: "to provide the skills needed for effective competition in the rapidly changing and increasingly competitive international economy, it

will be necessary to contemplate something in the order of a doubling of the proportion staying on in full time education and training. The importance of higher skill levels, which must be raised to levels more competitive with those achieved in competitor countries for higher employment levels will be accentuated by up market shifts in consumer taste, stronger competition in the international markets and the growing importance of IT and newer technologies."

III. METHODOLOGY

Procedure and Participants

Data for this study was collected through online questionnaires circulated to first year students with work experience, of Symbiosis Institute of Operations Management,a Management institute located in Nashik, under the aegis of a Pune headquartered reputed Management University, pursuing a two year full time MBA Course in the campus. The population consisted of 160 students, out of whom, 70 students responded to the questionnaire administered by the researcher. The response rate was 38 per cent. The average age of the respondents was 26.6 years.58 respondents were male and 12 were females. The average work experience of the respondents was 2.2 years.

The questionnaire consisting of 25 items was adapted from Journal of Advanced Nursing, March 2010, Vol 66, Issue 3, pp 616 – 625, from the research article, "*Leaving the organization or the Profession- A multivariate analyses of nurses' intentions*". The items in the questionnaire designed to measure the work related affective and effective behavior were classified into domains related to areas of career, job satisfaction, holistic learning, conflict resolutions, development opportunities, input sharing, physical work conditions, skill opportunities, learning, time optimization, initiative taking, work life balance, training, empowerment and work design. The scales in the questionnaire for items related to work initiative, expertise, learning, and workload, work planning, communication, conflicts, jobs and variety ranged from small extent to large extent from 1 up to 5 respectively. For the measures related to time optimization and work speed, the scale ranged from hardly ever to always from 1 up to 5. For items related to work prospects, physical working conditions and ability use the scale ranged from very unsatisfied to very satisfied from 1 up to 4. For the measures related to task and working day routine, the scale ranged from never to always from 1 up to 4.

IV. ANALYSES

The data was analysed using SPSS version 14.0. For the analyses, Descriptive Statistics, Factor Analyses using Varimax rotation and Frequency Graphs were computed. The Cronbach Alpha measuring sampling consistency was 0.736, which is

Factor Analyses with Varimax Rotation

	Component					
	1	2	3	4	5	6
job satisfaction priority	.826			.297	.111	
career prospects	.788		-.252	.136		

uniformly considered to be good. The KMO for sampling adequacy was measured at 0.623 .The tables below report the Factor Analyses and the Frequency Charts.

V. RESULTS

The Factor Analyses after rotation using the Varimax Rotation obtained eight factors from the twenty five items. For an item to be included in a factor, I used the minimum measure of 0.35 and above. The following table below, depicts the Factor names and denotes the measure.

Factor1: Career and Job satisfaction

- a. Career -0.846
- b. Job Satisfaction- 0.815
- c. Holistic Learning- 0.79
- d. Conflict Resolution – 0.79
- e. Development Opportunities- 0.75
- f. Input Sharing- 0.453
- g. Physical Conditions- 0.483

Factor 2: Learning and Initiative

- a. Input Sharing- 0.443
- b. Skill Opportunities- 0.780
- c. Learning- 0.762
- d. Variety – 0.563
- e. Time Optimisation- 0.435

Factor 3: Empowerment

- a. Voice in Work- 0.793
- b. Empowerment-0.633
- c. Pace Setter – 0.764
- d. Communication Time- 0.409

Factor 4: Work Design and Variety

- a. Variety in job- 0.455
- b. Job satisfaction- 0.455
- c. Training- 0.863
- d. Work Design- 0.549

Factor 5: Work balance

- a. Work balance- 0.852
- b. Time Optimisation- 0.511

Factor 6: Training

- a. Training on Job- 0.486
- b. Timely Information – 0.828
- c. Conflicting Orders – 0.773

Factor 7: Physical Work Conditions

- a. Physical work conditions- 0.577
- b. Work flexibility- 0.726

Factor 8: Work Speed

Work Speed: 0.904

development opportunities	.759	-.127		.141		
holistic job	.736	-.211	-.288			
conflict resolution	.699		-.340	.332	-.116	
ability utilisation	.698		-.291	-.162		.189
input sharing	.658	.154	.247	-.151	.124	.363
physical work conditions	.500	-.105	-.121	.137	.248	.297
time optimisation	-.157	.644	-.281		.248	
learning opportunity	.473	.621		-.202		
skills optimisation	.403	.579	.147	-.333		
timely information	-.213	.551	.209	.160	.451	.418
variety in job	.488	.491	.274		-.215	-.189
initiative empowerment	.225	.472	-.257	-.408	.172	.129
pace setter	.331		.776			-.142
communicate time	.329	-.271	.518	-.308	-.148	.244
task voice	.367	-.160	.485		.437	-.406
Work flexibility		-.429	.449	.207	.292	.208
empowerment	.206	.260	.442	-.307		-.257
training on job		.434	.203	.561	-.112	
work plan design	.474		.105	.531	-.129	-.187
conflicting orders	-.368	.244	.184	.527		.338
work balance	-.208	.373	-.144	.296	.527	-.401
satisfaction of working day		.319	.209	.418	-.506	
work speed requirement	-.302	.327			-.246	

Component Matrix^a

	Component	
	7	8
job satisfaction priority		.140
career prospects	.175	-.106
development opportunities	.165	.158
holistic job	.165	-.271
conflict resolution		
ability utilisation	.322	-.107
input sharing		
physical work conditions	-.203	.353
time optimisation		
learning opportunity	-.178	
skills optimisation	-.154	.195
timely information	.178	
variety in job	-.213	-.228
initiative empowerment	-.281	
pace setter		
communicate time	.131	.118
task voice		-.135
Work flexibility	-.353	.170
empowerment	.349	
training on job		-.110
work plan design	-.160	.159
conflicting orders	.312	-.238
work balance		.267
satisfaction of working day	-.192	
work speed requirement	.465	.639

Extraction Method: Principal Component Analysis.

a. 8 components extracted.

Rotated Component Matrix^a

	Component					
	1	2	3	4	5	6
career prospects	.846	.105				
job satisfaction priority	.815	.106	.122	.145		
holistic job	.796			-.155		-.125
conflict resolution	.794	.102		.259	.113	-.116
development opportunities	.758		.169		-.131	-.120
ability utilisation	.742	.215		-.226	-.255	
input sharing	.453	.443	.262		-.336	.208
skills optimisation	.106	.780	.165	.113		
learning opportunity	.212	.762	.138	.199		
initiative empowerment		.726	-.185	-.216	.126	
variety in job	.195	.563	.322	.455		
task voice	.182		.793	-.126	.136	
pace setter			.764	.222	-.230	
empowerment		.252	.633			
satisfaction of working day				.757		
training on job				.563	.166	.486
work plan design	.453		.147	.549	.128	-.111
work balance			.106		.852	.147
communicate time			.409		-.641	
time optimisation	-.112	.435	-.167		.511	.234
timely information	-.173	.251			.192	.828
conflicting orders	-.156	-.270		.262		.773
Work flexibility	-.138	-.239	.205		-.139	
physical work conditions	.482	.158	-.113			
work speed requirement	-.172				.105	

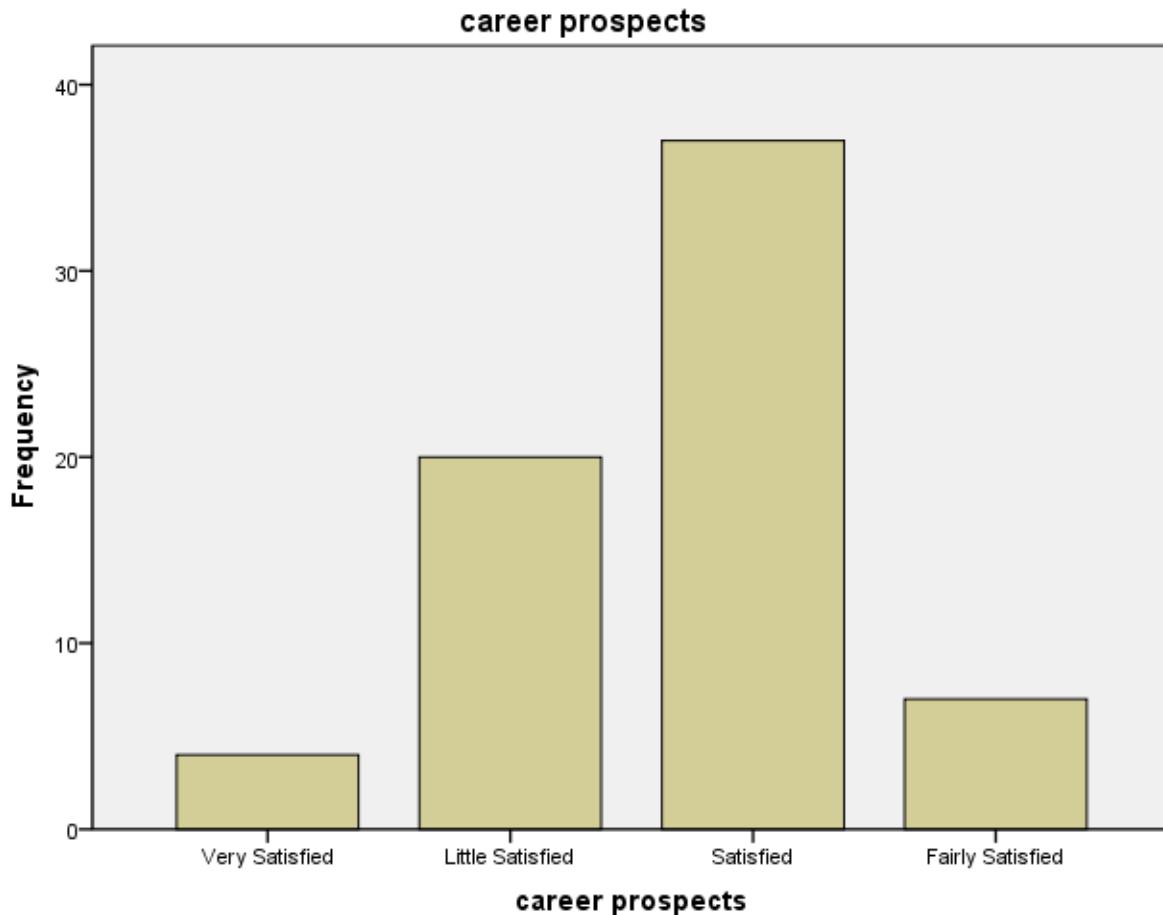
Rotated Component Matrix^a

	Component	
	7	8
career prospects		-.114
job satisfaction priority	.306	
holistic job	-.136	-.285
conflict resolution		
development opportunities	.134	
ability utilisation	-.191	
input sharing	.237	
skills optimisation		.190
learning opportunity	-.106	
initiative empowerment		
variety in job	-.168	-.198
task voice	.119	-.251
pace setter	.225	
empowerment	-.273	.196
satisfaction of working day		
training on job	.249	
work plan design		.185
work balance	.203	.124
communicate time		
time optimisation	-.216	
timely information	.104	
conflicting orders		
Work flexibility	.726	-.210
physical work conditions	.577	
work speed requirement	-.142	.904

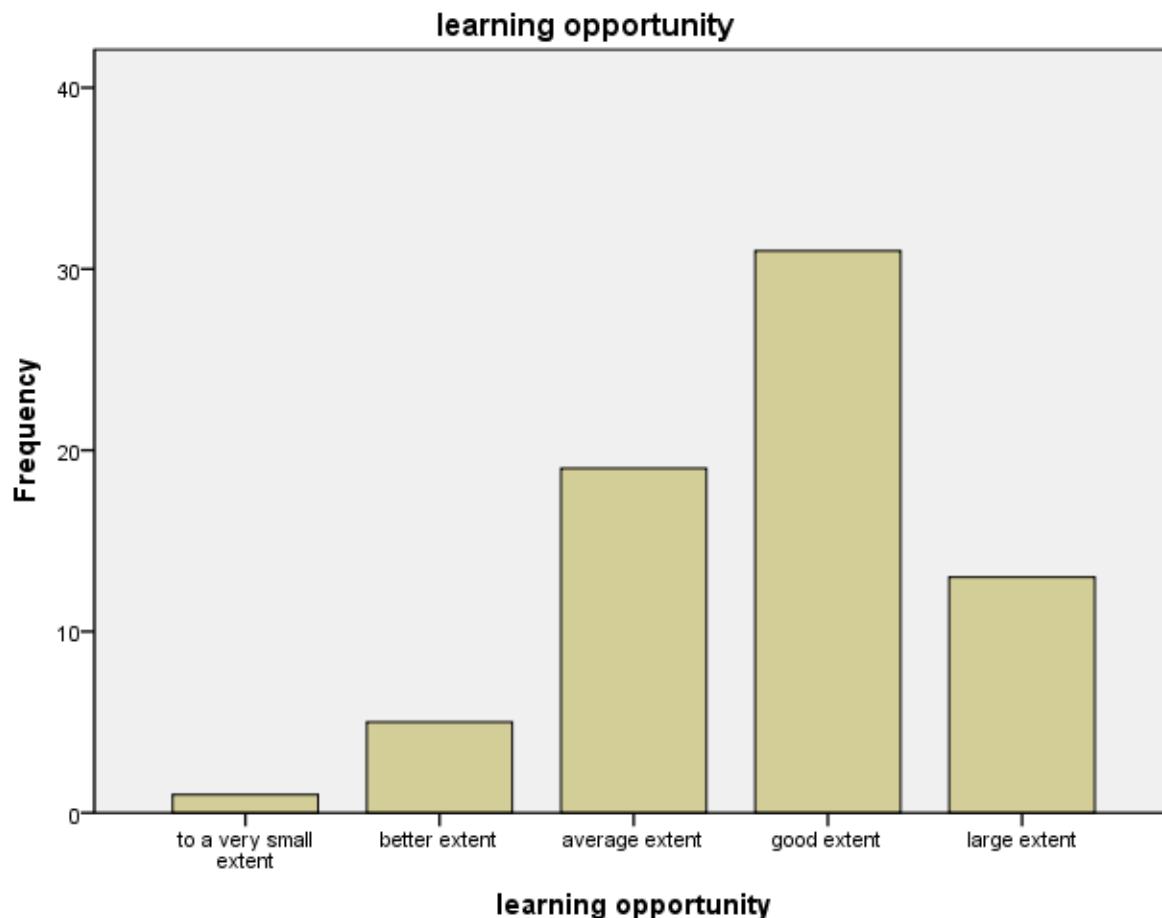
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 8 iterations.

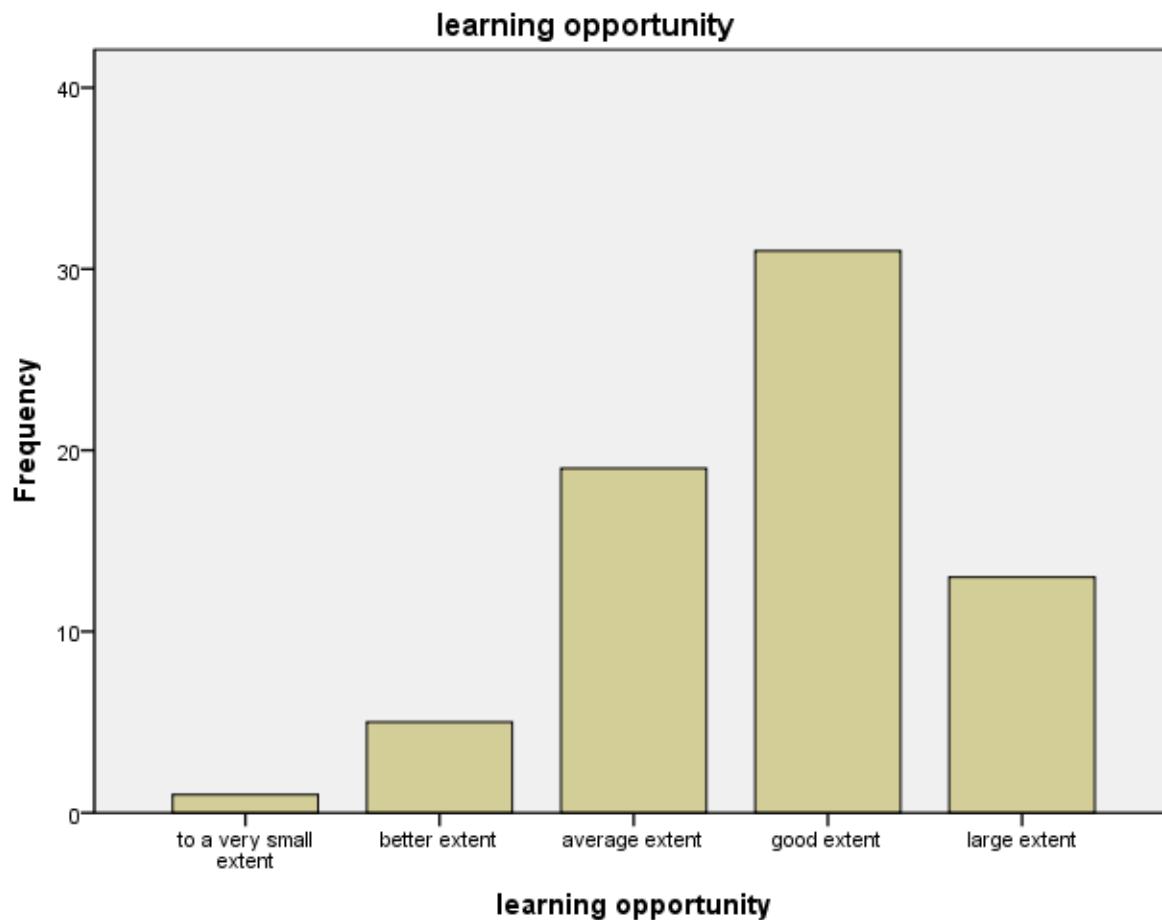
Frequency Charts

The Frequency Charts computed on the basis of the responses of the respondents are reproduced below.
Factor1- Career and Job satisfaction depicts an average frequency.

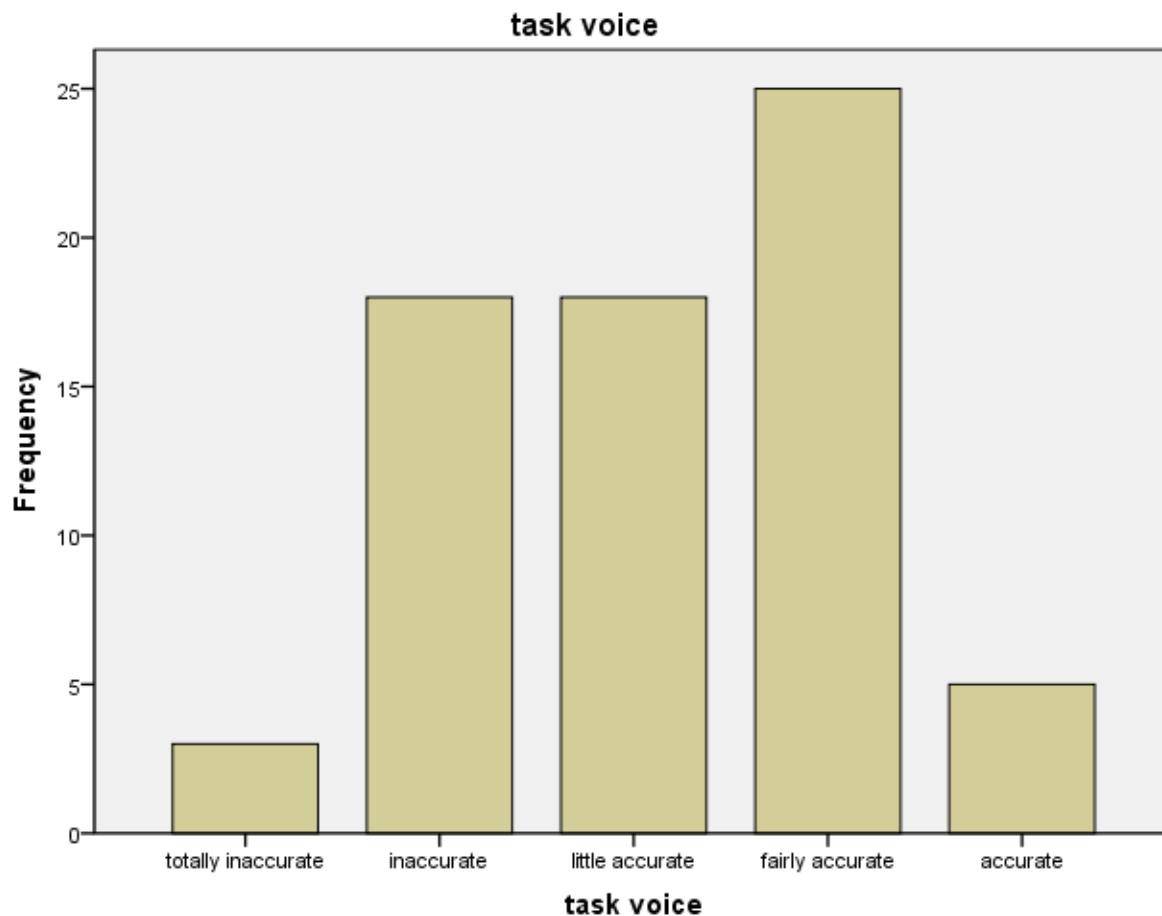


Factor 2- Learning and Initiative depicts a satisfactory level

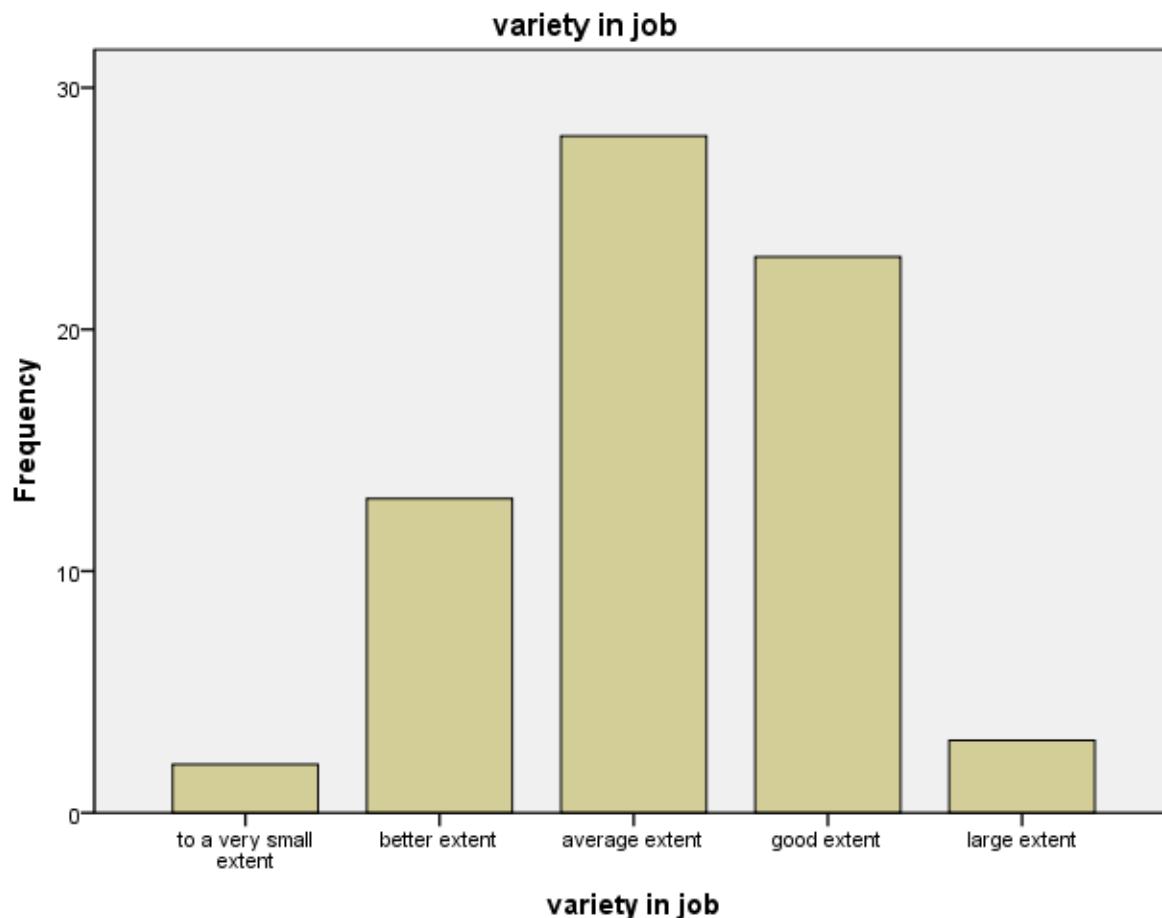




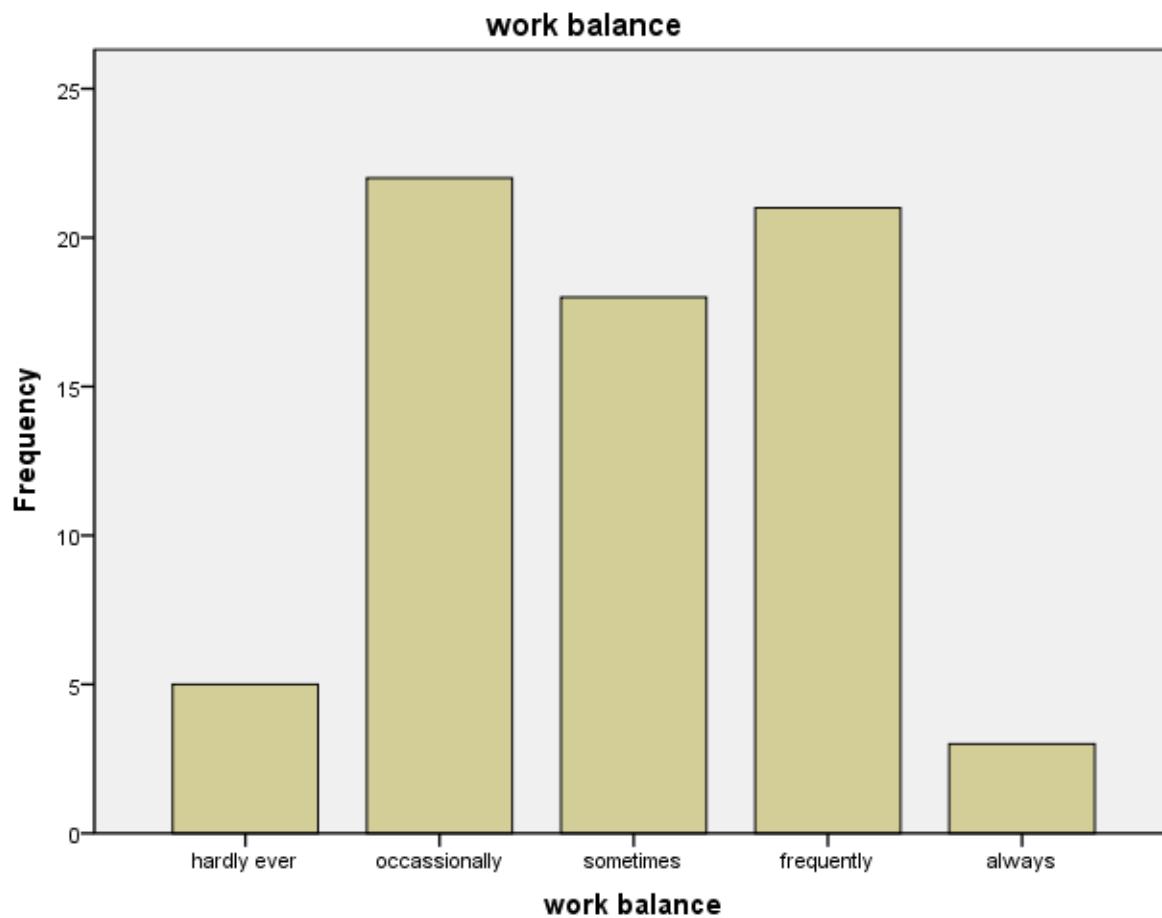
Factor 3- Empowerment depicts a fairly accurate voice in the tasks of the respondents



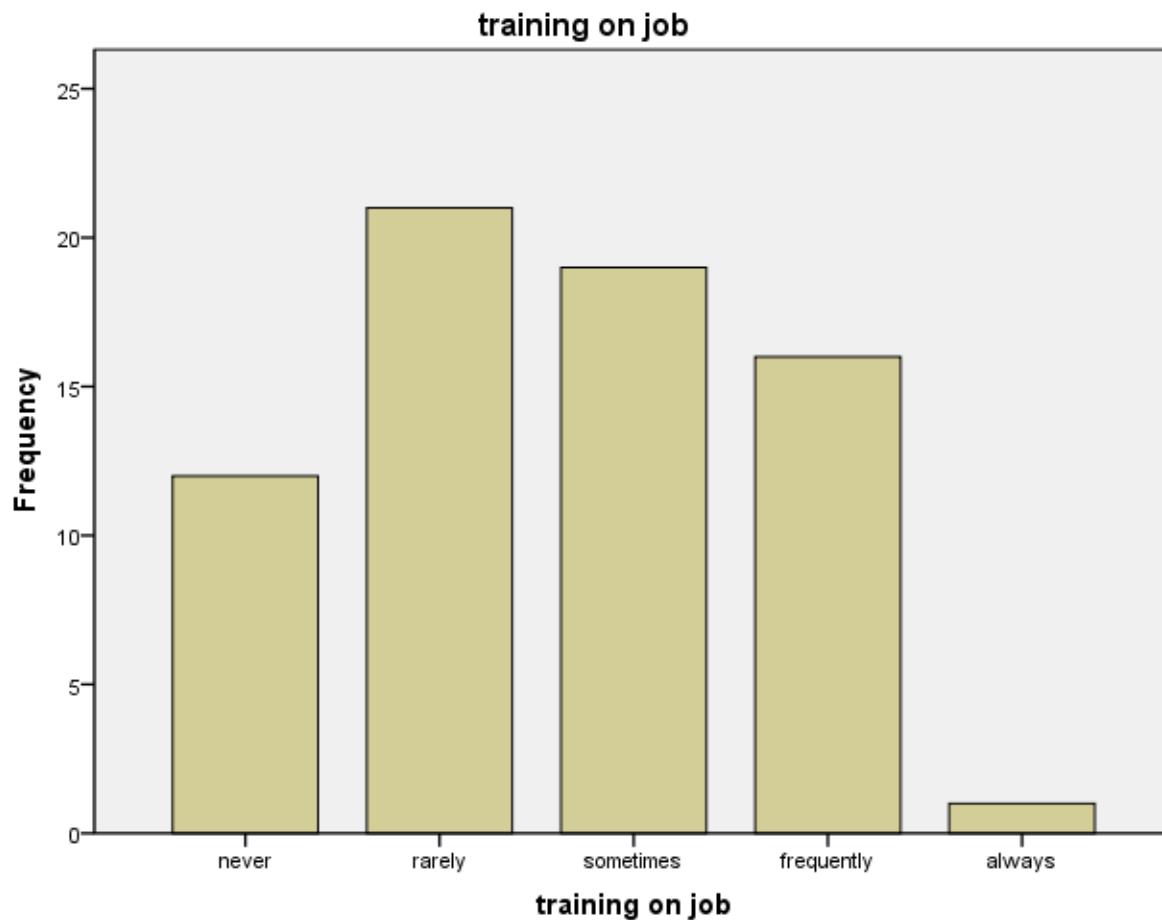
Factor 4- Work Design and Variety depicts a good extent of design and variety in the jobs allocated



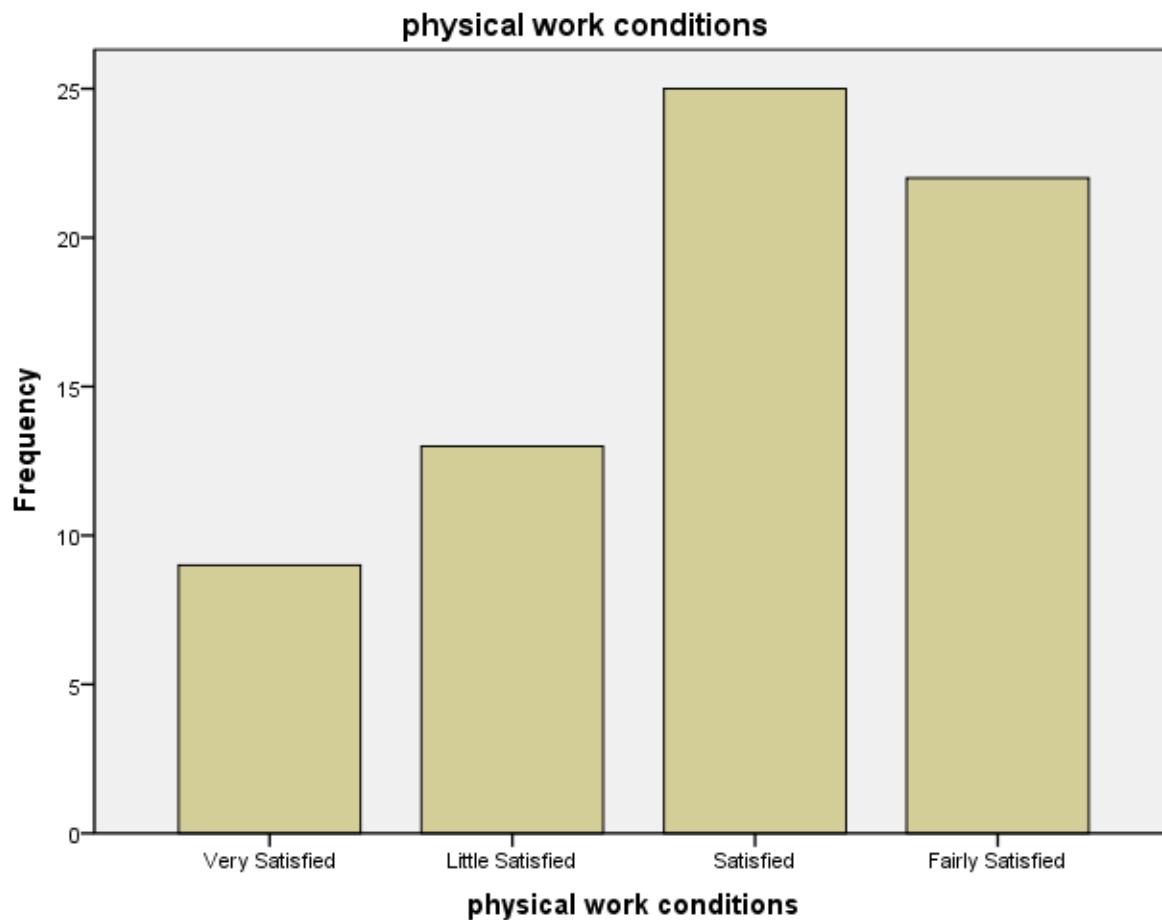
Factor 5- Work balance depicts an average frequency of balance maintained



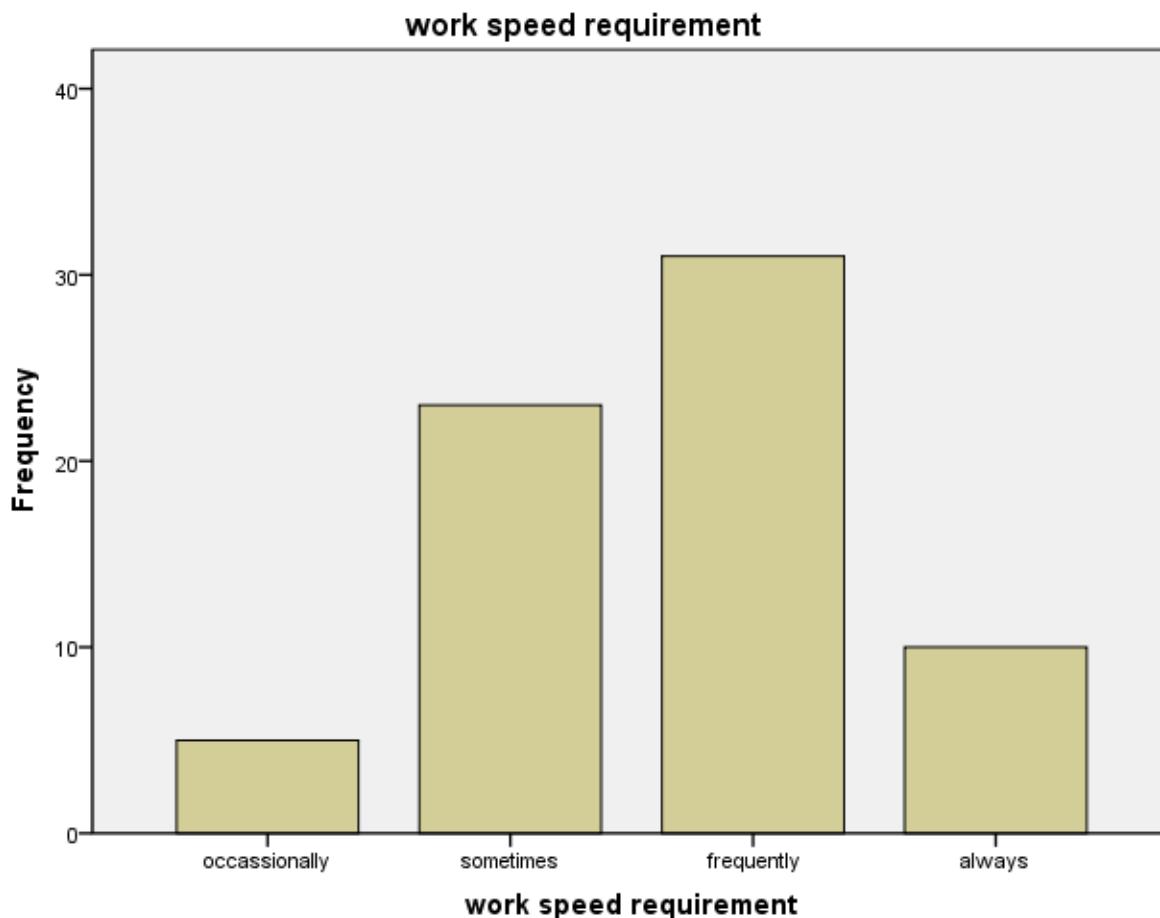
Factor 6- Training depicts a fairly low frequency of undertaking these programmes



Factor 7- Physical work conditions depicts a satisfactory level of the same



Factor 8 – Work Speed which depicts a high frequency level



VI. DISCUSSION

Having an MBA is perceived by many as a passport to senior managerial levels and fast track career. Prospective students are typically concerned with acquiring managerial competencies quickly and efficiently and thus leapfrogging peers and improving career prospects. In the above study too, except the factor of training, where the extension of the same is fairly low, as perceived by the respondents, the satisfaction levels of all other parameters of job satisfaction, career, empowerment, work design and variety in the job, work life balance, physical working conditions and work speed appear to be fairly good. Hawksley (1996) reported that the most cited reasons (88%) for undertaking an MBA was improving job opportunities. Asher (1984) studied graduates of four leading business schools in the early 1980s. In that study, the reasons most frequently cited by candidates for undertaking the MBA course were improved job opportunities, followed by a push to change career direction, obtain general business knowledge, experience intellectual stimulation, improve earning and self confidence. MBA degrees are perceived as a ticket to increased salary, enhanced career progress, advance knowledge and skills and a prerequisite for upper managerial ranks. Luker, Bowers and Powers (1989) have also cited attaining long term career objectives, including opportunities for advancement and remaining competitive in the labour market as important motivators. The findings of this study corroborate with the above models. Employees today keenly

desiring to leverage their career destinations and positions are increasingly convinced of the need to pursue higher education in the form of an MBA. This has been an established strategy to enhance their career success.(Dreher & Ryan, 2002; Simpson, Sturges, Woods, 2005). The analyses of the responses and the informal interviews with the respondents by the researcher, who also taught them, revealed a passion and a sense of burning ambition among the students to rapidly climb the career ladder and thus interrupt their working life with an education intervention in the form of an MBA. Employability is another driver influencing the respondents to quit their jobs in the IT and Manufacturing to pursue an MBA.

VII. MANAGERIAL IMPLICATIONS

From the above discussion and analyses, it may be recommended to the human resource and the top management, about the paradigm shift of the young Gen Y towards enhancing their employable skills. The top management and the HR professionals should learn to facilitate an environment where training, learning and an intermittent tuition reimbursement for an MBA or a related course in higher education must be certainly introduced. It may be recommended to the top management and the HR professionals that young Gen Y should be given work environment which is driven by innovation, job rotation, continuous learning, intensive training, conducive physical working conditions and a good balance of work and life.

VIII. CONCLUSION

The findings of this research show that in order to retain talented employees and drive better performances and loyalty from employees, organizations need to be sensitive to the burning career aspirations and growth ambitions of the employees. Organizations need to focus of policies and culture in their environment which promote and allow sabbaticals for employees to pursue their MBA and similar education aspirations. Although employee engagement practices and facilitation of a work atmosphere which is conducive for employee performance are being focused upon by organizations, these do not guarantee job satisfaction and career satisfaction from an employees' perspective. Career satisfaction is identified as an important factor in deciding whether or not to stay in the organization. (March and Simon, 1958). In recent years, many organizations have learnt that in order to survive in a world which is changing very fast with new technologies, employee education is essential for new types of jobs and new forms of working which requires a different combination of skills.

IX. LIMITATIONS

The limitation of this study is that it was confined to a population of one management institute only. The study attempted to measure factors only related to affective and effective behaviours of the ex employees who are now students. Another limitation of his study is that only those who wish to pursue MBA were considered as respondents and their responses were measured. There are many other courses of higher education which are being pursued by employees as a full time activity in order to enhance their skill levels and their career prospects. Such studies are not included in this research.

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AUTHORS

First Author – Dr Parveen Prasad, Associate Prof, M U College of Commerce, Pimpri, Pune, Parvin_prasad@hotmail.com, Address: C 302, Camellia, Jhambulkar Chowk,Wanowrie, Pune 411040, India

The Reliability of Musculoskeletal Ultrasound Video Tracking of Muscle and Tendon Displacement

Dones VCIII^{1,5}, Thomas J², Lesniewski P³, Thoirs K⁴, Grimmer K¹, Suarez C⁵

¹ International Centre for Allied Health Evidence, University of South Australia

² Group Scientific Pty Ltd, Australia

³ School of Engineering, University of South Australia

⁴ School of Health Sciences, University of South Australia

⁵ College of Rehabilitation Sciences, University of Santo Tomas

Abstract- Introduction: Lateral epicondylalgia [LE] is most common cause of elbow pain attributed to abnormalities in the extensor carpi radialis and extensor digitorum communis [EDC]. Quantifying the linear displacement using musculoskeletal ultrasound and the Motion Tracking Analysis Program [MTAP] may be useful in characterizing the abnormalities found in elbows with LE. This study investigated the reliability of the operators [i.e. sonologist and sonographer] and the reader [i.e. physiotherapist] in procuring and analyzing ultrasound videos using MTAP.

Methods: Participants were recruited from private physiotherapy clinics in Adelaide between October 2010 and November 2010. To be included in the study, participants had to be referred to the clinic for symptoms of pain on, or within 3 cm of, the lateral epicondyle and have literacy in the English language. Both elbows of participants were scanned independently by two operators. The videos were analyzed by reader using MTAP.

Results: Fifty two and 60 videos from 12 elbows of six participants were procured by the sonographer and sinologist, respectively. Intra-tester reliability was found to be most acceptable in location 2 [EDC; sonographer: intraclass correlation [ICC]=0.88, 95 percent confidence interval [95% CI] =0.46-0.98 and sonologist: ICC=0.92, 95% CI=0.42-1.00]. Considering all 53 videos, there was an almost perfect agreement in the tracking analysis of the reader [ICC=0.93, 95% CI=0.89-0.96] with most of agreements occurring in location 2 [EDC].

Conclusion: The acceptable reliability of the sonographer, sinologist, and reader in scanning and analyzing ultrasound videos of the EDC suggests they may be used in characterizing EDC movement in elbows with LE and thus, understanding the role of the EDC in the production of pain in elbows with LE.

Index Terms- TENNIS ELBOW, LATERAL EPICONDYLAGIA, TRACKING, ULTRASOUND, RELIABILITY

I. INTRODUCTION

Lateral epicondylalgia [LE] is the most common clinical condition causing lateral elbow pain (1). It is secondary to repetitive and forceful activities of the upper extremities (2) and is common in cooks and automobile assembly line workers (3,4). It typically occurs in individuals aged 35 to 60 years (5-7).

Elbow pain in LE is associated with the mechanical stresses on the tendinous origins of forearm extensors, specifically of the extensor carpi radialis brevis [ECRB], extensor carpi radialis longus [ECRL], and extensor digitorum communis [EDC] (8-10). The ECRB is most commonly cited as the cause of LE.⁹

Only one study used musculoskeletal ultrasound [MSUS] to investigate the movement of the forearm extensor muscles in elbows with LE. Liu et al. observed the decreased movement of the extensor carpi radialis of two participants with LE after application of elastic tape using a motion tracking program (11). This study did not specifically report testing of the ECRL. However, the figure in the paper points to this part of the extensor carpi radialis. The study did not determine the reliability of the process used in measuring the movement of the ECRL.

Although the ECRB is commonly reported as a cause for LE (8,9,12-14), no one has investigated its linear displacement using a motion tracking program. This may be due to the challenge of sonographically delineating the borders of the ECRB. The ECRB near the lateral epicondyle has a small cross-sectional area and is found deep under the EDC (15). This makes it difficult to measure.

The reliability of tracking movement in the ECRB and EDC using MSUS depends on the MSUS machine and the motion tracking program used. The MSUS videos have to be clear so the muscle or tendon can be followed. The clarity of MSUS videos depends on the skill of the operator and the imaging protocol used. The anatomical site, equipment settings, scanning, and interpretation procedures used all influence the quality of the images obtained (16). The sensitivity also varies between MSUS machines. It is influenced by gain, probe frequency, filtering and pulse repetition rate (16).

Challenges in the use of a motion tracking program are two-fold, namely: 1. difficulty in determining a landmark and 2. non-trackable feature of interest in the moving muscle or tendon (11). The landmark is a relatively fixed structure within the body such as bone. The feature of interest is the part of the muscle or tendon being tracked during body movement (17,18). Without an observable landmark, it may be difficult to locate the feature of interest (11). Once the feature of interest is identified, tracking its movement within the MSUS video is complicated by poor contrast, low signal-to-noise ratio, and typical blur common in MSUS videos (17-18).

Given the many factors influencing the measurement of moving muscle and tendons, the reliability of using a motion

tracking program in quantifying the linear displacement of the ECRL and EDC in MSUS videos has to be evaluated. This aims of study are to determine the:

1. standard error of measurement [SE_M] of the reader in using the Motion Tracking Analysis Program [MTAP] in quantifying the linear displacement of the ECRL [muscle] and EDC [muscle and tendons]
2. intra-tester and inter-tester reliability of the sonographer¹ and sonologist² in scanning the ECRL and EDC in the elbows of participants with LE.

II. METHODS AND MATERIALS

Oversight

This study was approved by the Human Research Ethics Committee of the University of * *** [ethics application protocol number 21929]. Informed consent was obtained from the participants.

Study Population

The study was conducted at the University of * *** School of Health Sciences [Physiotherapy] Clinic. Participants were recruited from private physiotherapy clinics in Adelaide between October 2010 and November 2010. To be included in the study, participants had to be referred to the clinic for symptoms of pain on, or within 3 cm of, the lateral epicondyle in at least one elbow and have literacy in the English language.

Patients were ineligible for inclusion if they had current general body malaise [which may be indicative of systemic illness], current diagnosis of cancer, previous or current fractures in the upper limb, osteoarthritis of the elbow, recent blunt trauma to the elbow, or previous surgery to the elbow.

Testers

The sonographer had postgraduate qualifications and 20 years of experience in musculoskeletal ultrasound. The sonologist had 20 years of practice in rehabilitation medicine, and had been using MSUS for the past three years. The reader had 10 years of physiotherapy practice and had contributed to the design of the MTAP software particularly used in this study.

Equipment

Musculoskeletal Ultrasound Instrument: Ultrasound measurements were made with a Siemens Antares Sonoline Ultrasound machine [Siemens Medical Solutions, USA, Inc, Ultrasound Group Issaquah, WA] with a 5-13 MHz linear array broadband transducer.

Mechanical Test Jig: Figure 1 shows the mechanical test jig used to control the movement of the elbow and wrist during the MSUS scan. The jig consisted of a wooden plank that positioned the forearm in pronation and supported the elbow in extension. A universal goniometer was used to measure wrist flexion.

¹ Sonographers are diagnostic medical professionals who perform ultrasonic imaging, ² Sonologists are medical doctors who perform ultrasonic imaging.

¹ Sonologists are medical doctors who perform ultrasonic imaging.

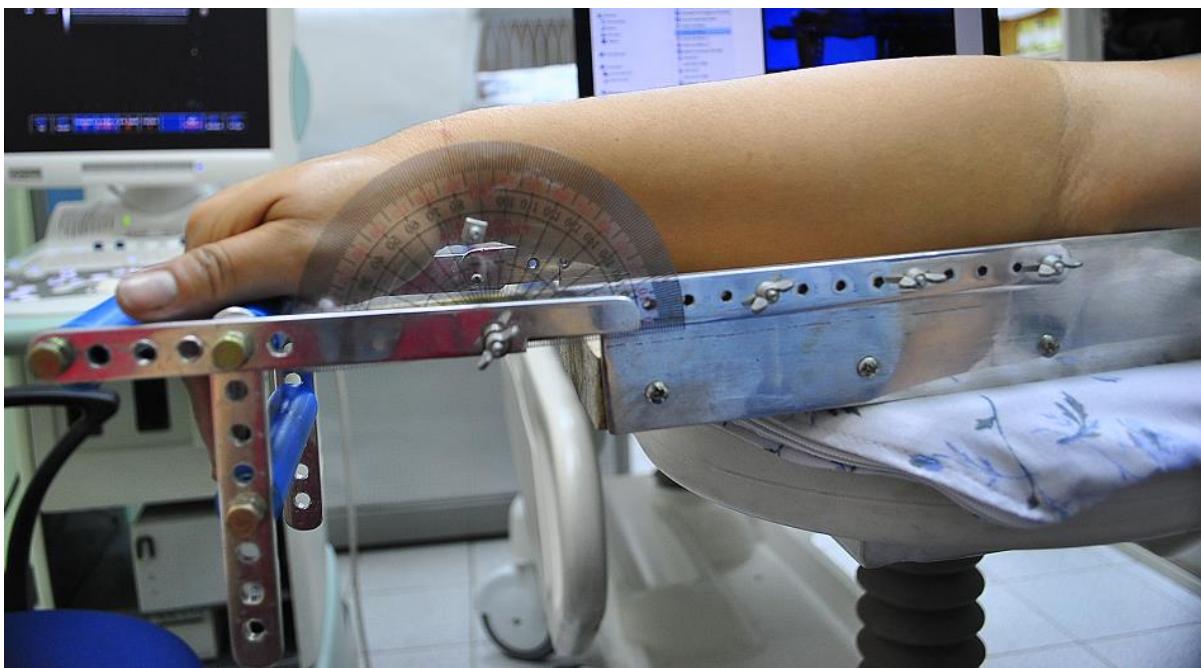


Figure 1. The mechanical test jig

Software: The MTAP in MatLabTM was developed at the Laser Light Scattering and Materials Science Laboratory of the University of South Australia (17-18). The program uses normalized cross-correlation to track a rectangular area known as a template from frame-to-frame in the video (19). The initial template is a region selected by the reader enclosing the feature of interest in the first video frame. The template is cross-correlated with the second frame of the video and the region of

best match generates the next version of the template which is tracked in the subsequent frame and so on until the last frame is processed. This adaptive template approach accommodates the small changes which occur in the feature being tracked over several frames and improves the tracking greatly (17-18).

Figure 2 shows a map of a typical cross-correlation matrix. The location of the maximum is the best match between the template and the video frame. This gives the new position and thus displacement of the template.

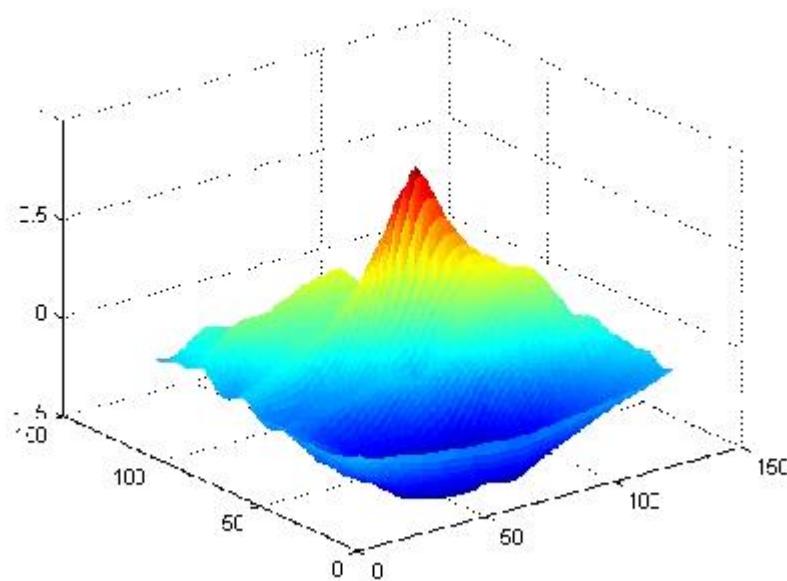


Figure 2. Cross-correlation matrix shown as surface plot

The motion of physiological structures during movement is complex and will usually consist of translational and rotational displacement and deformation. In addition the displacement may be perpendicular to the imaging plane so that, in MSUS videos,

structures will apparently change shape and orientation.¹⁷ This makes them difficult to track throughout the video sequence unless an adaptive template is used as is done here.

Even with the adaptive template, for some MSUS videos, the correlation output matrix of the MTAP may contain multiple maxima of similar magnitude resulting in ambiguous tracking as shown in Figure 3. This may occur when the feature of interest is ubiquitous or nondescript. The MTAP addresses this problem by allowing the user to limit the template displacement between

adjacent frames [$\square x_{\max}$] and reduce the likelihood of jumping to a different feature during tracking. This is a legitimate and practical restriction given that the features can be observed to move only small distances between adjacent frames and the feature would be expected to be found in the neighborhood of its position in the previous frame.

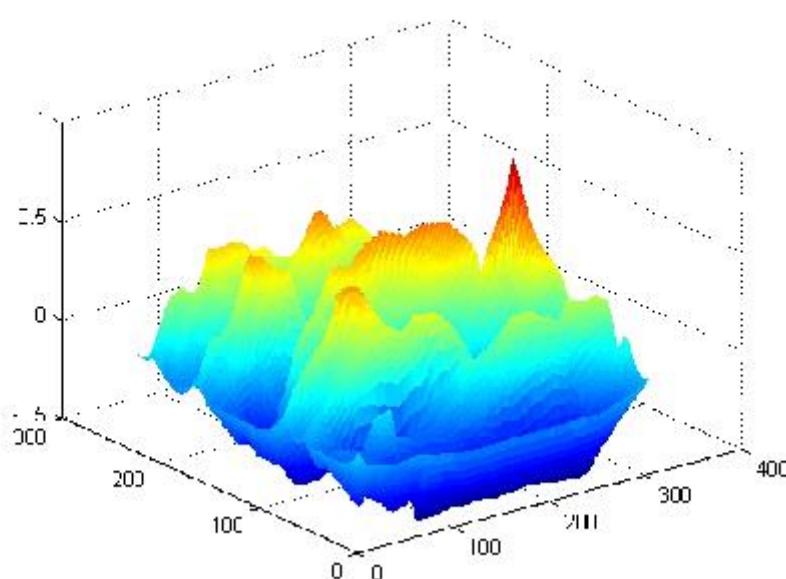


Figure 3. Cross-correlation matrix with multiple maxima

Provided that the template contains a pattern with sufficient variance and that it correlates properly [i.e. maxima in the correlation matrix exceeds 0.5, which is half of the perfect match], the accuracy of the MTAP in determining template displacement is one pixel. This determines the accuracy of the template velocity.

Study Method

Initial Screening: A research assistant with four years of clinical musculoskeletal experience oriented the participants to the study, performed screening tests to determine their eligibility and recorded the presence or absence of symptoms in both elbows of the participants included in the study. Both elbows were evaluated by the research assistant using the Mill test as a screening test for LE (20).

Standard Musculoskeletal Protocol: Both elbows of participants were scanned independently with the right elbow initially investigated by the two operators. The right elbow was imaged first to standardize the evaluation.

A stopwatch set at four seconds was used to coordinate the timing of the participant's active wrist flexion and start of MSUS scan. During wrist flexion, the movement of the EDC and ECRL were recorded using MSUS. Three locations were consecutively scanned under a high frequency linear transducer head as follows:

Location 1: Dorsal distal half of forearm. Here the upper edge of the transducer head was placed on the distal 1/3 of the forearm as shown in Figure 4. The transducer head was positioned parallel to the long axis of the ulna. The EDC was scanned at 1cm skin depth.



Figure 4. Placement of the transducer head on the dorsal distal half of the forearm (location 1)

Location 2: Dorsal proximal half of forearm. Here the upper edge of the transducer head was placed at the level of the upper end of the head of the radius on the proximal third of the

forearm as shown in Figure 5. The transducer head was positioned parallel to the long axis of the radius. The EDC was scanned at 1 cm skin depth.



Figure 5. Placement of the transducer head on dorsal proximal half of the forearm (location 2)

Location 3: Lateral distal half of arm. Here the lower edge of the transducer head was placed immediately above the lateral epicondyle on the distal third of the arm as shown in

Figure 6. The transducer head was positioned parallel to the distal aspect of the humerus. The ECRL muscle was scanned at 2.5cm skin depth.



Figure 6. Placement of the transducer head on lateral distal half of arm (location 3)

Locations 1, 2, and 3 were scanned by each operator in succession with one minute rest period between scans. This scanning procedure was repeated twice for each location by each operator.

Assessment of the Musculoskeletal Ultrasound Videos

The MSUS videos obtained by the operators from the upper extremities of the participants were assessed qualitatively and quantitatively by the reader.

Qualitative Assessment: Musculoskeletal ultrasound video image analysis using Windows Media Player

Windows Media Player was used to assess the quality of the MSUS videos. The MSUS videos with clear distinction between

muscles, bones and fascia were initially evaluated to exclude the factors that hinder successful tracking of the features of interest within the EDC and ECRL [e.g., typical blur of the entire image, poor contrast of tracked structures]. These videos were the first set of images investigated.

Quantitative Assessment: Tracking the linear displacement of the extensor carpi radialis longus and extensor digitorum communis using Motion Tracking Analysis Program: To start tracking the movement in EDC and ECRL using MTAP, an area in the first frame of the MSUS video containing the feature of interest was selected as the template to be tracked. The template position was defined by the XY pixel coordinate of its corner as shown in Figure 7.

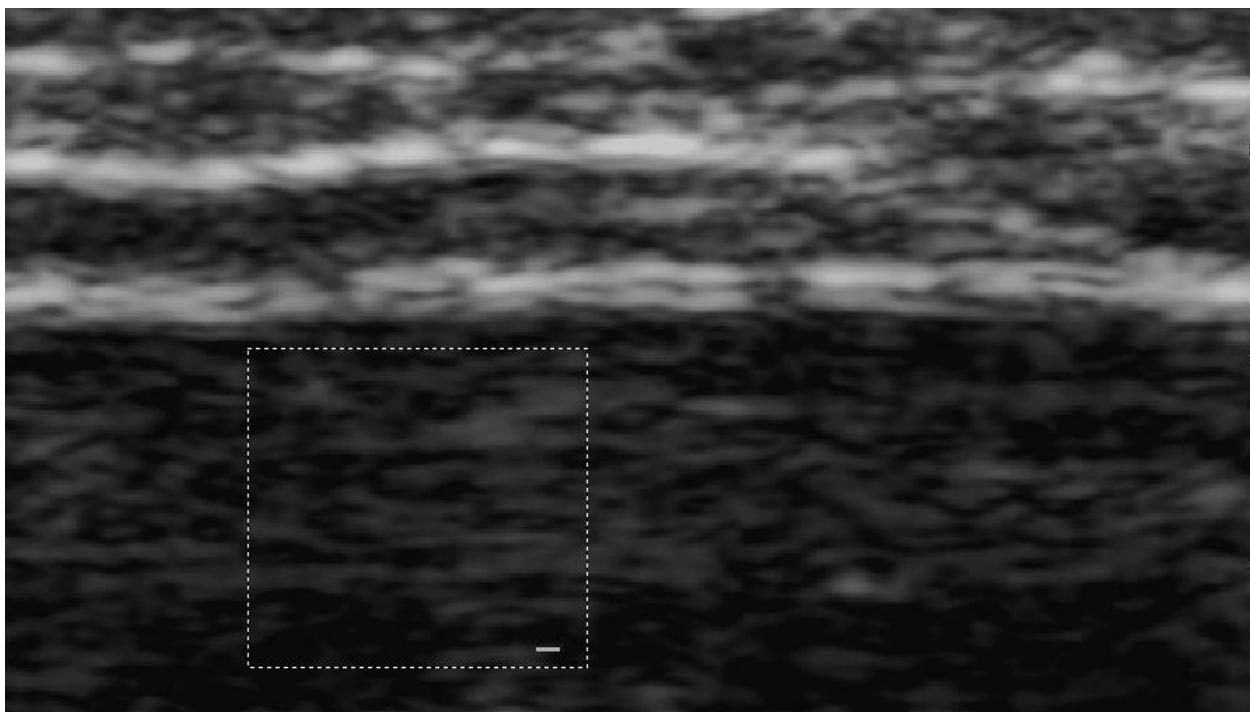


Figure 7. XY coordinate of the template.

The white arrow points to the starting XY coordinate of the tracked template. The tracked template is represented by the area contained in the box.

The MTAP tracked the template through the video as described above and the raw data for the linear displacement of EDC and ECRL were exported to Microsoft Excel™ 2010 for analysis. A list of frame-by-frame XY pixel coordinates was arranged in two columns. The link between pixels and units of length is obtained through calibration. The linear displacement of the ECRL and EDC during wrist flexion was measured along the X-axis due to the orientation of the transducer head. The linear displacement of the EDC and ECRL was computed by subtracting the initial X pixel from the final X pixel. For each video, tracking of the template was carried out three times.

Procedure to Establish Reliability of the Reader, the Sonographer, and Sonologist

Intra-tester reliability of the reader in evaluating the musculoskeletal ultrasound videos using MTAP: To determine the intra-tester reliability of the reader in measuring the movement of the EDC and ECRL using MTAP, all MSUS videos which were tracked in 2010 were re-analysed in 2012. The reader was blinded to the size of the tracked template and the results of the linear displacement of the EDC and ECRL of 2010. During re-analysis of the first set of MSUS videos in 2012, the MSUS videos were tracked four times.

Reliability of the sonographer and the sonologist: To determine the intra-tester reliability of the sonographer and the sonologist, the reader compared the results of the linear displacement of the tracked template between the first and second sets of MSUS videos that each had collected.

To determine the inter-tester reliability of the sonographer and sonologist, the first set of MSUS videos obtained by each tester was matched according to the participant's identification

code, laterality of symptoms, and location. Differences in linear displacement of the EDC and ECRL were then compared.

III. STATISTICAL ANALYSES

No current studies establishing the reliability of testers in collecting MSUS images of EDC and ECRL in elbows with LE are reported. To compute for the sample size, the authors instead used the differences in the mean measurements of median nerve longitudinal slide in the wrists of individuals with carpal tunnel syndrome reported in the study of Erel et al. (2003).²¹ As a result of sample size calculation using MedCalc Version 12.3.0 [MedCalc Software, Ostend, Belgium], this study was powerful enough to detect differences in longitudinal sliding of the EDC and ECRL at 80% power of 0.05.

The SE_M was used to estimate the error of the reader in measuring the linear displacement of the EDC and ECRL using the MTAP. The formula used to calculate SE_M is

$$SE_M = SD \times \sqrt{1 - ICC} \quad (1)$$

where SD is the standard deviation of differences and ICC is the intra-class correlation coefficient.

The SD was calculated from the differences in the measured linear displacement [in pixels] of the EDC and ECRL in 2010 and 2012. The ICCs were computed from the results of the measured linear displacement of the EDC and ECRL using MedCalc Version 12.3.0 [MedCalc Software, Ostend, Belgium]. The uncertainty in the total measured linear displacement of the EDC and ECRL due to the SE_M of the reader was expressed as a percentage of the measured displacement, i.e. relative uncertainty = (SE_M /average linear displacement)*100.

The intra- and inter-tester reliability of the sonographer and the sonologist in scanning the forearm was determined using the

ICC obtained using MedCalc. The ICC coefficient is a commonly used statistical measure in determining the intra-tester reliability of measurements of the same tester and inter-tester reliability of measurements obtained by two different testers. Single measures in ICC were used to obtain the intra-tester reliability of each sonographer and sonologist in scanning the linear displacement of the EDC and ECRL following a standard scanning protocol. Moreover, the average measures of the linear displacement of the EDC and ECRL of the sonographer and sonologist were determined to obtain the inter-tester reliability of both testers.

Intra-class correlation coefficients were interpreted as 0-0.2 = poor agreement, 0.3-0.4 = fair agreement, 0.5-0.6 = moderate agreement, 0.7-0.8 = strong agreement, and >0.8 almost perfect agreement.

IV. RESULTS

Participants

Six participants [three females, three males] aged 46 to 52 years [mean \pm SD: 49 \pm 2] with a mean duration of symptoms of nine months [minimum to maximum: 2.5 to 14 months] were included in the study. Among the 12 elbows of the six participants, only eight elbows of four participants (three with unilateral LE, one with bilateral LE) were scanned by both sonographer and sonologist due to scheduling difficulties. Both elbows of one participant were only scanned by the sonologist.

Number of Musculoskeletal Ultrasound Videos

As shown in Figure 8 there were a total of 112 MSUS video scans recorded. The sonographer scanned a total of 52 MSUS videos including 48 from eight elbows scanned twice for three locations, and four from one elbow which were discarded by the sonographer due to perceived image blurring but were viewed clearly using the Windows Media Player by the reader, and thus included in the tracking analysis. The sonologist scanned a total of 60 MSUS videos including 48 from eight elbows scanned twice for three locations and 12 from both elbows of one participant [two elbows scanned twice for three locations].

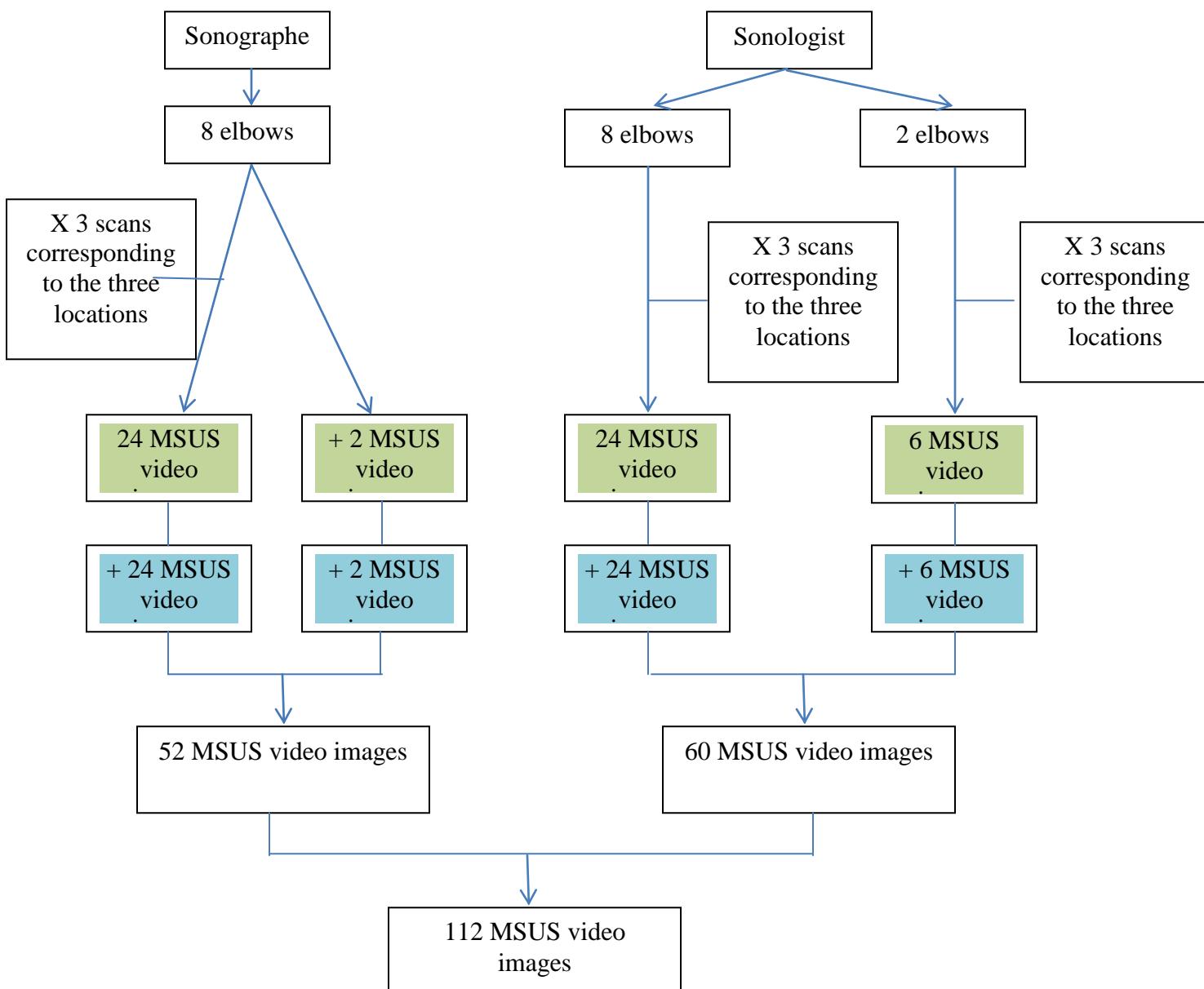


Figure 8. Flowchart of scanned MSUS images. *Key:* MSUS, musculoskeletal ultrasound

Details of the Musculoskeletal Ultrasound Videos: The size of the ultrasound image is 407 x 636 pixels, with the image in 8-bit grayscale [8 bits per pixel with 256 shades of gray]. Data were taken at 25 frames per second and a 75 frame sequence was analyzed as shown in Figure 9. The size of the template selected in the initial frame was different for each of the MSUS videos.

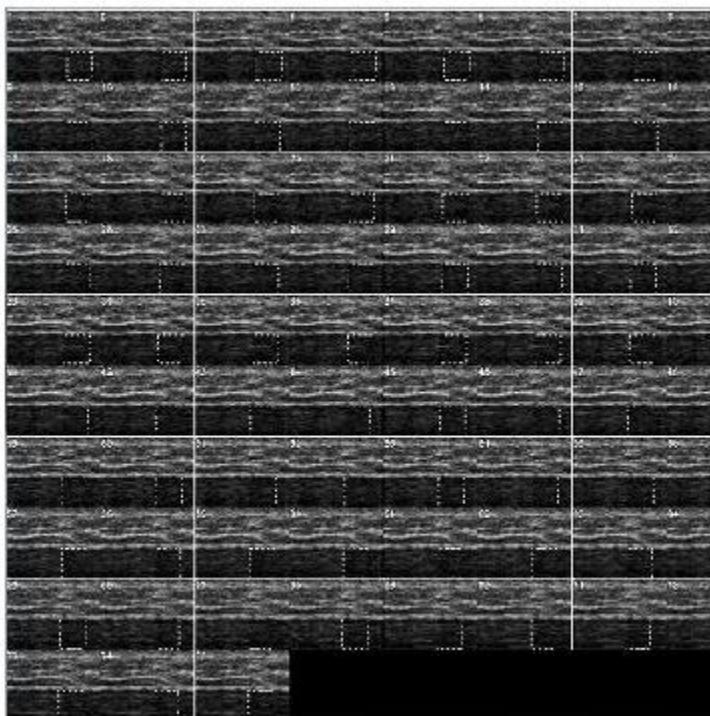


Figure 9. Seventy-five tracked templates of the Extensor Digitorum Communis in a musculoskeletal ultrasound video

Number of Musculoskeletal Ultrasound Videos Used for Reliability Test: The MSUS videos with better image quality were used to compute the SE_M of the reader [53 MSUS videos] and the inter-tester reliability of the sonographer and the sonologist [20 pairs of MSUS videos]. The intra-tester reliability of the sonographer and sonologist was determined by comparing the linear displacements of the EDC and ECRL between the two sets of scanned MSUS videos. The second set of MSUS videos had poor image quality compared with the first set of MSUS videos. Table 1 lists the number of MSUS videos tracked to determine the reliability of the reader, sonographer and sonologist.

Table 1. Number of musculoskeletal ultrasound (MSUS) video images investigated

Windows Media Player		MTAP
Initial number of MSUS video images investigated for clarity	Number of blurred MSUS video images	Final number of MSUS video images tracked
SE _M of primary	56	3
		53 pairs loc 1=18

Investigator			loc 2=17 loc 3=18
Intra-tester reliability of sonographer	26	First set: 0 Second set: 6	20 pairs loc 1=7 loc 2=7 loc 3=6
Intra-tester reliability of sonologist	30	First set: 3 Second set: 8	22 pairs loc 1=8 loc 2=6 loc 3=8
Inter-tester reliability of sonographer and sonologist	Sonographer: 24 Sonologist: 24	Sonographer: 2 Sonologist: 2	20 matches loc 1=7 loc 2=5 loc 3: 8

Key: loc, location; MSUS, musculoskeletal ultrasound; MTAP, motion tracking analysis program; SEM, standard error of measurements

Average Linear Displacement of the Extensor Digitorum Communis and the Extensor Carpi Radialis Longus: The reader had almost perfect agreement between the average linear displacements of the EDC muscle in the proximal dorsal half of forearm [location 2] followed by the ECRL muscle in the distal lateral half of the arm [location 3] taken in 2010 and 2012. Table 2 shows the average linear displacement of the EDC and ECRL of the upper extremities.

Table 2. Average linear displacement of EDC and ECRL in the upper extremities

Location	Read in 2010: Average Linear Displacement (in pixels)	Read in 2012: Average Linear Displacement (in pixels)
1 (EDC tendons)	88.28	92.72
2 (EDC muscle)	60.88	61.18
3 (ECRL muscle)	18.38	20.11

Key: ECRL, Extensor Carpi Radialis Longus; EDC, Extensor Digitorum Communis

Standard Error of Measurement of the Reader in the Use of the Motion Tracking Analysis Program: The SE_M of the reader in measuring the linear displacement of the muscles in all three locations was 5.40 pixels. The smallest SE_M was 0.37 pixel at location 2 which has negligible influence on the measured muscular linear displacement of the EDC. The largest SE_M of 13.80 pixels was in location 1 comprising 15 percent of the average linear displacement of the EDC tendon. The SE_M in location 3 was 1.00 pixel [ECRL muscle] comprising four to five percent of the averaged linear displacement of the ECRL muscle. **Intra-tester Reliability of the Reader in the Use of the Motion Tracking Analysis Program:** Considering all 53 MSUS videos analyzed in 2010 and re-analyzed in 2012, there was an almost perfect agreement in the tracking analysis of the reader [ICC=0.93, 95% CI=0.89-0.96] using MTAP with most of the agreements occurring in locations 2 and 3, as reported Table 3.

Table 3. Intra-class correlation coefficients of the primary investigator in using the Motion Tracking Analysis Program; and the sonographer and the sonologist in scanning the Extensor Digitorum Communis and Extensor Carpi Radialis Longus muscles

	Intra-tester reliability			Inter-tester reliability
	Primary investigator	Sonographer	Sonologist	Sonographer and sonologist
Location	Intra-class correlation coefficient (95% confidence interval)			
1	0.86 (0.67-0.95)	0.42 (-0.41 to 0.87)	0.90 (0.59 to 0.98)	0.37 (-2.68 to 0.90)
2	1.00 (0.99-1.00)	0.88 (0.46 to 0.98)	0.92 (0.42 to 1.00)	-0.69 (-15.20 to 0.82)
3	0.95 (0.87-0.98)	0.81 (0.13 to 0.97)	0.81 (0.13 to 0.97)	0.78 (-0.11 to 0.96)
Average for all three locations	0.93 (0.89-0.96)	0.65 (0.31 to 0.85)	0.88 (0.72 to 0.95)	0.58 (-0.71 to 0.83)

Key: Location 1, dorsal distal half of the forearm; Location 2, dorsal proximal half of the forearm; Location 3, lateral distal half of arm

Reliability of the Testers

Intra-tester Reliability of the Sonographer: For the 20 paired MSUS videos, there was a moderate agreement between the first and second sets of MSUS videos scanned by the sonographer with fair to almost perfect agreement found in Location 2 (EDC muscle, ICC=0.88, 95% CI=0.46-0.98).

Intra-tester Reliability of the Sonologist: For the 22 paired MSUS videos, there was a moderate agreement between the first and second set of MSUS videos of the sonologist with fair to almost perfect agreement noted in location 1 [EDC tendons, ICC=0.90, 95% CI=0.59-0.98] and location 2 [EDC muscle, ICC=0.92, 95% CI=0.42-1.00].

Inter-tester Reliability of the Sonographer and the Sonologist: For the 20 matched MSUS videos [from the first set of MSUS videos] of the sonographer and the sonologist, there was a wide range of agreement ranging from chance to excellent in the matched MSUS videos between the testers [ICC=0.58, 95% CI=-0.71-0.83].

V. DISCUSSION

This is the first study to report on the standard error of measurement and reliability of using a MTAP in measuring the linear displacement of the EDC and the ECRL in individuals diagnosed with LE. The study's findings were: 1. the reader was

most reliable in measuring the linear movement of the EDC muscle [location 2] using the MTAP, 2. the scanning of the linear movement of the EDC muscle in location 2 twice in succession by the sonographer or the sonologist showed moderate to excellent reproducibility of the MSUS videos, and 3. the agreement in the linear displacement of EDC and ECRL on MSUS videos collected by the sonographer and sonologist was variable.

The standard error of measurement of the reader depends on the re-identification of the XY coordinate of the previously tracked template and the contrast of the MSUS videos. The re-identification of the XY pixel was challenging due to the absence of a grid ruler in the MTAP and the absence of an identifiable bony landmark on the template in location 3. In lieu of the grid ruler, the right border of the window frame of the MTAP was used as a guide by the reader in re-identifying the XY coordinate of the EDC muscle in location 2. This decreased the reader error in re-identifying the XY coordinate resulting in the lowest SE_M of 0.37 pixel. Although the lateral epicondyle was used as a bony landmark for location 3, the angled orientation of the ECRL and the central location of the XY coordinate on the MSUS video frame made it difficult for the reader to locate the previously used XY coordinate. The re-identification of the XY coordinate in Location 1 was most challenging. The MSUS videos in Location 1 had poor contrast compared with the MSUS videos in Locations 2 and 3. There were no bony landmarks or grid ruler available. The complex movement of the EDC tendon between the skin and ulna as terminal wrist flexion approached may have been the underlying cause of the blurring of the videos. These factors contributed to the highest SE_M of 13.80 pixels of the reader in analyzing the videos in Location 1.

The sonographer and sonologist demonstrated moderate to perfect agreement in capturing the linear displacement of the EDC in Location 2 between the two successive MSUS videos. This was secondary to the minimal variation in the characteristics and movement of the EDC muscle in the proximal section of the forearm during scan. Given that the depth of scan of EDC in Location 2 is set at 1cm skin depth, the thickness of the EDC in Location 2 was almost uniformly reproduced in the next MSUS videos. During the scan when the wrist was flexing, there was minimal vertical displacement of the EDC muscle, and blurring of the MSUS videos resulting in fewer extraneous factors that would have influenced the reproducibility of the MSUS videos. Reproducing the MSUS videos in Location 3 proved to be challenging despite the conscious effort of the testers to ensure the static position of the transducer head on the distal lateral aspect of the arm. The wrist flexion movement could have caused a difference in the position of the ECRL [Location 3] during scan. The ECRL may not have moved linearly under the static transducer head which could mean tracking of structures other than the ECRL.

The wide range in agreement [poor to excellent] between the first and second set of videos of the sonographer in Location 1 may be due to the characteristics of the middle EDC tendons and their non-linear movement during wrist flexion. In contrast to the ultrasound videos collected by the sonologist, the sonographer deviated from the scan protocol and scanned the EDC tendons running exactly at the centre of the wrist. These

EDC tendons were more mobile than the tendons found at the borders of the wrist (22). Moreover, the middle EDC tendon movement could have been influenced by the repetitive wrist flexion movement during scans releasing them and thus yielding greater variations in the linear displacement of the EDC tendons. Despite the use of a standard scanning protocol for EDC and ECRL, there was a possibility of obtaining two significantly different linear muscular displacements from two different testers. Although our study controlled for variables such as MSUS machine and mechanical test jig used, time of day of scan, and standard protocol, factors such as differences in the experience in MSUS use of the sonographer and sonologist, number and timing of execution of wrist flexion, time in between MSUS scans, differences in the angle of tilt and pressure used on the transducer head, difference in the placement of the transducer head and mechanical characteristics of the muscles and tendons to movement caused varying agreement in the MSUS videos obtained by the sonographer and the sonologist.

The MTAP can be a reliable tool in measuring the linear displacement of EDC muscles in the proximal dorsal half of the forearm. The uniform characteristics of the structures under investigation during movement, such as found in the EDC muscle in Location 2, and scanning twice in succession are likely to increase the reproducibility of the MSUS videos. The MSUS scan procedures which are open to varying interpretation [such as that used in scanning the ECRL in Location 3] should be clarified prior to the implementation of the study.

Implications for Research

There is a need to standardise the protocol in scanning for the movement of the EDC tendon in Location 1. A specific point on the dorsum of the wrist to place the transducer head to scan the EDC tendon should be agreed prior to scanning.

A modern system which automatically puts the MSUS machine in scan mode once wrist flexion starts addresses the time lag that occurs in a manual and operator dependent system. A visual display of wrist flexion will provide an additional cue to verbal promptings, thus, improving the timing for initiation of wrist flexion.

Limitations of the Study

The study did not trace the scanned EDC and ECRL from their origin which could have further enabled the sonographer and sonologist in identifying these structures. Instead, the guide used by the testers in identifying the EDC and ECRL was based on descriptions of the muscles origin and insertion as found in the studies by Bunata et al. (8), Cohen et al. (23), Snell (24), Kutsumi et al. (22,25), and Greenbaum et al. (26).

The study used a system where the reader coordinated the synchronous initiation of wrist flexion movement and pressing of the scan button by the tester. The time lag between the verbal prompting of the reader and the initiation of the wrist flexion movement, the verbal prompting of the reader and the pressing of the scan button by the tester, and the initiation of the wrist flexion movement and the pressing of the scan button by the tester could have influenced the reproducibility of the MSUS videos. This time lag was not quantified in this study. The extent to which time lag affected the reliability of the testers was not determined in this study. Moreover, the non-fixed shoulder

and elbow joints could have influenced the reliability of the testers and was not assessed in this study.

Due to unavoidable errors in scanning such as the transducer head slipping off the skin while the wrist was flexing, a number of patients had to repeat the wrist flexion movement more than six times per limb. This could have influenced the extensibility of the forearm extensor muscles thus affecting the linear displacement of the EDC [muscle and tendon] and ECRL [muscle].

VI. CONCLUSION

Using the MTAP, the reader was most reliable in determining the linear muscular displacement of the EDC in the proximal dorsal half of the forearm of participants with at least one upper extremity with LE. Additionally, each of the sonographer and sonologist was reliable in scanning the EDC in the proximal forearm scanned twice in succession. This established reliability of the reader and the testers is important in characterising the mobility of the EDC muscles which may potentially clarify its role in the genesis of pain in elbows with LE.

CONFLICT OF INTEREST

We certify that no party having a direct interest in the results of the research supporting this article has or will confer a benefit on us or on any organization with which we are associated and, if applicable, we certify that all financial and material support for this research and work are clearly identified in the manuscript.

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Third Author: Lesniewski P, Adjunct Senior Research Fellow, School of Engineering, University of South Australia, Peter.Lesniewski@unisa.edu.au

Fourth Author: Grimmer, Karen, Director, International Centre for Allied Health Evidence, University of South Australia, Karen.Grimmer@unisa.edu.au

fifth Author: Thoirs K, Associate Head of School, School of Health Sciences, University of South Australia, Kerry.Thoirs@unisa.edu.au

Sixth Author: Suarez C, Professor, College of Rehabilitation Sciences, University of Santo Tomas, bebetsuarez61@gmail.com

Correspondence Author: Dones VCIII, Research Assistant, International Cetnre for Allied Health Evidence, DONVC001@mymail.unisa.edu.au

AUTHORS

First Author: Dones VCIII, Research Assistant, International Cetnre for Allied Health Evidence, DONVC001@mymail.unisa.edu.au

Second Author: Thomas J, Managing Director and Chief Technical Officer, Group Scientific Pty Ltd, PO Box 190 Salisbury South, SA 5106 AUSTRALIA and School of Electrical and Electronic Engineering, Shandong University of Technology, Zibo 255049, CHINA, John@group-scientific.com.au

FIGURE LEGEND

Figure 1. The mechanical test jig

Figure 2. Cross-correlation matrix shown as surface plot

Figure 3. Cross-correlation matrix with multiple maxima

Figure 4. Placement of the transducer head on the dorsal distal half of the forearm [Location 1]

Figure 5. Placement of the transducer head on dorsal proximal half of the forearm [Location 2]

Figure 6. Placement of the transducer head on lateral distal half of arm [Location 3]

Figure 7. XY coordinate of the template. The white arrow points to the starting XY coordinate of the tracked template. The tracked template is represented by the area contained in the box.

Figure 8. Flowchart of the procedure for obtaining musculoskeletal ultrasound images

Figure 9. Seventy-five tracked templates of the extensor digitorum communis in a musculoskeletal ultrasound video.

Solid Waste Disposal Site Selection for Kandy District, Sri Lanka Integrating GIS and Risk Assessment

B M R S Balasooriya^{1*}, M Vithanage², N J Nawarathna³, Ken Kawamoto^{4,5}, M Zhang⁶, G B B Herath⁷, M I M Mowjood¹

¹Post Graduate Institute of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka

²Institute of Fundamental Studies, Kandy, Sri Lanka

³Teaching Hospital, Kandy, Sri Lanka

⁴Graduate School of Science and Engineering, Saitama University, Saitama, Japan

⁵Institute for Environmental Science and Technology, Saitama University, Saitama, Japan

⁶National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan

⁷Faculty of Engineering, University of Peradeniya, Peradeniya, Sri Lanka

Abstract- Open dumping is the most common method of solid waste disposal in many developing countries including Sri Lankan urban areas. Appropriate landfill site selection is important to minimize negative impacts associated with open dump sites. Landfill siting is an extremely difficult task to accomplish due to strong public opposition and regulations. Developing countries do not have a systematic process for landfill site selection and hence unsuccessful landfill siting leading to environmental degradation is typically the result especially in the developing world. Data were collected from Kandy district, Sri Lanka. Both GIS analysis and semi quantitative risk assessment were used and eight map layers such as surface water bodies, distance from transportation routes and urban areas, land use/land cover, soil, rainfall, population density, elevation were utilized. ArcGIS 9.3 software and its extensions were used as the GIS tool since it is able to perform suitability analysis using Multi Criteria Evaluation (MCE) analysis. Results reveled that about 20% of the area in Kandy district belongs to very high risk area, 40 and 30% were defined as moderate and low risk areas for landfill site selection respectively. The selection of the final municipal solid waste site requires further geotechnical and hydrogeological analyses in order to protect the groundwater as well as surface water. At the end of the analyses, 10% of the candidate areas are suggested however for the selection of the final landfill site further analyses and protective measures are needed in order to ensure the long term sustainability of the environment.

Index Terms- Solid waste, landfilling site, Geographical Information System (GIS), Risk Assessment.

I. INTRODUCTION

Unprecedented population growth increases waste generation with rapid urbanization and economic development in urban centres. Improperly managed solid waste is a risk to human health and the environment (Abeynayaka & Werellagama 2007; Balasooriya et al. 2011; Bandara & Hettiaratchi 2010). Management of solid waste has become a major global concern that is increasing day by day (Yahaya & Ilori 2010; Savage et al. 1998). Land filling is the most common and cost effective system of waste disposal method for most urban centres in the developing region (Abeynayaka & Werellagama 2007; Nas et al.

2010). Uncontrolled open dumping and improper waste management causes various problems, including contaminating ground and surface water, attracting insects and rodents, increasing flooding due to blocked drainage canals or gullies and generation of toxic gases (Abeynayaka & Werellagama 2007; Balasooriya et al. 2011; Bandara & Hettiaratchi 2010). All these problems consequence on social, environmental sustainability of the ecosystems.

Large number of impacts are associated with open dumping sites in Sri Lanka (Balasooriya et al. 2011; Bandara & Hettiaratchi 2010). To access those impacts semi quantitative risk matrix was very useful approach. It was developed by Deere et al, 2001. According to it, each risk associated with dumping sites described by identifying the likelihood and consequence of hazard. The impact on public health is the most important consideration, but other factors such as environmental, topographic conditions, hydrology also considered. Each impacts were accessed based on possible, rare, insignificant and major basis. Properly defining likelihood and consequence of the hazard with sufficient assessment, reduce the impacts associated with open dump sites. Lack of data in Sri Lanka, is most critical problem. When data is insufficient to determine a risk is high or low, risk considered as a significant risk. Any areas fall under high, very high areas should not considered as suitable for landfill site selection or may require mitigation measures to avoid those risks.

According to the risk matrix each hazard associated with open dump sites were identified and evaluated according to severity and likelihood, values were decided using CEA landfill guidelines (CEA 2005). It provides general guideline for the landfill site selection. This guideline is cover only the municipal solid wastes. Sewage, hazardous waste including medical wastes and hazardous industrial waste do not consider in the guideline. This guidelines provide a technical guidance to landfill site selection with minimal impacts to the environment. In addition to Sri Lankan guidelines, regional countries guidelines (India, Pakistan, Nepal, Thailand) and EPA landfill manuals also considered. India, Thailand, Pakistan and Nepal are developing countries but in some conditions they are differing from Sri Lanka. For example India has much more land than Sri Lanka. By comparing regional countries guidelines, Sri Lankan guideline was used in this study, because it is more relax among others.

The impact on public health is the most important consideration, but other factors such as environmental, geology, social, topography, hydrology also considered (Javaheri et al. 2006; Department of Primary Industries, water and Environment 2004; Alfay et al. 2010). Each impacts were accessed based on possible, rare, insignificant and major basis. Properly defining likelihood and consequence of the hazard with sufficient assessment, reduce the impacts associated with open dump sites. Lack of data in Sri Lanka, is most critical problem. When data is insufficient to determine a risk is high or low, risk considered as a significant risk. Any areas fall under high, very high areas was considered as not suitable for landfill site selection or may require mitigation measures to avoid those risks.

Geographic information system (GIS) is a strong tool which can integrate in to several methodologies. It efficiently stores, retrieves, analyses and display information according to related method (Nas et al. 2010; Gorsevski et al. 2012; Sener et al. 2011; Guiqin et al. 2009; Donevska et al. 2011). The software ideal for this kind of preliminary studies due to its ability to manage large amount of spatial data from various sources and its saves time. The objective of this study is to select a suitable site using the Geographic Information System (GIS) and semi quantitative risk assessment matrix at Kandy district a case study.

II. MATERIAL AND METHODS

A. Study Area

Kandy district is located in middle part of the Sri Lanka. Its capital is the city of Kandy, with a population of the district about 1,368,216 (Census report, 2012) and the region occupy 1934 Km² of the country's total area.

The climate is tropical, the average annual precipitation varies around 3175 mm and it is located at latitudes 6°56', 7°28' N and longitudes 80°25'', 81°01' E. It has an average temperature range from 21 to 26 °C and in dry periods the temperature of the area rises up to 29-30 °C. The complex mountainous terrain of different landforms, soil types, geology and altitudinal gradients that range between 462 and 600 m

above sea level and slopes varying between 0% and 90% produce a variety of activities, such as agricultural, commercial, industrial and urban land uses.

Most common method of solid waste disposal in Kandy district is open dumping. Improper planning and maintenance of these dump sites affect in many ways to human health and environment in long run.



Figure: 1. Sri Lanka map including Kandy District

B. Methodology

The methodology described in this paper is an efficient approach for a landfill siting process. In this study, eight map layers such as land use, elevation, surface water, distance to roads, and distance to urban areas, soil, rainfall, population density data was collected from the district. Suitable landfill site was analysed by using the GIS together with risk assessment (Table 2). (Deere. et.al, 2001, Bartram. et. al.2009). Based on these data, a risk assessment was carried out with semi-quantitative matrix (Table 1). The findings obtained from this study were used to develop criteria for new landfill site selection.

Table1. Semi quantitative risk matrix

		Severity or consequence				
		Insignificant or no impact - Rating:1	Minor implication impact- Rating :2	Moderate esthetic impact- Rating:3	Major regulatory impact- Rating: 4	Catastrophic impact- Rating: 5
Likelihood or frequency	Almost certain/ Once a day- Rating:5	5	10	15	20	25
	Likely/ Once a week- Rating: 4	4	8	12	16	20
	Moderate/ Once a month- Rating: 3	3	6	9	12	15
	Unlikely/ Once a year- Rating: 2	2	4	6	8	10
	Rare/ Once Every 5 year- Rating: 1	1	2	3	4	5
	Risk Score	<6	6-9	10-15	>15	

Table 2: Typical hazards identification in landfill sites

Hazard Event	Criteria	Hazard Type	Likelihood	Severity	Risk	Risk Rating
Odour and diseases	Landfill within 500m-1km from an urban areas	Social	4	2	8	Medium
	Landfill within 100m from an urban area	Social	4	5	20	Very High
	Landfill >1km from an urban area	Social	2	2	4	Low
	Transportation routes within <300m away from a landfill site	Environmental	4	4	16	Very High
	Transportation routes within >500m away from a landfill site	Environmental	2	2	4	Low
	Landfill within 500m-1km from an urban areas	Environmental	2	1	2	Low
Surface water pollution	Landfill within 500m from an urban area	Environmental	4	3	12	High
	Surface water bodies within <300m landfill site	Environmental	5	5	25	Very High
	Surface water bodies within >500m landfill site	Environmental	2	2	4	Low
	High elevation(>2000m)	Environmental	5	5	25	Very High
	Elevation between 400m-1250m	Environmental	4	2	8	Medium
	Clay	Geology	2	2	4	Low
Ground water pollution	Mixed	Geology	2	3	6	Low
	Sandy	Geology	4	5	20	Very High
	Clean sand/gravel	Geology	4	5	20	Very High
	Rainfall <500mm	Meteorology	2	3	6	Low
	Rainfall 500mm-1500mm	Meteorology	2	4	8	Medium
	Rainfall >1500mm	Meteorology	5	5	25	Very High
Social/ Environmental impacts	Population Density 80 -1000Km ²	Social	3	3	9	Medium
	Population Density 1000- 3000Km ²	Social	4	5	20	Very High
	Land use- Plantations	Environmental	3	5	15	High
	Land use- Pasture areas	Environmental	4	5	20	Very High
	Land use- Rocky Terrain	Environmental	3	3	9	Medium
	Land use- Bush lands	Environmental	1	3	3	Low
	Land use- Agricultural land	Environmental	2	4	8	Medium
	Land use- Urban Centers	Social	4	5	20	Very High
	Land use- Villages	Social	5	5	25	Very High

According to the risk assessment, buffer zones were assigned as 100 m, 200 m, and 300 m along every existing road by using Arc GIS 9.3 software. 100m and 300m buffer zones were assigned for railway track and values were decided according to the risk assessment.

The location of a solid waste disposal site at a distance less than 100 m from a surface water body causes very high risk; a

distance equal to about 300 m causes moderate risk and a distance greater than 300 m causes low risk to the environment. The safe distance between a surface water body and buffer zones were considered to be greater than 500 m.

If a solid waste disposal site is located at a distance less than 100 m from a residential area , it causes very high risk to the residents. If the distance between the residential area and the

solid waste disposal site is greater than 1 km, it may impose low risk, while a distance between 400 m and 1 km is considered as to be of moderate risk condition.

The best areas for locating land disposal sites should have a medium altitude. An altitude greater than 2,100 m makes the relevant area not suitable for locating solid waste land disposal sites. Doneveska et al. (2011) considered areas which are 400–1,250 m above sea level, as the most suitable because of being the least less risk areas. An altitude greater than 2,000 m causes a high risk.

Land use map in the area was identified and urban centers, villages, parks and scenic areas were considered as high risk area for landfill site selection. Archeological, histological and protected areas exclude from the consideration (CEA, 2005).

Soil types in the area was considered and values were assigned based on risk assessment. Soil in Kandy district is covered by clay type soil considered as a low risk factor.

Population data in Kandy district was collected from census and statics department and density was calculated. Density higher than 1000Km^2 considered as high risk area and lower than that considered as low risk areas. Low risk areas were considered to be suitable for land disposal.

Meteorological factors are more important in landfill site selection. Rainfall data was collected in twelve meteorological stations (1963- 2011 yrs.) in Kandy district from meteorology department, Peradeniya and developed rainfall distribution pattern of Kandy district by interpolating data by calculating average annual rainfall.

Values were assigned to each layers according to risk assessment and finally overlay analysis was carried out to develop suitability map by using Arc GIS 9.3 software (Figure.2).

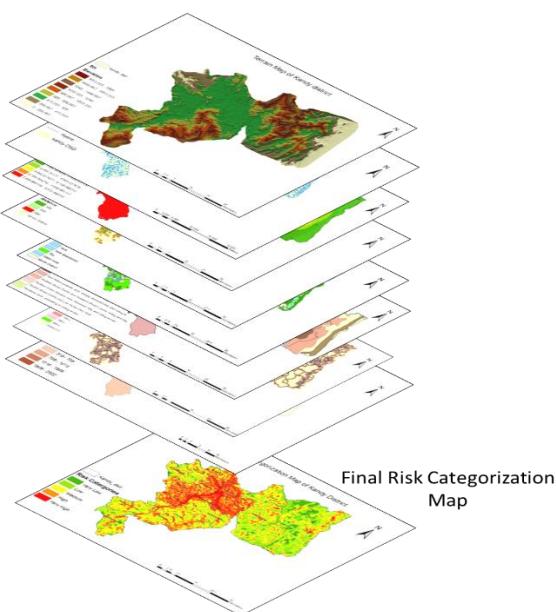


Figure.2. The spatial analysis procedure for landfill site selection

III. RESULTS AND DISCUSSION

Selection of potential landfill site is not an easy task and it needs careful evaluation of the study area. For this case study eight criteria were selected according to the CEA guidelines (2005) and the availability of data in Kandy district.

Landfill sites should not be placed too closed to high population density area in order to mitigate conflict against peoples who live in nearby. This prevents health problems, noise complains, odour complains, decreased property values and mischief due to scavenging animals. According to the EPA landfill guideline (Environmental Protection Agency 2006), a landfill site should be located in an area which is at least 500m away from an urban residential or commercial areas. Figure 3, shows the building with buffer zones, and the restricted areas represented by green colour.

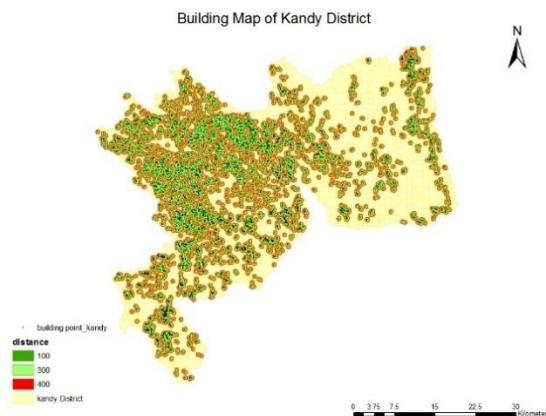


Figure.3. Building Map

Population density of the area was considered as another criterion. Kandy Four Gravest has highest density compared to the other regions. So it is considered as high risk region. Dense population settlements generate most of the waste quantity, it is a very important factor because it defines the operational cost for the waste landfill.

Being a natural resource, surface water is very important as a major human requirement and an agent to keep the ecological balance, Rivers are under risk, since the mixing of leachate with river water leads to river pollution. Older landfills in Kandy district were often sited close to Mahaweli River enhancing the potential for leachate to contaminate ground water as well as surface water. Figure 4 shows the suitability of areas for waste disposal sites according to the surface water distribution of Kandy district. According to the CEA guidelines safe distance buffer zones were created and values was given for each of them according to the risk assessment.

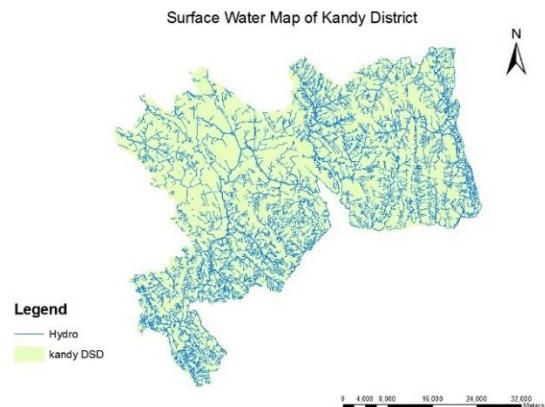


Figure.4. Surface water Map

An optimal landfill soil will have moderately low permeability, a low erodibility potential, and a high cation exchange capacity. Fine grained soils are more suitable for landfills than coarse grained (Şener et al. 2005) However, properties of clays including low drainage rates, shrink/swell potential, and low workability usually reduces a clay soils suitability against soils with a silty clay texture. As, in Kandy district more areas are covered by clay soil, it is considered as low risk area for landfill site selection.

Landfill site located too far away from the existing road network, costs for solid waste collection and transportation will be high. Also it cannot be placed too close due to aesthetic value. Kandy region has a well-developed, dispersed road network system. Buffer zones were created according to the related literature and modified according to the Sri Lankan situation by using risk assessment (Figure.5).

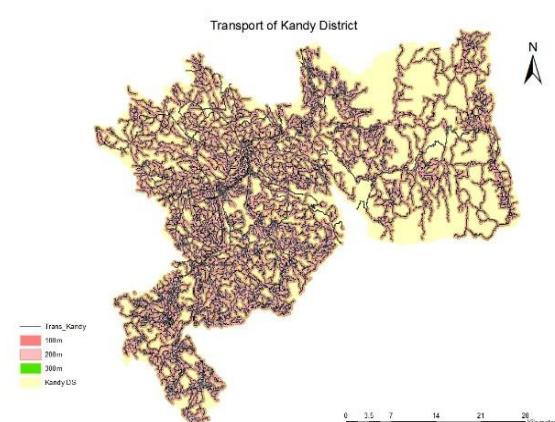


Figure.5.Transportation Map

Land use is considered as important criteria for the landfill site selection, because CEA technical guidelines (2005) exclude some areas as an unsuitable for landfill site selection. Water, urban area, forest were excluded from consideration and barren, shrub lands considered as low risk areas for landfill site selection (Figure.6).

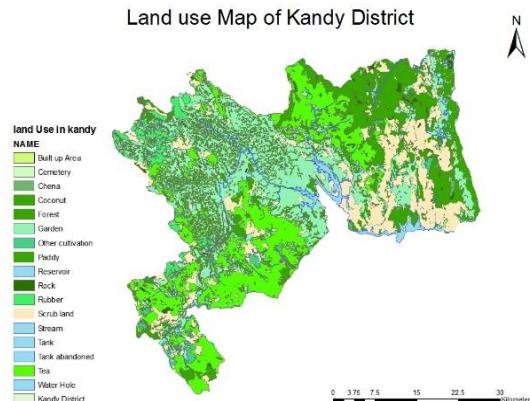


Figure.6. Land use Map

Chemicals in the landfill leach into ground water by precipitation and surface runoff. Precipitation in the area was considered as one of the criteria for this study and interpolate the average annual rainfall in the Kandy district and evaluate using risk assessment.

The elevation map of the study area is divided into four regions, low, medium, high, very high risk areas. The areas with elevations between 400m and 1250m are defined as suitable areas (Sharifi et al. 2009; Ugur & Sener 2010) for a landfill site and the remaining areas as unsuitable.

According to the risk assessment, risk areas were classified in to three categories, low, moderate and high. The identified suitable areas for landfilling are illustrated in Figure.7.

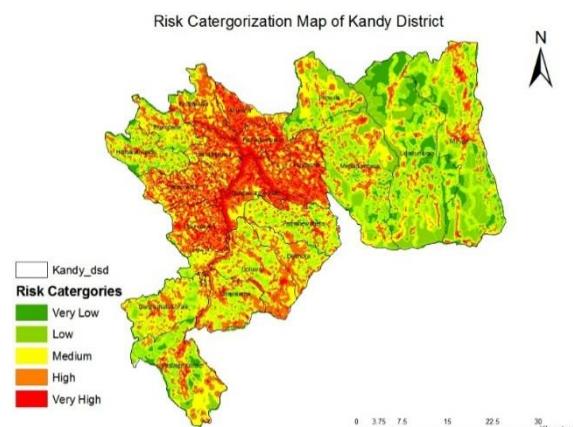


Figure.7. Risk Categorization Map of Kandy District

According to Figure.7, 20% of the area belongs to Kandy district is considered as very high risk area, and need to exclude from landfill site selection. Only 10% of the area considered as very low risk according to risk assessment and those areas suitable for landfill site selection. Rest of 70% belongs to low and moderate risk areas and other factors needs to be considered before use them as landfill site.

IV. CONCLUSIONS

This study integrates the use of GIS along with semi quantitative risk matrix method in order to site a landfill site. The GIS tool is a useful for the investigation of separate data sets and the creation of new data sets for visualization.

A landfill siting process requires evaluating many factors and criteria and processing much spatial information. Considering above eight landfill site selection criteria and the data availability, limited area (10%) in Kandy district is defined as suitable for landfill site. Moderate and low risk areas can be modified by using engineering solution in order to use as a suitable site for landfill.

These areas generally satisfy the minimum requirements for the landfill site selection. The selection of the final municipal solid waste site requires further geotechnical and hydrogeological analyses towards the protection of groundwater as well as surface water in order mitigate the impacts caused by landfills.

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AUTHORS

First Author – B M R S Balasooriya, Post Graduate Institute of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka, shamalibalasooriya@yahoo.com

Second Author – M Vithanage, Institute of Fundamental Studies, Kandy, Sri Lanka, meththika@ifs.ac.lk

Third Author – N J Nawarathna, Registrar in Surgery, Teaching Hospital, Kandy, Sri Lanka. nadeeshanawarathna@yahoo.com

Fourth Author - Ken Kawamoto, Graduate School of Science and Engineering, Institute for Environmental Science and Technology Saitama University, Saitama, Japan, kawamoto@mail.saitama-u.ac.jp

Fifth Author - M Zhang, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan, m.zhang@aist.go.jp

Sixth Author - G B B Herath, Faculty of Engineering, University of Peradeniya, Peradeniya, Sri Lanka, gemunuh@pdn.ac.lk

Seventh Author - M I M Mowjood, Post Graduate Institute of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka, mowjood@gmail.com

Correspondence Author – B M R S Balasooriya, shamalibalasooriya@yahoo.com, +94713239496

A Survey on Use, Hazards and Potential Risks of Rice Farming Pesticides in Permatang Keriang, Pulau Pinang (Malaysia)

Mardiana Idayu Ahmad^{a*}, Nur Anis Ahmad^a, Syahidah Akmal Muhammad^{a,c}, Norizan Esa^b

^a School of Industrial Technology, Universiti Sains Malaysia, 11800 Penang, Malaysia

^b School of Educational Studies, Universiti Sains Malaysia, 11800 Penang, Malaysia

^c Doping Control Centre, Universiti Sains Malaysia, 11800 Penang, Malaysia

Abstract

In agriculture, the use of pesticide has been the dominant form of pest management since the 1950s to kill pest organisms including insects, weeds, fungi and nematodes. In recent times, use of pesticides in rice farming has increased rapidly and this scenario contributes significantly towards adverse effects on human health and environment. This study investigated types of pesticide and identified their hazards and potential risks used by rice farmers in the village of Permatang Keriang, Pulau Pinang, Malaysia. Pesticide use, pesticide formulation, groups, classes, major pests as well as pesticide risks and toxicity were examined. Forty selected rice farmers which represent 33% of the total rice farmer population were interviewed based on 40 questions. From the survey, eight pesticide formulations including Actara (85%), Karate (93%), Nurelle 505 (73%), Nominee 100 SC (83%), Tapisan (65%) and Yasodion (62%) were found commonly used by the farmers in rice farming activities to control several major pests including plant diseases, fungi, insects and rodents. Major active ingredients of the pesticides found in this study were cypermethrin, chlorpyrifos, lambda-cyhalothrin, difenoconazole, bispyribac-sodium, isoprothiolane and cartap hydrochloride. From the study, it was observed that both high and low toxicity pesticides were used. Hazard identification and evaluation of potential risks which takes into account pesticide use and toxicity conducted in this study can help prioritise pesticides of greatest health risk to rice farming communities. In addition, this study could provide a fundamental baseline of a further study on a detailed risk assessment of pesticides amongst rice farmers and on the environment in order to establish control measures.

Index Terms- Pesticides; Risks; Toxicity; Hazard Identification; Pests; Rice Farming

I. INTRODUCTION

Pesticides are chemicals designed to kill or control unwanted organisms including insects, weeds, fungi and nematodes. They are widely used in agricultural production since the 1950s in an effort to reduce or eliminate yield losses and maintain high quality production. These pesticides can be classified in various and different types of chemicals with over eight hundred active ingredients in over tens of thousands of formulations [1]. They can be roughly divided based on the organisms they are intended to kill such as fungicides, insecticides, herbicides, molluscicides, nematicides, rodenticides and others [2]. In agriculture including rice farming, pesticide application has been promoted among farmers in developing countries to increase their productivity and enhance economic potential for farm households [3]. In particular, the rapid increase in the application of pesticides has posed threats to the environment and adverse health effects on farmers [4]. A proportion of the pesticide that is not absorbed by the plants will be moved and transferred to the environment through wind, water and soil. Depending on the physico-chemical properties, it can be transported thousands of miles away and can infiltrate into meat, milk, human blood, animal and plants [5] which may result in serious health implications to humans and the environment. In relation to this, various reports of ill health associated with those applying pesticides has been reported by Food and Agricultural Organisation (FAO) [6].

With the growth of agricultural pesticide usage, many studies pinpointed a number of accidents; cases of poisoning and occurrence of environmental hazards [7]. The World Health Organisation (WHO) had estimated that a million people were being poisoned every year with 20,000 cases resulting in death in its 1986 annual report [8]. Much of this problem was due to the toxicity of the pesticides used by many small-scale farmers in the agriculture sector, without adequate knowledge of safe pesticide management practices and failure to wear appropriate personal protective equipment [9]. In addition, continuous pesticide application may put farmers' health at risk, with pesticides being dispersed, spilled or leaked and entering the human body either directly or indirectly. In the literature, there is vast evidence that pesticides do pose a potential risk to humans [5], [10], [11], [12] and other life forms as well as unwanted side effects to the environment [13], [14], [15]. Based on these scientific evidence, several studies provided data on pesticide assessment in paddy areas [16], [17], [18], [19], [20], [21].

Despite the serious implications of pesticides to humans and the environment, only a few studies have published on pesticide in rice farming in Malaysia. They typically focus on the effect of pesticides on rice [22] and ecotoxicology of pesticides in the tropical paddy field ecosystem [23]. In contrast little information is available about the pesticide, hazards and potential risks used by rice farmers in Malaysia. With further expansion and intensification in rice production, extended research on pesticide use among farmers is then essential. This in turn may help in adapting safe pesticide management practices in rice farming. Thus, to close this gap this paper presents a study on pesticides, hazards and potential risks of rice farming pesticides used by rice farmers in Penang, Malaysia.

II. METHODOLOGY

A. Study Area

The village of Permatang Keriang is situated in the district of Seberang Perai Utara, Pulau Pinang, in the northern part of Peninsular Malaysia (Latitude: 5°34'0.01"Longitude: 100°22'0.01"). It lies in the hot and humid zone of Malaysia with an area of 1.5km² out of 753 km² (Seberang Perai) with average temperature ranges from 30 to 34 °C throughout the year, 60 to 87 % of relative humidity and 2670 mm of average rainfall annually. The village is an important rice-producing area with 0.7 km² of rice farming areas (47 % of total area) in Seberang Perai Utara. This district is known as the largest contributor of rice production in Pulau Pinang with three t farming seasons in a year. About 15 % of the village population (about 119 farmers out of a total population of 800) is engaged in rice farming activities.

B. Survey on Farmers' Background and Pesticide Use

A study was conducted in April 2013 involving a sample population of 38 active rice farmers out of a total of 119 total rice farmers (about 32%) in a village of Permatang Keriang, situated in Northern Peninsular Malaysia. Ethical approval was given to this study by Human Research Ethics Committee USM [Ref: USM/JEPM/279.3.(6)]. Farmers were selected randomly according to active rice farmers in the village as well as based on residence area near or adjacent to the rice farm and indirectly have high rates of exposure to the effects of pesticide use. Survey and formal interview which were guided by 40 questions were carried out to obtain information on pesticide use in rice farming activities of the farmers. The interview was carried out in an appropriate local language (Bahasa Melayu) for 30-45 minutes for each session. Farmers were asked about their socio-demographic data such as age, work experience, sex, education level and size of rice farm. They were also asked about pesticide use including types of pesticide to control pests, formulation or commercial name, major pests in rice farming, pesticide practices and frequency of spraying in one rice farming season.

C. Identification of Hazards and Potential Risks of Pesticide

Hazards and potential risks of each pesticide were identified and assessed based on the guidelines for potential health risk and occupational exposure drawn up by the Department of Occupational Safety and Health, Malaysia. Material Safety Data Sheet (MSDS) of each pesticide was collected from the manufacturer. Hazard identification was conducted in order to assess its potential risks and toxicity level. In addition, labels on pesticide containers were analysed to obtain information about hazards and potential risks of the pesticide.

III. RESULTS AND DISCUSSION

A. Farmers' Background

The rice farming system sampled in Permatang Keriang commonly consists of smallholder rice farmers planting paddy plants in areas with average farm size ranging from 0.4 to 10 hectares as shown in Table 1. Overall from the table, the size of rice farm showed that most farmers had less than 6.0 ha. From the interviews, it was found that most of the farmers were Malay (97%) while only (3%) was Chinese. The average ages of farmers ranged from 31 to 50 years. Therefore it appears that there are relatively few new entrants to rice farming in the area for the past 10 years. Most of the farmers interviewed were males (97%) and only 3% were females. The highest education level was secondary school (upper) (42%), followed by 26% for both secondary school (lower) and primary school. About 5% of farmers have higher education level at college or university. From the interview it was revealed that most of the farmers received training from the Department of Agriculture and obtained rice farming knowledge from experience with their parents, work on other farms or by asking other farmers. As reported by Mazlan and Mumford [24], farming experience is not much different between generations because they gained from their friends and parents through working experience. Most of the farmers were full-time pesticide applicators (66%) and about 34% were working as part-time applicators. The majority of the farmers involved in the interviews were smokers (84%) and only 16% were non-smokers. Most of the farmers were not suffering any illness (87%).

Table 1. Socio-demographic data from the survey and interview of rice farmers in Permatang Keriang

Characteristics	Frequency (Σn = 38)
Age	
20 and below	2
21-30	5
31-40	8
41-50	8
51-60	8
61-70	7
Race	
Malay	37
Chinese	1
Gender	
Male	37
Female	1
Education Level	
Primary school	10
Secondary school (lower)	10
Secondary school (upper)	16
College / University	2
Work	
Full time applicator	25
Part Time applicator	13
Farming Experiences (years)	
1 - 5 years	6
6 - 10 years	7
11 - 15 years	8
16 – 20 years	9
21 – 25 years	2
26 – 30 years	5
More than 30 years	1
Farming Area (ha)	
0.4 – 2.0	21
2.4 – 4.0	6
4.4 – 6.0	7
6.4 – 8.0	1
8.4 – 10.0	1
More than 10	2
Smoking habit	
Smoker	32
Non- smoker	6
Suffering from any illness	
Yes	5
No	33

B. Pesticide Use

From the survey, a total of eight different pesticides were identified as the most commonly used by the rice farmers in Permatang Keriang to control the infestation of various pests. Table 2 characterises the eight pesticides according to formulation, group and class. The use of these pesticides was recommended by the Department of Agriculture. Due to major pests, farmers usually applied several types of pesticide during a rice farming season including insecticides, herbicides, fungicides and rodenticides. It was found that

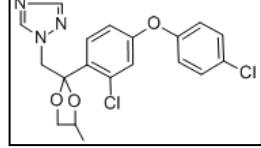
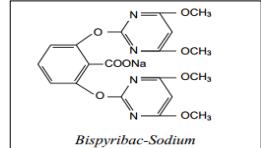
pesticides from insecticide group are the most common pesticide utilised by the farmers with formulation or commercial names of Actara (85%), Karate (93%), Nurelle 505 (73%), Nominee 100 SC (83%), Tapisan (65%) and Yasodion (62%).

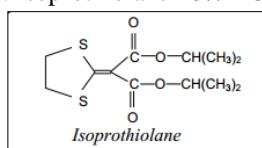
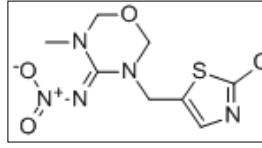
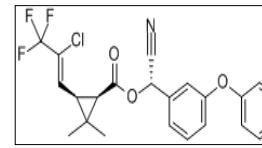
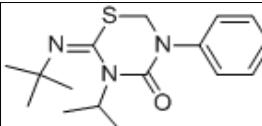
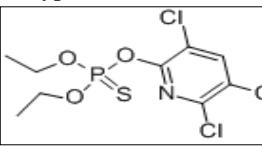
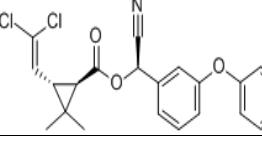
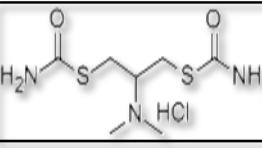
Table 2. Common pesticides used by rice farmers in Permatang Keriang

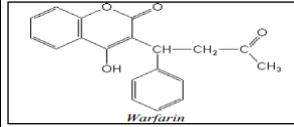
Pesticide Formulation	Pesticide Group	Pesticide Class
Actara	Insecticide	Class IV
Karate	Insecticide	Class II
Nurelle 505	Insecticide	Class Ib
Nominee 100 SC	Herbicide	Class III
Score	Fungicide	Class III
Tapisan	Insecticide	Class III
Yasodion	Rodenticide	Class IV

Table 3 shows pesticide formulation, active ingredients, chemical formula and chemical structure of pesticides regularly used by the rice farmers in Permatang Keriang found from the survey. Only frequently used active ingredients are listed, and the remaining group as unclassified. From the table, it can be seen that the number of formulations for an individual active ingredient varied. Some pesticide formulations contain more than one active ingredient. For instance, Score in fungicide group consists difenoconazole and bispyribac-sodium 9.7% SC as its active ingredient. In addition, Tapisan in insecticide group also contains two active ingredients which are buprofezin and cartap hydrochloride. The largest group (93%) of farmers used 3 to 4 types of these pesticides within one rice farming season. Of those interviewed 71.34% did use herbicides, while 97% relied on pesticides for insect and disease control. Fungal diseases were treated mainly with difenoconazole and bispyribac-sodium. The application of a very large range of insecticides was reported, but lambda-cyhalothrin, cypermethrin and chlorpyrifos were the most widely used. This survey also revealed that farmers under unusual circumstances tended to mix different types of pesticide with different active ingredients that would expose them to highly hazardous pesticides. This finding seems to support results reported by Panuwet et al. [25] that farmers usually mix the pesticides themselves, making a “cocktail” with some of them having different active ingredients without thinking of their synergistic effects [25].

Table 3. Pesticide formulations and their active ingredients

Pesticide Formulation	Active Ingredients	Chemical Formula	Chemical Structure
Score	i. Difenoconazole	Difenoconazole $C_{19}H_{17}Cl_2N_3O_3$	i. Difenoconazole 
	ii. Bispyribac-Sodium 9.7 % SC	i. Bispyribac-Sodium 9.7 % SC $C_{18}H_{17}N_4NaO_8$	i. Bispyribac-Sodium 9.7 % SC 

Fujione 40 EC	i. Isoprothiolane 40% EC	i. Isoprothiolane 40% EC $C_{12}H_{18}O_4S_2$	i. Isoprothiolane 40% EC  <i>Isoprothiolane</i>
Actara 25WG	Thiamethoxam	Thiamethoxam $C_8H_{10}ClN_5O_3S$	i. Thiamethoxam 
Karate	Lambda-Cyhalothrin	Lambda-Cyhalothrin $C_{23}H_{19}ClF_3NO_3$	i. Lambda-Cyhalothrin 
Nurelle 505	i. Chlorpyrifos ii. Cypermethrin	i. Chlorpyrifos $C_9H_{11}Cl_3NO_3PS$ ii. Cypermethrin $C_{22}H_{19}Cl_2NO_3$	i. Chlorpyrifos  ii. Cypermethrin 
Tapisan	i. Buprofezin ii. Cartap Hydrochloride	i. Buprofezin $C_{16}H_{23}N_3OS$ ii. Cartap Hydrochloride $C_7H_{16}ClN_3S_2O_2$	i. Buprofezin  ii. Cartap Hydrochloride 

Yasodion	Warfarin 1% Heavy Dust	Warfarin 1% Heavy Dust C ₁₉ H ₁₆ O ₄	i. Warfarin 1% Heavy Dust  Warfarin
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The chemical class for each active ingredient is characterised in Table 4. Each pesticide formulation has different active ingredient and chemical class depending on its group. From Table 4, it can be seen that most of the pesticides were classed under Class II, III, IV, Ib and IV with different chemical class of difenoconazole, organo-sulphur, pyrimidinyl carboxy, neonicotinoid, pyrethroids, organophosphate and thiadiazin. Of these products, one contains active ingredients classified as ‘highly hazardous’, another one contains active ingredients classified as ‘moderately hazardous’, and six other contain active ingredients classified as ‘slightly hazardous’ by the WHO. According to the classification of the US EPA [26] one product is classified as “warning”, three are classified as “caution” and four are classified as non-required.

Table 4. Chemical class for each pesticide formulation

Pesticide Group	Pesticide Formulation	Pesticide Class	Chemical Class
Fungicide	Score	Class III	Difenoconazole
	Fujione 40 EC	Class III	Organic-sulphur
Herbicide	Nominee 100 SC	Class IV	Pyrimidinyl carboxy
Insecticide	Actara	Class IV	Neonicotinoid
	Karate	Class II	Pyrethroids
	Nurelle 505	Class Ib	Organophosphate
	Tapisan	Class III	Thiadiazin
Rodenticide	Yasodion	Class IV	Aromatic hydrocarbon

^aWHO classification of chemical classes : Ia = extremely hazardous, Ib = highly hazardous, II = moderately hazardous, III = slightly hazardous, U = unlikely to present acute hazard in normal use.

^bEPA United States of chemical class: I = danger, II = warning, III = caution, IV = none required.

C. Major Pests in Rice Farming

Most of the farmers interviewed in this study were very knowledgeable in identifying pests and damage made by them in rice farming. All farmers stated that their primary method to control pest infestation is by the use of chemical pesticides. Only a few aged farmers (11%) still maintain pheromone and biological pest control methods for certain pests. Unfortunately, these pest control methods in rice farming are almost forgotten especially for the new generation [27]. Table 5 summarises the major pests in rice farming, which cause yield losses in rice farms in Permatang Keriang. The major pests in Permatang Keriang rice farms were *Rhizoctonia solani*, *Helminthosporium oryzae*, *Pyricularia oryzae*, *Pyricularia oryzae*, *Ishaemum rugosum*, *Echinochloa crus-galli*, *Empuasca fabae*, *Leptocoris acuta*, *Nephrotettix virescens*, *Nilaparvata lugens*, *Sogatella furcifera*, *Cnaphalocrosis medinalis*, *Nymphula depuntalis*, *Helopeltis spp* and *Rattus argentiventer*. These findings are in agreement with the outcome reported by Savary et al. [28]. From the survey, most of the farmers frequently used insecticide to control insects. These insecticides contain active ingredients of thiamethoxam, lambda-cyhalothrin, chlorpyrifos, cypermethrin, buprofezin and cartap hydrochloride and were applied more than twice in the early stages of rice farming. With respect to this, Ecobichon [3] stated that at global level, the

higher usage of pesticide become a trend in the majority of developing countries, where insects are the biggest problem in agriculture. Buprofezin and cartap hydrochloride are the active ingredients contained in Tapisan pesticide formulation that are usually utilised in rice farming to control green leafhopper, brown plant hopper and leaf roller. Meanwhile, difenoconazole and isoprothiolane are the active ingredients contained in Score and Fujione, respectively used to control fungus pests (*Rhizoctonia solani* and *Pyricularia oryzae*). As reported by Skamnioti and Gurr [29], about 10% until 30% of rice harvest were lost annually due to fungus infestation.

Table 5. Major pests in Permatang Keriang rice farms

Pesticide group	Pest	Pesticide formulation	Types of damage
Fungicide	Hawar seludang (<i>Rhizoctonia solani</i>)	Score	Produce empty rice especially at the bottom of stalk, cause rice collapse
	Bintik perang (<i>Helminthosporium oryzae</i>)		Caused by a fungus borne seeds that produce gray or white spots on the leaves or seeds.
	Karah Daun (<i>Pyricularia oryzae</i>)	Fujione 40 EC	Rice leaves will dry up and die.
	Reput Tangkai (<i>Pyricularia oryzae</i>)		Rice stalk rot and no substance in grains and rice plant will fall.
Herbicide	Rumput coloc cina (<i>Ishaemum rugosum</i>)	Nominee 100 SC	Live in paddy field and compete with paddy to get nutrients needed by plants
	Rumput padi burung (<i>Echinochloa crus-galli</i>)		
Insecticide	Lelompat daun (<i>Empuasca Fabae</i>)	Actara	Insect adults and nymphs suck the liquid from the surface of the leaves while inserting toxic substances into the leaves.
	Kesing or Pianggang (<i>Leptocoris acuta</i>)	Karate, Tapisan	Adult leafhopper and young leafhopper suck the liquid (milk) of rice being formed which will result in smaller fruit rice and half-filled.
	Bena Hijau or Green leafhopper (<i>Nephrotettix virescenes</i>)	Karate, Tapisan	Green leafhopper damage the rice plants either by sucking liquid from rice plants or carrying the virus that causes red (PMV).
	Bena Perang (<i>Nilaparvata lugens</i>)	Tapisan	Rice plant becomes yellow and dry
	Bena belakang putih (<i>Sogatella furcifera</i>)	Tapisan	Adult and young white leafhopper will suck fluids from rice plants and cause leaves to wither and slowly turn red.
	Ulat lipat daun /ulat guglung daun (<i>Cnaphalocrosis medinalis</i>)	Karate, Tapisan	Larvae will attack during rice growth by winding up the leaves and combine them at the end of growing process. They also will chew the green leaf.
	Ulat ratus (<i>Nymphula depuntalis</i>)	Nurelle 505	Caterpillars feed on green tissues of the leaves and leaves become whitish and papery
	Kepinding nyamuk or Nyamuk hijau (<i>Helopeltis spp.</i>)	Nurelle 505	Sucking on mouth parts, they pierce plant tissues and cause damage ranging from leaf destruction and fruit blemishes
Rodenti-cide	Rat (<i>Rattus argentiventer</i>)	Yasodion 1	Rodent infestation will cause effects such as cut rice stalks. Rice fields appear yellow and dry.

D. Hazard Identification and Potential Risks

The concentrations of active ingredients in field applications in rice farming activities may pose a threat to humans and animals. Thus, hazard identification which takes into account pesticide use, toxicity, and exposure potential can help prioritise pesticides of greatest health risk to rice farming communities. In general, it was found that there were three

main ways pesticides could enter the farmers' bodies: i) inhalation; ii) skin contact and; iii) ingestion. The characteristics of each pesticide formulation in the study area in terms of active ingredients, health effects on human and animals, persistence and degradability, mobility and environmental fate are listed in Table 6.

From the table, it can be seen that Yasodion under rodenticide group contains active ingredients of diphacinone which has oral toxicity of (LD_{50}): 20 to 50 mg/kg and dermal toxicity of (LD_{50}) (female): 637 mg/kg and (LD_{50}) (male): 807 mg/kg. This implies that exposure to only small amounts of this pesticide will cause toxic effects to the skin and eyes of rodents. According to US EPA, all formulations containing 3% of diphacinone are classified as Restricted Use Pesticides (RUP) and under Category 1 "danger". While based on WHO, it is categorised as "extremely hazardous". In general, exposure to this pesticide causes adverse toxic effects [26]. In addition, based on the Hodge and Stern Scale which was invented in 1943 [7], pesticide that contains diphacinone is categorised as highly toxic (1 to 50 mg/kg) with toxicity rating of 2. On the other hand, Tapisan from insecticide group with active ingredients of buprofezin has a value of 209 mg/kg (male) and 289 mg/kg (female) in terms of LD_{50} (oral toxicity) and is categorised as moderately toxic (50-500 mg/kg) based on the Hodge and Stern Scale (toxicity rating = 3). As stated by US EPA, buprofezin has low acute toxicity via the oral, dermal and inhalation routes of exposure and has classified buprofezin as having no greater than suggestive evidence of carcinogenicity. Nurelle 505 with active ingredient of chlorpyrifos has acute oral toxicity LD_{50} of 776 mg/kg (male) and 300 mg/kg (female). Also, it has acute dermal toxicity LD_{50} of >5000mg/kg. This indicated that Nurelle 505 is extremely toxic [26], as compared to other pesticide formulations commonly used by the rice farmers in this study.

In the context of eco-toxicity characteristics, Yasodion has LC_{50} 96 h of 2.1 mg/l (channel catfish), 7.6 mg/l (bluegill), 2.8 mg/l (rainbow trout) and LC_{50} 48 h of 1.8 mg/l (daphnia). Tapisan presents higher toxicity as compared to other pesticide formulations. It showed 2.7 mg/L or 2.703 ppm of fish toxicity (carp) for 48 hours. Score 250 EC with active ingredient of difenoconazole from fungicide group indicated higher toxicity of 3.7 mg/L or 3.704 ppm of fish toxicity (rainbow trout) for 96 hours followed by Fujione 40 EC with active ingredient of Isoprothio-lane from the same pesticide group which has 6.7 mg/L or 6.707 ppm of fish toxicity (carp) for 48 hours. According to US EPA [26], Fujione 40 EC is categorised as "moderately toxic" in terms of eco-toxicity (fish) and Score is classified as "moderately toxic" in terms of algae eco-toxicity.

Table 6. Health effects, eco-toxicity, physical and ecological properties of pesticides in Permatang Keriang rice farms

Property		Fungicide		Herbicide	Insecticide				Rodenticide
Pesticide formulation		Score 250 EC	Fujione 40 EC	Nominee 100 SC	Actara	Karate	Nurelle 505	Tapisan	Yasodion
Active Ingredients		Difenconazole	Isoprotiophiolane 40% EC	Bispyribac-Sodium 9.7 % SC	Thiametho-xam	Lambda-cyhalothrin	Chlorpyrifos	Buprofezin	Diphacinone 0.005% G
Health Effects	Oral Toxicity	Acute : (female rat) LD_{50} = 3129 mg/kg	Acute LD_{50} Rat (mg/kg) Male:>5000 Female:>5000 Male: 2429 Female: 2698	Acute LD_{50} Rat (mg/kg) Male:>5000 Female:>5000	Low acute (Rat) LD_{50} = >5000mg/kg	-	Acute LD_{50} Rat (mg/kg) Male:776 Female:300	Acute LD_{50} Rat (mg/kg) Male:209 Female:289	LD_{50} (Rat): 20 - 50 mg/kg
	Dermal Toxicity	Acute: (male and female rat) LD_{50} = >5000mg/kg	Acute LD_{50} Rat (mg/kg) Male:>4000 Female:>4000 Male: > 2000 Female: > 2000	Acute LD_{50} (Rat) LD_{50} = >2000mg/kg	Low acute (Rabbit) LD_{50} = >2000mg/kg	Slightly toxic: (rat) LD_{50} =>2000mg/kg	Acute (Rat) LD_{50} = >5000mg/kg	Acute LD_{50} Rat (mg/kg) Male:1326 Female:1083	LD_{50} Rat (mg/kg) Male: 637 Female: 807
	Inhalation	Acute: (male and)	LD_{50} Rat: Male: >	Acute (Rat) LC_{50} = >3.99mg/l -	Low acute (Rat) LC_{50} =	LC_{50} (Animal not)	Acute (Rat) LC_{50} =	Acute LD_{50} Rat: Male,	LC_{50} Rat : No data available

		female rats) (4h) = >5.17 mg/L (4h)	2.77 mg/l (isoprot holane)-4h	4h	>2.79mg/l air-4h	available= 3.12mg/L air- 4h available)	>2.7mg/l - 4h	female = >4.57mg/ L-4hr	
	Skin irritation	Slightly	Slightly	Mildly (rabbit)	Mildly (rabbit)	Moderate (rabbit)	Slightly (rabbit)	No data available	
	Eye irritation	Mode-rate	Slightly	Not irritant (rabbit)	Mildly (rabbit)	Moderate (rabbit)	Slightly (rabbit)	No data available	
	Sensitisation	Skin- not sensitizer (guinea pig)	Positive	Not sensitizing (Guinea pig)	Skin- not sensitizer (guinea pig)	Mildly (animal tests)	Skin- not sensitizer (guinea pig)	Negative (guinea pig)	No data available
Eco-toxicity	Fish	LC ₅₀ (rainbow trout)=3.7 mg/L, 96h	LC ₅₀ (Carp) = 6.7 mg/l (48hr)	Bluegill sunfish: >100 ppm Common carp: >100 ppm	Slightly : LC ₅₀ (Rainbow Trout) = >100 ppm (96h)	Eco-acute: 96h, LC ₅₀ : 0.19-0.21ppb Eco-chronic: 300-days LOEC 0.062ppb	Toxic	LC ₅₀ 48h: 2.7mg/L (Carp)	LC ₅₀ 96 h: 1. 2.1 mg/l (Channel catfish) 2. 7.6 mg/l (Bluegill) 3. 2.8 mg/l (Rainbow trout)
	Aquatic Invertebrates	E _C 50 (water flea)=4.3 mg/L, 48h	LC ₅₀ (Daphnia) = 40 mg/l (3hr)	Daphnia-magna: >100 ppm	E _C 50= >106 ppm (Water flea)	Very toxic	Toxic and hazardous to aquatic organisms (L _C 50/E _C 50 <0.1mg/L)	LC ₅₀ 30h: 50.6mg/L (Daphnia)	LC ₅₀ 48 h= 1.8 mg/l (Daphnia)
	Algae	Highly toxic E _b C ₅₀ /E _r C ₅₀ (green algae) =1.7-4.4 mg/L, 72 h	-	-	E _C C ₅₀ = >100 ppm (5day)	Eco-acute (Water flea): 48h EC50 0.04ppb	-	-	-
	Soil dwelling organisms	-	-	Acute LC ₅₀ : >1,000 ppm (14 days)	-	-	-	-	-
	Bees	-	-	LD ₅₀ : >200 µg/bee	-	Eco-acute: LD ₅₀ 0.038 ug/bee	Highly toxic	-	-
Persistence and degradability		Degradation half life in water : 1 d (not persistent in water)	-	No data available	Moderate persistence in water and soil	-	Half-life: i)Photolysis in water :3-4week ii)Tropospheric: 1.4 hours iii)Aerobic soil: 30-60 days Degradation	No data available	Decompose by microorganisms

	soil : 149- 187d (not persis- tent in soil)					tion: in soil within days to weeks		
Mobility	Low mobility in soil	-	No data available	Low mobility	-	-	No data available	Does not accumulat e in the environme nt.
Environmental fate	High potential to bioaccu- mulation	-	-	Moderate bioaccum ulation potential	-	Bio- concentrat ion potential is moderate.	-	-

IV. CONCLUSION

From this study it was found that, eight pesticide formulations including Actara (85%), Karate (93%), Nurelle 505 (73%), Nominee 100 SC (83%), Tapisan (65%) and Yasodion (62%) were commonly used by the farmers in rice farming activities to control several major pests including plant diseases, fungi, insects and rodents. Both high and low toxicity pesticides were used. These contain the active ingredients of cypermethrin, chlorpyrifos, lambda-cyhalothrin, difenoconazole, bispyribac-sodium, isoprothiolane and cartap hydrochloride. Hazard identification and evaluation of potential risks which takes into account pesticide use, toxicity, and exposure potential conducted in this study can help prioritise pesticides of greatest health risk to rice farming communities. By looking at the toxicity data of the pesticides, rice farmers who applied pesticides without adequate personal protection equipment and neglecting safety were exposed to hazards. It is also predicted that pesticide use and the associated risks to human health and the environment will increase rather than decrease in the near future [4]. From this study, it can be seen that the list of pesticides used in rice farming in the village of Permatang Keriang is in need of review in terms of potential risks, hazards and safety measures. In order to tackle these problems, monitoring programme and safety training are essential to ensure the permissible exposure limits of the pesticide are complied. Besides, farmers' awareness of the specific risks of pesticides and the necessity of using personal protection equipment and proper clothing should be emphasised. In this case, personal protection equipment should be used and maintained according to instructions on the container label. Besides, this study could provide fundamental data for further studies on knowledge, attitude and practices as well as a detailed risk assessment of pesticides amongst rice farmers and on the environment in Permatang Keriang rice farms.

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AUTHORS

First Author – Mardiana Idayu Ahmad, PhD, School of Industrial Technology, Universiti Sains Malaysia, mardianaidayu@usm.my

Second Author – Nur Anis Ahmad, BTech, School of Industrial Technology Universiti Sains Malaysia , nuranis@gmail.com

Third Author – Syahidah Akmal Muhammad, PhD, Doping Control Centre, Universiti Sains Malaysia,
syahidah.muhammad@usm.my

Fourth Author – Norizan Esa, PhD, School of Educational Studies, Universiti Sains Malaysia, norizanesa@usm.my

Corresponding Author – Mardiana Idayu Ahmad, mardianaidayu@usm.my; drmia707@gmail.com, 604-653 2214

Primary Productivity of Bay of Bengal at Chandipur in Odisha, India

Swati Sucharita Mohanty*, D.S.Pramanik **, B.P.Dash. ***

* Department of Bioscience, F.M.University,Balasore

**Department of Zoology, DR Nayapalli College, Bhubaneswar

***Department of Bioscience, F.M.University, Balasore, Odisha, India

Abstract- Productivity refers to the rate of production on a unit area basis. The total amount of solar energy converted to chemical energy by green plant is gross primary production. For the estimation of primary productivity of Bay of Bengal at Chandipur coastal area of Odisha, the light dark oxygen method was followed. Seasonally, the minimum GPP was recorded in monsoon and maximum GPP during summer. On monthly basis minimum value was observed in July and maximum in May. The higher value of GPP and NPP respectively during summer may be due to penetration of more light into water body.

Index Terms- Seasonal Variation, gross Primary Production, Net primary production, Community Respiration, Bay of Bengal, Chandipur.

I. INTRODUCTION

Primary production is centrally important to ecological process and biochemical cycling in marine ecosystems. It is thus surprising, if not disconcerting as discussed by Williams in 1993, that there is no consensus on a definition of Planktonic Primary Productivity, or its major components, net and gross primary production (Cullen, 2001, Yeragi and Shaikh, 2003). The primary productivity of a water body is the manipulation of its biological production. It forms the basis of the ecosystem functioning (Odum, 1971). It plays an important role in energy and organic matters available to the entire biological community (Ahmed et al, 2005). The estimation of primary productivity is predicted on the relationship between oxygen evolution and carbon fixation (Dash et al, 2011). Primary productivity varies from freshwater to estuarine and from estuarine to marine water body (Dash et al, 2011).

The area under study is Bay of Bengal at Chandipur in Odisha, India. Chandipur is situated between $86^{\circ}20'$ to $87^{\circ}29'$ East (Longitude) and $21^{\circ}3'$ to $21^{\circ}59'$ North (Latitude). The uniqueness of the beach lies in the fact that during a low tide the water recedes upto 5 km. into the sea exposing the golden sands. Further it is an important fish landing Centre of varieties of edible and commercially as well as economically important fish species. This water body is very much conducive for migratory fish *Hilsa Ilisha*. The drastic reduction in finfish and shellfish fauna and diversity along the Chandipur sea beach calls for immediate analysis and interaction.

II. MATERIAL AND METHODS

For the analysis of primary productivity, the water samples in triplicates were collected from 50 cm. depth of pelagic layer in sea-shore and observations were made in the middle of every month for a period of one year 2010-2011.

For the estimation of Primary productivity different techniques have been used by different workers viz. Radioactive Carbon (c^{14}) (Slumann-Nielson, 1952), Chlorophyll method (Ryther and Yentsch, 1957) and oxygen method by light and dark bottle (Gaarder and Gran, 1927, Vollenweiden, 1969). The light dark oxygen method is a standard approach for measuring photosynthesis in aquatic systems and does not require extensive instrumentation and therefore it was used during the present investigation.

The sample in the first bottle was used immediately to determine the initial level of dissolved oxygen following Wrinklers Volumetric method (APHA, 2008). Dissolved oxygen values obtained were converted to carbon values by multiplying with the factor 0.375 (Odum, 1956, Mohapatra and Patra, 2012).

The second bottle was painted with black color to prevent light penetration and hence served as a control to measure respiration. The third light bottle was treated as a test to measure the net production. The last two bottles were incubated under water in the euphotic zone for a period of twenty four hours at 50 cm. depth and then oxygen content was measured and then the DO. values were converted to $gCm^{-2} day^{-1}$ multiplied by average water depth. Oxygen values $mg l^{-1}$ were converted to carbon values by applying the equation suggested by Thomas et al, 1980 and Ahmed et al, 2005.

$$\text{Primary Production } gC = mg l^{-1} \times 0.375/PQ$$

Where PQ = 1.25

PQ represents respiratory quotient = respiration/photosynthesis and a compromised value of 1.25 was used which represent metabolism of sugars, some fats and proteins.

III. RESULTS AND DISCUSSION

The observed data of seasonal variations of gross primary productivity (GPP), net primary productivity (NPP) and community respiration (CR) along with mean standard deviation for four different seasons was shown in Table-2.

Seasonally, the minimum GPP ($151.25 \pm 2.16 \text{ gC m}^{-2} \text{ day}^{-1}$) was recorded in monsoon season and maximum GPP value

($220.65 \pm 5.76 \text{ gC m}^{-2} \text{ day}^{-1}$) was recorded during summer. Whereas, on monthly basis minimum value ($150.0 \pm 5.19 \text{ gC m}^{-2} \text{ day}^{-1}$) during july and maximum ($227.0 \pm 2.29 \text{ gC m}^{-2} \text{ day}^{-1}$) during May (Table-1).

However, the minimum NPP value ($100.25 \pm 3.25 \text{ gC m}^{-2} \text{ day}^{-1}$) was recorded in monsoon whereas maximum ($144.2 \pm 4.27 \text{ gC m}^{-2} \text{ day}^{-1}$) in summer. No particular trend was observed in seasonal variations of NPP. On comparison of the monthly variations, an increasing trend was observed from September to February, which is in agreement with Dash, Patra and Adhikary, 2011. Kumar et al, 2001, also obtained the same observations with the present study of decreasing values of GPP and NPP during monsoon. Although this has been variedly attributed to the light inhibition due to turbidity and cloud cover as well as high water current (Madhupratap et al, 2001). Besides, the poor nutrient concentration of Phosphates and Nitrogen in monsoon period may bring about the low productivity values (Pasternak and Kasza, 1979) and this confirmed the present study. At the same time the organic matter entering the marine system, through flooded riverine system caused increased demand of dissolved oxygen for the oxidation of allochthonous organic matter that possibly of decreasing trend may not be ruled out.

The higher values (221.41 ± 4.97 , $144.2 \pm 4.27 \text{ gC m}^{-2} \text{ day}^{-1}$) of GPP and NPP respectively during the summer (clean weather and higher temperature) may be due to penetration of more light into water body which facilitates the higher rate of planktonic photosynthesis and thus ultimately the productivity of the marine system (madhupratap, 2001).

The community respiration (CR) exhibited a systematic seasonal pattern with maximum ($77.31 \pm 2.78 \text{ gC m}^{-2} \text{ day}^{-1}$) during summer and minimum ($42.69 \pm 5.52 \text{ gC m}^{-2} \text{ day}^{-1}$) during winter. The decreased value during winter was linked with low water temperature and reduced light (Ahmed and Singh, 1987 and Dash et al, 2011).

The ratio of net and gross primary production is essential for the evaluation of the amount of gross production available to the consumers (Singh and Singh, 1999). The ratio between NPP : GPP as well as NPP : CR was highest (0.775, 3.57) during winter and lowest (0.644, 1.82) during summer while community respiration may account for 20 – 40% of GPP (Table-3), which shows good index (Muraleedharan, 2001).

The NPP : CR value > 1 (3.57) in winter which accounts for more penetration of light into water body as well as suitable temperature which favors abundance of planktons and more photosynthetic activities (Das, Patra and Adhikary, 2011).

Higher production is not governed by a single factor as stated by Singh and Singh, (1999), Moharana and Patra (2013). There are certain physicochemical and biological factors which in fact control the rate of production in marine ecosystem (Mohanty, 2000). It appears that there is a direct correlation between temperature and production which is in agreement with Srinivasan (1964), Hall & Moll (1975), Goldman and Wetzel (1963), Mohanty (2000), Pauly & Christensen (1995) and Thomas et al, (1980). In the present study too the productivity is high at high temperature, while in winter as the temperature is low the productivity is also low.

A positive correlation between GPP and NPP ($r = 0.996$, $P_{Er}=0.075$) during summer demonstrated that high NPP is followed by higher GPP. During winter a positive relationship

between GPP and NPP ($r = 0.827$, $P_{Er}=0.14$) was noted in the current study. The above findings are in agreement with that of the work Ahmed et al, (2005), Dash et al, (2011) and Moharana and Patra, (2013).

A positive relationship between GPP and CR ($r = 0.813$, $P_{Er}=0.13$) states that the growth of Phytoplankton resulting the high primary productivity may be due to high organic wastes, containing high nutrient values in the sea water.

Table1: Mean Monthly Variations of GPP, NPP and RES Values in $\text{gC m}^{-2} \text{ day}^{-1}$ (mean \pm SD) at Chandipur during 2010-2011.

Months	Temperature of Water in $^{\circ}\text{C}$	GPP $\text{gC m}^{-2} \text{ day}^{-1}$	NPP $\text{gC m}^{-2} \text{ day}^{-1}$	RES (CR) $\text{gC m}^{-2} \text{ day}^{-1}$
January	20.6	191.5 ± 2.86	146.41 ± 3.95	45.11 ± 3.37
February	23.4	193.25 ± 2.76	147.0 ± 7.79	46.25 ± 5.10
March	25.6	217.75 ± 1.56	141.16 ± 2.30	76.58 ± 2.87
April	29.6	219.2 ± 10.73	141.7 ± 5.25	79.7 ± 4.3
May	30.8	227.3 ± 2.29	149.3 ± 5.26	78.0 ± 3.00
June	30.4	153.75 ± 2.75	102.25 ± 2.75	51.5 ± 3.03
July	28.4	150.0 ± 5.19	102.0 ± 6.00	51.0 ± 3.0
August	28.3	150.0 ± 5.25	96.5 ± 4.82	53.5 ± 2.43
Septemeber	26.3	165.5 ± 2.29	113.5 ± 2.29	52.5 ± 1.5
October	26.2	166.75 ± 2.41	121.5 ± 5.41	45.25 ± 4.99
November	22.4	171.25 ± 1.56	130.8 ± 2.51	40.41 ± 3.12
December	20.9	175.33 ± 1.25	139.33 ± 2.88	35.83 ± 3.77

Table2: Mean Seasonal Variations of GPP, NPP and RES Values in (mean \pm SD) in $\text{gC m}^{-2} \text{ day}^{-1}$ at Chandipur during 2010-2011.

Season	GPP $\text{gC m}^{-2} \text{ day}^{-1}$	NPP $\text{gC m}^{-2} \text{ day}^{-1}$	RES (CR) $\text{gC m}^{-2} \text{ day}^{-1}$
Summer	221.41 ± 4.97	144.2 ± 4.27	77.31 ± 2.78
Winter	186.69 ± 9.87	144.0 ± 4.26	42.69 ± 5.52
Monsoon	151.25 ± 2.16	100.25 ± 3.25	52.0 ± 1.32
Post Monsoon	167.87 ± 3.02	121.9 ± 8.65	46.05 ± 6.08

Table 3: Total and Seasonal Ratio between Different Productivity Parameters of Bay of Bengal at Chandipur during 2010-2011.

Total			Seasonal											
NPP: GPP	NPP: CR	CR% of GPP	NPP : GPP				NPP : CR				CR % of GPP			
			S	W	M	PM	S	W	M	PM	S	W	M	PM
0.701	2.45	29.95	0.649	0.772	0.661	0.725	1.76	3.45	1.92	2.7	22.64	35.29	34.41	27.48

S=summer, **W**=winter, **M**=monsoon, **PM**= post monsoon

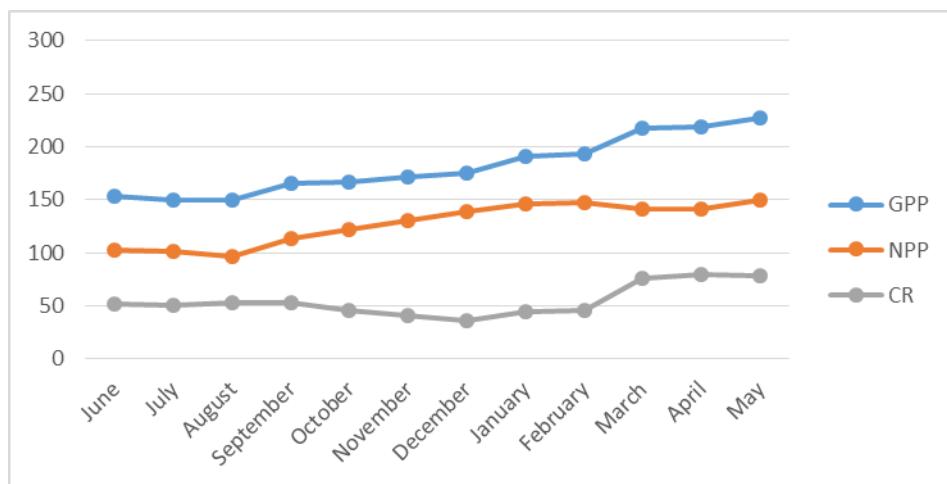


Figure 4: Monthly variations in Primary Productivity (GPP, NPP & CR) of Chandipur – on – Sea during 2010-2011 in $(\text{gc m}^{-2} \text{ day}^{-1})$.

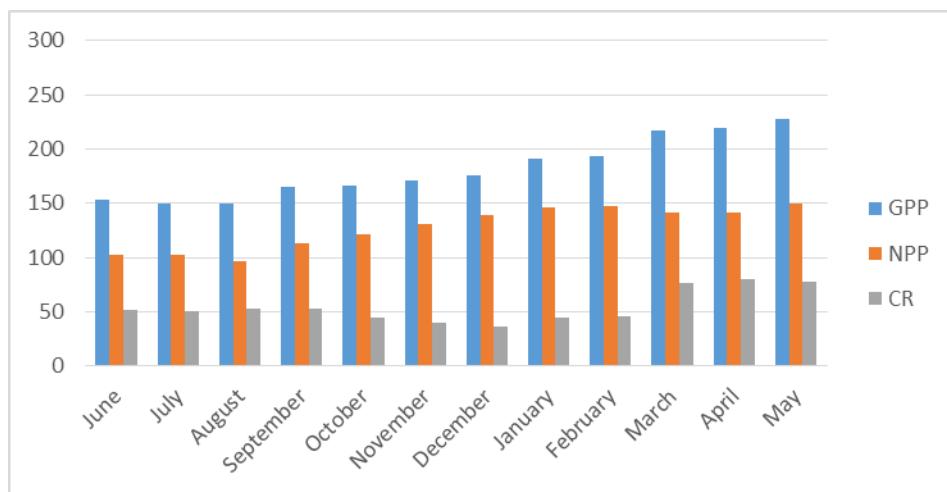


Figure 5 : Monthly variations in Primary Productivity GPP, NPP & CR of Chandipur – on - sea during 2010-2011 in $(\text{gc m}^{-2} \text{ day}^{-1})$.

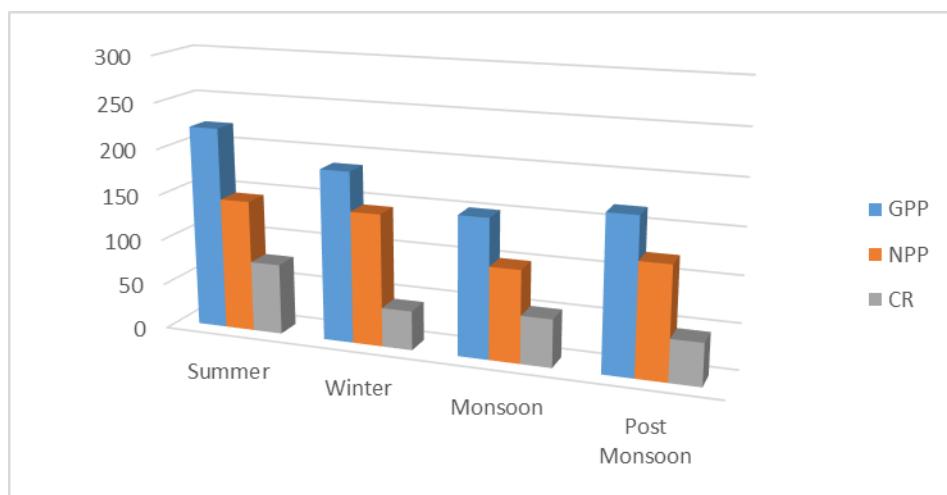


Figure 6: Seasonal variations in Primary Productivity (GPP, NPP & CR) of Chandipur – on – Sea during 2010-2011 in $(\text{gc m}^{-2} \text{ day}^{-1})$.

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AUTHORS

- First Author** – Swati Sucharita Mohanty, M.Sc(Zoology)
Department of Bioscience, F.M. University, Balasore, Odisha.
Second Author – D.S. Pramanik,(Ph.D.) Department of
Zoology, DR Nayapalli College, Bhubaneswar, Odisha. E-mail-
debansu2003@rediffmail.com, Contact No.09437173121
Third Author – B.P. Dash,(Ph.D) Department of Bioscience,
F.M. University, Balasore, Odisha.

Waithaka Health Centre Immunization Information System

Henry Peter Gommans ^{*}, Mercy Wangari ^{**}

^{*} (Lecturer/Professional), Mount Kenya University/Treadwinds Logistics Limited(JKIA)
^{**} (scolar), Mount Kenya University

Abstract- Immunization protects us from many harmful diseases that can have very serious complications or even cause death. More than 30 million children are unimmunized either because vaccines are unavailable, because health services are poorly provided or inaccessible, or because families are uninformed or misinformed about when and why to bring their children for immunization.

The main purpose of this project is to develop a computerized system that will transform the vaccination booklet to an immunization information system in Waithaka Health Centre. The project will automate the entire process of immunization at the Health Centre by capturing all immunization details. Besides reducing paper work and use of immunization booklet, the system will facilitate better record keeping and enable quick access to immunization records

The system is simple and easy to use. It has functionalities to facilitate registration of children and their parents, scheduling of immunization, searching and data retrieval and report generation. Observation and interviewing are the two methods used for collecting data. Tools for data analysis used are DFD's, flowcharts, Entity Life History Diagram (ELHD) and Entity Life History (ELH). Development tool is PHP and the database management system is MYSQL.

The system is made up of several modules which include:- registration module and immunization module. The major constraints are budget and time constraints and the main risk in this project is the possibility of not meeting the estimated project schedule.

I. INTRODUCTION

Immunization is a very important tool for disease prevention in human beings. Vaccines protect against disease by inducing immunity. According to the World Health Organization (WHO), immunization is not only a vital tool in preventing diseases, but it's an effective way to eradicate some diseases. For example, the launch of the Global Polio Eradication Initiative in 1988, led to the near eradication of the disease; saving millions of people from paralysis (WHO,2011). Since the launch of the campaign, polio infections reduced by near 99%. It's therefore evident that immunization is one of the greatest undertakings in disease prevention, and maintenance of a healthy population.

Waithaka Health Centre is a medium sized hospital located in Dagoretti South. It was started in 1996 by the City Council of Nairobi. It serves a population of 400,000 people who live around Waithaka town and its environs. The health Centre has two doctors, 4 clinical officers and 6 nurses. It has several

departments which includes:- Administration, Maternity, Laboratory and child Health. This system will automate the Child Health department where immunization of children takes place. The current immunization process at the health centre is manual. A booklet is issued to every parent, where the child details are manually filled by the health workers.

1.2. Problem Statement

The Immunization process at Waithaka Health Centre is currently Manual. Every parent is issued with a booklet where the child details about immunization are manually filled by the health workers. The book contains recordings of all immunizations; those that their children had already undergone and those planned in the future. However, this system is very erroneous because the booklets sometimes get lost leaving no records for the particular child about their immunization history. The manual system also makes it very hard for effective data collection regarding the effectiveness or the demand for vaccination within Waithaka, which is vital for planning. It is also very difficult to do periodic reports on immunization using the manual system, this is because the booklets are kept by the parents and not the health centre.

This project therefore, addresses the shortcomings of the manual system. It intends to develop a computerized system that maintains the immunization records, thereby making data collection and reporting to be undertaken easily.

1.3.Objectives of the Study

The objectives of this project are:-

- (i) To develop a computerized system that will transform the vaccination booklet to an immunization information system in Waithaka Health Centre. The project will help automate the entire process of immunization at the Health Centre.
- (ii) To develop a searchable database that records all immunization doses administered to children residing within Waithaka and its environs.
- (iii) To develop a system that will enhance periodic report generation on immunization in Waithaka Health Centre.

1.4.Justification of the Study

- (i) The proposed system will be more efficient compared to the current manual system which is tedious and time consuming.
- (ii) The process of data collection, regarding immunization in the current system is very cumbersome, since records

are maintained by the parent and not the health institution.

- (iii) Periodic Report generation on immunization in the current manual system is almost impossible but this will be very efficient in the new system.
- (iv) The system will help prevent spread of infectious diseases e.g polio by administering vaccinations in a timely manner and maintaining accurate immunization records.

The above mentioned reasons justify the need for a new system in order to curb the problems encountered in the current system.

1.5 Scope of the Project

The study entails designing and implementing an immunization information system that will capture and maintain Child details which includes immunization details. It will also capture parent and health workers details and also generate reports.

II. LITERATURE REVIEW

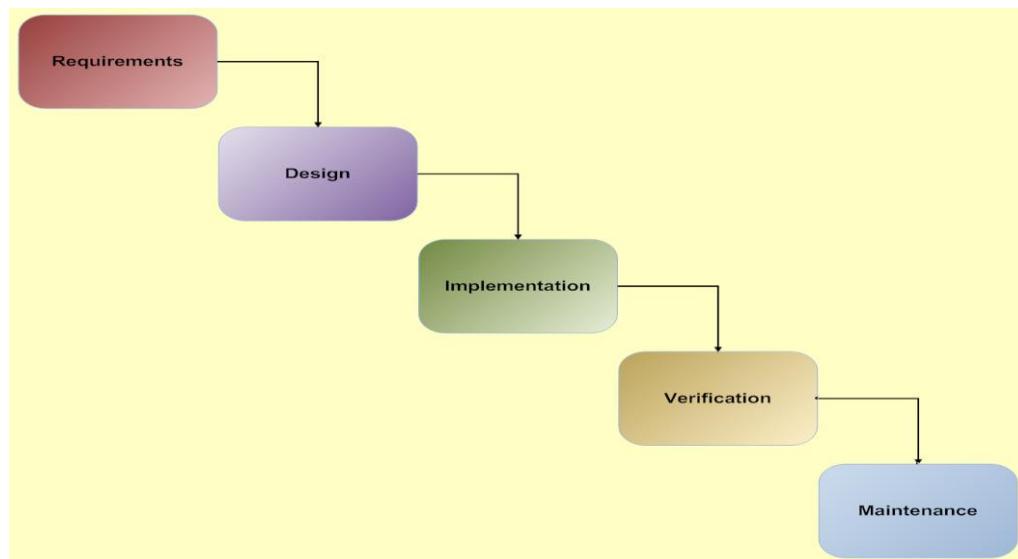
In the computing fundamentals glossary, an Information System (IS) is defined as a collection of technical and human resources that provide the storage, computing, distribution, and communication for the information required by all or some part of an enterprise. A special form of an Information System is a management information system (MIS), which provides information for managing an enterprise. Information Services

(IS), the glossary continues, is a common name for an organization within an enterprise that is responsible for its data processing and information system or systems. (Computing fundamentals, 2014)

An Immunization Information System (IIS) is a confidential, population-based, public health information systems that records immunization doses administered by participating providers within a defined geographic area. It is an important public health tool for collecting, analyzing, and acting upon relevant data to manage immunization programs. IIS provides for effectiveness in increasing vaccination rates by creating or supporting effective interventions, generating and evaluating public health response to outbreaks, facilitating vaccine management and accountability, determining client vaccination status to aid clinician decision making, and aiding surveillance and investigation of vaccination rates (ASTHO, 2014)

III. METHODOLOGY

This project will use waterfall model as the system development methodology. The Waterfall Model was the first Process Model to be introduced. It is also referred to as a linear-sequential life cycle model. It is very simple to understand and use. In a waterfall model, each phase must be completed fully before the next phase can begin. At the end of each phase, a review takes place to determine if the project is on the right path and whether or not to continue or discard the project. In waterfall model phases do not overlap. The reason why I chose waterfall model is because design errors are captured before any software is written thus saving time during implementation phase.



IV. SYSTEM ANALYSIS AND REQUIREMENT MODELING

Analysis is a phase in which the full description of the existing system and of the objectives of the proposed system that leads to a full specification of the user's requirements. This requirements specification (requirements definition) is admired

and approved before system design is embarked upon. The facts concerning the existing system once gathered are recorded. They are to be interpreted to aid in the subsequent design strategies. The aims of analysis are:

- (i) To assess the existing system
- (ii) To evaluate possible solutions
- (iii) To identify and remove weaknesses of the new while retaining the strengths

- (iv) To ensure that the new system caters for the processing needs of the organization and generating useful information
- (v) To model logical functions, data stores, data flows, and external entities associated with the current system.

4.1 Current System

The current vaccination process at Waithaka Health Centre is manual, parents have to attain a booklet for their child's vaccinations. The booklet is usually stamped with the date and location of the parent. It contains a list of all vaccinations that have to be administered to the child. Once a child is administered with an immunization, that particular vaccination is cancelled out and the parent is informed on the next date to take the child for the next vaccination. The parents have to produce the booklet every time they visit the Health Centre for immunization of their children.

In the unfortunate event that the booklet is lost, it becomes very hard to retrieve the history of immunization of the affected child. In such a case, a parent has to request for another booklet and together with the health practitioner, they try to fill the booklet to cancel out the already administered doses, by checking on the immunization attendance register, which is maintained by the health workers. The process of generating reports, regarding immunization in Waithaka Health Centre is very cumbersome, since records are maintained by the parent and not the health institutions. The health providers only maintain the register that assists in identifying children who missed some scheduled immunization.

Problems/ shortcomings of the current system

The current system presents a number of shortcomings that makes it ineffective. This include;

- (i) Storage of the records is problematic especially due to volume of data
- (ii) Report generation is very difficult and inaccurate since some files get misplaced.
- (iii) The system uses too many papers to maintain the records
- (iv) The system is time wasting
- (v) Data is not converted easily to information
- (vi) Readiness of the information.
- (vii) Data handling is a problem

4.2 Proposed System

With the development of the new computerized system, a number of improvements are expected to occur. The processes at the Waithaka Health Centre will be simplified since the information formally held in papers and immunization booklets will be held in a searchable database, where the health providers can easily access histories of the patients or children. In terms of data conversion to usable information, the system will facilitate mining of data and analysis to transform it to usable information, that is vital in planning and assessing the effectiveness of the immunization within Waithaka.

The system will also provide improvement in terms of notifying parents of the upcoming or scheduled immunizations and those that have been missed. With these features, the system will facilitate timely immunization through constant reminders to parents. The system will also provide improvements from the manual system in terms of clinical decision support, where the health providers can easily access the records and plan ahead; mainly on the medical supplies required for immunization. The goal of the Immunization Information system project is to create a system that will help prevent spread of infectious diseases by administering vaccinations in a timely manner and maintaining accurate immunization records.

Other improvements that are directly linked with the development of the new system will include;

- (i) Ease of data maintenance.
- (ii) Large volumes of data can be maintained.
- (iii) No paper work required hence saving on cost
- (iv) Data can be converted easily to information
- (v) The integrity of the data is preserved
- (vi) Reports on immunization are generated with ease

4.3 System Modelling

4.4.1 Process Modelling

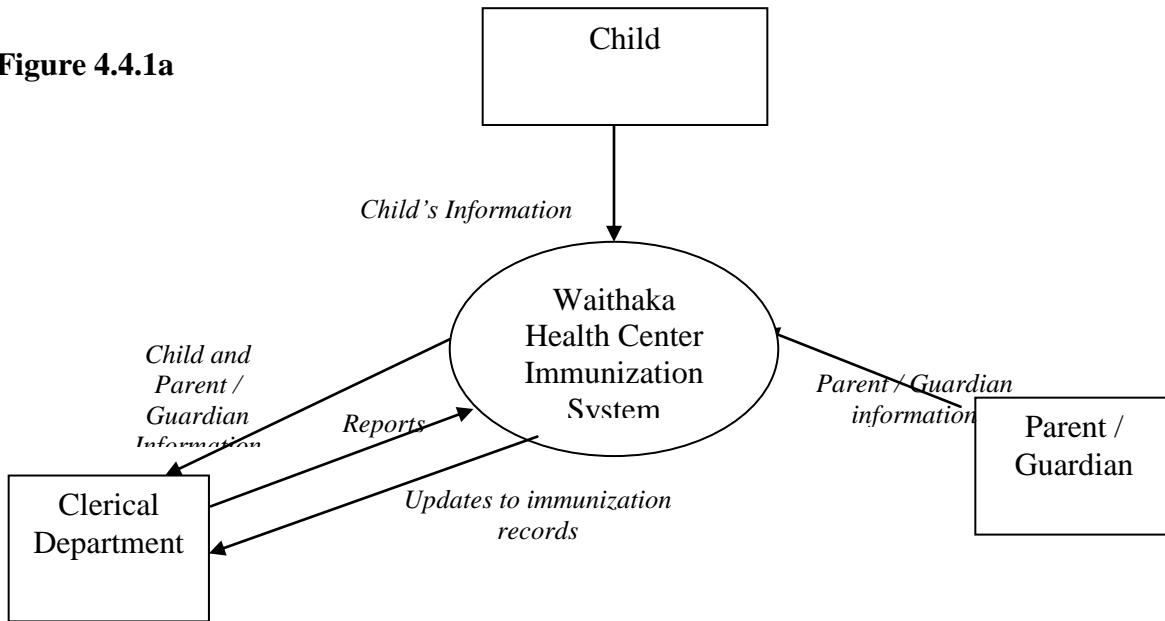
Data flow diagram (DFD)

The reason for using Data Flow Diagram in process modeling is because it is a good tool for breaking down the system processes

Context Diagram

The diagram below shows the external entities that interact with the system and data flows between this external entities and the system. The diagram is the **0 Level DFD**

Figure 4.4.1a



DATAFLOW

DIAGRAM FOR THE PROCESS EXECUTION IN THE PROPOSED SYSTEM

This diagram on the other hand shows an advanced view of the system with keenness to the flow of instructions and information in the various sections of the system involved.

Processes

- 1) A parent is received and their details recorded, alongside those of those of the child. The parent's and child's health records are also taken and stored. The child records are stored in the *Child records store(D1)*
- 2) Health Information which is very important in the immunization and medical processes is recorded and stored in the *health file (D2)*. It pertains to the parent of the child and also the child
- 3) Immunization records are stored in the *Immunization records file (D3)*. These records are used to know which immunizations the child has already received to avoid repetition.
- 4) On request for service, the records are scanned for a history of immunizations. If required criteria are met, the child is immunized else, the request is rejected
- 5) When the child has been immunized, necessary receipts or reports are issued to the guardian which can be used to confirm the immunization and be used in the next request.

DATA STORES

- D1 – Children's file
 D2 – Health Records file
 D3 – Immunization records file

4.4.2 DATA MODELLING Flowcharts

A flowchart is an aid to a systematic process of analyzing problems and developing suitable computer based solutions. It is a diagrammatic or pictorial representation of the plan of solution of a problem. It indicates the process of solution, the relevant operations and computations, the point of decision and other information which is a part of the solution. Flowcharts are of particular value for documenting a program.

Reasons for using the flowcharts are:

1. They give the designer a good visual reference of what the program will do. They serve as programs or systems documentation.
2. They allow programmers to test alternative solution problems over coding the problem.
3. They are good communication tools.

V. DATA DESIGN

Database

A database is a common data pool, maintained to support the various activities taking place within an organization. Input is made to a common data pool. It reduces duplications of the stored data records unlike the integrated file systems, in which case several interdependent files are maintained for the different user requirements. The integrated file systems have the problems of data duplication and in carrying out any file processing task(s) all the related files are to be processed. Further the information derived from several files may lack giving the overall state of affairs of the system. The type of database used for the proposed system is relational database. The proposed system uses the RELATIONAL DATABASE. This is because; data is related using logical conclusion inherent in the data rather than two physical pointers. Hence, it combines data from different sources. The data is represented in form of tables made up of columns and rows i.e. relations. The entire file of data can be processed with a single statement. The logical manipulation of

data makes feasible the creation of query languages which makes the access of database realistic for a much larger group of users. Information is produced from different tables as long as they share common data elements.

Reasons for using a relational database

1. Very flexible with regard to ad hoc queries
2. Simple to design and maintain
3. Easy to program and application in a relational environment
4. Simple to add new data and records without disturbing existing programs
5. They are neat and accurate.

TABLES
CHILDREN TABLE

Table 5.3.1a

Field Name	Data type	Size	Description
Registration No	Number	8	Identity card number
Surname	Text	12	First name
Other name	Text	12	Second name
Date of birth	Date/time	8	Birth date
Parent ID/ Passport	Number	8	Parent's Identification

PARENTS (Mother) TABLE

Table 5.3.1b

Field Name	Data type	Size	Description
ID / Passport No	Number	8	Identity card number
Fathers ID / Passport No	Number	8	Fathers Identification
Surname	Text	12	First name
Other Name	Text	12	Second name
Date of Birth	Date/time	8	Birth date
Address	Number	8	Residence address
Town	Text	12	Residence town
Street	Text	12	Residence street
Country	Text	12	Resident country
Postcode	Number	4	Country postcode
Telephone No	Number	10	Telephone
Mobile No	Number	10	Mobile phone number

STAFF TABLE

Table 5.3.1c

Field Name	Data type	Size	Description
ID / Passport No	Number	8	Identity card number
Surname	Text	12	First name
Other Name	Text	12	Second name
Date of Birth	Date/time	8	Birth date
Address	Number	8	Residence address
Town	Text	12	Residence town
Street	Text	12	Residence street
Country	Text	12	Resident country
Telephone No	Number	10	Telephone
Mobile No	Number	10	Mobile phone number
Job Description	Text	10	Staff Job Description

USERS TABLE

Field Name	Data type	Size	Description
User ID	Number	8	User's Unique ID
Username	Text	12	User's Access Name
Password	Text	12	Log in password
User Level	Date/time	8	User Authentication

IMMUNIZATIONS TABLE

Table 5.3.1e

Field Name	Data type	Size	Description
Immunization Type	Number	8	ID card number
Immunization No	Text	12	First name
Child Registration No	Number	10	Child Registration Number
Immunization dose No	Text	12	Immunization Dose Number
Immunization Desc	Text	100	Immunization Description

Normalisation

It is the process of removing duplication and grouping related data to minimize interdependence between data groups. The aim of normalization is to ensure that each fact is only recorded in one place so that facts cannot be inconsistent and the performance of updates cannot produce anomalies by updating one copy of the fact but not another.

UNNORMALISED DATA

REGISTRATION NO, SURNAME, OTHER NAME, DATE OF BIRTH, PARENT ID/ PASSPORT, ID / PASSPORT NO, FATHERS ID / PASSPORT NO, SURNAME, OTHER NAME, DATE OF BIRTH, ADDRESS, TOWN, STREET, COUNTRY, POSTCODE, TELEPHONE NO, MOBILE NO, ID / PASSPORT NO, SURNAME, OTHER NAME, DATE OF BIRTH, ADDRESS, TOWN, STREET, COUNTRY, TELEPHONE NO, MOBILE NO, JOB DESCRIPTION, USER ID, USERNAME, PASSWORD, USER LEVEL, IMMUNIZATION TYPE, IMMUNIZATION NO, CHILD REGISTRATION NO, IMMUNIZATION DOSE NO, USERNAME, USER TYPE, PASSWORD

FIRST NORMAL FORM (1 NF)

A table is said to be in first normal form if and only if it contains no repeating groups, i.e. it has no repeated values for particular attributes in a single record. If there are repeating groups and attributes they should be isolated to form a new entity.

CHILD DETAILS

Registration No, Surname, Other name, Date of birth, Parent ID/ Passport, Immunization No, Immunization Dose No, Immunization Description

PARENT DETAILS (ID /

Passport No, Surname, Other Name, Date of Birth, Address, Town, Street, Country, Telephone Mobile No, Job Description, Child Registration No,

Surname, Other name, Date of birth, Immunization No,
Immunization Dose No, Immunization Description)

STAFF DETAILS (ID / Passport No, Surname, Other Name, Date of Birth, Address, Town, Street, Country, Telephone No, Mobile No, Job Description, Username, Password)

SECOND NORMAL FORM (2NF)

A table is said to be in 2NF if and only if it is in first normal form and every non-key attribute is fully dependent on the key attribute. All non-key attributes that are not dependent on the key attribute should be isolated to form a new entity.

CHILD DETAILS

(Registration No, Surname, Other name, Date of birth, Parent ID/ Passport, Immunization No, Immunization Dose No, Immunization Description)

PARENT DETAILS (ID / Passport No, Surname, Other Name, Date of Birth, Address, Town, Street, Country, Telephone No, Mobile No, Job Description, Child Registration No, Surname, Other name, Date of birth, Immunization No, Immunization Dose No, Immunization Description, Username, Password)

STAFF DETAILS (ID / Passport No, Surname, Other Name, Date of Birth, Address, Town, Street, Country, Telephone No, Mobile No, Job Description, Username, Password)

USERS DETAILS (Staff Id, Username, Password)

THIRD NORMAL FORM (3NF)

A table is said to be in 3NF if and only if it is in second normal form and every non-key attribute is not dependent on any other non-key attribute. All other non-key attributes that are not dependent on other non-key attribute should be isolated to form a new entity.

5.3.2 Input Design

It involves all forms that are used to input data to the system

FORMS

CHILDREN FORM

This form is used to collect child details and store them into the system database. The form is also useful in showing the Immunizations a child has undergone and therefore determine whether the client is eligible for another.

PARENTS FORM

This form allows for the addition and manipulation of parent details in the system. The parent details are taken against every child record and used when there is need to communicate to the parent, or identify a child.

Figure 5.3.2b

PARENT DETAILS					
		ID No	<input type="text"/>	SEARCH	<input type="button"/> <input type="button"/> <input type="button"/>
PARENT'S RECORDS SUMMARY					
ID No	<input type="text"/>	ADDRESS	<input type="text"/>		
SURNAME	<input type="text"/>	TOWN	<input type="text"/>		
OTHER	<input type="text"/>	PASSWOR	<input type="text"/>		
LICENCE	<input type="text"/>				
MOBILE NO	<input type="text"/>				
ADD		EDIT	DELETE		

STAFF FORM

This form is used to record staff details and assign a password to the staff member, who is allowed to edit and update these passwords, besides other dynamic sections of their records.

Figure 5.3.2c

STAFF DETAILS		<input type="text"/>	SEARCH	<input type="button"/> <input type="checkbox"/> X
STAFF RECORDS SUMMARY				
ID No	<input type="text"/>	ADDRE	<input type="text"/>	
SURNAME	<input type="text"/>	TOWN	<input type="text"/>	
OTHER	<input type="text"/>	PASSWOR	<input type="text"/>	
JOB TITLE	<input type="text"/>			
PHONE	<input type="text"/>			
<input type="button"/> ADD <input type="button"/> EDIT <input type="button"/> DELETE				

VACCINATION FORM

This form allows for the addition and updating of immunization records in the system. The Immunization records are then appended to the child records for each immunization the child undergoes.

Figure 5.3.2d

VACCINATION DETAILS		<input type="text"/>	<input type="button" value="SEARCH"/>	<input type="button"/> —	<input type="button"/> X
VACCINATION RECORDS SUMMARY					
Vaccination No	<input type="text"/>				
Vaccination	<input type="text"/>				
Dosage	<input type="text"/>				
Description	<input type="text"/>				
<input type="button" value="ADD"/> <input type="button" value="EDIT"/> <input type="button" value="DELETE"/>					

5.3.3 Output Design

It involves all reports that result from data stored in the system.

CHILDREN IMMUNIZATION REPORT

This report will be displaying all immunizations that a child has undergone

Figure 5.3.3a

WAITHAKA HEALTH CENTER IMMUNIZATIONS REPORT				
CLIENTS REPORT				
Child Registration No	Names	Immunization No	Immunization Title	Immunization Description

IMMUNIZATION REPORT

This report will be displaying all immunizations that a child has undergone within a period of time specified by the system user

Figure 5.3.3b

WAITHAKA HEALTH CENTER PERIODIC IMMUNIZATIONS REPORT				
CLIENTS REPORT				
Child Registration No	Date From – Date To	Immunization List	Immunization Title	Immunization Description

VI. SYSTEM IMPLEMENTATION

Systems implementation is the construction of the new system and the delivery of that system into production. System implementation commences after the users have accepted the new system.

This phase involved all the activities that took place to convert the old manual system to a new computerized system. The design of the system was converted into an operational system that would meet the user's requirements. These activities include program and system testing, file conversion, training of the user staff and conversion from old system to a new system.

6.1 Tools used for Coding and Testing

The tools used for coding are PHP and HTML and MYSQL as database management system.

6.2 System test plan

A **test plan** is a document detailing a systematic approach to testing a system .The plan typically contains a detailed understanding of the eventual workflow.

A plan of how the testing would be done is prepared. The testing is to take twenty days and uses both historical data and dump data with every user carrying out the described duties using the system in order to test whether the system meets its purpose.

6.3 Testing

Testing is the process of verifying and validating the system for the conformance with specification and above all meeting the

user's requirements. Testing ensures that the system is error free and is achieving its goal

The testing done involved:-

Functional Testing / Functionality Testing

Functional testing is the process of confirming the functionality of the application. It ensures that the system functions the way it is intended to. The purpose of functional testing was to ensure that the program performs all the specified functions. It relates to the whole system and does not require a technical understanding of the system.

System testing

System testing is a level of the software testing process where a complete, integrated system is tested.

The purpose of this test is to evaluate the system's compliance with the specified requirements.

System testing is done after integration testing is complete. System testing should test functional and non functional requirements of the software.

Testing involved using the web application with an intention to discovering any errors. A good test approach is one that has capability of finding errors that were not yet discovered. Therefore the testing was done in order to clearly see if there were problems with the new computerized system.

Acceptance Testing:

Formal testing conducted to determine whether or not a system satisfies its acceptance criteria enable the customer to determine whether or not to accept the system. This testing

process is usually performed by customer representatives. This testing was done to determine whether the users embraced the system.

6.4 Test Data

Test data is data which has been specifically identified for use in tests, typically of a computer program.

Test data may be produced in a focused or systematic way or by using other, less-focused approaches. Test data may be produced by the tester, or by a program or function that aids the tester. Test data may be recorded for re-use, or used once and then forgotten.

It involved both correct and incorrect data. Correct data was keyed in the forms and the correct output was produced by the user while incorrect data was keyed and an error was produced. The use of correct and incorrect data is to check whether the validation and verification checks were working correctly.

6.4 Proposed change over techniques

System changeover is the process of putting the new information system online and retiring the old system.

Parallel changeover will be used where both the new and the old system are used simultaneously. In a parallel changeover, the new system runs simultaneously with the old for a given period of time. Of all the techniques, this tends to be the most popular, mainly because it carries the lowest risk. If something goes wrong at any point, the entire system can be reverted back to its original state.

By using parallel changeover, the users will have room to get acquainted with the new system. The new and the old system will be used together until it will be decided that the new system works correctly

VII. LIMITATIONS, CONCLUSIONS AND RECOMMENDATIONS

7.1 Limitations

During the development of this system, several challenges were encountered. The time allocated for the project was very little and this meant that I had to work extra hours to ensure timely completion the project. Budget was also a problem as the project required a lot of money to develop, I had to take a loan from my employer to ensure the project completed successfully. Training was also a big problem since the hospital did not have any person with IT expertise who could have helped in the training.

7.2 Conclusion

This project involved the design and development of an immunization information system. The project follows a water fall model where system development undergoes five main stages; requirements gathering, design, implementation, verification, deployment and maintenance. The development tools used are DFD's, Flowcharts and ERD. User interface is accessible online by use of a web browser, the business logic is hosted on a server and the database that runs on mysql database management system.

With this system, it's expected that there will be an improvement in health care by enabling more children to be immunized at the right time.

The process of immunization in Waithaka will be more efficient and time saving. Parents will be able to log in to the system from their homes and check the status of their child's immunization. The system will contribute towards the improvements in the quality of healthcare by reducing incidences of errors in medical records. It will also help the health workers to generate reports and access records with ease.

7.3 Reccomendations

I would recommend the system to be improved further for parents to be receiving alerts through their mobile phones about a scheduled immunization. This will ensure that no parent will ever miss to take their children for immunization thus building a healthy nation. The system should also be introduced to other hospitals.

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AUTHORS

First Author – Henry Peter Gommans (Lecturer/Professional), Mount Kenya University/Tradewinds Logistics Limited(JKIA)
e-mail: henrygommans@gmail.com

Second Author – Mercy Wangari (scolar), Mount Kenya University email: mercywangari01@gmail.com

Effect of seed size on germination and early growth of maize (*Zea mays*).

*C.S. Yusuf, **N. Makate and ***R. Jacob

*Research Scholar, Institute of Agricultural Science, BHU , Varanasi, India.

**Department of Biological Sciences, University of Botswana, Gaborone, Botswana.

***Department Of Biological Sciences, Adamawa state University, Mubi, Nigeria.

Abstract- The effect of seed size on germination and early growth of maize plant, was examined within three weeks to determine the best seed size require for planting. The larger size seed produced significant growth compared to medium size and small size. The seedling height, seedling width, and seedling biomass increased in larger size seed. The significant growth observed in larger size seed showed that larger size seed are good seed size for maize planting.

Index Terms- maize seedlings height, maize seedlings germination, maize.

I. INTRODUCTION

Maize is believed to have originated from Mexico and it is a widely cultivated crop in Central and South America. Maize was introduced into Africa in the 1500s and has since become one of Africa's dominant and staple food crops. Like in many other regions, it is consumed as a vegetable even though it is a grain crop. Africa produces 6.5% of the world's grain production, and the largest African producer being Nigeria with nearly 8 million tons produced annually, out of a worldwide production 785 million tons. Maize was introduced by the Portuguese to the West African coast during the early sixteenth century [1]. In Nigeria, maize is one of the agricultural commodities which serve as a raw material and food crop for human consumption. Maize grows across a range of agro-ecological zones in Nigeria but a lot of its production is from the northern part of the country that includes states like Adamawa, Bauchi, Yobe, Sokoto, Kebbi, Katsina, Nasarawa and Niger. The two types of maize grown are the yellow and white varieties.

Maize is a staple food crop for human and animal consumption, it is also important in breweries, paper and fabric manufacturing, adhesive and pharmaceutical industries and other useful products that generate a large source of income [2]. It is also an excellent source of carbohydrate and has complete nutrients than any other cereal. The protein content of maize is higher than that of polished rice and its fat content is higher than that obtained from wheat, sorghum and rice. It is also a good source of minerals. There are many end products from maize such as popcorn, snacks, biscuits and cereals. Traditionally, the dry stem of maize is used for fencing small farm land or gardens or the same can be thrashed and used as fodder for farm animals.

Seed germination is an essential process in any plant development in order to obtain an optimal number of seedlings that results in higher seed yield. In a likewise manner, it is

important to know the effect of seed size on germination and seedling performance of maize plant for production of maize on a large scale. It was however important to identify the best seed sizes that had fast germination rate and high percentage germination that could be recommended for farmers to use for the production of maize on a large scale for commercial purposes.

II. MATERIALS AND METHODS

The research work was carried out in the Biological Sciences research garden of Adamawa State University in Mubi, which is located in the North-Eastern part of Adamawa state of Nigeria, between the latitude 9°0' 30" and 11°0' N of the equator and longitude of 13°0' and 13°0' 45"E of the Greenwich meridian. It shares borders with Borno State in the north, Hong and Song in the west, and the Republic of Cameroon in the South East [3].

The type of vegetation found falls within the Sudan Savannah belt of Nigeria vegetation zone and this vegetation type is often called Combretaceae woodland savannah [4]; and it is made up of grasses, and dry land weed inter-spaced by shrubs and woody plants; which collectively make up about 70% of the vegetation.

The soil colour ranges from yellow through red to brown and is generally stony and shallow with almost undefined profile. The soil contains oxides of iron and aluminum [3]; and these are responsible for the varied coloration. The three main soil types from the study area include lithosols, luvisols and gleyiccombisols.

The climate in Mubi is of a tropical wet and dry type [4] with temperatures ranging from warm to hot throughout the year and an average rainfall between the ranges of 900mm to 1050mm annually.

Seed Viability Test

The seeds were obtained from Mubi main market. These were placed in a bucket of water for a viability test. The seeds that sunk down were classified as viable seeds, while those that floated were classified as non-viable. The viable seeds were then collected and sun dried. The seeds were further soaked in 70% ethanol for 5 mins to sterilize the seed surface, washed in distilled water and further sundried [6].

Soil Sterilization

The soil that was used was sterilized by autoclaving at 100°C for 15mins using steam. The soil sample to be used as

rooting medium was in the ratio 1:2:1 (sand: loam: manure) and these were all mixed together.

Seed planting

Perforated planting pots were filled with $\frac{3}{4}$ of the soil mixture, soaked with water and left for 2 days. Three seeds were planted in each pot to a depth of 1.5cm and left to germinate. The planting pots consisted of six replicates and the seedlings were separated into three different sizes for the two varieties as; sy, my and ly for yellow maize, and sw, mw and lw for white maize. A total of 108 seeds were planted for both varieties and these were watered twice a week and kept in the greenhouse under stable conditions.

Data Collection

Recording of data was carried out immediately after the first week of germination for three weeks and this was mainly by looking at the morphological parameters that included; seedlings height, seedlings width, seedlings leaf count, seedlings biomass and seed germination percentage. The data was analyzed using the analysis of variance (ANOVA).

III. RESULTS

Germination percentage

Table 1: Germination percentage for the yellow and white maize varieties

Treatment	Total no. of seeds planted	Total no. of germinated seedlings	Percentage of germinated seeds
Large size seeds	18	18	100
Medium size seeds	18	18	100
Small size seeds	18	18	90

Percentage germination of the seeds for both varieties indicated that seed size did not have any effect on the percentage of seeds that germinated. ($F=1.000$ at 5% probability level).

- Seedlings height*

Table 2a: Seedlings height in Yellow maize

Treatment	1 st week	2 nd week	3 rd week
Large size seeds	23.7	28.0	35.0
Medium size seeds	18.8	25.6	32.9
Small size seeds	17.9	22.0	29.1

There was a significant difference between the heights of the treatments during the 3 weeks of growth. ($f=12.159$, at 1% probability level).

Table 2b: Seedlings height in White maize

Treatment	1 st week	2 nd week	3 rd week
Large size seeds	25.0	30.0	36.0
Medium size seeds	19.5	26.2	32.9
Small size seeds	17.8	24.9	29.7

There was a significant difference that occurred between the treatments during the three weeks of growth. ($f=10.593$, at 5% probability level).

- Seedling width*

Table 3: Seedling width (cm) of Yellow maize for three weeks

Treatment	1 st week	2 nd week	3 rd week
Large size seeds	0.55	0.95	1.10
Medium size seeds	0.50	0.70	0.85
Small size seeds	0.40	0.55	0.70

The result obtained indicated that a significant difference occurred between the treatments. ($f=6.165$, at 5% probability level).

Table 4: Seedling width (cm) of White Maize for three weeks

Treatment	1 st week	2 nd week	3 rd week
Large size seeds	0.55	1.00	1.20
Medium size seeds	0.50	0.80	0.90
Small size seeds	0.45	0.70	0.75

The results show that larger seed sizes have the best seedling width. ($f=6.266$, at 5% probability level).

- Root weight*

Table 5: Root Biomass (g) of Yellow and White maize

Treatment	Yellow weight	White weight
Large size seeds	3.165g	3.160g
Medium size seeds	2.239g	2.125g
Small size seeds	1.650g	1.750g

The results show that there was a corresponding increase observed in the biomass of large size seeds in both the yellow and the white maize; which indicated that seed size has an effect on root biomass.

Table 6: Shoot Biomass (g) of Yellow and White Maize

Treatment	Yellow	White
Large size seeds	4.171g	4.130g
Medium size seeds	3.388g	3.480g
Small size seeds	2.920g	2.386g

The results show that there was an increase in the large size seeds in both the yellow and the white seeds.

This indicated that seed size has an effect on the shoot biomass.

IV. DISCUSSION

The results obtained from this study shows that large and medium size seeds had a higher germination percentage even though it was not any different from the small size seeds (Table 1); as the larger size seeds and medium size seeds germinated faster within three to four days than the smaller size seeds. The high germination rate and faster growth of the seedling may be attributed to greater food reserves available to the growing seedling. These findings are in agreement with the findings reported that seedlings of larger size seeds constantly maintain size advantage over small size seedlings[7]. This constant advantage of seedlings from larger size seeds was due to the large food material available to the growing seedlings. Seed size showed not to have any effect on the number of leaves as all the treatments developed equal number of leaves as growth progressed(Table2). However it was pointed out that the number of leaves may not be a good index for measuring potential productivity of the plant [8].The results also show that larger size seeds tend to have an increase in seedling height, width, and rapid biomass accumulation;more than the medium and small size seeds (Table 3&4). The corresponding increase in the parameters stated due to the larger size seeds, may be as a result of a large embryo and high food reserves for the supply of energy. These findings are supported by the fact that larger size seeds in turn produced larger embryos and have a high respiration rate that results in greater field emergence than the small size seeds. They seedlings height, width and biomass of large size seeds (Table 5 & 6) over the small size seeds indicated that larger size seeds can be the best recommendation in maize plant growth, as it was also reported that plants with larger biomass will consequently produce large grain [9].

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AUTHORS

First Author – C. Yusuf- Research scholar, Institute of agricultural Science, BHU, Varanasi, India

Second Author – N. Makate, Department of Biological Sciences, University of Botswana, Gaborone, Botswana

Third Author – Jacob, R. Department of Biological Sciences, Adamawa State University, Mubi. Nigeria.

Correspondence Author – C. Yusuf- Department of , Email: baldeino67@gmail.com

Cognitive and Affective Characteristics of History Students of the University of Cape Coast

Charles Adabo Oppong

Department of Arts & Social Sciences Education
University of Cape Coast, Ghana
kindtheman@yahoo.co.uk
c.oppong@rocketmail.com

Abstract- Cognitive and affective attributes are the key in any educational endeavor. They seek to give an indication of the extent to which a learner would succeed in a given subject. Given this, the paper examined the cognitive and affective characteristics of History students of the University of Cape Coast, using primary data collected via focus group discussions with a sample of History students selected through random sampling technique. Discussions were transcribed into written text and coded into themes and sub-themes. Commonalities and differences in the key themes have been presented. The study revealed that knowledge traits characterized students' cognitive abilities. The study further found that students have a negative attitude and lack of interest towards History. The results from this study calls for the need to improve the transaction of the History curriculum in the University. It is, therefore, recommended that teachers adopt and use appropriate implementation strategies that would help students develop higher intellectual abilities and the right affective attributes for the subject.

Index Terms- Cognitive, Affective, History, Curriculum, Ghana

INTRODUCTION

The factors influencing students' learning and academic success are many and varied. To understand and make useful conceptualisation of how students learn and succeed in the classroom, it is necessary to classify these variables into manageable categories. These categories have broadly been known as the cognitive and affective characteristics. This general formulation suggests the complex interrelationship between the cognitive characteristics and affective characteristics that affect classroom learning.

Emphasis has centred on cognitive processes in the past and recent years. The many curriculum development and reform projects are based on a cognitive approach (Ripple & Rockcastle, 1964), which have also tailored classroom implementation in that focus. There are many voices being raised in recent years warning against an exclusive concern with cognition. For example, practically all assessment done in colleges and universities is cognitive bias (Saxon, Levine-Brown & Boylan, 2008). It is also to say that few efforts are made to examine students' affective characteristics such as motivation, attitudes toward learning, autonomy, or anxiety. According to a recent study by Gerlaugh, Thompson, Boylan, and Davis (2007), although almost all community colleges assess students'

cognitive skills, only 7% assess students' affective characteristics. As in other areas of academic achievement, research on achievement has focused primarily on the cognitive determinants. Undoubtedly, intelligence has a significant influence on academic achievement. For example, a vast body of research has provided consistent evidence for the link between Intelligent Qoutient (IQ) and academic achievement (e.g. Jensen, 1998a; Matarazzo, 1972; Snow & Yalow, 1982). Yet as Snow recognized, cognition alone presents too narrow a view of students' achievement. First, a typical mean correlation between IQ and academic achievement reported in the literature is about 0.50 (Jensen, 1998a). This implies that IQ accounts for about 25% of the variance in achievement, and that about 75% of the variance is explained by factors other than IQ. Second, academic research has focused on cognitive characteristics other than students' affective characteristics, which equally play a significant role in determining how students are able to succeed in the classroom.

This lack of attention on the affective characteristics of students represents a serious weakness in the whole enterprise of helping to develop students holistically. However, studies have shown that cognitive preferences, learning achievements, and students' affective characteristics are interrelated (Tamir, 1985). This blend is critical in the face of the fact that it helps direct teachers and curriculum developers in general to focus on all factors that encourage students to develop as holistic beings (Zohar, 2004). The argument is that the limitations of the cognitive view underscore the need for moving beyond cognitive factors in accounting for how students learn in the classroom. This is to note that the cognitive and affective domains are interdependent. For this reason, focusing on cognitive constructs to the exclusion of affective construct in History lessons can only unavoidably lead to an incomplete educational experience for History students and this has been the situation in History education for a long time. The implication of this, among other things, is that we have History students for example with an advanced knowledge in the subject and with no great abilities as well as little or no regard for the subject they study or the ethical standards that govern the subject. This lacuna presents the need for a study of the cognitive and affective characteristics of History students.

This study, therefore, seeks to enhance the discourse and our understanding of conjoint relevance of cognitive and affective characteristics of students, as the interplay of these variables becomes critical for classroom learning. This study is,

however, limited to History students in the University of Cape Coast and it is the hope of the researcher that other interested researchers on this discourse will replicate this in other subject areas or institutions.

In the subsequent sections, the researcher discusses the definitions of cognitive and affective characteristics and the various theoretical perspectives, followed by an analytical framework, and an outline of the research methodology used for the study. This is followed by the results and discussion and, lastly, the conclusion and implications of the findings.

Definitions and Theoretical Perspectives

Cognitive characteristics

The cognitive domain involves knowledge and the development of intellectual skills (Bloom, 1956). This includes the recall or recognition of specific facts, procedural patterns, and concepts that serve in the development of intellectual abilities and skills. In a sense, cognitive characteristics are features that exhibit the working of a human mind. In the view of Piaget and Inhelder (1973), cognitive characteristics are mental skills and broadly range from memory skills to procedural skills, and from language skills to thinking skills. In general, the cognitive characteristics can be categorized into lower order cognitive skills such as recalling and listing; and higher order cognitive skills such as problem solving, hypothesis testing, decision making, evaluating, and self-reflecting (Sternberg, 1998). That is, the characteristics of cognition include the following: verbal reasoning, quantitative reasoning, abstract reasoning, and short term memory. Verbal reasoning is the ability of reasoning using concepts framed in words. It aims at evaluating the ability to think constructively, rather than at simple fluency or vocabulary recognition. This underscores the fact that students who intend reading History must possess verbal reasoning skills, in order to help them appreciate the subject History, considering its abstract nature. Quantitative reasoning is the application of mathematical concepts and skills to solve real-world problems, and it requires reasoning based on mathematical properties and relations, with a low demand on computation and high demand on reasoning with numbers, operations, and patterns. Quantitative reasoning cycle begins with the individual engaging in the act of quantification by identifying objects, their attributes, and assigning measures so as to understand it in numerical terms. It is not far from right by indicating that the mathematical aspect in History is obviously the dates in the subject, hence the need for quantitative reasoning in the study of History at any level in education. Research suggests that understanding time is heavily bound up with knowledge in mathematics. This presents difficulties for young people because of the wide range of systems used to describe time. A mapping exercise of any History textbook reveals a complex network of dates or time terms and markers that learners need to navigate in order to make sense of the History subject matter. Many of these terms and markers constitute the mechanics of time and are used to measure and reference events in the past (Taylor & Young, 2003). Quantitative reasoning also enables students to look at statistical tables and, knowing the broader historical contexts, draw conclusions from the raw data.

Abstract reasoning is the ability to analyze information and

solve problems on a complex, thought-based level. Abstract reasoning ability is important because it enables students to apply what they learn in complex ways. Since the subject History is abstract in nature, it is important for students of History to acquire an abstract reasoning ability in order to appreciate the subject. Another way to look at cognitive skills is to use Bloom's taxonomy: lower level skills are related to knowledge and comprehension, and higher level skills are related to synthesis and evaluation. In general, cognitive characteristics has to do with the emergence of the ability to think and understand issues.

Affective characteristics

Birbeck and Andre (2009) rightly point out that the affective domain is a vague concept that could relate to so many aspects of teaching and learning. This is because most definitions of the affective area are grappling with important psychological traits such as motivation, self-esteem, and socialization. For example, Byrne (1984) reports that self-esteem is closely related to academic achievement; however, it was not clear which factor was the cause and which was the effect. Bloom (1956) contends that defining the affective domain involves a taxonomy that includes changes in interest, attitude, and values, as well as the development of appreciation and adequate adjustments. Krathwohl, Bloom & Masia (1964) developed a similar classification system for affective characteristics. In his view, affective behaviours exist along a continuum of internalization, from initial awareness of a phenomenon to a pervasive action-oriented outlook on life. Krathwohl's et al. taxonomy was based on a concern with the degree of internalization (i.e. the degree to which an attitude, value, or interest had been incorporated into the personality). Anderson (1981) also proposes that the affective dimension of students could be categorised by the characteristics of values, academic self-esteem, anxiety, interest, locus of control, attitude, and preferences. Anderson further suggested that these affective characteristics must: (a) include essential features of involved feelings and emotions, (b) be typical of the thoughts or behaviours of the person, (c) have intensity of strength of feelings, (d) have a positive or negative direction or orientation of feelings, and (e) have a target for which the feeling is directed. In all these conceptualisation, it is obvious that affective features characterize the emotional area of learning reflected by beliefs, values, interests, and behaviours of learners (Krathwohl, Bloom & Masia, 1964; Smith & Ragan, 1999; Gronlund & Brookhart, 2009). That is, the affective domain includes the manner in which we deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations, and attitudes. These thematic areas have been arrived at because Miller (2005) has indicated that affective learning is concerned with how learners feel while they are learning, as well as with how learning experiences are internalised so they can guide the learner's attitudes, opinions, and behaviour in the future. It is also important to further clarify the concepts of attitude, interest and value since these words appear to be the hub of the conceptualisation of the affective characteristics. Attitudes are lasting pattern of beliefs and opinions which predispose reaction to objects, events, and people. Attitude serves as brief composites of ones beliefs. These attitudes with regard to learning can be either positive or negative and each has an influence on learning. For instance, a learner who has a negative attitude towards

reading as a result of fear for reading will not have any interest in choosing a programme of study in the humanities, which include History. In a similar vein, a History student's attitude will have an influence on how he/she learns the subject as Huberman (1983) observes that the psychological state of a person can have either positive or negative effect on an implementation process.

Values as characteristics of affective in general are the important and lasting beliefs or ideals shared by the members of a culture about what is good or bad. With respect to learning, values are the ideals that learners view as important to learning and will have a bearing on their lives after studying that particular subject of study. This variable becomes critical in History education because how students value History will inevitably relates to the inputs they make in the learning of the subject. It has been reported severally that students do not value History because of perceived lack of job opportunities for History graduates (e.g. Dwarko, 2007; Cobbold & Oppong, 2010). Interest, on the other hand, describes the cognitive and affective (attitude) relationship between a student and a particular subject in relation to its subject matter. This therefore means that a learner's performance in History could be based on the interest that the learner has for it and the effort that one will make towards the study of History.

On the basis of the foregoing definitions and conceptualisation of cognitive and affective characteristicsIn summary, Bloom's (1956) and Krathwohl, Bloom and Masia (1973) conceptualisation of cognitive and affective domainsis deemed relevant to this study. It is thus employed as the analytical framework for the study. The choice of the two-dimensional taxonomies was informed by two main reasons. First, the choice was made against background of the nature of the discipline (History). History by its nature is more cognitive focused, which demands low and high order thinking skills to enable a learner understand and appreciate the issues involved. Secondly, the interest and attitude of those who study the subject as well as how they value the subject affect the inputs that they make towards the subject. That is, the cognitive and affective domains provide a framework for teaching, assessing and evaluating the effectiveness of lesson design and delivery, and also the retention and its effect on the learner.

Analytical Framework

Bloom's (1956) and Krathwohl, Bloom and Masia (1973) Taxonomies of Learning Domains – Cognitive and Affective Domains - is adopted to guide the study. The various theoretical underpinnings discussed below form the basis of analyses in this paper.

Cognitive Domain

The cognitive domain which emphasizes intellectual outcomes is divided into categories or levels. The key words used and the type of questions asked may aid in the establishment and encouragement of critical thinking, especially in the higher levels (Bloom, 1956).

Level 1: Knowledge – Knowledge is defined as the remembering of previously learned material. This involves the recall of a wide range of materials, from specific facts to complete theories, but all that is required is for the student to bring to mind the appropriate information.

Level 2: Comprehension – Comprehension is defined as the ability to grasp the meaning of materials. This is usually shown by translating material from one form to another (words to numbers), by interpreting material (explaining or summarising), and by estimating future trends (predicting consequences or effects). These learning outcomes go one step beyond the simple remembering of material, and represent the lowest level of understanding.

Level 3: Application – Application refers to the ability to use learned material in new and concrete situations. That is, solving problems by applying acquired knowledge, facts, techniques and rules in a different way. This level is mostly used in the History subject to test students' mastery of various topics treated. In this case, students are usually required to demonstrate how a past event has come to affect present generation.

Level 4: Analysis – Analysis pertains to the ability to break down material into its component parts so that its organisational structure may be understood. This includes the identification of the parts, analysis of the relationships between parts, and recognition of the organisational principles involved. Learning outcomes here represent a higher intellectual level than comprehension and application because they require an understanding of both the content and the structural form of the material. This level is very useful in the study of History, in that History students are required to analyse historical happenings and throw more light on the causes and effects of the past. Since historical happenings or events are past and gone, their reasons and motives are unknown to those studying it in the present. It is, therefore, the place of the History student to make inferences and come out with the reasons or motives behind those past happenings.

Level 5: Synthesis – Synthesis is concerned with the ability to put parts together to form a new whole. This involves the production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information). Learning outcomes in this area stresses creative behaviours, with major emphasis on the formulation of new patterns of structures. This level is essential in the study of History for the very reason that the past is reconstructed through the use of different sources and information. This level becomes critical as students need the ability to put different information together to make interpretation and meaning.

Level 6: Evaluation – Evaluation, the last of the six, is concerned with the ability to judge the value of material (statement, novel, poem, research report) for a given purpose. The judgments are to be based on definite criteria. These may be internal criteria (organisation) or external criteria (relevance to the purpose), and the student may determine the criteria or be given them. Learning outcomes in this area are highest in the cognitive hierarchy because they contain elements of all of the other categories, plus conscious value judgments based on clearly defined criteria. History as a subject is very subjective (Burston, 1927). This is because historical materials are written by people who have different philosophy and from diverse backgrounds and these backgrounds as well as philosophical orientations tend to affect their perspectives on the historical events that they write. It is, therefore, the place of the History student to recognise these subjective tendencies by comparing several historical materials

on any event that they study. Evaluative skills therefore become critical.

Affective Domain

Krathwohl et al., (1964) proposed a five level taxonomy of the affective domains which is also arranged in a hierarchy according to complexity.

Level 1: Receiving – Receiving refers to the learner's awareness of the topic, stimuli, event or issue and is willing and ready to learn about it or respond to it. That is, the learner's willingness to attend to particular phenomena of stimuli (classroom activities, textbook, music, etc.). From a teaching standpoint, it is concerned with getting, holding, and directing the learner's attention. Learning outcomes in this area range from the simple awareness that a thing exists to selective attention on the part of the learner. It follows therefore that in order to progress in the taxonomy; a learner must be aware of and attend to the issue or event in question. Where the learner fails to receive information, progress on affective hierarchy becomes stalled. A common example of this level of affective learning is History class attendance and concentration during classes at school. During the process of "receiving", the learner comes across new ideas and makes effort to understand them.

Level 2: Responding – Responding is concerned with the active participation on the part of the learner. At this level he or she does not only attend to a particular phenomenon but also reacts to it in some way. Learning outcomes in this area may emphasize acquiescence in responding (reads assigned material), willingness to respond (voluntarily reads beyond assignment), or satisfaction in responding (reads for pleasure or enjoyment). For example, a History student obeys class rules and regulations, complies with teacher's instructions and participates in History class activities as required.

Level 3: Valuing - Valuing is associated with the worth or value a student attaches to a particular subject, object, phenomenon, or behaviour. Valuing is based on the internalisation of a set of specified values, but clues to these values are expressed in the student's overt behaviour (Olatunji, 2013). At this level, the learner voluntarily manifests behaviours that are consistent with certain beliefs. For example, when a learner demonstrates kind gestures towards others, comes punctually to school, does and submits assignment as and when due. Students demonstrate "valuing" when they consistently prioritize time effectively to meet academic obligations (Gronlund & Brookhart, 2009). This variable becomes critical in History education because how students value the subject History will inevitably relates to the inputs they make in the learning of the subject. It has been reported severally that students do not value the History subject because of perceived lack of job opportunities for History graduates (e.g. Dwarko, 2007; Cobbold & Oppong, 2010).

Level 4: Organisation -Organisation is concerned with bringing together different values, resolving conflicts between them, and beginning the building of an internally consistent value system. Thus, the emphasis is on comparing, relating, and synthesising values. Learning outcomes may be concerned with the conceptualization of a value (recognises the responsibility of each individual for improving human relations) or with the organisation of a value system (develops a vocational plan that satisfies his or her need for both economic security and social

service).

Level 5: Characterisation - Characterisation relates to a value or value set" and this occurs when a student's behaviour is consistent and predictable as if it has been adopted as a life-style (Gronlund, 1991). In other words, the student has internalised the values to the extent that they characterise him or her as the person's attitude. The individual has a value system that has controlled his or her behaviour for a sufficiently long time for him or her to develop a characteristic "life-style." Thus, the behaviour is pervasive, consistent, and predictable. Learning outcomes at this level cover a broad range of activities, but the major emphasis is on the fact that the behaviour is typical or characteristic of the student. The issues discussed in the analytical framework informed the discussion of the results.

Methodological Approach

This study was conducted on the qualitative research paradigm. The basic inputs for analysis in the study were data collected from selected level Four hundred (400) students in the University of Cape Coast. The use of these students was informed by the fact that they have studied the subject History for long, and were, therefore, in a position to share opinion on all the levels in the analytical framework more than level One (100) or Two (200) hundred students would share. Random sampling technique was used to select 16 (8 males and 8 females) students into focus groups. The proceedings of the fora were recorded as audio tapes and transcribed for making meanings for the discussion.

Results and Discussion

The discussion is done within the framework adopted for the study.

Cognitive Characteristics

In terms of the variables specified in the analytical framework, the study revealed that knowledge traits, to a large extent, characterised students' cognitive abilities. According to the discussants involved in the study, they are more comfortable with issues or questions that demand recall of facts, with few indicating that they prefer application questions that allow them to apply what they have learnt. Though the discussants acknowledged the existence and importance of the other levels of cognition, it became evident that their preference has been occasioned by a number of reasons. These reasons have been described in two ways. The first is related to the nature of the subject which discussants expressed makes them memorise facts for recalling. The following quotes communicate the reason: "The History subject is too abstract that I find it difficult so I always memorise whatever is taught in class". "The subject involves a lot of dates and factual statements that make me memorise for recalling, especially in examinations." The second reason was related to pedagogy. According to the discussants, the pedagogical practices of History teachers do not enhance any interactive class sessions that enable them to participate during instructional time. This, they noted, do not allow them to ask questions to further clarify issues they do not understand. One discussant summarised this as: "The History lecturers always lecture, give notes for us to copy and do not allow us to even ask questions. So the things we are taught are not understandable so

we just memorise for examination." This implies that the nature and the methods of teaching the subject have made them appreciate recalling of information at the level of the taxonomy. As Larsson, Booth and Matthews (1998) indicate students engage in note taking for the purpose of passing the examinations which, certainly as far as History is concerned, is the regurgitation of factual knowledge. As a follow up question, they were asked how they saw and handled examination questions that demanded application, analysis and evaluation of certain historical information. To confirm their earlier submission, they noted that the kind of questions that were asked in their examinations further made them memorise whatever they were taught for recalling. A discussant was very emphatic: "You know what, the questions they [lecturers] ask only ask you to reproduce what they taught you. Any attempt to write them the way you understand them, I bet you they would mark you down."

One could reasonably argue that students' cognitive abilities are dependent or shaped by conditions outside them [students] which relate to the subject being studied and classroom practices. Thus, the students felt that the single most important factor that influences their cognitive characteristics is shaped by the subject and its teaching. One could reasonably conclude that, the use of small groups and other appropriate methods for instructional purposes are rare and student presentations are limited. Classroom proceedings focus on the teacher, who elaborates at length in a final lesson. The blackboard is used to enhance teacher explanation and to aid note taking by students. Few questions are raised by either teacher or students (Rohlen & Le Tendre, 1996).

The finding on this issue further contributes to the debate on the discourse that History is learnt by memorisation (Oppong, 2013). This suggests that there is no difference in students' opinions in the study and what the literature says on how students study History. Contrary to the ubiquitous optimistic belief that History as a subject demands higher order thinking skills such as application, analysis, synthesis and evaluation, it appears that History students in this study seem to operate at a lower cognitive level with regard to historical reasoning. If these students view the study of History mostly as memorisation and recalling, then they are operating at what Hallam (1970) describes as the concrete operational level of thinking in Sigmund Freud's psychoanalytic theory. According to Hallam, such students possess the ability to give organized answers, yet very often their responses are limited to what is immediately apparent in the text. Given this, it means that History students deny themselves of the development of other important intellectual skills, such as critical thinking and imaginative skills that the study of History seeks to give to those who study it. In a similar disposition, the relevance of the other higher levels as conceptualised in the framework for the study of History would also be missing in appreciating the past. It is necessary, therefore, that teachers guide students beyond this threshold to the point where they could move past historical dates to engage in deeper probing about the meaning of the events associated with historical dates and places (Joseph, 2011). This would help History students develop high intellectual abilities for the study of History, and also apply them in their later lives. This is because History makes significant cognitive demands on young

people. It requires students to explore time scales longer than their own lives, connect with complex political and religious ideas, and immerse themselves in lifestyles far removed from their own experiences (Taylor & Young, 2003).

Affective Characteristics

The focus group discussions show that affective characteristics also play critical roles in the study of History. For instance, on the element of receiving, the results show that the History students used in the study admitted their awareness of the History topics to be treated on semester basis but attendance at lectures and concentration are not appreciable in their case. They noted that this position is triggered by instructional practices related to teaching. This quotation is illustrative:

"We are given course outlines at the beginning of the semester and that gives us an overview of what we are going to treat for the semester. But some of us don't attend lectures often, however, when we attend concentration is not all that good. The reason is that, how the History lecturers teach is so boring that you don't wish to go for lectures. They just lecture and dictate notes which don't make the class exciting for concentration."

Obviously, this attitude of students is worrying.

In relation to responding, the discussion revealed that the students show commitment to certain activities required of them relative to institutional requirement. The following quotes are explanatory: "I do class assignments, quizzes, exercises because these would be used for grading," "I participate in those activities that would be used for determining my grade." It is obvious from these responses that students' actions at this level of the affective domain are not voluntary but dependent on University's policies and how it would affect their academic progress. It means that certain class activities that are not considered as part of scoring points for students are not participated by students. It is against this situation that some educationists have suggested that other class activities such as discussions, conduct, among others, must be scored. This, they believe would shape students' attitude towards their profession in their later lives (Oppong, 2013).

With respect to valuing, the results showed that students do not have internalised values that reflect in their overt behaviours towards the subject. Respondents indicated that they do not place any value to the study of History. This assertion was made in comparable terms with other subjects they study. It was evident that they attached much seriousness to other subjects more than History because of earlier reasons articulated. "I like studying my other courses more than History because after all History is not so much important to me," "Because of how the subject is and how it is being handled I don't really attach any seriousness to it and it is obvious." These observations indicate that the learners noted mainly the nature of the subject and how the subject is being delivered in class as reasons that do not make them value History. This finding corroborates several studies and comments that the nature and instructors practices regarding History make the subject not appealing to students (e.g. Marwick, 2001; Cobbold & Oppong, 2010; Dwarko, 2007).

The issue of organisation of students' affective characteristics was not different from the responses on valuing. Clearly, the respondents did not demonstrate anything, during the

discussions, in relation to organisation as conceptualised in the framework. Indeed, there was a clear admittance that they do not accept responsibility for their own behaviour. This is because they explain that their behaviour towards the subject have been as a result of factors related to the subject and its implementation. It also emerged that the students did not prioritise time effectively to meet the needs of the subject, which demands extensive reading from many sources. Finally, responses on characterisation as captured in the framework show that History students in the study rely on lecture notes when studying History. Group studies were noted as something that was practised. The following quotes communicate their intents: "my style has been that I read only the lecture notes for exams and so I don't go for any group discussion," "The lecturers expect us to reproduce what they have given, so I rely only on the lecture notes." These imply that the value system that controls their behaviour is what they are expected to do in an examination which has become characteristic of the students.

Conclusions and Implications

Following the discussion in this paper, it can be deduced that History students' cognitive characteristics relative to their study of the subject is identified at the level of knowledge as captured in the framework. This suggests that the students are likely to be engaged in recall of historical facts without examining historical facts as it requires of them. The affective characteristics of the students could be summarised as not appreciative since it was evident that their approach and how they value the subject History is not what is expected. Obviously, the students do not have a favourable attitude or interest, and do not value the subject. However, Popham (2011) argues that the reasons such affective variables such as students' attitudes, interest and values are important are because they typically influence future behaviour. He highlights further that it is necessary to promote positive attitudes towards learning because students who have positive attitudes towards learning today will be inclined to pursue learning in the future. This means that such students are likely to drop the subject in their later years in school.

There is a clear assumption that affective learning is a by-product of cognitive learning. The reason is that students' articulation that they memorise whatever they are taught for examination purpose and not necessarily for proper understanding for later use is a confirmation of how they feel and behave towards the study of the History subject. For this reason, it is argued that affective learning outcomes do not need to be indicated, taught, or assessed separately. Furthermore, it is maintained that there are in fact, close parallels between Bloom's taxonomy for the cognitive domain and Krathwohl, et. al's taxonomy for the affective domain (Smith & Regan, 1999) and because of this, special attention should not be given to the affective domain. The crux of the argument is that within a learning environment, if the implementing agents adequately process the inputs into the system, the desired output can be attained.

On pedagogical practices, the call here in this paper is not different from several others on History instructional practices articulated by many scholars in History education (e.g

Marwick, 2001; Cobbold & Oppong, 2010; Dwarko, 2007, Shemilt, 2000). It became clear from the results that students' cognitive characteristics have been occasioned, largely, by how the subject is taught, which does not engage students actively. This implies that students would be more involved in the use of higher order thinking skills if the curriculum is transacted more interactively, which would allow students to question historical facts and further engage in analysis and evaluation of historical events. Regarding assessment, the conclusion and the two-dimensional taxonomy emphasizes the need for assessment practices to extend beyond discrete of knowledge to focus on more complex aspects of learning and thinking. Such assessment practices will not only discourage memorisation in History but it will also help students to develop higher intellectual skills, which the disciplinary canons dictate.

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AUTHOR

Charles Adabo Oppong – BEd (Hons), MPhil (curriculum Studies), University of Cape Coast, Cape Coast, Ghana, kindtheman@yahoo.co.uk, c.oppong@rocketmail.com
+233244566764

Geochemical Study of Crude Oil Samples to Evaluate Extent and Effect of Secondary Alteration Process (i.e. Biodegradation).

Salisu Nasir¹, Nasar Mansir² and Nasir Muhammad Augie³

^{1&2}Department of Chemistry, Federal University, Dutse, Jigawa State-Nigeria

³Kaduna Refining and Petrochemical Company (KRPC), Nigeria

Abstract- A mild chemical treatment i.e. Ruthenium ion catalysed oxidation (RICO) has been employed to examine the asphaltenes of two oils (fresh and slightly degraded) chosen from four oils samples after bulk geochemical analysis. The oils were from same geographical location but unknown oilfield in North America. The distributions of hopanoic acids released from the asphaltenes were investigated and compared with that of hopanes in the maltenes. The distributions were dissimilar e.g. distribution of carbon number maximized at C32 in the terpenoic acids which are not consistent with that of terpanes (hopanes) in the maltenes. However, C29 and C30 hopanes were the prominent in the maltenes where as C32 hopanoic acids homologues in the released products. Comparatively, biodegradation was inferred to have no effect on the bonded biomarkers due to their unaltered nature after RICO treatment. Concomitantly, the difference and level of degradation between the samples were also investigated and found to be small (insignificant) with minor or no loss of n-alkanes or any other biomarkers in the samples. Although, samples 6661 and 8673 were slightly degraded and ranked "1" in the Peters and Moldowan (1993) scale, still none of the sample appeared to have lost their isoprenoids, hopanes and steranes. This indicates that the samples were slightly biodegraded. On the other hand, oils (8673 and 8676) were ranked "0" on the same scale indicating that they are not degraded.

Index Terms- Asphaltenes, Biodegradation, Hopanes and Hopanoic acids, Maltenes, RICO, Whole oils.

I. INTRODUCTION

Crude oil is a mixture of organic compounds containing diverse chemical, physical and compositional behaviours. This mixture consists of many thousands of different components. Most of these are hydrocarbons i.e. carbon and hydrogen atoms arranged in chains or rings [1]. However, molecular weight (i.e. the weight of each hydrocarbon molecule) primarily depends on the number of carbon atoms, which can vary from one (1) to more than hundred (100). The overall properties of crude oils are dependent upon their chemical composition and structure [2].

Light oil has a greater proportion of the low molecular weight components, while heavy oil has more of the higher molecular weight components. Other components of this complex mixture contain heteroatoms and metals. In general,

crude oil mixture can be classified into different groups such as alkanes, branched alkanes, alkenes, branched alkenes, aromatics, monocyclic-aromatics etc. [3]; [1].

Petroleum study reveals that solubilities of compounds in particular solvent varied from one compound to another and molecular weights of these compounds is always useful for separating different type of compounds from one another [2]

Asphaltenes are one of the four main classes of petroleum mixture. The other three main classes of compounds in the latter are saturated hydrocarbons, aromatic hydrocarbons and resins making the acronym SARA. Similarly, asphaltenes are the largest molecules in oil, they contain aromatic rings system containing one to four aromatic rings, usually bonded to linear or cyclic saturated hydrocarbon structures and polar functional groups. They are a dark brown to black, friable, infusible solid component of crude oil [4]. [5] characterized this infusible solid component of crude oil (asphaltene) by a C:H ratio close to one and specific gravities near to one and reported that they are extremely aromatic [5].

The percentage compositions of SARA in the crude oil samples were determined in this work using Iatroscan analysis with special consideration given to asphaltene content in each of the sample for selection purposes.

[6] and [7] revealed that asphaltenes, like many compounds found in crude oil fraction, contains chemically bound biomarkers which hold important information about the origin, biological source material, and diagenetic history of the oil. These features and others made them of economic importance for geochemical studies.

In spite of an undisputed argument about their structures and molecular weights [8] they have been shown to contain bound biomarkers that are normally present in the deasphaltened (maltene) fraction from oils and bitumen [7]; [6].

[9] examined the bound biomarkers from asphaltenes of a range of different oils, released in the form of acids by ruthenium ion catalysed oxidation (RICO) and analysed in form of methyl esters. All the samples show high proportion of *n*-alkanoic acids and isoalkanoic acids up to C₃₅ among the oxidation products. In addition, hopanoic and steranoic acids were also detected [9].

II. MATERIALS AND METHODS

2.1 Precipitation of Asphaltenes:

For crude oils, deasphalting of the samples is usually the first step prior to further analysis. This is usually done by a standard asphaltene precipitation by alkanes like pentane, hexane or heptane. In this work, the asphaltene precipitation was conducted using *n*-hexane for cost reason. The method was adopted based on the procedure carried out by [10] although *n*-hexane was used as a precipitation solvent instead of *n*-heptane for the stated reason above.

About 200 ml of *n*-hexane was added into a 250 ml conical flask containing about 5 g of the crude oil sample with regular swirling. The mixture was stirred for 2 hours and was allowed to equilibrate for 24 hours. It was centrifuged at 3500 rpm per minute for 15 minutes and the asphaltene recovered. The supernatant (maltenes) is filtered without disturbing the whole mixture and kept in a vial. The asphaltene recovered was reprecipitated with another 40 fold of *n*-hexane per gram of the sample. The mixture was sonicated for about 30 minutes and the asphaltene recovered by centrifugation. The former and the latter procedures were repeated twice to enhance recovery. The recovered asphaltene was transferred into a pre-weighed vial with minimal amount of DCM. The excess solvent was removed under stream of nitrogen and was allowed to stand at ambient temperature until evaporation completed. The amounts recovered were weighed respectively. The same precipitation procedure was repeated for another new 5 g of the same sample.

2.2 Cleaning of the Asphaltenes:

Due to possibility of “trapped” maltenes and other impurities, the dried asphaltene residue recovered by precipitation was thoroughly cleaned by Soxhlet extraction using *n*-hexane in order to remove the co-precipitated maltenes. The procedure was carried out by transferring the asphaltene in to a cellulose thimble and placed in a Soxhlet apparatus and refluxed with *n*-hexane for 72 hours. The cellulose thimbles were pre-extracted with DCM prior to usage. The heating rate, condenser cooling rate, and fluid level of the solvent in the Soxhlet apparatus was adjusted to maintain a temperature of 30 (3 °C in the sample chamber). Contact between the asphaltenes and the solvent (*n*-hexane), the Soxhlet was enhanced by stopping the procedure once a day and the asphaltene sample crushed and mixed (Alboudwarej *et al.*, 2002).

After the extraction, the asphaltenes were allowed to dry inside the thimble and 50 mg was taken for RICO analysis.

2.3 Thin Layer Chromatography (TLC) for whole oils and maltenes:

About 15-20 mg of each of the four crude oil samples and maltenes were separated into saturated hydrocarbon fraction using thin layer chromatography (TLC). The maltenes were further separated in to aromatic fraction.

The TLC plates were prepared using a 20 cm square glass plates coated with 0.5 mm thick silica gel 60G as the stationary phase. The plates were activated in an oven at a temperature of 100°C for 24 hours and then pre-eluted with DCM and oven dried.

The crude oil samples and the maltenes were dissolved into small amounts of DCM and then spotted onto the silica plate using small pipettes. A standard was used along the side of plate in order to recognise different hydrocarbon fractions.

Afterwards, the plates were immersed in the TLC tank containing 200 ml petroleum ether. It was kept monitored until the solvent (mobile phase) migrated to the top of the plate.

The plates were removed and air dried and sprayed with Rhodamine-6G dye and viewed under ultra violet light (UV). The bands of saturate in the whole and saturate and aromatic fractions in the maltenes were marked while viewing under the ultra violet light (UV). It was scraped off and transferred in to short columns where it was eluted out with 15 ml petroleum ether and 15 ml DCM, evaporated using a rotary evaporator and then analysed by GC and GC-MS.

2.4 Ruthenium Ion Catalysed Oxidation (RICO):

This is a chemical technique that selectively oxidises aromatic ring structures into carbon dioxide (CO₂) with aliphatic moieties transformed to fatty acids. This technique has been commonly used to illuminate the aliphatic composition of geopolymers [7]. In this work, it has been carried out as follows. About 50 mg of asphaltene transferred into a 100 ml conical flask, it was followed by 4 ml of DCM and stirred until the asphaltene dissolves.

Afterwards, 4 ml of acetonitrile was added followed by 5 ml of 12% aqueous sodium periodate (NaIO₄). About 5 mg RuCl₃ was soon added and stirred for 24 hours at room temperature. Subsequently, 10 ml of DCM was added followed by 10 ml methanol and swirled.

It was then centrifuged at 3500 rpm for 15 minutes and the supernatant decanted. The residue was washed with 15 ml DCM and 15 ml of de-ionised water and was repeated twice.

After that, the washings were combined with the supernatant, and the organic phase was recovered using separating funnel. The aqueous phase was washed with 20 ml DCM (3x). Then the solvent was removed using rotary evaporator to about 10 ml. concurrently, 5 ml of 1M NaOH solution was added in a separating funnel and shaken rigorously.

Afterward, the organic phase was removed and discarded, and the aqueous phase washed with 20 ml DCM (3x). It was followed with 5 ml of 2 M HCl (50% HCl) solution (i.e. added) and shaken rigorously. The acid was extracted with 20 ml DCM (3x) and the excess solvent was removed using rotary evaporator and nitrogen below down [7].

However, to divertised the acids to methyl esters before analysis esterification came in to place as follows;

Acid Esterification; About 1 ml DCM was used to transfer the acids into a boiling tube. It was followed by addition of 50 µl of internal standard (1 mg/ml C₁₆D₃₁COOH). This was followed by addition of about 5 ml of 2% concentrated sulphuric acid in methanol. Some (3 to 4) anti-bumping granules were added. The mixture was refluxed on a test tube heater for 3 hours. It was allowed to cool and 10 ml of deionised water added. The methyl esters were extracted with DCM (10 ml, x3). The DCM extract was washed with 4 ml of 2% NaHCO₃. The esters were dried over stream of nitrogen. Excess solvent was removed using a rotary evaporator at room temperature. The esters were transferred into a GC vial using 1 ml DCM and submitted for GC & GC-MS analyses.

2.5 Gas Chromatography:

This was done using an Agilent 5890 gas chromatograph (GC) instrument, which was equipped with a split/ split less inlet and an Agilent HP-5 fused silica capillary column (30m x 0.25mm I.D. x 0.25 μ m film thickness) to analyse the aliphatic hydrocarbon fractions. The saturates were injected on to the GC column in split/split less mode (1 min. Split less, then 30 ml/min split) by an Agilent 6890 automatic injector. The inlet temperature was 300 °C and the detector temperature was 310 °C. The carrier gas used (hydrogen gas) was applied at constant pressure of 50 kPa and an internal flow rate of 1.5 ml/ minute. Flame ionisation detector (FID) was used as detector. However, In order to arrive at 300°C (final hold time 20 min), the GC oven was heated to 40°C (initial hold time 2 min) at 4°C ramp per minute. The data were collected and processed using a Thermo Atlas software system.

2.6 Gas Chromatography-Mass Spectroscopy:

GC-MS analysis was carried out on an Agilent 7890A gas chromatograph (GC) equipped to an Agilent 5975C mass selective detector (MSD). The separation of dissimilar components was achieved by using an Agilent HP-5 fused silica capillary column (30 m x 0.25 mm I.D. x 0.25 μ m film thickness). An Agilent 7683B auto sampler was used as sample

injector. The GC inlet was operated in pulsed split less mode (inlet pressure = 150 kPa for 1 min split less, then inlet pressure = 50 kPa with a split flow rate of 30 ml/min). For the saturated hydrocarbons, the temperature of GC oven was programmed from 50°C (initial hold time 5 min) to 310 °C at 5 °C/min, with a final hold time of 10 min. The GC inlet temperature was 280 °C and the GC/MSD interface temperature was 300 °C. Helium gas was used as carrier at a constant flow of 1 ml/ min.

The MSD was operated in complete scan mode (40-550 amu/s) or in combined selected ion monitoring (SIM)/scan mode by following the conditions: electron voltage 70 eV, filament current 220 μ A, source temperature 230 °C, quad temperature 150 °C, multiplier voltage 2247 V. Agilent Chemstation software was used to process the data.

III. RESULTS

3.1 Thin Layer Chromatography (TLC) of the whole oils:

The saturate fraction after the TLC of the whole oils were analysed by GC and GC-MS with the results demonstrated in the subsequent figures below.

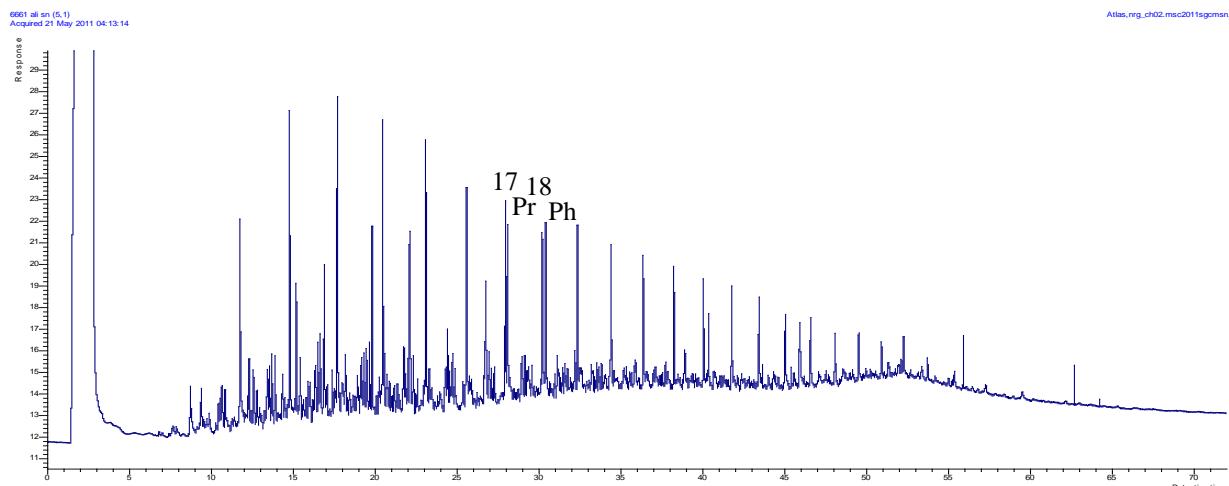


Figure 3.1 GC traces demonstrating the distribution of hydrocarbon in the saturate fraction of sample 6661.
Pr=Pristane and Ph=Phytane coming immediately after nC₁₇ and nC₁₈ respectively.

8672 all.in (5,1)
Acquired 21 May 2011 05:32:24

Atlas.nrg_ch02.msc2011sgmmsn,6,1,1

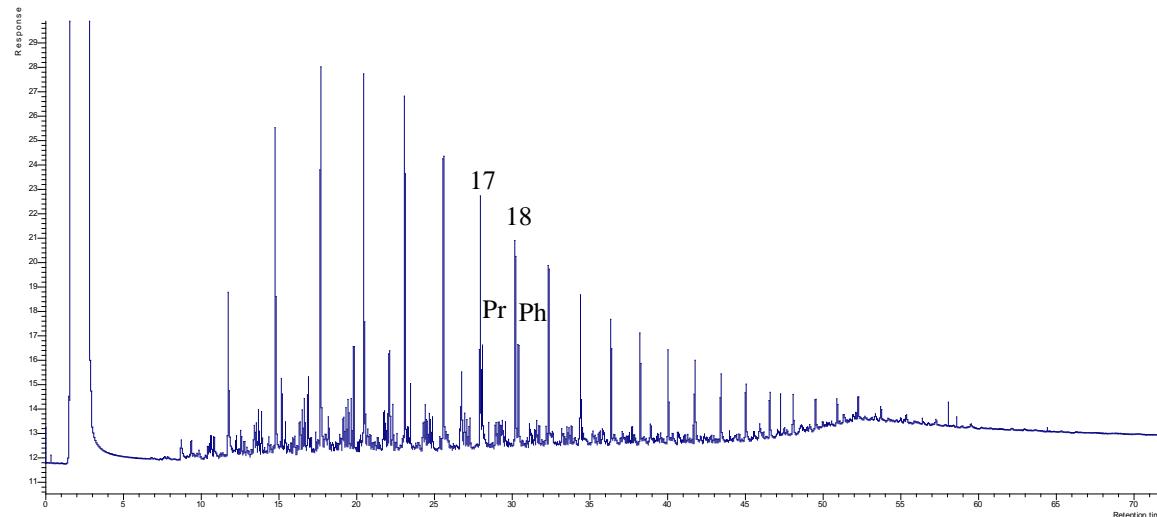


Figure 3.2 GC traces demonstrating the distribution of hydrocarbon in the saturate fraction of sample 8672. Pr=Pristane and Ph=Phytane coming immediately after nC₁₇ and nC₁₈ respectively

8673all (13,1)
Acquired 25 May 2011 16:06:13

Atlas.nrg_ch02.msc2011sgmmsn,13,1,1

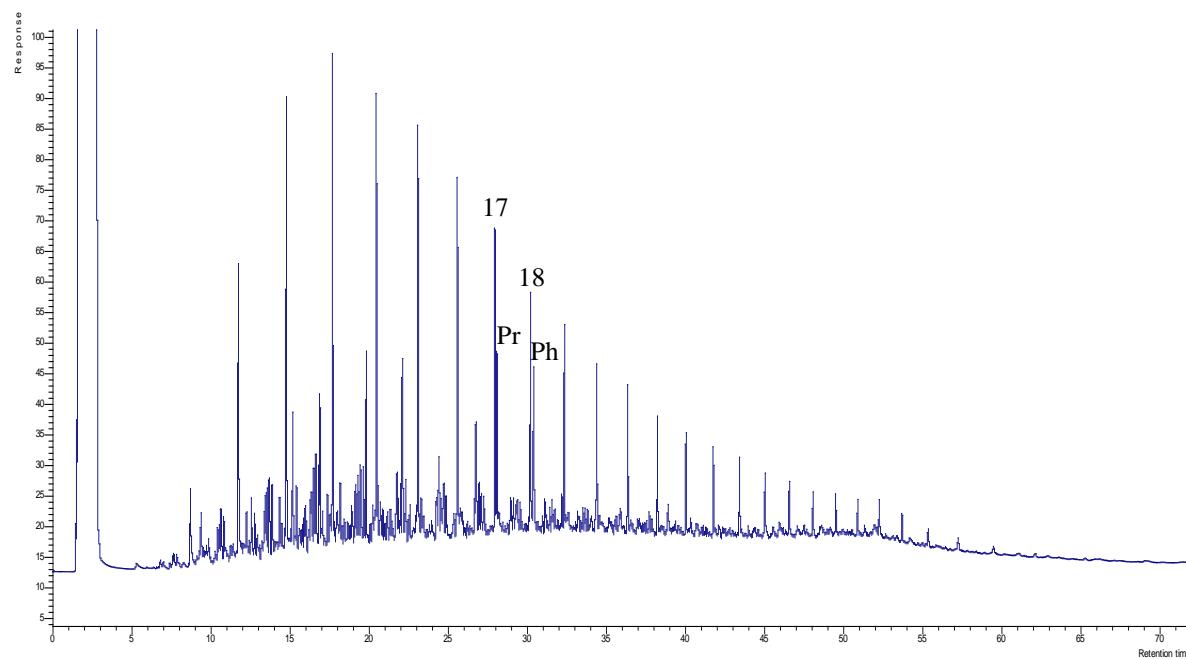


Figure 3.3 GC traces demonstrating the distribution of hydrocarbon in the saturate fraction of sample 8673. Pr=Pristane and Ph=Phytane coming immediately after nC₁₇ and nC₁₈ respectively.

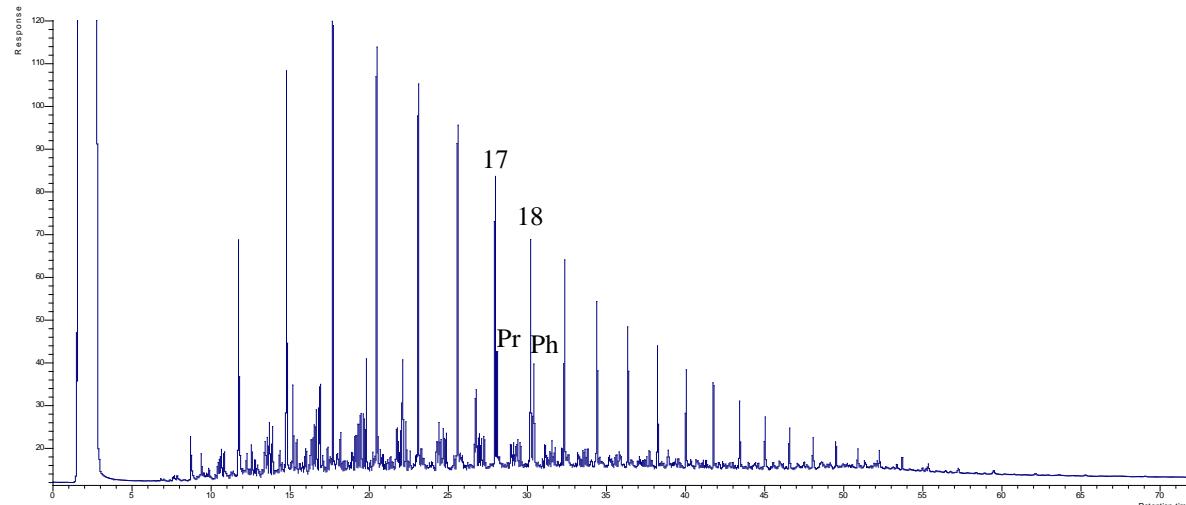


Figure 3.4 GC traces demonstrating the distribution of hydrocarbon in the saturate fraction of sample 8676. Pr=Pristane and Ph=Phytane coming immediately after nC_{17} and nC_{18} respectively.

The early stages of oil biodegradation (loss of n -paraffins) can be readily identified by gas chromatography (GC) analysis of the oil as did in this study using Pr/nC_{17} and Ph/nC_{18} ratios [11] modified by [12].

The n -alkanes in Fig. 3.1 to 3.4 exhibited a unimodal distribution for all the oils indicating similarities of the oils. There were slight systematic changes with increasing biodegradation as seen in the gas chromatograms e.g.

concentration of lower n -alkanes were not prominent in oil 6661 when compared to its counterpart 8676 in which the n -alkanes were relatively intact Fig 3.4. Based on this reason, and additionally by considering the relatively very lower UCM in sample 8676 and relatively higher UCM in 6661, the two samples were categorised as slightly degraded and non-degraded using [11] biodegradation Scale as computed in Table 3.1 and Fig. 3.5 and 3.6 below.

Table 3.1 Ranking of biodegradation in the crude oil samples. It was done in the light of [11] Biodegradation Scale.

S/N	Sample	P&M (1993) Ranking	Chemical composition
1	6661	1	Lower homologous n -alkanes depleted
2	8676	0	Presence of abundant n -alkanes
3	8673	1	Lower homologous n -alkanes depleted
4	8672	0	Presence of abundant n -alkanes

From the scale above, two of the samples (6661 & 8673) were categorised as slightly degraded whereas the other two samples (8676 & 8672) as fresh non-degraded oils.

Table 3.2 Ratios of some selected parameter (Straight chain alkanes and acyclic isoprenoids) in the saturate (aliphatic fraction) obtained after the TLC of the whole oil fraction. The ratios were calculated from the GC traces in Fig. 3.1 to 3.4 above.

S/N	Sample	Pr/Ph ratio	Pr/ nC_{17} ratio	Ph/ nC_{18} ratio
1	6661	1.03	0.89	1.06
2	8676	1.14	0.39	0.44

3	8673	1.12	0.59	0.68
4	8672	1.00	0.40	0.49

From Table 3.2 above, all the pristane/phytane ratios of the oils are almost similar with very little variation. In considering the $\text{Pr}/n\text{C}_{17}$ and $\text{Ph}/n\text{C}_{18}$ ratios, oil 6661 has relatively higher of these ratios compared to its counterparts. On the other hand, oil 8676 has the least of the ratios.

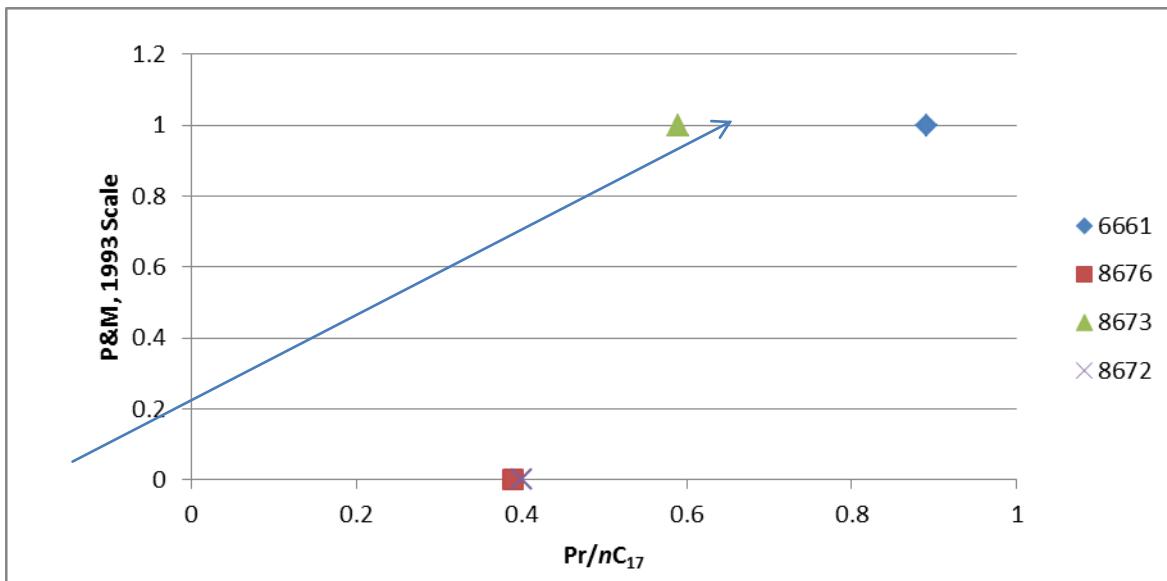


Figure 3.5 Ratio Pristane/ $n\text{C}_{17}$ against the level of biodegradation on [11] Biodegradation Scale.

There was systematic increase of Pristane/ $n\text{C}_{17}$ ratio among the oils with increasing biodegradation. Oils 6661 and 8673 were having higher values of this ratios and corresponds to level '1' on the vertical axis which is the biodegradation assessment scale. However, the other two samples were having relatively lower ratios and received '0' on the vertical axis.

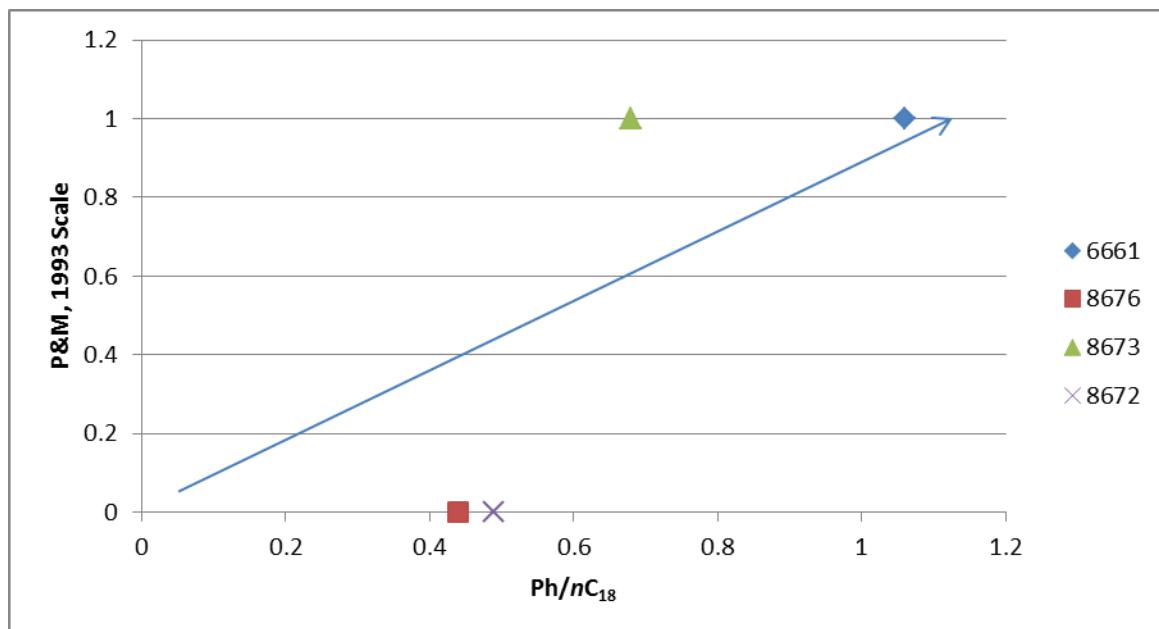


Figure 3.6 Level of biodegradation against Phytane/ $n\text{C}_{18}$ ratio. There was systematic increase of Pristane/ $n\text{C}_{18}$ ratio among the oils with increasing biodegradation.

Relatively, large UCM observed in Fig. 3.1 coupled with higher Pr/ nC_{17} and Ph/ nC_{18} ratios supported the view that sample 6661 is most biodegraded. Relative small UCM observed in Fig. 3.4 and lower Pr/ nC_{17} and Ph/ nC_{18} ratios as in Table 3.2 indicate that sample (8676) is least biodegraded compared to its counterparts.

After considering the n -alkanes and acyclic isoprenoids as demonstrated in the previous figures above, the hopanes and steranes distributions in the oils were also considered with m/z 191 and 217 chromatograms displayed in the subsequent figures below;

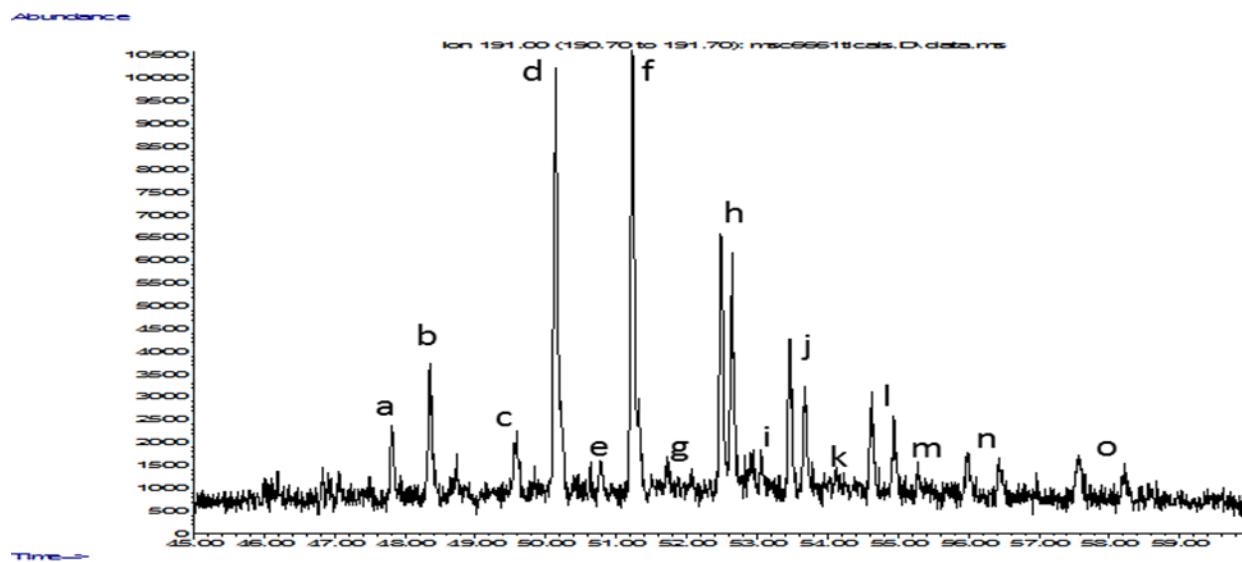


Figure 3.7 Chromatogram (ion 191) of the saturate fraction of sample 6661 obtained after the TLC of the whole oil fraction of the sample and analysed by GC-MS. The Biomarkers (Hopanes) are marked with alphabets above the peaks. The interpretation of the alphabets (acronyms) for each peak is given below.

a ≡ C_{27} Ts, b ≡ C_{27} Tm, c ≡ C_{28} , d ≡ $C_{29\alpha\beta}$ hopane, e ≡ $C_{29\beta\alpha}$ hopane, f ≡ $C_{30\alpha\beta}$ hopane,

g ≡ $C_{30\beta\alpha}$ hopane, h ≡ $C_{31\alpha\beta}$ hopane 22S & 22R isomers, i ≡ $C_{31\beta\alpha}$ hopane, j ≡ $C_{32\alpha\beta}$ hopane 22S & 22R isomers, k ≡ $C_{32\beta\alpha}$ hopane, l ≡ $C_{33\alpha\beta}$ hopane 22S & 22R isomers, m ≡ $C_{33\beta\alpha}$ hopane, n ≡ $C_{34\alpha\beta}$ hopane 22S & 22R isomers, o ≡ $C_{35\alpha\beta}$ hopane 22S & 22R isomers

From Fig. 3.7 above, the distribution indicate dominance of $C_{29\alpha\beta}$ hopane and $C_{30\alpha\beta}$ hopane and decrease as molecular weight increase i.e. from $C_{31\alpha\beta}$ hopanes (peak h) to $C_{35\alpha\beta}$ hopanes (peak o)

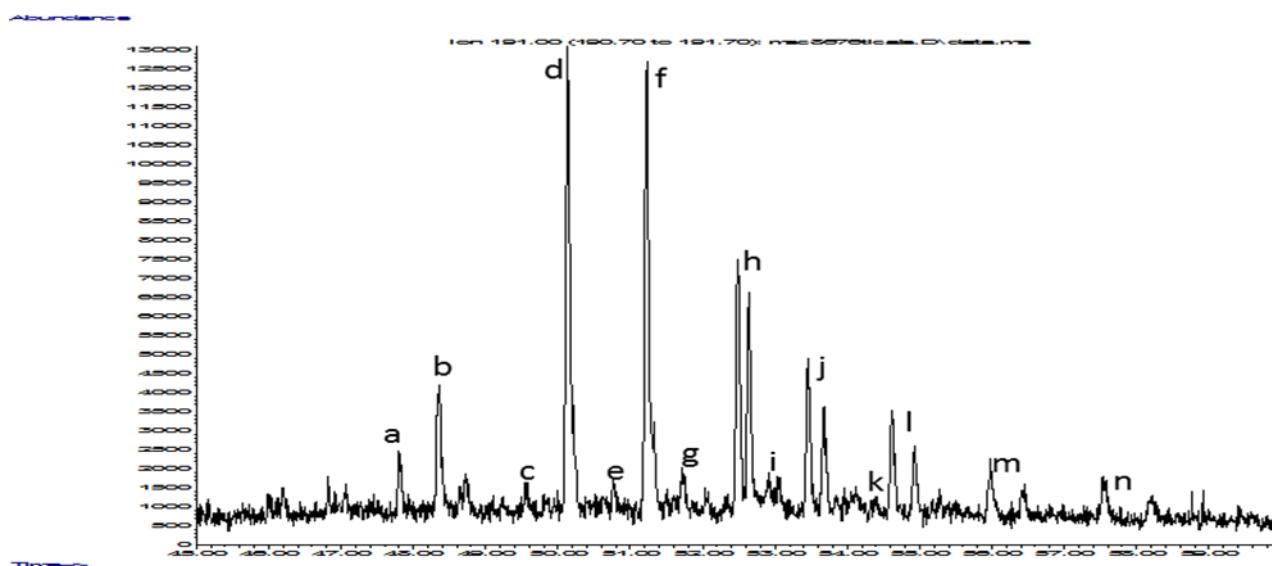


Figure 3.8 Chromatogram (ion 191) for the saturate fraction of sample 8676 obtained after the TLC of the whole oil fraction of this sample and analysed by GC-MS. The Biomarkers (Hopanes) are marked with alphabets above the peaks. The interpretation of the alphabets (acronyms) for each peak is given below.

a \equiv C₂₇ Ts, b \equiv C₂₇ Tm, c \equiv C₂₈, d \equiv C₂₉ $\alpha\beta$ hopane, e \equiv C₂₉ $\beta\alpha$ hopane, f \equiv C₃₀ $\alpha\beta$ hopane,
 g \equiv C₃₀ $\beta\alpha$ hopane, h \equiv C₃₁ $\alpha\beta$ hopane 22S & 22R isomers, i \equiv C₃₁ $\beta\alpha$ hopane, j \equiv C₃₂ $\alpha\beta$ hopane 22S & 22R isomers, k \equiv C₃₂ $\beta\alpha$ hopane,
 l \equiv C₃₃ $\alpha\beta$ hopane 22S & 22R isomers, m \equiv C₃₃ $\beta\alpha$ hopane, n \equiv C₃₄ $\alpha\beta$ hopane 22S & 22R isomers.

From Fig. 3.8 above, the distribution indicate dominance of C₂₉ $\alpha\beta$ hopane and C₃₀ $\alpha\beta$ hopane and decrease as molecular weight increase from C₃₁ $\alpha\beta$ hopanes (peak h) to C₃₅ $\alpha\beta$ hopanes (peak o). The distribution is similar to sample 6661 in Fig. 3.7

3.2 Thin Layer Chromatography (TLC) of the Maltenes:

This section demonstrates the distribution of hopanes in the maltene fractions obtained after the TLC of the maltenes

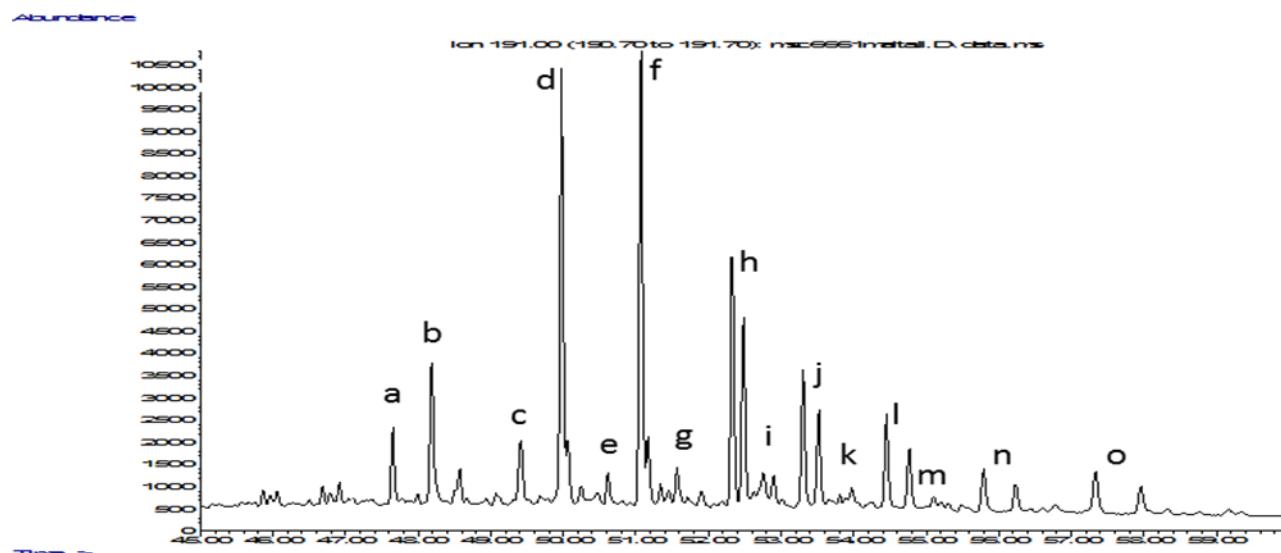


Figure 3.9 Chromatogram (ion 191) of sample 6661 obtained after the TLC of the maltene fraction of this sample and analysed by GC-MS. The biomarkers (hopanes) are marked with alphabets above the peaks. The interpretation of the alphabets (acronyms) for each peak is given below.

a \equiv C₂₇ Ts, b \equiv C₂₇ Tm, c \equiv C₂₈, d \equiv C₂₉ $\alpha\beta$ hopane, e \equiv C₂₉ $\beta\alpha$ hopane, f \equiv C₃₀ $\alpha\beta$ hopane,

g \equiv C₃₀ $\beta\alpha$ hopane, h \equiv C₃₁ $\alpha\beta$ hopane 22S & 22R isomers, i \equiv C₃₁ $\beta\alpha$ hopane, j \equiv C₃₂ $\alpha\beta$ hopane 22S & 22R isomers, k \equiv C₃₂ $\beta\alpha$ hopane,
 l \equiv C₃₃ $\alpha\beta$ hopane 22S & 22R isomers, m \equiv C₃₃ $\beta\alpha$ hopane, n \equiv C₃₄ $\alpha\beta$ hopane 22S & 22R isomers, o \equiv C₃₅ $\alpha\beta$ hopane 22S &
 22R isomers

From Fig. 3.9 above, it is clearly observed that C₂₉ and C₃₀ hopanes (i.e. peak d and f) are more prominent than their counterparts. Similarly, concentrations of C₃₁ to C₃₅ were decreasing with increasing molecular weights (i.e. peak h to peak o)

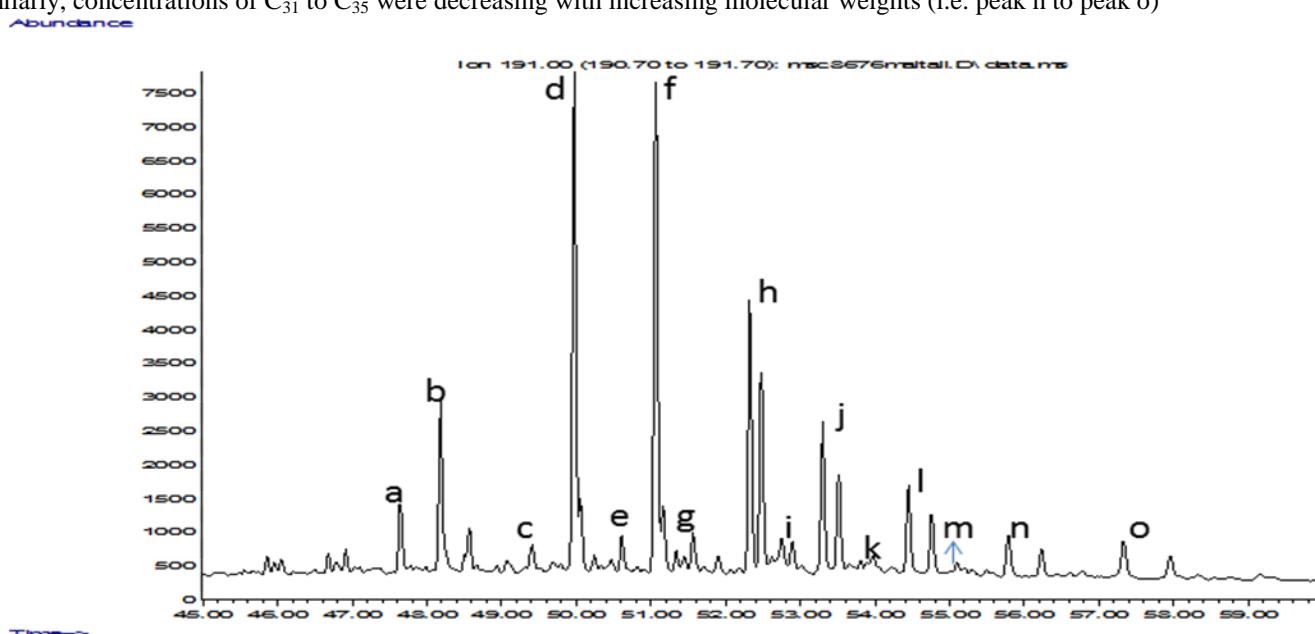


Figure 3.10 Chromatogram (ion 191) of sample 8676 obtained after the TLC of its maltene fraction and analysed by GC-MS. The biomarkers (hopanes) are marked with alphabets above the peaks. The interpretation of the alphabets (acronyms) for each peak is given below.

a \equiv C₂₇ Ts, b \equiv C₂₇ Tm, c \equiv C₂₈, d \equiv C₂₉ $\alpha\beta$ hopane, e \equiv C₂₉ $\beta\alpha$ hopane, f \equiv C₃₀ $\alpha\beta$ hopane,

g \equiv C₃₀ $\beta\alpha$ hopane, h \equiv C₃₁ $\alpha\beta$ hopane 22S & 22R isomers, i \equiv C₃₁ $\beta\alpha$ hopane, j \equiv C₃₂ $\alpha\beta$ hopane 22S & 22R isomers, k \equiv C₃₂ $\beta\alpha$ hopane, l \equiv C₃₃ $\alpha\beta$ hopane 22S & 22R isomers, m \equiv C₃₃ $\beta\alpha$ hopane, n \equiv C₃₄ $\alpha\beta$ hopane 22S & 22R isomers, o \equiv C₃₅ $\alpha\beta$ hopane 22S & 22R isomers

From Fig. 3.10 above, it is clearly observed that C₂₉ and C₃₀ (i.e. peak d and f) hopanes are more prominent than their counterparts. Similarly, concentrations of C₃₁ to C₃₅ were decreasing with increasing molecular weights (i.e. peak h to o). However, the distributions of all the hopanes were similar to oil 6661 in Fig. 3.9 above reaffirming their similar source.

3.3 Results of the RICO generated products:

The results displayed in this section are the hopanoic acids and *n*-alkanoic acid methyl esters released by RICO. The hopanoic acids were used for comparison study with distribution of hopanes in the maltenes. Whereas *n*-alkanoic acids with *n*-alkanes in whole oil.

(a) Distribution of terpanoic acids methyl esters from the RICO of asphaltene (sample 6661)

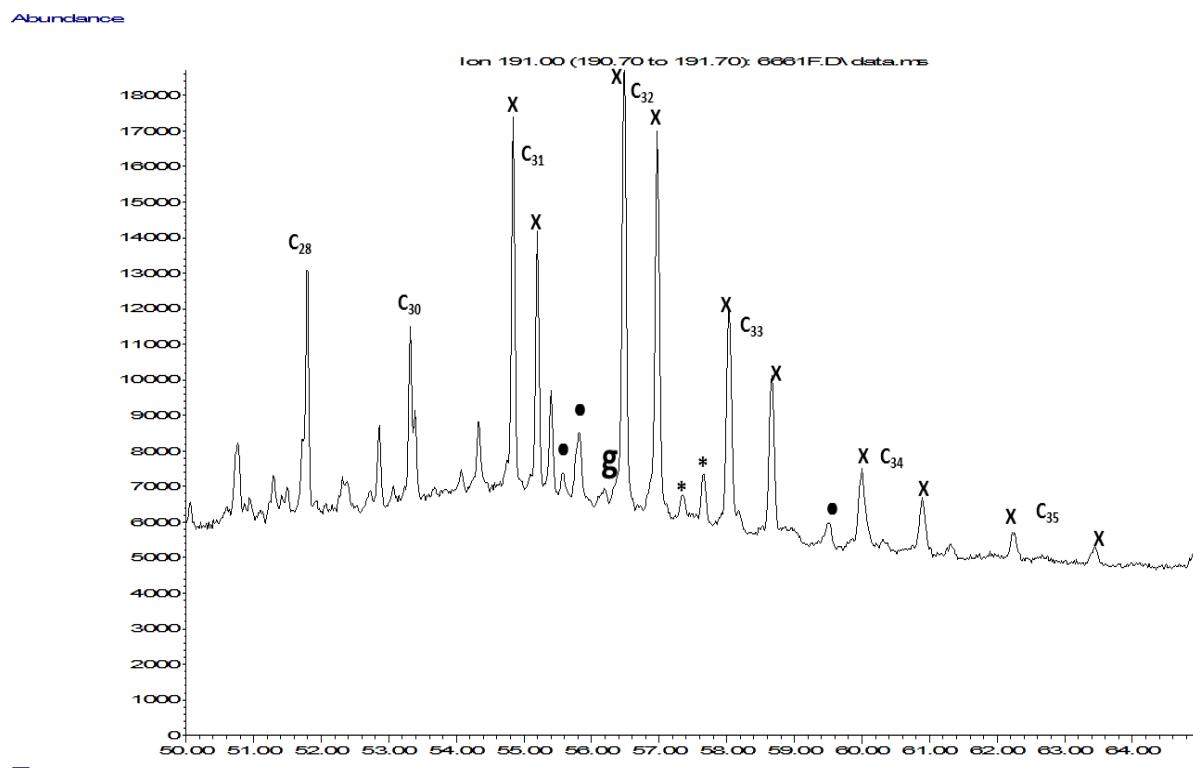
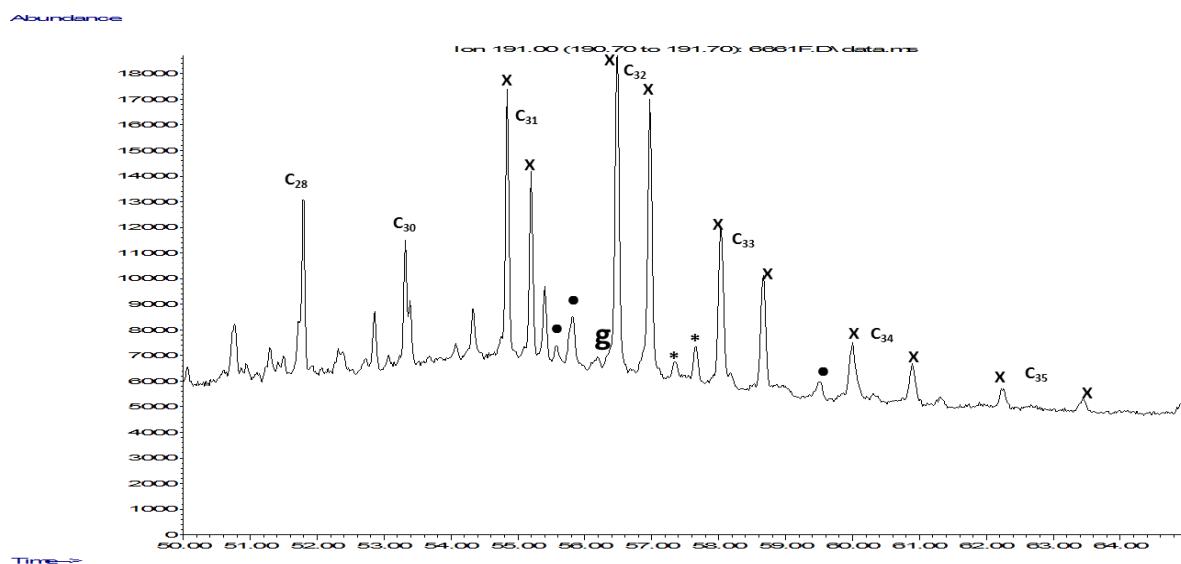


Figure 3.11 *m/z* 191 demonstrating the terpanoic acid methyl esters in asphaltene released after RICO treatment, in oil sample 6661 from North America. G refers to gammaceranoic acid. C₃₁ refers to C₃₁ hopanoic acid methyl ester, x to 17 α (H), 21 β (H) hopanoic acid methyl ester, the former is 22S, the latter is 22R. •, 17 β (H), 21 α (H) moretanoic acid methyl ester, the former is 22S, the latter is 22R, others are the same, peak assignment after [13].

(a) Distribution of terpanoic acids methyl esters from the RICO of asphaltene (sample 6661)



(b) Distribution of terpane in saturate of the maltene (sample 6661)

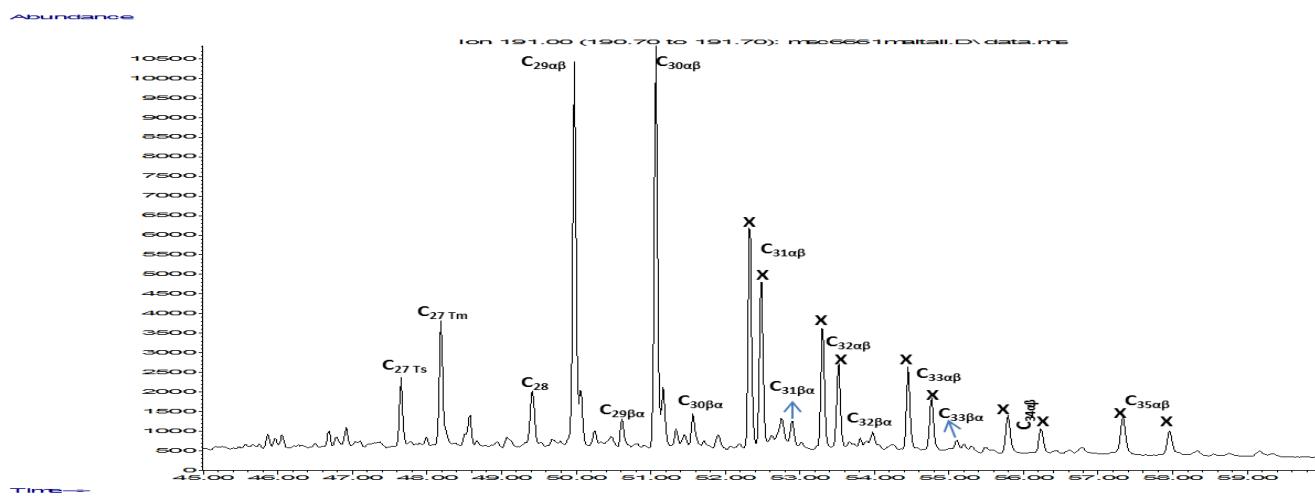


Figure 3.12 m/z 191 demonstrating the comparison of the terpanes in saturate of the maltene (deasphaltene fraction) and the terpanoic acid methyl esters in asphaltene released after RICO treatment, in the oil sample 6661 from North America. G in terpanoic refers to gammacerane. C₃₁ in asphaltene refers to C₃₁ hopanoic acid methyl ester, x to 17 α (H), 21 β (H) hopanoic acid methyl ester, the former is 22S, the latter is 22R. •, 17 β (H), 21 α (H) moretanoic acid methyl ester, the former is 22S, the latter is 22R, others are the same, peak assignment after [13].

From Fig. 3.11 demonstrated above, there was no C₃₆ hopanoic acid in the RICO products and this could be due to none addition of extra carbon from oxidative degradation of the asphaltene aromatic moiety. Similarly, no C₃₆ hopane was observed in the maltene.

IV. DISCUSSION

4.1 Distributions of Biomarker e.g. *n*-alkanes, isoprenoids, hopanes and steranes in the whole oils and maltenes fractions-TLC:

According to [14] *n*-alkanes are the saturated hydrocarbon that are easily destroyed by bacteria, hence biodegraded oil can be characterised by absence or very low concentration of these compounds. Several indices can be used to determine extent of biodegradation e.g. C₃₀ $\alpha\beta$ hopane/(Pr+Ph), C₂₉ $\alpha\beta$ -25-norhopane/C₃₀ $\alpha\beta$ hopane, Pr/*n*C₁₇ and Ph/*n*C₁₈. In this work, the extent of biodegradation was determined using ratios involving *n*-alkanes and isoprenoids compounds e.g. Pr/*n*C₁₇ and Ph/*n*C₁₈. This is because the latter are more useful when determining early stage of oil biodegradation [15]; [16]. The ratios are based on the reason that *n*-alkanes are more prone to biodegradation than isoprenoids. In this study, the ratios were observed to increase with increasing biodegradation as presented in Table 3.2 and Fig. 3.5 to 3.6.

The gas chromatograms of the saturate fractions of the four oils from North America obtained after the TLC of the whole oil fraction Fig. 3.1 to 3.4 are dominated by *n*-alkanes in the range of *nC*₁₁-*nC*₃₅, maximizing at *nC*₁₃ or *nC*₁₄ and in some cases extend up to *nC*₃₇ as equally shown in Fig. 3.4.

After exhaustive analysis, all of the four oil samples showed slight to no biodegradation on a lately proposed biodegradation ranking scale based on considering the biomarkers [11]. This was demonstrated in Table 3.1 and Fig. 3.5 to 3.6. According to the scale, non-degraded oils are ranked "0" where *n*- alkanes, isoprenoids, steranes, diasteranes, and hopanes are all unaltered and were all clearly identifiable in the extract with no UCM observed Fig. 3.2 and 3.4 and Table 3.1. These features correspond to sample 8676 and 8672 respectively. On the other hand, two of the samples (6661 and 8673) were ranked "1" in the scale as presented in Table 3.1, indicating slight or early stage of degradation due to partial depletion of fewer lower *n*-paraffins. Similarly, presence of relatively large unresolved complex mixture (UCM) in sample 6661 supports the notion of its biodegradation whereas absence of UCM in 8676 and presence of *n*-alkanes and acyclic isoprenoids that were recorded in abundance in gas chromatograms of oil 8676 indicate that the latter oil was not biodegraded. Generally speaking, non-biodegraded oil can be found in reservoirs with a very recent oil charge and can also occur in sediments which are rapidly deposited [17]. Concurrently, the Pr/*nC*₁₇ and Ph/*nC*₁₈ ratios for the oils computed in Table 3.2 also confirmed that oil 6661 is relatively the most biodegraded due to relatively higher values of these ratios whereas 8676 least degraded due to lower ratios of Pr/*nC*₁₇ and Ph/*nC*₁₈.

Evidently, as presented in Fig. 3.1, biodegradation was shown to have been very mild and not adequately severe to have affected isoprenoids, hopanes and steranes distributions. Likewise, demethylated hopanes (i.e. 25-norhopanes), considered to be either the result of hopanes biodegradation or their unmasking through their resistance to microbial attack [15]; [18]; [19]; [20]; [21] were not identified. Therefore, absence of 25-norhopane in sample 6661 which is believed to be present in severely degraded crude oils [15]; [22] indicate that sample 6661 is slightly degraded.

Furthermore, in comparison of abundance and distribution of *n*-alkanes in the saturated hydrocarbons of the whole oils Fig. 3.1 to 3.4 with *n*-alkanoic acid methyl esters in the asphaltene after RICO Fig. 3.11 it could be seen that the short chain *n*-alkanoic acids were more abundant and ranges from *nC*₇-*nC*₃₁ compared to their counterparts *n*-alkanes in the whole oils. This implies that the asphaltene within its structure has protected the bonded biomarkers from secondary alteration process i.e. biodegradation.

V. CONCLUSION

Whole oils GCs analysis showed a progressive increase in biodegradation in two of the oils (6661 & 8673) and the decline of their quality. The difference in level of biodegradation amongst the oils was small. However, increasing pristane /*nC*₁₇ and phytane/*nC*₁₈ observed in sample 6661 and 8673 demonstrate the preference for *n*-alkanes over isoprenoids in biodegradation. The other two oils (8672 & 8676) were not biodegraded based on

Peters and Moldowan (1993) biodegradation scale. Moreover, the abundance of hopanes in the maltenes indicates a contribution from bacteria to the oil shale organic matter. Similarly, the calculated biomarker indices indicate that the oils trail from mature oil source and 6661 and 8673 have undergone a very low biodegradation.

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AUTHORS

First Author – Salisu Nasir, Department of Chemistry, Federal University, Dutse, Jigawa State-Nigeria, Email:
salisunasirbb@yahoo.com

Second Author – Nasar Mansir, Department of Chemistry, Federal University, Dutse, Jigawa State-Nigeria

Third Author – Nasir Muhammad Augie, Kaduna Refining and Petrochemical Company (KRPC), Nigeria

Teaching English as a Second Language = Theory + Methods + Creativity

Rohini Chandrica Widyalankara

English Language Teaching Unit, University of Kelaniya, Sri Lanka

Abstract- This study proposes that the pedagogical procedures within the genre of Teaching English as a Second Language should not only gain from the rich theoretical resources and the vast repertoire of methodological approaches available it should also tap the creative powers of the teaching practitioners. Merging tenets of Behaviorism with Innatism in the Interaction Theory and adapting theories on Second Language Acquisition the second language teaching/learning environment discussed aims to maximize acquisition and lower the affective filters of the learners. Principled Eclecticism provides the methodological foundation for cooperative learning and formative peer assessment with focused corrective feedback provide remedial support and an opportunity for the learners to reevaluate their work and engage in timely adjustments. The session aims at interpsychological cognitive development with peers/teacher and individual intrapsychological cognitive enhancement in language skills.

Index Terms- Interaction Theory, principled eclecticism, cooperative peer assessment, focused corrective feedback

I. INTRODUCTION

T1.1 The interactionist hypothesis

The Interaction Theory of language development by Vygotsky (1978)^[1] is a compromise between the Innatist and the Behaviorist theories. While Skinner's theory of

Behaviorism^[2], states that children learn a language mainly through repetition, imitation and habit formation. Chomsky (1959)^[3] deviating from the tenets of Behaviorism introduces the Innate Hypothesis. Chomsky (1993: 519)^[4] states that 'Language learning is not really something that the child does; it is something that happens to the child placed in an appropriate environment, much as the child's body grows and matures in a predetermined way when provided with appropriate nutrition and environmental stimulation'. He raises the argument that if children learn language by imitation 'why do they say things they have never heard before'? Introducing the parameters Language Acquisition Device (LAD) or Universal Grammar (UG) Chomsky states that the LAD is the ability to discover the underlying rules of a language system. This device contains the main rules for all possible human languages and he called this set of common rules UG which is innate to a child's biological endowment. Concurring Lightbown and Spada (2006: 16)^[5] state that the LAD is like an imaginary 'black box' existing somewhere in the brain and thought to contain only the principles which are universal to all natural languages. Merging tenets of Behaviorism and Innatism the Interactionist theory recognizes that both environmental and biological factors are important in language development. For example interactionists believe that language is a byproduct of the children's social interactions with more knowledgeable people in their lives and the innate ability to acquire language as illustrated below.

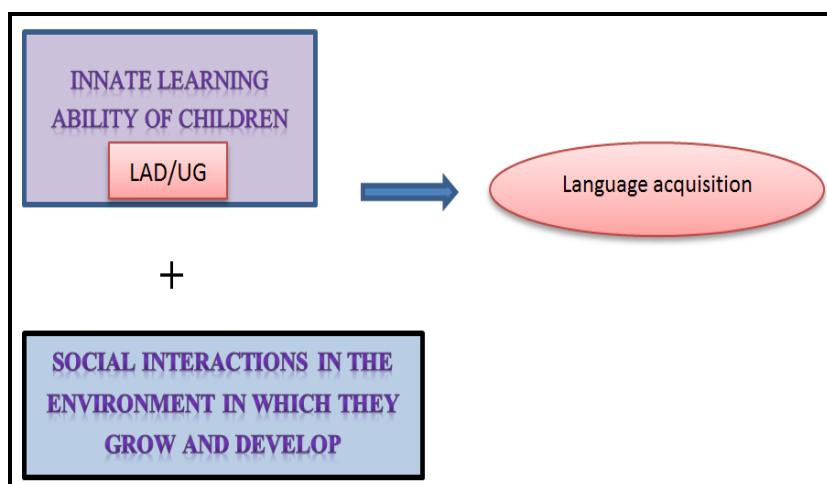


Figure 1: Combining Behaviorist and Innate hypotheses to illustrate how a language is acquired

Thus interactionism postulates that children acquire language through their innate language abilities to extract the rules of the language from their environment and construct the phonology, semantics, and syntax of their native language. This innate language ability is the ability to identify patterns in language, formulate rules about those patterns, and then apply them to new utterances (Rowe & Levine, 2006: 235)^[6].

1.2 Major themes in the Interactionist hypothesis

- i. According to Vygotsky (1978)^[7] social interaction plays a fundamental role in the process of cognitive development. ‘Every function in the child’s cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapyschological).’
- ii. At the interpsychological level the child interacts with a More Knowledgeable Other (MKO). The MKO refers to anyone who has a better understanding or a higher ability level than the learner, with respect to a particular task, process, or concept. The MKO could be a teacher or older adult, but the MKO could also be peers, a younger person. In the modern world technology especially computers too can become a MKO.
- iii. The Zone of Proximal Development (ZPD) stretches the child’s ability at solving a problem independently and moves the child to perform a task under adult guidance and/or with peer collaboration. According to Vygotsky, learning occurred in this zone. Within the ZPD a child’s linguistic development progresses from *the current* to *the unknown*. For optimal outcome the child should work within the ZPD in collaboration with a MKO. Thus much important learning by the child occurs through social interaction with a skillful tutor. Vygotsky refers to this as cooperative or collaborative dialogue. According to McLeod (2007)^[8] ZPD is where the most sensitive instruction or guidance should be given allowing the child to develop skills they will then use on their own in the process of developing higher mental functions. Thus Vygotsky proposes that ZPD is where learners construct the new language through socially mediated interaction.

Thus Vygotsky’s observations proved that

- i. Children doing tasks on their own rarely did as well as when they were working in collaboration with a More Knowledgeable Other (MKO). The MKO can be an adult, a teacher or the child’s peers.
- ii. Even when the MKO was not teaching them how to perform the task, the process of engagement with

the adult enabled them to refine their thinking or their performance to make it more effective.

Agreement comes from Shannon (2005)^[9] who states that the basic concept in interactionism is that children have some innate knowledge of the structure of language, but also require meaningful interaction with others.

1.3 From first language acquisition to second language acquisition

Applying the tenets of interactionism to second language learning Atherton (2013)^[10] states that skill construction is based on three premises 1. *Can do alone* 2. *Can do with help* 3. *Cannot do yet*. The ZPD centers around *can do with help*. This is not a state where learners stagnate but a stage prior to *Can do alone*. The Interactionist theory was resourceful in revolutionizing the TESL classroom moving it from a locale where the teacher disseminated knowledge to a reciprocal knowledge constructing experience between the teacher and the learners. The learning contexts considered students to be equal stakeholders who perform an active part in the process of learning and take responsibility for achieving the objectives. The teacher and the learners collaborate in order to help facilitate meaning construction. The entry of Krashen’s (1981)^[11] five hypotheses shed more light on how second language learners acquire a new language.

1.3.1 The Acquisition-Learning distinction

Krashen (1982: 10) ^[12] states that adults have two distinct and independent ways of developing competence in a second language.

- a) Language acquisition
 - i. This process is similar, if not identical, to the way children develop first language ability.
 - ii. It is a subconscious process as the language acquirers are not usually aware of the fact that they are acquiring language but are only aware of the fact that they are using the language for communication.
 - iii. Correct grammar *feels* right, and errors feel wrong, even if the learners do not consciously know what rule was violated.
 - iv. As it is subconscious acquisition error correction has little or no effect.
 - v. The acquisition-learning hypothesis claims that not only children but adults too can acquire language by accessing the same natural LAD that children use.
- b) Language Learning
 - i. Conscious.
 - ii. Error correction supposedly helps the learners to alter their conscious mental representation of a rule and learn the right form of the rule.

1.3.2 The Input Hypothesis

Krashen (1982: 21)^[13] makes the following claim on the input hypothesis:

Acquisition occurs when one is exposed to language that is comprehensible and that contains $i + 1$. i stands for the acquirer's current level of proficiency. He is able to move to a higher stage by understanding language containing $i + 1$ (where "+1" stands for language which is slightly beyond the acquirer's current level of competence). A necessary condition to move from stage i to stage $i + 1$ is that the acquirer understands input that contains $i + 1$, where "understand" means that the acquirer is focused on the meaning and not the form of the message.

- i. The input hypothesis relates to acquisition, not learning.
- ii. We acquire by understanding language that contains structure a beyond our current level of competence ($i + 1$). This is done with the help of context or extra-linguistic information.
- iii. When communication is successful, when the input is understood and there is enough of it, $i + 1$ will be provided automatically.
- iv. Production ability emerges. It is not taught directly.

1.3.3 The Affective Filter Hypothesis

The Affective Filter hypothesis states how affective factors relate to the second language acquisition process.

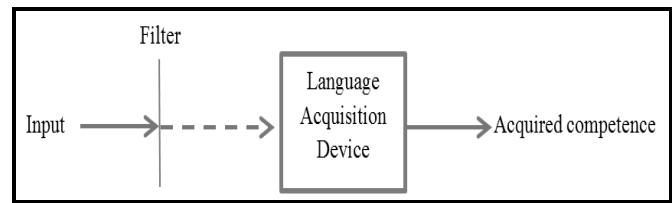


Figure 2: Operation of the Affective Filter Krashen (1982: 32)

Identifying affective variables Krashen (1982: 32)^[14] states 'The Affective Filter hypothesis implies that our pedagogical goals should not only comprise of supplying comprehensible input, but also creating a situation that encourages a low filter.' He further states that three factors regulate the Affective Filter during second language acquisition.

- i. *Motivation*: Performers with high motivation generally do better.
- ii. *Self-confidence*: Performers with self-confidence and a good self-image tend to do better
- iii. *Anxiety*: Low anxiety appears to be conducive, whether measured as personal or classroom anxiety.

Merging Krashen's (1982)^[15] Input Hypothesis with the Interactionist Theory this study identifies stage i as the *Can do alone* or current knowledge. The move from stage i to stage $i + 1$ is to enter the ZPD. At the ZPD the acquirer cognizes input that contains $i + 1$ under the guidance of a MKO. The following figure is an adaption from Atherton (2013)^[16] and illustrates the progression of learning.

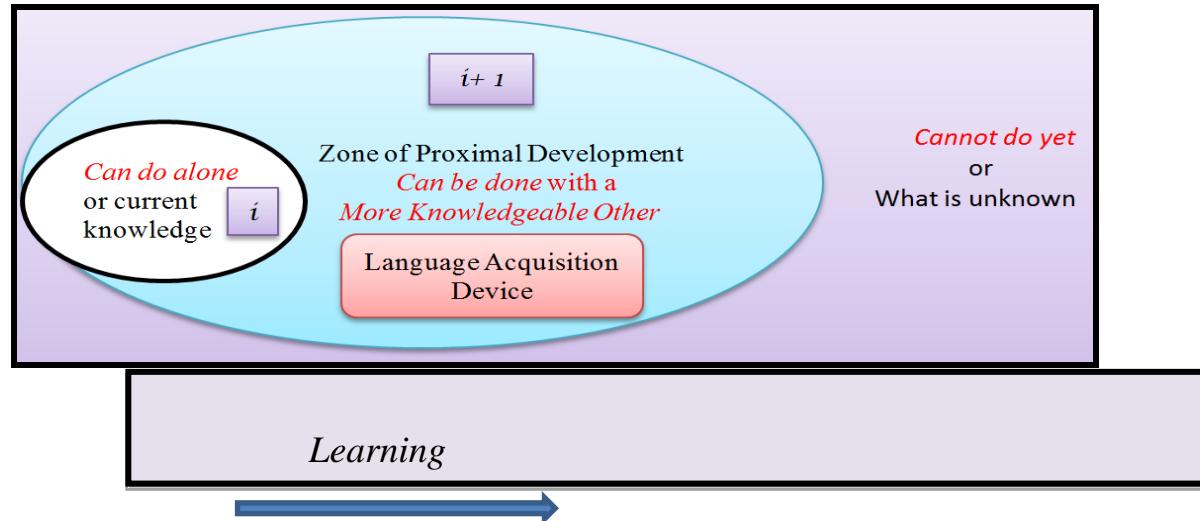


Figure 3: The progression of learning

Combining the progression of learning above with the second language acquisition model by Krashen (1982) ^[17] this study visualizes a second language learner classroom which aims to teach the present continuous tense.

Comprehensible input in this instance is a lesson plan to elaborate the present continuous tense. It anticipates creating a classroom environment based on the Affective Filter Hypothesis. Thus for optimal function at the ZPD a

low filter is emphasized generating high motivation, enhancing self-confidence and lowering the anxiety level.

At the ZPD the learners work with the guidance of More Knowledgeable Others. This guidance indoctrinates Krashen's (1982: 10)^[18] Acquisition-Learning distinction and the interaction between the MKO/s and in the language acquirers is based on maximizing acquisition. Thus prioritizing Acquisition over Learning the classroom environment endeavors to make production ability emerge as 'a subconscious process'. The language acquirers 'are not usually aware of the fact that they are acquiring language, but are only aware of the fact that they are using the language for communication' (*ibid*). But experience denotes

that all learner populations in a language teaching environment consist of the dichotomy: Good and Weak learners. As the classroom gives priority to acquisition it is assumed that the Good learners would ideally be more on a knowledge acquisition mode and learnt knowledge will be less. On the other hand the Weak learners are expected to be more on a conscious learnt knowledge mode and will engage in extensive monitoring prior to producing output. This study constructs the following Figure to illustrate the suggested language teaching/learning environment where input is in the form of a lesson on present continuous tense and is diversely processed by Good and Weak learners.

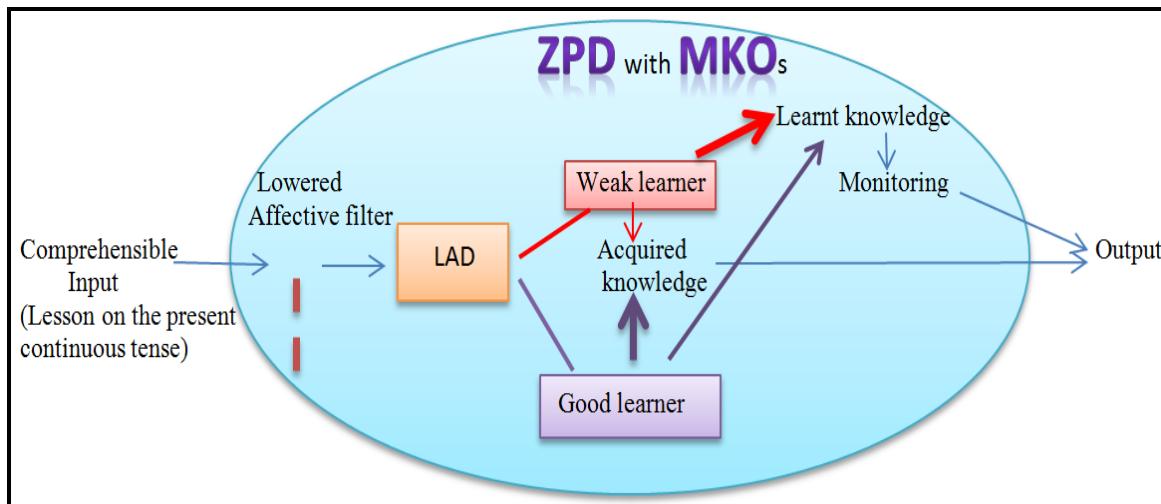


Figure 4: An adaptation of second language acquisition model by Krashen (1982) to illustrate a second language teaching/learning environment.

Within this language teaching/learning environment to maximize acquisition the teaching methodology is Eclecticism but it utilizes methodological approaches available strictly in a principled manner.

II. THE METHOD: PRINCIPLED ECLECTICISM

Teaching English as a Second Language (TESL) at present is based on an amalgamation of many diverse methods. Larsen-Freeman (2000)^[19] recognizes that there is no single acceptable way to go about teaching language today. Introducing the term Principled Eclecticism she defines it as a desirable, coherent, pluralistic approach to language teaching. Eclecticism makes the lesson planner deviate from reliance upon a single approach to teaching where the planner is constricted within its limited number of techniques. Furthermore the students' performance can become mechanical and as a result they cannot reap maximum benefits from the learning. By the inclusion of the term *Principled* Larsen-Freeman (*ibid*) cautions against the haphazard use of a random mix of multitude methods available within the genre of TESL.

Within the field of TESL methodology traditional structural approaches such as Grammar Translation, and Audio-lingual Method; Communicative Methods as the Communicative Approach, Total Physical Response, Natural Approach and modern innovative approaches as the Silent Way and Suggestopedia all carry strengths as well as weaknesses (Larsen-Freeman, 2000^[20]; Richards and Rodgers 2001^[21]; Wesche and Skehan, 2002^[22]) provide detailed descriptions of these methods and approaches). Thus principled eclecticism ideally is a mix of structural approaches with communicative use of language appropriate to the learner population. Guided by the tenets of Principled Eclecticism and scaffolding the relevant theory discussed this study creates a lesson plan where intuition and innovative ideas aim at developing an instrument appropriate to the target student population of this study.

III. CREATIVITY: THE LESSON PLAN

Armed with the theory and methodology as a TESL practitioner I seek to include creativity into a lesson plan with the aim of recreating real-life social and functional

situations in the classroom to guide students toward communicative competence.

3.1 Aim and Objectives

Graves (2000)^[23] states that goals are general intentions of teaching and objectives are specific, aims at cognitive, psychomotor and affective domains of learning and link observable behavior to teaching and assessment. Thus the aim of this session is to make learners use the present continuous tense with minimum/no errors in tense or tense contradiction.

Objectives: At the end of this session students will be able to:

- Outline the form of the present continuous tense
- Assemble sentence structures to describe an ongoing process and construct a peer composition using the present continuous tense
- Analyze and evaluate peer performance in the present continuous tense
- Justify decisions on peer correction

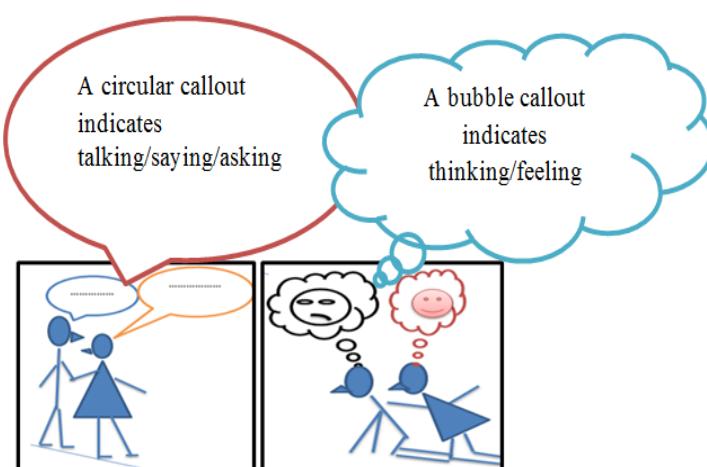
Table 1: Grid depicting the structures of the present continuous tense

Structure of present continuous		
Positive	Negative	Question
I'm thinking of her.	I'm not thinking of her.	Am I thinking of her?
You're thinking of her.	You're not thinking of her.	Are you thinking of her?
We're watching them.	We're not watching them.	Are we watching them?
They're watching them.	They're not watching them.	Are they watching them?
He's talking to her.	He's not talking to her.	Is he talking to her?
She's listening to him.	She's not listening to him.	Is she listening to him?
It's interesting/ irritating.	It's not / it isn't interesting/ irritating.	Is it interesting/ irritating?

Activity I:

Complete the sentences with the present continuous tense form of the verb in the brackets.

1. Anil and Mala hands. (hold)
2. They (talk)
3. Sadun and Dilmi (watch).
4. Dilmi thinks that it..... (interest)
5. She happy. (feel)
6. Sadun finds it..... (irritate)
7. He is happy. (not, feel)



3.3.1.1 Methodological approach: Stage I

The session aims at utilizing the Principled Eclectic Method. Key concepts in the Audiolingual Method are

- Create a story line for an ongoing process

3.2 The learners

The target population consists of 20 low/intermediate proficiency first year undergraduates. Each year undergraduates place high priority on learning grammar in the pre-entry needs analysis.

3.3 The lesson plan (Time frame: one hour)

3.3.1 Stage I: Recapping the structures of the present continuous tense (05 minutes)

The material: The form of present continuous as a grid and a short exercise.

Exposition: The present continuous tense is sometimes called the present progressive and is generally used to explain an event that is in progress at the current moment. Here is how to form the present continuous tense in English.

employed to make students recap the rules of the present continuous tense formation. Drills help students to differentiate between structures and they are reinforced

inductively. Then expressing the rule, questions are asked to guide the learners through a dialogue which introduces the lesson's sentence patterns. In this instance the MKO can be the teacher or might be cherry picked from among the learners. This is in

agreement with a fundamental methodological principle in Communicative Language Teaching (CLT) which favors of

3.3.2 Stage II (40 minutes)

The material: This section uses a cartoon created to suit the target population for the purpose of exploration and elaboration. The instrument, Figure 5 below has 5 frames.

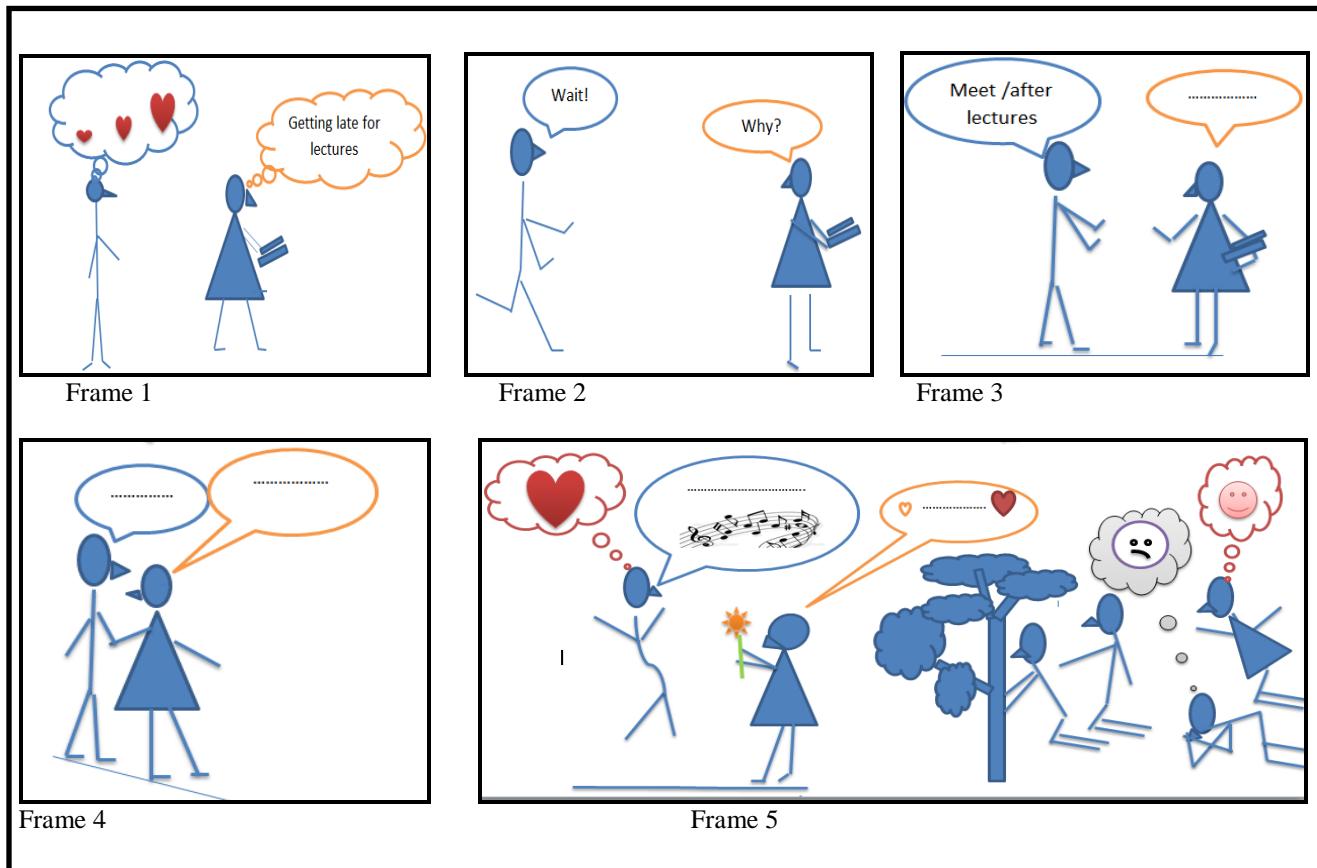


Figure 5: Instrument for communicative activities

Procedure: The cartoon frames are placed outside the classroom in five different spots which are easy to access. This creates an information gap. The learners form 4 heterogeneous groups of 5. Seating plan allows for easy to and fro movement and good eye contact between listeners and speakers during group work. Additionally the arrangement provides feasibility for eye contact with the teacher by slight alteration of the positioning of the chairs while remaining within the group. The procedure is based on even participation at the right language level. Thus the task is designed so that students can complete it successfully with the language that they have + one step higher with the help of a MKO who is a group member. Member domination in

a *focus on form* approach. This approach to explicit grammar teaching emphasizes a form-meaning connection followed by elaborating the grammar form taught within contexts and through communicative tasks. Based on Grammar Translation Method difficult vocabulary (for example *irritate*) is presented with a translation equivalent as it accelerates comprehension.

discussions is minimized by strategic task allocation. When necessary, the teacher may interfere to guarantee equal opportunities for students of different levels.

Instructions: Each member of the group is given a number 1-5 which allots the respective cartoon frame. They are allotted roles. For example when group member 1 is the Runner cum Communicator of Information others (2-5) take the role of Interrogator, Writer, Editor and Presenter. The teacher introduces each of the command cards in Figure 6 to keep the time frame intact during the five cycles of activity and explains the physical response each card demands. At the end of each cycle a minimum of 5 sentences should be constructed using the present continuous tense for the

respective frame. Learners could make other sentence structures which would help cohesion but they will not undergo assessment.

The following command cards are explained and used as non-verbal forms of communication.

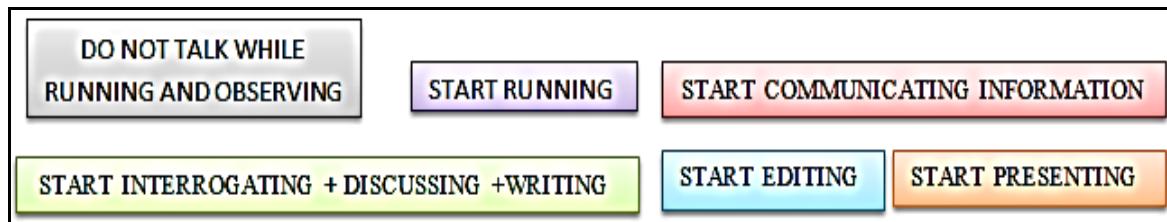


Figure 6: Command cards

There are 5 cycles for the 5 cartoon frames. The first 4 cycles are of 5 minutes duration while the last cycle for frame 5 is allotted 10 minutes (total = 30 minutes). The first Command card states that the Runners cannot talk while running or observing. During the first cycle for example as the command states START RUNNING member 1 of each group becomes the Runner runs to Frame 1 observes the ongoing action gets back to the group and communicates information. The Runners try to find answers to questions such as 'Who are the people / characters? What are they doing? What are they thinking? What are they saying to each other? What happens next?' Second members of the groups become Interrogators. After/during discussion the third member who is the Writer writes the five sentences using the present continuous tense for the respective frame. Other sentence structures which would help cohesion too can be added but will not undergo assessment. The Editors of each group run to the Frame I and check whether editing/ additional information is required. Each of these actions is controlled by the Command cards which go up at one minute durations. But this stage is time flexible. For example the Editors can run and check the frames while the discussion is ongoing to clarify information if the Runner is in doubt. Awareness is created among the learners that time management, dynamism and soft skills are needed for optimal output as the activities within each of the first 4 frames end in 5 minutes. The last frame is given 10 minutes as the content is more complex. The learners are advised to use the time judiciously to reevaluate the sentences produced for the first 4 frames.

At the end of the each cycle the presenter of each group reads the sentences to the class (0.5 minutes x 4 groups x 5 presenters = 10 minutes). Through the presenter the teacher gets an idea of global errors. During the 5 cycles where the 5 frames are covered the roles of Runner, Interrogator, Writer, Editor and Presenter move clockwise. At the end of this activity each group will have constructed 5 frame cards each with a minimum of 5 sentences containing a present continuous tense form. Furthermore each member of the group would have played the roles of Runner, Interrogator, Writer, Editor and Presenter.

Stage II of this session too aims at utilizing a principled eclectic method which facilitates the language learning process. As too many unknown vocabulary items will raise the affective filter of the students and will tempt them to use the first language the need for new words is kept minimal. Though emphasis is on learning to communicate through the target language the use of the first language is not prohibited if a student is struggling for a word. For accessing the English equivalent MKO aid can be sought. A key feature in the Total Physical Response approach: nonverbal aid for communication is used during Command card usage where students react to language in the present continuous subconsciously. This reduces student anxiety and stress. Furthermore they interact with props and learn to associate them with motor activity in the learning environment.

The methodological approach in Stage II adheres to the principles of CLT too. One of the instructional practices promoted by CLT is that material should reflect real-life situations and demands. Thus inventiveness in material preparation is pedagogically necessary to create meaningful, comprehensible input. In communicative language classrooms the focus shifts from teacher-led to student-centered language application and using a cooperative and collaborative learning mode is recognized as a strong facilitator of learning. Information gap creation in the activities result in each runner communicating information to the rest of the group who do not know the contents of the cartoon frame while the others listen, interrogate, discuss and take turns to write, edit and present. Thus during group activities the language focus encompasses all four skills: Listening, Speaking, Reading and Writing. Furthermore during cooperative activities Weimer (2002)^[24] identifies the following as crucial: Positive interdependence among learners in respect to resources and task accomplishment; Face-to-face interaction in small groups; Individual accountability for participation or internalization of the relevant knowledge or skills. The methodological approach used during group activities in Stage II satisfies all three criteria. Cooperative problem-solving behavior is enhanced as peer performance is analyzed during intergroup work. If a problem surfaces during the course of communication solutions are found as a team.

3.3.2.1 Methodological approach: Stage II

3.3.3 Stage III: Cooperative peer assessment and focused corrective feedback

The function of assessment is to check whether the aim and objectives of the session have been met. According to

Biggs (2003)^[25] assessment tasks tell us how well students have attained the intended learning outcomes as illustrated below.

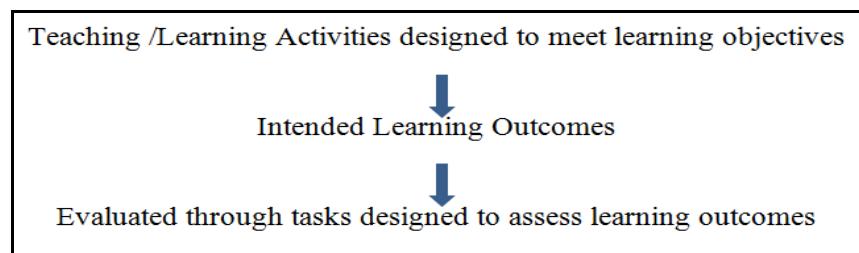


Figure 7: Assessment of intended learning outcomes

Based on the above this session selects Formative Assessment procedures from within the repertoire of pedagogical evaluation practices. It offers the information needed and provides remedial support to the learners so that timely adjustments can be made. To assess learning outcomes of a session which aims to teach a grammar form Sheen (2007)^[26] endorses the use of Focused corrective feedback where errors in the specific grammatical structure are targeted for identification and correction. Thus Cooperative peer assessment for this session is a Formative Assessment where corrective feedback is given by peers.

3.3.3.1 Procedure

Activity (10 minutes): amongst the 4 groups two groups exchange the constructed 5 frame card sets. Each member gets one frame. The words Reject, Accept and Track changes are introduced. The markers assess the sentences mark Reject/Accept, suggest changes and return the card set to the owner group. The owner groups Track changes suggested for the Rejected sentences and Reject/Accept the changes.

Table 2: A sample frame card after assessment and the grading scheme

Frame I: Sentences	Assessment	Suggested change	Circle	Track changes	Circle	Grading scheme	# of correct sentences
1. Anil is looking at Mala.	Accept		(sad)		(sad)		
2. She not looking at Anil.	Reject	She is not looking at Anil.	(red circle)	Accept ✓	(sad)		
3. Mala is carrying some books.	Accept		(neutral)		(neutral)		
4. She is thinking I am getting late for lecturers.	Reject	She is thinking that she is getting late for lecturers	(smiley)	Reject ?	(smiley)		
5.						0,1	2,3
						4,5	

The Reject- Reject sentences are written on the board and each marker justifies the suggested change while the owners of the frames justify their decisions to Reject the Rejections. The teacher acts as the MKO and finalizes the correct version and reconsiders the smiley allotment.

encourages learners to assess their understanding of the taught grammar form and fine tune abilities of elaboration. Furthermore an individual task provides the teacher an opportunity to evaluate each student's understanding of the grammar form taught.

3.3.4 Stage IV: Recapping session (05 minutes)

3.3.5 Stage V: Take-home individual task: Write the story in the cartoon. Give it a title. (10 marks)

During this stage the learners create a storyline for the ongoing process in the cartoon frames as an individual Take-home task. This hones intrapsychological cognitive skills as the final output is a self-creation. As it is a mark allotting task the creativity in each learner will endeavor to couch the sentences constructed for each frame within a stylistic whole. This

IV. SUMMARY STATEMENT

The global aim of the session is to make learners self discover that the process of learning is not only accumulating knowledge and skills. Solving communicative problems and monitoring their own work guide the students along a path of inquiry and generates new patterns of thinking where the final outcome is evolving knowledge through self-discovery. Thus the cognitive development is interpsychological as well as intrapsychological.

One limitation of the session is the tightness of the time frame. This can be overcome by dividing the lesson plan into two sessions by moving the session from Stage III: Cooperative peer assessment and focused corrective feedback onwards to a follow-up second session. Such a follow-up lesson could include a song which is supposedly sung at frame 5. My target is ‘A Whole New World’ with lyrics given as a handout. The *Aladdin* or the Peabo Bryson and Regina Belle version provide opportunity for a listening task where the learners fill in the blank with continuous tenses. The Sing-along karaoke version can be downloaded from http://www.youtube.com/watch?v=gILZIya_h_4 and used in the classroom. This makes the learners acquire additional vocabulary items: Soaring, tumbling, freewheeling, dreaming, thrilling etc. Furthermore though the lesson plan targets a tertiary level learner population it could be creatively adapted to any audience.

AUTHORS

First Author – Rohini Chandrica Widyalankara, B. A. (English), University of Colombo, Sri Lanka; M. Ed. (TESL), University of Manchester, UK; M. Phil. (Linguistics), University of Kelaniya, Sri Lanka; Diploma in TESP University of Manchester, UK; Certificate in TESOL Methods, University of Oregon, USA.

Correspondence Author – Rohini Chandrica Widyalankara, Senior Lecturer, English Language Teaching Unit, University of Kelaniya, Sri Lanka, rdhrcw@yahoo.com, 00940776615069/ 00940112697820

BLOOD LEAF (*Iresine herbstii*) EXTRACT USED AS AN INDICATOR OF SOIL pH

Doctor, T. R. and Cababat, RA. P.

Departmentt of Natural Sciences, College of Arts and Sciences, University of the Cordilleras, Baguio City Philippines

Abstract- This study had investigated on the possibility of blood leaf(*Iresine herbstii*) as a soil pH indicator. An aqueous solution was prepared and settled to remove impurities. The pH is 4.6. The solution was tested in a 0-14 pH solutions to check on the color changes in the scale. The soil pH was tested using pH paper and pH meter. The soil pH was also tested using the blood leaf extract and the tests showed the same result. In conclusion, the aqueous extract of blood leaf can be used as soil pH indicator. This can benefit gardeners and flower growers because they can use it as fresh extract or can be kept even for many weeks in closed container.

Index Terms- plant pigment, anthocyanin, pigment, blood leaf(*Iresine herbstii*), pH, soil

I. INTRODUCTION

Plants show characteristic colors due to the presence of strong pigments. Pigment may include include quercetin, from yellow onion skins, and anthocyanins, from red cabbage and blueberries. Anthocyanin comes from Latin; the Latin *anthos* is flower and *cyan* is blue. This family of molecules is responsible for the color found in radishes, eggplant, many different flowers, and even the varied colors we see in autumn leaves. Until the 19th century, people relied on various plants, animals, and minerals as sources of dyes for fabrics. Many natural plant pigments also have acid-base properties, and will change colors when exposed to different pH solutions. Anthocyanin pigments generally show this behavior. In several attempts, the red cabbage, sugar beets and other vegetables had been used as pH indicator in class activities and showed positive results. The blood leaf (*Iresine herbstii*) is usually used as a landscape ornamental plant which can easily be grown in the tropics. Its availability all year round makes it a very accessible plant for testing pH. The color looks like the red cabbage so anthocyanin seem to be present in this plant.

Anthocyanins are members of a class of nearly universal, water-soluble, terrestrial plant pigments that can be classified chemically as both flavonoid and phenolic. They are found in most land plants, with the exception of the cacti and the group containing the beet. They contribute colors to flowers and other plant parts ranging from shades of red through crimson and blue to purple, including yellow and colorless. These pigment apparently play a major role in two very different plant processes: for one, attracting insects for the purpose of pollination. Advantage is made of the fact that the pigments absorb strongly in the UV (ultraviolet), visually attracting insects but with light wavelengths that are invisible to humans. These

pigments play a major role in plant pollination - and in predation in carnivorous plants, attracting insects into the trap apparatus. Anthocyanins play a very versatile role in pollination, especially in the *Bromeliaceae*. Certain bromeliads turn a vivid red just before and during pollination but soon revert to the original green color characteristic of the photosynthesis pigment, chlorophyll.

Anthocyanins are not a biochemical dead end but rather a dynamic signalling device that can be switched on when needed by the plant to assist in pollination. They are then degraded by plant enzymes when no longer needed to attract pollinators to flowers.

In their second major role, anthocyanin-related pigments serve as a UV screen and are produced in response to exposure of the plant to UV radiation, protecting the plant's DNA from damage by sunlight. (UV causes the paired strands of genetic material in the DNA double helix to become cross-linked, preventing cell division and other vital cellular processes like protein production.

And in a third, and no less significant role, anthocyanins serve as anti-feedents, their disagreeable taste serving to deter predatory animals. In a related defense mechanism, anthocyanin production can be induced by ionizing radiation, which can damage DNA as readily as UV can. Chemical messengers apparently signal the damage to DNA and induce anthocyanin production in these plants.

The biosynthesis of this class of pigment is accomplished by a series of enzymes that are bound to cell membranes and that help convert two central biochemical building blocks derived from photosynthesis (acetic acid and the amino acid phenylalanine) found in the cell's cytoplasm through a series of discrete chemical steps into the final pigments, which are then excreted on the other side of the membrane into vacuoles in the epidermal cell layer. Significant genetic change in the DNA coding for the production of these enzymes results in loss of pigment production.

Anthocyanin pigments can be produced by growing plant cells in tissue culture. Plants having no pigmentation themselves in cultivation were subsequently demonstrated to produce anthocyanin in tissue culture.

Environmental factors affecting anthocyanin production included light intensity and wavelength, with blue and UV being most effective, temperature, water and carbohydrate levels, and the concentrations of the elements nitrogen, phosphorous and boron in the growth medium. Anthocyanin production can be induced by light, blue being the most effective color. Low light levels also induce the formation of different flavonoid pigments, which is another interesting adaptive response on the part of plants. (Tillandsias), for example, develop a bright red coloration

due to induced anthocyanin production if grown in strong light. For some additional observations on possible alternate roles for anthocyanin in Tillandsia,(see noted bromeliaexpert David Benzing's personal observations as quoted in Paul T. Isley III's excellent book *Tillandsia*.)

Since the anthocyanin pigments are regularly made by plants like the blood leaf, it is therefore very convenient to tap its potential as pH indicators.

Modern methods of determining pH are available nowadays but these are only methods are only available in sophisticated laboratories in universities and science centers. In the Philippines, most florists and subsistence gardeners do not have the access to these protocols. This research gives an accessible method to these gardeners so that they can test their soil pH using this indigenous method using an ornamental plant that is readily available instead of using chemicals which can be toxic. Hence this study.

II. MATERIALS AND METHOD

About a hundred gram of blood leaf was collected and put in a blender and around 10 mL distilled water were mixed and blended until a thick extract was produced. The extract was filtered and kept in a tightly closed bottle. Using a pH meter the pH was tested and it was recorded a 4.6. The impurities settled and it was separated by decantation.

A set of solution from 0-14 pH was prepared and stored in closed container. The extract was tested to show the color changes .Distinct color changes appeared. The color changes of the extract is shown below in Fig 1. . Based on this color changes, four soil samples were tested using the blood leaf extract. The pH meter and pH paper records were used to verify the data observed using the extract as indicator.

The four soil samples were tested using pH meter and pH paper. The ash from burnt organic matter and lime was also tested to show the changes in the higher pH levels.

III. DATA ANALYSIS AND INTERPRETATION

A. Color change of the blood leaf extract along the pH scale

The blood leaf extract was subjected to the solutions pH 0-14. The color changes were very distinct which shows that it can be a pH indicator. The color changes were maintained even after an hour which is not true to some commercial indicators. Table 1 shows the color changes of the extract in the pH solutions 0-14. The real color changes that were observe is shown in Plate 2. The color changes had been observable even after one hour which is not true to some commercial pH indicator.

Table 1 shows the color changes of the extract in the pH solutions 0-14. The real color changes that were observed are shown in Plate 2.

Table 1. Color Changes when Blood leaf extract were subjected to the pH solutions.

pH	Color change
0	Dark green

1	Light green
2	Very light pink
3	Light pink
4	pink
5	Dark pink
6	Darker pink
7	Darkest pink
8	Darker pink
9	pink
10	Very light pink
11	indigo
12	green
13	Light green
14	Yellow green

B. pH test of the Soil Samples using blood leaf Extract

The pictures below showed a comparison of the blood leaf extract scale with the different soil samples.

Picture 1 is a comparison of the pH4 blood leaf extract and pH5. The clay soil showed a reading reading of of 4.5 which coincides with the result using the blood leaf extract indicator.

Picture 2 showed the comparison of color change in the soil from Balenben which is betweenpH 5 -6. The reading coincides which the pH meter reading which is 6.5.

The soil from the strawberry farm showed a darer pink color as shown in picture 3. When compared with the blood leaf extract indicator, it showed a pinkish color between pH 6-7 which coincides with the pH meter reading which is 6.3.

Picture 4 below showed a change to color green when tested with blood leaf extract. The pH meter and pH paper showed a pH 12 which is the same as the extract reading.



**pH 5- (clay soil=pH 4.5) - pH4
Picture 1**



pH6-(b. soil pH5.5) – pH 5

Picture 2



pH6 (St soil =6.5) pH 7
picture 3



pH 11 Ash tested with blood leaf extract
Picture 5



Lime water tested with blood leaf extract
Picture 4

Soil pH Test

The table shows the result of the pH test. There were five (5) samples, 3 soil samples, lime and ash that were tested using the pH meter and pH paper and the blood leaf extract. The table shows that three tests showed similar results. Among the five soil samples, the clay soil is the most acidic which showed a pH of 4.3 in the pH meter reading between 4 to 5 pH in the pH paper reading and showed light pink color in the blood extract pH test. The soil from a vacant lot has a pH of 5.6 using the pH meter and similar results were observed using the blood leaf showing a pink color which is darker than the other samples which are acidic. The darker pink coloration has a higher pH.

This shows the soil samples were in the range of 4-7. This means that the soils were acidic. The ash showed a reading at pH 11 which showed a color change of indigo and the lime solution showed a greenish color. Thus the two substances were basic.

Table 2. pH Readings of the Soil samples using blood leaf extract As compared to pH paper and pH meter readings.

Indicators	Clay Soil La Trinidad , Benguet	Soil From Vacant Lot with plants Balenben Baguio City	Soil From Strawberry Farm, la Trinidad, Benguet	ash	lime
pH METER	4.3	5.6	6.3	11	12
pH PAPER	4 to 5	5 to 6	6 to 7	11	12
plant extract from Blood leaf	4-5 pink color	5- 6 pink	6-7 pink	11 indigo	12 green

IV. CONCLUSION AND RECOMMENDATION

Based on the results of this study, it is therefore noted that the blood leaf extract can be a pH indicator for soil considering its easy preparation and acquisition of the plant material. Since it is an ornamental plant, the material is readily available. Small scale gardeners and florists can do it even extract it using mortar and pestle. The changes are easy to observe and the changes in color do not disappear immediately. Further studies can be done by analyzing the type of anthocyanin present in blood leaf.

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AUTHORS

First Author – Teresita Rubang Doctor– BsBiology, MAEd Bio. Ph.D.

Second Author – Reuel Alexis Cababat – BS Ed Bio-Chem, MAEd

Correspondence Author – Teresita Rubang Doctor, Email:
tessdoctor@gmail.com

| pH |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |

Appendix

Plate 1. Blood Leaf

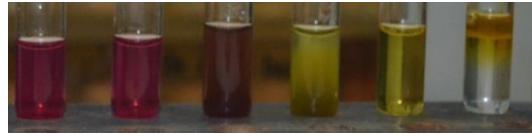


Plate 2. pH readings of the soil samples using pH paper



Plate 3. color changes of the blood leaf extract in the pH solutions 0-14

Bayesian Inference for Mean of the Lognormal Distribution

Juliet Gratia D'Cunha*, K. Aruna Rao**

* Research Scholar, Department of Statistics, Mangalore University, Mangalagangothri, Karnataka, India.

** Professor of Statistics (Retd.), Department of Statistics, Mangalore University, Mangalagangothri, Karnataka, India.

Abstract- Lognormal distribution has wide applications in the analysis of failure time data, stock prices and rainfall. In this paper we derive Bayes estimator and credible regions for the mean of the lognormal distribution. We compare the coverage probability and length of the Bayes credible interval with the confidence interval obtained from the maximum likelihood estimator of the log location and scale parameters. The procedure is illustrated using the failure time data of locomotive control and stock price.

Keywords- Lognormal distribution, stock prices, Bayes estimator and credible regions, confidence interval, maximum likelihood estimator.

I. INTRODUCTION

Lognormal distribution has support on the positive part of the real line. It is right skewed and is widely applicable when normal distribution does not fit well to the data. It is used in the analysis of failure time data, stock market data and in the analysis of rainfall data. The commonly used procedure in this area is to take log transformation and use the technique developed for normal models. The mean and variance of the lognormal distribution are not invariant under distributional transformation. Therefore it is necessary to develop estimators and confidence intervals for the mean and variance of the lognormal distribution.

In applied research coefficient of variation (C.V) is widely used as a measure of variability than the standard deviation. The reason for this is that C.V is unitless and facilitates easy interpretation. Zellner (1971) initiated Bayesian inference for lognormal distribution. He considered Bayes estimator for the mean and median of the lognormal distribution. He observed that Bayes estimator for mean of the lognormal distribution does not exist and he obtained improved estimators of mean and median of the distribution. He used diffuse prior $\pi(\mu, \sigma) = \frac{1}{\sigma}$ which is also the right invariant prior for the location scale family (Ghosh *et al.* (2006)). Padgett and Wei (1977) developed Bayes estimator of reliability function for the lognormal distribution. They used two types of priors namely normal prior for mean and gamma prior for the inverse of the scale parameter; the other prior is the vague prior of Jeffrey (See Ghosh *et al.* (2006) for discussion on this prior). This research was extended by Padgett and Johnson (1983) where they obtained lower bounds on reliability function of the two parameter lognormal distribution. Sarabia *et al.* (2005) proposed a class of Bivariate conjugate priors for μ and σ of the lognormal distribution using the conditional specification. Several procedures were also suggested for the estimation of the hyperparameters. Harvey and Merwe (2010), Harvey *et al.* (2011), and Harvey and Merwe (2012) compared the Bayesian credible interval for the means and variances of lognormal distribution. The performance of the credible interval is compared with credible/confidence interval suggested by Zhou and Tu (2000) and Krishnamoorthy and Mathew (2003). In the last section the authors discuss about bivariate lognormal distribution and obtain Bayesian confidence intervals for the difference between two correlated lognormal means and for the ratio of lognormal variances. The overall conclusion is that Bayes credible interval has shorter width compared to the width of the other intervals. D'Cunha and Rao (2014) developed Bayesian credible interval for the C.V of the lognormal distribution and compared it with the confidence interval obtained by the maximum likelihood estimator. In this paper we show that, under mild regularity conditions, Bayes estimator for the mean of the lognormal distribution exists. The priors used are 1) Left invariant Jeffrey's prior 2) Right invariant prior. For a discussion of these priors see Ghosh *et al.* (2006), Berger (2005). The $100(1-\alpha)\%$ credible interval is compared with the corresponding level confidence interval obtained through the use of maximum likelihood estimator (M.L.E). The reason for this is that confidence interval is easy to compute and is preferred by the applied researchers. This type of comparison has not been done in the past. The simulation results indicate that Bayes credible interval have smaller length compared to the confidence interval obtained through the M.L.E. The procedure is illustrated to obtain the Bayes estimate of the mean lifetime and the associated credible intervals of the data on locomotive controls given in Schmee and Nelson (1977).

The Organization of the paper is such that section 2 presents the derivation of the Bayes estimator and associated credible interval for the mean of the lognormal distribution, while section 3 presents details of the simulation experiment. The results are presented in section 4. The procedure is used to derive the mean lifetime of locomotive controls and the associated credible interval and it also used to predict the future stock price which is given in section 5, while the concluding remarks are provided in section 6.

II. BAYES ESTIMATOR FOR THE MEAN OF THE LOGNORMAL DISTRIBUTION

Let μ and σ^2 denote the log location and scale parameter of the lognormal distribution. Given a random sample of size n , x_1, \dots, x_n from this distribution, let $Z_i = \log X_i$, $i=1, \dots, n$, where Z follows normal distribution with parameter μ and σ^2 and maximum likelihood estimator of μ and σ^2 are \bar{Z} and S_z^2 respectively, where $\bar{Z} = \frac{\sum_i z_i}{n}$ and $S_z^2 = \frac{\sum_i (z_i - \bar{Z})^2}{n}$. Using invariance property of maximum likelihood estimator (Kale (1999)), the maximum likelihood estimate (M.L.E) of the mean of the lognormal distribution namely $\theta = e^{\mu + \frac{1}{2}\sigma^2}$ is given by $\hat{\theta} = e^{\bar{\mu} + \frac{1}{2}\hat{\sigma}^2} = e^{\bar{Z} + \frac{1}{2}S_z^2}$. The asymptotic variance of $\hat{\theta}$ can be obtained using delta method and is given by $\text{var}(\hat{\theta}) = e^{2\mu + \sigma^2} \frac{\sigma^2}{n} \left(1 + \frac{\sigma^2}{2}\right) + o(n^{-1})$ (1)

In the above expression we have used $\frac{n-1}{n} \approx 1$. The $100(1-\alpha)\%$ asymptotic confidence interval for $\hat{\theta}$ is given by $\hat{\theta} \pm Z_{\alpha/2} S.E(\hat{\theta})$, where $Z_{\alpha/2}$ refers to upper $\alpha/2$ th percentile value of the standard normal distribution and $S.E(\hat{\theta})$ refers to estimated standard error ($\hat{\theta}$). The estimate of μ and σ^2 is obtained by substituting the value of $\hat{\mu}$ and $\hat{\sigma}^2$ in the expression for variance of $\hat{\theta}$.

We have used two objective priors namely the right invariant prior $\pi(\mu, \sigma) = \frac{1}{\sigma}$ and left invariant Jeffrey's prior given by $\pi(\mu, \sigma) = \frac{1}{\sigma^2}$ (Ghosh *et al.* (2006), Berger (2005)). The choice of the right invariant prior stems from the fact that Z follows normal distribution and the right invariant prior used in this paper is the one that is suggested for location scale family (Ghosh *et al.* (2006)). The advantage of objective Bayesian analysis is that the prediction remains the same irrespective of the decision maker. Thus the procedure can be applied universally given the past data. The posterior density $\pi(\mu, \sigma | z_1, \dots, z_n)$ for the right invariant and the left invariant Jeffry's priors are given by the following expression,

$$\pi(\mu, \sigma | z_1, \dots, z_n) = \frac{1}{\sqrt{2\pi} \frac{\sigma}{\sqrt{n}}} e^{-\frac{1}{2} \frac{(\bar{Z}-\mu)^2}{\sigma^2/n}} \frac{\left(\frac{(n-1)S_z^2}{2}\right)^{\frac{n+2}{2}}}{\Gamma\left(\frac{n+2}{2}\right)} \left(\frac{1}{\sigma^2}\right)^{\left(\frac{n+2}{2}\right)-1} e^{-\frac{1}{2} \frac{(n-1)S_z^2}{\sigma^2}} \quad (\text{using right invariant prior}) \quad (2)$$

$$(\pi(\mu, \sigma | z_1, \dots, z_n) = \frac{1}{\sqrt{2\pi} \frac{\sigma}{\sqrt{n}}} e^{-\frac{1}{2} \frac{(\bar{Z}-\mu)^2}{\sigma^2/n}} \frac{\left(\frac{(n-1)S_z^2}{2}\right)^{\frac{n+3}{2}}}{\Gamma\left(\frac{n+3}{2}\right)} \left(\frac{1}{\sigma^2}\right)^{\left(\frac{n+3}{2}\right)-1} e^{-\frac{1}{2} \frac{(n-1)S_z^2}{\sigma^2}} \quad (\text{using left invariant prior}) \quad (3)$$

It may be noted that although we have used independent prior for μ and σ , the posterior density has a bivariate correlated distribution. The Bayes estimator of θ is $E(\theta | z_1, \dots, z_n)$, where expectation is taken with respect to the posterior density of μ and σ . For the right invariant prior it is given by

$$\iint e^{\mu + \frac{1}{2}\sigma^2} \frac{1}{\sqrt{2\pi} \frac{\sigma}{\sqrt{n}}} e^{-\frac{1}{2} \frac{(\bar{Z}-\mu)^2}{\sigma^2/n}} \frac{\left(\frac{(n-1)S_z^2}{2}\right)^{\frac{n+2}{2}}}{\Gamma\left(\frac{n+2}{2}\right)} \left(\frac{1}{\sigma^2}\right)^{\left(\frac{n+2}{2}\right)-1} e^{-\frac{1}{2} \frac{(n-1)S_z^2}{\sigma^2}} d\mu d\sigma = \int e^{\bar{Z} + \frac{\sigma^2}{2n} + \sigma^2} \frac{\left(\frac{(n-1)S_z^2}{2}\right)^{\frac{n+2}{2}}}{\Gamma\left(\frac{n+2}{2}\right)} \left(\frac{1}{\sigma^2}\right)^{\left(\frac{n+2}{2}\right)-1} e^{-\frac{1}{2} \frac{(n-1)S_z^2}{\sigma^2}} d\sigma \quad (4)$$

In the above integral $\left(\frac{1}{\sigma^2}\right)^{\left(\frac{n+2}{2}\right)-1} e^{-\frac{1}{2} \frac{(n-1)S_z^2}{\sigma^2}}$ tends to zero as σ^2 tends to ∞ and $e^{\frac{\sigma^2}{2} \left(\frac{1}{n} + 1\right)}$ tends to ∞ as σ^2 tends to ∞ . The latter tends to ∞ at a faster rate than the former tending to zero. This is the reason for the non existence of the mean of the posterior density. Table 1 shows that the location parameter of the lognormal distribution is bounded.

Therefore under the mild assumptions, σ^2 is bounded in probability, the expected value of $e^{\mu + \frac{1}{2}\sigma^2}$ exists, where the expectation is taken with respect to the posterior density of μ and σ^2 . Closed form solution does not exist for this expectation and has to be evaluated using numerical integration or the Monte Carlo integration. In this paper we have used Monte Carlo integration to compute Bayes estimate. In our simulation we did not encounter very large value of this expectation and thus $100(1-\alpha)\%$ credible interval for the mean of the lognormal distribution is justifiable. The samples of μ, σ^2 are generated using importance sampling approach. Since the marginal distribution of $\eta = \frac{1}{\sigma^2}$ follows gamma distribution for the right as well as left invariant priors, the observation for η is generated from the gamma distribution. The conditional posterior distribution of μ given σ^2 follows normal distribution with mean \bar{Z} and variance $\frac{\sigma^2}{n}$. Using the previously generated value of σ^2 , we generate an observation from the normal distribution. This constitutes a pair of observation μ, σ^2 from the posterior density. Then $E(e^{\mu + \frac{1}{2}\sigma^2} | z_1, \dots, z_n) = \frac{1}{M} \sum_{i=1}^M (e^{\mu_i + \frac{1}{2}\sigma_i^2})$, where M denotes the number of paired samples generated from the posterior distribution. In this paper we have used M=10,000. The generated samples were also used for obtaining equitailed credible intervals. An alternate approach for finding the Bayes estimator and the associated Highest Posterior Density (HPD) credible interval is given in the appendix.

III. SIMULATION EXPERIMENT

In order to find the finite sample (small sample) performance of the Bayes credible interval and the confidence interval, a simulation experiment was conducted. A sample of size n was generated from the normal distribution with mean μ and variance σ^2 . The value of μ and σ^2 are so adjusted so that the C.V of the lognormal distribution ranges from 0.1, 0.3, 0.5, 0.7, 1, 1.5, 2 and 2.5, the mean of the lognormal distribution is 1000. The value of μ equal to 1000 corresponds to the stock market data analyzed in this paper. Observations from the joint posterior distribution were generated as explained in section 2. The Bayes estimator and the associated equitailed credible interval were also constructed along with the maximum likelihood estimator of the mean and the associated confidence interval. For each simulation, the length of the credible and confidence interval was also noted. Using 1000 simulations, confidence and equitailed credible intervals are constructed. Using the 1000 simulations, the average length and standard deviation of the length of confidence and credible intervals were also computed. Confidence/credible level is fixed at $1 - \alpha = 0.95$. The sample sizes considered are $n = 10, 20, 40, 60, 80, 100, 150$ and 200. The total number of simulation configuration = Number of samples \times Number of C.V = 8 \times 8 = 64; these 64 configuration were common for credible interval based on Jeffrey's prior, right invariant prior and confidence interval.

IV. RESULTS AND DISCUSSION

Table 2 presents the coverage probabilities across different sample sizes for eight values of C.V taken together. We say that confidence/credible interval maintains the level if the estimated coverage probability is in between the range of 0.940 to 0.960. That is $(1 - \alpha) \pm 0.01$ where $\alpha = 0.05$, which is approximately equal to error rate of 10%. From the table it becomes clear that the confidence interval failed to maintain coverage probability even for large samples of size $n = 100$ to 200. On the other hand equitailed credible intervals obtained from left and right invariant priors by and large maintain the credible level. For example, when $n = 100$, the credible level is maintained in 7 out of 8 times for right invariant as well as left invariant priors. From the table it also follows that the minimum sample size required for the construction of credible interval is 100 for which one can expect that the confidence level would be maintained. On the contrary the confidence interval based on maximum likelihood estimator requires a sample size more than 200 to maintain the confidence level. This is the advantage of the Bayes credible interval over confidence interval.

Table 3 presents the average length of the confidence/credible interval for various sample sizes whenever the confidence/credible level is maintained. Although it appears that the average length of the confidence interval is shorter compared to average length of credible interval using both right and left invariant priors, caution is exercised to interpret the results of this table. For example, in table 2 when $n = 100$, the average length for the confidence interval is 116.71 which is the average length of 3 confidence intervals, while for the left and right invariant priors it is 340.84 which is the average length based on 7 credible intervals. To explore the ideas further, the average length of the confidence/credible interval is cross tabulated across sample sizes and C.V of the distribution and is presented in table 3. A careful examination of the table reveals that when $n=100$, the confidence interval maintains coverage probability for 3 values of C.V and if we compare the average length of the confidence interval it is almost the same as the average length of the credible interval using left and right invariant prior. For $n=150$, for 5 values of C.V the confidence interval maintains coverage probability and the average length of the confidence/credible intervals are almost equal. When $n=200$, for 5 values of C.V the confidence interval maintains coverage probability. Out of these 5 values of C.V, for 3 values of C.V namely 0.7, 1.5, and 2 the average length of confidence interval is marginally shorter than the average length of the credible interval using left and right invariant priors. And for 2 values of C.V namely 0.3, 0.5 the average length is marginally shorter for equitailed credible interval compared to confidence interval. Further for smaller values of C.V from 0.1 to 0.7, the average length of the credible interval is marginally shorter than the average length of the confidence interval. Thus if we take the average length of the confidence/credible interval over the different values of C.V (for which confidence/credible level is maintained), the picture that emerges is the one given in table 2. Thus for larger values of C.V in several cases the confidence interval does not maintain the coverage probability while the credible interval maintains coverage probability at the expense of larger width.

V. EXAMPLES

5.1 Locomotive Data

To illustrate the procedure we consider the data on the number of thousand miles at which different locomotive controls failed in a life test involving 96 controls. The test was terminated after 135,000 miles by which time 37 failures had occurred. The data were discussed by Schmee and Nelson (1977). This is a well known data set and is analyzed by several researchers in the past. The failure times for the 37 failed units are 22.5, 37.5, 46.0, 48.5, 51.5, 53.0, 54.5, 57.5, 66.5, 68.0, 69.5, 76.5, 77.0, 78.5, 80.0, 81.5, 82.0, 83.0, 84.0, 91.5, 93.5, 102.5, 107.0, 108.5, 112.5, 113.5, 116.0, 117.0, 118.5, 119.0, 120.0, 122.5, 123.0, 127.5, 131.0, 132., 134.0. In addition, there are 59 censoring times, all equal to 135.0. Initially to check whether the underlined distribution is lognormal, Q-Q plot of the log of the failure time is plotted and is given in figure 1. From this figure it follows that log of the observations is normally distributed. The box plot given in figure 2 summarizes the characteristic features in the data. From the figure we observe that the first quartile $Q_1=4.25$, second quartile $Q_2= 4.45$ and third quartile $Q_3=4.75$. The distance between Q_3 to Q_2 is 0.3 and distance between Q_2 to Q_1 is 0.2. And thus the failure time data of locomotive is right skewed.

Table 4 reports the mean failure time using maximum likelihood estimator and Bayes estimator and also the associated 95% confidence/credible intervals. From the table it follows that the mean failure time is 90.36 years using the maximum likelihood estimator while it is 90.33 years and 97.4033 years using right and left invariant priors respectively. The length of the confidence interval is 19.68 and it is 24.39 for both left and right invariant priors. In the simulation experiment for $n=40$ the coverage probability is maintained only for one value of C.V=0.5 and in this case the average length of the confidence interval is slightly greater than the average length of credible intervals. If we ignore the coverage probability, the length of the confidence interval is greater for the values of C.V = 0.1 and 0.3 and for other values of C.V it is shorter than the length of the credible interval. This example confirms the finding of the simulation study.

5.2 Stock price data

This example illustrates the use of Bayes estimator for predicting the future observation. Given a sequence of observation Y_1, Y_2, \dots, Y_n , the predicted value for the observation at time point $n+1$ is the mean of the posterior distribution (Berger (2005), Ghosh *et al.* (2006)). The data consists of the average daily stock prices of ICICI bank of National Stock Exchange (NSE) limited of India, for the period October, 2013. The date for which the stock price to be predicted was arbitrarily decided as October 31st, 2013. Using 5, 10, 15 and 20 days of the stock price prior to this date, the value of the stock price is predicted for October 31st, 2013. Table 5, reports the predicted value and the associated 95% equitailed credible interval along with the reported average price for October 31st. The results indicate that previous 5 days average price can accurately predict the stock price for the 6th day.

VI. CONCLUSION

Bayesian analysis is nowadays very common in scientific investigations. The uncertainty in the parameters of the probability model can very well be captured by two prior distributions. The use of objective priors facilitates the comparison with the Frequentist approach. In this paper Bayes estimator and the associated credible intervals are derived for the mean of lognormal distribution. The results of the simulation study indicates that the credible level is maintained for a sample size $n=100$, while the confidence interval requires a larger sample size $n>200$. The average length of the equitailed credible interval is at par with the length of confidence interval whenever the latter maintains the coverage probability. Since the confidence interval using maximum likelihood estimator is approximate it is quite natural that in more number of cases the Bayesian credible interval maintains coverage probability compared to the confidence interval obtained through the maximum likelihood estimator. Right invariant prior has not been used in the previous investigation to compare the coverage probability of the credible and confidence intervals. The Bayesian robustness of the credible interval is also established by using the two objective priors. Therefore we recommend the use of Bayes estimator of the mean and associated credible intervals using the non informative right invariant prior for the analysis of real time data as well as stock market data. The conclusion complements the findings of Harvey and Merwe (2010) and Harvey *et al.* (2011). For the Bayesian computation a program was written in the public domain software R and Matlab and interested persons can obtain it from the first author.

APPENDIX

Alternate approach to find Bayes estimator of the mean of the Lognormal distribution.

The Bayes estimator of the mean of the lognormal distribution is given by

$$\int_{-\infty}^{\infty} \int_0^{\infty} e^{\mu + \frac{1}{2\eta n}} \frac{\sqrt{n}}{\sqrt{2\pi}} \eta e^{-\frac{n}{2}(z-\mu)^2 n} \frac{\left(\frac{(n-1)}{2} S_z^2\right)^{\frac{n+2}{2}}}{\Gamma\left(\frac{n+2}{2}\right)} \eta^{\frac{n+2}{2}} e^{-\frac{n}{2}(n-1)S_z^2} d\mu d\eta$$

Interchanging the order of integration this is equal to

$$\int_0^{\infty} e^{z + \frac{1}{2\eta n} + \frac{1}{2\eta}} \frac{\left(\frac{(n-1)}{2} S_z^2\right)^{\frac{n+2}{2}}}{\Gamma\left(\frac{n+2}{2}\right)} -\eta^{\frac{n+2}{2}} e^{-\frac{n}{2}(n-1)S_z^2} d\eta$$

This integral cannot be evaluated in a closed form. To evaluate the integral, importance sampling approach can be used. For this, generate M observations from the gamma density with parameters $\left(\frac{n+2}{2}\right)$ and $\left(\frac{n-1}{2}\right) S_z^2$. Then the value of above integral is $\frac{1}{M} \sum_{i=1}^M e^z e^{\frac{1}{2n\eta_i} + \frac{1}{2\eta_i}}$. Because of the one to one relation between η and $e^{\frac{1}{2n\eta} + \frac{1}{2\eta}}$, the HPD credible interval for the mean of the lognormal distribution can be constructed using above gamma density. The procedure is similar as described by D'Cunha and Rao (2014).

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AUTHORS

First Author – Juliet Gratia D'Cunha, M.Sc, Mangalore University, Mangalagangothri, Karnataka, India.

Email: gratiajuliet@gmail.com

Second Author – Aruna Rao K, Ph.D, Mangalore University, Mangalagangothri, Karnataka, India.

Correspondence Author – Juliet Gratia D'Cunha, gratiajuliet@gmail.com.

Table 1: Range of values of σ^2 for various values of C.V of lognormal distribution

C.V	σ^2
0.1	0.01
0.3	0.0862
0.5	0.2231
0.7	0.3988
1	0.6931
1.5	1.1787
2	1.6094
2.5	1.9810
3	2.3026
3.5	2.5840
4	2.8332
4.5	3.0564
5	3.2581
10	4.6151

Table 2: Coverage probability of the credible and confidence interval for the C.V across sample sizes for 8 combinations of specified values of C.V

Sample size	Bayes Procedure (Equitailed)				Maximum Likelihood (Equitailed)	
	No. of times the Coverage probability is maintained		Average length		No. of times the Coverage probability is maintained	Average length
	Right invariant prior	Left Invariant prior	Right invariant prior	Left Invariant Prior		
10	0	0	*	*	0	*
20	0	0	*	*	1	262.38
40	1	1	306.14	306.14	1	308.37
60	5	5	597.81	597.81	4	236.13
80	6	6	344.84	344.84	5	223.35
100	7	7	340.84	340.84	3	116.71
150	6	6	253.33	253.33	5	145.73
200	7	7	306.75	306.75	5	254.76
Overall	32	32	358.28	358.28	24	221.06

*Whenever coverage probability is not maintained average length has not been calculated.

Table 3: Average length of the confidence/credible interval for various values of C.V and sample sizes.

Sample size	Confidence/credible interval based on	Average length (Coverage probability) when C.V equal to							
		0.1	0.3	0.5	0.7	1	1.5	2	2.5
100	M.L.E	39.13 (0.952)	116.77 (0.947)	194.23 (0.950)	269.57 (0.936)	377.31 (0.935)	541.30 (0.938)	667.99 (0.910)	798.70 (0.934)
	right invariant prior	38.80 (0.956)	116.11 (0.943)	194.25 (0.950)	269.25 (0.944)	381.00 (0.948)	555.69 (0.951)	691.28 (0.939)	830.75 (0.950)
	Left invariant prior	38.81 (0.956)	116.11 (0.943)	194.25 (0.950)	269.25 (0.944)	381.00 (0.948)	555.70 (0.951)	691.28 (0.939)	830.75 (0.950)
150	M.L.E	31.92 (0.942)	95.89 (0.947)	159.28 (0.952)	219.26 (0.943)	308.41 (0.932)	441.57 (0.945)	548.62 (0.939)	652.95 (0.927)
	right invariant prior	31.75 (0.944)	95.48 (0.951)	158.88 (0.953)	220.21 (0.945)	310.44 (0.939)	449.33 (0.942)	564.31 (0.948)	670.95 (0.932)
	Left invariant prior	31.75 (0.944)	95.48 (0.951)	158.88 (0.953)	220.21 (0.945)	310.44 (0.939)	449.33 (0.942)	564.31 (0.948)	670.95 (0.932)
200	M.L.E	27.64 (0.938)	83.18 (0.952)	137.61 (0.948)	191.69 (0.954)	266.41 (0.939)	385.74 (0.948)	475.56 (0.942)	553.06 (0.918)
	right invariant prior	27.52 (0.940)	82.86 (0.949)	137.41 (0.948)	192.22 (0.955)	267.82 (0.952)	389.90 (0.948)	482.29 (0.953)	567.23 (0.939)
	Left invariant prior	27.52 (0.940)	82.86 (0.949)	137.41 (0.948)	192.22 (0.955)	267.82 (0.952)	389.90 (0.948)	482.29 (0.953)	567.23 (0.939)

Table 4: Mean life time of locomotive using Maximum Likelihood Estimator and Bayes Estimator and associated 95% confidence/credible interval

Maximum Likelihood Estimation		Bayes Estimation		
		Bayes Estimator	Right invariant	Left invariant
MLE	90.36		90.33	97.40
Confidence Interval	(80.51,100.21)	Credible Interval	(79.42,103.81)	(79.42,103.81)

Table 5: Prediction of stock price for October 31st, 2013 (the 6th day) using Bayes estimation for the script ICICI BANK

Average price reported by NSE	Bayes Estimator		Credible interval	
	Right invariant	Left Invariant	Right invariant	Left invariant
1107.95	1052.10	1047.20	(1008.2, 1101.3)	(1028.5, 1066.1)

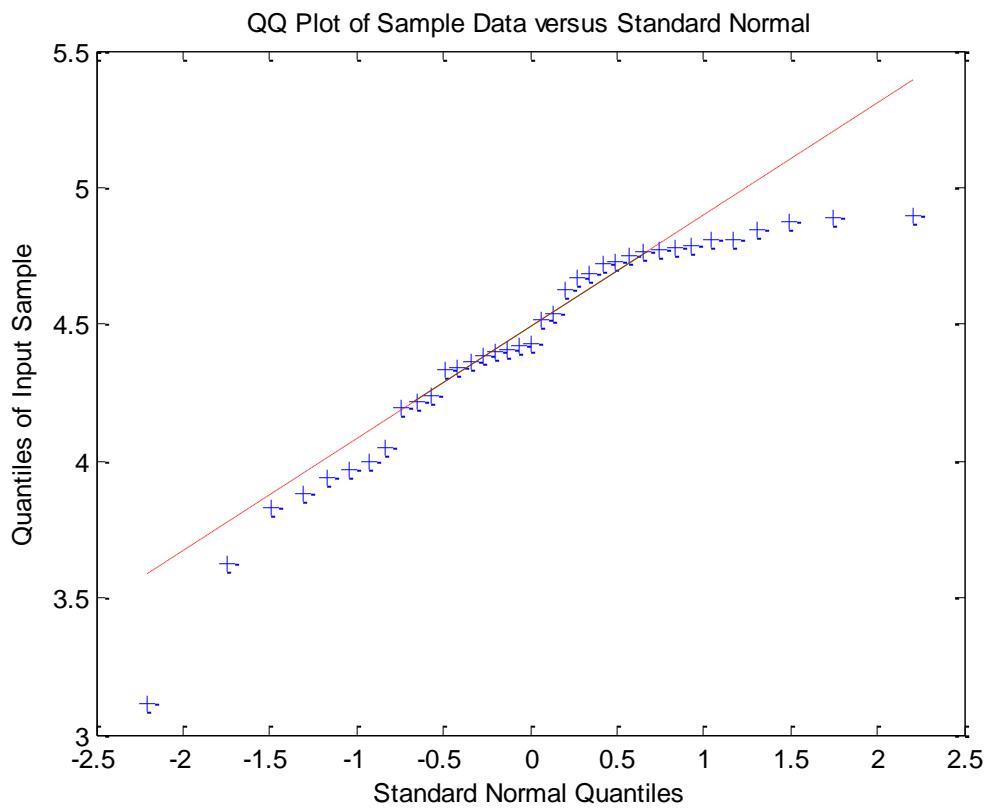


Figure 1: Q-Q plot of log of failure times

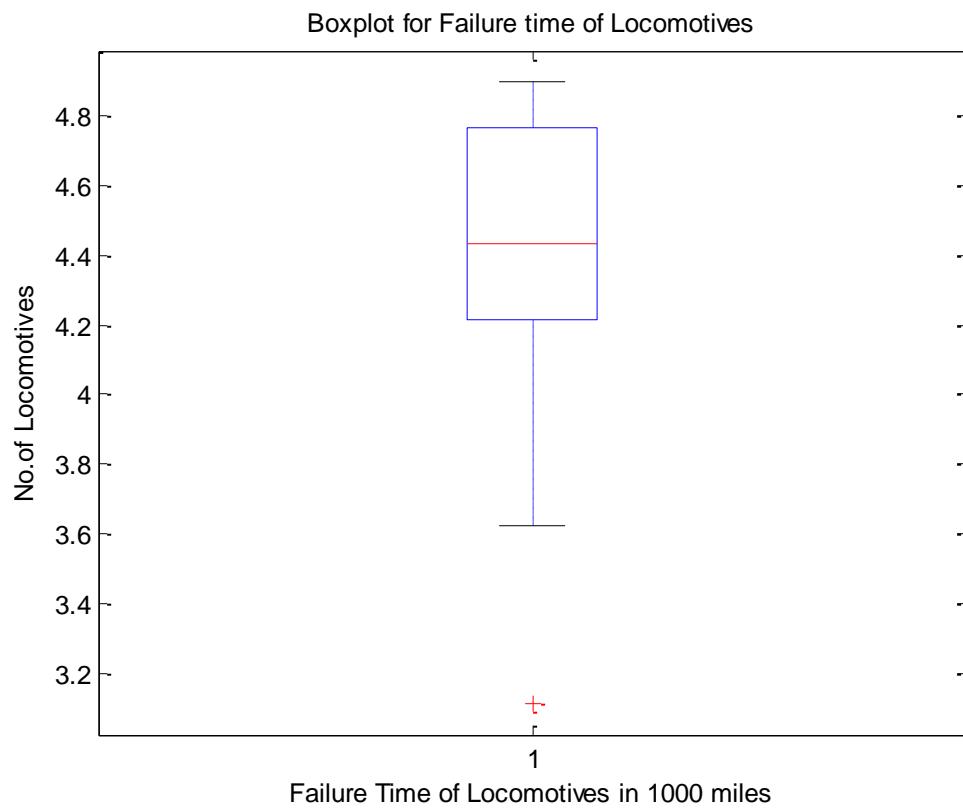


Figure 2: Boxplot for Failure time of Locomotives

Scenario of Sanskritization at Shaktipeeths – A Step towards Empowerment of the Marginalised

(With Special Reference to Katyayani Shaktipeeth, Vrindavan (U.P.)

Dr. Rajesh Kumar Sharma¹ & Sandhya Dixit²

¹Head- Department of Sociology, Government P.G. College, Dholpur (Rajasthan)

² Project Fellow- UGC Major Research Project on Sanskritization

Abstract- Sanskritization is one of the ongoing revolutionary social processes in India. It is the process under which the religious practices of the Hindu upper castes are adopted by the members of SCs and STs in order to raise their social and cultural status in the society. By now the members of SCs and STs are aware that their cultural modes are responsible for their low status in the society. Therefore, they are ready to give them up for the sake of their improvement. Shaktipeeths and Durga temples in India are effective platforms for it. They provide an opportunity to such people to observe the upper caste religious and cultural practices closely and then to follow them for their own betterment. The scenario of Sanskritization becomes perfect during the Nava Ratras of Chaitra and Ashwin months. Obviously, it witnesses a revolutionary social change when during these specified Hindi months the people from all the castes mix up with one another and when they participate in the rituals together forgetting the differences of their castes. Eversince India has been a land of sages and saints. It is the land which gave thousands of spiritual saints from time to time. Spiritualism is in the spirit of India. It can be observed in everything. It will not be an exaggeration to say that spiritualism is another name of the Indian culture which is capable of magnetically drawing the people from all the four corners of the world. Spiritualism brings a real peace and satiety to the people, and helps the people keep themselves balanced. It links them up with God. Spiritualism is one of the features of the Hindu upper castes. Its impact can obviously be seen on the members of the lower Hindu castes. It not only keeps them away from the turmoil of their own caste-practices but also brings them a new identity of solace. Spiritualism's main focus is to promote an individual's personal experience with God. It may also refer to the philosophy, doctrine, or religion pertaining to a spiritual aspect of existence.³ It is also a term commonly used for various psychic or paranormal practices and beliefs recorded throughout humanity's history⁴ and in a variety of cultures.⁵

Index Terms- Sanskritization, Uchawal Chandrahaas , Shaktipeeth, Coorgs

I. INTRODUCTION

The development of Hinduism can be interpreted as a constant interaction between the religion of the upper social groups, represented by the Brahmins, and the religion of other groups. From the time of the Vedas , people from many strata of society throughout the subcontinent tended to adapt their religious and

social life to Brahmanic norms. This development resulted from the desire of lower-class groups to rise on the social ladder by adopting the ways and beliefs of the higher castes. Further, many local deities were identified with the gods and goddesses of the Puranas. The process, sometimes called "Sanskritization," began in Vedic times and was probably the principal method by which the Hinduism of the Sanskrit texts spread through the subcontinent and into Southeast Asia. Sanskritization still continues in the form of the conversion of tribal groups, and it is reflected in the persistence of the tendency among some Hindus to identify rural and local deities with the gods of the Sanskrit texts. Sanskritization also refers to the process by which some Hindus try to raise their status by adopting high-caste customs, such as wearing the sacred cord and becoming vegetarians.

II. MEANING AND SIGNIFICANCE OF SANSKRITIZATION

Sanskritization is a particular form of social change found in India. It denotes the process by which castes placed lower in the caste hierarchy seek upward mobility by emulating the rituals and practices of the upper or dominant castes. This term was made popular by Indian sociologist M. N. Srinivas in the 1950s.¹ Srinivas defined sanskritization as a process by which "a low or middle Hindu caste, or tribal or other group, changes its customs, ritual ideology, and way of life in the direction of a high and frequently twice-born caste. Generally such changes are followed by a claim to a higher position in the caste hierarchy than that traditionally conceded to the claimant class by the local community"² One clear example of sanskritization is the adoption, in emulation of the practice of twice-born castes, of vegetarianism by people belonging to the so-called "low castes" who are traditionally not averse to non-vegetarian food. According to M.N. Srinivas, Sanskritization is not just the adoption of new customs and habits, but also includes exposure to new ideas and values appearing in Sanskrit literature. He says the words Karma, dharma, paap, maya, samsara and moksha are the most common Sanskritic theological ideas which become common in the talk of people who are sanskritized.¹ M. N. Srinivas propounded his theory of Sanskritization in the book titled Religion and Society Among the Coorgs of South India. Published in 1952, the book was an ethnographical study of the Kodava community of Karnataka. Srinivas writes in the book:

"The caste system is far from a rigid system in which the position of each component caste is fixed for all time. Movement has always been possible, and especially in the middle regions of

the hierarchy. A caste was able, in a generation or two, to rise to a higher position in the hierarchy by adopting vegetarianism and teetotalism, and by Sanskritizing its ritual and pantheon. In short, it took over, as far as possible, the customs, rites, and beliefs of the Brahmins, and adoption of the Brahminic way of life by a low caste seems to have been frequent, though theoretically forbidden. This process has been called 'Sanskritization' in this book, in preference to 'Brahminization', as certain Vedic rites are confined to the Brahmins and the two other 'twice-born' castes.¹² The book challenged the then prevalent idea that caste was a rigid and unchanging institution. The concept of sanskritization addressed the actual complexity and fluidity of caste relations. It brought into academic focus the dynamics of the renegotiation of status by various castes and communities in India.

III. CAUSES OF THE SUCCESS OF SANSKRITIZATION IN INDIA

- Political and Economic Factors; The establishment of British rule in India gave more opportunities to lower castes to sanskritize themselves and raise their social status.
- Expanding means of transport and communication too have contributed to the process by the way of new avenues and opportunities of cultures contracts.
- However, lower castes aspiring to climb upwards in caste hierarchy have to face hostility from the castes of middle strata. The same from higher castes too when the lower castes try to start using shoes or wear neat and clean clothes.
- Lower castes are more liberal, permissive and progressive despite their lower status. They have liberal and positive attitude especially towards the position of women but tend to become conservative by the process of sankritization.
- However, the lower castes beside restoring to sankritization to acquire higher status in the society, they are also struggling fiercely to retain their backward status for taking advantage of educational concessions and government job.

IV. RESULTS OF THE PROCESS OF SANSKRITIZATION

- Erosion of cultural autonomy of the woem folk includes erosion in the freedom to choose life partner.
- Changes in family structure include a movement towards the orthodox Hindu joint family.
- Stronger authority to father, monogamy, a stronger caste organisation with increased tendency of out casting.
- Change in food habits include outlawing beef and pork eating and consumption of liquor.
- Acquisition of higher education. Adoption of dowry practices instead of the token bride price.
- Change in religious practices include donning of sacred thread, giving up of sacrifice of pigs at the time of wedding and increased emphasis on pilgrimage.

V. MEANING & SIGNIFICANCE OF SHAKTIPEETH

The Shakti Peethas (holy places of cosmic power) are places of worship consecrated to the goddess Sati, the female principal of Hinduism¹ and the main deity of the Shakta sect. They are sprinkled throughout the Indian subcontinent. This goddess Shakti, the Goddess of power is the complete incarnation of Adi Shakti, has three chief manifestations, as Durga, Goddess of strength and valour, as Mahakali, goddess of destruction of evil and as Goddess Gowri, the goddess of benevolence. As the legend goes, Sati and Shiva got married against the consent of Sati's father Yaksha. Once, Daksha performed a yajna with a desire to take revenge on Lord Shiva. Daksha invited all the deities to the yajna

Fuller, Christopher John (2004). The Camphor Flame: Popular Hinduism and Society in India except Lord Shiva and Sati. The fact that she was not invited did not deter Sati from attending the yajna. She expressed her desire to attend the yajna to Shiva, who tried his best to dissuade her from going. Shiva eventually relented and Sati went to the yajna. Sati, being an uninvited guest, was not given any respect at the yajna. Furthermore, Daksha insulted Shiva. Sati was unable to bear her father's insults toward her husband, so she immolated herself. Enraged at the insult and the injury, Shiva destroyed Daksha's yajna, cut off Daksha's head, and later replaced it with that of a male goat as he restored him to life. Still immersed in grief, Shiva picked up the remains of Sati's body, and performed the Tandava, the celestial dance of destruction, across all creation. The other Gods requested Vishnu to intervene to stop this destruction, towards which Vishnu used the Sudarshana Chakra, which cut through the Sati's corpse. The various parts of the body fell at several spots all through the Indian subcontinent and formed sites which are known as Shakti Peethas today.

VI. SHAKTIPEETHS

In the listings below:

- "Shakti" refers to the Goddess worshipped at each location, all being manifestations of Dakshayani (Sati), Parvati or Durga;
- "Body Part or Ornament" refers to the body part or piece of jewellery that fell to earth, at the location on which the respective temple is built.

Sr. No.	Place	Body Part or Ornament
1	In Puri, Odisha (inside Jagannath Temple complex)	Pada Bimala
2	ShawajPur Near Forbesganj, Bihar	kati Prades (Waist) Maa Chhinnamashtika
3	Guwahati-Assam	Yoni khanda Kamakshya
4	Kolkata- West Bengal	Mukha khanda Dakshina Kalika

Apart from these four there are 52 other famous Peethas recognised by religious texts. According to the Pithanirnaya

Tantra the 52 peethas are scattered all over India, Sri Lanka, Bangladesh, Nepal, Tibet, Bhutan and Pakistan. The Shivacharita besides listing 52 maha-peethas, speaks about 26 more upapeethas. The Bengali almanac, Vishuddha Siddhanta Panjika too describes the 52 peethas including the present modified addresses. A few of the several accepted listings are given below. One of the few in South India, Srisailam in Andhra Pradesh became the site for a 2nd-century temple. Then there are other 51 famous Shaktipeeths located in the various parts of India and 18 Maha Shaktipeeths. According to the manuscript Mahapithapurana (circa 1690-1720 CE), there are 52 such places. Among them, 23 are located in the Bengal region, 14 of these are located in what is now West Bengal, India, 1 in Baster (Chhattisgarh), while 7 are in what is now Bangladesh.

VII. KATYAYANI SHAKTIPEETH, VRINDAVAN

Katyayani shakti peeth also known as Uma shakti peeth located in Vrindavan is one of the 51 Shaktipeethas where the 'Ringlets of Hair' of Devi Sati have fallen. Here the worship idols are – Devi as Uma (also known as another name of Goddess Parvati) and Lord Shiva as Bhootesh. The Katyayani Devi present here has a sword named Uchawal Chandrahaas in her hand and is sitting on a throne. The Katyayani Devi temple is situated in Radhbag near Yamuna in Vrindavan and is a very renowned Siddhapeeth. Katyayani is the 8th from of Durga. It is said that the girls of Braj worshipped Mata Katyayani in this Siddhapeeth to get Shri Krishna.

VIII. OBJECTIVES OF THE STUDY

- To observe the behavior, activities and attitude of the members of the upper and lower Hindu castes at the Shaktipeeths
- To observe ways of living and rituals through which the members of the upper Hindu castes attract the members of the lower Hindu castes towards them.
- To find out the causes of this attraction.
- To explore the changes in the behavior and life style of the members of the lower Hindu castes.
- To observe and explore the occasions at the Shaktipeeths which allow both the members of the upper and the lower Hindu castes to join each other.
- To study and observe the attitude of the members of the high castes at the point of time and on those occasions when the members of the lower castes join them at the time of the worship and rituals.

IX. HYPOTHESIS

- The past of the lower Hindu castes in India is the history of struggle, exploitation, humiliation and injustice.
- The members of the upper Hindu castes have always kept themselves away from the members of the lower castes for several reasons.

- The members of the lower castes are now conscious of the fact that their own culture is responsible for this detachment.
- Now the members of the lower castes are ready to give up their own culture and to imbibe the culture of the members of the upper castes.
- Religious centres are open to all.
- The Shaktipeeths and Durga temples in India present a beautiful scenario of Sanskritization which reveals a tremendous change in the members of the lower castes.
- Katyayani Shaktipeeth at Vrindavan (U.P.) witnesses itself to be a platform of Sanskritization on certain occasions throughout the year, and particularly in the month of Chaitra (March) and in the month of Kwar (October) every year.

X. RESEARCH METHODOLOGY

The work is an empirical study of 100 units selected randomly at Katyayani Shaktipeeth, Vrindavan. All the steps of scientific method of research including participant observation, collection of data through schedule technique, classification, analysis, interpretation, re-testing and tabulation of data and generalization were followed. Both the primary and the secondary data were used for the study. In the interview schedule, in addition to the other questions relating to the other aspects, 10 questions were included about the scenario of Sanskritization at Katyayani Shaktipeeth, Vrindavan. The investigator has tried his best to make his work scientific. He followed all the steps of scientific method.

XI. FINDINGS

- The members of the lower Hindu castes are conscious of their caste-evils like eating non-vegetarian food, drinking, gambling, odd-wearing, insanity, unhealthy surroundings etc.
- They are forced to believe of themselves that they are inferior to the members of the upper castes.
- They find the ways of living, customs, traditions, ways of worship of the members of the upper class much better than their own ways of living.
- They are eager to lead a normal and respectable life, i.e. the life which is led by the members of the upper castes.
- For the sake of their betterment, they are ready to give up their evils and to imbibe the cultural modes of living of the members of the upper castes.
- They believe that ritualistic and spiritualistics at the temples and at home can change their destiny and bring them closer to the members of the upper castes.
- Religious centres provide the members of the lower castes opportunities to practice rituals with the members of the upper castes.
- The shaktipeeths and Durga temples are playing a dominant role in enabling the members of the lower castes to learn the culture of the upper castes.

- The process of Sanskritization is bringing about a tremendous change in the life of the members of the lower castes.
- Many of the members of the lower castes have stopped eating non-vegetarian food, drinking wine, gambling, abusing in public etc.
- As a result of it, they have started eating vegetarian food, wearing holy thread around their wrists and necks, using surnames of the upper castes before their names, and having clean and healthy surroundings.
- Many of them have started worshipping deities at home and performing rituals like arti, offering bhog, singing hymns at their home-temples.
- During the nav-ratra in the months of March and October, they not only observe fast but also attend the arti at Shaktipeeths and Durga temples.
- Sanskritization is benefitting women, young girls and young men more than aged men and women.
- Katyayani Shaktipeeth at Vrindavan (U.P.) becomes a perfect place of Sanskritization every evening at the time of Arti and during the navratra in the months of March and October when the members of the lower castes as well as of the higher castes are seen together in the temple campus performing various rituals to please the goddess Katyayani.
- Sanskritization is a revolutionary socio-cultural process which is changing the destiny of the members of the lower castes and which is allowing them to lead a respectable life.

XII. SUMMING UP

Change is inevitable, and the same is true of the Indian society. Of the various ongoing associative social processes, the process of sanskritization is probably the most important one, as it has brought about a tremendous and incredible change in the ill-destiny of the members of the lower Hindu castes. It has brought rays of new hopes in their life ensuring them equality, security and indiscrimination. Like M. N. Sriniwas, there are several optimists who strongly believe that the day is not very far when there shall be no discrimination between man and man in the name of caste, class or creed, and that the process of sanskritization will play a dominant role in bringing about this change in the Indian society.

In the ongoing social process of Sanskritization, the Katyayani Shaktipeeth is playing a dominant role. It recognizes neither any caste- hierarchy nor any personal reputation. Once in the campus of the Shaktipeeth, all the people become the same. They throw themselves in the mood of spiritualism religiosity. They forget the identity of their castes and are overpowered by spirituality and brotherhood. Their participation at the ritualistic activities like parikrama, darshan, garland and prasad offering and spiritual meditation reveal their sameness which makes them forget the discrimination often found in the society in the name of caste, class and creed. Here, the members of the lower Hindu castes can be seen in large numbers practising rituals and spiritual meditation. Some of the glimpses of sanskritization at Katyayani Shakti Peeth are- bringing prasad, flowers, garlands

and other gifts for the goddesses; offering them with the members of the upper castes; joining them in the queues at the time of darshan and parikrama; spiritual meditation with them; staying with them in the temple campus for the sake of worship, vigils etc. Indeed, all this witnesses a positive social change in the Indian social system.

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AUTHORS

First Author – Dr. Rajesh Kumar Sharma, Head- Department of Sociology, Government P.G. College, Dholpur (Rajasthan)

Second Author – Sandhya Dixit, Project Fellow- UGC Major Research Project on Sanskritization

Effects on morphology and motility of *Listeria monocytogenes* cells subjected to sublethal stress of temperatures

Mohd Nizam Lani¹, Zaiton Hassan² and Son Radu³

¹School of Food Science and Technology, Universiti Malaysia Terengganu (UMT), 21030 Kuala Terengganu, Terengganu, MALAYSIA.
²Faculty of Food Science and Technology, Universiti Sains Islam Malaysia (USIM), Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan, MALAYSIA.
³Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia (UPM), 43400 Serdang, Selangor, MALAYSIA.

Abstract- Survival and growth of *Listeria monocytogenes* L56 (IMR isolate) was studied in trypticase soy broth (TSB) grown at 37°C before being subjected to three selected sublethal stress temperatures (55°C, 28°C and 4°C). The morphological changes and motility as affected by temperature stresses were determined using Scanning Electron Microscopy (SEM) and motility media, respectively. For this purpose, 10 ml broth containing *L. monocytogenes* previously grown in 300 ml of TSB at 37°C at log phase (12 hour) and stationary phase (19 hour) to 55°C, 28°C and 4°C were taken every 2 h intervals for measurement of morphological changes and motility. A total of 180 cells were measured lengthwise at 9,500x Scanning Electron Microscopy (SEM) magnification using SEMafore for each temperature treatments. The study demonstrated cells of both log and stationary phase of stressed temperature of *L. monocytogenes* showed a significant variation in morphology. Cells of log phase become elongated at 55°C but not at 28°C and 4°C, whereas cells of stationary phase were shorter and more coccoidal rather than elongated as in log phase cells at the three temperatures studied. Loss of motility was observed in cells stressed at stationary phase cells but not at log phase; suggesting that motility plays a role in survival of the organism under temperature stress.

Index Terms- *Listeria monocytogenes*, temperature stress, morphology, motility, survival

I. INTRODUCTION

Microorganism is able to devise mechanisms that assist them in overcoming stresses that are designed to limit their growth. Therefore, the exposure of cells to some form of stress may induce and allow the survival of microorganisms with usually high durability to a given inactivation process. Temperature is a major factor in microbial destruction of spoilage and pathogenic microorganisms in foods. If the heat treatment is insufficient, it imposes a stress on the organism, which result in damage or injury of bacterial cells. Nevertheless, the bacteria have physiological mechanisms that trigger adaptive strategies which enables them to survive in environments that preclude their growth [1].

Listeria monocytogenes has become a major concern to the food industry as indicated by several reports of listeriosis outbreaks associated with contaminated dairy and food products in America and Europe. The Centers for Disease Control and

Prevention (CDC) reported that twenty-four confirmed listeriosis outbreaks during 1998–2008, resulting in 359 illnesses, 215 hospitalizations, and 38 deaths from 1998–2008 [2]. Listeriosis includes a spectrum of clinical illnesses ranging from febrile gastroenteritis to potentially fatal bacteremia and meningitis in groups at higher risk for invasive diseases, including older adults and persons with certain medical conditions [3, 4].

Many processes in food preservation such as freezing, heating and drying caused sublethal injury to the pathogen, which resulted in surviving cells being unable to grow on selective media containing NaCl, bile salts or other detergents [5]. *Listeria* can be sublethally injured by a variety of processing treatments. Injured *Listeria* may be present in foods, yet escape detection because current techniques are inadequate for the recovery of injured *Listeria*. Injured *Listeria*, which escapes detection, possesses the potential to repair in food, thereby poses a serious public health threat.

L. monocytogenes can grow at a wide range of temperatures (-1°C to ~ 45°C) [6]. Foods are subjected to different temperature during handling and storage that may influence the growth and survival of pathogens. Growth of 4°C was selected because most foods are kept in refrigeration temperature. Growth of ambient temperature (28°C) was selected because many foods are handled at this temperature and *L. monocytogenes* may often be present on surfaces and utensils and become a major source of contamination. A temperature of 55°C was chosen because food may be subjected to temperature abuse during food handling or storage and this temperature can be stressful to the microorganism [7]; thus this study was conducted to determine the survival of growth characteristic of *L. monocytogenes* in these stressful temperature environments.

Scanning Electron Microscopy (SEM) was used to observe the morphological changes of *L. monocytogenes* subjected to various temperature stresses. Motility of *L. monocytogenes* during adaptation of temperature stress was also studied.

Therefore, the objective of this study was to examine the morphology and growth as indicated by motility of temperature stressed *L. monocytogenes*.

II. EXPERIMENTAL METHOD

A. Source of Microorganism

Listeria monocytogenes (L56) used in this study was obtained from Institute for Medical Research (IMR) of Malaysia. The

source of this culture was from Royal College of Pathologists of Australasia (RCPA) Quality Assurance Programme M8/92 Daving Change (UHN 009967), which was a clinical isolate from infected human blood (serotype 4b). Cultures were maintained at -20°C in trypticase soy broth (Merck, Germany) containing 10% glycerol.

B. Confirmation of *L. monocytogenes* Culture

Biochemical and morphological tests were performed to confirm the purity of the isolate. Isolate was streaked on trypticase soy agar (Merck, Germany) with 0.6% yeast extract (TSAYE) prior to subculturing into PALCAM agar (Merck, Germany) and incubated at 37°C for 24 to 48 h. Presumptive positive *Listeria* colonies that were grey green with a black sunken center which exhibited black halo in PALCAM agar (Merck, Germany) after incubation 24-48 h at 37°C were selected and further purified by streaking on Trypticase Soy Agar (Merck, Germany). Isolates that were Gram (+), catalase (+), motile at 21°C (+), methyl red (+), β hemolysis (+), nitrate reduction (-), rhamnose (+) and xylose (-) were considered to be *L. monocytogenes* [8].

C. Survival of *L. monocytogenes* under Temperature Stress

For preparation of inoculum for survival studies, a single isolated colony of the bacteria on Trypticase Soy Agar (Merck, Germany) after incubation of 24 h at 37°C was transferred to 100 ml Trypticase Soy Broth (Merck, Germany) and incubated at 37°C for 30 min. One ml from this broth was transferred into 300 ml of TSB with an initial 10^3 CFU/ml. The bacterium was grown at 37°C until the bacterium reached log and stationary phase after 12 and 19 h, respectively before subjected to selected sublethal temperature stresses (55°C, 28°C and 4°C). Prior to sudden shifting temperature, the inoculum size for log and stationary phase were 10^8 and 10^9 CFU/ml, respectively.

During the stressing of *L. monocytogenes* from 37°C to 55°C, 28°C and 4°C, 10 ml broth containing stressed cells of *L. monocytogenes* were taken from 300 ml of TSB and transferred into the sterile centrifuge tubes. The sampling was taken at every 2 h interval during the growth of *L. monocytogenes* at three temperature stress (55°C, 28°C and 4°C) at log and stationary phases. Then, the broth of stressed cells of *L. monocytogenes* was harvested by centrifugation (Kubota 5100) at 6,000 rpm for 15 minutes at 4°C. The supernatant was replaced with 4% glutaraldehyde solution for fixation purpose and kept at refrigeration until further used for SEM's sample preparation.

D. SEM's Sample Preparation

The cells were then washed in 0.1M sodium cacodylate buffer (repeated three times), post-fixed in 1% buffered osmium tetroxide for 24 h at 4°C, washed again in 0.1 M sodium cacodylate buffer (repeated three times), subjected to 0.1M graded acetone; 35%, 50%, 75%, 95% and 100% (repeated three times), and critical point dried in liquid CO₂. Each sample was then individually mounted on stubs, sputter coated with a gold-palladium complex and examined using a JSM 6400 Model Scanning Electron Microscopy (JOEL) at 15 kV.

E. Measurement of Cells Length Using SEMafore

Each SEM image consisted of approximately 60-100 stressed cells of *L. monocytogenes*. In order to get at least 60% of overall population cells for each observation, a total of 180 measurements from triplicate SEM images for each sampling time were recorded. The sampling time was done at 2 h interval for 6 h at 55°C, 28°C, and 4°C for cells at log and stationary phases. The SEM magnification at 9,500x was used throughout this study.

F. Effect of Temperature Stress on Motility of *L. monocytogenes*

Aseptically, at one hourly interval the motility media (Merck, Germany) was stabbed inoculated with temperature stressed *L. monocytogenes* followed by incubation at 25°C for 3 d. Results were recorded as positive or negative based on umbrella-shaped growth pattern in motility media.

G. Statistical Analysis

The length of cells at log and stationary phase exposed to different stressed temperatures were statistically analysed using SAS (SAS Institute, Cary, NC, USA). One-way ANOVA was used to determine significant different ($P \leq 0.05$) between samples. Duncan's test was used as post hoc comparison between means of variables of samples.

III. RESULTS AND DISCUSSIONS

A. Mean Cells Length of *L. monocytogenes* As Affected by Sublethal Stress Temperatures

Upon exposure to sublethal stress of temperatures, *L. monocytogenes* undergoes various morphogenesis as observed under SEM. There phenotypic variations observed include cell elongation, coccoid and intact cells. Cell width was neglected due to the insignificant changes observed in this study.

Table 1: Comparison of mean cells length (μm) of log and stationary phase *L. monocytogenes* on exposure to sublethal temperature stresses

Bacterial phase	Temperature and hour of stress	Mean (μm) ± Standard deviation
Log	55°C (2 h)	0.94 ± 0.46 ^{a,a}
Stationary	55°C (2 h)	0.87 ± 0.27 ^a
Log	55°C (4 h)	2.07 ± 0.97 ^a
Stationary	55°C (4 h)	0.74 ± 0.27 ^b
Log	55°C (6 h)	1.33 ± 0.77 ^a
Stationary	55°C (6 h)	0.84 ± 0.30 ^b
Log	28°C (2 h)	0.83 ± 0.24 ^a
Stationary	28°C (2 h)	0.89 ± 0.25 ^b
Log	28°C (4 h)	0.88 ± 0.24 ^a
Stationary	28°C (4 h)	1.01 ± 0.31 ^b
Log	28°C (6 h)	0.87 ± 0.27 ^a
Stationary	28°C (6 h)	0.94 ± 0.28 ^b
Log	4°C (2 h)	1.02 ± 0.35 ^a
Stationary	4°C (2 h)	0.72 ± 0.20 ^b
Log	4°C (4 h)	0.92 ± 0.32 ^a

Stationary	4°C (4 h)	1.05 ± 0.25^b
Log	4°C (6 h)	0.89 ± 0.29^a
Stationary	4°C (6 h)	1.01 ± 0.30^b

Table 1 demonstrates the variation of cells length (μm) of log phase cells after exposure to various temperature stresses, which ranging between $0.83 \mu\text{m}$ to $2.07 \mu\text{m}$. Log phase cells exposed to 55°C resulted in filament formation. The mean cells length increased from $0.94 \mu\text{m}$ to $2.07 \mu\text{m}$ at 2 and 4 h, but decreased to $1.33 \mu\text{m}$ after 6 h exposure. In contrast, no elongation of cell length occurred when *L. monocytogenes* cells were stressed at 28°C and 4°C . Cells of log phase at 28°C were relatively shorter in length as compared to cells at 4°C . However, cells at 4°C showed a continuous decrease of cells length throughout the duration of stress. There was no difference in cell length stressed at 28°C within the six hour of stress.

The length of log phase cells length increased as the growth environment became more challenging. The mean of cells length increased at 28°C , followed by 4°C , and 55°C . Cell elongation was evident at 55°C than 28°C (Fig. 1 and 2). This study showed that the log phase cells *L. monocytogenes* undergo changes in phenotypic morphologically in cell length when exposed to high temperature stress. Previous reports demonstrated long filamentous structures occurred when *Listeria* were propagated on agar containing 8 to 9% NaCl [9, 10]. In other study, filament formation of *L. monocytogenes* occurred at NaCl concentration above 1,000 mM with an increase in filament length as NaCl concentration increased [11]. The formation of filaments of *L. monocytogenes* was also reported when this organism was exposed to salt, acid and alkali stress at 3°C [12], and 5% NaCl and 7% KCl [13]. They concluded that the cells length increased as the growth environment became more challenging. The formation of filaments is required for the repair of DNA lesions which give rise to mode one killing, which involved DNA damage.

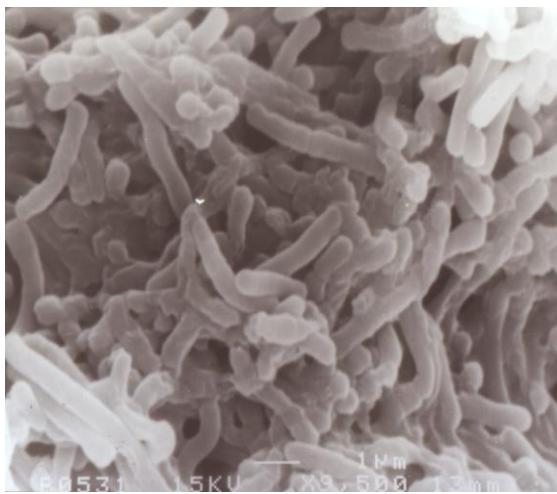


Fig. 1. SEM of log phase cells *L. monocytogenes* became elongated at 55°C

Bacterial cells exposed to mild heating temperature (55°C) had an accelerated growth rate [14] and became filamentous rather than at other stress conditions. It was concluded that the

faster bacterial cells grow, the longer they are, and the size seems to be an exponential function of growth rate at a given temperature [15]. Another hypothesis is that mild heating of bacterial cells would adapt 'thermal expansion'. According to Serway [16], as growth temperature increases, its volume increases. The overall thermal expansion of a bacterial cell is a consequence of the changes in the average separation between its constituent liquid atoms and molecules.

However, a different phenomenon was observed during stationary phase of *L. monocytogenes* (Table 1). Most of *L. monocytogenes* cells became shorter and coccoid with mean ranged between $0.72 \mu\text{m}$ to $1.05 \mu\text{m}$. Exposure to 55°C resulted in shortening of cells. The mean of cells length was decreased from $0.87 \mu\text{m}$ (2 h) to $0.74 \mu\text{m}$ (4 h), however the cells length increased to $0.84 \mu\text{m}$ (6 h). Cells of stationary phase at 28°C were $0.89 \mu\text{m}$ to $1.01 \mu\text{m}$ whilst, the cells length of stationary phase at 4°C were $0.72 \mu\text{m}$ to $1.05 \mu\text{m}$. The cells length increased from $0.72 \mu\text{m}$ (2 h) to $1.05 \mu\text{m}$ (4 h), and the filament decreased to $1.01 \mu\text{m}$ (6 h). It was observed that cells of stationary phase at 55°C (4 h) and 4°C (2 h) demonstrated shorter cells length than other stress condition with the mean cells length of $0.74 \mu\text{m}$ and $0.72 \mu\text{m}$, respectively.

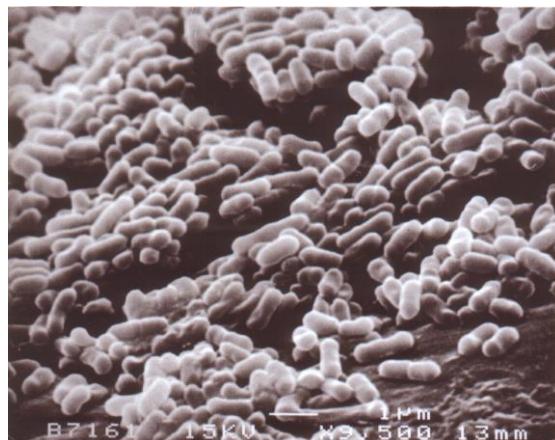


Fig. 2. SEM of log phase cells *L. monocytogenes* at 28°C

As shown in Fig. 2, no apparent differences in average size (below than $1.01 \mu\text{m}$) was observed at 28°C . Although both log and stationary phase cells were shorter, they were statistically different at $P \leq 0.05$. Cells growths at 28°C were more intact and this suggests that at this temperature which is near to optimal growth (30 - 37°C) were not disrupted by temperature stress. It was reported that young cultures of *L. monocytogenes* consist of short rod organism measuring from 0.5 by 1 to 2 μm ; the ends that may be slightly pointed, with short chains and diploforms often seen as V or Y-shaped [17].

At 4°C , the decreased in cells length was observed constantly from 2 to 6 h during log phase of stressed cells of *L. monocytogenes*. In contrast, during stationary phase, it was an increase of stressed cells length, which observed after 2 hour. Stressed cells of stationary phase of *L. monocytogenes* at 4°C were slightly longer (0.72 to $1.05 \mu\text{m}$) than cells at 28°C ($0.83 \mu\text{m}$ to $1.01 \mu\text{m}$). The possibility of cells were structural damaged

due to temperature stress is described as "fussy phenomenon", which was reported earlier when *L. monocytogenes* was subjected to long-term chilling storage [18]. In addition, SEM showed the bacteria tend to clump together when cells at stationary phase was stressed at 4°C as shown in Fig. 3. The organism being presented in clumps is associated with the occurrence of shoulder present in survival curves [19].

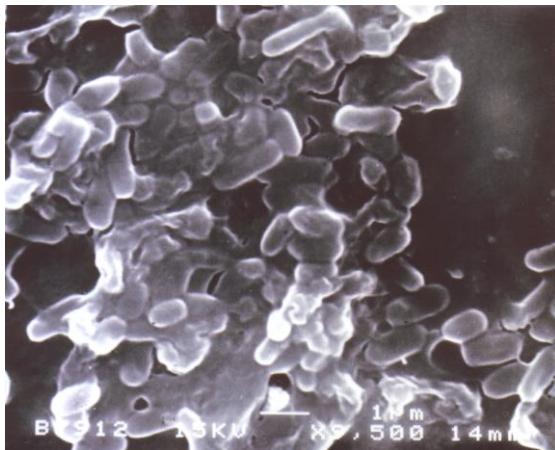


Fig. 3. SEM of stationary phase cells *L. monocytogenes* showing cell clumping at 4°C

Based on the statistical analysis, the present study demonstrated that the changes in morphology of *L. monocytogenes* were dependent on the bacterial growth phase environment. It is suggested that alteration and changes of morphology of *L. monocytogenes* is a part of microbial cells adaptation for their continued survival and successful growth [20].

B. Motility of *L. monocytogenes* As Affected by Sublethal Stress of Temperatures

Studies using motility agar was used to determine whether cells from temperature stresses could influence listerial motility when subjected to sublethal stress of temperatures. Motility character of *L. monocytogenes* was affected by growth phase of the pathogen (Table 2). It was observed that loss of motility was observed for cells at stationary phase compared to cells at log phase at the three stressed temperatures studied.

Table 2: Motility results of *L. monocytogenes* subjected to sublethal stress of temperatures at log and stationary phases

Bacterial phase	Temperature and hour of stress	Motility
Log	55°C (2 h)	Motile
Stationary	55°C (2 h)	Non-Motile
Log	55°C (4 h)	Motile
Stationary	55°C (4 h)	Non-Motile
Log	55°C (6 h)	Motile
Stationary	55°C (6 h)	Non-Motile
Log	28°C (2 h)	Motile
Stationary	28°C (2 h)	Non-Motile

Log	28°C (4 h)	Motile
Stationary	28°C (4 h)	Non-Motile
Log	28°C (6 h)	Motile
Stationary	28°C (6 h)	Non-Motile
Log	4°C (2 h)	Motile
Stationary	4°C (2 h)	Non-Motile
Log	4°C (4 h)	Motile
Stationary	4°C (4 h)	Non-Motile
Log	4°C (6 h)	Motile
Stationary	4°C (6 h)	Non-Motile

Little is known concerning listerial motility character as affected by environmental stress. The present study demonstrated that cells during stationary phase lost their motility character, whereas listerial motility during log phase was not affected. Very little is known about the influence of temperature on motility of *L. monocytogenes*, however, a previous study reported that 30 (68.2%) of 44 strains tested showed swimming at 22°C and 4 (9.1%) of those were also motile at 12°C. Their finding showed that swimming motility was observed only at 22°C, so confirming the temperature-dependent flagellum production in *Listeria* spp [21].

The result is of this study clearly suggested that stress may affect some of phenotypic characteristic of organism as adaptation for survival. The finding of this study is very useful in preventing misidentification of *L. monocytogenes* in food systems, as most of food systems present in stress environment. This study provides a better understanding about filament and coccoid formation of *L. monocytogenes* in stress environment and its potential implication to food safety.

IV. CONCLUSIONS

L. monocytogenes cells are able to grow and survive throughout the sublethal temperature stress evaluated and undergo changes in morphology and motility in order to adapt to the new environment.

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AUTHORS

First Author – Mohd Nizam Lani, PhD, Senior Lecturer in School of Food Science and Technology, Universiti Malaysia Terengganu (UMT), 21030 Kuala Terengganu, Terengganu, MALAYSIA and email: nizamlani@umt.edu.my

Second Author – Zaiton Hassan, PhD, Assoc. Prof. in Faculty of Food Science and Technology, Universiti Sains Islam Malaysia (USIM), Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan, MALAYSIA and email: drzaiton@usim.edu.my

Third Author – Son Radu, PhD, Prof. in Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia (UPM), 43400 Serdang, Selangor, MALAYSIA and email: son@upm.edu.my

Correspondence Author – Mohd Nizam Lani, nizamlani@umt.edu.my, or nizamlani@gmail.com

Development and Acceptability of Training Module in Switching Logic

Leo Caccam. Rio

University of Rizal System, Tanay, Rizal Province of Rizal, Philippines

Abstract- The study aimed to develop a Training Module in Switching Logic as instructional material in the teaching of students of Bachelor of Technology in subjects such as Industrial Design Process and Control, Industrial Electronics and Industrial Motor Control. This was conducted at the University of Rizal System-Morong Campus during the First Semester of School-Year 2007-2008. Professors and Instructors of the College of Industrial Technology and College of Engineering as well as the fourth year students of Bachelor of Technology major in Electrical technology served as the respondents –evaluators in the study. The researchers used an adopted and modified questionnaire-checklist to determine the level of acceptability of the module with respect to its objectives, Contents, Pretest and post-test contents, Illustrations/photos and Usefulness.

To determine the level of acceptability of the developed training module in switching logic as perceived by the evaluators in terms of objectives, contents, pre and post-test contents, illustrations/photos and usefulness, weighted mean was used. To test if there is significant difference on the level of acceptability of the developed training module in switching logic as perceived by the two groups of respondents, t-test was utilized.

Based from the result of the study, the developed training module was very much accepted as evaluated by the two groups of evaluators, thus, it can be used as instructional material in the teaching of Motor Control and Industrial Design Process and in Industrial electronic subjects. In addition, the developed training module is also suitable and fitted for use by the students who are enrolled in BT and BS Engineering courses major in electrical technology and can be utilized as an effective instructional material in accomplishing competency-based subjects.

Index Terms- Instructional Materials, IM's, Switching Logic, Training Module

I. INTRODUCTION

Teaching is considerably one challenging but meaningful job an individual person can choose out of hundreds of professional careers. It is really a difficult work yet a challenging one. Educators don't just teach, impart and discuss lessons from course outline or syllabi, they also share their times to share their talents and other skills to their students.

An ideal teacher gives concern to the effective delivery of the lessons and put high values on the learning capabilities of his learners. Hence, teacher employs a variety of methodologies and teaching strategies to give to the students the hundred percent learning and acquisition of new skills.

One of the concerns that a teacher has to employ is the initiative to conceptualize, prepare and utilize instructional devices and materials that are beneficial to students' effective and creative learning. These instructional materials may be originally designed and customized according to the preference and teaching style of the teacher.

Instructional materials are devices that assist the Instructors in the teaching-learning process. These materials are not self-supporting; they are supplementary training devices. These are materials that are used to aid in the transference of information from one to another. For example, a teacher may use instructional materials to aid in the learning of subject matter for a class. These instructional materials could include Power Point presentations (visual aids), Books , Articles and Materials for project development.

There are many reasons why teachers use Instructional devices or material. One of the reasons is that it helps the students remember important information, tasks or ideas. They help gain and hold the attention of students. Audio or visual aids can be very useful in supporting a topic, and the combination of both audio and visual stimuli is particularly effective since the two most important senses are involved.

Instructors should keep in mind that they often are salesmen of ideas, and many of the best sales techniques that attract the attention of potential clients are well worth considering. One caution-the instructional aid should keep student's attention on the subject; it should not be a distracting gimmick. Good instructional devices also can help solve certain language barrier problems. Consider the continued expansion of technical terminology in everyday usage. This, coupled with culturally diverse backgrounds of today's students, makes it necessary for instructors to be precise in their choice of terminology. Words or terms used in an instructional aid should be carefully selected to convey the same meaning for the student as they do for the instructor. They should provide an accurate visual image and make learning easier for the student.

Another use of instructional materials is to clarify the relationships between material objects and concepts. When relationships are presented visually, they often are much easier to understand. For example, the subsystems within a physical unit are relatively easy to relate to each other through the use of schematics or diagrams. Symbols, graphs, and diagrams can also show relationships of location, size, time, frequency, and value. By symbolizing the factors involved, it is even possible to visualize abstract relationships. Clearly, a major goal of all instruction is for the student to be able to retain as much knowledge of the subject as possible, especially the key points. Numerous studies have attempted to determine how well

instructional-aids serve this purpose. Indications from the studies vary greatly-from modest results, which show a low percent increase in retention, to more optimistic results in which retention is increased by high percentage level.

Instructional-aids should also be reviewed to determine whether their use is feasible in the training environment and whether they are appropriate for the students' use. In practice, the choice of instructional-aids depends on several factors. Availability, feasibility, or cost may impose realistic limitations. The number of students in a class and the existing facilities are other considerations. In some school situations, the designers of the curriculum determine the use of instructional aids. In this case, the instructor may have little control over their use. On the other hand, an independent facilitator of learning may have considerable latitude, but limited resources. Often, teachers improvise and adapt to the existing circumstances in order to incorporate quality instructional-aids.

The researcher believes that developing an instructional or training material is worth pursuing as these are truly beneficial particularly among students of Bachelor of Technology, who, in spite of the unavailability of the Programmable Logic Control [PLC] still wish to be knowledgeable and adept in the design and programming of circuit controls. This was the inspiration that urged the researchers in the conduct of this study.

As educator, the researcher also believed that the development of a training module in switching logic will help students realize the importance of the subject relative to technology management. Also, with the use of the training module, the students will be able to direct and focus their learning towards a comprehensive and scholarly understanding and practice of their skills in the subject as prescribed by the BT program especially in the conduct of industrial design process and control subject.

The study was anchored on "Instructional Conceptualism by Bruner. Bruner believes that mental processes such as perception, concept attainment and reasoning depends upon an imaginative process of construction. He points out that in order to present a lesson teacher should give a concrete visual presentation to motivate the eagerness of the pupil to learn.

Bruner's theory points out four significant concerns applicable to learning situation which is acquisition of the basic relationship in the structure of a subject matter, Readiness, Development of the Independent Learner and Motivation.

The theory of Bruner was related to the present study since the study was primed with the development of an instructional material.

II. OBJECTIVES

The main purpose of this study is to develop a training module in switching logic and test its acceptability using an adopted and modified questionnaire-checklist.

Specifically, it aimed to:

1. Design and write a training module in switching logic.
2. Determine the level of acceptability of the developed training module in terms of:
 - 2.1 Objectives;
 - 2.2 Contents;

- 2.3 Pre-test and Post-Test;
- 2.4 Photos/illustrations; and
- 2.5 Usefulness.

3. Determine the significant difference on the evaluation made by the two groups of respondents-evaluators with respect to the acceptability of the developed training module in switching logic in terms of Objectives, Contents, Pre-test & Post-test, Photos/Illustrations and Usefulness.

III. REVIEW OF RELATED STUDIES AND LITERATURE

Instructional materials are used by teachers to facilitate effective teaching and better quality of learning among students. Instructional materials are created to suit the different ways that students learn. While some students learn and retain information that are fed to them through a lecture, others learn better by reading. Other students however absorb information with the aid of visual cues in addition to the lecture and reading. The use of different instructional materials assures and provides the student with different learning aids to maximize learning and retain the information given to them. (Bone. n.d.)

Along this context, Lardizabal et.al stated that the effectiveness of testing process can be increased greatly through the use of instructional materials. In connection to this, learning is made easy through the utilization of a variety of instructional materials, hence, students are more likely to learn as they are motivated to acquire knowledge and skills.

This really calls for the teachers to employ varied methodologies in presenting their lessons for their students to attain the set objectives out of the lessons and to satisfy the needs of the students to acquire knowledge and skills in order to improve and grow in their chosen career.

As mentioned by Hughes, modular instruction is a unique kind of individualized instruction which provides the basis for close interaction between the learners and subject matter. He further stressed the modernization of the teaching process using a module suited to every student who is given a chance to advance at his own rateⁱ.

Laron stated that a variety of instructional materials has been proven to produce more effective and efficient learning.

According to Flores, instructional materials in the classroom are most effective tools to catch up the interest and understanding of the students and help teachers to teach better.

Victorio, et. al. said that teaching aid device is a faithful companion of a teacher in lessons because it enables the teacher to discuss the lesson more accurately and it gives the student a better insight on the content of the lesson.

Brenda Corpuz believed that the use of different types of graphics in teaching learning process promotes better retention of learning.

The guideline in the use of instructional materials emphasizes that they should be based on the fundamental concepts and principles involved in the specific subject or course that is taught. The purpose of this is to align the students understanding of the topic with current knowledge. It also teaches them to control and monitor their thought processes to facilitate learning. (Van Hooser, 2010) The method of instruction

also determines the choices of instructional materials. The teaching methods can be divided into mass instruction techniques, individualized learning techniques, and group learning techniques. For mass instruction, audiovisual and instructional materials are used, worksheets, hand-outs and visual aids. They are illustrative and supplementary material to increase motivation or to integrate the lesson. In individualized learning, the material is the vehicle where instruction takes place. This material should be designed and created with utmost care as it facilitates exercises or used for diagnostic purposes. Group learning on the other hand, requires no specialized instructional learning because the emphasis on this avenue of learning is on the approach and technique. Nevertheless, booklets, worksheets and briefing materials are used. Like individualized learning they should be designed carefully to make sure that the learning exercise runs smoothly. (Ellington, 1987)

There are seven types of instructional materials: printed and duplicated materials, non-projected display materials, still-projected display materials, audio-materials, link-audio and still video materials, cine and video materials and computer-mediated materials. Printed and duplicated materials consist of hand-outs, assignment sheets, individualized learning materials, and resource materials for group exercises. Non-projected display materials are chalkboard displays, marker board displays, feltboard displays, flipcharts, hook and loop, magnetic board, wallcharts, charts, posters, photographic prints, mobiles (3D objects hung on the roof), 3D models, dioramas, and realia. Still-projected display materials are overhead projectors, slide shows, film strips, microforms. Audio materials are radio, gramophones, and audiotapes. Link audio and still video materials include tape slide programs, tape-photograph programs, film strips with sounds, radio-vision programs, tape-text, tape-model and tape realia. Cine and video materials are cine films, loop-films, tape-films, television broadcasts, videotape recordings, video-disk recordings. Computer-mediated materials are number crunching and data processing package, substitute tutor packages, data base systems, computer-managed learning systems, and interactive video systems. (Ellington, 1987)

The method of teaching and student learning styles determine the type of instructional materials used. Further, the use of different instructional materials designed within the 5E model is most effective in enhancing student learning. The 5E instructional model is based on the constructivist approach to learning. This model approaches learning by constructing new knowledge and skills by building on prior knowledge and experience. The 5E model follows five stages: engage, explore, explain, elaborate, evaluate. Studies have shown that there is a high statistical link between the use of the 5E model and high achievement of students. (Van Hooser, 2010) The use of the 5E model is associated with high test scores and positive attitudes and feelings among first graders towards science. (Edey and Gomez, n.d.)

IV. MATERIALS AND METHOD

This study focused on the development of training module in switching logic as an instructional material. This was conducted during school year 2007-2008. The respondents of the study were the selected Bachelor of Technology electrical

professors/instructors and selected fourth year Bachelor of Technology students major in Electrical Technology of the College of Industrial Technology and College of Engineering of University of Rizal System- Morong Campus.

Development of Training Module in Switching Logic

The instructional material entitled Training Module in Switching Logic was developed following the systematic procedures to make it appropriate to the learning capabilities of the students who are enrolled in advanced major subject Industrial Design Process and Control. Procedural steps were considered and followed in its development.

Main topics in Industrial Design Process and Control such as types of switches, gates such as AND , OR, NAND and NOR were chosen for reasons that these topics are vital in all circuit designing for industrial electrical controls that BT-electrical students need to learn.

Validation of the developed instructional material was conducted. The developed material was shown to experts in the field of English, Technology, Electricity and Electronics and Drawing for content validation. Suggestions and recommendations from experts were accepted and incorporated, thus, an improved and validated module was printed.

With this in mind, the researchers administered an adopted and modified questionnaire-checklist to selected respondents to test the acceptability of the output to find out whether such instructional material can help in the training/ learning process and can be used by the BT electrical technology students.

To determine the level of acceptability of the developed training module in switching logic as perceived by the respondents in terms of objectives, contents, pre and post-test contents, illustrations/photos and usefulness, weighted mean was used. To test if there is significant difference on the level of acceptability of the developed training module in switching logic as perceived by the two groups of respondent-evaluators, t-test was used.

V. RESULTS AND DISCUSSION

This part presents the analysis and interpretation of data with regards to the acceptability of the developed Training Module in Switching Logic.

Level of Acceptability of the Developed Training Module in Switching Logic with Respect to Objectives.

Table 1 presents the computed weighted mean on the level of acceptability of the developed instructional material as perceived by two groups of respondents with respect to objectives.

The expert-respondents perceived that the "Objectives" set for the training modules as very much accepted as it earned an average mean of 4.83.

As for the 4th year BT students, they find the "Objectives" as very much acceptable too as indicated by the average mean of 4.59.

Over-all, the "Objectives" designed for the training module is found very much acceptable as it gained an average mean of 4.71

The findings describe that both groups of the respondents accepted the “Objectives” of the developed training module in switching logic very much.

This implies that the objectives of the developed instructional material in teaching of industrial design process and control subject are simple and very attainable.

Table 1
Computed Weighted Mean on the Acceptability of the Developed Training Module in Switching Logic with Respect to Objectives

Objectives	Experts		4 th yr. BT students		Overall	
The objectives stated in the Instructional Materials	Mean	VI	Mean	VI	Mean	VI
1. are clear	4.74	VMA	4.66	VMA	4.70	VMA
2. are attainable	4.87	VMA	4.56	VMA	4.72	VMA
3. are based on the learning abilities of the students	4.80	VMA	4.50	VMA	4.65	VMA
4. are time bounded	4.97	VMA	4.64	VMA	4.81	VMA
5. are measurable	4.77	VMA	4.59	VMA	4.68	VMA
Average	4.83	VMA	4.59	VMA	4.71	VMA

Level of Acceptability of the Developed Instructional Training Module in Switching Logic with Respect to Contents.

Table 2 presents the computed weighted mean on the level of acceptability of the developed Training Module in Switching Logic as perceived by two groups of respondents with respect to contents.

The average weighted mean obtained from the teacher-respondents is 4.67 and is verbally interpreted as “very much accepted”. Item number 1 which is “based on the prescribed/expected learning competency got the highest rank and has a weighted mean of 4.75 and verbally interpreted as “very much accepted. Next in rank are items number 2 which is “arranged logically” and 4 which is “presented with specific instruction”, both has a verbal interpretation of “very much accepted”. Third in rank is item number 3 and 5 “appropriate and relevant” and “are congruent to the objectives of the lesson” with

weighted mean of 4.63 and verbally interpreted as “very much accepted”.

The table also shows the average weighted mean obtained from the 4th yr. BT student-respondents is 4.63 and verbally interpreted as “very much accepted”. Item number 1 “based on the prescribed /expected learning competency got a highest rank weighted mean score of 4.72 and verbally interpreted as “very much accepted”. Next is item number 2 which is “arranged logically”, followed by the item number 4 “presented with specific instruction” with obtain the weighted mean of 4.62 and verbally interpreted as “very much accepted”. The fourth rank goes to item number 5 “are congruent to the objective of the lesson” which has a weighted mean score of 4.60 and “verbally interpreted as “very much accepted” and the fifth in rank is item number 3 “appropriate and relevant ” with a weighted mean of 4.52 and also verbally interpreted as “very much accepted”.

Table 2
Computed Weighted Mean on the Acceptability of the Developed Training Module in Switching Logic with Respect to Contents

Contents	Experts		4 th yr. BT students		Overall	
The content stated in the Instructional Material	Mean	VI	Mean	VI	Mean	VI
1. based on the prescribed/expected learning competency.	4.75	VMA	4.72	VMA	4.74	VMA
2. arranged logically.	4.67	VMA	4.69	VMA	4.68	VMA
3. appropriate and relevant	4.63	VMA	4.52	VMA	4.58	VMA
4. presented with specific instruction	4.67	VMA	4.62	VMA	4.65	VMA
5. are congruent to the objectives of the lesson.	4.63	VMA	4.60	VMA	4.62	VMA
Average	4.67	VMA	4.63	VMA	4.65	VMA

The findings revealed that both the student-respondents and expert-respondents perceived that the content of the developed training module in switching logic is based on the prescribed /expected learning competency.

This may be due to the fact that both groups of respondents are more focused on the development of the learning competencies. Hence, they accepted the developed training module with respect to contents.

Level of Acceptability of the Developed Training Module in Switching Logic with Respect to Pre & Post Test.

Table 3 presents the computed weighted mean on the level of acceptability of the developed training module in switching logic as perceived by the two groups of respondents with respect to pretest and post test.

The average weighted mean obtained from the expert-respondents is 4.60 and verbally interpreted as "very much accepted". Item number 2 and 5 got the highest weighted mean with a weighted mean of 4.67 and verbally interpreted as "very much accepted". This was followed by item number 3 with weighted mean of 4.63. Third in rank is item number 4 with a weighted mean of 4.53 and verbally interpreted "very much accepted". Least among the 5 items is item number 1 "is simple

and easy to understand" which has a weighted mean of 4.50 likewise verbally interpreted as "very much accepted".

The table also shows that the average weighted mean of 4.69 and verbally interpreted as "very much accepted", item number 1 "is simple and easy to understand" got also the highest rank and weighted mean of 4.87 and verbally interpreted as "very much accepted", followed by the item number 2 "provides technical term for easy understanding" with obtain weighted mean of 4.79 and verbally interpreted as "very much accepted". The third in rank is the item number 5 "present clear direction" has a weighted mean of 4.67 and verbally interpreted as "very much accepted". The fourth in the rank is item number 4 "provides appropriate font size for easy reading" with weighted mean of 4.57 and verbally interpreted as "very much accepted". Least in the rank is item number 3 with obtained weighted mean of 4.55 and verbally interpreted as "very much accepted".

The findings revealed that expert- respondents found that the pretest and post test were presented with clear direction. The student-respondents on the other hand viewed the pretest and post test as simple and easy to understand. This could imply that the developed training module in switching logic could be used by the students since it is simple, easy to understand and has a clear direction.

Table 3
 Computed Weighted Mean on the Acceptability of the Developed Training Module in Switching Logic with Respect to Pretest and Post-Test

Pre and Post-Test	Experts		4 th yr. BT students		Overall	
	Mean	VI	Mean	VI	Mean	VI
The language and styles stated in the Instructional Material						
1. is simple and easy to understand	4.50	VMA	4.87	VMA	4.69	VMA
2. provides technical term for vocabulary development	4.67	VMA	4.79	VMA	4.73	VMA
3. are appropriate to the ability of the students.	4.63	VMA	4.55	VMA	4.59	VMA
4. Provides appropriate font size for easy reading.	4.53	VMA	4.57	VMA	4.55	VMA
5. present clear directions.	4.67	VMA	4.67	VMA	4.67	VMA
Average	4.60	VMA	4.69	VMA	4.65	VMA

Level of Acceptability of the Developed Training Module in Switching Logic with Respect to Illustrations/Photos

Table 4 shows the computed weighted mean on the level of acceptability of the developed training module in switching logic as perceived by two groups of respondents with respect to illustrations/photos.

As can be gleaned from the table, with respect to illustrations/photos, the average weighted mean obtained from teacher-respondents is 4.87 and verbally interpreted as "very much accepted". Item number 1 " clearly convey the idea or thoughts in the illustrations and photos" and item number 5 "presented with vivid color" was the highest rank since it obtained a weighted mean of 4.98 and verbally interpreted as "very much accepted". While descriptor number 2 "show appropriate schematic symbols for electrical devices and

components" is least in the rank as it obtained weighted mean of 4.69 and verbally interpreted as "very much accepted".

The findings describe that the expert-respondents have very much accepted the developed instructional module since it utilized appropriate illustrations and original pictures.

This implies that the developed instructional module can motivate the students of BT-electrical in their training on industrial design process and control.

Level of Acceptability of the Developed Training Module in Switching Logic with Respect to Usefulness

Table 5 presents the computed weighted mean on the level of acceptability of the developed training module in switching logic as perceived by two groups of respondents with respect to usefulness.

As gleaned from the table, both expert and student-respondents perceived that the usefulness of the developed

module on real-life task is very much accepted since it obtained a weighted mean of 4.93 and 4.88 respectively. It was followed by item number 5 “creates opportunity for the students to learn and study with independency which has a weighted mean of 4.85 and verbally interpreted as “very much accepted. Item number is last in rank with obtained weighted mean of 4.55 and verbally interpreted as “very much accepted”.

As depicted from the table, the student respondents perceived that with respect to usefulness the statement “can be used at any particular learning time frame” ranks last with a weighted mean of 4.48 and is verbally interpreted as “very much accepted”.

Table 4
 Computed Weighted Mean on the Acceptability of the Developed Training Module in Switching Logic with Respect to Illustrations/Photos

Illustrations/Photos	Experts		4 th yr. BT students		Overall	
	Mean	VI	Mean	VI	Mean	VI
The illustrations and photos in the Instructional Material						
1. clearly convey the idea or thoughts in the illustrations/photos	4.98	VMA	4.39	VMA	4.69	VMA
2. show appropriate schematic symbols for electrical circuits and components	4.69	VMA	4.58	VMA	4.64	VMA
3. use appropriate diagrams and drawings	4.86	VMA	4.79	VMA	4.83	VMA
4. are originally crafted by the author	4.84	VMA	4.59	VMA	4.72	VMA
5. are presented with vivid color.	4.98	VMA	4.60	VMA	4.79	VMA
Average	4.87	VMA	4.59	VMA	4.73	VMA

The findings describe that the student-respondents perceived that the developed instructional material provides opportunity for the student to acquire a real-life task which is a pre-requisite to the real job.

This implies that the developed instructional material can help the learner to study at their own pace and they can learn

with less assistance or supervisions of their professor in industrial design process and control subject. As a whole, average weighted mean of the experts obtained is 4.73 while from the 4th yr. BT student-respondents is 4.59 and with the same verbal interpretation of “very much accepted”

Table 5
 Computed Weighted Mean on the Acceptability of the Developed Training Module in Switching Logic with Respect to Usefulness

Usefulness	Experts		4 th yr. BT students		Overall	
	Mean	VI	Mean	VI	Mean	VI
The usefulness stated in the Instructional Material						
1. provides real-life task applicable to the students actual work	4.93	VMA	4.88	VMA	4.91	VMA
2. adapts to any size of training groups	4.59	VMA	4.49	VMA	4.54	VMA
3. can be used at any particular learning time frame.	4.73	VMA	4.48	VMA	4.61	VMA
4. Is easy to use and is transportable to the place of training	4.55	VMA	4.56	VMA	4.56	VMA
5. Creates opportunity for the students to learn and study with independency.	4.85	VMA	4.54	VMA	4.70	VMA
Average	4.73	VMA	4.59	VMA	4.66	VMA

Composite Table on the Level of Acceptability of the Developed Training Module in Switching Logic.

Table 6 shows the composite table on the level of acceptability of the Developed Training Module in Switching Logic

On the level of acceptability of instructional material as perceived by the expert- respondents in terms of objectives, contents, pre and post test, illustrations /photos and usefulness, an overall average mean of 4.66 is obtained and interpreted as “very much accepted”.

On the level of acceptability of the developed Training Module in Switching Logic as perceived by the BT student- Respondents with Respect to Objectives, Contents, Pre and post test, Illustrations /photos and Usefulness, an average mean of 4.59 was obtained with verbal interpretation of very much accepted.

It can be seen from the table that it was statistically found that the two groups of respondents accepted the developed

module very much as revealed by the computed average mean. that there is significant difference in the perception of the two groups of respondents in the developed Training Module in Switching Logic in terms of the variables used in the study namely objectives, contents, pre and post test Illustrations/photos and usefulness.

The findings imply that the developed instructional material is useful because the respondents evaluated and perceived that the developed material has attainable objectives, appropriate contents, pre test and post test, provide good illustrations and photos which will help BT-electrical students to gain better training-learning scheme.

Table 6
 Composite Table on the Computed Weighted Mean of the Respondents Level of Acceptability of the Developed Training Module in Switching Logic

Variable	Experts		4th yr. BT students		Overall	
	MEAN	VI	MEAN	VI	MEAN	VI
1. Objectives	4.83	VMA	4.59	VMA	4.71	VMA
2. Contents	4.67	VMA	4.53	VMA	4.65	VMA
3. Pre &Post Test	4.60	VMA	4.69	VMA	4.65	VMA
4. Illustrations/photos	4.87	VMA	4.59	VMA	4.73	VMA
5. Usefulness	4.69	VMA	4.47	VMA	4.58	VMA
Average	4.73	VMA	4.59	VMA	4.66	VMA

Computed T-test Result on the Significant Difference on the Level of Acceptability of the Developed Training Module in Switching Logic.

Table 7 presents the computed t-test result on the level of acceptability of the developed instructional material Training Module in Switching Logic.

As shown on the table, both groups of respondents statistically found out that there is a significant difference in

terms of Objectives and Illustration/Photos having probability values of .007 and .042 respectively. The table also shows that there is no significant difference in terms of Contents, Pre-test/Post-test and Usefulness with probability values of .129, .308 and.082.

Table 7
 Computed T-test Result on the Significant Differences on the Level of Acceptability of The Developed Training Module in Switching Logic

	VARIABLES	t	df	Sig.	Ho	VI
Pair 1	OBJECTIVES	5.015	4	.007	R	S
Pair 2	CONTENTS	1.907	4	.129	FR	NS
Pair 3	PRE-TEST AND POST-TEST	-1.168	4	.308	FR	NS
Pair 4	ILLUSTRATIONS/PHOTOS	2.951	4	.042	R	S
Pair 5	USEFULNESS	2.314	4	.082	FR	NS

It means that the two groups of respondents have different perceptions regarding the acceptability of the instructional material with respect to the variables used in this study.

The findings support the ideas of Bruner's on "Instructional Conceptualism". Bruner believed that a mental process such as perception and reasoning depends upon an imaginative process

of construction. He pointed out that in order to present and discuss lesson, teacher should make use of significant instructional materials to give concrete visual presentation and to motivate the eagerness of the students to learn. This is the reason why the researcher set his purpose to develop an instructional

material in Switching Logic for use of the students of Bachelor of Technology major in electrical technology.

VI. SUMMARY, CONCLUSION AND RECOMMENDATIONS

From the analysis of data gathered, the following findings are hereby summarized:

1. The researcher who has been teaching the subject for quite a long time has thought of developing the Training Module in Switching Logic towards providing the learners the necessary competency and technical know-how in Circuit Control and Circuit Programming despite the non-existence of the Programmable Logic Control [PLC] equipment which is the primary instructional training material in the teaching of the subject. The researcher considered a number of features for the design of the Module. The content, particularly the design and statement of the learning objectives was based on the course syllabus. It followed a format prescribed by the University for most module writers. Illustrated pictures were considered in the final lay-out so as to make the learning material more interesting and friendly.
2. On the level of acceptability of instructional material as perceived by the expert- respondents in terms of objectives, contents, pre and post test, illustrations /photos and usefulness, an overall average mean of 4.73 is obtained and interpreted as "very much accepted".
3. On the level of acceptability of the developed Training Module in Switching Logic as perceived by the BT student-Respondents with Respect to Objectives, Contents, Pre and post test, Illustrations /photos and Usefulness, an average mean of 4.59 was obtained with a verbal interpretation of very much accepted.
4. The Training Module in Switching Logic was developed out of the ideas, initiative and effort of the researchers.
5. The Training Module in Switching Logic was developed based from the existing syllabus of the BT on Industrial Design Process and Control.
6. Due to the fact that there are no available references and module in switching logic, the developed Training Module in Switching Logic will be of help in the teaching of BT students.

From the summary of findings, the following conclusions were drawn:

1. The instructional material was developed out of the initiative of the researcher. It was crafted utilizing the researcher's simple knowledge in module writing.
2. The instructional material was developed based from the University's existing policy on Instructional Material development and preparation.
3. The instructional material was developed out of researcher's expense.
4. The developed instructional material was found very much accepted by the experts and students-evaluators.

5. The developed instructional material was found very useful in the delivery of lessons in Industrial Design Process and Control subject.

Recommendations

From the summary of findings and conclusion drawn, the following are hereby recommended:

1. Prepare instructional materials utilizing more attractive and colorful pictures to enhance students' interest towards the lesson.
2. A follow up study shall be conducted to determine the effectiveness of the developed Instructional Material.
3. The developed material shall be applied copyright and ISBN at the Philippines' National Library or Philippines' Intellectual Property Office.
4. Improve the instructional material with more circuit diagrams that will help motivate the students to do self-learning method to gain better understanding of the lesson ahead of the scheduled and regular class time.
5. A mass production shall be done for the developed Training Module in Switching Logic as instructional material for utilization of the students of Industrial Design Process and Control subject under Bachelor of Technology major in electrical technology.

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AUTHORS

First Author – Leo C. Rio, Ed. D. Associate Professor IV, College of Industrial Technology University of Rizal System-Morong Campus, Morong, Rizal, Philippines.. leocrio@yahoo.com .

AGAIN VACUUM TUBES

Ranjith S*

Abstract- Transistor is the major invention in electronics field, vacuum tubes are used in older times. But vacuum tubes have lot of drawbacks when comparing with transistor like their large size high power consumption etc. So transistor will easily replace vacuum tubes because transistors are small size, low power consumption cheap etc. but transistor can't completely replace these vacuum tubes because transistor can't work in high frequency application and also transistor will almost hit its minimum size further reduction in size is not easy so need a better replacement. Nano size vacuum tubes are better option.

I. INTRODUCTION

In electronics vacuum tubes are devices which are used to control the electric current. This devices are enclosed in a chamber with thermionic emission. Vacuum tubes contains mainly 3 terminals De Forest, inserted a third electrode which is known as grid. So the current flow in the vacuum tubes controlled by adjusting the grid potential with respect to the cathode. Unfortunately vacuum tubes are inefficient for on/off application. These triode are consumes lot of electrical power and gave enormous heat energy these are the major problems.

One of the major revolution in electronics is conversion from vacuum tubes to transistor. Transistors are solid state electronics switches which are suitable to replace vacuum tube. Because transistors are small size. Fast and less power consumption. So normally size of all electronic devices reduced and efficiency will be increased.

Silicon transistors are not completely perfect so many drawbacks one of the major is hit the limit on shrinking silicon transistor any further. So need to find another material. Silicon transistors can't operate much faster than a few giga hertz. These transistors are operated by the movement of electrons through solid state but comparing with the vacuum tubes electrons move more slowly in the solid. These transistors are not suitable for military or radiation experiments. Semiconductors are influenced by strong radiation strong radiations then the atomic structure of silicon will change and later electrons will not move properly. So when comparing with these drawbacks need a better replacement then only further size reduction will be possible. Make the vacuum tubes in nano size is the best option. Nanometer-scale vacuum tubes that is early testing, has reached speeds upto 460Ghz.

II. VACUUM TUBE

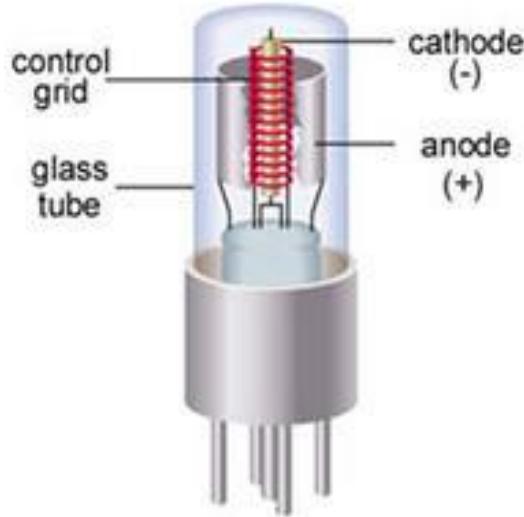


Figure1: vacuum tube (image from:<http://mobile.extremetech.com/#/latest/221582-the-vacuum-tube-strikes-back-nasas-tiny-460ghz-vacuum-transistor-that-could-one-day-replace-silicon-fets>)

here is the diagram of the old vacuum tubes. Consist of three terminals cathode, anode and a grid. These terminals are enclosed in a evacuated chamber as shown in the diagram. When voltage applied to the cathode then it start to emit electron, and it will accepted by positively charged anode. Electron flow is controlled by third terminal known as grid. Cathode is heated by a filament so this filament is also start to emit electrons. The rate of electron flow from cathode to anode is controlled by charge on the intervening grid.

The filament used to heat up the cathode will consume more power that's why vacuum tubes consume more energy. Vacuum tubes rely on a process called thermionic emission: heating the cathode cause it to shed electron in to the surrounding vacuum[2]

III. VACUUM CHANNEL TRANSISTOR

These types are a combination of conventional transistor and vacuum tubes. Here between cathode and anode only vacuum. here is using a field emission process in definition “emission of electron induced by an electrostatic field, field emission can take place from solid or liquid to vacuum.

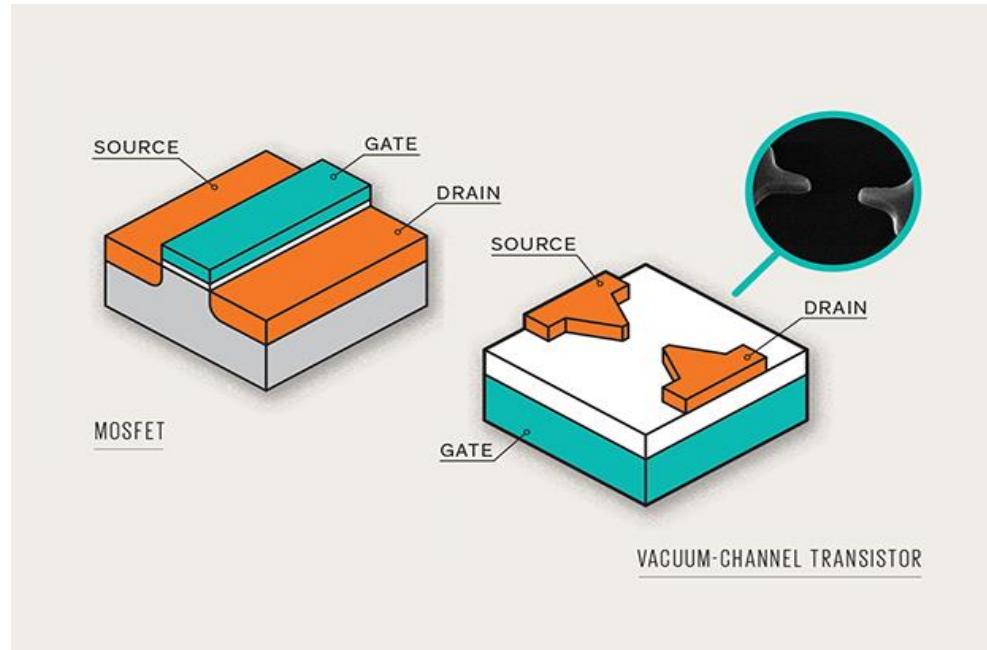


Figure2: mosfet Vs Vacuum channel transistor

(image from: spectrum.ieee.org/semiconductors/devices/introducing-the-vacuum-transistor-a-device-made-of-nothing)

Development of vacuum channel transistor are ongoing, research is still at an early stages. But the works show that this device is extraordinary. When comparing the work efficiency with the conventional transistor vacuum transistor could work 10 times faster than our conventional silicon based transistor. The calculation of researchers shows that it wok terahertz of frequency.

Major problem of vacuum tubes are heat dissipation and power consumption it will be solved here. Vacuum transistors are small enough so electrons will not required more energy to travel so filament is not used to heat the cathode. Electric field applied to the cathode will sufficient to emit electrons. Not required more electric field to emit electrons so it can work properly.

Another important advantage of small size is that the mean distance that an electron travel is less, so normally collision probability is less. Gate electrodes are used to control the flow of current. It is made-up of insulating dielectric material, the dielectric insulator transfer the electric field where it's needed while preventing the flow of current into gate [2].

By analyzing both silicon transistor and vacuum transistor we can find one thing that the main difference between them is only one in vacuum transistor electron flow from the source to drain through vacuum instead of silicon.

IV. CONCLUSION

Nano vacuum tubes are better option to replace transistor for high frequency application. These Vacuum tubes can work in high frequency. They are manufactured in small size so they don't require high power so generally power consumption is less and also their heat dissipation is less. So nano vacuum tubes are better option to replace transistor especially in high frequency application

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Phytoremediation of Soil Mercury and Cadmium by Weed Plants, *Trianthema Portulacastrum L.*, *Saccharum Spontaneum L.* and *Ipomoea Carnea Jacq.*

K.K. Kavitha¹ and M. Jegadeesan²

¹Assistant Professor, Department of Environmental and Herbal Science, Tamil University, Thanjavur, Tamil Nadu, India.

²Professor, Department of Environmental and Herbal Science, Tamil University, Thanjavur, Tamil Nadu, India.

Abstract- Phytoremediation appears as a very promising technology for the removal of metal pollutants from the environment and at present, the technology becomes commercially applied throughout the world becomes commercially throughout the world.

The success of using plants to extract metals from contaminated soils requires a better understanding of the mechanism of metal uptake, translocation, and accumulation by plants. The present study was conducted to find useful weed species for Cadmium (Cd) and Mercury (Hg) phytoremediation. Three species of locally available common weeds were grown for two months in pot culture with three treatment doses of Cd and Hg (5, 10 and 25 mg / kg dry weight (DW)) using $HgCl_2$ and $CdCl_2$ salts. The Cd and Hg concentrations in the dry plant biomass were determined by Atomic absorption spectrometry. The concentrations of Cd were relatively higher in *Ipomoea carnea* (38.710 ± 0.324 mg/kg) *Trianthema portulacastrum* (6.0720 ± 0.232 mg/kg). Higher concentrations of Hg were recorded in *Ipomoea carnea* (58.150 ± 0.247 mg/kg). These results suggest that *Ipomoea carnea* and *Trianthema portulacastrum* accumulate Cd in higher concentrations and *Ipomoea carnea* also accumulate Hg significantly.

Index Terms- Mercury, Cadmium, weed and phytoremediation

I. INTRODUCTION

A major environmental concern due to dispersal of industrial and urban wastes generated by human activities is the

contamination of soil. Controlled and uncontrolled disposal of waste, accidental and process spillage, mining and smelting of metaliferous ores, sewage sludge application to agricultural soils are responsible for the migration of contaminants into non – contaminated sites, as dust or leachate and contribute towards contamination of our ecosystem. As far as the impact of environmental pollution is concerned, heavy metals are known to be the most harmful, because like most organic pollutants, the metals are not biodegradable or Perishable. Heavy metals are elements having atomic weight between 63.54 and 200.59, and a specific gravity greater than 4 (Kennish, 1992).

The processes include all plant-influenced biological, chemical, and physical processes that aid in the uptake, sequestration, degradation and metabolism of contaminants, either by plants or by the free living organisms that constitute a plant's rhizosphere. Phytoremediation takes advantage of the unique and selective uptake capabilities of plant root systems, together with the translocation, bioaccumulation and contaminant storage and degradation capabilities of the entire plant body.

Phytoremediation appears as a very promising technology for the removal of metal pollutants from the environment and at present, approaches towards commercialization

Weed plants selected for phytoremediation study

Common weed plants found in Thanjavur area were taken up for this study. Among weeds growing in and around stagnant and polluted water bodies.

S. No	Species (Vernacular name)	Common Name
1	<i>Saccharum spontaneum L.</i>	Naanal
2	<i>Trianthema portulacastrum L.</i>	Sikappu Saranathi
3	<i>Ipomoea carnea Jacq.</i>	Neyveli kattamanakku

Saccharum spontaneum L.



Trianthema portulacastrum L.



Ipomoea carnea Jacq.



This experiment was conducted to identify Mercury and Cadmium accumulation of these selected plants.

Pot culture experiments

Stem cuttings of *Ipomoea carnea* Jacq. ,and uprooted *Saccharum spontaneum* L., and *Trianthema portulacastrum* L. were planted in polythene bags containing the mixture of sand, red soil and compost in the ratio of 1:1:1 and placed in earthen pots. To assess the heavy metal accumulation capacity of selected plant species were planted in pots filled with 4 kg of above soil mixture containing the heavy metals (Hg and Cd) with different concentrations (5, 10, 25 ppm). Soil mixture with heavy metals was packed in polythene bag and kept in earthen pot to prevent loss of heavy metal leaching. The experimental setup was kept in green house conditions. The mean temperature inside the green house was $34 \pm 4^{\circ}\text{C}$ and humidity 70-80 RH. The plant

growth parameters were recorded once in fifteen days by sacrificing three plants from each treatment group.

Plant samples were dried in a hot air oven at 60°C and ground to 20 meshes using a stainless steel Wiley Mill. The ground material was digested using Nitric and Perchloric acids (3:1). The resulting solution was analyzed for metal content by (U.S EPA.1983) AAS (SHIMADZO – 7000 model) by flame method for Cd and Hydride vapor generator method for Hg in The South India Textile Research Association (SITRA), Coimbatore.

Statistical Analysis

All the data were analyzed using the multiple mean comparison test (Agres Statistical Software) and the interrelationship between parameters were assessed using ANOVA (Analysis of Variance) analysis.

Table-1: Accumulation of Hg and Cd by weed plants in pot culture

S. No	Species	Control		5ppm		10ppm		25ppm	
		Hg (mg/kg)	Cd (mg/kg)	Hg (mg/kg)	Cd (mg/kg)	Hg (mg/kg)	Cd (mg/kg)	Hg (mg/kg)	Cd (mg/kg)
1	<i>Saccharum spontaneum L.</i>	0.012±0.010	0.125±0.018	0.1254±0.012	0.564±0.023	0.954±0.025	0.8246±0.021	1.1500 ±0.320	1.348±0. 256
2	<i>Ipomoea carnea Jacq.</i>	0.548±0.024	0.214±0.025	1.246±0.0542	2.545±0.145	18.654±0.142	12.657±0.264	58.150±0.24 7	38.710±0. .324

3	<i>Trianthema portulacastrum L.</i>	0.114±0.014	0.102±0.012	0.231±0.012	0.854±0.241	0.245±0.124	1.498±0.214	0.2211±0.12	6.0720±0.232
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The values are Mean \pm SEM, n=4, ** P < 0.01 and compared with Treatment

II. RESULTS AND DISCUSSION

Hg and Cd accumulation of *Ipomoea carnea* Jacq., *Saccharum spontaneum* L., and *Trianthema portulacastrum* L. in Pot culture was studied

It was observed in the present study, the rate of Hg and Cd accumulation differs in selected plant species and in different concentrations in pot culture methods. Hg and Cd accumulation by *I. carnea* was comparatively higher than that in other two selected plant species in all the treated concentrations. Even in *I. carnea*, Hg accumulation was comparatively higher than Cd accumulation (Table-1) in all the concentrations used. And at 25 ppm, Hg accumulation by *I. carnea* was 58 fold more than that by other two species. Adhikari *et al.*, (2010) also revealed that *Typha angustifolia* L. and *Ipomoea carnea* L. plants showed promise for the removal of Pb from contaminated wastewater because they can accumulate high concentrations of Pb in roots. *Trianthema portulacastrum* L. accumulate 6.0720±0.232 mg/kg of Cd in T₃ treated concentration. It is Inferred that *I. carnea* was significant for Hg and Cd phytoremediation.

Similar high metal accumulation pattern was also observed in Mulberry plant for Cd and Cu (Prince *et al.*, 2001), in tomato and *Calamus tenuis* Roxb. for Cd (Cho and Park 1999; Khan and Patra 2007; in *I. carnea* for Cd,Cr and Pb Ghosh and Sing 2005). It has been suggested by Vitoria *et al.*, (2001) and Fargasova, (2001) that amount of Cd absorbed by the plants could be elevated by inducing higher transpiration rates. Higher heavy metal accumulation.

III. CONCLUSION

Based on the present investigation it is suggested that *Ipomoea carnea* have better accumulation capacity for Hg phytoremediation and *Trianthema portulacastrum* L. and *I. carnea* can be used for Cd phytoremediation. Phytoremediation appers a very promising technology for the clean- up of metal pollutants from the environment.

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AUTHORS

- First Author** – K.K. Kavitha, Assistant Professor, Department of Environmental and Herbal Science, Tamil University, Thanjavur, Tamil Nadu, India. , E-mail ID: kavikiruthiga@gmail.com
Second Author – M. Jegadeesan, Professor, Department of Environmental and Herbal Science, Tamil University, Thanjavur, Tamil Nadu, India.

Leakage Detection Using “PLUMBOAT”

Pratiksha Kulkarni

Electronics & Telecommunication Department, R.A.I.T

Abstract- Plumboat is a robot which is specially designed to detect the cracks and leakages in the underground pipes. This project is a combination of embedded systems and Robotics. Leaky water pipes pose serious problems for cities, as it leads to the loss of roughly a billion Litres of clean drinking water every day. Whenever there is a leakage problem in the underground pipes, the entire roadways are dug to detect the cracks in the pipes and also the water supply is stopped for the same amount of span causing inconvenience to the people. Also, due to the destruction of entire roadways it becomes very difficult for the people to drive vehicles on the roads leading to traffic and inconvenience. To avoid these problems we have designed a robot which will detect the underground pipe leakages in the pipes with the help of a wireless camera due to which only the relevant part of the road will be dug for repair. This robot has a tripod design. It smartly detects the cracks and displays them on the screen by which we are able to locate the cracks and leakage easily.

We have developed a robot called Plumboat which will successfully detect leakages in the pipes. Our approach automatically analyzes the pipes using night vision camera. We used Xbee transmitter and receiver for wireless reception and

transmission of data from our hardware to camera. While developing such system we focused more on hardware which will give accurate output and detects cracks more efficiently. The speed of the robot will be kept constant. As soon as the movement of the robot starts till the time a crack is detected, that particular time can be recorded in the stopwatch. In this way, with the help of constant speed and the recorded time the distance where the crack is located can be found. Plumboat is a robot that will go inside the pipe and scan, thus finding the exact location of the breach and can be repaired by opening up the smallest amount of street necessary, rather than digging up entire roadways.

Index Terms- Plumboat, Leakage Detection, Xbee.

I. INTRODUCTION

After the survey of various methods used for water leakage detection we came through a few of these like water leakage detection using acoustics and ultrasonic scanning.

Tubebot:

Motion Concept

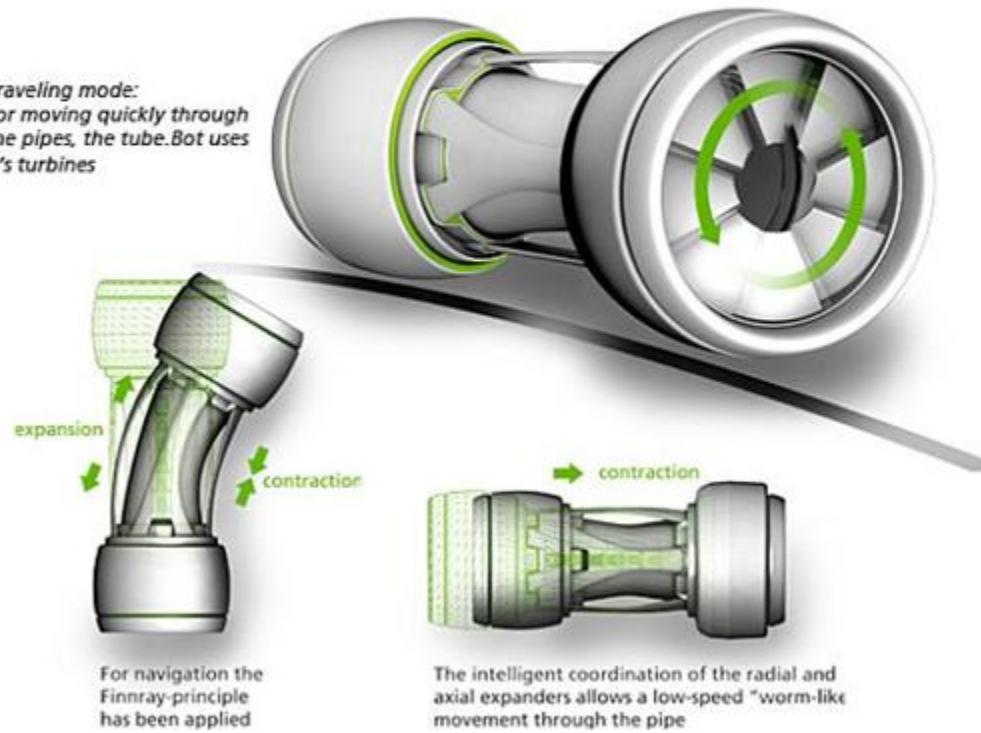


Fig.1 TUBEBOBOT

Leaky water pipes pose serious problems for cities, as it leads to the loss of roughly a billion liters of clean drinking water every day. A self-powering robot, called Tubebot, a maintenance robot designed for use in the piping of urban drinking water systems. Tubebot is an autonomous robot that generates electricity from the pressure of water to power itself and keep it moving. The system ultrasonically scans the whole length of the piping system and sends the data to a remote location. In this way the cracks are detected using this robot.

Tubebot can detect defects and breaches in underground water pipes by scanning a length of the piping system and sending data to a remote location. The leak is located and can be repaired by opening up the smallest amount of street necessary, rather than breaking up roadways the entire length of the pipe. This is the zero-energy solution for detecting leaks in the water supply pipes of the urban drinking water systems of the world. Tubebot generates the electricity to power itself by harnessing the pressure that exists in the pipes. It uses turbines at either end to move through pipes and the coordination of the radial and axial expanders allows a worm-like movement through the pipe.

It's quick at detecting and can fix almost all kinds of leaks. The Tubebot works without an additional energy supply; this is because it incorporates intelligent functionality of using the existing pressure in the pipes to move. By employing this robot, urban drinking water agencies can expect to save and conserve

this precious resource. Tubebot is designed by Kunsthochschule Berlin students; Tubebot still needs considerable research to enable it to fit into the smaller pipes leading off from main pipes of the water stations before it is available for purchase. As observed the design in the above project is such that it requires ultrasonic scanning thus making it expensive. It also requires considerable amount of research to enable it to fit into the pipes of smaller diameter.

Understanding Acoustic Leak Detection:

What are the Sounds of Water Leaks?

Water leaks in underground, pressurized pipes may make many different sounds:

- “Hiss” or “Whoosh” from pipe vibration and orifice pressure reduction
- “Splashing” or “Babbling Brook” sounds from water flowing around the pipe
- Rapid “beating/thumping” sounds from water spray striking the wall of the soil cavity
- Small “clinking” sounds of stones and pebbles bouncing off the pipe

The “Hiss” or “Whoosh” sound, which often sounds like constant static noise, is the only one which is always present for leaks in pipes with 30 psi or higher water pressure. The other sounds may or may not be present, and usually they are not as

loud. So, we decide "Is there a leak?" by listening for the "Hiss" or "Whoosh."



Fig.2 Small Leak on Cast Iron Water Main

What Factors Affect These Sounds?

There are several factors that affect the loudness and the frequency range of the sounds made by water leaks transmitted on the pipes and transmitted to the surface of the ground:

1. Water pressure in the pipe
2. Pipe material and pipe diameter
3. Soil type and soil compaction
4. Depth of soil over the pipe
5. Surface cover: grass, loose soil, asphalt, concrete slab, etc.
6. The loudness or intensity of the leak sound is directly proportional to the water pressure inside the pipe (up to a limit).
- 7.

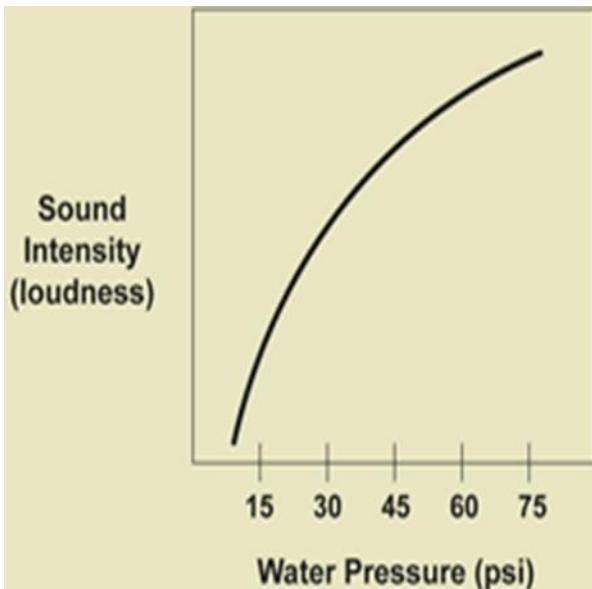


Fig.3 Sound Intensity (loudness) vs. Water Pressure

1. Metal pipes, such as iron mains, copper services, and steel pipes, transmit water leak sounds that are louder and higher frequency than do PVC pipes or asbestos-

cement pipes. Thus, knowledge of the pipe material is important.

2. Large diameter pipes, whether they are PVC, concrete, steel, or iron, transmit much less sound from water leaks than small diameter pipes. And, large diameter pipes transmit lower frequency sounds than small diameter pipes.
3. Sandy soil and very loose soils, particularly over a freshly buried pipe line, do not transmit the sounds of water leaks very well, nor do water saturated soils such as bogs and swamps. Hard, compacted soil transmits the sounds of water leaks best. Soil absorbs the sounds of water leaks very quickly. Leaks in water lines that are only 3 or 4 feet deep are much easier to hear at the ground's surface than leaks in deeper lines. At 7 or 8 feet deep, only very large leaks with good water pressure will produce enough noise to be heard at the surface.
4. Finally, the ground cover, whether it is an asphalt street, loose dirt, concrete slab, or grass lawn, also makes an important difference. Hard street surfaces and concrete slabs resonate with the sounds of the water leak, and the leak may be heard for 5 to 10 feet or more on either side of the water pipe. Grass lawns and loose dirt surfaces do not offer such a resonating plate-like surface, and their surface variations make firm contact more difficult.

II. PROBLEM STATEMENT

Tubebot:

As observed the design in the above project is such that it requires ultrasonic scanning thus making it expensive. It also requires considerable amount of research to enable it to fit into the pipes of smaller diameter.

Detection using acoustics:

The above method is adopted in foreign countries for the detection of leakage in the underground pipes. It is also very costly since it requires the core knowledge and application of acoustics. It consists of methods wherein a human being has to hear the sounds and also study the intensity of the sounds underground. Also, the pressure and sound intensity need to be compared. Size of the pipe also needs to be considered. This method is not always accurate. Its implementation also requires a large amount of concentration. It is also very expensive.

Assuming the issues of concern from the above projects created in the past we have come to a conclusion to design a robot that will detect the underground water leakages in the pipes with the help of a wireless night vision camera. The speed of the motion of the camera will be kept constant. The time till the crack is detected will be noted on the stopwatch and assuming the speed and the time the distance can be calculated. This robot is simple to design and very cost efficient.

III. STUDY ANALYSIS

Pinpointing

1. "Water Leak Pinpointing" is the term applied to the process of pinpointing the exact leak location. For Acoustic Leak Detection, the exact leak location is usually the spot where the leak sounds are the loudest:

2.

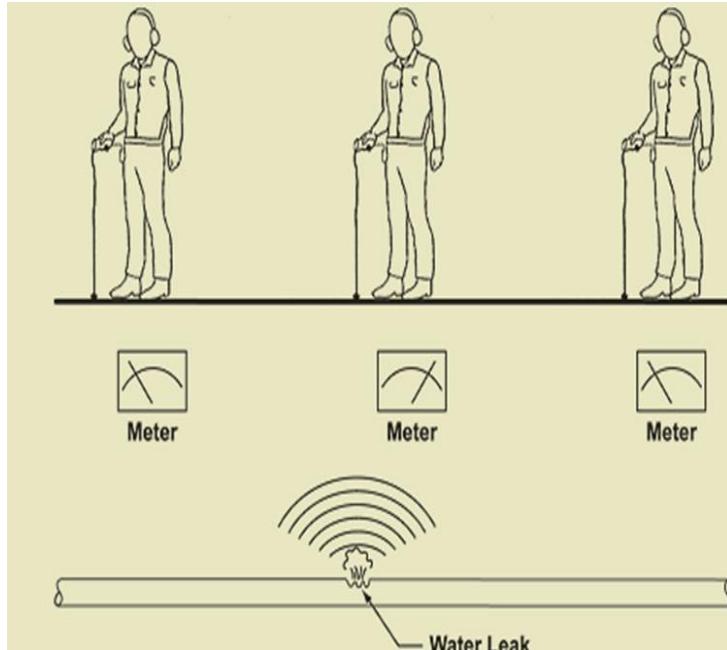


Fig.4 Determining Water Leak Pinpointing

3. To find this spot, the listener must carefully mark the location of the water line on the street after locating it exactly with a pipe and cable locator. Usually, the piping between the valve or hydrant with the loudest sound and the valve or hydrant with the second loudest sound is the section of the line that needs to be marked. The section must be accurately located and marked on the street in order for the listener to consistently listen directly over the pipe.
4. The listener moves the ground microphone 3 to 4 feet each time in the direction of the water line, listening, and moving closer to the water leak. While the listener is moving, he does not adjust the volume control, since the volume control must be held constant in order to make accurate comparisons. When the listener is very close to the leak, it may be impossible to decide based upon the user's hearing alone whether the leak is in one spot or in a spot 3 to 4 feet away. When this occurs, the listener must study the visible display (meter) to see if the signal is slightly stronger at one location than at another location.
5. The loudness of a leak heard on an asphalt street or a concrete slab depends upon the size of the leak, water pressure, and depth of the pipe. Hard, dry materials like asphalt, concrete, rock, and compacted soil transmit sounds better than wet clay, sand, or loose soil. The sounds travel further on iron and steel pipes than on PVC pipes or Poly pipes.
6. We have come to a conclusion to design a robot that will detect the underground water leakages in the pipes with the help of a wireless night vision camera. The

speed of the motion of the camera will be kept constant. The time till the crack is detected will be noted on the stopwatch and assuming the speed and the time the distance can be calculated. This robot is simple to design and very cost efficient.

Proposed Work



Fig.5 Plumboat

The aim of the project is to find out the cracks in the pipelines which will be carried out by a vehicle and the wireless camera placed on it. This is embedded based system. This will help to drive vehicle, to control its direction i.e. to move left, right, forward or backward. To capture these cracks, camera needs to be moved in particular direction. This is achieved by embedded system which controls camera positioning and movement of camera. This information is send to the control house. For transmitting as well as receiving signals, wireless transmitter and receiver are used that is XBEE. Range of XBEE which we are using is from 100m to 750m. It will capture the commands; will display images of cracked pipelines. After decoding this information 89C51 will execute a program according to which XBEE will guide the vehicle. In this way, the objective is achieved.

Proposed Methodology

The problem of underground water leakages in the pipes without digging up the entire roadways and at a lower cost can be solved by using PLUMBOAT. Its rough physical design is shown as follows. It consists of a tripod design with spiral arms which are activated by the motor assembly. It consists of a wireless camera above the motor assembly. The three arms of the robot are along the circumference of the pipe.

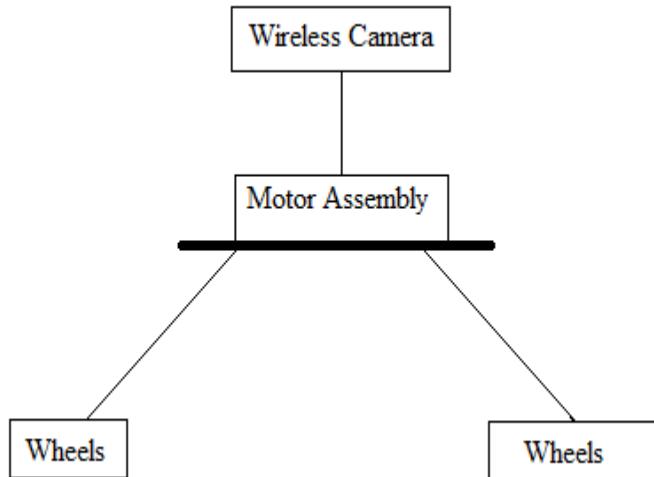


Fig.6 PLUMBOAT Design with Spiral Stand & Tripod

The main building blocks of the project are XBEE, stepper motor, and wireless camera which interact with each other using an embedded system. By analyzing the project we come to know that Xbee is a powerful means of way of wireless transmission and reception with some more advantages over Bluetooth. Range of Bluetooth is very limited viz. 15m and that of Xbee is 100m to 750m. This increases coverage range of project. Wheels of vehicles are driven by DC motor, in which its speed is an important parameter. Microcontroller 8051 executes the program and performs the desired action.

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AUTHORS

First Author – Pratiksha Kulkarni, Bachelors of Electronics & Telecommunication, R.A.I.T., pratiksha018@gmail.com

Correspondence Author – Pratiksha Kulkarni,
Pratiksha018@gmail.com, (+91) 98 92 336 913.

Relationship between Pulmonary Function Tests and Common Haematological Parameters (RDW, Hb, MCH, MCHC, MCV) In Healthy Non-Smokers

Dr R Vijayashree¹, Ms Tejashvee², Dr. S. Govindarajan³, Dr K. Ramesh Rao¹

¹Department of Pathology

²Final Year Student

³Department of Statistics,

Abstract- BACKGROUND: The pulmonary function tests (PFT) are known predictors of clinical outcome in respiratory disorders. Several recent studies have shown inverse correlation between PFT and certain haematological parameters like red cell distribution width (RDW) independent of confounding factors like smoking. This study was taken up to find out if there is any direct correlation between PFT and certain haematological parameters in healthy non-smokers. METHODS: The study was carried out on 200 healthy non-smokers aged between 20 and 55 years. In all the subjects PFTs were performed and common haematological parameters like haemoglobin, RDW, MCV, MCH, MCHC and derived ratios were determined. The correlation between PFT and haematological parameters were statistically analysed. RESULTS & CONCLUSIONS: Despite the absence of pulmonary illness, the mean values for PFT in the study subjects were lower than the predicted range. There was no correlation between PFT and any one of the haematological parameters studied. In healthy non-smokers, PFT does not appear to have a direct effect on any one of the haematological parameters or *vice versa*

Index Terms- haematological parameters; predictors of outcome; pulmonary function tests; red cell distribution width;

I. INTRODUCTION

Recently, many studies have been published assessing the potential of common laboratory investigations to act as predictors of outcome in various illnesses. The ultimate aim of such studies is not only to find new biomarkers but also to find simple, quick, cost-effective alternatives to the current, more expensive, time consuming investigations that are used as biomarkers. Most of these studies have focussed on common haematological parameters that are part of complete blood count. The parameters that have been explored include haematocrit in chronic obstructive pulmonary disease (COPD) (Arnaud Chambellan, 2005); red cell distribution width (RDW) in such diverse ailments as heart disease (Ola Hammarsten, 2010), inflammatory bowel disease (Mehmet ARHAN, 2011) and respiratory disease (Nathan et al., 2013; Schunemann HJ, 2000); derived parameters such as RDW/MCV ratio in diabetic ketoacidosis(Liu DS, 2013); and Hb/MCHC, Hb/RDW and MCHC/RDW ratios in grading the severity in hereditary spherocytosis (Rocha S, 2011).

In one such cross-sectional study performed on a random population, Grant et al (Grant et al., 2003) found an inverse correlation between an established predictor of mortality like pulmonary function tests (PFT) (Schunemann HJ, 2000), and RDW that was independent of confounding factors like smoking and ethnicity. They even suggested that RDW can be used as an alternative biomarker of clinical outcome in respiratory illness. The findings of this publication prompted us to take up the present study to find out if there are any direct correlations between PFT and certain haematological parameters (including RDW) *per se* in non-smoking healthy individuals and whether this correlation is significant enough to justify these parameters being used as biomarkers.

II. MATERIALS AND METHODS

The present study was carried out on 200 non-smoking healthy, clinically asymptomatic adult subjects, with no respiratory complaints, attending the Master Health Check-up Clinic at Chettinad Hospital and Research Institute, Chennai. The study population consisted of 180 males and 20 females aged between 20 and 55 years. The subjects were inducted to the study after obtaining informed consent. The study was initiated after getting clearance from the Institutional Ethics Committee.

On all the subjects, the pulmonary functions tests consisting of FEV1 (forced expiratory volume in 1 second in litres), FVC (Forced Vital Capacity in litres), %FEV1 (Percentage of the predicted value for FEV1), %FVC (Percentage of the predicted value for FVC) and FEV1/FVC ratio were performed using Chestgram HI-105 Spirometer. From all the subjects, venous blood was collected in K2EDTA vacutainers for the estimation of haemoglobin, RDW (CV) (red cell distribution width – coefficient of variation), MCH (mean corpuscular haemoglobin), MCHC (mean corpuscular haemoglobin concentration), and MCV (mean corpuscular volume) using Beckman Coulter HMX Haematology Analyser. From these parameters, the following ratios were calculated: HB/RDW, MCV/RDW, MCH/RDW and MCHC/RDW.

Results were analysed using the statistical package SPSS version 21. Besides the mean and the standard deviation of all the results, independent samples t-test was performed to test the gender differences; one-way ANOVA to test the differences in the values between different age groups and Pearson's correlation coefficient to determine the relationship between PFT

and various haematological parameters. A “p” value of 0.05 was accepted as significant.

III. RESULTS AND OBSERVATIONS

Gender based summary statistics and the results of the student t-test are given in table 1.

The results of PFT and haematological investigations in various age groups along with results of one-way ANOVA are summarised in table 2.

Correlation between PFT and various haematological parameters are summarised in tables 3, 4 and 5

PFT. As expected, the values for FEV1 and FVC showed statistically significant difference ($p <0.001$) between the genders, with higher values in men (Table 1). However, the mean values for FEV1 (2.09L) in women and FVC (2.79L and 2.14 L) in both sexes were below the predicted normal value (Pierce R, 2008). One-way ANOVA was done to highlight the differences between the age groups (Table 2). Although the values for FEV1 and FVC remained the same across all age groups, %FEV1 and %FVC were significantly higher and FEV1/FVC ratio was

significantly lower in the age group 30-34 compared to the age group 20 – 24.

Haematological parameters: As expected, mean value for haemoglobin (Hb) was significantly higher in males than in females. In addition, one of the derived parameters, Hb/RDW, significantly differed in men and women (Table 1); it was significantly higher in men. The study subjects in the age group 20 – 24 exhibited significantly higher mean values for Hb, MCH and Hb/RDW ratio (Table 2); similarly, study subjects of the age group 30-34 had significantly higher mean values for RDW and significantly lower values for MCV, MCV/RDW, MCH/RDW, and MCHC/RDW than subjects who were 45 years or older.

Correlation between PFT & haematological parameters: There was no correlation between any of the pulmonary function tests and haematological parameters. Within PFT, FEV1 and FVC showed strong positive correlation as expected ($r=0.975$). Within haematological parameters, RDW showed negative correlation with Hb ($r=-0.377$), MCH ($r=-0.415$), MCV ($r=-0.323$), MCHC ($r=-0.577$), MCHC/RDW ($r = -.949$), MCV/RDW ($r = -0.837$), MCH/RDW ($r = -0.836$), and HB/RDW ($r = -0.816$). As expected, there was positive correlation among other haematological parameters.

Table 1. Mean and SD of all the parameters & gender differences

Parameters	Normal Range*	Sex				Independent Samples t-test	
		Male (180)		Female (20)			
		Mean	SD	Mean	SD	t-value	Sig.(p)
Height		168.17	6.43	155.80	5.48		
Weight		65.83	13.32	56.85	9.66		
FEV1 (L)	2.23 – 4.54	2.65	.68	2.09	.87	3.396	.001
FVC (L)	2.85 – 5.42	2.79	.76	2.14	.89	3.613	.000
FEV1_FVC	> 70%	95.21	5.97	97.86	2.47	-1.963	.051
% FEV1	80 – 120%	70.76	17.42	76.44	37.60	-1.190	.236
% FVC	80 – 120%	62.96	16.14	67.45	32.77	-1.034	.302
Hb	12.1 – 17.2 g/dL	14.78	1.31	12.35	1.45	7.797	.000
RDW (CV)	12.8 ±1.2%	12.61	1.34	13.08	2.18	-1.387	.167
MCH	27 to 31 pg/cell	29.29	2.85	27.92	4.08	1.945	.053
MCHC	32 to 36 gm/dL	33.30	1.03	32.96	1.08	1.397	.164
MCV	80 to 95 fL	87.78	7.34	84.58	10.79	1.754	.081
Hb / RDW		1.19	.17	.97	.20	5.372	.000
MCV / RDW		7.05	.97	6.64	1.24	1.749	.082
MCH / RDW		2.35	.36	2.20	.45	1.829	.069
MCHC / RDW		2.67	.31	2.58	.40	1.199	.232

*(Pierce R, 2008; Stanojevic S, 2008) (<http://www.nlm.nih.gov/medlineplus/ency/article/003642.htm>);

Note: [FEV1 = forced expiratory volume in 1 second in litres; FVC = Forced Vital Capacity in litres; %FEV1 = Percentage of the predicted value for FEV1; %FVC = Percentage of the predicted value for FVC; Hb= haemoglobin; RDW (CV) = red cell distribution width coefficient of variation); MCH = mean corpuscular volume; MCHC = mean corpuscular volume concentration; MCV = mean corpuscular volume]

Table 2: Summary statistics of Pulmonary function and haematological function parameters and one way ANOVA

	Age												One way ANOVA	
	20 – 24 (n = 52)		25 – 29 (n = 61)		30 – 34 (n = 36)		35 – 39 (n = 24)		40 – 44 (n = 17)		45 or more (n = 10)			
	Mean	SD	Mean	SD	F	p value								
FEV1	2.49	.90	2.61	.64	2.71	.49	2.67	.70	2.63	.70	2.29	.89	.814	.541
FVC	2.57	1.00	2.74	.72	2.88	.57	2.86	.73	2.80	.75	2.44	.90	1.136	.343
FEV1_FVC	97.65	3.31	95.62	5.18	94.54	6.86	93.34	5.97	94.58	6.58	93.37	9.65	2.814	.018
% FEV1	63.43	21.37	70.73	16.79	75.29	13.16	76.90	24.66	79.68	25.45	74.25	24.21	2.987	.013
% FVC	57.42	20.20	62.74	15.50	67.28	12.45	68.62	20.97	70.25	21.89	60.50	23.60	2.423	.037
HGB	14.83	1.29	14.81	1.59	13.82	1.91	14.55	1.38	14.41	.74	14.17	.86	2.678	.023
MCH	29.85	2.72	29.11	3.13	27.76	3.77	29.43	2.05	29.18	2.39	29.97	2.33	2.357	.042
RDW (CV)	12.45	1.13	12.57	1.41	13.25	2.04	12.90	1.33	12.50	.87	11.83	.99	2.385	.040
MCHC	33.23	.84	33.40	.96	32.99	1.21	33.19	.80	33.19	.61	33.82	2.19	1.340	.249
MCV	89.71	6.96	86.95	7.90	83.52	9.27	88.37	5.45	87.86	7.26	90.10	6.37	3.250	.008
HB / RDW	1.21	.17	1.19	.17	1.08	.24	1.14	.15	1.16	.09	1.20	.10	2.867	.016
MCV / RDW	7.26	.82	7.01	.97	6.48	1.30	6.92	.79	7.04	.53	7.70	1.20	3.919	.002
MCH / RDW	2.42	.30	2.35	.36	2.16	.48	2.31	.29	2.34	.20	2.56	.43	3.089	.010
MCHC / RDW	2.69	.26	2.69	.30	2.55	.40	2.60	.26	2.67	.22	2.89	.48	2.488	.033

. Table 3: Correlation coefficients between PFT and haematological Parameters

	FEV1	FVC	FEV1/ FVC	% FEV1	% FVC	HGB	RDW	MCH	MCHC	MCV
FEV1	1									
FVC	.975**	1								
FEV1/FVC	-.120	-.324**	1							
% FEV1	.813**	.779**	-.045	1						
% FVC	.763**	.776**	-.252**	.933**	1					
HGB	.068	.066	-.029	-.078	-.070	1				
RDW	-.105	-.096	.001	-.106	-.110	-.377**	1			
MCH	-.036	-.048	.063	-.077	-.091	.558**	-.415**	1		
MCHC	-.022	-.038	.078	-.013	-.030	.390**	-.577**	.597**	1	
MCV	-.050	-.060	.050	-.098	-.107	.502**	-.323**	.969**	.448**	1

Note: Values with ** indicates significance at 5% level of significance (red = positive; green = inverse)

Table 4: Correlation coefficients between PFT and haematological Ratios

	FEV1	FVC	FEV1/ FVC	% FEV1	% FVC	HB / RDW	MCV / RDW	RDW / HB	MCH / RDW	MCHC / RDW
FEV1	1									
FVC	.975**	1								

FEV1/FVC	-.120	-.324**	1							
% FEV1	.813**	.779**	-.045	1						
% FVC	.763**	.776**	-.252**	.933**	1					
HB / RDW	.095	.082	.015	-.006	-.002	1				
MCV / RDW	.024	.009	.054	-.009	-.014	.800**	1			
MCH / RDW	.026	.009	.063	-.004	-.013	.813**	.989**	-.784**	1	
MCHC / RDW	.062	.046	.049	.064	.059	.800**	.856**	-.760**	.873**	1

Note: Values with ** indicates significance at 5% level of significance (red = positive; green = inverse)

Table 5: Correlation coefficients between haematological Parameters

	HGB	RDW	MCH	MCHC	MCV	HB / RDW	MCV / RDW	MCH / RDW	MCHC / RDW
HGB	1								
RDW	-.377**	1							
MCH	.558**	-.415**	1						
MCHC	.390**	-.577**	.597**	1					
MCV	.502**	-.323**	.969**	.448**	1				
HB / RDW	.813**	-.816**	.557**	.573**	.467**	1			
MCV / RDW	.479**	-.837**	.797**	.642**	.755**	.800**	1		
MCH / RDW	.503**	-.836**	.816**	.710**	.741**	.813**	.989**	1	
MCHC / RDW	.349**	-.949**	.462**	.750**	.347**	.800**	.856**	.873**	1

Note: Values with ** indicates significance at 5% level of significance (red = positive; green = inverse)

IV. DISCUSSION

The need for simple, cost-effective and quick predictors of outcome has sparked a flurry of new studies trying to identify such biomarkers. Some of the common haematological parameters like RDW, haematocrit and absolute indices have emerged as probable candidates. RDW in particular has shown great promise as a predictor outcome in several disease states (Koma et al., 2013; Ola Hammarsten, 2010). There is a prospect of its being considered as an effective alternative to pulmonary functions tests (PFT) which have been recognised for some time as a long-term predictors of mortality (Schunemann HJ, 2000). In a cross-sectional study conducted on a random population, Grant and his associates (Grant et al., 2003), found a inverse correlation between RDW and PFT. This correlation persisted even when the confounding factors like smoking and ethnicity, which normally influence RDW, were accounted for.

The present study was taken up to find out if there is any direct relationship between haematological parameters like RDW, Hb, MCV, MCH, MCHC and pulmonary function tests in a healthy population. The study was carried out on ethnically homogeneous, controlled, healthy population in whom confounding factor like smoking was used as an exclusion criteria. All the subjects were attending routine master heath check-up with no history of respiratory ailment.

Despite the lack of any respiratory problem, mean values of PFT (FVC in both sexes and FEV1 in women) were below the predicted normal range for white population. This is in agreement with the study of Fulambarker et al (Fulambarker, Copur, Javeri, Jere, & Cohen, 2004) who found that the mean values for PFT in Asians are 20 – 28% lower than those for white population. In addition, we also noticed a higher mean values for FEV1 and FVC in the age group 30 – 34 than all other age groups. This is somewhat unusual as the age related reduction in pulmonary function is progressive and linear (Pruthi & Multani, 2012).

There was no correlation between any one of the Routine haematological parameters (RDW, Hb, MCH, MCHC and MCV) and PFT in our study. We also failed to find any correlation between the derived ratios (HB/RDW, MCV/RDW, MCH/RDW and MCHC/RDW) with PFT. This was in marked contrast to the findings of Grant et al (Grant et al., 2003) who found a significant inverse correlation between RDW and PFT in a population based study. However, the investigators were not sure whether the pulmonary function directly influenced RDW or vice versa, as other factors like nutrition that can influence both pulmonary function and RDW were not accounted for in their study. They hypothesized that micronutrients may play a role in this correlation. In our study, RDW showed an inverse correlation with other haematological parameters including Hb, MCH, MCHC, MCV and derived ratios. This is significant as

Hb, MCH, MCV, and MCHC are indirect indicators of the nutritional status of the individual and the latter is known to affect RDW values. Surprisingly, there was no correlation between these indirect indicators and PFT.

From our study, it appears that the pulmonary function does not directly influence RDW and other haematological parameters, and vice versa, in healthy non-smokers. The significant correlation observed between PFT and RDW in the previous study (Grant et al., 2003) is probably due to an as yet unidentified factor that has independent effect on both these parameters. This factor may be nutritional as suggested by Grant et al. Further study required to elucidate this relationship.

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AUTHORS

First Author – Dr. R. Vijayashree, MBBS, MD (Pathology), Associate Professor, Department of Pathology, Chettinad Hospitals & Research Institute (CHRI), Kelambakkam, Chennai 603103, Tamilnadu, Email: drvjshree@gmail.com

Second Author – Ms. Tejasvee, Final Year Medical Student, Chettinad Hospitals & Research Institute (CHRI), Kelambakkam, Chennai 603103, Tamilnadu

Third Author – Dr. S. Govindarajan, PhD, Professor of Statistics, Chettinad Hospitals & Research Institute (CHRI), Kelambakkam, Chennai 603103, Tamilnadu, Email: sg_raju49@yahoo.co.in

Correspondence Author – Dr. K. Ramesh Rao, MBBS, MD (path), DCP, Professor and head, Department of Pathology, Chettinad Hospitals & Research Institute (CHRI), Kelambakkam, , Chennai 603103, Tamilnadu, Email: rameshkrao@gmail.com, Email: rame5hra0@yahoo.co.uk, Cell: 9884616318

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Genetic characterization of environmental and clinical *Pseudomonas aeruginosa* strains degrading the n-alkanes

Asmae Aboulkacem*, Abouddihaj Barguigua**, Itto Maroui*, Mohammed Timinouni** and Abdelhaq Belhaj*

* Ecology and Biodiversity of Wetlands Team, Biology Department, Faculty of Sciences, Moulay Ismail University, BP: 11201, Meknes, Morocco.
**Molecular Bacteriology Laboratory, Pasteur Institute of Morocco, Casablanca, Morocco

Abstract- Environmental and hospital-sampling allowed us to isolate and identify one hundred of *Pseudomonas aeruginosa* (*P. aeruginosa*) strains. The study of the degradation capacity of alkanes has shown that almost all isolates grew in the presence of long chain n-alkanes, while no growth was recorded in the presence of short chain n-alkanes, isoalkanes or cycloalkanes. The kinetics of growth in the presence of hexadecane, as a sole carbon source, enabled recording various optical densities (OD) depending on the strain of *P. aeruginosa*. The polymerase chain reaction (PCR) in the presence of ERIC (Enterobacterial repetitive intergenic consensus) primers has shown genetic diversity within isolates. The search for *alkB* and *alkB1* genes, which are respectively responsible for the degradation of short chain n-alkanes and long chain n-alkanes, has shown the absence of *alkB* gene; however, the *alkB1* gene, strongly present within the population of *P. aeruginosa* isolated, is absent in a few strains despite their ability to degrade long chain n-alkanes. The nucleotide sequencing of a *alkB1* gene fragment for 4 *P. aeruginosa* strains as well as the reference strain *P. aeruginosa* PAO-1 has shown a highly conserved nucleotide sequences in spite of their heterogeneity origin.

Index Terms- Alkanes, *alkB1* genes, Biodegradation, optical density, *Pseudomonas aeruginosa*

I. INTRODUCTION

Alkanes are major constituents of crude oil (Marín *et al.*, 2003). They are also present at low concentrations in diverse non-contaminated areas because many living organisms produce them as protecting agents against water loss. They are saturated hydrocarbons of different sizes and structures. Many micro organisms, capable of utilizing them as a carbon and energy source, have been isolated and characterized (van Beilen *et al.*, 2003; Wentzel *et al.*, 2007, Rojo, 2009; Whyte *et al.*, 2002). However, some bacterial species are highly specialized for hydrocarbon degradation. These species play a key role in the removal or biodegradation of hydrocarbons from polluted and non-polluted environments (Harayama *et al.*, 2004; Head *et al.*, 2006; Yakimov *et al.*, 2007; Wang, *et al.*, 2010a; Wang *et al.*, 2010b). Among these species, *Pseudomonas aeruginosa* take up a preponderate place (Marín *et al.*, 2003). The biodegradation of alkanes consists first on their oxidation by an oxygenase, which is under the control of an *alk* operon (Peterson *et al.*, 1966). This later includes a group of genes whose the first are *alkB* or similar genes.

This paper reports a set of *P. aeruginosa* strains isolated in Meknes city (Morocco) from environmental and Hospital samples. These strains were characterized by their growth profile in presence of alkanes and genes involved in their biodegradation. We report evenly the genetic diversity of these strains by the determination of their Enterobacterial repetitive intergenic consensus (ERIC) profil.

II. MATERIALS AND METHODS

1 – Sampling

The samples studied are of two types: The first correspond to environment water and soil, the second correspond to Hospital samples. The environmental samples are carried along Boufekrane River which crosses the city of Meknes. The second corresponds to pathological samples from various regional hospital services (burned, resuscitation ...) of Meknes city; these sampling were performed using sterile swabs. All sampling are realized during the year 2012.

2 – Culture medium

The culture mediums used are Luria-Bertani agar, King A, King B medium and citrimide agar. The mineral medium (M.M) is containing in g/l: KH₂PO₄: 0.68; MgSO₄.7H₂O: 0.35; Na₂HPO₄: 1.7; CaCl₂: 0.02; NH₄NO₃: 1; FeSO₄: 0.004. The medium was supplemented with a solution (0, 01% final concentration) of trace elements containing in g/l: CuSO₄: 0.05; H₃BO₄: 0.1; MnSO₄: 0.1; ZnSO₄: 0.1; Na₂MoO₄: 0.1; CoCl₂: 0.1. The pH was adjusted to 7.

3-Samples preparation, inoculation and identification: Water samples were inoculated directly in Petri dishes containing King A, King B medium or citrimide agar. For soil samples, we performed a suspension of 10% (w/v) in sterile distilled water, and then the supernatant is inoculated as before. Swabs containing the pathological specimens are suspended in 1ml of sterile physiologic water; this later is inoculated as the water samples.

All inoculated medium were incubated at 30 ° C during 24h to 48h.

The bacterial colonies obtained were examined to identify those belonging to the species *P. aeruginosa*. The identification tests are primarily morphology, Gram, oxidase enzyme, production of pigments pyoverdin and pyocyanin and growth at 42° C.

4- Biodegradation of alkanes

All bacterial strains identified as *P. aeruginosa* are tested towards short and long chains n-alkanes. Thus, each strain was inoculated into a 250 ml Erlenmeyer flask containing 100 ml of

MSM supplemented with one of the following HC as sole carbon source: n-hexane, n-heptane, n-octane, n-decane, n-dodecane, n-hexadecane, pristane and cyclohexane with concentrations ranging from 0.1% to 0.5%. Incubation is carried out at 30 ° C in agitation at 150 rpm for 72-96 h.

Strains of *P. aeruginosa* have shown a growth in the presence of one of the HC were tested again to measure changes in their optical density (OD) versus time. The OD measurements were performed regularly once a day at 580nm for a period of 8 days using the M.M as mineral medium.

5- Molecular biology and PCR amplification techniques

5-1- Preparation of DNA template for PCR: Total DNA was extracted by suspending 4-5 colonies of overnight culture of *P. aeruginosa* isolates growing on Luria Bertani agar (Bio-Rad, Marnes-la-Coquette, France) in 500µl of DNase- and RNase-free water (Invitrogen, Paisley, UK). The suspension was boiled at 100°C for 10min in thermal block (Polystat 5, Bioblock Scientific, France), then centrifuged at 19000 x g for 5min. An aliquot of 1 µL of the supernatant was used as DNA template for PCR.

5-2- Enterobacterial repetitive Intergenic Consensus (ERIC): ERIC analysis was performed using the primers ERIC-2

and ERIC 1R (Table I) as previously reported (Versalovic *et al.*, 1991). Each PCR reaction was carried out in a 25 µL volume using 1.5 U of *Taq* DNA polymerase (Promega, Madison, Wis, USA) in the reaction buffer provided by the manufacturer containing 2.5 mM of MgCl₂, 50 µM of each deoxynucleoside triphosphate, 10% of dimethyl sulfoxide, 1.7mg/ml of bovine serum albumin, 2 µM of the selected primer and 5 µl of the DNA template. Aliquots (10µl) of each PCR product were subjected to an electrophoresis on 1.5% agarose gel.

The similarity of the ERIC-PCR banding patterns was analyzed by the Dice coefficient, and the data obtained were analyzed by the unweighted pair group method with arithmetic average (UPGMA) clustering using the Pearson correlation coefficient (Biochemistry and Biotechnology Department, Rovira i Virgili University, Tarragona, Spain) (<http://genomes.urv.cat/UPGMA/index.php>).

5-3- Detection of alkane monooxygenases encoding genes: *P. aeruginosa* isolates were screened by PCR for the detection of genes involved in the biodegradation of n-alkanes as described by Whyte *et al.* (1996). Primers used are shown in Table I.

Table I: Oligonucleotides primers used in this study

Gene or location	Sequences Primers (5' to 3')		Fragment size (bp)	Reference
<i>alk B</i>	<i>alkB</i> -F	TGGCCGGCTACTCCGATGATCGGAATCTGG	870	Kok <i>et al.</i> 1989
	<i>alkB</i> - R	CGCGTGGTGATCCGAGTGCCGCTGAAGGTG		
<i>alkB1</i>	<i>alkB1</i> -F	CGGGGTTCAAGGTCGAGCAT	434	Smits <i>et al.</i> , 1999
	<i>alkB1</i> -R	CAGGACCAGGTTGGTGAAAGA		
ERIC	ERIC-2	AAGTAAGTGACTGGGTGAGCG	variable	Versalovic <i>et al.</i> 1991
	ERIC 1R	ATGTAAGCTCCTGGGGATTACAC		

PCR products were detected on 1.5 % agarose gel (FMC Bioproduct, Rockland, ME) after ethidium bromide staining and UV illumination, photographed with an Olympus digital camera and analyzed using the Digi-Doc-it software (UVP, Upland, CA).

5-4- Sequencing of alkane monooxygenases encoding genes: The amplified products obtained were sequenced to validate their identities. Both strands of the purified amplicons were sequenced with a Genetic Analyzer 3130x1 sequencer (Applied Biosystems, Foster City, CA, USA), with the same primers used for PCR amplification. The nucleotide and deduced protein sequences were analyzed with software available over the Internet at the National Center for Biotechnology Information website (www.ncbi.nlm.nih.gov).

III. RESULTS AND DISCUSSION

1 - Isolation and identification of bacterial strains

Among bacterial strains isolated, a total of 100 strains are Gram-negative, oxidase positive, showing growth at 42 ° C and producing pyoverdine and pyocyanin on king A and king B as well as on citrimide agar mediums. They were capable of denitrification and were identified as *P. aeruginosa* strains using classical tests. 58 of them are from the environment and 42 are

from hospitals. These strains are indicated Pa in the text and preceded with the letter E or H in case of Environmental or Hospital origins.

2- Alkanes biodegradation

All strains of *P. aeruginosa* isolated have not shown growth in the presence of short chain n-alkanes (n-hexane, n-heptane, n-octane or n-decane), isoalkanes (pristane) or cyclohexane; however, nearly all of them have grown in dodecane and hexadecane (long chain n-alkane) in concentrations ranging from 0.1 to 0.5%. This suggests that these strains are probably devoid of genes responsible for the degradation of these types of alkanes, but possess the ones responsible for the degradation of long chains n-alkanes.

We have opted for studying the kinetics of growth in the presence of hexadecane (0, 5%). We have chosen seven strains of *P. aeruginosa*. The choice of these strains was done taking into account those that show both a good and a moderate growth in the presence of hexadecane. Thus, we were able to identify two groups of strains, one containing four strains (EPa10, EPa45, HPa59 and EPa11) degrading effectively hexadecane and the other of 03 strains (EPa22, HPa32 and HPa24) degrading moderately hexadecane (Figure 1).

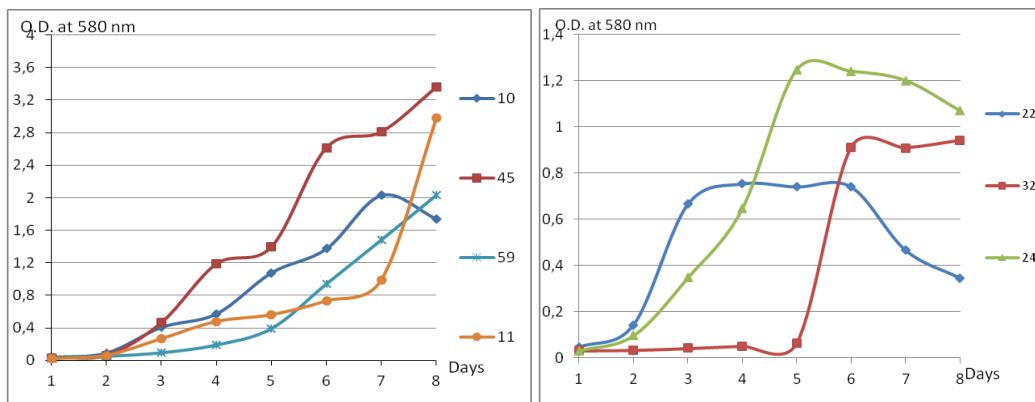


Figure 1: Growth of *P. aeruginosa* EPa10, EPa45, HPa59, EPa11 (group1), EPa22, HPa32 and HPa24 (group 2) in the presence of hexadecane at 0.5%.

Indeed, group 1 strains exhibits a high OD between 2 and 3.3, while those in group 2 show low OD with a maximum ranging between 0.8 and 1.3. In addition, the OD for group1 continues to increase until the 8th day, while the strains of group2 started decrease from the 6th day or before.

It should be noted that strain HPa32, which have a hospital provenance, unlike other strains of *P. aeruginosa*, present a large latency phase.

3- ERIC Migration Profile

The amplification patterns of total DNA using ERIC primers is illustrated by figure 2. The interpretation of patterns was based on the criteria of Tenover *et al.* (1995). Briefly, strains showing more than three DNA fragment variations and a similarity of <80% at dendrogram analysis were considered to represent different ERIC-PCR types, while one- to three-fragment differences and a similarity of >80% upon dendrogram analysis were considered to represent ERIC-PCR pattern subtypes (Figure 2).

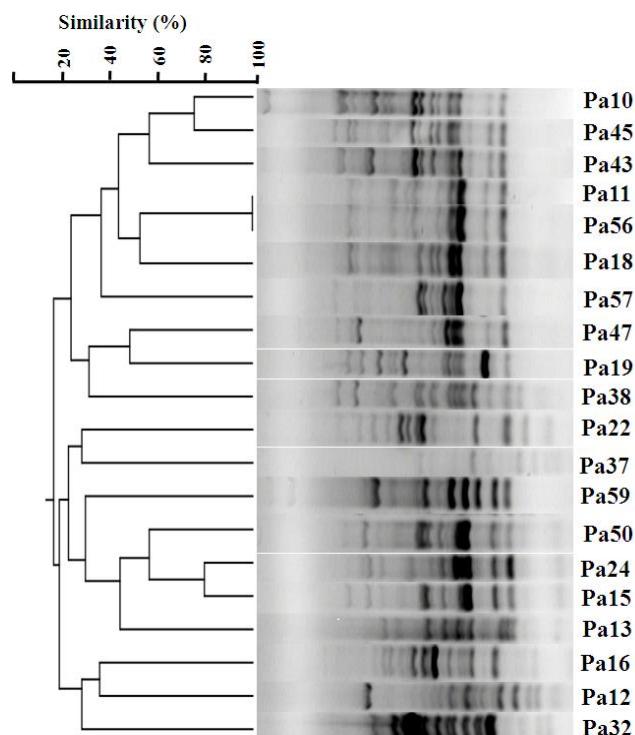


Figure 2: ERIC profile for twenty *P. aeruginosa*, the strains EPa10, EPa45, EPa43; EPa11, EPa56, EPa18, EPa57, EPa47, EPa19, EPa22 and EPa16 are environmental *P. aeruginosa*, the strains HPa59, HPa50, HPa12, HPa13, HPa38, HPa37, HPa32, HPa24 and HPa15 are hospital *P. aeruginosa*.

The patterns amplification showed a genetic diversity within strains of *P. aeruginosa* isolated. The similarity percentage seems varied with the origin of strains; it reached below 20% when the strains compared are from environmental and Hospital origins but increase when strains are from the same origin (strains EPa11 and EPa56, which are environmental strains, show 100% of similarity) (figure 2). Taken as whole, and except for these two latest strains, the *P. aeruginosa* strains isolated are not similar and belong at variables subtypes.

4 – Search for alkane monooxygenase encoding genes

Among the 100 *P. aeruginosa* strains isolated, we have studied a set of 50 strains for the presence of *alkB* and *alkB1* genes. The strains chosen covered that these having an environmental and hospital origin. The PCR in presence of *alkB* primers doesn't amplify the fragment of the expected size (870 bp) for all *P. aeruginosa* strains. These results concord with those indicating the failure growth in presence of short chains alkanes. However, many strains gave unspecific bands of 600 bp. Figures N° 3 shows the results of amplification for some of these strains.

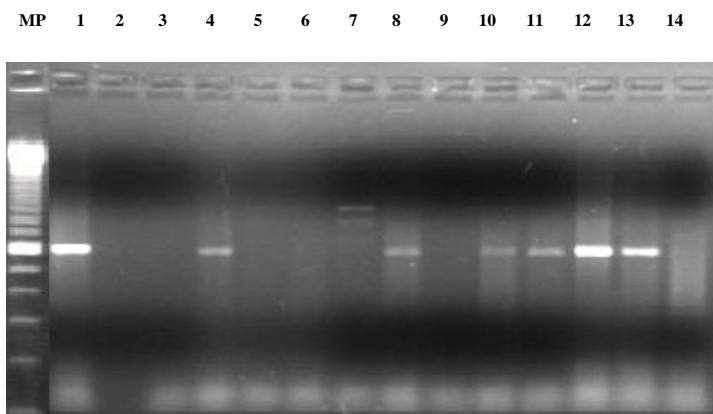


Figure 3: Amplification patterns on agarose gel 1.5% using *alkB* primers. MP: 100 bp DNA Ladder, lane 1: HPa20, lane 2: EPa19, lane 3: EPa18, lane 4: EPa17, lane 5:EPa27, lane 6:EPa26, lane 7: EPa14, lane 8: HPa 13, lane 9: HPa24, lane 10: EPa23 lane 11: EPa45, lane 12: EPa10, lane 13: EPa30 and lane 14: HPa12.

The band of 600bp was amplified with a frequency of 68% (Diagram 1), the latter is non-specific since the strains showed no growth towards short chain n-alkanes; besides, further research works (McCoy., 2000, Belhaj et al., 2002) have reported similar bands (600pb) for strains not degrading short chains n-alkanes. Therefore, the isolates do not possess the *alkB* gene. The *alkB* primers were possibly amplifying DNA fragments with no homology to *P. putida* GP01 (*P.oleovorans*) *alkB*. (McCoy., 2000). This suggestion seems very likely. Indeed, *P. aeruginosa* strains were isolated from the slightly contaminated site by hydrocarbon; the probability of finding the *alkB* gene at its stem is too low or even neglected (Gerhard 1986; Kok et al., 1989b; Smith et al., 1999, van Beilen, et al., 1994; Whyte et al., 1996). In addition, research in this field reported that the *alkB* gene is in a mobile form and it is; therefore, very unstable (Gerhard 1986). Some alkane degradation genes have been found either on transposons (van Beilen et al., 2001; Belhaj et al., 2002) or on plasmids (Sekine et al., 2006; van Beilen et al., 1994), which clearly facilitate their horizontal transfer (Rojo, 2010).

Contrary to *alkB*, the PCR in the presence of primers *alkB1* gave an amplification product of 434 bp for strains of *P. aeruginosa*. But strangely, 05 strains did not give this product; nevertheless, they perfectly grew in presence of long chain n-alkanes. At this purpose, the frequency amplification of the

434pb fragment is of 90% (diagram N°2). Figure N° 4 show the results of amplifications obtained for some of these strains.

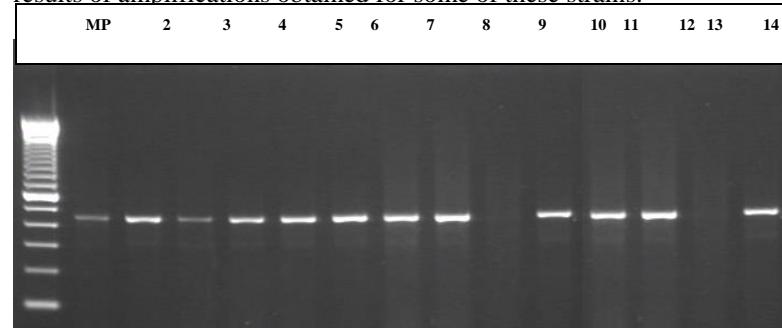
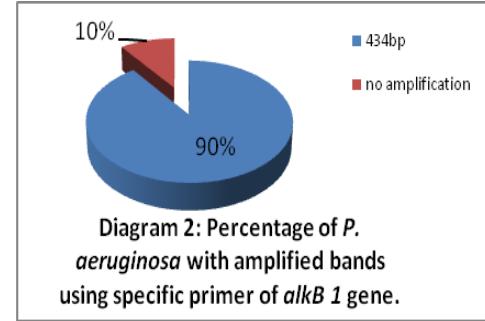
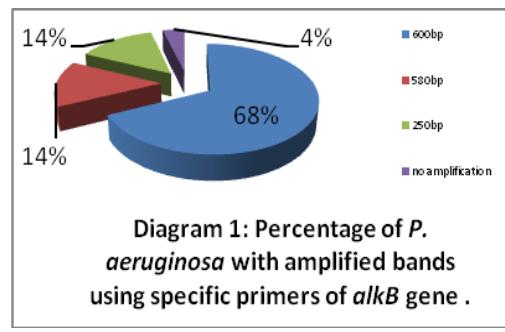


Figure 4: Migration on 1.5% agarose gel profile after PCR amplification in the presence of *alkB1* primers.

MP: 100 bp DNA Ladder, lane 1: HPa20, lane 2: EPa19, lane 3: EPa18, lane 4: EPa17, lane 5:EPa27, lane 6:EPa26, lane 7: EPa14, lane 8: HPa 13, lane 9: HPa24, lane 10: EPa23 lane 11: EPa45, lane 12: EPa10, lane 13: EPa30 and lane 14: HPa12.

Diagrams N° 1 and N° 2 allow accounting the frequency of *alkB* and *alkB1* genes fragments amplification for isolated *P. aeruginosa* strains.



Most *P. aeruginosa* strains isolated from both hospital and natural environments can degrade n-alkanes (Alonso et al., 1999, van Beilen et al., 1998, Yuste et al., 2000). The ability of clinical *P. aeruginosa* strains to grow on long chain n-alkanes may be explained by the fact that *P. aeruginosa* strains are not committed to a pathogenic lifestyle: patients may be infected by clinical strains as well as bacteria picked up from soil or water. Apparently, *P. aeruginosa* frequently encounters alkanes as a carbon source, and normally retains the genes required for their biodegradation (Smits et al., 2003). Indeed, long chain alkanes remains in hydrocarbon contaminated soils for long periods of

time (Stroud *et al.*, 2007; Throne-Holst *et al.*, 2007), and short chain alkanes are especially difficult for microorganisms to degrade in nature (Matsumiya and Kubo , 2007). Interestingly, only a few of alkB enzymes oxidize C₅–C₁₃ alkanes, as does *P. putida* GPo1, whereas most members of this family prefer alkanes larger than C₁₀ (Rojo *et al.*, 2010).

In order to identify *alkB1* genes involved in the biodegradation of long chain n-alkanes, the fragments amplified from strains EPa10, EPa45, HPa38 and HPa59 were purified and nucleotides sequences established. The four strains chosen have hospital or environmental origins. The sequences obtained were compared to that of *P. aeruginosa* PAO-1 (reference strain). The results obtained are shown in Figure N° 5.

5 - Nucleotide Sequencing

alkB1,Pa38 TGACCCTGCT GGAAATCATC AACTACGTCG AGCACTACGG CCTGCATCGG
alkB1,Pa59 TGACCCTGCT GGAAATCATC AACTACGTCG AGCACTACGG CCTGCATCGG
alkB1,PAO-1 TGACCCTGCT GGAGATCATC AACTACGTCG AGCACTACGG CCTGCATCGG
.....|.....|.....|.....|.....|.....|.....|.....|
360 370 380 390 400
alkB1,Pa10 CGAAAGGGCG AGGACGGGCG CTACGAGCGG ACCAACATA CCCACTCCTG
alkB1,Pa45 CGAAAGGGCG AGGACGGGCG CTACGAGCGG ACCAACATA CCCACTCCTG
alkB1,Pa38 CGGAAGGGCG AGGACGGGCG CTACGAGCGG ACCAACATA CCCACTCCTG
alkB1,Pa59 CGGAAGGGCG AGGACGGGCG CTACGAGCGG ACCAACATA CCCACTCCTG
alkB1,PAO-1 CGAAAGGGCG AGGACGGGCG CTACGAGCGG ACCAACATA CCCACTCCTG

.....|.....|.....|.....|.....
 410 420 430
alkB1,Pa10 GAACAGCAAC TTCTGTTCA CCAACCTGGT CCTG
alkB1,Pa45 GAACAGCAAC TTCTGTTCA CCAACCTGGT CCTG
alkB1,Pa38 GAACAGCAAC TTCTGTTCA CCAACCTGGT CCTG
alkB1,Pa59 GAACAGCAAC TTCTGTTCA CCAACCTGGT CCTG
alkB1,PAO-1 GAACAGCAAC TTCTGTTCA CCAACCTGGT CCTG

Figure 5: Comparison of Nucleotides sequences of *alkB1* gene with that of *P. aeruginosa* PAO-1. *P. aeruginosa* strains EPa10 and EPa45 are from environmental origin; HPa38 and HPa59 are from clinical origin.

It appears that *alkB1* genes fragments of strains EPa10 and EPa45 (environmental strains) present a high identity with that of *P. aeruginosa* PAO-1; however, strains HPa38 and HPa59 (clinical strains) differ by 4 nucleotides with those of PAO-1 and the environmental strains. Relying on the aforementioned facts, we notice that high DNA sequence similarity exist between the four strains and *P. aeruginosa* PAO-1. Furthermore, as we could not detect a plasmid in those strains, it's very probable that *alkB1* genes, like that of PAO-1 strain, are carried not by a plasmid but by the chromosome. In brief, DNA sequence conservation has been reported by several authors who have dealt with *P. aeruginosa* strains degrading long chain n-alkanes (Smits *et al.*, 1999, Guerra-santos *et al.*, 1986).

IV. CONCLUSION

The *P. aeruginosa* strains isolated in Morocco show heterogeneity in both biodegradation of n-akanes and the presence of *alk* genes. No strains degrade short chains n-alkanes or posses the *alkB* gene. However, they degrade the long chains n-alkanes, but the biodegradation kinetics and the presence of *alkB1* genes vary according to strains; furthermore, a few strains did not posses this latest gene. The heterogeneity of *P. aeruginosa* strains is confirmed with their patterns amplification with primers ERIC.

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AUTHORS

First Author – Asmae Aboulkacem , PhD student, Laboratory of Ecology and Biodiversity of Wetlands Team, Biology Department, Faculty of Sciences, Moulay Ismail University, BP: 11201, Meknes, Morocco. Email: saulasm@yahoo.fr

Second Author – Abouddihaj Barguigua, PhD student, Laboratory of Molecular Bacteriology, Pasteur Institute of Morocco, Casablanca, Morocco. Email: dihaj82@yahoo.fr

Third Author – Itto Maroui, , PhD student , Laboratory of Ecology and Biodiversity of Wetlands Team, Biology Department, Faculty of Sciences, Moulay Ismail University, BP: 11201, Meknes, Morocco. Email: ittomaroui@gmail.com

Fourth Author – Dr Mohammed Timinouni, Laboratory of Molecular Bacteriology, Pasteur Institute of Morocco, Casablanca, Morocco. Email: mohammed.timinouni@pasteur.ma

Fifth Author- Prof. Abdelhaq Belhaj, Laboratory of Ecology and Biodiversity of Wetlands Team, Biology Department, Faculty of Sciences, Moulay Ismail University, BP: 11201, Meknes, Morocco. Email: abelha02@yahoo.fr

Correspondence Author – Prof. Abdelhaq Belhaj, Laboratory of Ecology and Biodiversity of Wetlands Team, Biology Department, Faculty of Sciences, Moulay Ismail University, BP: 11201, Meknes, Morocco. Email:

abelha02@yahoo.fr. Phone: 06 67 87 71 4, Fax: (00212) 05 35 68 08

Effect of Caffeine on Serum and Urinary Electrolytes

G. Geethavani ¹, M. Rameswarudu ², R. Rameswari reddy ³, S. Babu rao ⁴, D. Moulali ⁵

¹ Tutor, Department of Physiology, SVS Medical College, Mahabubnagar, A.P.

² Professor of Physiology & Dean, SVS Medical College, Mahabubnagar, A.P.

³ Professor & HOD, Department of physiology, SVS Medical college, Mahabubnagar, A.P.

⁴ Assistant professor, Department of Anatomy, Santhiram Medical college, Nandyal, A.P.

⁵ Tutor, Department of BioChemistry, SVS Medical College, Mahabubnagar, A.P.

Abstract- In order to establish a relationship between caffeine and serum and urinary electrolytes, 30 healthy males were given an oral dose of 400 mg caffeine over a period of 120 min in four divided doses and electrolyte concentrations were measured during control and experimental periods. Serum potassium decreased significantly($P<0.01$) from 4.4 ± 0.2 (control period) to 3.9 ± 0.2 (experimental period at 400 mg of caffeine). Increased urinary sodium (i.e from 139 ± 3 in the control period to 209 ± 8) and increased chloride concentrations (i.e from 46 ± 7 in the control period to 124 ± 9) associated with increased urinary output was noticed significantly($P<0.01$) at 400 mg of caffeine. These results helps in establishing a dose response relationship between caffeine and electrolytes.

Index Terms- caffeine, serum potassium, urinary sodium, urinary output.

I. INTRODUCTION

Caffeine is a xanthine alkaloid most commonly consumed by humans. In North America, United Kingdom, and Denmark 82 to 95% of adults regularly consume caffeine (1, 2). Caffeine is generally considered as safe under moderate consumption (according to FDA). In increased doses, caffeine causes a significant change in renal and cardiovascular indices (3). Caffeine is associated with changes in serum and urinary electrolytes. We know that electrolytes are important in regulating the amount of water present in the body, acid- base balance and muscle function etc. Very few studies (3, 4) were reported in literature regarding the effect of caffeine on electrolytes. There is a need for study to determine the relationship between the dose of caffeine ingested and serum and urinary electrolytes for two reasons. Firstly, they are reported with inadequate sample size. Secondly, no report is published based on Indian population.

This study mainly aims at establishing a dose response relationship between caffeine and serum and urinary electrolytes, with adequate sample size in Indian population. It serves as a clinical database for Indian population.

II. MATERIALS AND METHODS

Thirty healthy male volunteers of age group between 19-22 years and weight between 45-60 kg were recruited for this study.

They were non-smokers and not suffering from any cardiac or pulmonary diseases. All the participants gave the informed written consent for the study. The study was approved by Institutional Human Ethical Committee on 26/03/2010. The study was conducted according to the guidelines of SVS Medical College, Mahabubnagar.

All the participants were instructed not to take coffee or tea atleast four days prior to the test. They were instructed to take normal diet and were restricted to eat foods high in sodium and potassium content. Once they were in the lab they were permitted to take rest for 30 minutes. Blood pressure and heart rate were recorded for all the individuals using sphygmomanometer and pulse rate.

On stabilisation, blood and urine samples were collected from all the participants and sent to laboratory and labelled as controls. All the participants were given 100 mg of caffeine in gelatine capsules. This was repeated at 30- minute intervals for a total period of 120 minutes which accounts to a total amount of 400 mg caffeine. At each interval, blood and urine samples were collected before the caffeine intake and sent to laboratory. In order to maintain the water balance and to ensure a brisk urine flow rate, each participant is allowed to take an equal amount of water load after voiding. This procedure was followed to eliminate total body water.

Analyses:

The blood samples in the laboratory were centrifuged by 3000rpm to separate serum and allowed to estimate the electrolytes by selective ionic exchange method. Urine samples were also allowed to estimate the electrolytes by selective ionic exchange method. The data was tabulated and analysed by using SPSS 16 statistical soft ware. Values are represented as means \pm SD.

III. RESULTS

1. Serum electrolytes:

Serum potassium was found to decrease significantly from 4.4 ± 0.2 in the control period to 3.9 ± 0.2 at 400 mg of caffeine intake (Table 1). Serum sodium and chloride levels decreased slightly but not significant.

Table 1: Serum electrolyte concentrations (means ± SD; n = 30 subjects)

	Control period (30 min)	Experimental period (Total 120 min)				significance
		100 mg caffeine (30 min)	100 mg caffeine (30 min)	100 mg caffeine (30 min)	100 mg caffeine (30 min)	
Na ⁺ (mmol/L)	139±2	139±2	138±2	138±2	138±2	NS (p=0.5)
K ⁺ (mmol/L)	4.4±0.2	4.4±0.2	4.4±0.2	4.3±0.2	3.9±0.2	P < 0.01, S
Cl ⁻ (mmol/L)	106±2	106±2	106±2	105±2	105±2	NS (p=0.5)

2. Urine output & electrolytes:

Increased urinary sodium (i.e from 139±3 in the control period to 209±8) and increased chloride concentrations (i.e from 46±7 in the control period to 124±9) associated with increased urinary output was noticed significantly at 400 mg of caffeine

intake (Table 2). Urinary potassium concentrations increased slightly but not significant.

Table 2: Urine output and electrolyte concentrations (means ± SD; n = 30 subjects)

	Control period (30 min)	Experimental period (Total 120 min)				significance
		100 mg caffeine (30 min)	100 mg caffeine (30 min)	100 mg caffeine (30 min)	100 mg caffeine (30 min)	
Na ⁺ (mEq/L)	139±3	144±3	150±4	177±5	209±8	P<0.01, S
K ⁺ (mEq/L)	18±3	18±3	19±3	20±3	21±3	NS (p=0.75)
Cl ⁻ (mEq/L)	46±7	51±7	58±7	87±8	124±9	P<0.01, S
Output(ml)	104±4	109±4	113±4	120±4	142±2	P<0.01, S

IV. DISCUSSION

Present study states that with increasing doses of caffeine i.e at 400mg, a significant acute increase in urinary sodium and chloride concentrations were noticed. At this dose of caffeine, a significant increase in urinary output was also noticed. This clearly suggests that, with moderately high doses of caffeine it causes acute natriuresis associated with diuresis. The same was supported by Shirley D.G. et al⁴ which states that caffeine causes an acute substantial increase in sodium excretion with accompanying diuresis at moderately high doses. According to Passmore AP et al³, caffeine doses greater than 90mg will significantly increase the urinary sodium excretion but urinary volume was increased by 360 mg of caffeine only. No significant change in urinary output was noticed with low oral doses of caffeine (45, 90 and 180 mg). Reviews of scientific literature^{5,6} stated that caffeine induces acute diuretic effect in greater dosages [i.e >250 mg/d (5); >680 mg/d (6)]. Another study by Gonzalez-Alonso⁷ also suggested that caffeine causes an acute diuretic effect when consumed in moderately high doses. The intrarenal mechanisms responsible for the natriuretic and diuretic effects of caffeine remains to be determined. Many conflicting views exist over the role of altered renal haemodynamics and tubular reabsorption. D.G., Shirley et al (3,8) states that the caffeine induced natriuresis resulted largely

from inhibition of fractional tubular reabsorption without affecting the renal plasma flow, since hemodynamic effects are involved in natriuresis. However based on scientific reviews^{4,8} the probable causes are: 1. Inhibition of proximal tubular sodium reabsorption due to A₁-adenosine receptor antagonism of caffeine.⁹⁻¹¹ 2. Reduction of distal sodium reabsorption due to A₂-adenosine receptor antagonism of caffeine, but the underlying mechanism behind this remain unexplained.

The study states that caffeine also causes slight increase in urinary potassium concentrations which are not significant. This was supported by Shirley D.G. et al⁴ who states that no major significant changes are observed in urinary potassium concentrations with caffeine ingestion.

Present study states that caffeine decreases the concentrations of serum sodium and chloride levels to a lesser extent which are not significant. Scientific reviews^{3,4} substantiated that no major changes were observed in the concentrations of serum sodium and chloride levels.

Caffeine also causes a significant decrease in the concentrations of serum potassium at doses of 400 mg. Passmore AP et al³ also stated that Serum potassium was significantly reduced by 360 mg of caffeine.

V. CONCLUSION

The present study confirmed and established a dose response relationship between caffeine and serum and urinary electrolytes with adequate sample size. It also provides a clinical database for Indian population. This data suggest the importance of regulating the caffeine intake in human beings.

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AUTHORS

First Author – G. Geethavani, Tutor, Department of Physiology, SVS Medical College, Mahabubnagar, A.P.

Second Author – M. Rameswarudu, Professor of Physiology & Dean, SVS Medical College, Mahabubnagar, A.P.

Third Author – R. Rameswari reddy, Professor & HOD, Department of physiology, SVS Medical college, Mahabubnagar, A.P.

Fourth Author – S. Babu rao, Assistant professor, Department of Anatomy, Santhiram Medical college, Nandyal, A.P.

Fifth Author – D. Moulaali, Tutor, Department of BioChemistry, SVS Medical College, Mahabubnagar, A.P.

Economics of different enterprises in identified Farming System in Chittoor district of Andhra Pradesh

Ajit Singh, Vikash Pawariya

Department of Agricultural Economics, S.V. Agricultural College, Tirupati-517502, A.P.

Abstract- Farming systems represent integration of farm enterprises such as cropping systems, animal husbandry, fisheries, forestry, etc. for optimal utilization of resources bringing prosperity to the farmer. The present study has been made to identify types of farming system and to assess the potentialities for increasing farm income through reallocation of resources in farming system. The data were collected from 90 respondents pertaining Chittoor district of Andhra Pradesh during 2012-13. The study revealed that maximum return obtained from dairy based farming system.

Index Terms- costs, returns, returns per rupee outlay.

I. INTRODUCTION

Agriculture constitutes one of the most crucial sectors of Indian economy by virtue of its being the single largest contributor to National Gross Domestic product (GDP) which hover around 15.7 percent (2011). With the declining farm sizes, it is becoming increasingly difficult to produce enough food to country. At the farmer's level, the incomes that were obtained from the small holdings are not adequate to meet the requirements of the family with no scope existing to increase the land area there is a possibility to enhance the income of the farmers through farming systems approach. This forms the background of the present study.

II. METHODOLOGY

The study will be conducted in Chittoor district of Andhra Pradesh. In the selected district, the farming systems practiced will be identified along with the mandals. From the mandals identified two mandals with existing farming system will be purposively chosen. Following the same criteria three villages will be selected from each mandal. From the villages so selected 30 farmers from each farming systems will be randomly selected. The collected data were analysed using statistical techniques such as, mean, percentages and ratios for better precision of analysis.

III. RESULTS AND DISCUSSION

(a) Costs and returns in farming system- I

The costs incurred and returns realized from different crop enterprises and their shares in total cost and returns were calculated and presented in Table 1. It is observed that among the seven major enterprises, expenditure made towards dairy

component was the highest (37.10%), followed by sugarcane (15.22%), *rabi* groundnut (12.36%), *kharif* groundnut (11.52%), *kharif* paddy (9.10%), *rabi* paddy (8.63%) and bajra (6.06%) accordingly to the total variable cost. Among the enterprises, highest share in total cost was in dairy with 33.18 per cent, followed by sugarcane (14.82%), *kharif* groundnut (13.52%), *rabi* groundnut (12.11%), *kharif* paddy (9.24%), *rabi* paddy (8.84%) and bajra (7.76%). The total cost of the Farming System as a whole was ` 282908.19 and the gross returns were ` 456151.45. The contribution of dairy enterprise to the net returns was 48.31 per cent. Among field crops, *rabi* groundnut (17.48%) contributed maximum and stood next to dairy, followed by *kharif* groundnut, *kharif* paddy, sugarcane, bajra and *rabi* paddy with a share of 12.02, 8.66, 7.75, 3.37 and 2.38 per cent, respectively to the net returns in the Farming System. The net returns obtained from the Farming System as a whole was ` 1,73243.26.

The returns per rupee of expenditure was observed to be the highest in dairy (1.89), followed by *rabi* groundnut, *kharif* paddy, *kharif* groundnut, sugarcane, bajra and *rabi* paddy with 1.88, 1.57, 1.54, 1.37, 1.27 and 1.17, respectively and for the system as a whole it was found to be 1.61.

(b) Costs and returns in farming system – II

There were mainly seven enterprises identified under this Farming System. Costs and returns of each of the enterprises were calculated and presented in Table 2. The cost of cultivation observed for the Farming System-II as a whole was ` 3,27,826.54, where as the gross returns and net returns were ` 4,99,637.01 and ` 1,71,810.47, respectively. Further, with the existing enterprises in Farming System-II, the maximum share of 52.87 per cent in the total variable cost of the system was absorbed by poultry enterprise, followed by *kharif* paddy (10.50%), *rabi* groundnut (9.93%), *kharif* groundnut (8.38%), *rabi* paddy (6.92%), ragi (6.47%), and fodder jowar (5.12%).

Under this Farming System, the share of poultry enterprise in total cost of the system was observed to be maximum (46.27%). Contribution of *Kharif* paddy stood next to poultry with 11.67 per cent, followed by share of *rabi* groundnut (10.16%), *kharif* groundnut (8.60%), *rabi* paddy (8.20%), ragi (8.16%) and fodder jowar (6.46%).

The contribution of poultry to the net returns was maximum (41.76%), followed by *rabi* groundnut (16.61%) to the net returns. The share of remaining enterprise was *rabi* paddy, *kharif* groundnut, *kharif* paddy, fodder jowar and ragi 13.60%, 12.43%, 7.07%, 4.57% and 3.97% respectively.

The returns per rupee of expenditure was observed to be more in *rabi* paddy (1.87), followed by *rabi* groundnut (1.82), *kharif* groundnut (1.76), poultry (1.47), fodder jowar (1.37),

kharif paddy (1.32) and ragi (1.25), whereas for the system as a whole it was 1.52. The results were in corroborated with Rai J and Tiwari, U. S. (2011).

(c) Costs and returns in farming system – III

The per farm cost and returns of enterprises in Farming System-III were calculated and presented in the Table 3. It can be observed that among the five enterprises practiced under this Farming System, the major share of total cost was incurred in sheep enterprise (40.99%), followed by *rabi* groundnut (20.95%). *Kharif* groundnut, *kharif* paddy and *rabi* paddy, accounted for 20.82, 16.03, and 12.97 per cent, respectively to

the total cost. The total cost of the Farming System was ` 184375.16.

Among the enterprises, the contribution of net returns to total returns was maximum in sheep rearing, which contributed 41.14 per cent to the total returns, where as the share of total net returns by *kharif* paddy enterprise was 29.19 per cent. The share of *rabi* paddy, *rabi* groundnut and *kharif* groundnut were 28.49, 26.12 and 11.34 per cent, respectively.

The returns per rupee of expenditure was observed to be more in *rabi* groundnut (1.94), followed by sheep rearing (1.75), *kharif* groundnut (1.41), *rabi* paddy (1.17) and *kharif* paddy (1.14), where as for the system as a whole it was 1.75.

Table 1. Costs and Returns structure of different enterprises under farming system – I

Sl.No.	Particulars	<i>Kharif</i> groundnut	<i>Rabi</i> groundnut	<i>Kharif</i> paddy	<i>Rabi</i> paddy	Bajra	Sugarcane	Dairy	Farming system as a whole
I.	Costs								
	Total variable costs	24802.8 (11.52)	26596.8 (12.36)	19602.5 (9.10)	18565 (8.63)	13033.1 (6.06)	32756.8 (15.22)	79855.1 (37.10)	215212.1 (100)
	Total fixed costs	13456.89 (19.88)	7655.0 (11.31)	6543.9 (9.67)	6430.0 (9.50)	8931.9 (13.19)	10654.5 (15.74)	14024.0 (20.72)	67696.1 (100)
	Total costs	38259.6 (13.52)	34251.8 (12.11)	26146.4 (9.24)	24995 (8.84)	21965.0 (7.76)	43411.3 (14.82)	93879.1 (33.18)	282908.2 (100)
II.	Returns								
	Gross returns	59077.0 (12.95)	64532.8 (14.14)	41142.8 (9.01)	29120.1 (6.38)	27850.6 (6.10)	56846.1 (12.46)	177581.9 (38.93)	456151.4 (100)
	Net returns	20817.3 (12.02)	30280.1 (17.48)	14996.5 (8.66)	4125.1 (2.38)	5885.7 (3.39)	13434.8 (7.75)	83702.8 (48.31)	173243.3 (100)
	Returns per rupee outlay	1.54	1.88	1.57	1.17	1.27	1.31	1.89	1.61

*Figures in parentheses indicate percentage to respective totals

Table 2. Costs and Returns Structure of different enterprises under farming system – II

Sl	Particulars	<i>Kharif</i> groundnut	<i>Rabi</i> groundnut	<i>Kharif</i> paddy	<i>Rabi</i> paddy	Ragi	Fodder jowar	Poultry	Farming system as a whole
I.	Costs								
	Total variable costs	21745.63 (8.38)	25762.53 (9.93)	26716.36 (10.50)	17939.19 (6.92)	16775.7 (6.47)	13284.05 (5.12)	137132.6 (52.87)	259356.06 (100)
	Total fixed costs	6453.78 (9.43)	9067.5 (13.24)	11543.3 (16.86)	8956.7 (13.08)	9987 (14.56)	7896.9 (11.53)	14565.3 (21.27)	68470.48 (100)
	Total costs	28199.41 (8.60)	34830.03 (10.16)	38259.66 (11.67)	26895.89 (8.20)	26762.7 (8.16)	21180.95 (6.46)	151697.96 (46.27)	327826.54 (100)

II.	Returns								
	Gross returns	49563.9 (9.92)	63360 (12.68)	50400 (10.09)	50261.54 (10.06)	33564.9 (6.72)	29040 (5.81)	223446.67 (44.72)	499637.01 (100)
	Net returns	21364.49 (12.43)	28529.97 (16.61)	12140.34 (7.07)	23365.65 (13.60)	6802.2 (3.96)	7859.05 (4.57)	71748.71 (41.76)	171810.47 (100)
	Returns per rupee outlay	1.76	1.82	1.32	1.87	1.25	1.37	1.47	1.52

*Figures in parentheses indicate percentage to respective totals

Table 3. Costs and Returns Structure of different enterprises under farming system – III

Sl. No.	Particulars	Kharif groundnut	Rabi groundnut	Kharif paddy	Rabi paddy	Sheep rearing	Farming system as a whole
I.	Costs						
	Total variable cost	24503.36 (17.80)	27386.2 (19.89)	21665.4 (15.74)	20290.9 (14.74)	65453.33 (47.56)	137633.79 (100)
	Total fixed cost	13875.6 (29.68)	11243.87 (24.05)	7890.8 (16.88)	3617.3 (7.75)	10113.8 (21.64)	46741.37 (100)
	Total cost	38378.96 (20.82)	38630.07 (20.95)	29556.2 (16.03)	23908.2 (12.97)	75567.13 (40.99)	184375.16 (100)
II.	Returns						
	Gross returns	54080 (16.75)	74800 (23.17)	33600 (10.41)	27855 (8.63)	132540.54 (41.05)	322875.54 (100)
	Net returns	15701.04 (11.34)	36169.93 (26.12)	4043.8 (29.19)	3946.8 (28.49)	56973.4 (41.14)	138500.38 (100)
	Returns per rupee outlay	1.41	1.94	1.14	1.17	1.75	1.75

*Figures in parentheses indicate percentage to respective totals

(d) Costs and returns in identified major farming system in study area

The total cost incurred, gross returns generated, net returns and the BC ratios in different Farming Systems were computed and depicted in Table 4. It was observed that the returns per rupee outlay ratios in all the Farming Systems ranged between 1.52 and 1.75. The farmer was getting as much as ` 1.75 per rupee of investment in Farming System-III, followed by Farming

System-I (1.61). It was found to be the lowest in Farming System-II (1.52). The maximum cost was observed in Farming System-II (` 3,27,826.54) and the least was in Farming System-III (` 1,84,375.16) where the respondents were following only field crops. However, net returns was highest in Farming System-I (` 1,73,243.26) and the same was comparatively less in Farming System-II (` 1,71,810.47), and followed by Farming System-III (` 1,38,500).

Table 4. Costs and returns Structure under existing farming system in the study area

Sl. No.	Particulars	Farming systems			
		I	II	III	
I.	Costs				
	Total variable cost	215212.12	259356.06	137633.79	
	Total fixed cost	67696.07	68470.48	46741.37	
	Total cost	282908.19	327826.54	184375.16	
II.	Returns				
	Gross returns	456151.45	499637.01	322875.54	
	Net returns	173243.26	171810.47	138500.38	
	Returns per rupee of investment	1.61	1.52	1.75	

*Figures in parentheses indicate percentage to respective totals

IV. CONCLUSION

It has been found that groundnut and paddy are dominant in all the farming systems in the Chittoor district. The study has observed that farmers of the area follow traditional farming systems, which do not provide adequate income for a good living there is a need to develop low cost technologies like simultaneous planting of sugarcane with paddy using improved varieties and site specific nutrient management with emphasis on balanced nutrition deserve due attention for increasing profitability of farming systems. A combination of technology, policy and institutional innovations is needed for improvement in productivity and profitability of crop and livestock sectors in the area, as has been suggested by Birthal *et al.* (2006) also.

AUTHORS

First Author – Ajit singh, Research scholar, Department of Agriculture Economics, S.V. Agricultural college Tirupati Acharya NG Ranga Agriculture university, Hyderabad (A.P), Email: ajitsingh15789@gmail.com

Second Author – VIKASH PAWARIYA, Research Scholar, Department of Agricultural Economics, SKN COA, Jobner, SKN AU, JOBNER, JAIPUR-303329

Third Author – Dr. I. Bhavani Devi, Professor, Department of Agriculture Economics, S.V. Agricultural college Tirupati, Acharya NG Ranga Agriculture university, Hyderabad (A.P)

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A Laboratory Investigation on the Compaction Properties of Soil mixed with Fly ash and Gypsum

Manjul Chandravanshi

Assistant Professor, Civil Engineering, IFTM University

Abstract- Fly ash is one of the numerous substance that cause air, water and soil pollution, disrupts ecological cycles and set off environmental hazards. Fly ash produced during the burning of powdered coal in thermal power plants is a hazardous waste. Disposal of this enormous amount of fly ash faces problem of huge land requirement, transportation, and ash pond construction and maintenance, which can be reduced by utilizing fly ash as a construction material for civil engineering structures. Soil stabilization has been implemented for improving soils, which have inadequate engineering properties. An attempt has been made in this present paper to highlight on the pollution hazards due to the disposal of fly ash into the environment and its utilization in civil engineering activities by conducting some laboratory investigations. This paper describes a research that is carried out to study the effect of gypsum and fly ash on compaction properties and California bearing ratio values of silty sand. Different percentages of fly ash (i.e. 10, 15 and 20%) alone and with combination of gypsum (i.e. 2 and 4%) were added to the soil in order to evaluate the optimum moisture content and maximum dry density. The given result of specimens illustrate that the combination of gypsum and fly ash in soil is more effective than fly ash treatment alone.

Index Terms- Compaction, CBR, Gypsum, Fly ash.

I. INTRODUCTION

The wastes generated from different industrial processes are of complex characteristics and composition and hence, their safe management and disposal is also intricate and complex. The disposal and storage of these wastes without treatment leads to contamination of surface and groundwater through long term leachate accumulation from the disposal sites and ultimately disturbs the ecological and environmental balance. One of the industrial wastes is fly ash having disposal problem. In India, about 76% of electrical energy is generated using coal as fuel in thermal power plants. Presently in India, more than 70 millions tones of fly is being generated by the thermal power plants, out of which a vast majority is fly ash having low lime content. Researchers have tried since sixties to transform fly ash from liability to asset. The solution of this problem may be achieved through bulk utilization of the fly ash as a construction material in different civil engineering and infrastructural projects.

Fly ash is known to have self hardening characteristics depending upon the availability of free lime in it for pozzolanic reaction. To enhance the strength, fly ash may be stabilized with proper additives (lime and gypsum) in suitable amount. Several investigators have reported the influences of the addition of fly

ash on soil properties. The effect of fly ash is noted mainly through the pozzolanic reactivity. The percentage increase of fly ash content in fly ash-soil mixtures leads to a decrease in the dry density due to the low specific gravity of fly ash.

Fly ash from thermal power plants can be considered either as a waste or as a resource yet to be fully utilized. Indian coals have very high ash content. The fly ash content of coal used by thermal power plants in India varies between 25 and 45%, with average fly ash content being 40%. As a consequence, a large amount of fly ash is generated from thermal power plants, causing several disposal related problems. In spite of initiatives taken by the government, several non-governmental and research and development organizations for fly ash utilization, the level of fly ash utilization in the country was estimated to be less than 10%. Globally, less than 25% of the total annual fly ash produced is utilized. Two methods are in practice to dispose of the generated fly ash. They are wet disposal and dry disposal methods with ash ponds being the most common methods of disposal in India

A review of the literature revealed that various laboratory investigations have been conducted independently on fly ash / lime stabilization of soil. Studies concerning fly ash and lime utilization for soil stabilization have been conducted in the past years by many investigators like Mitchell and Katti (1981), Consoli et al. (2001) and Edil et al. (2006) indicated the effectiveness of fly ashes for stabilization of fine grained soils. It is revealed from the previous studies that there is wide variation of the geotechnical properties of fly ash when it is stabilized with soil and any binding material.

II. MATERIALS AND METHODS

The experimental program in this investigation was conducted with silty sand, fly ash and gypsum. The soil was taken from Baini River, situated at Pantnagar, district Udhamsingh Nagar and classified as light brown silty sand (SM) as per IS:1498-1970. The specific gravity (G_s) of the soil is 2.45 and it does not exhibit any plasticity. The fly ash used in this study was low calcium class F fly ash obtained from Century Pulp and Paper Mill situated at Lalkuan, district Nainital. The fly ash had a dark grayish colour with a carbon content of (6-8%). The specific gravity of fly ash was 2.04 and it also does not exhibit any plasticity. The gypsum used in this study was locally available.

Different percentages of fly ash (i.e. 10, 15 and 20%) and gypsum (i.e. 2 and 4%) were added to the soil and the tests were performed. Proctor compaction tests were performed to determine the maximum dry density (MDD) and optimum

moisture content (OMC) for soil-fly ash and soil-fly ash-gypsum mixtures. The tests were conducted in accordance with Indian Standard test method (IS: 2720-Part 7).

III. TEST RESULTS AND DISCUSSIONS

Observations from standard proctor tests have been analyzed to study the effect of fly ash and gypsum on the engineering behaviour of soil.

Table I: OMC and MDD of soil +fly ash + gypsum mixes

OMC (%)						Max. Dry Density (kN/m ³)			
Fly Ash		0%	10%	15%	20%	0%	10%	15%	20%
Gypsum	0%	11.0	14	16	17	15.60	15.40	15.30	14.91
	2%	---	18	20	21	---	15.99	15.70	15.30
	4%	---	19	21	22	---	15.99	15.40	15.11

California Bearing Ratio

CBR-value is used as an index of soil strength and bearing capacity. This value is broadly used and applied in design of the base and the sub-base material for pavement. California Bearing

Ratio tests (CBR) were carried out on soil mixed with different proportion of fly ash and gypsum so as to study their bearing capacity.

Table II: CBR values for Unsoaked and Soaked condition

Soaked						Unsoaked			
Fly Ash		0%	10%	15%	20%	0%	10%	15%	20%
Gypsum	0%	4.92	4.98	5.99	6.46	13.07	13.34	14.89	15.56
	2%	---	5.05	5.41	6.34	---	13.81	16.30	16.50
	4%	---	5.19	5.54	6.35	---	20.61	20.82	20.95

IV. CONCLUSIONS

Soil stabilization as a cost-effective method is utilized in order to improve the properties of poor soil by adding the binder and by-products. The experiments conducted to study the effect of fly ash and gypsum addition on the geotechnical behaviour of soil.

Based on the experimental results and discussions as presented above the following conclusion can be drawn:

- With an increase in the percentages of fly ash in soil specimens the optimum moisture content increases and maximum dry density decreases.
- On addition of gypsum in soil –fly ash mixtures firstly an increase in both optimum moisture content and maximum dry density is observed. Further by increasing the percentage of gypsum the optimum moisture content increases and maximum dry density decreases.
- At optimum content, the CBR values of soil alone and soil – fly ash mixtures increases from 13.07% to 15.56% for Unsoaked condition. By increasing the percentages of fly ash and gypsum in soil samples the CBR value increases up to 20.95%.
- For soaked condition, the CBR values of soil and soil – fly ash mixtures increases from 4.92% to 6.46%. On addition of gypsum in soil – fly ash mixtures the CBR value

decreases to 4.39%. With increase in percentage of gypsum the CBR value again increases.

- The CBR values for unsoaked conditions are more than the CBR values for soaked conditions.

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AUTHORS

First Author – Manjul Chandravanshi, Qualification- M.Tech
(2013 pass out), Assistant Professor, IFTM University,
Moradabad., Email: manjul1811@gmail.com

Synthesis and Characterisation of CaCO₃ (Calcite) Nano Particles from Cockle Shells Using Chitosan as Precursor

Manjusha Hariharan*, Neethumol Varghese*, Dr. A. Benny Cherian*, Dr. P.V. Sreenivasan*, Jenish Paul*, Asmy Antony. K.A**

*Department of Chemistry, Union Christian College, Aluva, Ernakulum (DIST), Kerala, India, 683102

**Department of Chemistry, St. Xavier's College for Women, Aluva, Ernakulum (DIST), Kerala, India, 683101.

Abstract- Calcium carbonate nano particles were synthesized using precipitation method from cockle shells by employing chitosan as precursor. Synthesized Calcium carbonates were characterized using scanning electron microscopy (SEM), X-ray diffraction (XRD), UV-Visible and FTIR Spectroscopy. The results were compared with commercial calcium carbonate nano particles. Cockle shells are the potential source of calcium carbonate. The materials used were naturally occurring and also from the byproducts of sea food industry. The adopted methods were cost effective and ecofriendly.

Index Terms- calcium carbonate, synthesis, chitosan, nano particle.

I. INTRODUCTION

Calcium Carbonate is a naturally occurring inorganic biomaterial [1]. It is a white, insoluble solid occurring naturally as chalk, limestone, marble, and calcite, and is the main component of shells of marine organisms, snails, pearls, and eggshells. It is a white powder or a stone. Calcium carbonate exists in three polymorphs: calcite, aragonite, and vaterite [2]. Aragonite has got enormous research attention because of its biocompatible properties [3-6]. Among these three polymorphs, calcite is thermodynamically stable [4, 7]. Even though calcite is the most stable polymorphism of calcium carbonate, aragonite has higher density and hardness which make it very suitable material in plastic, paper, glass, fiber and other industry [8]. Among biological minerals, calcium carbonate has a special place since it is the main constituent of bones and shells. In both materials, the inorganic mineral is associated with biopolymers. CaCO₃ bio deposits exhibit variation in crystal size, shape, morphology, texture and aggregation. CaCO₃ nano particles (<100 nm) have shown many unique properties compared to regular particles.

Biological systems are capable of producing inorganic materials such as calcium carbonate with different structures, morphologies and polymorphs [9]. Cockle (a common name for a group of (mostly) small, edible, saltwater clams, marine bivalve mollusks in the family Cardiidae) shell, also known as '*Anadara granosa*' is one of the most common sources of calcium carbonate [10]. It is a type of edible bivalve shellfish that grows well in muddy coastal area. It is a cheap protein source which is quite common to be prepared as local dishes [11]. The distinctive rounded shells of cockles are bilaterally symmetrical, and are heart-shaped when viewed from the end. Cockle shells are

composed of pure calcium carbonate, usually both in the form of calcite and aragonite. Sea shell contained of 95-99% by weight of CaCO₃ which has enable it to be applied for quite a number of purposes [12 - 13]. It was found that cockles shell is the potential biomass resource for bone repair material especially made for cancer patients [14]. Calcium carbonate is an extremely versatile filler and pigment that is utilized in a wide variety of products including paper, plastics, rubber and pharmaceuticals. Its final application is determined by different physical and chemical properties. The most important aspect with respect to the synthesis of nano particles is control of the particle size, polymorphism, and morphology of the desired material [15]. Control of this parameter has led to the development of new materials with unique properties that differ from those in the bulk material.

Tsuzuki et al. synthesized calcium carbonate nanoparticles using a mechano chemical reaction followed by heat treatment [16]. A solid-state displacement reaction would occur during mechanical milling of the reaction powder mixture. The heat treatment ensured completion of the reaction. This limited the morphology of the particle to calcite, and had high energy consumption. Mechanical milling causes irregularities in particle shape and distribution. Liu et al. prepared nanosized CaCO₃/SiO₂ composite particles by the sol-gel process of CaCO₃ and Na₂SiO₃ in an agitated tank reactor, with an average composite size of sol gel coated CaCO₃ of about 40 nm [17]. CaCO₃ nanoparticles have also been prepared using a microemulsion technique consisting of sodium dodecyl-sulphate (SDS)/isopentanol/cyclohexane/water, [18]. The synthesis of pure calcium carbonate nano crystals using a high pressure homogenizer (HPH) via a microemulsion system was reported by [Abdullahi Shafiu Kamba](#) et al. [9]

In the present study, nano calcium carbonate was synthesized by employing biopolymer chitosan as the size reducing agent. The synthesis of calcium carbonate (calcite) nano particles from cockle shells is greatly promising approach. Cockle shells are naturally purified source of aragonite polymorphs of calcium carbonate. However by applying high temperatures, the aragonite polymorph converts to calcite, which is thermodynamically most stable.

II. MATERIALS AND METHODS

2.1 Materials

Cockle shells obtained from local market, Analytical grade. Conc. HCl, Acetic Acid Glacial, Sodium carbonate supplied by

SD fine chem. Limited, Worli, Mumbai, Chitosan provided by CIFT Cochin were used for the synthesis of calcium carbonate nano particles.

2.2 Experimental methods

For the preparation of cockle shell CaCO_3 nano powder, approximately 100 grams of cockle shells were first washed by normal tap water to remove dirt from the outer surface and inside of the shells. The shells were then boiled for about 30 minutes using a steel container and stove followed by drying in an oven at 110 °C for 2 days. Washed and dried cockle shells were finely grounded using a grinder. The nano sized calcium carbonate was synthesized by an in situ deposition technique (Mishara et al 2005). This method was adopted here to synthesize calcium carbonate nano particles. The powder of calcium carbonate obtained from cockle shells was dissolved in about 150 gram of concentrated hydrochloric acid. Obtained calcium chloride solution was mixed with 1.5 gram of chitosan, which was dissolved in 3% acetic acid. This mixture was blended with 70 gram sodium carbonate solution and slightly heated the mixture to complete the reaction. The mixture was kept overnight. Obtained calcium carbonate precipitate was filtered off, washed several times with water to remove sodium chloride, hydroxide etc and dried. It was kept for two hours calcinations in a muffle furnace at 650 °C to burn out Chitosan and to obtain nano sized calcium carbonate nano particles. The obtained powder was stored in small air tight bottles to avoid absorption of any moisture.

XRD analysis: After thoroughly cleaning the sample holder, the CaCO_3 nano powder obtained from cockle shells was spread on the sample holder. The sample was then placed inside the XRD machine (Model-DY-1656) and the sample was investigated to understand the phase(s) and size of the CaCO_3 nano powder.

FT-IR analysis: The CaCO_3 powder was mixed with KBr at the ratio of 1:100. The mortar and pestle was thoroughly cleaned with acetone, the mixture of CaCO_3 powder and KBr was crushed. The CaCO_3 powder and KBr mixture was then put into the disc which was placed on a holder placed inside the FT-IR (Shimadzu IR Affinity-1 Spectrophotometer) machine to investigate the unknown materials present in the sample.

SEM Analyses: The sample of CaCO_3 nano powder was affixed to a metallic stub which is placed on the sample holder. The sample holder was then fixed on a rotatable disc inside the machine and the CaCO_3 nano powders were ready for SEM. The surface morphology of the powder sample was observed on SEM (JEOL-JSM 5800) operated under low vacuum at an accelerating voltage of 25 kV to get the sharp image of the sample.

UV-Spectrophotometer: Deionized water was taken in a quartz cuvette as the reference and was placed in UV spectrophotometer (Shimadzu UV 1800) to get the absorbance. The calcium carbonate nano powder obtained from cockle shells were partially dissolved in deionized water. These sample solution were taken in a quartz cuvette and placed in the spectrophotometer to obtain the absorbance.

III. RESULTS AND DISCUSSION

3.1 XRD

The size of the CaCO_3 nano powder obtained from cockle shell was demonstrated [XRD, PANalytical, (model: DY-1656)] machine (Position 2θ, range 20-60). The XRD pattern is shown in Figure 1. The analysis of crystal structure using XRD illustrates that the nano powder synthesized from cockle shell was made up of calcite, CaCO_3 . It was one type of crystal form of calcium carbonate other than aragonite and vaterite. The strong and sharp peaks showed that the cockle shell CaCO_3 powder was well crystalline. The average crystallite size (D) of the calcium carbonate was calculated using Debye-Scherrer equation [19, 20].

$$D = \frac{0.9\lambda}{\beta \cos \theta}$$

D = shape factor, λ = x-ray wavelength, β = FWHM of diffraction peak, θ = Bragg angle.

The grain size was calculated to be 28.64 nm. However the calcium carbonate obtained from cockle shells was mainly in the form of aragonite, natural aragonite on heating converts to calcite, the conversion being very rapid at temperatures above 400 °C temperatures. It was concluded that all of the peaks obtained in the XRD pattern of cockle shell CaCO_3 nano powder matched perfectly with the standard calcite pattern [21] and JCPDS file (88-1807).

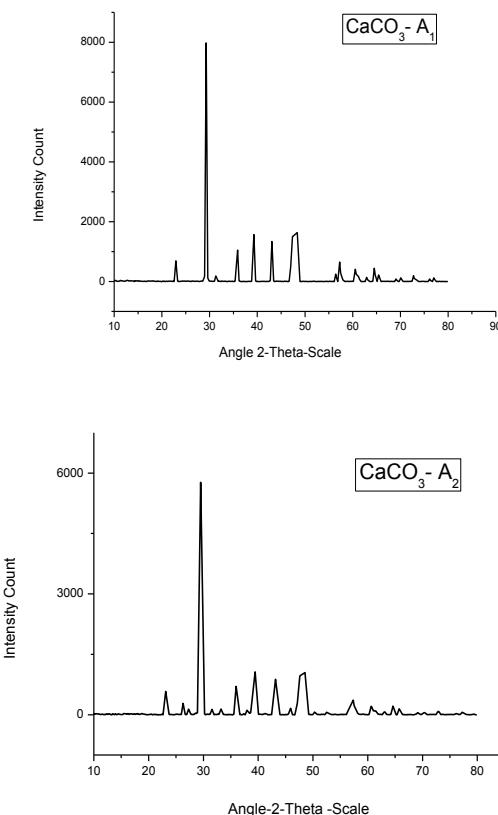


Figure 1.The XRD images for the commercial (A1) and synthesized calcium carbonate (A2)

3.2 Fourier transforms infrared analysis

The phase of the cockle shell CaCO_3 powder was further confirmed by (Shimadzu IR Affinity-1 Spectrophotometer)

machine. An FTIR spectrum was generated by the absorption of electromagnetic radiation in the frequency range $400 - 4000 \text{ cm}^{-1}$. The obtained spectrum is shown in the figure 2. The spectrum showed vibrational bands at 1456.391 cm^{-1} , 876.72 cm^{-1} , 712.7281 cm^{-1} and 409.891 cm^{-1} indicates plane bending vibration of carbonate. FT-IR analysis confirmed that the CaCO_3 nano powder obtained from cockle shell had the characteristic peak of carbonate group. A sharp peak at 876.72 cm^{-1} confirmed that the CaCO_3 nano powder obtained from cockle shell was calcite. FT-IR analysis also evidenced that the powder consisted of CaCO_3 itself.

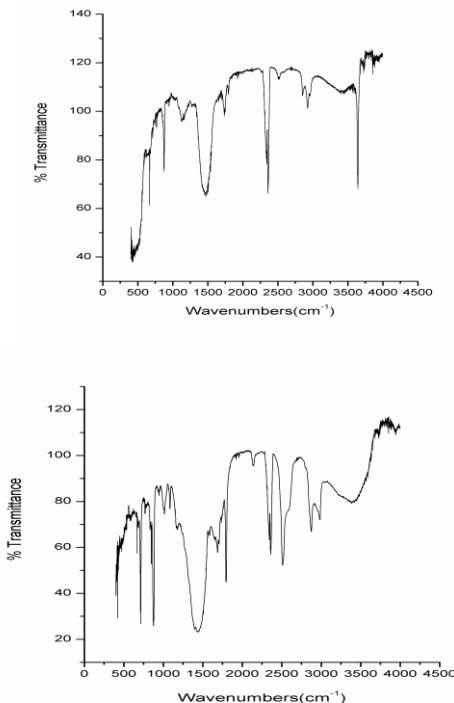


Figure2. FTIR images of commercial and synthesized of nano calcium carbonate.

3.3 UV-Visible

The calcium carbonate nano powder obtained from cockle shells were again confirmed by taking UV spectra using (Shimadzu UV 1800) spectrophotometer. Calcium carbonate nano powders were partially dissolved in distilled water to obtain the UV absorption bands for calcium carbonate nano powders. Obtained spectra are given in the figure 3. Particular absorbance will produce a band in UV spectrophotometer. The strong absorbance peak obtained for of calcium carbonate nano powders were in the range of 538, 685, 780, 865, 963 nms.

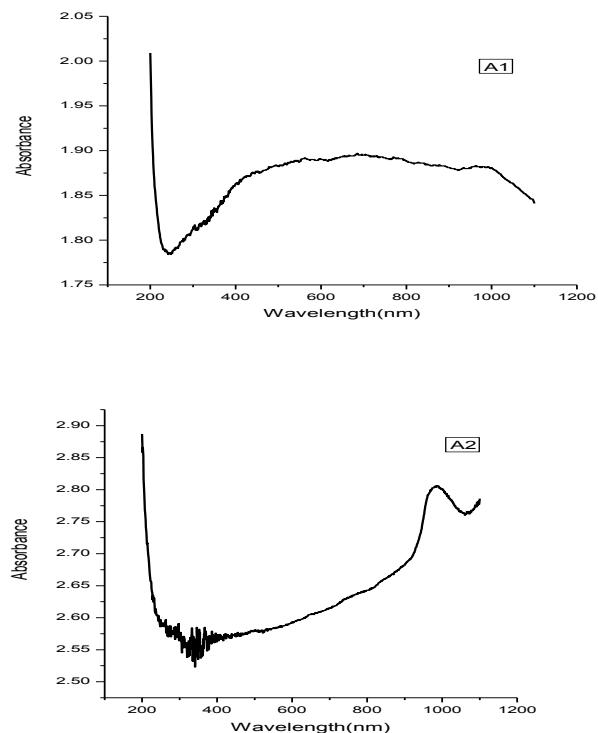


Figure3. UV Spectra of commercial and synthesized nano calcium carbonate.

3.4 Scanning Electron Microscopy

Scanning electron microscope is a very useful tool for studying morphology of nano powders. The surface morphology of the CaCO_3 nano powder synthesized was examined by SEM (JEOL-JSM 5800) scanning electron microscope operating at 25 kV accelerating voltage. The CaCO_3 nano powder is a non-conducting powder therefore the SEM images were taken at low vacuum mode to obtain sharp images. The images are shown in Figure 4. Calcite and aragonite possess different crystal growth patterns and crystal structure. Calcite is hexagonal and aragonite is orthorhombic. Cube-like crystals of calcite are stable as compared to Rod-like orthorhombic crystals of aragonite.

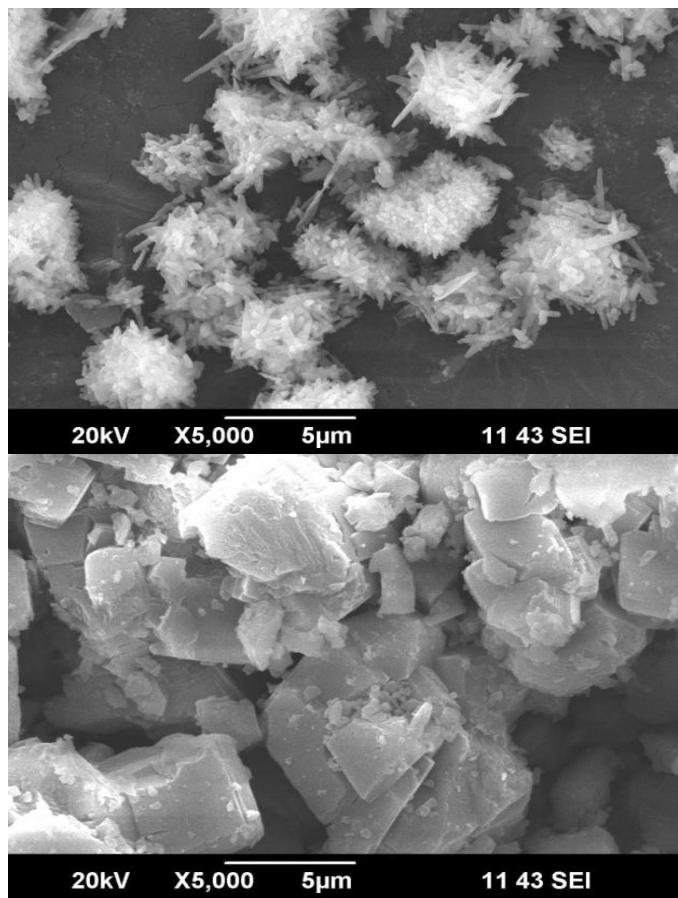


Figure 4. SEM morphology of commercial and synthesized calcium carbonate nanopowder.

IV. CONCLUSION

This work deals with the synthesis of nano particles of CaCO_3 using precipitation method from cockle shells by employing Chitosan. The obtained calcium carbonate is characterized by XRD, FTIR, UV-Visible and SEM. Using precipitation method and by applying Chitosan the obtained calcium carbonate powder is in nano metric scale. XRD analysis showed that the CaCO_3 nano powder synthesized from cockle shell had more stable calcite phase as compared to less stable aragonite phase. FT-IR analysis confirmed that the CaCO_3 nano powder obtained from cockle shell had the characteristic peak of carbonate group at 1456.391 cm^{-1} , 876.72 cm^{-1} , 712.7281 cm^{-1} and 409.891 cm^{-1} . SEM images confirmed that the synthesized calcium carbonate nano powder from cockle shells have calcite phase. Calcium carbonate powders obtained at the nano metric scale, may have superior properties as compared to the powders obtained in larger particle sizes and can be used in various applications.

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AUTHORS

First Author: Manjusha Hariharan, Research Scholar,
Union Christian College (MG University, Kottayam), Aluva,
Ernakulam Dist, Kerala, India, 683102. Email:
manjushahariharan@gmail.com

Second Author: Neethumol Varghese, Research Scholar, Union
Christian College (MG University, Kottayam), Aluva,
Ernakulam Dist, Kerala, India, 683102, Email:
neethumol84@gmail.com.

Third Author: Dr. A Benny Cherian, Associate Professor Union
Christian College, (MG University, Kottayam), Aluva,
Ernakulam Dist, Kerala, India, 683102., Email:
bennycherian@gmail.com

Fourth Author: Dr. P.V Sreenivasan, Associate Professor,
Union Christian College (MG University, Kottayam), Aluva,
Ernakulam Dist, Kerala, India, 683102. Email:
sreenucc@gmail.com

Fifth Author: Jenish Paul, Assistant Professor, Union Christian
College (MG University, Kottayam), Aluva, Ernakulam Dist,
Kerala, India, 683102. Email: jenishpaul@gmail.com

Sixth Author: Asmy Antony K.A, Assistant Professor, St.
Xavier's college for women (MG University, Kottayam), Aluva,
Ernakulam Dist, Kerala, India, 683101.
Email: asmy.antony30@gmail.com

Correspondence Author: Manjusha Hariharan, Email:
manjushahariharan@gmail.com, Contact no: +919048547432.

The Study of the Application of Data Encryption Techniques in Cloud Storage to Ensure Stored Data Integrity and Availability

Okeke Stephen

Department of Computer Science, College of Physical and Applied Sciences, Michael Okpara University of Agriculture, Nigeria.

Abstract- Nowadays, the rates of malicious data theft and data destruction are alarming. Governments, companies and other organizations have lost a lot of money and many others have closed down due to the activities of dubious hackers and attackers. As data is the life wire of every organization, there is the need to remotely and securely store the data generated daily by these organizations in order to enable them recover quickly in the event of attach and hack. Cloud storage is needed here for the remote data storage. For many establishments, data security is one of their major concern when sending their files into the cloud. They worry about their files being seen or even compromised by malicious and dubious people because that's what happened in the past. User accounts have been hacked, cloud storage systems failed, files and personal data were exposed. So how can you effectively prevent that from happening even if your account gets hacked or something happens to your cloud storage provider. Data encryption techniques are required to protect the integrity of the stored data. In the past, many businesses felt comfortable allowing the cloud providers to manage all their data, believing that security risks could be managed through contracts, controls and audits. Over time it has become apparent, however, that cloud providers cannot honor such commitments when responding to government requests for information. In this paper, I will focus on cloud storage providers, cloud security challenges, encryption methodologies.

Index Terms- Cloud Storage, Encryption, Cipher text, Symmetric and Asymmetric encryptions.

I. INTRODUCTION

Cloud Storage is a system whereby data is remotely stored, maintained, managed, and backed up. The service is available to users over a network, which is usually the internet. It allows the user to store files online so that the user can access them from any location through the internet. The service providing company makes them available to the user online by keeping the uploaded files on an external server. This gives companies using cloud storage services ease and convenience, but can potentially be costly. Storing data safely offsite is one of the cloud's key features. Studies have found that fully 80% of businesses that suffer major data loss go out of business within two years. This is where cloud storage has generated the most interest because it allows you to safely store critical data on a public or private cloud.

These off-site, proven production systems are managed by trained and experienced admins that few businesses could otherwise afford themselves. Cloud Storage has also been increasing in popularity recently due to many of the same reasons as Cloud Computing. Cloud Storage delivers virtualized storage on demand, over a network based on a request for a given quality of service (QoS). There is no need to purchase storage or in some cases even provision it before storing data. You only pay for the amount of storage your data is actually consuming. Cloud storage is used in many different ways. For example: local data (such as on a laptop) can be backed up to cloud storage; a virtual disk can be "synched" to the cloud and distributed to other computers; and the cloud can be used as an archive to retain (under policy) data for regulatory or other purposes.

For applications that provide data directly to their clients via the network, cloud storage can be used to store that data and the client can be redirected to a location at the cloud storage provider for the data. Media such as audio and video files are an example of this, and the network requirements for streaming data files can be made to scale in order to meet the demand without affecting the application. The type of interface used for this is just HTTP. Fetching the file can be done from a browser without having to do any special coding, and the correct application is invoked automatically. But how do you get the file there in the first place and how do you make sure the storage you use is of the right type and QoS? Again many offerings expose an interface for these operations, and it's not surprising that many of these interfaces use REST principals as well. This is typically a data object interface with operations for creating, reading, updating and deleting the individual data objects via HTTP operations.

II. THE BRIEF EVOLUTION OF CLOUD STORAGE

Over the last few years, the capabilities and reach of cloud storage services have evolved rapidly, with many organizations expressing interest in storage-as-a-service. Cloud storage is a subcategory of the very complex cloud computing idea. It is a service model in which data is: maintained, managed and backed up remotely and made available to users over a network (typically the Internet). FilesAnywhere.com was one of the first companies to offer the cloud storage service. Their cloud storage service enabled users to store data on their servers from anywhere at any time, while also being able to retrieve the data from anywhere at any time. FilesAnywhere.com would be a pioneer in the cloud storage business and many companies would follow suit.



Figure 1 Evolution of Cloud Storage

III. CLOUD STORAGE ARCHITECTURES

Cloud storage architectures are primarily about delivery of storage on demand in a highly scalable and multi-tenant way. Generically, cloud storage architectures consist of a front end that exports an API to access the storage. In traditional storage systems, this API is the SCSI protocol; but in the cloud, these protocols are evolving. There, you can find Web service front ends, file-based front ends, and even more traditional front ends (such as Internet SCSI, or iSCSI). Behind the front end is a layer of middleware that I call the storage logic. This layer implements a variety of features, such as replication and data reduction, over the traditional data-placement algorithms (with consideration for geographic placement). Finally, the back end implements the physical storage for data. This may be an internal protocol that implements specific features or a traditional back end to the physical disks.

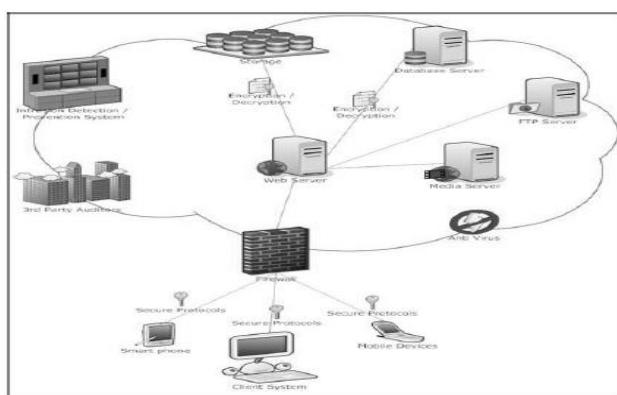


Figure 2 Cloud Storage Architecture

IV. CLOUD STORAGE PROVIDERS AND THEIR FEATURES

There are many cloud service providers. Generally, these service providers normally give out free storage space to a certain number of gigabytes, after which monthly fee

subscription commence. The cloud storage service providers provide drag-and-drop accessing option and syncing of folders and files between a desktop and mobile devices, and the cloud drive. They also allow all account users to collaborate with each other on documents. The major providers are:



Figure 3 Cloud Storage Providers

Box

Collaboration: You can share content with both colleagues that do have Box accounts, and those who don't. Like Dropbox, you can create a shared folder and invite Box account colleagues for ongoing sharing. You can receive email notifications when files are uploaded, downloaded, or added. You can also set passwords for important files and set time limits for user access to certain files. You have more control over user access to files and documents because security levels can be defined. Box is geared more towards businesses and enterprises, but it is also available for personal use.

Mobile App Support: Users can view, edit, create and share content on-the-go. You can find files fast with built-in search. It allows you to save files you create or edit in other apps to your Box account. You can also upload files from your phone or tablet to Box as well as save files from Box onto your mobile device for offline access.

Storage: Box offers 5 GB of free storage.

Strengths: You can store larger file sizes. Box is organized and user friendly, you can create and organize several layers of folders for all of your documents and data. You can use tagging as a way to keep track of your folders and files. Tags allow you to mark and sort related files that may not be located in the same section of your Box. Box offers the highest security options. Content management tools.

Weaknesses: Box doesn't do file-syncing from the computer to box.com as simply as other services do. There is a desktop component called Box Sync, but it's available only to Business and Enterprise account holders for a fee.

Google Drive

Collaboration: Users of Google Drive documents must have a Google Drive account. All updates and editing by collaborators will be synced to Google Drive. For documents that you have permission to access, you can receive notifications when changes are made. You can share files with people by sending them a link to your file.

Mobile App Support: Google Drive has an Android app which gives you the ability to share the files on your Android device using your Drive account. You can also share any file from Drive with your phone contacts.

Storage: Google Drive offers 5GB of free storage.

Strengths: Has built-in document editor so that programs such as Microsoft Word are not required to be installed on computer in order to edit document. Allows comments to be left on any files stored.

Weaknesses: Sharing not as easy and intuitive as Dropbox—must use the Google Drive web application to set it up. Also no ability to set preferences on syncing speed.

Microsoft SkyDrive

Collaboration: Colleagues can access SkyDrive files without having to sign up for a SkyDrive account. You can also update documents simultaneously online with colleagues.

Mobile App Support: SkyDrive offers both a Windows phone app and an iOS (iPhone/iPad) app. This allows users to view and share as well as edit and update files via phone or tablet. SkyDrive files can also be opened using third party iOS apps, such as Pages and Keynote.

Storage: SkyDrive offers 7GB of free space.

Strengths: Offers the most storage for free of the options reviewed in this document. Like Google Drive, you can edit documents within the browser, without having to open up a client application like Microsoft Word.

Weaknesses: – Skydrive is somewhat less user friendly than Dropbox and Google Drive.

Dropbox

Collaboration: Dropbox gives users the capability of sharing entire folders with other Dropbox account users, which allows updates to be viewable by all collaborators. Users can download shared documents directly from Dropbox's web interface without having to install the Dropbox desktop client. Storing files in the Dropbox "Public" folder allows links to files to be sent to Dropbox and non-Dropbox users; however non-Dropbox link recipients must download the file to access/edit it, and any changes or revisions made to the file by the link-recipients will not be reflected in the Dropbox version of the file.

Mobile App Support: Documents are easily accessible through phone and tablets using the Dropbox mobile app.

Storage: Dropbox offers 2GB of free storage.

Strengths: Primarily in its ease of use. Very intuitive interface—for example, sharing folders is available by simply right-clicking the file or folder on the desktop, and choosing Sharing. You can also determine how fast files are synced in Preferences (right-clicking the Dropbox icon). You can also recover deleted files in Dropbox easier than some other options.

Weaknesses: Lowest amount of free storage of the offerings reviewed in this document. Also, when inviting users to share files/folders, the email invitation must be sent to the email address that is associated with the users' Dropbox account.

▪ Pros of Cloud Storage

Usability – All cloud storage services reviewed in this topic have desktop folders for Mac's and PC's. This allows users to drag and drop files between the cloud storage and their local storage.

Bandwidth – You can avoid emailing files to individuals and instead send a web link to recipients through your email.

Accessibility – Stored files can be accessed from anywhere via Internet connection.

Disaster Recovery – It is highly recommended that businesses have an emergency back-up plan ready in the case of an emergency. Cloud storage can be used as a back-up plan by businesses by providing a second copy of important files. These files are stored at a remote location and can be accessed through an internet connection.

Cost Savings – Businesses and organizations can often reduce annual operating costs by using cloud storage; cloud storage costs about 3 cents per gigabyte to store data internally. Users can see additional cost savings because it does not require internal power to store information remotely.

▪ Cons of Cloud Storage

Usability – Be careful when using drag/drop to move a document into the cloud storage folder. This will permanently move your document from its original folder to the cloud storage location. Do a copy and paste instead of drag/drop if you want to retain the document's original location in addition to moving a copy onto the cloud storage folder.

Bandwidth – Several cloud storage services have a specific bandwidth allowance. If an organization surpasses the given allowance, the additional charges could be significant. However, some providers allow unlimited bandwidth. This is a factor that companies should consider when looking at a cloud storage provider.

Accessibility – If you have no internet connection, you have no access to your data.

Data Security – There are concerns with the safety and privacy of important data stored remotely. The possibility of private data commingling with other organizations makes some businesses uneasy.

Software – If you want to be able to manipulate your files locally through multiple devices, you'll need to download the service on all devices.

V. CLOUD DATA ENCRYPTION

Encryption is the process of making files or data unreadable with an encryption key or pass phrase so that even if somebody gains access to the files – it doesn't matter because the only thing an intruder sees is gibberish. Only with the key you can properly see what's in a file. Cloud encryption is a service offered by cloud storage providers whereby data, or text, is transformed using [encryption](#) algorithms and is then placed on a storage cloud. It is the transformation of a cloud service customer's data into [ciphertext](#). Cloud encryption is almost identical to in-house encryption with one important difference -- the cloud customer must take time to learn about the provider's policies and procedures for encryption and [encryption key management](#). The cloud encryption capabilities of the service provider need to match the level of sensitivity of the data being hosted. Because encryption consumes more processor overhead, many cloud providers will only offer basic encryption on a few database fields, such as passwords and account numbers. At this point in time, having the provider encrypt a customer's entire database can become so expensive that it may make more sense to store the data in-house or encrypt the data before sending it to the

cloud. To keep costs low, some cloud providers have been offering alternatives to encryption that don't require as much processing power. These techniques include redacting or obfuscating data that needs to remain confidential or the use of proprietary encryption algorithms created by the vendor.

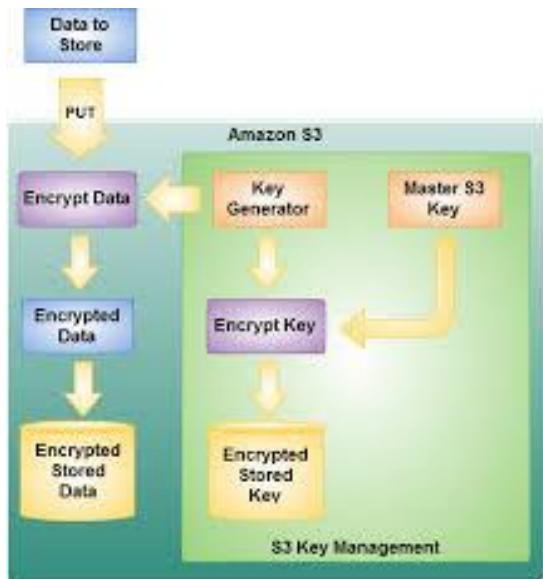


Figure4 Cloud Data Encryption

VI. CLOUD DATA ENCRYPTION METHODS

Cipher Text

In cryptography, a cipher (or cypher) is an algorithm for performing encryption or decryption—a series of well-defined steps that can be followed as a procedure. An alternative, less common term is encipherment. To encipher or encode is to convert information from plain text into cipher or code. In non-technical usage, a 'cipher' is the same thing as a 'code'; however, the concepts are distinct in cryptography. In classical cryptography, ciphers were distinguished from codes. Codes generally substitute different length strings of characters in the output, while ciphers generally substitute the same number of characters as are input. There are exceptions and some cipher systems may use slightly more, or fewer, characters when output versus the number that were input.

Codes operated by substituting according to a large codebook which linked a random string of characters or numbers to a word or phrase. For example, "UQJHSE" could be the code for "Proceed to the following coordinates". When using a cipher the original information is known as plaintext, and the encrypted form as ciphertext. The ciphertext message contains all the information of the plaintext message, but is not in a format readable by a human or computer without the proper mechanism to decrypt it.

Block Ciphers and Stream Ciphers

One of the main categorization methods for encryption techniques commonly used is based on the form of the input data they operate on. The two types are Block Cipher and Stream Cipher. This section discusses the main features in the two types,

operation mode, and compares between them in terms of security and performance.

Block Cipher

In this method ciphering, data is encrypted and decrypted if data is in from of blocks. In its simplest mode, you divide the plain text into blocks which are then fed into the cipher system to produce blocks of cipher text. ECB(Electronic Codebook Mode) is the basic form of block cipher where data blocks are encrypted directly to generate its correspondent ciphered blocks. More discussion about modes of operations will be discussed later.

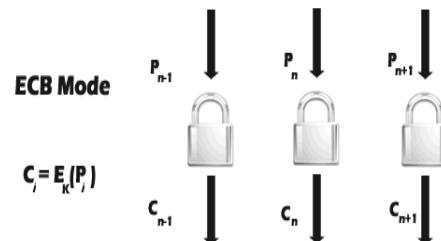


Figure5 Block Cipher ECB Mode

Stream Ciphers

Stream cipher functions on a stream of data by operating on it bit by bit. Stream cipher consists of two major components: a key stream generator, and a mixing function. Mixing function is usually just an XOR function, while key stream generator is the main unit in stream cipher encryption technique. For example, if the key stream generator produces a series of zeros, the outputted ciphered stream will be identical to the original plain text. Figure 3 shows the operation of the simple mode in stream cipher.

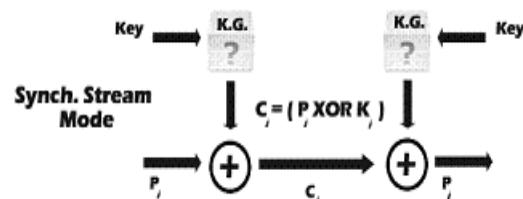


Figure6 Stream Cipher (Simple Mode)

Explanation

This section explains the two most common modes of operations in Block Cipher encryption-ECB and CBC- with a quick visit to other modes. There are many variances of block cipher, where different techniques are used to strengthen the security of the system. The most common methods are: ECB (Electronic Codebook Mode), CBC (Chain Block Chaining Mode), and OFB (Output Feedback Mode). ECB mode is the CBC mode uses the cipher block from the previous step of encryption in the current one, which forms a chain-like encryption process. OFB operates on plain text in away similar to stream cipher that will be described below, where the encryption key used in every step depends on the encryption key from the previous step. There are many other modes like CTR (counter), CFB (Cipher Feedback), or 3DES specific modes that are not discussed in this paper due to the fact that in this paper the main concentration will be on ECB and CBC modes.

▪ Symmetric and Asymmetric encryptions

Data encryption procedures are mainly categorized into two categories depending on the type of security keys used to encrypt/decrypt the secured data. These two categories are: Asymmetric and Symmetric encryption techniques

Symmetric Encryption

In this type of encryption, the sender and the receiver agree on a secret (shared) key. Then they use this secret key to encrypt and decrypt their sent messages. Fig. 4 shows the process of symmetric cryptography. Node A and B first agree on the encryption technique to be used in encryption and decryption of communicated data. Then they agree on the secret key that both of them will use in this connection. After the encryption setup finishes, node A starts sending its data encrypted with the shared key, on the other side node B uses the same key to decrypt the encrypted messages.

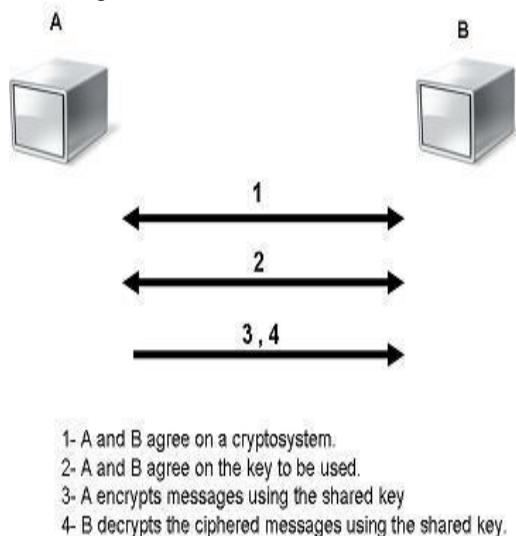


Figure7 Symmetric Encryption

The main concern behind symmetric encryption is how to share the secret key securely between the two peers. If the key gets known for any reason, the whole system collapses. The key management for this type of encryption is troublesome, especially if a unique secret key is used for each peer-to-peer connection, then the total number of secret keys to be saved and managed for n-nodes will be $n(n-1)/2$.

For example, Let m be the plaintext message that Jude wants to secretly transmit to Kalu and let E_k be the encryption cipher, where k is a secret key. Jude must first transform the plaintext into ciphertext, c , in order to securely send the message to kalu.

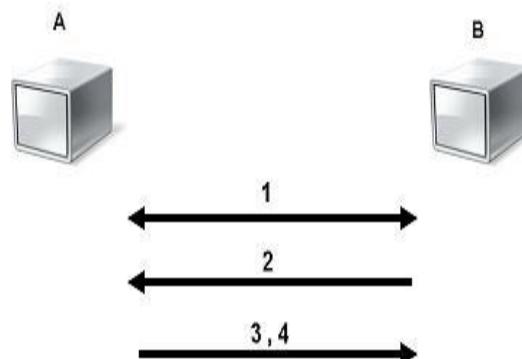
$$c = E_k(m)$$

Both Jude and Kalu must know the choice of key, k , or else the ciphertext is useless. Once the message is encrypted as ciphertext, Jude can safely transmit it to Kalu (assuming no one else knows the key). In order to read Judes's message, Kalu must decrypt the ciphertext using E_k^{-1} which is known as the decryption cipher, D_k .

$$D_k(c) = D_k(E_k(m)) = m$$

Asymmetric Encryption

Asymmetric encryption is the other type of encryption where two keys are used. To explain more, what Key1 can encrypt only Key2 can decrypt, and vice versa. It is also known as Public Key Cryptography (PKC), because users tend to use two keys: public key, which is known to the public, and private key which is known only to the user. Figure 5 below illustrates the use of the two keys between node A and node B. After agreeing on the type of encryption to be used in the connection, node B sends its public key to node A. Node A uses the received public key to encrypt its messages. Then when the encrypted messages arrive, node B uses its private key to decrypt them.



- 1- A and B agree on a cryptosystem.
- 2- B sends its public key to A.
- 3- A encrypts messages using the negotiated cipher and B's public key.
- 4- B decrypts the ciphered messages using its private key and the negotiated cipher.

Figure8 Asymmetric Encryption

This capability surmounts the symmetric encryption problem of managing secret keys. But on the other hand, this unique feature of public key encryption makes it mathematically more prone to attacks. Moreover, asymmetric encryption techniques are almost 1000 times slower than symmetric techniques, because they require more computational processing power. To get the benefits of both methods, a hybrid technique is usually used. In this technique, asymmetric encryption is used to exchange the secret key, symmetric encryption is then used to transfer data between sender and receiver.

For example, in an open system, given any two principals X and Y, X should be able to encrypt a message that can only be decrypted by Y. If there is some binding established between principal identities and public keys, then these operations can easily be performed. A naive scheme might function as follows: principal X looks up public key K_Y for principal Y and uses it to compute an encryption for Y using some trapdoor function $c = f_{K_Y}(m)$.

Then Y, on receipt of this message computes $f^1_{K_Y}(c) = m$.

But there's a significant problem with this scheme given our definitions of security for shared-key encryption: it doesn't satisfy Semantic Security, since it's trivial for an adversary to compute $f_{K_Y}(m)$ and $f_{K_Y}(m')$ and compare them against given ciphertexts in the different attack models. Once again we see that there is no Semantic Security without probabilistic encryption. This is especially true in the public-key setting, since every

principal has access to an encryption function for every other principal, by definition. Especially when the space of possible messages is small, it is easy to simply check all messages under the encryption function to figure out what has been encrypted.

▪ Hybrid Encryption

Hybrid encryption is a mode of encryption that merges two or more encryption systems. It incorporates a combination of asymmetric and symmetric encryption to benefit from the strengths of each form of encryption. These strengths are respectively defined as speed and security. Hybrid encryption is considered a highly secure type of encryption as long as the public and private keys are fully secure.

Method of Encryption Hybrid Encryption

⊕ Using Any Symmetric Algo And RSA Algo Encryption

Steps using Hybrid Crypto System at the source Source:
Has destination public key(PEK)

Inputs: Plain Data Block (PDB) Symmetric Key (SK)

Outputs: Encrypted Data Block (EDB)

Note: EDB contains both the encrypted PDB (denoted by ED) concatenated with encrypted SK (denoted by ESK)

Encryption Steps:

(1) Encrypt PDB using SK to get ED. (Note: This can be done using any symmetric-key crypto algorithm like DES and AES)

(2) Encrypt SK using destination's PUK to get ESK. (Note: This can be done using any public key algorithm like RSA)

(3) Concatenate ED with its corresponding ESK to get EDB which is sent to the destination.

$$EDB = \{ ESK, ED \}$$

Decryption Steps using Hybrid Crypto System at the Destination Prerequisite:

Destination has its Private Key (PRK)

Inputs: Encrypted Data Block (EDB)

Note: EDB contains both the encrypted PDB (denoted by ED) concatenated with encrypted SK (denoted by ESK)

Outputs: Plain Data Block (PDB)

Decryption Steps:

(1) Decrypt ESK using PRK to retrieve SK.

Note: This should be done using the same public key algorithm which is used at source

(2) Use the retrieved SK as decryption key to decrypt ED to get PDB.

⊕ Hybrid Crypto System Using Rsa And D H

Steps of this algorithm are as:

1. Choose two large prime numbers P and Q.

a. Calculate $N = P \times Q$.

b. Select public key (i.e. encryption key) E such that it is not a factor of $(P-1)$ and $(Q-1)$

c. Select the private key (i.e. the decryption key) D such that the following equation is true

$$(D \times E) \bmod (P - 1) \times (Q - 1) = 1$$

Suppose R, S and G is automatic generated prime constants And put

$$A=E \text{ and } B=D$$

2. Now calculate following as public number

$$X = GA \bmod R \quad Y = GB \bmod R$$

3. Calculate session key with formula

$$KA = YA \bmod R \quad KB = XB \bmod R$$

Such that $KA = KB = K$.

▪ Hashing

Hashing creates a unique, fixed-length signature for a message or data set. Each "hash" is unique to a specific message, so minor changes to that message would be easy to track. Once data is encrypted using hashing, it cannot be reversed or deciphered. Hashing, then, though not technically an encryption method as such, is still useful for proving data hasn't been tampered with. Here's a simple example:

Input Number

10,667

Hashing Algorithm

Input# x 143

Hash Value

1,525,381

You can see how hard it would be to determine that the value 1,525,381 came from the multiplication of 10,667 and 143. But if you knew that the multiplier was 143, then it would be very easy to calculate the value 10,667. Public-key encryption is actually much more complex than this example, but that's the basic idea. Public keys generally use complex [algorithms](#) and very large hash values for encrypting, including 40-bit or even 128-bit numbers. A 128-bit number has a possible 2^{128} , or 3,402,823,669,209,384,634,633,746,074,300,000,000,000,000,000,000,000,000 different combinations -- this would be like trying to find one particular grain of sand in the [Sahara Desert](#).

VII. CONCLUSION

Security and integrity of data stored in cloud is a challenging task and of paramount importance to every organization using the system. Many research problems are yet to be identified. Cryptographic techniques are used to provide secure communication between the user and the cloud. Symmetric encryption has the speed and computational efficiency to handle encryption of large volumes of data in cloud storage. This paper proposed a symmetric encryption algorithm for secure storage of cloud user data in cloud storage. The proposed encryption algorithm is described in detail and the decryption process is reverse of the encryption. This algorithm is used in order to encrypt the data of the user in the cloud. Since the user has no control over the data once their session is logged out, the encryption key acts as the primary authentication for the user. By applying this encryption algorithm, user ensures that the data is stored only on secured storage and it cannot be accessed by administrators or intruders.

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AUTHORS

First Author – Okeke Stephen, Department of Computer Science, College of Physical and Applied Sciences, Michael Okpara University of Agriculture, Nigeria.,
okeke2020@yahoo.com, +2348133626900

Simulation of Heat Dissipation for High Power Electronic Component using Carbon Nanotube Nanofluids

Bui Hung Thang*, Phan Hong Khoi**, and Phan Ngoc Minh**

* Institute of Materials Science (IMS), Vietnam Academy of Science and Technology (VAST),
A2 Building, 18 Hoang Quoc Viet Road, Cau Giay District, Hanoi, Vietnam

**Center for High Technology Development (HTD), Vietnam Academy of Science and Technology (VAST),
2B Building, 18 Hoang Quoc Viet Road, Cau Giay District, Hanoi, Vietnam

Abstract- Carbon nanotubes(CNTs) are some of most valuable materials that have highest thermal conductivity. The thermal conductivity of individual carbon nanotubes is $2000 \text{ Wm}^{-1}\text{K}^{-1}$ compared with the thermal conductivity $419 \text{ Wm}^{-1}\text{K}^{-1}$ of silver. Therefore, carbon nanotubes have opened a new way for heat dissipation for high power electronic components, such as micro-processor, high brightness LED, etc. In this paper, we present the simulation results on heat dissipation for a high power electronic component using carbon nanotube nanofluids.

I. INTRODUCTION

Thermal management is widely recognized to be an important aspect of electronic design, with device performance being significantly affected by temperature. In addition, device lifetime can be decreased drastically because of large thermal stresses. The challenge for thermal management is to develop high-conductivity structures that can accommodate the fixed temperature drop with the increasing power densities that characterize new generations of microprocessors [1].

Nanofluid concept is employed to designate a fluid in which nanometersized particles are suspended in conventional heat transfer base fluids to improve their thermal physical properties. Nanoparticles are made from various materials, such as metals (Cu, Ag, Au, Al, and Fe), oxide ceramics (Al_2O_3 and TiO_2), nitride ceramics (AlN, SiN), carbide ceramics (SiC, TiC), semiconductors, carbonnanotubes, and composite materials such as alloyed nanoparticles or nanoparticle corepolymer shell composites. It is well known that conventional heat transfer fluids, such as oil, water, and ethylene glycol, in general, have poor heat transfer properties compared to those of most solids. Nanofluids have enhanced thermophysical properties such as thermal conductivity, thermal diffusivity, viscosity, and convective heat transfer coefficients compared with those of base fluids like oil or water [2-7].

Carbon nanotubes (CNTs) are some of the most valuable materials with high thermal conductivity (about 2000 W/m.K compared to thermal conductivity of Ag 419 W/m.K) [8-10]. CNTs have been used as additives in liquids to increase the thermal conductivity, one of the most important issues in industry [11]. Owing to their very high thermal conductivity, CNTs become ones of the most suitable nano additives to fabricate the nanofluid for thermal dissipation in many industrial and consumer products [12-13]. CNT-nanofluids or liquids are likely to be the future heat transfer media as their thermal

conductivities are significantly higher than those of the parent liquids even when the CNTs concentrations are negligible.

In this paper, we present the simulation results on heat dissipation for a high power electronic component using carbon nanotube based liquid.

II. SIMULATION METHOD

Figure 1 is the diagram of heat dissipation system for high power electronic components using carbon nanotube nanofluids. In this system, the copper heat-sink was set to directly contact with a high power electronic component. The nanofluid was pumped from container to copper heat-sink by using a mini pump. The track inside the copper heat-sink was fabricated to allow nanofluid flows through it and absorb heat from high power electronic component, after that the nanofluid flows from the copper heat-sink to heat radiator and returns the container.

In order to simplify the simulation process, we assumed that the heat exchange process takes place only in copper heat-sink, heat radiator, and nanofluid container. In order to perform the simulation, we divide operation time of electronic component into many very short differential times (Δt). The heat transfer equations were calculated by dedicated software in each very short differential time. These processes are repeated many times to obtain simulation results.

We assumed that:

- + v denote the flow-rate of the nanofluid in system (m^3/s)
- + Δt denote the differential time of the simulation (s)
- + ΔV denotes the volume of fluid flowing in Δt (m^3)

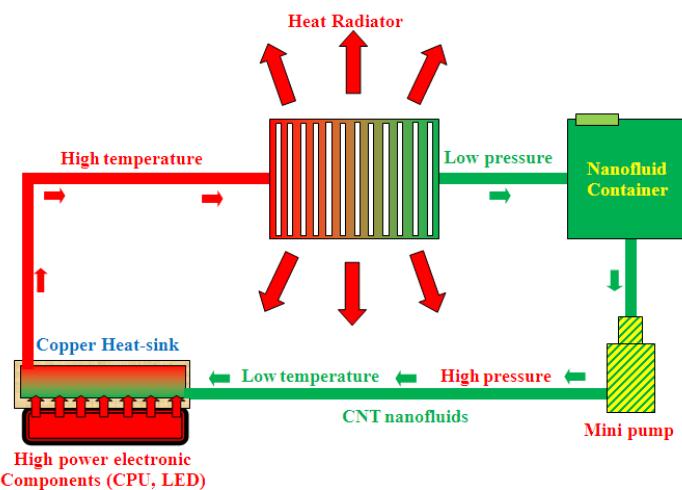


Figure 1. Diagram of the heat dissipation system for high power electronic components using carbon nanotube nanofluid

We have:

$$\Delta V = v \cdot \Delta t \quad (1)$$

The heat transfer equation between nanofluid in copper heat-sink and nanofluid volume ΔV flowing from container to copper heat-sink is:

$$T'_h = \frac{C_0 D_n [(V_h - \Delta V) T_h + \Delta V \cdot T_c] + C_h T_h}{C_0 D_n \cdot V_h + C_h} \quad (2)$$

Where:

- + V_h denote the volume of the nanofluid in heat-sink (m^3)
- + T_h denote the temperature of the nanofluid in heat-sink ($^{\circ}C$)
- + T'_h denote the temperature of the nanofluid in heat-sink after the amount of ΔV nanofluid flowing from container to heat-sink ($^{\circ}C$)
- + T_c denote the temperature of the nanofluid in container ($^{\circ}C$)
- + C_h denote the heat capacity of the heat-sink (J/K)
- + C_0 denote the specific heat capacity of the nanofluid (J/kg.K)
- + D_n denote the density of the nanofluid (kg/m^3)

The heat flow from electronic component to nanofluid is calculated by following formula:

$$I_{p-h} = \frac{(T_p - T'_h)}{R_{p-h} + R_h + R_n} \quad (3)$$

Where:

- + I_{p-h} denote the heat flow from electronic component to nanofluid in the heat-sink (W)
- + T_p denote the temperature of the electronic component ($^{\circ}C$)
- + R_{p-h} denote the heat resistance of contact layer between electronic component and the heat-sink (K/W)
- + R_h denote the heat resistance of the heat-sink (K/W)
- + R_n denote the effective heat resistance of nanofluid (K/W)

The effective heat resistance of the nanofluid is calculated by following formula:

$$R_n = \frac{1}{2} \cdot \frac{1}{k} \cdot \frac{d}{S} = \frac{1}{2} \cdot \frac{1}{k} \cdot \frac{d}{a \cdot b} \quad (4)$$

Where:

- + k denote the thermal conductivity of the nanofluid (W/mK)
- + d denote the thickness of the nanofluid in the heat-sink (m)
- + S denote the cross-sectional area of the nanofluid in the heat-sink (m^2)
- + a, b denotes the width and length of the nanofluid in the heat-sink, respectively (m)

We have:

$$T'_p = T_p + \frac{\Delta Q}{C_p} = T_p + \frac{(P - I_{p-h}) \Delta t}{C_p} \quad (5)$$

Where:

- + T'_p denote the temperature of the electronic component after very short differential times Δt ($^{\circ}C$)
- + ΔQ denote the retain heat in the electronic component ($^{\circ}C$)
- + C_p denote the heat capacity of the electronic component (J/K)
- + P denote the heat generation power of the electronic component (W)

The temperature of the nanofluid in the heat-sink after very short differential times Δt is calculated by following formula:

$$T'_h = T_h + \frac{\Delta Q_h}{C_h + C_n} = T_h + \frac{I_{p-h} \cdot \Delta t}{C_h + C_n} \quad (6)$$

$$T'_h = T_h + \frac{I_{p-h} \cdot \Delta t}{C_h + C_0 D_n \cdot V_h} \quad (7)$$

Where:

- + T'_h denote temperature of the nanofluid in the heat-sink after very short differential times Δt ($^{\circ}C$)
- + ΔQ_h denote the heat from electronic component to nanofluid and the heat-sink (J)
- + C_n denote the heat capacity of the nanofluid in the heat-sink (J/K)

The heat transfer equation between nanofluid in radiator and nanofluid volume ΔV flowing from copper heat-sink to radiator is:

$$T'_r = \frac{C_0 D_n [(V_r - \Delta V) T_r + \Delta V \cdot T_h] + C_r T_r}{C_0 D_n \cdot V_r + C_r} \quad (8)$$

Where:

- + V_r denote the volume of the nanofluid in radiator (m^3)
- + T_r denote the temperature of the nanofluid in radiator ($^{\circ}C$)
- + T_h denote the temperature of the nanofluid flow from heat-sink to radiator ($^{\circ}C$)
- + T'_r denote the temperature of the nanofluid in radiator after the amount of ΔV nanofluid flowing from the heat-sink to radiator ($^{\circ}C$)
- + C_r denote the heat capacity of the radiator (J/K)

The heat flow from radiator to environment is calculated by following formula:

$$I_{r-e} = \frac{(T_r - T_e)}{R_{r-e} + R_n} \quad (9)$$

Where:

- + I_{r-e} denote the heat flow from radiator to environment (W)
- + T_e denote the temperature of environment ($^{\circ}C$)
- + R_{r-e} denote the heat resistance between the radiator and environment (K/W)
- + R_n denote the effective heat resistance of the nanofluid in the radiator (K/W)

We assume that the liquid-tracks inside the radiator are rectangular shape. The effective heat resistance of the nanofluid in the radiator is calculated by following formula:

$$R_n = \frac{1}{2} \cdot \frac{1}{k} \cdot \frac{d}{S} = \frac{1}{2} \cdot \frac{1}{k} \cdot \frac{d}{a \cdot b} \quad (10)$$

Where:

- + d denote the thickness of the nanofluid in the radiator (m)
- + S denote the cross-sectional area of the nanofluid in the radiator (m^2)
- + a, b denotes the width and length of the nanofluid in the radiator, respectively (m)

The temperature of the nanofluid in the radiator after very short differential times Δt is calculated by following formula:

$$T'_r = T_r - \frac{\Delta Q_{r-e}}{C_r + C_n} = T_r - \frac{I_{r-e} \cdot \Delta t}{C_r + C_n} \quad (11)$$

$$T'_r = T_r - \frac{I_{r-e} \cdot \Delta t}{C_r + C_0 D_n \cdot V_r} \quad (12)$$

Where:

+ T' denote temperature of the nanofluid in the radiator after very short differential times Δt ($^{\circ}\text{C}$)
+ ΔQ_{r-m} denote the heat from radiator to environment (J)
+ C_n denote the heat capacity of the nanofluid in radiator (J/K)
The heat transfer equation between nanofluid in container and nanofluid volume ΔV flowing from radiator to container is:

$$T_c' = \frac{C_0 D_n [(V_c - \Delta V) T_c + \Delta V \cdot T_r] + C_c \cdot T_c}{C_0 D_n V_c + C_c} \quad (13)$$

Where:

- + V_c denote the volume of the nanofluid in container (m^3)
- + T_c denote the temperature of the nanofluid in container ($^{\circ}\text{C}$)
- + T_r denote the temperature of the nanofluid flow from radiator to container ($^{\circ}\text{C}$)
- + T' denote the temperature of the nanofluid in container after after very short differential times Δt ($^{\circ}\text{C}$)
- + C_c denote the heat capacity of the container (J/K)

III. RESULTS AND DISCUSSION

We choose carbon nanotube base distilled water with concentration of CNTs was from 0.0 vol. % to 1.0 vol % for all simulation. The parameters were used in the simulation process as following:

- + The differential time of the simulation: $\Delta t = 10^{-8}$ (s)
- + The density of the nanofluid: $D_n = 1000 \text{ kg/m}^3$
- + The specific heat capacity of the nanofluid: $C_0 = 4200 \text{ J/kg.K}$
- + The dimensions of the heat-sink: $a \times b \times c = 100 \text{ mm} \times 90 \text{ mm} \times 6 \text{ mm}$
- + The dimensions of liquid-track in the radiator: $a \times b \times c = 300 \text{ mm} \times 10 \text{ mm} \times 0.5 \text{ mm}$
- + The volume of container: $V_c = 0.5 \text{ litter}$
- + The temperature of environment: $T_e = 20^{\circ}\text{C}$
- + The heat power of electronic component: $P = 80 \text{ W}$
- + The flow-rate of the nanofluid: $v = 5(\text{cm}^3/\text{s})$

The thermal conductivity of the nanofluid is calculated by flowing formula [14]:

$$\frac{k}{k_w} = 1 + \frac{1}{3} \frac{k_{\text{CNT}} \varepsilon r_w}{k_w (1 - \varepsilon) r_{\text{CNT}}} \quad (14)$$

Where:

- + $k_w = 0.6 \text{ W/mK}$, denote the thermal conductivity of water.

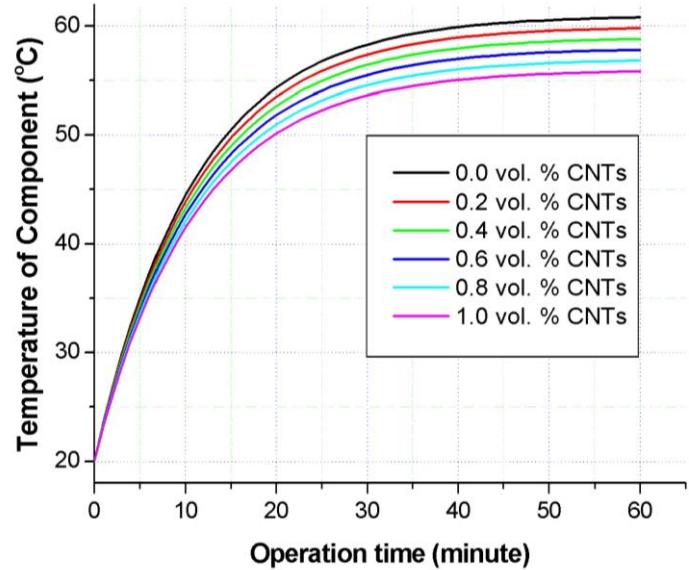


Figure 2. Simulation results on heat dissipation for high power electronic components using carbon nanotube nanofluid

- + $k_{\text{CNT}} = 1750 \text{ W/mK}$, denote the thermal conductivity of CNT.
- + $r_w = 0.1 \text{ nm}$, denote the radius of water molecule.
- + $r_{\text{CNT}} = 5 \text{ nm}$, denote the average radius of CNT.
- + $\varepsilon = 0.0 \text{ vol. \%} \div 1.0 \text{ vol. \%}$, denote the volume concentration of CNTs in nanofluid.

The simulation results on heat dissipation for a high power electronic component using carbon nanotube nanofluid is described as in figure 2. Simulation results showed that the temperature of electronic component increased with exponential growth. The temperature of electronic component reached a saturation value after about 55 minutes. Figure 2 showed that when the concentration of CNTs increases, the saturation temperature of electronic component decreases. This can be explained that the thermal conductivity of nanofluid increased by adding CNTs in nanofluid, and the increasing thermal conductivity of nanofluid helps improve the heat transfer process at substrate and radiator. Simulation results also showed that the saturated temperature of electronic component decreased about $1^{\circ}\text{C} \div 4^{\circ}\text{C}$ as described in figure 2. By using nanofluid with 1.0 vol. % of CNTs, the saturated temperature of electronic component decreased 4°C compare to only using distilled water.

IV. CONCLUSION

The thermal dissipation for high power electronic component using the carbon nanotube nanofluid was simulated. Simulation results showed that the saturated temperature of electronic component decreased about $1^{\circ}\text{C} \div 4^{\circ}\text{C}$ with the concentrations of CNTs were 0.0 vol. % \div 1.0 vol. % in nanofluid. By using nanofluid with vol. % of CNTs, the saturated temperature of electronic component decreased 4°C compare to only using distilled water. The simulation results have confirmed the advantage of the CNTs as an excellent additive component in nanofluid for the thermal dissipation of high power electronic components and devices.

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Center for High Technology Development (HTD), Vietnam Academy of Science and Technology (VAST).

Correspondence Author – M.Si. Bui Hung Thang
Email: thangbh@ims.vast.vn, thangbh@ims.vast.ac.vn
Mobile phone: +84 985175655

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AUTHORS

First Author – M.Si. Bui Hung Thang, Research scholar, Laboratory of Carbon Nanomaterials, Institute of Materials Science (IMS), Vietnam Academy of Science and Technology (VAST).

Second Author – Dr. Phan Hong Khoi, Professor, Laboratory for Developing Advanced Materials Technology, Center for High Technology Development (HTD), Vietnam Academy of Science and Technology (VAST).

Third Author – Dr. Phan Ngoc Minh, Associate Professor, Laboratory for Developing Advanced Materials Technology,

Association between polymorphism in APOC3, and Metabolic Syndrome in the Moroccan Population

Maria Ajjemami¹, Houria Rhaissi², Houda Benrahma¹, Hicham Charoute^{1,*}, Errouagui Abdeltif¹, Fouzia Lakbakbi el yaagoubi¹, Mostafa Kandil³, Abdelhamid Barakat¹, Hassan Rouba¹

¹. Laboratoire de Génétique Moléculaire Humaine, Département de Recherche Scientifique, Institut Pasteur du Maroc, 1, Place Louis Pasteur, 20360 Casablanca, Morocco.

². Laboratoire de Physiologie et Génétique Moléculaire, Faculté des sciences Ben M'Sik, Université Hassan II, Mohammedia, Morocco.

³. Equipe d'Anthropogénétique et biotechnologies, Faculté des Sciences, Université Chouaïb Doukkali, El Jadida, Morocco

Abstract- Metabolic syndrome (MS) is regarded as a real public health problem its prevalence rises each year as well as its morbidity. It is a multi factorial disease and besides environmental factors and genetic factors also contribute to the pathogenesis of MS. In several studies the SstI (3238C> G) polymorphism of APOC3 gene is associated with increased plasma concentrations of triglyceride (TG) and hypertriglyceridemia. The aim of the present study was to determine the association between polymorphism 3238C> G in APOC3, and Metabolic Syndrome in the Moroccan Population. Statistical analysis has revealed an association of polymorphism APOC3 3238C>G susceptibility with the metabolic syndrome in two models, codominant 1 [OR = 4.21 [1.66-10.68], p = 0.0008] and dominant [OR = 3.83 [1.59-9.19] p = 0.0010]. The variant APOC3 3238G were associated with elevated TG levels (P = 0.0146) and LDL-C (p = 0.0068) compared to patients with MS and controls non-carriers of this variant.

Index Terms- Metabolic Syndrome, APOC3 gene, Polymorphisms, TG.

I. INTRODUCTION

Metabolic syndrome (MS), as the name suggests is not a specific disease but a syndrome. A syndrome is a recognized set of symptoms with no obvious cause. The components of the syndrome coexist regularly enough that their appearance is not randomly assigned. When the cause is clearly defined, the syndrome becomes disease [1]. MS thus refers to a combination of metabolic abnormalities linked together, the clinical significance remains controversial and accurate.

The definitions of MS the most famous are those of the World Health Organization (WHO), European Study of Insulin Resistance (EGIR), National Cholesterol Education Program – Adult Treatment Panel III (NCEP-ATPIII), American Association of Clinical Endocrinologists (AACE), American Heart Association/National Heart, Lung, and Blood Institute (AHA/NHLBI) and the International Diabetes Federation (IDF). [2-6].

The IDF requires as a mandatory criterion the presence of abdominal obesity plus 2 other criteria: High levels of TG> 1.7 mmol / L or treatment, reduced HDL-C<1 mmol / L in men and <1.3mmol / L in women or treatment, high systolic and diastolic

blood pressure \geq 130/85mmHg or treatment, high fasting plasma glucose \geq 100 mg / dL or treatment of type 2 diabetes.

MS is regarded as a real public health problem, its prevalence rises each year as well as its morbidity. In Morocco as defined by the NCEP-ATPIII, the prevalence of MS was 16.3% according to a study of 249 Saharawi women in southern Morocco [7], according to the study of El Ayachi et al. the prevalence of MS was 17.8% [8] and recently, another study on a population of 640 cardiac patients with a male predominance shows that the prevalence of MS according to the IDF is about 12.18%. [9].

The prevalence of MS is age-dependent [10,11]. Numerous studies have shown that MS is associated with an increased risk for Cardiovascular disease [12,13], type 2 diabetes [14], myocardial infarction and stroke [15]. It is a multi factorial disease and besides environmental factors such as cigarette smoking, obesity, lack of exercise and bad nutrition habits, genetic factors also contribute to the pathogenesis of MS [16,17]. The APOC3 gene codes for apoCIII, several polymorphic sites have been detected within and around the APOC3 gene. The most extensively studied has been the SstI polymorphism, resulting from the substitution of cytosine by guanine at nucleotide 3238 [3238C> G] in the 3'UTR region of exon 4 of the gene [18]. In the literature, the SstI polymorphism is associated with increased plasma concentrations of TG and hypertriglyceridemia [19].

The aim of the present study was to determine the association of known functional SstI polymorphism [3238C> G] in APOC3 gene in the Moroccan population with and without the MS as defined by the International Federation of Diabetes (IDF).

II. MATERIALS AND METHODS

This is a case-control study in a Moroccan population of 283 subjects recruited at the Pasteur Institute of Morocco Casablanca, aged between 20 and 60 years,

We have 176 patients with metabolic syndrome according to the criteria of the International Federation of Diabetes (IDF) and 105 controls subjects according to the criteria of IDF.

All participants signed informed consent forms, and the study protocol was approved by local Committee on Research Ethics of Pasteur Institut of Morocco.

Systolic and diastolic blood pressures were measured using a sphygmomanometer after 5 minutes of rest in a sitting position at

least. Weight and height were measured to determine body mass index (BMI). BMI was calculated by the following formula: weight in kilograms (kg) / height in square meters (m)². Waist and hip circumference were also measured.

Fasting glucose, triglyceride (TG), total cholesterol (Total-C), LDL cholesterol (LDL-C) and HDL cholesterol (HDL-C) were measured after at least 8 hours of fasting. All assays were performed using an automatic (VITROS) by the biochemistry laboratory IPM Casablanca

Genomic DNA was extracted from whole blood by using conventional phenol-chloroform-isoamyl alcohol [20]. To detect the SstI (APOC3-3238C>G) (rs5128) polymorphism, polymerase chain reaction (PCR) conditions and restriction fragment-length polymorphism analyses were performed according to previous published protocols [21].

III. STATISTICAL ANALYSIS

Statistical analyses were performed using STATA software, version 11.0. Quantitative data were expressed as means \pm standard deviation (SD). Student test was used to compare quantitative parameters. Manne-Whitney test was used to compare parameters not normally distributed. Chi-square test

was applied to examine differences in genotype distributions between cases and controls. Odds ratios (ORs) and their 95% confidence intervals (CIs) were computed to assess strength of association.

IV. RESULTS

Clinical and biochemical characteristics of MS patients and control subjects are shown in Table 1. Serum triglycerides, HDL-Cholesterol and fasting plasma glucose levels, BMI, waist circumference, hip circumference, Systolic and diastolic blood pressure values were significantly elevated in the MS group compared to the controls. But no significant association in total cholesterol, LDL-Cholesterol in the MS group compared to the controls.

Table 1: Anthropometric, clinical and biological characteristics of the patients with metabolic syndrome and control subjects (means \pm SD)

	Controls (n=69)	Patients (n=116)	P-value
Systolic blood pressure (mm Hg)	11.49 \pm 1.21	12.93 \pm 1.84	<0.001
Diastolic blood pressure (mm Hg)	7.71 \pm 0.87	8.39 \pm 1.25	0.0001
Total cholesterol (mg/dl)	1.89 \pm 0.37	1.95 \pm 0.44	0.3773
Triglycerides (mg/dl)	0.99 \pm 0.32	1.47 \pm 0.69	<0.001
LDL-cholesterol (mg/dl)	1.16 \pm 0.33	1.24 \pm 0.36	0.1316
HDL-cholesterol (mg/dl)	0.55 \pm 0.12	0.48 \pm 0.17	<0.001
Fasting plasma glucose (mg/dl)	0.85 \pm 0.09	1.31 \pm 0.54	<0.001
Body mass index (Kg/m²)	25.04 \pm 3.04	30.98 \pm 5.12	<0.001
Waist circumference (cm)	84.64 \pm 10.43	100.84 \pm 11.91	<0.001
Hip circumference (cm)	104.04 \pm 11.54	114.41 \pm 11.30	<0.001

(means \pm SD).HDL, high-density lipoprotein. LDL, low-density lipoprotein

Statistical analysis of genotype distribution models

Statistical analysis of different models of genotype distribution was studied; Table 2 summarizes the results of this study. All genotypic distributions are in Hardy-Weinberg equilibrium. (APOC3-3238C>G / T=0,090 and p= 0,510).

Statistical analysis has revealed an association of polymorphism APOC3 3238C>G susceptibility with the metabolic syndrome in two models, codominant 1 [OR = 4.21 [1.66-10.68], p = 0.0008] and dominant [OR = 3.83 [1.59-9.19] p = 0.0010]. But no association was found in two recessive codominant model for all SNPs 3238C> G of APOC3.

Table 2: Distribution of APOC3 genotype among Metabolic Syndrome subjects and controls

Polymorphism	Genotype	Controls	Patients	Model	OR [95%CI]	P-value
APOC3 3238C>G	C/C	62 [89.9%]	81 [69.8%]	Codominant 1 [CC vs CG]	4.21 [1.66-10.68]	0.0008
	C/G	6 [8.7%]	33 [28.4%]	Codominant 2 [CC vs GG]	1.53 [0.14-17.27]	0.7254
	G/G	1 [1.4%]	2 [1.7%]	Dominant [CC vs CG+GG]	3.83 [1.59-9.19]	0.0010
				Recessive [CC+CG vs GG]	1.19 [0.11-13.40]	0.8853

Association study between clinical and biochemical parameters and genotypes of polymorphism 3238C>G gene APOC3

We grouped the rare allele carriers for SNP 3238C>G, gene APOC3, and we compared their frequency with the common allele for all parameters of the metabolic syndrome [Table 3].

Holders of the variant APOC3 3238G were associated with elevated TG levels ($P = 0.0146$) and LDL-C ($p = 0.0068$) compared to patients with MS and controls non-carriers of this variant.

Table 3: Subjects characteristics according to the APOC3 3238C>G genotypes

	APOC3 3238C>G		
	CC	CG+GG	P-value
Systolic blood pressure	12.37±1.77	12.45±1.80	0.7879
Diastolic blood pressure	8.13±1.12	8.15±1.32	0.9894
Total cholesterol	1.92±0.37	1.94±0.53	0.8581
Triglycerides	1.22±0.56	1.52±0.77	0.0068
LDL-cholesterol	1.18±0.33	1.33±0.42	0.0146
HDL-cholesterol	0.50±0.13	0.54±0.24	0.1746
Fasting plasma glucose	1.11±0.49	1.23±0.47	0.0605
BMI	28.46±5.05	29.79±6.02	0.3096
Waist circumference	93.85±12.49	98.02±17.36	0.0847

V. DISCUSSION

During the last years, the rapid increase in the prevalence of MS in industrialized countries associated with devastating complications for human health, mainly due to a higher risk of developing cardiovascular disease [16]. In vivo apoCIII modulates the postprandial management of the TG [22] and inhibits the hepatic uptake of VLDL remnants [23]. The genetically determined deficiency of apoCIII in humans has been shown to increase the rate of TG clearance from plasma by 6- to 7-fold [24]. Associated with an increased risk of diabetes and CVD risk, SM is now considered one of the most important public health problems of our time.

To our knowledge, this is the first study to test such an association in the Moroccan population. Our results show an association of polymorphism APOC3 3238C>G susceptibility with the metabolic syndrome in two models, codominant 1 and dominant. But no association was found in two recessive codominant model for all SNPs 3238C>G of APOC3. Moreover the variant APOC3 3238G were associated with elevated TG levels and LDL-C compared to patients with MS and controls non-carriers of this variant.

Several polymorphic sites were detected in APOC3 gene. The most studied is the SstI polymorphism, resulting from the substitution of a guanine with cytosine at nucleotide 3238(3238C>G) in the 3'UTR region of exon 4 of the gene [18]. Alleles of this transversion are: S1 and S2. The frequency of the rare allele (S2) varies among different ethnic groups [25,26]. Several study suggests an association between the rare allele S2 and total cholesterol and high cardiovascular risk [27,28]. In several case-control study, the SstI polymorphism was associated with HTG [25,29]

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORS

First Author – Maria Ajjemami, PhD student, Institut Pasteur du Maroc, ajj-maria@hotmail.com

Second Author – Houria Rhaissi, PhD, Faculté des sciences Ben M'Sik, houriarhaissi@hotmail.com.

Third Author – Houda Benrahma, PhD, Institut Pasteur du Maroc, benrahmahouda@yahoo.fr

Correspondence Author – Hicham Charoute, hcharoute@gmail.com, Tel: +212 522 43 44 50; Fax: +212 522 26 09 57

On Strong Product of Two Fuzzy Graphs

Dr. K. Radha*

Mr.S. Arumugam**

* P.G & Research Department of Mathematics, Periyar E.V.R. College, Tiruchirapalli-620023

** Govt. High School, Thinnanur, Tiruchirapalli-621006.

Abstract- In this paper, the strong product of two fuzzy graphs is defined. It is proved that when two fuzzy graphs are effective then their strong product is always effective and it is proved that the strong product of two complete fuzzy graphs is complete. Also it is proved that the strong product of two connected fuzzy graphs is always connected. The lower and upper truncations of the strong product of two fuzzy graphs are obtained. The degree of a vertex in the strong product of two fuzzy graphs is obtained. A relationship between the direct sum and the strong product of two fuzzy graphs is obtained.

Index Terms- Fuzzy Graph, Direct Sum, Strong Product, Effective Fuzzy Graph, Connectedness, Upper and Lower Truncations.

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I. INTRODUCTION

Fuzzy graph theory was introduced by Azriel Rosenfeld in 1975. The properties of fuzzy graphs have been studied by Azriel Rosenfeld[9]. Later on, Bhattacharya[7] gave some remarks on fuzzy graphs, and some operations on fuzzy graphs were introduced by Mordeson.J.N. and Peng.C.S.[3]. The conjunction of two fuzzy graphs was defined by Nagoor Gani.A and Radha.K.[4]. We defined the direct sum of two fuzzy graphs and studied the effectiveness, connectedness and regular properties of the direct sum of two fuzzy graphs [8].

In this paper, the strong product of two fuzzy graphs is defined. It is proved that when two fuzzy graphs are effective then their strong product is always effective and it is proved that the strong product of two complete fuzzy graphs is complete. Also it is proved that the strong product of two connected fuzzy graphs is always connected. The lower and upper truncations of the strong product of two fuzzy graphs are obtained. The degree of a vertex in the strong product of two fuzzy graphs is obtained. A relationship between the direct sum and the strong product of two fuzzy graphs is obtained.

First let us recall some preliminary definitions that can be found in [1]-[9].

A fuzzy graph G is a pair of functions (σ, μ) where σ is a fuzzy subset of a non empty set V and μ is a symmetric fuzzy relation on σ . The underlying crisp graph of $G:(\sigma, \mu)$ is denoted by $G^*(V, E)$ where $E \subseteq V \times V$.

Let $G:(\sigma, \mu)$ be a fuzzy graph. The underlying crisp graph of $G:(\sigma, \mu)$ is denoted by $G^*(V, E)$ where $E \subseteq V \times V$. A fuzzy graph G is an effective fuzzy graph if $\mu(u, v) = \sigma(u) \wedge \sigma(v)$ for all $(u, v) \in E$ and G is a complete fuzzy graph if $\mu(u, v) = \sigma(u) \wedge \sigma(v)$ for all $u, v \in V$. Therefore G is a complete fuzzy graph if and only if G is an effective fuzzy graph and G^* is complete. (σ', μ') is a spanning fuzzy subgraph of (σ, μ) if $\sigma = \sigma'$ and $\mu' \subseteq \mu$, that is, if $\sigma(u) = \sigma'(u)$ for every $u \in V$ and $\mu'(e) \leq \mu(e)$ for every $e \in E$.

The degree of a vertex u of a fuzzy graph G is defined as $d_G(u) = \sum_{u \neq v} \mu(uv) = \sum_{uv \in E} \mu(uv)$.

The Cartesian product of two fuzzy graphs $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ is defined as a fuzzy graph $G = G_1 \times G_2: (\sigma_1 \times \sigma_2, \mu_1 \times \mu_2)$ on $G^*(V, E)$ where $V = V_1 \times V_2$ and $E = \{((u_1, v_1)(u_2, v_2)) / u_1 = u_2, v_1 v_2 \in E_2 \text{ or } v_1 = v_2, u_1 u_2 \in E_1\}$

with $(\sigma_1 \times \sigma_2)(u, v) = \sigma_1(u) \wedge \sigma_2(v)$, for all $(u, v) \in V_1 \times V_2$ and

$$(\mu_1 \times \mu_2)((u_1, v_1)(u_2, v_2)) = \begin{cases} \sigma_1(u_1) \wedge \mu_2(v_1 v_2) & , \text{if } u_1 = u_2, v_1 v_2 \in E_2 \\ \sigma_2(v_1) \wedge \mu_1(u_1 u_2) & , \text{if } v_1 = v_2, u_1 u_2 \in E_1 \end{cases}$$

The conjunction or the tensor product of two fuzzy graphs $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ is defined as a fuzzy graph $G = G_1 \wedge G_2: (\sigma, \mu)$ on $G^*(V, E)$ where $V = V_1 \times V_2$ and $E = \{((u_1, v_1)(u_2, v_2)) / u_1 u_2 \in E_1, v_1 v_2 \in E_2\}$ with $\sigma(u_1, v_1) = \sigma_1(u_1) \wedge \sigma_2(v_1)$, for all $(u_1, v_1) \in V_1 \times V_2$ and $\mu((u_1, v_1)(u_2, v_2)) = \mu_1(u_1 u_2) \wedge \mu_2(v_1 v_2)$, for all $(u_1, v_1)(u_2, v_2) \in E$.

If $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ are two fuzzy graphs such that $\sigma_1 \leq \mu_2$ then $\sigma_2 \geq \mu_1$ [6].

The lower and upper truncations of σ at level t , $0 < t \leq 1$, are the fuzzy subsets $\sigma_{(t)}$ and $\sigma^{(t)}$ defined respectively by ,

$$\sigma_{(t)}(u) = \begin{cases} \sigma(u), & \text{if } u \in \sigma^t \\ 0, & \text{if } u \notin \sigma^t \end{cases}$$
 and $\sigma^{(t)}(u) = \begin{cases} t, & \text{if } u \in \sigma^t \\ \sigma(u), & \text{if } u \notin \sigma^t \end{cases}$.

Let $G:(\sigma, \mu)$ be a fuzzy graph with underlying crisp graph $G^*:(V, E)$. Take $V_{(t)} = \sigma^t$, $E_{(t)} = \mu^t$. Then $G_{(t)}:(\sigma_{(t)}, \mu_{(t)})$ is a fuzzy graph with underlying crisp graph $G_{(t)}^*:(V_{(t)}, E_{(t)})$. This is called the lower truncation of the fuzzy graph G at level t . Here $V_{(t)}$ and $E_{(t)}$ may be proper subsets of V and E respectively. Take $V^{(t)} = V$, $E^{(t)} = E$. Then $G^{(t)}:(\sigma^{(t)}, \mu^{(t)})$ is a fuzzy graph with underlying crisp graph $G^{(t)}^*:(V^{(t)}, E^{(t)})$. This is called the upper truncation of the fuzzy graph G at level t [5].

Let $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ denote two fuzzy graphs with underlying crisp graphs $G_1^*:(V_1, E_1)$ and $G_2^*:(V_2, E_2)$ respectively. Let $V = V_1 \wedge V_2$ and let $E = \{uv / u, v \in V; uv \in E_1 \text{ or } uv \in E_2 \text{ but not both}\}$.

Define $G:(\sigma, \mu)$ by

$$\sigma(u) = \begin{cases} \sigma_1(u) & \text{if } u \in V_1 - V_2 \\ \sigma_2(u) & \text{if } u \in V_2 - V_1 \\ \sigma_1(u) \vee \sigma_2(u) & \text{if } u \in V_1 \cap V_2 \end{cases} \quad \text{and} \quad \mu(uv) = \begin{cases} \mu_1(uv), & \text{if } uv \in E_1 \\ \mu_2(uv), & \text{if } uv \in E_2 \end{cases}$$

Then if $uv \in E_1$, $\mu(uv) = \mu_1(uv) \leq \sigma_1(u) \wedge \sigma_1(v) \leq \sigma(u) \wedge \sigma(v)$, if $uv \in E_2$, $\mu(uv) = \mu_2(uv) \leq \sigma_2(u) \wedge \sigma_2(v) \leq \sigma(u) \wedge \sigma(v)$. Therefore (σ, μ) defines a fuzzy graph. This is called the direct sum of two fuzzy graphs.

II STRONG PRODUCT

Definition 2.1

Let $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ denote two fuzzy graphs with underlying crisp graphs $G_1^*:(V_1, E_1)$ and $G_2^*:(V_2, E_2)$ respectively. The normal product of G_1^* and G_2^* is $G^* = G_1^* \circ G_2^* : (V, E)$ where $V = V_1 \times V_2$ and $E = \{(u_1, v_1)(u_2, v_2) / u_1 = u_2, v_1, v_2 \in E_2 \text{ or } v_1 = v_2, u_1, u_2 \in E_1 \text{ or } u_1, u_2 \in E_1 \text{ and } v_1, v_2 \in E_2\}$.

Define $G:(\sigma, \mu)$, where $\sigma = \sigma_1 \circ \sigma_2$ and $\mu = \mu_1 \circ \mu_2$ by

$\sigma(u_1, v_1) = \sigma_1(u_1) \wedge \sigma_2(v_1)$, for all $(u_1, v_1) \in V_1 \times V_2$ and

$$\mu((u_1, v_1)(u_2, v_2)) = \begin{cases} \sigma_1(u_1) \wedge \mu_2(v_1 v_2) & \text{if } u_1 = u_2, v_1 v_2 \in E_2 \\ \sigma_2(v_1) \wedge \mu_1(u_1 u_2) & \text{if } v_1 = v_2, u_1 u_2 \in E_1 \\ \mu_1(u_1 u_2) \wedge \mu_2(v_1 v_2) & \text{if } u_1 u_2 \in E_1, v_1 v_2 \in E_2 \end{cases}$$

If $u_1 = u_2, v_1 v_2 \in E_2$, $\sigma_1(u_1) \wedge \mu_2(v_1 v_2) = \sigma_1(u_1) \wedge \sigma_1(u_2) \wedge \mu_2(v_1 v_2) \leq \sigma_1(u_1) \wedge \sigma_1(u_2) \wedge \sigma_2(v_1) \wedge \sigma_2(v_2)$
 $= \sigma_1(u_1) \wedge \sigma_2(v_1) \wedge \sigma_1(u_2) \wedge \sigma_2(v_2) = \sigma(u_1, v_1) \wedge \sigma(u_2, v_2)$

Similarly if $v_1 = v_2, u_1 u_2 \in E_1$, $\sigma_2(v_1) \wedge \mu_1(u_1 u_2) \leq \sigma(u_1, v_1) \wedge \sigma(u_2, v_2)$

If $u_1 u_2 \in E_1$ and $v_1 v_2 \in E_2$, $\mu_1(u_1 u_2) \wedge \mu_2(v_1 v_2) \leq \sigma_1(u_1) \wedge \sigma_1(u_2) \wedge \sigma_2(v_1) \wedge \sigma_2(v_2) = \sigma(u_1, v_1) \wedge \sigma(u_2, v_2)$

Hence $\mu((u_1, v_1)(u_2, v_2)) \leq \sigma(u_1, v_1) \wedge \sigma(u_2, v_2)$. Therefore $G:(\sigma, \mu)$ is a fuzzy graph. This is called the normal product or the strong product of the fuzzy graphs G_1 and G_2 and is denoted by $G_1 \circ G_2$.

Example 2.2

The following Figure1 gives an example of the strong product of two fuzzy graphs.

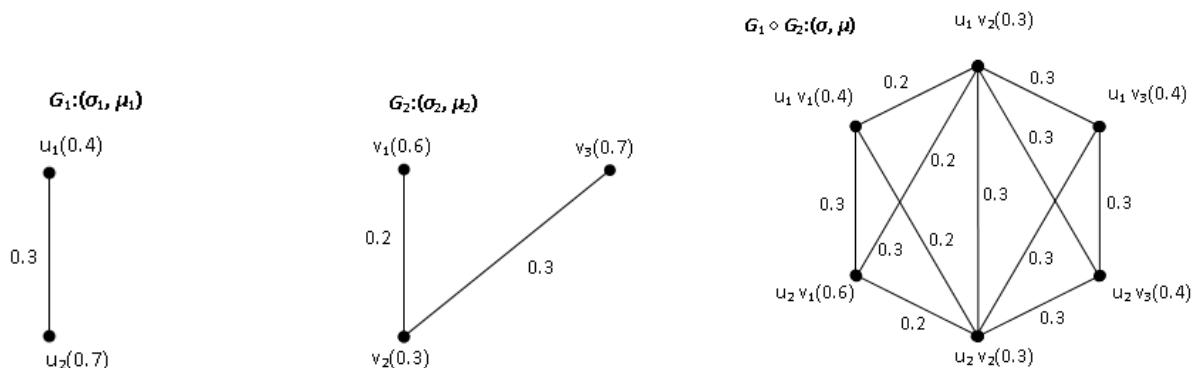


Figure 1: The strong product $G_1 \circ G_2$ of G_1 and G_2

Theorem 2.3:

If G_1 and G_2 are two effective fuzzy graphs, then $G_1 \circ G_2$ is an effective fuzzy graph.

Proof:

Let G_1 and G_2 be effective fuzzy graphs.

Then $\mu_1(u_1 u_2) = \sigma_1(u_1) \wedge \sigma_1(u_2)$ for any $u_1 u_2 \in E_1$ and $\mu_2(v_1 v_2) = \sigma_2(v_1) \wedge \sigma_2(v_2)$ for any $v_1 v_2 \in E_2$.

Therefore proceeding as in the definition,

If $u_1 = u_2, v_1 v_2 \in E_2$, $\mu((u_1, v_1)(u_2, v_2)) = \sigma_1(u_1) \wedge \mu_2(v_1 v_2) = \sigma_1(u_1) \wedge \sigma_1(u_2) \wedge \sigma_2(v_1) \wedge \sigma_2(v_2) = (\sigma_1(u_1) \wedge \sigma_1(u_2)) \wedge (\sigma_2(v_1) \wedge \sigma_2(v_2)) = \sigma(u_1, v_1) \wedge \sigma(u_2, v_2)$. Similarly,

If $v_1 = v_2, u_1 u_2 \in E_1$, $\mu((u_1, v_1)(u_2, v_2)) = \sigma(u_1, v_1) \wedge \sigma(u_2, v_2)$

If $u_1 u_2 \in E_1$ and $v_1 v_2 \in E_2$, $\mu((u_1, v_1)(u_2, v_2)) = \sigma(u_1, v_1) \wedge \sigma(u_2, v_2)$.

Hence $G_1 \circ G_2$ is an effective fuzzy graph.

Theorem 2.4:

If G_1 and G_2 are two complete fuzzy graphs, then $G_1 \circ G_2$ is a complete fuzzy graph.

Proof:

Let G_1 and G_2 be complete fuzzy graphs. Then G_1 and G_2 are effective fuzzy graphs and G_1^* and G_2^* are complete graphs. Therefore $G_1 \circ G_2$ is an effective fuzzy graph by Theorem 2.2 and $G_1^* \circ G_2^*$ is a complete graph. Hence $G_1 \circ G_2$ is a complete fuzzy graph.

Example 2.5:

The following Figure 2 gives an example of the strong product of two effective fuzzy graphs.

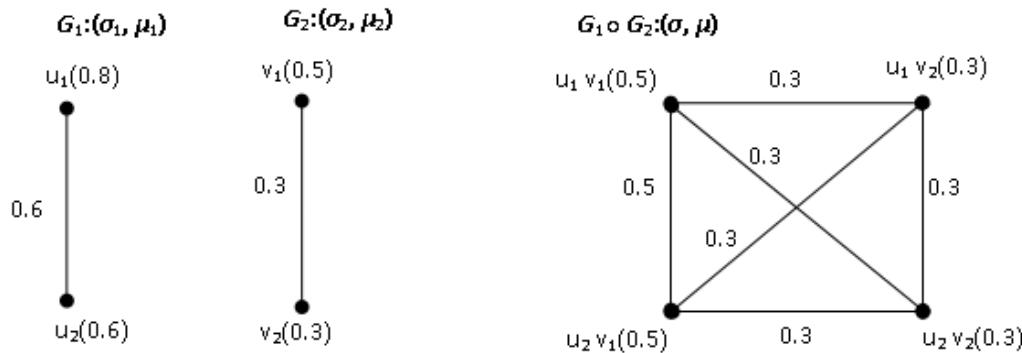


Figure 2: The strong product $G_1 \circ G_2$ of two effective fuzzy graphs G_1 and G_2

Example 2.6:

The following Figure 3 gives an example of the strong product of two complete fuzzy graphs.

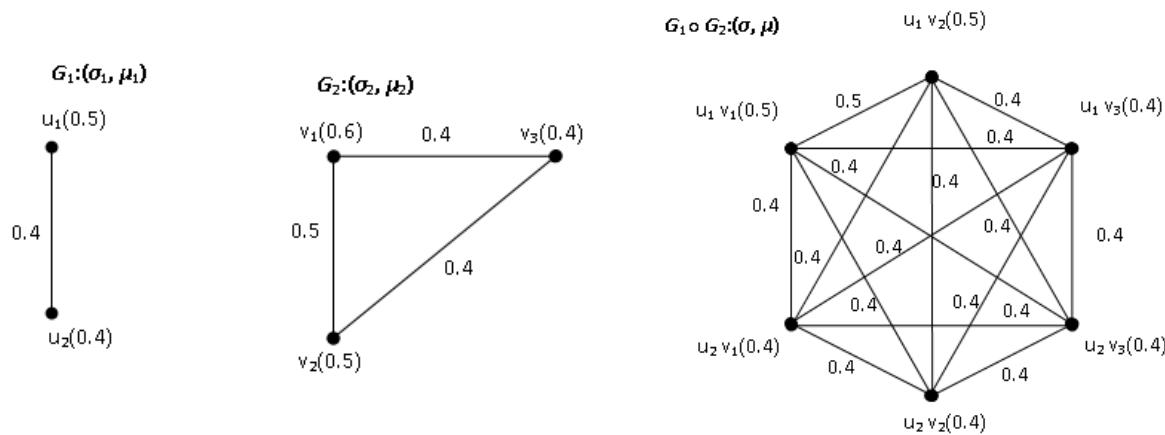


Figure 3: The strong product $G_1 \circ G_2$ of two complete fuzzy graphs G_1 and G_2

Theorem 2.7:

The strong product of two connected fuzzy graphs is always a connected fuzzy graph.

Proof:

Let $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ be two connected fuzzy graphs with underlying crisp graphs $G_1^*:(V_1, E_1)$ and $G_2^*:(V_2, E_2)$ respectively.

Let $V_1 = \{u_1, u_2, \dots, u_m\}$ and $V_2 = \{v_1, v_2, \dots, v_n\}$.

The strong product of two connected fuzzy graphs $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ can be taken as $G:(\sigma, \mu)$ where $\sigma = \sigma_1 \circ \sigma_2$ and $\mu = \mu_1 \circ \mu_2$.

Now consider the ' m ' sub graphs of G with the vertex sets $\{u_i v_1, u_i v_2, \dots, u_i v_n\}$ for $i=1,2,\dots,m$.

Each of these sub graphs of G is connected since the u_i 's are the same and since G_2 is connected, each v_i is adjacent to at least one of the vertices in V_2 .

Also since G_1 is connected, each u_i is adjacent to at least one of the vertices in V_1 .

Therefore there exists at least one edge between any pair of the above ' m ' sub graphs. Hence G is a connected fuzzy graph.

III TRUNCATIONS OF THE STRONG PRODUCT OF TWO FUZZY GRAPHS

Theorem 3.1: $(G_1 \circ G_2)_{(t)} = G_{1(t)} \circ G_{2(t)}$ and $(G_1 \circ G_2)^{(t)} = G_1^{(t)} \circ G_2^{(t)}$.

Proof:

$$\text{We have } (\sigma_1 \circ \sigma_2)_{(t)}(u, v) = \begin{cases} (\sigma_1 \circ \sigma_2)(u, v) & , \text{if } (\sigma_1 \circ \sigma_2)(u, v) \geq t \\ 0 & , \text{if } (\sigma_1 \circ \sigma_2)(u, v) < t \end{cases}$$

$$\text{Now } (\sigma_1)_{(t)}(u, v) = \sigma_1(u) \wedge \sigma_2(v)$$

If $(\sigma_1 \circ \sigma_2)(u, v) \geq t$, then $\sigma_1(u) \wedge \sigma_2(v) \geq t \Rightarrow \sigma_1(u) \geq t$ and $\sigma_2(v) \geq t \Rightarrow \sigma_1(u) = \sigma_1(u), \sigma_2(v) = \sigma_2(v)$
 $\Rightarrow \sigma_1(u) \wedge \sigma_2(v) = \sigma_1(u) \wedge \sigma_2(v) = (\sigma_1 \circ \sigma_2)(u, v)$.

If $(\sigma_1 \circ \sigma_2)(u, v) < t$, then $\sigma_1(u) \wedge \sigma_2(v) < t \Rightarrow$ either $\sigma_1(u) < t, \sigma_2(v) \geq t$ or $\sigma_1(u) \geq t, \sigma_2(v) < t$ or $\sigma_1(u) < t, \sigma_2(v) < t$
 $\Rightarrow \sigma_1(u) = 0, \sigma_2(v) = \sigma_2(v)$ or $\sigma_1(u) = \sigma_1(u), \sigma_2(v) = 0$ or $\sigma_1(u) = 0, \sigma_2(v) = 0$
 $\Rightarrow \sigma_1(u) \wedge \sigma_2(v) = 0$.

$$\text{Therefore } (\sigma_{1(t)} \circ \sigma_{2(t)})(u, v) = \sigma_{1(t)}(u) \wedge \sigma_{2(t)}(v) = \begin{cases} (\sigma_1 \circ \sigma_2)(u, v) & , \text{if } (\sigma_1 \circ \sigma_2)(u, v) \geq t \\ 0 & , \text{if } (\sigma_1 \circ \sigma_2)(u, v) < t \end{cases}$$

Hence $(\sigma_1 \circ \sigma_2)_{(t)}(u, v) = (\sigma_{1(t)} \circ \sigma_{2(t)})(u, v)$ for every $(u, v) \in V_1 \times V_2$.

$$\text{Now } (\mu_1 \circ \mu_2)_{(t)}((u_1, v_1)(u_2, v_2)) = \begin{cases} (\mu_1 \circ \mu_2)((u_1, v_1)(u_2, v_2)) & , \text{if } (\mu_1 \circ \mu_2)((u_1, v_1)(u_2, v_2)) \geq t \\ 0 & , \text{if } (\mu_1 \circ \mu_2)((u_1, v_1)(u_2, v_2)) < t \end{cases}$$

If $(\sigma_1 \circ \sigma_2)(u, v) \geq t$, then $\sigma_1(u_1) \wedge \mu_2(v_1 v_2) \geq t$ or $\sigma_2(v_1) \wedge \mu_1(u_1 u_2) \geq t$ or $\mu_1(u_1 u_2) \wedge \mu_2(v_1 v_2) \geq t$

Proceeding as above, we can show that

$$\begin{aligned} (\mu_{1(t)} \circ \mu_{2(t)})(((u_1, v_1)(u_2, v_2))) &= \begin{cases} \sigma_1(u_1) \circ \mu_2(v_1, v_2) & , \text{if } \sigma_1(u_1) \circ \mu_2(v_1, v_2) \geq t \\ \sigma_2(u_1) \circ \mu_1(u_1, u_2) & , \text{if } \sigma_2(v_1) \circ \mu_1(u_1, u_2) \geq t \\ \mu_1(u_1, u_2) \wedge \mu_2(v_1, v_2) & , \text{if } \mu_1(u_1, u_2) \wedge \mu_2(v_1, v_2) \geq t \\ 0 & , \text{if } \mu_1(u_1, u_2) \wedge \mu_2(v_1, v_2) < t \end{cases} \\ &= \begin{cases} (\mu_1 \circ \mu_2)((u_1, v_1)(u_2, v_2)) & , \text{if } (\mu_1 \circ \mu_2)((u_1, v_1)(u_2, v_2)) \geq t \\ 0 & , \text{if } (\mu_1 \circ \mu_2)((u_1, v_1)(u_2, v_2)) < t \end{cases} \end{aligned}$$

Therefore $(\mu_1 \circ \mu_2)_{(t)}((u_1, v_1)(u_2, v_2)) = (\mu_{1(t)} \circ \mu_{2(t)}((u_1, v_1)(u_2, v_2)))$ for every edge $(u_1, v_1)(u_2, v_2)$ in $G_1 \circ G_2$.

Hence $(G_1 \circ G_2)_{(t)} = G_{1(t)} \circ G_{2(t)}$.

Proceeding in the same way, we can show that $(G_1 \circ G_2)^{(t)} = G_1^{(t)} \circ G_2^{(t)}$.

IV. DEGREE OF A VERTEX IN THE STRONG PRODUCT OF TWO FUZZY GRAPHS

The degree of any vertex in the strong product $G_1 \circ G_2$ of two fuzzy graphs $G_1: (\sigma_1, \mu_1)$ and $G_2: (\sigma_2, \mu_2)$ is given by,

$$d_{G_1 \circ G_2}(u_i, v_j) = \sum_{u_i = u_k, v_j v_1 \in E_2} \sigma_1(u_i) \wedge \mu_2(v_j v_1) + \sum_{u_i u_k \in E_1, v_j = v_1} \mu_1(u_i u_k) \wedge \sigma_1(v_j) + \sum_{u_i u_k \in E_1, v_j v_1 \in E_2} \mu_1(u_i u_k) \wedge \mu_2(v_j v_1) . \text{ This expression can be simplified using the terms of the degrees of vertices in } G_1 \text{ and } G_2 \text{ with some constraints.}$$

Theorem 4.1:

If $G_1: (\sigma_1, \mu_1)$ and $G_2: (\sigma_2, \mu_2)$ are two fuzzy graphs such that $\sigma_1 \geq \mu_2$ and $\sigma_2 \geq \mu_1$ and $\mu_1 \wedge \mu_2 = c$ (a constant), then the degree of a vertex in the strong product of the two fuzzy graphs $G_1: (\sigma_1, \mu_1)$ and $G_2: (\sigma_2, \mu_2)$ is given by,
 $d_{G_1 \circ G_2}(u_i, v_j) = d_{G_2}(v_j) + d_{G_1}(u_i) + [d_{G_1^*}(u_i) d_{G_2^*}(v_j)]c$.

Proof:

Let $G_1: (\sigma_1, \mu_1)$ and $G_2: (\sigma_2, \mu_2)$ be two fuzzy graphs with underlying crisp graphs $G_1^*: (V_1, E_1)$ and $G_2^*: (V_2, E_2)$ respectively.

Suppose that $\sigma_1 \geq \mu_2$ and $\sigma_2 \geq \mu_1$ and $\mu_1 \wedge \mu_2 = c$ (a constant), then

$$\sigma_1 \geq \mu_2 \Rightarrow \sigma_1 \wedge \mu_2 = \mu_2 \text{ and } \sigma_2 \geq \mu_1 \Rightarrow \sigma_2 \wedge \mu_1 = \mu_1$$

Now,

$$d_{G_1 \circ G_2}(u_i, v_j) = \sum_{u_i = u_k, v_j v_1 \in E_2} \sigma_1(u_i) \wedge \mu_2(v_j v_1) + \sum_{u_i u_k \in E_1, v_j = v_1} \mu_1(u_i u_k) \wedge \sigma_1(v_j) + \sum_{u_i u_k \in E_1, v_j v_1 \in E_2} \mu_1(u_i u_k) \wedge \mu_2(v_j v_1) .$$

$$\begin{aligned} d_{G_1 \circ G_2}(u_i, v_j) &= \sum_{u_i = u_k, v_j v_i \in E_2} \mu_2(v_j v_i) + \sum_{u_i u_k \in E_1, v_j = v_i} \mu_1(u_i u_k) + \sum_{u_i u_k \in E_1, v_j v_i \in E_2} c \\ &= d_{G_2}(v_j) + d_{G_1}(u_i) + [d_{G_1^*}(u_i) d_{G_2^*}(v_j)]c. \end{aligned}$$

Theorem 4.2:

If $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ are two fuzzy graphs such that $\sigma_1 \geq \mu_2$ and $\sigma_2 \geq \mu_1$ and $\mu_1 \vee \mu_2 = C$ (a constant), then the degree of a vertex in the strong product of the two fuzzy graphs $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ is given by, $d_{G_1 \circ G_2}(u_i, v_j) = [1 + d_{G_2^*}(v_j)]d_{G_1}(u_i) + [1 + d_{G_1^*}(u_i)]d_{G_2}(v_j) - [d_{G_1^*}(u_i) d_{G_2^*}(v_j)]C$.

Proof:

Let $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ be two fuzzy graphs with underlying crisp graphs $G_1^*:(V_1, E_1)$ and $G_2^*:(V_2, E_2)$ respectively.

Suppose that $\sigma_1 \geq \mu_2$ and $\sigma_2 \geq \mu_1$ and $\mu_1 \vee \mu_2 = C$ (a constant), then

$$\sigma_1 \geq \mu_2 \Rightarrow \sigma_1 \wedge \mu_2 = \mu_2 \text{ and } \sigma_2 \geq \mu_1 \Rightarrow \sigma_2 \wedge \mu_1 = \mu_1$$

Now,

$$\begin{aligned} d_{G_1 \circ G_2}(u_i, v_j) &= \sum_{u_i = u_k, v_j v_i \in E_2} \sigma_1(u_i) \wedge \mu_2(v_j v_i) + \sum_{u_i u_k \in E_1, v_j = v_i} \mu_1(u_i u_k) \wedge \sigma_2(v_j) + \sum_{u_i u_k \in E_1, v_j v_i \in E_2} \mu_1(u_i u_k) \wedge \mu_2(v_j v_i) \\ &= \sum_{u_i = u_k, v_j v_i \in E_2} \mu_2(v_j v_i) + \sum_{u_i u_k \in E_1, v_j = v_i} \mu_1(u_i u_k) + \sum_{u_i u_k \in E_1, v_j v_i \in E_2} [\mu_1(u_i u_k) + \mu_2(v_j v_i) - \mu_1(u_i u_k) \vee \mu_2(v_j v_i)] \\ &= d_{G_2}(v_j) + d_{G_1}(u_i) + \sum_{u_i u_k \in E_1, v_j v_i \in E_2} \mu_1(u_i u_k) + \sum_{u_i u_k \in E_1, v_j v_i \in E_2} \mu_2(v_j v_i) - \sum_{u_i u_k \in E_1, v_j v_i \in E_2} [\mu_1(u_i u_k) \vee \mu_2(v_j v_i)] \\ &= d_{G_2}(v_j) + d_{G_1}(u_i) + d_{G_2^*}(v_j) d_{G_1}(u_i) + d_{G_1^*}(u_i) d_{G_2}(v_j) - \sum_{u_i u_k \in E_1, v_j v_i \in E_2} C \\ &= [1 + d_{G_2^*}(v_j)]d_{G_1}(u_i) + [1 + d_{G_1^*}(u_i)]d_{G_2}(v_j) - [d_{G_1^*}(u_i) d_{G_2^*}(v_j)]C. \end{aligned}$$

Theorem 4.3:

If $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ are two fuzzy graphs such that $\sigma_1 \leq \mu_2$ and $\mu_1 \wedge \mu_2 = c$ (a constant), then the degree of a vertex in the strong product is given by, $d_{G_1 \circ G_2}(u_i, v_j) = d_{G_2^*}(v_j) \sigma_1(u_i) + d_{G_1}(u_i) + [d_{G_1^*}(u_i) d_{G_2^*}(v_j)]c$.

Proof:

Let $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ be two fuzzy graphs with underlying crisp graphs $G_1^*:(V_1, E_1)$ and $G_2^*:(V_2, E_2)$ respectively.

Suppose that $\sigma_1 \leq \mu_2$. Then $\sigma_2 \geq \mu_1$. This implies that $\sigma_1 \leq \sigma_2$. Also $\mu_1 \wedge \mu_2 = c$ (a constant).

Now,

$$\begin{aligned} d_{G_1 \circ G_2}(u_i, v_j) &= \sum_{u_i = u_k, v_j v_i \in E_2} \sigma_1(u_i) \wedge \mu_2(v_j v_i) + \sum_{u_i u_k \in E_1, v_j = v_i} \mu_1(u_i u_k) \wedge \sigma_2(v_j) + \sum_{u_i u_k \in E_1, v_j v_i \in E_2} \mu_1(u_i u_k) \wedge \mu_2(v_j v_i) \\ &= \sum_{u_i = u_k, v_j v_i \in E_2} \sigma_1(u_i) + \sum_{u_i u_k \in E_1, v_j = v_i} \mu_1(u_i u_k) + \sum_{u_i u_k \in E_1, v_j v_i \in E_2} \mu_1(u_i u_k) \wedge \mu_2(v_j v_i) \\ &= d_{G_2^*}(v_j) \sigma_1(u_i) + d_{G_1}(u_i) + [d_{G_1^*}(u_i) d_{G_2^*}(v_j)]c. \end{aligned}$$

Example 4.4:

If $G_1:(\sigma_1, \mu_1)$ and $G_2:(\sigma_2, \mu_2)$ are two fuzzy graphs such that $\sigma_1 \leq \mu_2$ and $\mu_1 \wedge \mu_2 = c$ (a constant), then their strong product $G_1 \circ G_2 : (\sigma, \mu)$ is given in the following example.

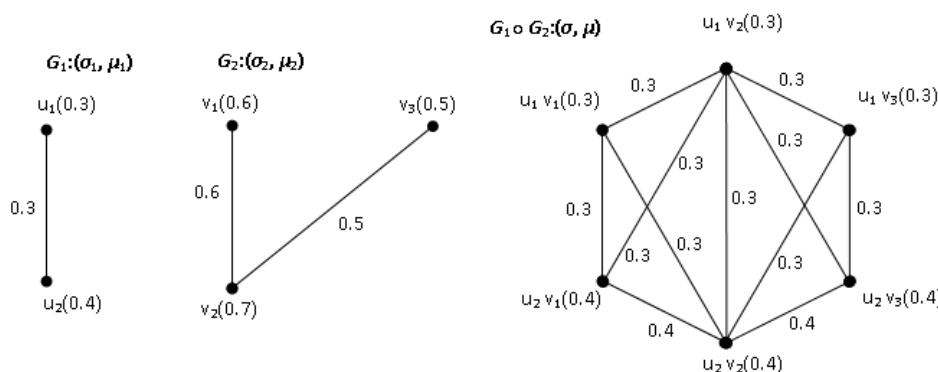


Figure 4: The Strong Product of two fuzzy graphs such that $\sigma_1 \leq \mu_2$ and $\mu_1 \wedge \mu_2 = 0.3$.

Now,

$$d_{G_1 \circ G_2}(u_1, v_1) = d_{G_2^*}(v_1) \sigma_1(u_1) + d_{G_1}(u_1) + [d_{G_1^*}(u_1) d_{G_2^*}(v_1)]c = 1 \times 0.3 + 0.3 + 1 \times 0.3 = 0.9$$

$$d_{G_1 \circ G_2}(u_2, v_2) = d_{G_2^*}(v_2) \sigma_1(u_2) + d_{G_1}(u_2) + [d_{G_1^*}(u_2) d_{G_2^*}(v_2)] c = 2 \times 0.4 + 0.3 + 1 \times 2 \times 0.3 = 1.7$$

V. RELATIONSHIP BETWEEN THE DIRECT SUM AND THE STRONG PRODUCT

Theorem 5.1:

The strong product of two fuzzy graphs G_1 and G_2 is the direct sum of the Cartesian product of G_1 and G_2 and the conjunction of G_1 and G_2 .

Proof:

From the definitions, $(\sigma_1 \circ \sigma_2)(u, v) = (\sigma_1 \times \sigma_2)(u, v) = (\sigma_1 \wedge \sigma_2)(u, v) = \sigma_1(u) \wedge \sigma_2(v)$ for every $(u, v) \in V_1 \times V_2$.

So $((\sigma_1 \circ \sigma_2) \oplus (\sigma_1 \wedge \sigma_2))(u, v) = \sigma_1(u) \wedge \sigma_2(v)$ for every $(u, v) \in V_1 \times V_2$.

Hence $(\sigma_1 \circ \sigma_2)(u, v) = ((\sigma_1 \times \sigma_2) \oplus (\sigma_1 \wedge \sigma_2))(u, v)$ for every $(u, v) \in V_1 \times V_2$.

From the definitions of Cartesian product and the conjunction,

$$(\mu_1 \times \mu_2) \oplus (\mu_1 \wedge \mu_2)((u_1, v_1)(u_2, v_2)) = \begin{cases} \sigma_1(u_1) \circ \mu_2(v_1, v_2) & , \text{if } u_1 = u_2, v_1 v_2 \in E_2 \\ \sigma_2(u_1) \circ \mu_1(u_1, u_2) & , \text{if } v_1 = v_2, u_1 u_2 \in E_1 \\ \mu_1(u_1, u_2) \wedge \mu_2(v_1, v_2) & , \text{if } u_1 u_2 \in E_1 \text{ and } v_1 v_2 \in E_2 \end{cases}$$

$$= (\mu_1 \circ \mu_2)((u_1, v_1)(u_2, v_2))$$

Hence $G_1 \circ G_2 = (G_1 \times G_2) \oplus (G_1 \wedge G_2)$.

VI. CONCLUSION

In this paper, the strong product of two fuzzy graphs is defined. It is proved that when two fuzzy graphs are effective then their strong product is always effective and it is proved that the strong product of two complete fuzzy graphs is complete. Also it is proved that the strong product of two connected fuzzy graphs is always connected. The lower and upper truncations of the strong product of two fuzzy graphs are obtained. The degree of a vertex in the strong product of two fuzzy graphs is obtained. A relationship between the direct sum and the strong product of two fuzzy graphs is obtained. Operation on fuzzy graph is a great tool to consider large fuzzy graph as a combination of small fuzzy graphs and to derive its properties from those of the small ones. Through this paper, a step in that direction is made.

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AUTHORS

First Author – Dr. K. Radha, M.Sc.,M.Phil.,Ph.D., P.G & Research Department of Mathematics, Periyar E.V.R. College, Tiruchirapalli-620023. *E-mail: radhagac@yahoo.com*

Second Author – Mr.S. Arumugam, M.Sc.,M.Phil.,B.Ed.,(Ph.D.), Govt. High School, Thinnanur, Tiruchirapalli-621006. *E-mail: anbu.saam@gmail.com*

Correspondence Author – Dr. K. Radha, M.Sc.,M.Phil.,Ph.D., P.G & Research Department of Mathematics, Periyar E.V.R. College, Tiruchirapalli-620023. *E-mail: radhagac@yahoo.com*

Extraction of biodiesel from Jatropha oil and performance study of diesel engine with biodiesel fuels

*Ayush Kumar Raghuvanshi, **C P Singh

*Mechanical Engineering Department of JSSATE Noida
**Mechanical Engineering Department of JSSATE Noida

Abstract- Biodiesel refers to a vegetable oil- or animal fat-based diesel fuel consisting of long chain alkyl (methyl, propyl or ethyl) esters. Biodiesel is typically made by chemically reacting lipids with an alcohol. Biodiesel is meant to be used in standard diesel engines and is thus distinct from the vegetable oils. Biodiesel can be used alone, or blended with diesel. Biodiesel, a promising substitute as an alternative fuel has gained significant attention due to the predicted shortness of conventional fuels and environmental concern. The utilization of liquid fuels such as biodiesel produced from Jatropha oil by transesterification process represents one of the most promising options for the use of conventional fossil fuels.

In this project, the Jatropha oil is converted into jatropha oil methyl ester known as biodiesel, prepared in the presence of homogeneous acid catalyst with the help of Rotor Mantle which stirs the jatropha oil.

The physical properties such as density, flash point, viscosity, and load test were found out for Jatropha oil and Jatropha methyl ester. The blends of biodiesel (B10, B20, etc.) are tested on a diesel engine and Brake Horse Power (BHP), weight of fuel consumption (Wf) and specific fuel consumption (sfc) are determined.

The same characteristics study was also carried out for the diesel fuel for obtaining the base line data for analysis. The values obtained from the Jatropha methyl ester is closely matched with the values of conventional diesel and can be used in the existing diesel engine without any modification.

Index Terms- Biodiesel, Blends, Jatropha Transestrification, Performance

I. INTRODUCTION

Our earth contains various reservoirs of carbon that can be used in form of solid, gaseous or liquid fuels for meeting power requirements. However, we all completely rely upon fossil-based reserves due to which cost of these reserves have increased drastically to heights. In the coming generation there will be no fossil fuels left to meet our energy requirements. So, a renewable source of fuels is required for meeting the future energy needs of the world [1].

Here comes a need for Biodiesel. Biodiesel is biodegradable and non-toxic. Biodiesel fuel is a clean burning alternative fuel that is made from renewable source of materials. It does not contain pure petroleum crude (diesel), but is mixed with petroleum to produce various biodiesel blend. (e.g. - B20, B30). Thus it can be used in different engines. [2-3]

Blending of various types of vegetable oils with diesel fuel can help resolve problems and results in low CO, HC and smoke emissions. [4]

Biodiesel is different from vegetable oil or alternative fuels. It can be used perfectly in its unaltered form in diesel engines. Biodiesel is one of the easiest alternative fuel for future use. It can also be used on farms in farm equipment. [5]

The process of making of Biodiesel fuel is known as Transesterification. Glycerol from the vegetable oil or fat is removed in this process. The absence of sulphur in 100% biodiesel extends the life of catalytic convertors. If combined with heating oil, Biodiesel fuel can be used to heat residential and industrial buildings. In a diesel powered combustion engine, biodiesel fuel eliminates use of any type of retrofits. [6]

In this research work, B10 and B20 blends of jatropha bio diesel with diesel were used as the biodiesel fuel and their performance was compared with diesel. Jatropha Bio diesel oil was prepared by transesterification using KOH as the catalyst and was tested in a 4- stroke direct natural aspirates diesel engine. [6]

The oil content is 25-30% in the seed. The oil contains 21% saturated fatty acids and 79% unsaturated fatty acids. Jatropha curcus oil cake is rich in Nitrogen, Phosphorous and Potassium and can be used as organic manure. Jatropha oil expelled from seeds and filtered through filter press can replace kerosene or oil lamp. [7-8]

II. METHOD

Biodiesel is typically produced through the process known as transesterification. In this method, reaction of a vegetable oil or animal fat with Ethanol in the presence of a catalyst yields glycerin and Ethyl esters. Methyl esters and glycerol are the by-products which are left behind in this process. Unlike traditional fuels, biodiesel fuel is free from substances such as sulphur and aromatics. It has passed all the health effects testing requirements, unlike other alternative fuel. In this present study, Jatropha Bio diesel was prepared by transesterification using KOH as the catalyst as it rapidly absorbs moisture from the atmosphere and was tested in a 4- stroke direct natural aspirates diesel engine.

The plant that is generally cultivated for the purpose of extracting jatropha oil is Jatropha curcas. The seeds are the primary source from which the oil is extracted. Owing to the toxicity of jatropha seeds, they are not used by humans. The major goal of jatropha cultivation, therefore, is performed for the sake of chemical compositions.

Main constituents in jatropha are:

- Moisture: 6.20%
- Protein: 18.00%
- Fat: 38.00%
- Carbohydrates: 17.00%
- Fiber: 15.50%
- Ash: 5.30

III. EXPERIMENTATION

The apparatus used for experimentation was a single cylinder, four-stroke, direct injection (DI), water-cooled, diesel engine with mechanical rope brake loading was used for this study which is developing a power output of 5.2 KW @ 1500 rpm. The engine specifications are given in Table 1.

Table I: ENGINE SPECIFICATIONS

RATED POWER	5.2 KW@ 1500rpm
SPEED	1500 RPM
No. OF CYLINDERS	ONE
COMPRESSION RATIO	17.5:1
BORE	87.5mm
STROKE	110mm
ORIFICE DIAMETER	20mm
TYPE OF IGNITION	COMPRESSION IGNITION
METHOD OF LOADING	ROPE BRAKE
METHOD OF STARTING	CRANK START

The engine was tested with Diesel, and blend ratios of 10%, 20%, and 30% at variable speeds. The engine has run smoothly through the whole study and no major problem was reported. Performance parameters such as brake horse power, brake specific fuel consumption, weight of fuel consumption were evaluated.

Also a viscosity test was conducted on a redwood viscometer to compare the viscosity of biodiesel with diesel. Also Flash and Fire point test was conducted on a testing apparatus known as Pensky-Martens Flash and fire point testing apparatus to compare the properties of biodiesel with traditional fuel. Also density test was also conducted for both the fuels

IV. TESTING PARAMETERS AND TESTING

- A) **VISCOSITY TEST:** - This test was conducted on both fluids, i.e. on diesel and biodiesel. The test is conducted on a redwood viscometer. Resistance offered by any fluid against flow is known as viscosity. It is generally expressed in centistokes (Cst). It decreases with increase in temperature. This test was done to check and compare the viscosity of biodiesel with conventional fuel, which led to the conclusion that biodiesel can be used instead of conventional fuel.

The testing parameters that were recorded after the test can be seen as under:-

Table II: Viscosity Table
(Room Temperature 32° C)

FUEL	Temperature (° C)	Quantity (ml)	Viscosity (cst)
BIODIESEL	40	50	5.2
DIESEL	40	50	4.5

B-) FLASH AND FIRE POINT TEST: - The lowest temperature at which a liquid can vaporize to form an ignitable mixture in air is known as flash point of a volatile liquid. The vapor may cease to burn when the source of ignition is removed at the flash point. The fire point is slightly a higher temperature, which is defined as the temperature at which the vapor continues to burn after being ignited. There are various international standards for defining them, but the most common is that, the liquids having a flash point less than 43°C are flammable, while those having a flash point above this temperature are combustible.

This test was done on both conventional diesel available and biodiesel in order to check the flash and fire point temperature which should match or nearby values. This test is conducted on a Flash and fire point testing apparatus known as Pensky-Martens Flash and fire point testing apparatus, where the vapors above the liquid are not in equilibrium with the liquid temperature.

This test when conducted lead to the conclusion that Biodiesel can be used instead of conventional diesel fuel.

The testing parameters that were recorded after the test can be seen as under:-

Table III: Flash Point and Fire Point

S. No.	Oil	Flash point temperature (° C)	Fire point temperature (° C)
1	DIESEL	50	65
2	BIO-DIESEL	175	184

C-) **DENSITY TEST:**-This test is also conducted on both conventional fuel and biodiesel. The ratio of mass to volume is termed as Density. This test was done in order to check the density of both the fuels which should match or nearby values,

which only lead to conclusion that Bio-Diesel can be used instead of conventional fuel.

The testing parameters that were recorded after the test can be seen as under:-

Table IV: Density Table

S. No.	Oil	Density(g/cm ³)
1	DIESEL	0.841
2	BIO_DIESEL	0.838

D-) LOAD TEST AND PERFORMANCE TEST:-

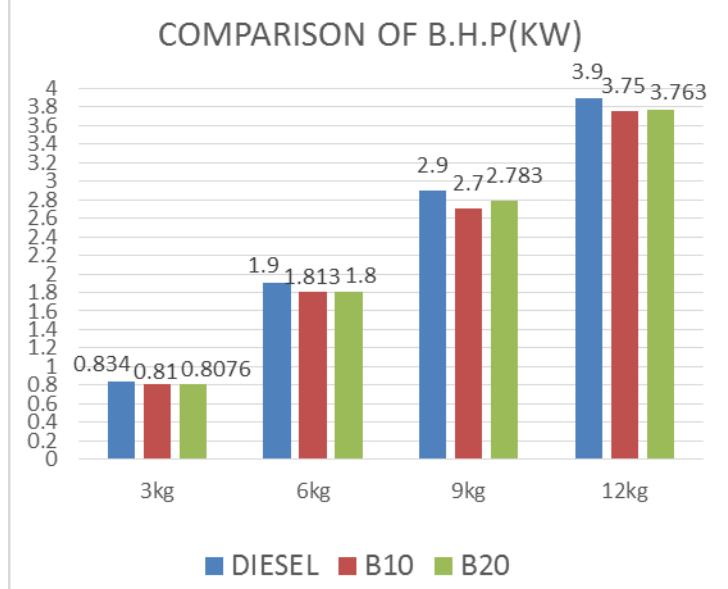


Figure 1: BRAKE HORSE POWER

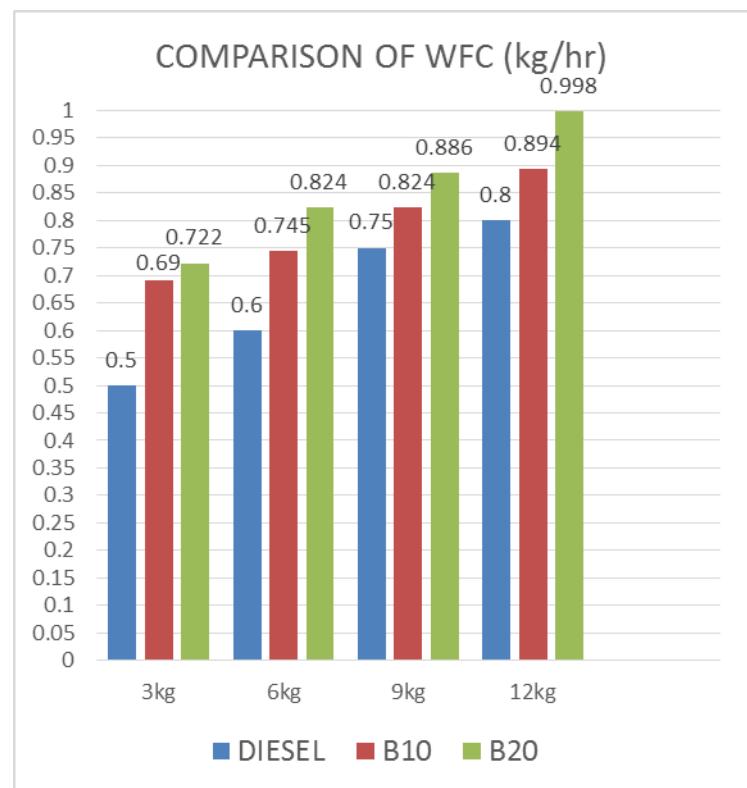


Figure 2: WEIGHT OF FUEL CONSUMPTION

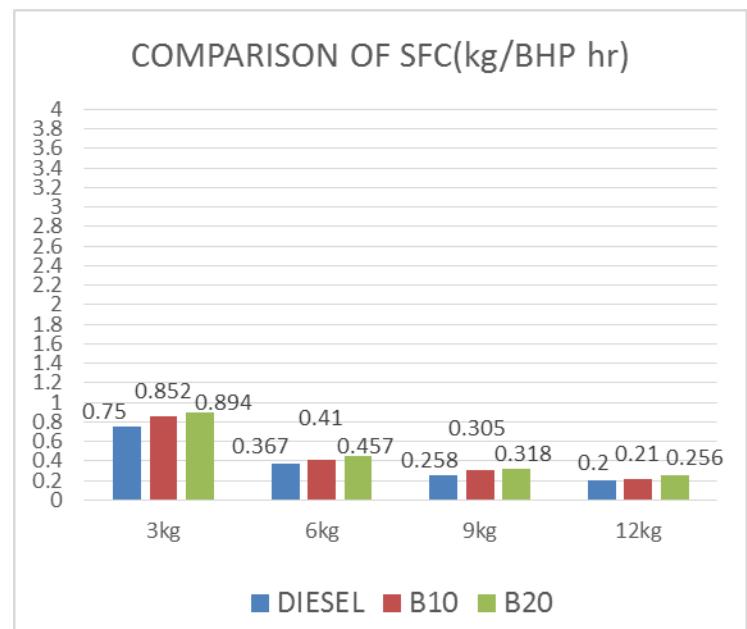


Figure 3: SPECIFIC FUEL CONSUMPTION

- 1.) **FOR B 10 (10% BIODIESEL & 90% DIESEL):-**
From the charts above, we get to see that:-

- a.) As load increases, brake horse power increases.
- b.) As load increases, weight of fuel consumption also increases.
- c.) As load increases, specific fuel consumption decreases.

2.) FOR B 20 (20% BIODIESEL & 80% DIESEL):-

From the charts above, we get to see that :-

- a.) As load increases, brake horse power increases.
- b.) As load increases, weight of fuel consumption also increases.
- c.) As load increases, specific fuel consumption decreases.

V. RESULTS AND DISCUSSIONS

The combustion and emission characteristics of single cylinder compression ignition engine fuelled with Jatropha Oil biodiesel and its blends have been analyzed and compared to the standard diesel fuel. Based on the experimental results, the following conclusions are obtained:-

- 1.) The Biodiesel from Jatropha Oil has been extracted successfully. The catalyst used was NaOH.
- 2.) The flash and Fire point of biodiesel are approximately four time more than diesel which shows that indeed Jatropha Oil Bio diesel can be used as an alternative to conventional fuel.
- 3.) Density and viscosity of Biodiesel is near about to Diesel.
- 4.) Weight of fuel consumption and Specific fuel consumption increases as quantity of biodiesel increases in blending condition and as the load increases Weight of fuel consumption increases and Specific fuel consumption decreases for each of the three blends.
- 5.) Brake horse power reduces as quantity of biodiesel increases in blending conditions and with increase in load Brake horse power increases for each of the three blend.

VI. CONCLUSONS

- In the current investigation, it has confirmed that Jatropha Oil may be used as a resource to obtain biodiesel. The cost of production is low on small scale production, but the cost is high if mass production and accuracy is the goal. The physical and chemical properties of biodiesel extracted were discussed above and on comparing them with conventional diesel oil we can conclude that the various properties discussed above are of nearby values of the diesel oil.
- Glycerin which is the by-product of the chemical reaction can be sold to the pharmaceutical companies, since it is used to produce valuables such as creams and toothpaste.
- Engine performance tests and other tests shows that Jatropha Oil as a fuel does not differ greatly from that of diesel. A slight power loss, combined with an increase in fuel consumption, was experienced with Jatropha Bio diesel. This may be due to the lower heating value of the ester.

From the above testing results and experimentation and study it can be clearly observed that the biodiesel made from Jatropha Oil can be used as an alternative fuel to conventional fuel as it showed better results than diesel in terms of engine performance and emission.

ACKNOWLEDGEMENT

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AUTHORS

First Author – Ayush Kumar Raghuvanshi, Student, Mechanical Engineering student of Jss College Of Technical Education, Noida, raghu.ayush.23@gmail.com

Second Author – C P Singh, Assistant Professor, Mechanical Engineering Department of Jss College Of Technical Education, Noida, cpsingh@jssaten.ac.in

To Study Clinical Evaluation and Outcome of Patients with Febrile Thrombocytopenia

Prithviraj Patil*, Pranita Solanke**, Gayatri Harshe***

* Senior Resident.,D.Y.Patil medical college, D.Y. Patil University Kolhapur 416 006.

** Asst.Professor,Miraj govt.medical college, Miraj 416 416.

*** Professor, D.Y.Patil medical college, D.Y. Patil University Kolhapur 416 006.

Abstract- The aim was to the study clinical evaluation and outcome of patients with febrile thrombocytopenia. Methodology:100 patients of fever with thrombocytopenia. Malaria was the commonest cause of febrile thrombocytopenia. followed by Dengue and viral fever. Maximum percent of bleeding seen at 5×10^3 to $10 \times 10^3/\text{cumm}$ platelet count, then 11×10^3 to $20 \times 10^3/\text{cumm}$ followed by 21×10^3 to $30 \times 10^3/\text{cumm}$. Out of 100 patients 23 patients showed bleeding manifestations. The Commonest form of bleeding manifestation was petechiae in 17 patients followed by hematuria, per rectal bleeding and epistaxis in 3,2 and 1 patient respectively. Good recovery was noted in 95% patients and mortality noted in 5% patients. Septicemia accounted for 75% mortality. We conclude that the febrile illness patients should be investigated for platelet count whether they have bleeding manifestations or not. Strong probability of dengue fever or other common causes like malaria, viral fever and leptospirosis should be kept in mind in any case of fever and thrombocytopenia as a decreased platelet count can be severe without external manifestation and lead to a bad prognosis if not treated with platelet transfusion early.

Index Terms- Febrile thrombocytopenia, Malaria, Bleeding manifestation, Mortality

I. INTRODUCTION

Fever is the most ancient hallmark of disease. Fever is known as pyrexia from Greek “pyretus” meaning fire; Febrile is from the Latin word Febris, meaning fever.¹

It is a frequent medical sign that describes increase in internal body temperature to the level above normal. It is considered as one of the body's immune mechanisms to attain neutralization of perceived threat inside the body².

It is a symptom caused by a variety of illnesses. Every one of us has experienced the wave of chills and exhaustion that a fever causes. Fever usually occurs in response to an infection or inflammation. However, many other causes are possible, including drugs, poisons, cancer, heat exposure, injuries or abnormalities in the brain, or disease of the endocrine (hormonal or glandular) system.

A fever rarely comes without other symptoms and sign. It is often accompanied by specific complaints or pattern. Many times it is associated with low platelet count.

The normal platelet count is 150000-450000/cumm. Thrombocytopenia is defined as platelet count less than 150000/cumm. It results from either decreased production,

increases sequestration or destruction of platelets.³ The causes for thrombocytopenia are varied and range from idiopathic, infectious to malignancies. Patients with an acute febrile illnesses in a tropical country like India usually have an infectious etiology and may have associated thrombocytopenia. Infections like malaria, dengue, leptospirosis, typhoid are some of the common causes of fever with thrombocytopenia. If we can analyse the low platelet count as one of the diagnostic marker of some common infections, we can narrow the differential diagnosis.

Patients having thrombocytopenia with fever many times do not have bleeding manifestations. Hence study of correlation between platelet counts and hemorrhagic manifestations will help us to know the correct time for infusion of platelets, thus avoiding unnecessary platelet transfusion.

II. METHODOLOGY

The patients admitted with fever and thrombocytopenia, in D.Y. Patil hospital Kolhapur were included in the study. A careful history was recorded with general physical examination and detailed systemic examination. This was followed by routine investigations which included complete blood count, total leucocyte count, renal function test, liver function test, PT and INR, urine routine, ECG, USG, X-ray chest were done where ever indicated.

Repeat platelet count was done on day 0, 3, 5 and then on discharge in patients with platelet count between 40000/cumm – 150000/cumm. In patients with platelet count less than 40000/cumm – or having bleeding manifestation platelet count was repeated daily for at least 3 days or till rising trend of platelet is seen.

Special investigations were done in order to achieve the diagnosis. Once the specific diagnosis was reached the patients were treated for it specifically and symptomatically. Platelet transfusion were considered in patients with platelet count of 10000/cumm as absolute indication. Bleeding manifestation with any platelet count was another absolute indication for platelet transfusion.

The temperature was measured orally by clinical thermometer. The thermometer was kept for 2 min and patient was asked to breath from nose.

The platelet counting was done by 3 methods.

- Crude method: A film was made from EDTA blood and stained with romanswky stain. The count was considered adequate if there was 1 platelet found per 10-

30 red cells. At 1000X magnification 7-20 platelet/oil immersion field.

- 3 part cell counter is an automated cell counter with features of counting RBC's, WBC's, platelets, blood indices and Hb concentration all together.
- Direct visualization: 0.02 ml EDTA blood was diluted with 2 ml of diluting fluid followed by charging the Neubaur'schamber with the fluid and number of platelet was counted.

We need to rule out 'pseudo thrombocytopenia'. Platelet contains fine granules that usually fill the cytoplasm. Occasionally, granules are concentrated in centre (the granulomere) and surrounded by a pale cytoplasm (hyalomere) which are probably activated platelets, the appearance resulting from microtubular band. In EDTA blood the fraction of platelet that exceed 3^μm in diameter and fraction of platelets that are hypo granular are both increased if films are made immediately or after 60 min of collection leading to false reading. This artifact was reduced with the films made at 10 min to 60 min after blood is drawn.

III. RESULTS

Causes of febrile thrombocytopenia

The causes of thrombocytopenia in our study are Malaria 54% followed by viral fever 17%, Dengue 15%, enteric fever 6% and septicemia 4%

Table 1: Causes of febrile thrombocytopenia

Diagnosis	Number of Subjects (n)
Chikungunya	2
Dengue	15
Enteric fever	6
Leptospira	2
Malaria	54
Septicemia	4
Viral fever	17
Grand Total	100

Correlation of bleeding manifestations with platelet count.

There was a decreasing trend seen in bleeding manifestations as platelet count increased Maximum bleeding count was seen in range of 5000- 10000/cumm, then 11000-20000/cumm followed by 21000-30000/cumm. There was no bleeding manifestation at counts more than 50000/cumm.

Table no 2: Correlation of bleeding manifestations with platelet count

PLT count (cumm)	Bleeding	Total no. patients	%
5000-10000	2	2	100
11000-20000	7	8	87.5
21000-30000	5	6	83.3
31000-40000	3	5	60
41000-50000	6	15	40

Number of patients showing different types of bleeding manifestations

- a) Out of 100 patients 23 patients showed bleeding manifestations.
- b) Petechiae were seen in 17 patients as a major bleeding manifestations followed by 3 patients having hematuria and then 2 patients with per rectal bleed.
- c) The mean platelet count at which each of these manifestations were seen are summarized in the table above. Petechiae at an average of 31000/cumm, while hematuria at an average of 36000/cumm.

Table no 3: Number of patients showing different types of bleeding manifestations

Bleeding manifest	Number of subjects	Mean platelet count (cumm)
Epistaxis	1	12000
Hematuria	3	36000
Petechiae	17	31000
PR bleed	2	36000

Outcome and Follow ups

Good outcome was seen in 95% patients with increasing trends in platelet count at the time of discharge. Mortality was noticed in 5% of patients. Major incidence of mortality was seen in patients of septicemia almost 60% followed by malaria and viral fever.

Table 4: Outcome and Follow ups

Diagnosis	Good	Mortality	Grand Total
Chikungunya	2	-	2
Dengue	15	-	15
Enteric fever	6	-	6
Leptospirosis	2	-	2
Malaria	53	1	54
Septicemia	1	3	4
Viral fever	17	1	17
Grand Total	95	5	100

IV. DISCUSSION

Comparison of cause of thrombocytopenia

The causes of febrile thrombocytopenia in our study was Malaria 54% followed by Viral fever 17%, Dengue 15%, enteric 6% and septicemia 4%. (table 5) Similar results were obtained in Srinivas study⁴ while Nair study⁵ had septicemia as the major cause of thrombocytopenia.

Table no. 5 Comparison of cause of thrombocytopenia

Diagnosis	Nair Study ⁴ (%)	Srinivas study ⁵ (%)	Present study
Septicemia	26	19	4
Enteric fever	15	24	6
Dengue	14	14	15
Malaria	09	41	54
Others	18	2	21

Comparison of bleeding manifestation

Out of 23 patients maximum patients presented with petechiae (17 cases i.e.73.9%) which was followed by spontaneous bleedings (6 cases i.e.26.9%).(Table 6) Compared to study by P.S. Nair et al⁵ spontaneous bleeding in 77.78% was a major manifestation followed by petechiae/purpura accounting for (22.22%) While in a similar study by Dr. Srinivaset al⁴ purpura (63%) was the commonest bleeding manifestations followed by spontaneous bleeding (37%)

Table no. 6 Comparison of bleeding manifestation:

Bleeding manifestations	Nair study ⁵	Srinivas study ⁴	Present study
	%	%	%
Present	41.3	49	23
Absent	58.7	51	77

Comparison of outcome of patients

Good outcome was seen in 95% patients with increasing trends in platelet count at the time of discharge. Mortality was noticed in 5% of patients. Major cause for mortality was septicemia in 60% patients followed by malaria and viral fever.

In the study by Srinivaset al⁴ septicemia accounted for 78% and dengue accounted for 22% of mortality.

During the course of follow up platelets showed increasing trends in 61% patients and continuously decreasing trends in 39% patients while in the study by Srinivaset al⁴ the follow up platelets showed increasing trends in 63.3% patients and continuously decreasing trend was seen in 36.7% patients.

Table no.7 Comparison of outcome of patients

	Srinivas study ⁴	Present study
Septicemia	78%	60%
Malaria	---	20%
Dengue	22%	---
Others	---	20%

V. CONCLUSION

Malaria was the commonest cause of febrile thrombocytopenia. Bleeding manifestation risk increases when platelet count decreases < $20 \times 10^3/\text{cumm}$. Petechiae was the commonest presentation of bleeding manifestation in febrile thrombocytopenia which was followed by hematuria and per rectal bleeding. Identification of causative infection for febrile thrombocytopenia and its treatment gives good outcome.

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AUTHORS

First Author- Dr Prithviraj Patil MD(MEDICINE). Dr.D.Y.Patil medical college Kolhapur 416 006. Email-prithvipatil44@gmail.com

Second Author- Dr.Pranita Solanke MD (OBGY) Govt medical college miraj 416 416. E mail-drpranitasolanke@gmail.com

Third Author- Dr.Gayatri Harshe MD (MEDICINE)
Dr.D.Y.Patil medical college, kolhapur 416 006

Correspondence Author- Dr Prithviraj Patil. MD(MEDICINE)
Dr.D.Y.Patil.medical college Kolhapur. Email-prithvipatil44@gmail.com, Contact no-9423870032

Study of Postpartum Hemorrhage in Tertiary Care Centre

Pranita Solanke*, Swapnali Patil**, Prithviraj Patil***

* Assistant Professor, Dept of obgy, Government Medical College, Miraj

** Junior Resident, Dept of obgy, Dr. D.Y. Patil Medical College Kolhapur

*** Consultant , Dept of Medicine, Wanless Hospital Miraj

Abstract- The aim was to analyse factor responsible for causing PPH and its management. Methodology: This study included all patients admitted for delivery and ending up in PPH. Out of 5998 patients 96 patients landed up in PPH. Uterine atony is the major cause of PPH followed by traumatic and retained tissue. In 70.83% cases of PPH had a more than one predisposing factors like anaemia, prolonge labour, placenta previa, multiparity, multifetal gestations, macrosomia, uterine inversion, fibroid uterus. Total 62.50% cases responds to medical line of treatment. 8.33% patients required bimanual uterine massage with medical treatment. 22.91% patients required conservative surgical interventions & 6.25% patients required radical surgery(sub total obstetric hysterectomy). We conclude that identification of predisposing factor and timely medical,surgical and bimanual massage can reduce mortality and morbidity in PPH

Index Terms- Postpartum hemorrhage, Uterine atony, Bimanual massage

I. INTRODUCTION

Postpartum hemorrhage is a life threatening situation and an obstetrician's nightmare. It remains a major cause of maternal morbidity and mortality worldwide. It is still an important issue in the developing world. About 13% of all deliveries may result in PPH. There are 6,00000 maternal deaths reported worldwide every year and 99% of these occur in developing countries¹.

Around 25% of deaths in developing world are due to PPH. Uterine atony is the most common cause of PPH, in about 75-90% of cases. Other causes include placenta previa, accreta, lower genital tract laceration, coagulopathy, uterine inversion and ruptured uterus¹.

Oxytocin, syntometrine, ergometrine, PGF2 alpha and misoprostol are different medical preparations used as uterotronics for prophylaxis and therapeutic management of PPH. The two main aspects of management of PPH are resuscitation and identification/management of underlying cause. Interventions like application of compression sutures, internal iliac artery ligation, uterine artery embolization and hysterectomy are other life saving measures. Objectives of this study were to determine the frequency, causes of PPH and various treatment options.

II. METHODOLOGY

Source of Data: This study was carried out in our hospital, Miraj from Dec 2010 to September 2012. Method of data collection:

Sample collection method: Random

Study method: Prospective study

Inclusion criteria: This study included all patients admitted for delivery & ending up in PPH or presenting with PPH in outpatient department, casualty or referred from outside as PPH.

Exclusion criteria: Patients with history of coagulation disorder & patients who were taking heparin & warfarin.

For calculation of frequencies, the total number of deliveries in the setting during study period was used. All subjects underwent a complete obstetrical clinical workup comprises of history, general physical examination, abdominal & pelvic examination, relevant laboratory investigations.

Diagnosis of PPH was made clinically based on findings of pelvic examination, condition of uterus and amount of bleeding. Maternal condition was assessed and managed according to established hospital protocols which included both pharmacological and surgical interventions. All maternal complications were noted and recorded in predesigned proforma.

III. RESULTS

No PPH cases out of total delivery:

96 cases land up in PPH out of 5998 cases of delivery.

Table 1: No PPH cases out of total delivery

No of total delivery	5998
No PPH cases	96

Incidence of PPH in different mode of delivery:

Incidence of PPH increase with instrumental vaginal delivery. But nearly equal in vaginal and caesarian section.

Table 2 : Incidence of PPH in different mode of delivery

Title	Percentage
PPH in vaginal delivery	1.32%
PPH in instrumental vaginal delivery	5.26%
PPH in caesarian section	1.80%

Causes of PPH

Atony was present in 79.17% of cases, traumatic was in 16.67% & retained placenta in 4.16%.

Table 3: Causes of PPH

Causes of PPH	Total cases	Percentage
Atony	76	79.17%
Traumatic	16	16.67%
Retained placenta	4	04.16%

Treatment of PPH:

Total 62.50% cases responds to medical line of treatment. 8.33% patients required bimanual uterine massage with medical treatment. 22.91% patients required conservative surgical interventions & 6.25% patients required radical surgery.

Table 4: Treatment of PPH

Treatment	Total cases	Percentage
Medical	60	62.50%
Medical + Bimanual uterine massage	08	08.33%
Surgical	22	22.91%
Radical	06	06.25%

Maternal mortality:

Only one patient died due to PPH out of 96 patient

Table 5: Maternal mortality

Total no PPH cases	96
Mortality	1

IV. DISCUSSION

Incidence of PPH in different study.

- In present study, 96 mothers were having postpartum haemorrhage during study period giving incidence of 1.60%.
- A study by Lu, MC, Fridman, M, Korst, LM et al., found incidence of 2.4% of deliveries.

Table 6: Incidence of PPH in different study.

Present study	1.6%
Lu, MC, Fridman et al study ²	2.4%

Incidence PPH associate with different mode of delivery:

- Present study show 5.26% incidence of PPH in all instrumental deliveries, incidence lower with caesarian section i.e. 1.80%.
- In Combs and colleagues study incidence of PPH with instrumental deliveries is 3%.
- In Magann and colleagues study incidence of PPH with caesarian section is 2.25%.

Table 7: Incidence PPH associate with different mode of delivery

Mode of delivery	Instrumental delivery	Vaginal delivery	Caesarian section
Present study	5.26%	1.32%	1.80%
Combs and colleagues study ³	3%		
Magann and colleagues study ⁴			2.25%

Uterine atony:

- Present study show uterine atony is the major cause of PPH i.e. 79.17% cases.
- In study by Anderson J, Etches D, Smith D., Uterine atony, the most common cause of postpartum haemorrhage, is reported in 70% of cases.
- In study done by Dildy GA uterine atony was present in 80% of cases.

8: Table Uterine atony

Name of study	%
Present study	79.17%
Anderson j and colleagues study ⁵	70%
Dildy GA ⁶	80%

Medical line of management:

- In study done by Soriano D and colleagues observed that Oxytocin is an effective first-line treatment for postpartum haemorrhage 10 international units (IU)

should be injected intramuscularly, or 20 IU in 1 L of saline may be infused at a rate of 250 ml per hour. As much as 500 ml can be infused over 10 minutes without complications.

In present study, oxytocin was required in 36.45% of cases.

- In present study, 15 methyl PGF2 alpha was used in 5.20% of postpartum haemorrhage. A study done by Mousa HA and colleagues found that 15 methyl PGF2 alpha has been proven to control haemorrhage in up to 87 percent of patients.

Manual removing of placenta:

Manual removal of placenta was required in 4.16% of postpartum haemorrhage cases in present study. A study done by Carroli G & colleagues retained placenta occurred in less than 3 percent of vaginal deliveries.

Management of PPH with obstetrical hysterectomy:

In present study 6 out of 5998 patients required obstetrical hysterectomy and in Yamamoto study only 1 out of 6978 patients required obstetrical hysterectomy.

Table 9: Management of PPH with obstetrical hysterectomy

Name of study	No. obstetrical hysterectomy in all deliveries.
Present study	6/5998
Yamamoto study ⁸	1/6978

V. CONCLUSION

Identification of predisposing factors like anaemia, multiparity, macrosomia, multiple pregnancy, placenta previa and prolonged labour with use of appropriate laboratorial investigation, clinical judgement and ultra sound & timely medical and surgical intervention can reduce maternal morbidity and mortality in cases with postpartum hemorrhage.

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AUTHORS

First Author –Dr.Pranita Solanke, M.S. (OBGY), Government Medical College, Miraj [Email-drpranitasolanke@gmail.com](mailto>Email-drpranitasolanke@gmail.com).

Second Author – Dr.Swapnali Patil, M.B.B.S., D.Y.Patil Medical College, Kolhapur, [Email-swapnalipatil@gmail.com](mailto>Email-swapnalipatil@gmail.com).

Third Author–Dr.Prithviraj Patil, M.D.(MED) Wanless Hospital Miraj, [Email-prithvipatil44@gmail.com](mailto>Email-prithvipatil44@gmail.com).

Correspondence Author –Dr.Pranita Solanke [Emaildrpranitasolanke@gmail.com](mailto>Emaildrpranitasolanke@gmail.com), AlternateEmaildrpranitasolanke@gmail.com
Contact no: 9423870038,8806706801.

The Water Birds of Gidhwa & Parsada Wetlands, Nandghat, Bemetara, Chhattisgarh (India)

Devendra Sharma*, Anurag Vishwakarma*, K. C. Yadav**

*Junior Research Fellow, State Forest Research & Training Institute, Raipur, Chhattisgarh (India)

**Director, State Forest Research & Training Institute, Raipur, Chhattisgarh (India)

Abstract- Birds Community of Gidhwa & Parsada Wetlands in Nandghat, Bemetara District, and Chhattisgarh State was studied during February 2013 to March 2014. The methodology followed was mainly observation using binocular and collected information with the help local bird watcher of those particular wetlands. A total 143 species of birds, belonging to 48 families were recorded from the area during the period. Among them 11 migrants, 26 local migrants and are 106 resident birds. Highest number of birds was recorded in mid-month of October to Post January, and the lowest was observed in month of April - June. Abundance of birds has recorded with appropriate status i.e. M, LM & R. Habitat disturbance through multi utilization of wetlands, many factors, which threatened the Gidhwa and Parsada wetlands ecosystem and the bird population, poaching of birds, Gidhwa and Parsada wetlands has slightly biomagnifications, introduction of bi-carbonates due to regular flow of agricultural activities, continuous uses of detergent cause Eutrofication. Birds play vital role in pollination, dispersal of seeds, predatory on insects as scavenger, food chain balancing, and as bio-indicators of fresh & healthy ecology or environment. All the ponds are interconnected with enough food materials and specific habitat for migratory birds. With the coined reference of species diversity for promoting this place as ecotourism site, Important Birds Area (IBA), facilitation center for breeding of birds, these are some main theme, in which birds comes in healthy wetlands in and around the world. The alternative source for increasing visiting birds per year through introducing of native floral species or provide them homely habitat. This paper calls for some basic information about migratory, local migrants, resident birds and conservation of avian habitat from human-elementary generated interference on birds movements.

Index Terms- Birds, Migration, Wetlands, Ecosystem, Conservation Problem and issues.

I. INTRODUCTION

Wetlands are extremely important areas throughout the world for wildlife protection, recreation, sediment control, flood prevention (1). Wetlands are important bird's habitats and birds use them for feeding, roosting, nesting and rearing their young (2, 3). In Gidhwa and Parsada Wetlands are mainly used for agriculture, aquaculture, reclamation for harboring and irrigation purposes. In the same field, Kerala Wetlands are highly used for industrial purpose, disposition the waste materials, discharging the industrial effluents and municipal waste water,

wood seasoning, dumping dredged soil, coir retting and for fishing (4).

II. STUDY SITE

The Gidhwa and Parsada Wetlands is one of the wonderful places to watch the resident and migratory birds, being near from both cities of Raipur and Bilaspur, Chhattisgarh. The Gidhwa and Parsada Wetland is situated in coordinate of $21^{\circ}50'25.6''$ N, $081^{\circ}46'29.9''$ E and $21^{\circ}51'10.9''$ N, $081^{\circ}49'23.2''$ E respectively in Nandghat, Bemetara District, Chhattisgarh (India). The distance from the district head quarter is around 70 km.

III. MATERIALS AND METHODS

Gidhwa and Parsada Wetland is one of the most important wetlands in the south eastern central zone and Raipur plains agro climatic zone, because thousands of ducks and other migrants are choosing as their wintering during post monsoon season. This Wetland covers approximately 06 km radius from Gidhwa village. This site has maximum inter-connected ponds in Nandghat Panchayats. Gidhwa and Parsada has total water logged area is 180 ha with muddy banks. The major soil type of the site is blackish and fertile soil: are accumulations of deposition of decayed biomass in that particular field. Distribution of soil types is mainly clay, sandy, loamy and silicate. The Pond/Tank has enough food for the various species of birds. As most depend on the aquatic vegetation like; hydrilla, sage grasses, lotus and green algae are increased because of Eutrofication. The various insects that are found in the muddy land, in this manner it is a perfect habitat for feeding, breeding and as temporary residency. The habitats has maximum littoral zone: it is very essential for any aquatic succession. Present study actually based on avian fauna of Mavoor wetland, are very few, except the regular Asian Water fowl Census since past five years and Paper on diving behavior of Cormarants and Darter (5).

Systematic list of the birds of this region is lacking. Hence the present study documented the avian fauna of this wetlands from mainly direct observation and local informer interaction about counting status of resident and migratory birds from post monsoon September 2013 to post February 2014. Study area visited 5 times in a month, the observation were made between 0600 hrs to 1200 hrs morning and 0400 hrs to 0600 hrs evening and birds were identified. The abundance status of birds are categorized into common (Com) -seen on most of the visited, uncommon (Uncom) -seen in a few visits and Rare (Ra) –seen once or twice, Residential status of species is classified into

Resident (R), local movement (LM), Migrants (M) and Straggler (S). Some birds are residents and they are breeding in the different habitat; of Chhattisgarh, but Gidhwā and Parsada Wetland they are seen only for limited time and as migrants, hence they are included in category of local migrants or movements. Winter visiting from the other region of Indian Sub-continent and Central Asian Countries are included in the category of Migratory.

IV. RESULTS

A total of 143 species of birds belonged to 48 families, during study all recorded avian fauna has classified into Resident birds, Local Movement birds, Migratory birds, Straggler, Common and Uncommon (Table No.1 and Plate 1), were recorded from the Gidhwā and Parsada Wetlands.

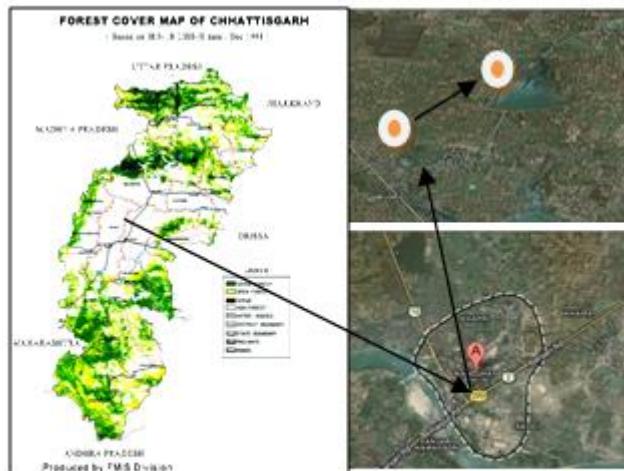


Fig. 1 Study area of Gidhwā & Parsada wetlands

Table No.: 1 Checklist birds recorded in Gidhwā and Parsada Wetlands with their residential movement status.

S. No.	Family	Local Name	Common Name	Scientific Name	Abundance	Status
1	Accipitridae	Cheel	Black Kite	<i>Milvus migrans</i>	Uncom	R/LM
2		Kapassi	Black shouldered kite	<i>Elanus caeruleus</i>	Uncom	R
3		Kaljanga	Greater spotted Eagle	<i>Aquila Clanga</i>	Uncom	R
4		Cheepka	Shikra	<i>Accipiter badius</i>	Uncom	R
5		Ragar	Steppe Eagle	<i>Aquila Nipalensis</i>	Uncom	R
6		Teesa	White-eyed Buzzard	<i>Butastur teesa</i>	Uncom	R
7	Alaudidae	Diyora	Ashy-crowed sparrow -lark	<i>Eremopterix griseus</i>	Ra	R/LM
8		Asiyai chandol	Eurasian Skylark	<i>Alauda arvensis</i>	Uncom	R
9		Aagiya	Indian Bush-lark	<i>Mirafra erythroptera</i>	Com	R
10		Jendoka agiya	Jerdons bushlark	<i>Mirafra affinis</i>	Ra	LM
11		Aagiya	Rufous-tailed Lark	<i>Ammomanches phoenicura</i>	Uncom	R
12		Ageen	Singing Bushlark	<i>Mirafra cantillans</i>	Com	R
13	Alcedinidae	Albakh, kilkila	Pied kingfisher	<i>Ceryle rudis</i>	Uncom	R
14		Chhota kilkila	Small blue kingfisher	<i>Alcedo atthis</i>	Com	R
15		Kilkila	White Throated King fisher	<i>Halcyon smyrnensis</i>	Uncom	R

16	Anatidae	Chakwa	Brahmy selduck	<i>Tadorna ferruginea</i>	Uncom	LM
17		Nakta	Comb Duck	<i>Sarkidiornis melanotos</i>	Uncom	R/LM
18		Lal Sir	Common Pochard	<i>Aythya ferina</i>	Ra	LM
19		Chhoti Murgabi	Common Teal	<i>Anas crecca</i>	Ra	M
20		Girja	Cotton teal	<i>Nettapus coromandelianus</i>	Uncom	LM
21		Patari, Chhota lal sir	Eurasin Wigeon	<i>Anas Penelope</i>	Uncom	LM
22		Badi silhi	Fulvous Whistling-duck	<i>Dendrocygna bicolor</i>	Com	R
23		Bekhur	Gadwall	<i>Anas strepera</i>	Ra	M
24		Kheera	Garganey	<i>Anas querquedula</i>	Uncom	R
25		Gugral	Indian spot billed duck	<i>Anas poecilorhyncha</i>	Uncom	R
26		Selhi	Lesser whistling duck	<i>Dendrocygna javanica</i>	Uncom	R
27		Sinkh Par	Northern Pintail	<i>Anas acuta</i>	Ra	M
28		Tidari Punna	Northern Shoveller	<i>Anas clypeata</i>	Ra	M
29		Lalchonch	Red-crested Pochard	<i>Netta rufina</i>	Ra	LM
30		Ablakh	Tufted duck	<i>Aythya fuligula</i>	Uncom	M
31		Ablakh	Tufted pochard	<i>Aythya fulingula</i>	R	LM
32	Apodidae	Samanya babila	House Swift	<i>Apus apus</i>	Com	R
33	Ardeidae	Kala Bagula	Black bittern	<i>Dupetor flavicollis</i>	Uncom	LM
34		Quak Quak	Black Crowed Night heron	<i>Nycticorax nycticorax</i>	Uncom	R
35		Waak	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	Uncom	LM
36		Gay Bagula	Cattle Egret	<i>Bubulcus cromandus</i>	Com	R
37		Lal Bagula	Cinnamon Bittern	<i>Ixobryucus cinnamomeus</i>	Uncom	LM
38		Mangal Bagula	Great Egret	<i>Ergetta alba</i>	Uncom	R/LM
39		Nari, Anjan	Grey Heron	<i>Ardea cinerea</i>	Uncom	LM
40		Blind Bagula	Indian Pond Heron	<i>Ardeola grayii</i>	Com	R
41		Patangkha	Intermediate Egret	<i>Ergetta intermedia</i>	Com	R
42		Chhota Bagula	Little Bitterern	<i>Ixobrychus minutus</i>	Com	R
43		Karchiya Bagula	Little Erget	<i>Ergetta garzetta</i>		
44		Red Anjan	Purple Heron	<i>Ardea purpurea</i>	Uncom	LM
45		Jun Bagula	Yellow Bittern	<i>Ixobrychus sinensis</i>	Com	R
46	Bucerotidae	Danesh	Indian Grey Hornbill	<i>Ocyceros birostris</i>	Com	R
47	Capitonidae	Chhota Basant	Coppersmith Barbet	<i>Megalaima haemacephala</i>	Uncom	R
48	Caprimulgidae	Bhartiya chippak	Indian Nightjar	<i>Caprimulgus indicus</i>	Uncom	R
49	Charadriidae	Bada merwa	Common Ringed Plover	<i>Charadrius hiaticula</i>	Uncom	R
50		Collarwala Merwa	Kentish Plover	<i>Charadrius alexandrinus</i>	Uncom	R
51		Merwa	Little Ringed Plover	<i>Charadrius dubius</i>	Uncom	R
52		Titori, Titi	Red -Wattled	<i>Venellus indicus</i>	Com	R

			Lapwing		
53		River titori	River Lapwing	<i>Venellus duvaucelii</i>	Uncom R
54		Jhhedri	Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	Uncom LM
55	Chloropseidae	Harewa	Blue-winged leafbird	<i>Chloropsis cochinchinensis</i>	Uncom R
56		Harewa	Golden-fronted Leafbird	<i>Chloropsis aurifrons</i>	Uncom R
57	Ciconiidae	Gangala, Ghonghill	Asian open bill	<i>Anastomus oscitans</i>	Uncom LM
58		Hazi lak-lak	Woody-necked stork	<i>Ciconia episcopus</i>	Ra LM
59	Cisticolidae	Kali Fudki	Ashy Prinia	<i>Prinia socialis</i>	Uncom R
60		Fudki	Plain prinia	<i>Prinia inornatca</i>	Com R
61	Columbidae	Gugi	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	Com R
62		Padki	Laughing dove	<i>Strepopelia Senegalensis</i>	Com R
63		Ghughu	Oriental Turtle Dove	<i>Streptopelia orientalis</i>	Uncom R
64		Seroti fakhta	Red Collared Dove	<i>Streptopelia tranquebarica</i>	Com R
65		kabutar	Rock pigeon	<i>Columba livia</i>	Com R
66		Chitroka	Spotted dove	<i>Strepopelia chinensis</i>	Com R
67	Coraciidae	Neelkanth	Indian roller	<i>Coracias benghalensis</i>	Com R
68	Corvidae	Desi kowa	House Crow	<i>Corvus splendens</i>	Com R
69		Jungli Kowa	Jungle Crow	<i>Corvus macrorhynchos</i>	Uncom R
70	Cuculidae	Koel	Asian koel	<i>Eudynamys scolopacea</i>	Com R
71		Mahok	Greater Coucal	<i>Centropus sinensis</i>	Uncom R
72	Dicruridae	Beehraj	Grearter racket tailed drongo	<i>Dicrurus paradiseus</i>	Uncom R
73	Diguridae	Jangle Kotwal	Ashy Drongo	<i>Dicrurus leueophaeus</i>	Uncom R
74		Kolsa, Kotwal	Black Drongo	<i>Dicrurus macrocercus</i>	Com R
75	Estrildidae	Charga	Indian Silverbill	<i>Euodice malabarica</i>	Uncom R
76		Lal muniya	Red avadavat	<i>Amandava amandava</i>	Uncom R
77		Teliya munia	Scaly-breasted Munia	<i>Lonchura punctulata</i>	Uncom R
78	Glareolidae	Nukri	Indian courser	<i>Cursorius coromandelicus</i>	Uncom R
79		Chhota tejpar	Small pranticol	<i>Glareola lactea</i>	Uncom M
80	Hirundinidae	Masjid ababil	Red-rumped Swallow	<i>Hirundo daurica</i>	Uncom R
81	Jacanidae	Jal pipi	Bronze Winged jacana	<i>Metopidius indicus</i>	Uncom R
82		Jal pipi	Pheasant-tailed jacana	<i>Hydrophasianus chirurgus</i>	Uncom R
83	Laniidae	Pachnaak	Bay-backed shrik	<i>Lanius vittatus</i>	Uncom R
84		Kajla latora	Long-tailed Shrike	<i>Lanius schach</i>	Uncom R
85	Meropidae	Patringa	Green- Bee eater	<i>Merops orientalis</i>	Com R

86	Monarchidae	Sultan bulbul	Asian paradise flycatcher	<i>Terpsiphone paradisi</i>	Uncom	R
87		Saleti khanjan	Grey wagtail	<i>Motacilla cinerea</i>	Uncom	R
88	Motacillidae	Hari charchari	Olive backed pipit	<i>Anthus hodgsoni</i>	Com	R
89		Khet chachari	Peddy field pipit	<i>Anthus rufulus</i>	Uncom	R
90		Dhoban	White Wagtail	<i>Motacilla alba</i>	Ra	M
91		Pani-Ka-Pilkiya	Yellow Wagtail	<i>Motacilla flava</i>	Ra	M
92	Motacillidae	Peetsir pilkiya	Citrine Wagtail	<i>Motacilla citreola</i>	com	R
93		Pilkiya	Western yellow wagtail	<i>Motacilla flava</i>	Uncom	M
94	Muscicapidae	Jhakki	Asian Brown flycatcher	<i>Muscicapa dauurica</i>	Uncom	R
95		Hussaini Pidda	Blue Throat	<i>Luscinia svecica</i>	Ra	M
96		Kallhuri	Indian black robbin	<i>Saxicoloides fulicola</i>	Com	R
97		Dahiyal	Oriental Magpie Robin	<i>Copsychus saularis</i>	Uncom	R
98	Nectariniidae	phool sunghni	Purple sunbird	<i>Nectarinia asiatica</i>	Com	R
99	Oriolidae	Peelak	Black hooded Oriole	<i>Oriolus xanthornus</i>	Uncom	R
100		Peelak	Eurasian Golden Oriole	<i>Oriolus kundoo</i>	Uncom	R
101	Paridae	Peela Ramgangaar	Black lored yellow Tit	<i>Parus xanthogenys</i>	Uncom	LM
102	Passeridae	Gauriya	House sparrow	<i>Passer domesticus</i>	Com	R
103		Razi	Yellow Throated Sparrow	<i>Petronia xanthocollis</i>	Uncom	R
104	Phalacrocoracidae	Ghoghoor ,Bada jal kowa	Great Cormorant	<i>Phalacrocorax carbo</i>	Uncom	R/LM
105		Chhota Jal kowa	Little Cormorant	<i>Phalacrocorax nigra</i>	Com	R
106	Picidae	Sunahra Katfodwa	Black rumped Flamback	<i>Dinopium benghalense</i>	Uncom	R
107		Bada kathfodwa	Greater flameback	<i>Chrysocolaptes lucidus</i>	Com	R
108	Ploceidae	Baya	Baya weaver	<i>Ploceus philippinus</i>	Uncom	R
109	Podicipedidae	Dubdubi	Great Crested Grebe	<i>Podiceps cristatus</i>	Uncom	R
110		Dubdubi	Little Grebe	<i>Tachybaptus ruficollis</i>	Uncom	R/LM
111	Psittacidae	Tota	Rose-ringed Parakeet	<i>Psittacula krameri</i>	Com	R
112		Tuiya tota	Plum-headed parakeet	<i>Psitta acuticauda cyancephala</i>	Uncom	R/LM
113	Pycnonotidae	Kala Bulbul	Red-Vented Bulbul	<i>Pycnonotus cafer</i>	Com	R
114	Rallidae	Jal Bater	Brown Crake	<i>Porzana akool</i>	Com	R
115		Jal Murgi	Common Moorhen	<i>Gallinula chloropus</i>	Uncom	R
116		Jalmurgi	Common moorhen	<i>Gallinula chloropus</i>	Uncom	R
117		Aari	Eurasian coot	<i>Fulica atra</i>	Uncom	R
118		Dasari Arri	Eurosian Coot	<i>Fulica atra</i>	Uncom	M
119		Jamuni vanmurgi	Purple Swamphen	<i>Porphyrio poliocephalus</i>	Uncom	R
120		Jalmurgi	White-breasted	<i>Amaurornis</i>	Uncom	R

121	Recurvirostridae	Gajpaon	Waterhen Black-winged Stilt	<i>phoenicurus</i> <i>Himantopus</i> <i>himantopus</i>	Com	R
122	Rhipiduridae	Chakdil ;Nachhan	White-browed fantail	<i>Rhipidura aureola</i>	Ra	R/LM
123	Scolopacidae	Jalrank	Common sandpiper	<i>Aclitis hypoleucos</i>	Uncom	R
124		Timtima	Common Greenshank	<i>Tringa nebularia</i>	Com	R
125		Chhota butan	Common redshank	<i>Tringa totanus</i>	Uncom	R
126		Jalrank	Common sandpiper	<i>Actitis hypoleucos</i>	Com	R
127		Samudri Jalrank	Dunlin	<i>Calidris alpina</i>	Uncom	R/LM
128		Hara retal chaha	Green Sandpiper	<i>Tringa ochropus</i>	Uncom	R
129		Chhota panlovva	Little Stint	<i>Calidris minuta</i>	Uncom	LM
130		Chambhi chaha	Marsh Sandpiper	<i>Tringa stagnatilis</i>	Uncom	R
131		Chhupka	Wood sandpiper	<i>Tringa glareola</i>	Uncom	R
132	Sturnidae	Albakh myna	Asian peid starling	<i>Grarpila Contra</i>	Com	R
133		Brahming Myna	Brahming Starling	<i>Temenuchus</i> <i>pogodarum</i>	Uncom	R
134		Desi maiyna	Common myna	<i>Acriclotheres tristis</i>	Com	R
135		Myyna	Rosy Starling	<i>Sturnus rosesus</i>	Ra	M
136	Sylviidae	Podna	Blyth's Reed Warbler	<i>Acrocephalus</i> <i>dumetorum</i>	Uncom	R
137	Threskiornithidae	Kavari	Glossy Ibis	<i>Plegadis falcinellus</i>	Uncom	R
138		Kala bajhha	Indian black Ibis	<i>Pseudibis papillosa</i>	Uncom	R
139		Safed bajhha	White Ibis	<i>Threskiornis</i> <i>melanocephalus</i>	Uncom	R
140	Timaliidae	Chilchil	Common Babbler	<i>Turdoides caudata</i>	Uncom	R
141		Saatbhai	Jungle Babbler	<i>Turdoides striatus</i>	Com	R
142		Saatbhai	Large Babbler	<i>Turdoides</i> <i>malcolmii</i>	Com	R
143	Upupidae	Hudhud	Common Hoopoe	<i>Upupa epops</i>	Uncom	R



Fig.: 1 Birds eye view of Gidhwa Dam and Tank



Fig.: 2 Birds eye view of Parsada Dam and Tank



Fig.: 3 Northern pintail in Gidhwा Tank

Of these migratory birds, Gidhwā and Parsada wetlands has biomagnifications (deficiency of oxygen in water); property caused by access amount of aquatic flora and fauna. Introduction of bi-carbonates due to regular flow of agricultural activities, continuous uses of detergent cause Eutrofication.

Highest numbers of birds were observed during mid-month of October to Post January and lowest in post January to upcoming summer. Little Erget *Ergetta garzetta*, Great Erget *Ergetta alba*, Little Cormorant *Phalacrocorax nigrar*, Great Cormorant *Phalacrocorax carbo*, Black Crowed Night heron *Nycticorax nycticorax*, Lesser whistling duck *Dendroeygna javanica*, Cotton teal *Nettapus coromandelianus*, Purple Swamhen *Porphyrio poliocephalus*, Bronze Winged jacana *Metopidius indicus*, Red-Wattled Lawping *Venellus indicus*, Spotted dove *Streptopelia chinensis*, Laughing dove *Streptopelia Senegalensis*, Blue cheeked Bee eater *Merops persicus*, House sparrow *Passer domesticus*, Common myna *Arciclotheres tristis*, Asian peid starling *Grawpila Contra*, Black Drongo *Dicrurus macrocercus*, House Crow *Corvus splendens*, Eurasian Coot *Fulica atra*, Common Moorhen *Gallinula chloropus*, Little



Fig.: 4 Whistling duck in Parsada Tank

Grebe *Tachybaptus ruficollis*, Indian Pond Heron *Ardeola grayii*, Red-crested Pochard *Netta rufina*, etc were the most abundant resident, local movement and migrant birds species found in the Gidhwā and Parsada Wetlands.

V. DISCUSSION

Lower species richness of birds in this area is attributed due to habitat disturbance through multi utilization status of wetlands (6). As reported earlier from the Mavoor, Keralian paper authors, as the highest number of birds reported mid-month of October to Post January and there was reduction in population size and movement during month of April - June. Many factors, which threatened the Gidhwā and Parsada wetlands ecosystem and the bird population, were poaching of birds. Birds were hunted using fishing net recorded. Birds use wetlands as source of drinking water and for feeding, resting, nesting, shelter and social interaction (7). Pollution mainly from chemical is the major threats faced by birds in ecosystem, due to continuous uses of bi-carbonates, fertilizer and other substances in water body.

This area is one of the major feeding grounds of ducks, terns and other resident species. The local people use water that has leached out from this tank for agriculture, aquaculture, fishing activities and there by this polluted water would reach all the adjoining bird visiting areas. During Post January to upcoming summer season, climate and water status of wetlands also affects the population size of resident, local movement and migrant birds. Uncontrolled fishing depletes the food source of wetland birds and regular removal of water from water body causes opening of littoral zone of aquatic ecosystem, which results destruction of green food sources of any aquatic zone; affecting the food source for birds.

Habitat disturbance through many factors, which threatened the Gidhwa and Parsada wetlands ecosystem. Gidhwa and Parsada wetlands has biomagnifications, introduction of bi-carbonates due to regular flow of agricultural activities, continuous uses of detergent cause Eutrofication, Birds play vital role in pollination, dispersal of seeds, predatory on insects as scavenger, food chain balancing, and as bio-indicators of fresh & healthy ecology or environment. All the ponds are interconnected with enough food materials and specific habitat for migratory birds. With the coined reference of species diversity for promoting this place as ecotourism site, Important Birds Area (IBA), facilitation center for breeding of birds, these are some main theme, in which birds comes in healthy wetlands in and around the world. This paper calls for some basic information migratory, local migrants, resident and conservation of avian habitat from human-elementary generated interference on birds movements. The alternative source for increasing visiting birds per year through introducing of native floral species or provide them homely habitat. If floriculture will adapted upside the bund using suitable species then many birds species whose only feed insects will surely appear around the pond and also support food chain of terrestrial ecology.

VI. CONCLUSION

The study proved that, if the present ecological characteristics of this wetland continuous, the birds were unable to inhibit this habitat in the immediate future. Proper awareness class regarding the importance of birds and vital role in daily life to the local peoples through different massive programs will ultimately help the protection of birds of this region. Being this area is one the main habitat of wetland birds in polar zone of India, coastal region, and sub-continent coastal zone of Asia and it should be declared as a protected area.

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Our purpose to this research paper on “**The Water Birds of Gidhwa & Parsada Wetlands**” is to create general awareness about birds found in Bemetara district of Chhattisgarh State. Also the Gidhwa wetlands has suitable habitat for seasonal migrants and due to richness of avifauna species. With the sense of high resolve & reverence, the authors express thanks to our sincere & deep sense of gratitude to respected Mr. Ram Prakash (IFS), PCCF (Wildlife), Chhattisgarh. I also wish to express my grateful thanks to research scholars Mr. Ashutosh Pandey,

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AUTHORS

First Author – Devendra Sharma, Junior Research Fellow, State Forest Research & Training Institute, Raipur, Chhattisgarh, India; e-mail: devendrasharma111@gmail.com

Second Author – Anurag Vishwakarma, Junior Research Fellow, State Forest Research & Training Institute, Raipur, Chhattisgarh, India. E-mail: anurag.rose@gmail.com

Third Author – K.C. Yadav, Director, State Forest Research & Training Institute, Raipur, Chhattisgarh, India; e-mail: directorsftri@gmail.com

Correspondence Author – Devendra Sharma, Junior Research Fellow, State Forest Research & Training Institute, Raipur, Chhattisgarh, India; e-mail: devendrasharma111@gmail.com

Status of Terrestrial and Wetland Birds in Kawardha, Kabirdham District in Chhattisgarh, India

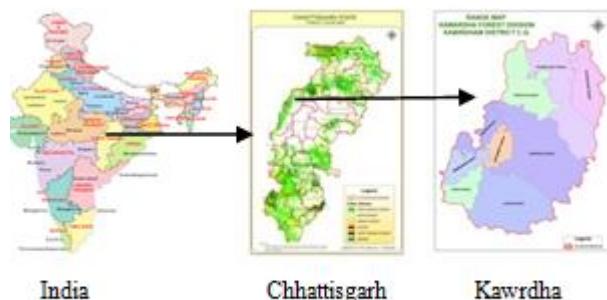
Anurag Vishwakarma^{*} Avinash Hemrom^{*}, K. C. Yadav^{**}

^{*}Junior Research Fellow, State Forest Research & Training Institute, Raipur, Chhattisgarh (India)
^{**} APCCF & Director, State Forest Research & Training Institute, Raipur, Chhattisgarh (India)

Abstract- Birds as best indicators of wetland function or as measures of success in wetland management, restoration and creation. This study was conducted during Jan to March 2014; totally 09 selected wetlands were surveyed in Kawardha, Kabirdham District of Chhattisgarh. Species diversity and dominance of birds were calculated. Totally 64 birds belonging to 36 families were recorded, out of these 64 species 35 water birds and 29 terrestrial bird species. Maximum diversity of birds was recorded in Sutiypath dam. Bird abundance and vegetation cover were recorded. The highest numbers of birds were recorded in Chhirbandha lake (21) followed by Sutiypath dam (19), Sarodha dam (15) and Lalpur Nursery (13). Three near threatened species, namely **Threatened Egyptian vulture**, **Indian Black Ibis** and **Oriental White Ibis** were recorded. In most of the wetlands *Ipomea carnea* (15.28 %) was the dominant species. This pond has abundant maximum occasionally birds and maximum number of birds. Sutiypath dam has good population of birds and this site could be protected for the birds.

Index Terms- Wetland • Water birds • Abundance • Conservation

district. The district is located between 21.32° to 22.28° north latitude and 80.48° to 81.48° east. The wetlands consist of *Ipomea carnea* biomass and some micro and macro fauna which support the migratory birds species. Ecologically it is an important wetland providing habitat to migratory and local bird species. Dense vegetation and pollution free environment in wetlands has attracted the large number of birds in winter season. The migratory birds like Gadwall, Pintail, Pochard, Shoveller & Herons etc. visit in winter season.



I. INTRODUCTION

Wetland birds provide us with some of nature's most wonderful sights, from vast flocks wheeling overhead to newly hatched chicks drying in the sun. Apart from their beauty and recreational and economic importance, these birds are excellent indicators of water quality and measures of biodiversity. Wetlands are extremely important areas throughout the world for wildlife protection, recreation, sediment control, flood prevention. Wetlands are important bird's habitats and birds use them for feeding, roosting, nesting and rearing their young. "Wetlands" have been defined as swamps and other damp areas of land but in common parlance the word is used interchangeably with "Lakes" which denotes a large body of water surrounded by land. However, internationally accepted term of wetlands describes them as "Area of Marsh, Fen, Peat land or water whether natural or artificial, permanent or temporary with water, that is static or flowing, fresh, brackish or salt including areas of marine water"

II. STUDY SITE

Kabirdham district is one of the 27 administrative districts of Chhattisgarh states in central India. The district was earlier known as Kawardha district. The district is known as Kawardha

III. MATERIAL AND METHODS

Bird watching and recording has been carried out for a period of one year January 2014 to March 2014 and observation were made with the aid of binocular. Identification was done with the help of field guides given by Ali and Ripley (1995), Ali Slim (1996) and Grimith and Inskip (1999). The study was carried out in eight wetland habitats namely Sing pond, Bhoramdev pond, Chhir pond, Sarodha dam, Sutiypath dam, Karranala dam and Lalpur Nursery. Regular surveys were done by systematically walking on fixed routes through the study area. Birds were mostly observed during the most active period of the day, i.e., from 6:00 to 9:00 hr and from 16:00 to 18:00 hr. However, observations were also made during other timings according to convenience. Observations were carried out with the aid of Canon camera with high zoom. Birds seen were recorded along with habitat type, season and frequency of occurrence. Identification of birds was done using field guides (Ali and Ripley, 1987; Grimmet et al., 1999) and only those species with confirmed identity are reported in this paper. For making the list of birds, photographs as well as visit reports and actually observed birds were used as evidence. According to the status birds were categorized as Resident (R), Seasonal Local Migrant (LM) and Winter Migrant (WM) (Ali Salim 2001).

Table: 1 Checklist birds recorded in Gidhwa and Parsada Wetlands with their residential movement status.

S. No.	Family	Name of birds	Scientific Name	Status	Abundance
1	Accipitridae	Black shouldered kite	<i>Elanus caeruleus</i>	R	O
2		Egyptian Vulture	<i>Neophron percnopterus</i>	R	UC
3	Alaudidae	Ashy crowned sparrow-Lark	<i>Eremopterix griseus</i>	R	A
4	Alcedinidae	Lesser pied kingfisher	<i>Ceryle rudis</i>	R	O
5		Small blue kingfisher	<i>Alcedo atthis</i>	R	O
6		White throated kingfisher	<i>Halcyon smyrnensis</i>	R	A
7	Anatidae	Brahmny selduck	<i>Tadorna ferruginea</i>	M	O
8		Common pochard	<i>Aythya ferina</i>	LM	UC
9		Cotton teal(M/F)	<i>Anas crecca</i>	R	O
10		Gadwall	<i>Anas strepera</i>	M	O
11		Garganey	<i>Anas querquedula</i>	M	O
12		Lesser whistling duck	<i>Dendrocygna javanica</i>	R	O
13		Northern Pintail	<i>Anas acuta</i>	M	O
14		Northern shoveller	<i>Anas clypeata</i>	M	O
15		Red crested pochard	<i>Netta rufina</i>	LM	O
16	Ardeidae	Greater egret	<i>Ergetta alba</i>	R	C
17		Indian pond heron	<i>Ardeola grayii</i>	R	C
18		little egret	<i>Egretta garzetta</i>	R	C
19		Yellow bittern	<i>Ixobrychus minutus</i>	R	C
20	Bucerotidae	Indian Grey hornbill	<i>Ocyceros birostris</i>	LM	UC
21	Capitonidae	Coppersmith Barbet	<i>Megalaima haemacephala</i>	R	UC
22	Chloropseidae	Blue-winged Leafbird	<i>Choloropsis cochinchinensis</i>	LM	UC
23	Charadriidae	Common ringed plover	<i>Charadrius hiaticula</i>	M	UC
24		Red wattaled lapwing	<i>Venellus indicus</i>	R	A
25	Ciconiidae	Aasian openbill stork	<i>Anastomus oscitans</i>	LM	O
26	Columbidae	Spotted dove	<i>Streptopelia chinensis</i>	R	C
27		Laughing dove	<i>Streptopelia senegalensis</i>	R	A
28	Corvidae	Rufous Treepie	<i>Dendrocitta vagabunda</i>	R	O
29	Coraciidae	Indian roller	<i>Coracias benghalensis</i>	R	A
30	Cuculidae	Greater coucal	<i>Centropus sinensis</i>	R	C
31	Diguridae	Black drongo	<i>Dicrurus macrocercus</i>	R	C
32	Estrildidae	Red Avadavat	<i>Amandava amandava</i>	R	O
33	Jacanidae	Bronzed wing jacana	<i>Metopidius indicus</i>	R	A
34	Laniidae	Brown shrike	<i>Lanius cristatus</i>	LM	A
35	Meropidae	Green bee eater	<i>Merops orientalis</i>	R	C
36	Monarchidae	Asian paradise flycatcher	<i>Terpsiphone paradisi</i>	R	UC
37	Motacillidae	Olive backed pipit	<i>Anthus hodgsoni</i>	R	O
38		White wagtail	<i>Motacilla alba</i>	M	O

39		Yellow wagtail	<i>Motacilla flava</i>	M	O
40	Muscicapidae	Asian Brown flycatcher	<i>Muscicapa dauurica</i>	R	O
41		Indian black robin	<i>Saxicoloides fulicola</i>	R	A
42		Oriental magpie robin	<i>Copsychus saularis</i>	LM	O
43	Nectariniidae	Purple sunbird	<i>Nectarinia asiatica</i>	R	A
44	Oriolidae	Black hooded Oriole	<i>Oriolus xanthornus</i>	R	O
45	Phalacrocoracidae	Little cormorant	<i>Phalacrocorax niger</i>	R	A
46	Picidae	Greater flameback	<i>Chrysocolaptes lucidus</i>	R	UC
47	Podicipedidae	Little grebe	<i>Tachybaptus ruficollis</i>	R	O
48		Great Crested Grebe	<i>Podiceps cristatus</i>	R	O
49	Psitteuidae	Plum headed parakeet	<i>Psittacula cyanocephala</i>	R	A
50	Pycnonotidae	Red vented bulbul	<i>Pycnonotus cafer</i>	R	O
51	Rallidae	Common moorhen	<i>Gallinula chloropus</i>	LM	O
52		Eurasian Coot	<i>Fulica atra</i>	LM	O
53	Recurvirostridae	Black winged stilt	<i>Himantopus himantopus</i>	R	O
54	Scolopacidae	Common redshank	<i>Tringa totanus</i>	LM	UC
55		Common sandpiper	<i>Aclitis hypoleucos</i>	R	O
56		Marsh sandpiper	<i>Tringa stagnatilis</i>	LM	O
57		Wood sandpiper	<i>Tringa glareola</i>	M	O
58	Sturnidae	Asian pied starling	<i>Graptops Contra</i>	R	A
59		Brahminy Myna	<i>Temenuchus pagodarum</i>	M	UC
60	Threskiornithidae	Glossy Ibis	<i>Plegadis falcinellus</i>	LM	UC
61		Indian black Ibis	<i>Pseudibis papillosa</i>	LM	UC
62		Oriental White Ibis	<i>Threskiornis melanocephalus</i>	LM	UC
63	Timaliidae	Jungla babbler	<i>Turdoides striatus</i>	R	A
64	Upupidae	Common hoopoe	<i>Upupa epops</i>	R	O

O - Occasionally

A – Abundance

UC – Uncommon

C - Common

IV. RESULTS AND DISCUSSION

A total of 64 species of wetland birds belonging to 36 families distributed have been recorded from the study area. Details such as common and scientific names, status and abundance of the wetland birds are presented in. Based on the frequency of sightings, Northern Shoveller (*Anas clypeata*), Northern Pintail (*Anas acuta*), White-Throated Kingfisher (*Halcyon smyrnensis*), Common Moorhen (*Gallinula chloropus*), Black-Winged Stilt (*Himantopus himantopus*), Red-Wattled Lapwing (*Vanellus indicus*), Cattle Egret (*Bubulcus ibis*) and Indian Pond-Heron (*Ardeola grayii*) were the common species inhabiting these ponds/ water bodies, while Purple Heron (*Ardea purpurea*) Asian Openbill Stork ,Lesser Pied Kingfisher (*Ceryle rudis*), Oriental white Ibis (*Threskiornis melanocephalus*), Indian Black Ibis (*Pseudibis papillosa*), Glossy Ibis (*Plegadis*

falcinellus) and Egyptian Vulture(*Neophron percnopterus*) were rarely sighted. These water birds were found to utilize different wetland habitats extensively for foraging, nesting and roosting on the emergent and fringed vegetation. Water birds, being generally at or near the top of most wetland food chains are highly susceptible to habitat disturbances and are therefore good indicators of general condition of aquatic habitats (Kushlan, 1992; Jayson and Mathew, 2002; Kler, 2002). The rich diversity of the wetland birds documented during the present study may be because of availability of varied sources of feed as well as foraging. The wetland birds are in general being heterogeneous in their feeding habits (Ali and Ripley, 1987). Thus wetland birds exploit a variety of habitats and depend upon a mosaic of microhabitats for their survival. Paddy fields with stray trees and scattered vegetation cover might have extended comfortable shelter and suitable foraging grounds for the wetland birds. The

number of occasionally birds found is more here because the climate condition, food and shelter are

suitable in those particular wetlands.

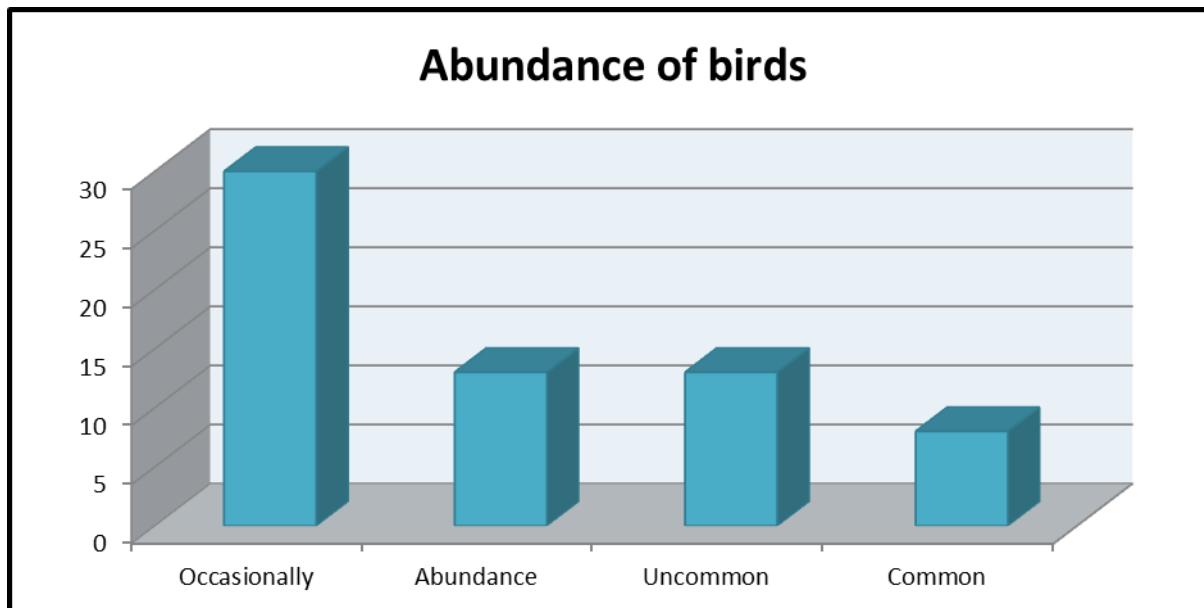


Figure: 1 showing the frequency of the bird in the study site

V. THREATS AND CONSERVATION

This heritage is today threatened by the increased human interference, direct and indirect, resulting in habitat destruction and fragmentation. In plate 1 I have added some of the Bird like Egyptian Vulture, White Ibis, Red Crested Pochard, Grey heron and Northern Pintail are the near threatened species which is needed to conserve so proper scientific methodology is required for upkeep of these birds. One of the most important part of these pond is that we have identified many migratory birds here because of (i) lack of human interference and non polluted water bodies and I have observe that their basic need i.e. food and shelter (ii) was in sufficient in there. Bird conservation can also highlight the diversity of different habitats. All birds cannot live in the same habitats, and understanding the needs and requirements of different species can lead us to have more compassionate tolerance for different peoples and cultures. Climate has an enormous influencing factor on where birds survive and reproduce. In the short term, weather can influence the timing of migration, territory establishment, breeding, and egg laying. Over the long term, species have adapted to seasonal weather trends. As global climate pattern change, many harbingers of spring are occurring earlier each year. We combined data from citizen-science projects with long-term data on weather to examine climate's role in the change we are seeing in the ranges of some bird species, as well as the timing and outcomes of breeding.

Water birds require (iii) a cluster of platforms within the water bodies in order to sit there for bask during the winters. There are no platforms available within the village ponds observed during the study. Hence the suitable measures should be taken, to ensure that artificial platforms should be made available within the ponds with thick cover of aquatic vegetation.

VI. CONCLUSION

The study proved that, if the present ecological characteristics of this wetland continuous, the birds were unable to inhibit this habitat in the immediate future. Proper awareness class regarding the importance of birds and vital role in daily life to the local peoples through different massive programs will ultimately help the protection of birds of this region. Being this area is one the main habitat of wetland birds in polar zone of India, coastal region, and sub-continent coastal zone of Asia and it should be declared as a protected area.

ACKNOWLEDGEMENT

Our endeavor to publish this paper is to create awareness to teach young ornithologists a little about birds found in Chhattisgarh State. We acknowledge our indebtedness in the writing of this paper. We are highly grateful to Shri Ram Prakash (PCCF Wildlife), Chhattisgarh Forest for his valuable cooperation to carry out the research work.

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Plate: 1



A. Northern Pintail



B. Red Crested Pochard



C. Egyptian Vulture



D. Grey Heron

Photography by
Anurag Vishwakarma



E. Oriental White Ibis

Photo By
Anurag Vishwakarma

Figure: 2 Some Resident, Local migratory and Migratory bird of Kawardha forest division Chhattisgarh.

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AUTHORS

First Author – Anurag Vishwakarma, Junior Research Fellow, State Forest Research & Training Institute, Raipur, Chhattisgarh, India; e-mail: anurag.rose@gmail.com

Second Author – Avinash Hemrom, Junior Research Fellow, State Forest Research & Training Institute, Raipur, Chhattisgarh, India. e-mail: avinashhemrom@gmail.com

Third Author – R. K. Patley, Technical Assistant, State Forest Research & Training Institute, Raipur, Chhattisgarh, India; e-mail: anurag.rose@gmail.com

Fourth Author – K.C. Yadav, Director, State Forest Research & Training Institute, Raipur, Chhattisgarh, India; e-mail: directorsftri@gmail.com

Correspondence Author – Anurag Vishwakarma, Junior Research Fellow, State Forest Research & Training Institute, Raipur, Chhattisgarh, India; e-mail: anurag.rose@gmail.com

Water Quality Assessment of Baba Ghat of Bihar River Rewa (M.P.) India

Dr. Nivedita Agrawal*, Paras Mani Choube** and Dr. Jai Prakash Pandey***

* Department of Chemistry, Govt. Girls PG College, Rewa (M.P.)

** Department of Chemistry, Govt. T. R. S. College, Rewa (M.P.)

***Department of Biotechnology, Govt. T. R. S. College, Rewa (M.P.)

Abstract- All life on earth depends on water. Fresh water is a critical, finite, vulnerable, renewable natural resource on the earth and plays as important role in our living environment without it life is impossible .In this paper we are analyzed to monthly variation and comparative physio- chemical study of Baba Ghat of Bihar river of Rewa city (M. P.) in March, April and May 2012. Monthly variation in physical and chemical parameters like Temperature, pH, total solids, total dissolved solids, total hardness , chlorides, calcium, magnesium, biological oxygen demand and chemical oxygen demand etc.

Index Terms- Baba ghat, Physico-chemical parameters, Variation.

I. INTRODUCTION

Water is essential for all socioeconomic development and for maintaining healthy ecosystems. Natural surface water bodies like rivers and streams are subjected to pollution comprising of organic and inorganic constituent. As pollution increases and development call for increase allocations of groundwater and surface water for the domestic agriculture and industrial sectors the pressure on water resources intensifies leading to tensions conflicts among user and excessive pressure on the environment. [1]

Water is most indispensable requirement for all living organisms and any alterations in water may lead to the issue of survival for these organisms. Good quality of water is essential for living organisms. The quality of water can be assessed by studying its physical and chemical characteristics as well as by plankton growing in it. Because of vast population and negligence of human being the quality of water is being deteriorated day by day. [2]

The present study was compared the physio-chemical parameters of water in Baba Ghat of Bihar river in rewra.

II. MATERIALS AND METHODS

The present study was carried out at Baba Ghat of river Bihar near Badi Pool in Rewa district (M.P.) India. The study was conducted between the months March to May 2012. For water collection acid cleaned plastics containers were utilized. Parameters like pH and temperature were detected at sampling sites while remaining parameters were analyzed immediately after reaching in laboratory. The procedure prescribed by APHA (1999) [3].

III. RESULTS AND DISCUSSION

Water like other components (air and soil) is equally important for sustenance of life and to maintain ecological progress of the bio-system. But relentless increases in the demand of water for multipurpose brought about by the two interdependent and parallel line of forces *i.e.* industrialization and urbanization, which in one hand usually reflects the all around development and progress but on the other hand posses strong concern about the fate of fresh water habitats. The requirement of water in all lives, from microorganisms to human beings, is increased day-by-day but it is a serious problem to provide a safe drinking water because all water resources have reached to a point of crisis due to unplanned urbanization and industrialization. [4]

The data on physio-chemical analysis of Baba Ghat have been given in table no. 1, 2 and 3.

Temperature:-

Temperature is one of the most important factors. The water temperature followed the change in solar radiation and ambient air temperature. The temperature of surface water during March, April and May are 22-25 °C, 25-30 °C and 35-40 °C respectively. Temperature has been considered as an important factor in aquatic environment. [5]

pH Values:-

pH is also an essential parameter of water quality which is governed by the carbon dioxide, bicarbonate equilibrium. The pH during March, April and May are 6.7, 7.3 and 8.2 respectively. High water values of pH during summer months may be due to utilization of bicarbonates and carbonates buffer system. [4]

Total Solid (TS):-

Total solid values during March, April and May are 620 mg/l, 635 mg/l and 710 mg/l respectively.

Dissolved solid (DS):-

Dissolved solid values during March, April and May are 525 mg/l, 570 mg/l and 620 mg/l respectively.

Total Suspended Solid (TSS):-

Suspended solid denote to impurities present in the water. According to tragedies all total suspended solid can be calculated by this relation.

Total hardness:-

It has specified the total hardness of water to be within 300 mg/l of CaCO₃. Total hardness values observed of Bihar River of ranges from 124 mg in March, and 115 in April and 105 in May. Calcium (Ca) and Magnesium (Mg) hardness are also calculated.

The ranges of Ca hardness are 76 mg/l in March, 70 mg/l in April and 60 mg/l in May. The ranges of Mg hardness are 48 mg/l in March, 40 mg/l in April and 30 mg/l in May.

Chloride:-

The Chloride is present in all natural waters; mostly at low concentrations. It is highly soluble in water and more freely desirable limit of chloride with water through soil and rock. In ground water the chloride content is mostly below 205 mg/l except in cases where inland salinity is content is mostly below 250 mg/l except in cases where inland salinity is prevalent in coastal areas. In water is 250mg/l except in cases where inland salinity is prevalent in coastal areas. In water in 250mg/l and maximum permissible in 1000mg/l as suggested by IBS and ISI, chlorides are important in detecting the contamination of ground water by waste, water. The value of Chloride obtained 30 mg/l in March and 35 mg/l in April and 40-45 in May. The presence of Chloride in higher amounts may be due to natural process such as passage of water through natural salt formation in the earth or it may be an indicator of pollution from domestic use.

Biological Oxygen Demand (BOD):-

The B.O.D. Value of Water Sample under present investigation varied between 3.0 mg/l to 3.8 mg/l and 4.1 mg/l during March, April and May. Significantly the value of B.O.D. exceeded the permissible limit (2.0mg/l) through the study which in due to the intense human activities. Regular addition of organic or organic matter ion the surface water might have offered intense bacterial growth which consequently resulted in increased BOD level. BOD indicates the amount of Oxygen required for stabilizing biological decomposable organic matter in waste under aerobic condition by micro organism. The reason of high content of BOD in summer months could be due to the fact that several microbes accelerated their metabolic activities with concentrated amount of organic matter discharged due to human activities, and hence required more amount of oxygen. [6]

Chemical Oxygen Demand (COD):-

The COD values of studied water sample were found in the range 15 mg/l, 20 mg/l and 30 mg/l during March, April and May respectively. Chemical oxygen is measure of Oxygen demand consumed for oxidation of Oxidizable organic matter present in water sample by strong oxidising agent, thus it is an indicator of pollution strength of water. The sources of COD in Baba Ghat may be due to input of domestic drains and the use of soap and detergents for washing and bathing by common man, as suggested by Mathur *et al.* 2008. [7]

Table 1- Physico-chemical analysis of surface water Quality Assessment of Bihar River in March

S. No.	Parameters	Values
1	Temperature	22-25 $^{\circ}$ C
2	pH	7.8
3	T. S. (mg/l)	620
4	D. S. (mg/l)	525
5	T. S. S. (mg/l)	95
6	Total hardness(mg/l)	124
7	Calcium hardness (mg/l)	76
8	Magnesium hardness (mg/l)	48

9	Chlorides hardness (mg/l)	30
10	C. O. D. (mg/l)	15
11	B. O. D. (mg/l)	3.0

Table 2- Physico-chemical analysis of surface water Quality Assessment of Bihar River in April

S. No.	Parameters	Values
1	Temperature	25-30 $^{\circ}$ C
2	pH	8.2
3	T. S. (mg/l)	635
4	D. S. (mg/l)	570
5	T. S. S. (mg/l)	65
6	Total hardness(mg/l)	115
7	Calcium hardness (mg/l)	70
8	Magnesium hardness (mg/l)	40
9	Chlorides hardness (mg/l)	35
10	C. O. D. (mg/l)	20
11	B. O. D. (mg/l)	3.8

Table 2- Physico-chemical analysis of surface water Quality Assessment of Bihar River in May

S. No.	Parameters	Values
1	Temperature	35-40 $^{\circ}$ C
2	pH	9.2
3	T. S. (mg/l)	710
4	D. S. (mg/l)	620
5	T. S. S. (mg/l)	90
6	Total hardness(mg/l)	105
7	Calcium hardness (mg/l)	60
8	Magnesium hardness (mg/l)	30
9	Chlorides hardness (mg/l)	40-45
10	C. O. D. (mg/l)	30
11	B. O. D. (mg/l)	4.1

IV. CONCLUSION

This study provides an informative data and helps to understand water characteristics and indicate that the water of Bihar River can serve as a good habitat. The pH value indicates the alkaline water of in the month of May might be due to high temperature that indicates the solubility of CO₂. The analysis of the quality parameters of water from Baba Ghat of Bihar River shows that pH, alkalinity, chloride ion, total hardness, BOD and COD etc. are well within the permissible limit.

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AUTHORS

First Author – Dr. Nivedita Agrawal, PhD., Department of Chemistry, Govt. Girls P. G. College, Rewa-
dr_nivedita2005@rediffmail.com

Second Author – Paras Mani Choubey, MPhil, Department of Chemistry, Govt. T. R. S. College, Rewa –
paraschb950@gmail.com

Third Author- Dr. Jai Prakash Pandey, PhD, Department of Biotechnology, Govt. T. R. S. College, Rewa –
bttrsrewa@gmail.com

Correspondence Author – Dr. Nivedita Agrawal, email
dr_nivedita2005@rediffmail.com , +919098448300

Application of Fuzzy Logic in Operation Management Research

Preeti Kaushik

Assistant Professor, Inderprastha Engineering College, Ghaziabad (U.P)

Abstract- Decision making is an important aspect of any business entity. In this paper, a new linguistic methodology is suggested in order to express the results obtained by analyzing the situations in a way that can be easily understood by non-experts users through fuzzy logic. The paper will further explain the relationship between variable through the application of fuzzy Logic. The model will be useful to understand better the system as compared to statistical results. It will also allow us to confront both kind of results considering that statistical analysis that are more discriminatory while fuzzy models show a broader vision. The model will let us understand the input variables behavior according to variations in output variables, therefore strategic planning possibilities are increased as no implementation is required. The use of decision support systems (DSS) is increasing and becoming generalized and it actually is the evolution of business computing networking and client/server architectures are impelling utilization of shared information in a decision support context. In addition, an expert system is presented with the information that will act as simulator of output results according to different input conditions controlled by the user

Index Terms- Business Environment, Business Decision, Fuzzy Logic, Fuzzy Rules Based System, Linguistic Modeling, shared information, Operation Management.

I. INTRODUCTION

Nowadays, firm managers are becoming aware of the need for information analysis tools in order to support business decisions in the current complex and turbulent business environment. Competition in changing environments due to fast progression of technical advances turns competition on information into the main competitive parameter in order to prevent and anticipate changes in customer needs, technology, industry trends and other competition parameters.

In this context, the use of new DSS techniques has been scarcely applied in the field of operations management. In fact, even though management information systems literature has broadly dealt with tools to assist in managerial decisions, the wide utility these systems generate for specific Operations Management (OM) decisions is not still generalized.

The decision is required to be taken for different areas and in this paper decision making for selection of product portfolio. Companies must take proper decision to allocate a limited set of resources to projects to balance risk, reward, and in alignment with its strategies. The management has to take decision keeping in view the resources available and it has been extremely

complex in case of selection of optimum product portfolio mix for the company. The complexity, uncertainty and imprecision associated with new product portfolio selection result due to following reasons:

1. At the time of decision, only uncertain and incomplete information is usually available.
2. The competitive environment is marked by uncertainty and rapid changes in technologies and markets.
3. The criteria for new product portfolio selection are not always quantifiable or comparable; and they may directly conflict or interact with one another.
4. The number of feasible portfolios is often enormous.

Fuzzy logic allows uncertain and imprecise systems of the real world to be captured through the use of linguistic terms so that computers can emulate the human thought processes. Thus, fuzzy logic is a very powerful tool in dealing. The decisions involving complex, ambiguous and vague phenomena that can only be assessed by linguistic values rather than numerical terms. Furthermore, such fuzzy logic has been applied to the evaluation of multi-criteria decision problems. To compensate the ineffective use of traditional quantitative techniques, a method for new product portfolio decision using fuzzy logic is proposed. The criteria ratings and the corresponding importance weights are assessed in linguistic terms, which are described by fuzzy numbers with triangular membership function, and fuzzy weighted average is employed to aggregate these fuzzy numbers into fuzzy value index (FVI), fuzzy risk index (FRI) and fuzzy strategy fitting index (FSFI). Furthermore, under balancing between product value, project risk and business strategies, the FVI, FRI and FSFI are consolidated into a fuzzy project attractive index (FPAI). Finally, the FPAI is ranked for new product selection decision. The fuzzy logic new product portfolio selection model [FLNPPSM] can efficiently aid managers dealing with ambiguity and complexity in achieving relatively realistic and informative results in the evaluation process.

II. FUZZY RULE BASED

Fuzzy rule based is developed to relate the input variables to the output variables by if-then rules. Fuzzy rules consist of two parts: an antecedent part stating condition on the input variables, and a consequent part describing the related value of the output variables. A single fuzzy if-then rule assumes as follow:

If x is A then y is B (3)

Where A and B, are linguistic values defined by fuzzy set on the ranges (universes of discourse) X and Y, respectively. The if-part of the rule "x is A" is antecedent or premise, while the then-part of the rule "y is B" is consequent or conclusion. An example such a rule might be If service is good then price of food is average

In this rule, service and price are two fuzzy variables. The fuzzy values in this rule are good and average descriptions. These values are defined on universes of discourse and determine the degree of element x which belongs to the membership functions. In general, the input to an if-then rule is the current value for the input variable (in this case, service) and the output is an entire fuzzy set (in this case, average).

III. METHOD AND ALGORITHM

The framework of fuzzy logic new product portfolio selection model is composed of three main stages. The first stage is the new-product pre-screening. In this stage, on the basis of business strategy and new product strategy, the managers will set up a set of critical characteristics for the new product must meet to determine a new product is pass or kill. The second stage is the individual new product scoring. In this stage, due to the change in business environment, managerial goals and company's competency, the managers develop a set of criteria that new product should meet to rate the attractiveness of a new product. The third stage prioritizes projects and allocates resources into projects for portfolio selection. A stepwise description is given below:

1. Form a committee of decision-makers and collect the project related data.
2. Select a criteria for scoring project's value, strategy fitting and development risk.
3. Define linguistic variables as well as associated membership functions for measuring the project's value, strategy fitting and development risk.
4. Assess the criteria using linguistic terms and translate them into fuzzy numbers.
5. Aggregate fuzzy numbers to obtain FSFI, FVI and FRI of a new product development project.
6. Alignment of portfolio strategies.
7. Resource allocation and project selection

The fuzzy logic new product portfolio selection model [FLNPPSM] can efficiently aid managers dealing with ambiguity and complexity in achieving relatively realistic and informative results in the evaluation process.

IV. APPLICATION OF FLNPPSM

Select criteria for scoring project's strategy fitting, value and risk. The next step in the product selection process was to decide the criteria to evaluate the proposed products. A new product selection decision depends not only on the value of the product but also on strategy fitting and development risk. Based

Table 1: Characteristics of high-performance new product arenas:

Major criteria	Sub criteria	Element criteria
Strategy fit (A)	Business strategy fit (A ₁)	Degree of fitting the strategy for the product line and/or business (A ₁₁)
		Synergy with other product/business within company (A ₁₂)
	Strategic leverage (A ₂)	Proprietary position (A ₂₁)
		Platform for growth (A ₂₂)
New product value (B)	Competitive Marketing advantages (B ₁)	Matches desired entry timing needed by target segments (B ₁₁)
		Has unique or special functions to meet and/or special features to attract target segments (B ₁₂)
		Conforms to our sales force, channels of distribution and logistical strengths (B ₁₃)
	Market attractiveness (B ₂)	Size of the markets (B ₂₁)
		Long-term potential of markets (B ₂₂)
		Growth rates of markets (B ₂₃)
	Technological suitability (B ₃)	Allows the company to use very best suppliers (B ₃₁)
		Degree of fitting R&D skills/resources (B ₃₂)
		Degree of fitting engineering/design skills/resources (B ₃₃)

	Potential for gaining product advantage (B_4)	Magnitude of effect for customers (B_{41}) New products will meet customer needs (B_{42}) New product differentiated from competitive products (B_{43})
New product development risk (C)	Organizational Risk (C_1)	Lack of resource commitment (C_{11}) Lack of implementation capability (C_{12}) Organizational and/or financial impact (C_{13})
		Technical uncertainty risk (C_2)
		Technical gap (C_{21}) Program complexity (C_{22}) The Project time frame (C_{23})
	Competitive risk (C_3)	Market competitiveness (C_{31})

Solutions of fully fuzzy linear system by ranking function

Definition: The $n \times n$ linear system

$$(a_{11} \otimes x_1) \oplus (a_{12} \otimes x_2) \oplus \dots \oplus (a_{1n} \otimes x_n) = b_1 \\ (a_{21} \otimes x_1) \oplus (a_{22} \otimes x_2) \oplus \dots \oplus (a_{2n} \otimes x_n) = b_2 \\ \vdots \\ (a_{n1} \otimes x_1) \oplus (a_{n2} \otimes x_2) \oplus \dots \oplus (a_{nn} \otimes x_n) = b_n$$

or in its matrix form,
 $A \otimes x = b$,

is called a fully fuzzy linear system of equations (FFLSE) where the coefficient matrix $A = [a_{ij}]^n_{i,j=1}$ is a fuzzy matrix and $b = [b_1, \dots, b_n]^T$ is a fuzzy number vector and the fuzzy number vector x is the unknown to be found.

Proposition Suppose that the matrices B and $M = \begin{bmatrix} A^+ & A^- \\ C^- & C^+ \end{bmatrix}$ are invertible,

and $(x_1, \dots, x_n)^T$ given by $X_j = (x_j, y_j, z_j)$, $j = 1, \dots, n$, be the solution of equation

Then this solution is a nonnegative fuzzy exact solution of (3.4) if it satisfies $0 < x_i < y_i < z_i$, $i = 1, \dots, n$.
 $\{A^+x + A^-z, By, C^-x + C^+z\} = b = (d_1, d_2, d_3)$.

Numerical example

Consider the following system:

$$\begin{cases} (1, 2, 5) \otimes (x_1, y_1, z_1) \oplus (3, 4, 4) \otimes (x_2, y_2, z_2) & \oplus(0, 1, 2) \otimes (x_3, y_3, z_3) \\ (2, 3, 5) \otimes (x_1, y_1, z_1) \oplus (0, 1, 11) \otimes (x_2, y_2, z_2) & = (19, 68, 115) \\ (2, 5, 7) \otimes (x_1, y_1, z_1) \oplus (4, 6, 6) \otimes (x_2, y_2, z_2) & \oplus(4, 5, 6) \otimes (x_3, y_3, z_3) \\ & = (30, 77, 261) \\ & \oplus(5, 7, 10) \otimes (x_3, y_3, z_3) \\ & = (61, 167, 253) \end{cases}$$

So we must solve two following systems

$$\begin{pmatrix} 1 & 3 & 0 & 0 & 0 & 0 & x_1 \\ 2 & 0 & 4 & 0 & 0 & 0 & x_2 \\ 2 & 4 & 5 & 0 & 0 & 0 & x_3 \\ 0 & 0 & 0 & 5 & 4 & 2 & z_1 \\ 0 & 0 & 0 & 5 & 11 & 6 & z_2 \end{pmatrix} \begin{pmatrix} = \\ = \\ = \\ = \\ = \end{pmatrix} \begin{pmatrix} 19 \\ 30 \\ 61 \\ 115 \\ 261 \end{pmatrix}$$

0 0 0 7 6 10 z3 = 253

$$\begin{bmatrix} 2 & 4 & 1 \\ 3 & 1 & 5 \\ 5 & 6 & 7 \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix} = \begin{bmatrix} 68 \\ 77 \\ 167 \end{bmatrix}$$

Using theorem to solve fuzzy linear system:

$$\begin{bmatrix} x_1 & y_1 & z_1 \\ x_2 & y_2 & z_2 \\ x_3 & y_3 & z_3 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 7 \\ 6 & 12 & 14 \\ 7 & 10 & 12 \end{bmatrix}$$

Linguistic variables as well as associated membership functions for measuring the project's strategy fitting, value and risk are defined. Finally, the rating scale $R = \{\text{Worst [W]}, \text{Very Poor [VP]}, \text{Poor [P]}, \text{Fair [F]}, \text{Good [G]}, \text{Very Good [VG]}, \text{Excellent [E]}\}$ was chosen for evaluating the rating effect of the different criteria of the project's strategy fitting and value; the rating scale $R' = \{\text{Extremely High [EH]}, \text{Very High [VH]}, \text{High [H]}, \text{Fairly High [FH]}, \text{Medium [M]}, \text{Fairly Low [FL]}, \text{Low [L]}\}$ was used for estimating the possibility of project development risk; the weighting scale $W = \{\text{Very Low [VL]}, \text{Low [L]}, \text{Fairly Low [FL]}, \text{Fairly High [FH]}, \text{High [H]}, \text{Very High [VH]}\}$ were used for evaluating the relative importance of the various criteria. All scales and their associated membership functions are listed in

Table 2: Linguistic variables and the corresponding fuzzy numbers

Performance rate		Risk possibility		Importance weight	
Linguistic variables	Fuzzy number	Linguistic variables	Fuzzy number	Linguistic variables	Fuzzy number
Worst (W)	(0, 0, 0.2)	Low (L)	(0, 0, 0.2)	Very Low (VL)	(0, 0, 0.2)
Very poor (VP)	(0, 0.2, 0.4)	Fairly Low (FL)	(0, 0.2, 0.4)	Low (L)	(0, 0.2, 0.4)
Poor (P)	0.2, 0.35, 0.5	Medium (M)	0.2, 0.35, 0.5	Fairly Low (FL)	0.2, 0.35, 0.5
Fairly (F)	(0.3, 0.5, 0.7)	Fairly High (FH)	(0.3, 0.5, 0.7)	Fairly (F)	(0.3, 0.5, 0.7)
Good (G)	(0.5, 0.65, 0.8)	High (H)	(0.5, 0.65, 0.8)	Fairly High (FH)	(0.5, 0.65, 0.8)
Very Good (VG)	(0.6, 0.8, 1.0)	Very High (VH)	(0.6, 0.8, 1.0)	High (H)	(0.6, 0.8, 1.0)
Excellent (E)	(0.8, 1.0, 1.0)	Extremely High (EH)	(0.8, 1.0, 1.0)	Very High (VH)	(0.8, 1.0, 1.0)

Assess the criteria using linguistic terms and translate them into fuzzy numbers: Once the linguistic variables and associated membership functions for evaluating are defined, the experts use the linguistic terms to directly assess the rating which characterizes the degree of the effect/impact of various factors on the attractiveness of the new product development project as in Table 3. Furthermore, On the basis of Table 2, fuzzy numbers parameterized by quadruples, Table 4 is the linguistic terms approximated by the fuzzy numbers of new product P1 assessed by senior manager of marketing.

Aggregate fuzzy numbers to obtain fuzzy value index (FVI), fuzzy risk index (FRI) and fuzzy strategy fitting index (FSFI) of the new product development project. According to the fuzzy weighted-average definition, the FVI, FRI and FSFI can be obtained by a standard fuzzy operation.

Applying the same processes, the new project P₁ was assessed by the other four seniors managers. Finally, mean operation is used for integrating the FVIs, FRIs and FSFIs under the same project assessed by different senior managers. Furthermore, the senior managers assess the other eight new product projects.

Table 3: Linguistic assessment of new product P₁ given by the senior manager of marketing

Sub criteria	Element criteria	Fuzzy rating	Fuzzy weight of sub criteria	Fuzzy weight of sub criteria
A ₁	A ₁₁	VG	H	H
	A ₁₂	E		VH
A ₂	A ₂₁	G	VH	H
	A ₂₂	VG		VH
B ₁	B ₁₁	G	H	VH
	B ₁₂	VG		FH
	B ₁₃	E		H
B ₂	B ₂₁	VG	VH	VH
	B ₂₂	G		VH
	B ₂₃	G		H
B ₃	B ₃₁	E	FH	FH
	B ₃₂	VG		H
	B ₃₃	VG		H
B ₄	B ₄₁	G	H	H
	B ₄₂	VG		VH
	B ₄₃	G		H
C ₁	C ₁₁	H	H	FH
	C ₁₂	VH		VH
	C ₁₃	FL		F
C ₂	C ₂₁	VH	VH	VH
	C ₂₂	H		H
	C ₂₃	EH		VH
C ₃	C ₃₁	VH	H	H
	C ₃₂	H		FH

Alignment of portfolio strategies: To keep a balance between project's strategy fitting, value and development risk, under the consideration of business environments, company's business strategy and marketing direction, the steering committee of company sets a directive of the weights of project's strategy fitting, value and development risk as "Very High", "High" and "High", respectively.

Table 4: Linguistic terms approximated by fuzzy numbers of new product P₁ given by a senior manager of marketing

Sub criteria	Element criteria	Fuzzy rating	Fuzzy weight of sub criteria	Fuzzy weight of sub criteria
A ₁	A ₁₁	(0.6,0.8,1.0)	(0.6,0.8,1.0)	(0.6,0.8,1.0)
	A ₁₂	(0.8,1.0,1.0)		(0.8,1.0,1.0)
A ₂	A ₂₁	(0.5,0.65,0.8)	(0.8,1.0,1.0)	(0.6,0.8,1.0)
	A ₂₂	(0.6,0.8,1.0)		(0.8,1.0,1.0)
B ₁	B ₁₁	(0.5,0.65,0.8)	(0.6,0.8,1.0)	(0.8,1.0,1.0)
	B ₁₂	(0.6,0.8,1.0)		(0.5,0.65,0.8)
	B ₁₃	(0.8,1.0,1.0)		(0.6,0.8,1.0)
B ₂	B ₂₁	(0.6,0.8,1.0)	(0.8,1.0,1.0)	(0.8,1.0,1.0)
	B ₂₂	(0.5,0.65,0.8)		(0.8,1.0,1.0)
	B ₂₃	(0.5,0.65,0.8)		(0.6,0.8,1.0)
B ₃	B ₃₁	(0.8,1.0,1.0)	(0.5,0.65,0.8)	(0.5,0.65,0.8)
	B ₃₂	(0.6,0.8,1.0)		(0.6,0.8,1.0)
	B ₃₃	(0.6,0.8,1.0)		(0.6,0.8,1.0)

B ₄	B41	(0.5,0.65,0.8)	(0.6,0.8,1.0)	(0.6,0.8,1.0)
	B42	(0.6,0.8,1.0)		(0.8,1.0,1.0)
	B43	(0.5,0.65,0.8)		(0.6,0.8,1.0)
C1	C11	(0.5,0.65,0.8)	(0.6,0.8,1.0)	(0.5,0.65,0.8)
	C12	(0.6,0.8,1.0)		(0.8,1.0,1.0)
	C13	(0.3,0.5,0.7)		(0.3,0.5,0.7)
C2	C21	(0.6,0.8,1.0)	(0.8,1.0,1.0)	(0.8,1.0,1.0)
	C22	(0.5,0.65,0.8)		(0.6,0.8,1.0)
	C23	(0.8,1.0,1.0)		(0.8,1.0,1.0)
C3	C31)	(0.6,0.8,1.0)	(0.6,0.8,1.0)	(0.6,0.8,1.0)
	C32	(0.5,0.65,0.8)		(0.5,0.65,0.8)

Applying the fuzzy mean and spread method, the mean and variance of each project are calculated. The results are shown in Table 5.

Table 5: The FPAIs of the nine new product projects and their ranking

Product	Cost estimate \$ Million	Fuzzy project attractive index (FPAI)	$\mu(M)$	$\sigma(M)$	Ranking
P1	85	(0.38, 0.63, 0.83)	0.618	0.0051	8
P2	90	(0.44, 0.69, 0.88)	0.675	0.0049	1
P3	93	(0.39, 0.64, 0.85)	0.63	0.0053	5
P4	84	(0.40, 0.64, 0.84)	0.63	0.0049	4
P ₅	105	(0.38, 0.63, 0.84)	0.62	0.0053	7
P6	98	(0.43, 0.69, 0.87)	0.67	0.0049	2
P7	86	(0.41, 0.66, 0.86)	0.645	0.0051	3
P8	83	(0.39, 0.62, 0.83)	0.615	0.0048	9
P9	97	(0.44, 0.62, 0.83)	0.628	0.0038	6

V. CONCLUSIONS

This research has highlighted the decision support system for selection of new product portfolio. Because of complexity, incomplete information and ambiguity in the portfolio selection context, a fuzzy logic-based portfolio selection model, which applies linguistic approximation and fuzzy arithmetic operation, has been developed to address the new product portfolio selection. The method incorporates the multiplicity in meaning and ambiguity of factor measurement while considering important interactions among decision levels and criteria. The company and managers involved in the case study illustrated in this study were generally pleased with the approach.

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AUTHORS

First Author – Preeti Kaushik, Assistant Professor, Inderprastha Engineering College, Ghaziabad (U.P), Email: preeti.kaushik@ipec.org.in , Mobile No.: 9717663165

Role of Human Resource Management Strategy in Organizational Performance in Kenya

Gerrard Charles Mutembei¹, Ondabu Ibrahim Tirimba²

* PHD in Human Resource Management candidate, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya
** PHD Finance candidate, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya

Abstract- Organizations today have increasingly become aware of the importance of strategic Human Resource Management (SHRM). This awareness in a system is a critical dimension in the performance of organizations. Most organizations today are undergoing some structural, operational, and business strategic changes with the aim of improving their performance. The organization's competitive strategy may include mergers and acquisitions, downsizing to increase efficiency, internal operations, or the acquisition of automated production technology. These strategic decisions determine the demand for skills and human resource. Incompetent and unbalanced: resourcing, training, development, reward, and appraisal methods have led to poor performance. The seminar sought to establish what other researchers have done in the field of human resource and performance of organization.

Index Terms- Absenteeism, Commitment, Expectation, Job satisfaction

levels and Extensive sharing of financial and performance information throughout the organization.

This seminar paper will evaluate and critique researches on human resource management and their effect on performance of public service in Kenya. Since the inauguration of the new constitution, there has been various policy review in the public and recently most public service servants have been on strike starting with the teachers, nurses just to name a few. Under the devolved county government, some services were devolved like the ministry of health and we have seen challenges in meeting the human resource needs at the county level which has adversely affected the performance of the county government, hence the seminar will address the issue of Human Resource Management and performance of County government under devolved County governments in Kenya. Therefore, this study aims to gain insight into the relationship between HRM and the quality of public service, to support public organizations to improve their performance by means of better HRM policies.

I. INTRODUCTION

Nowadays, in the HRM literature there is growing interest for the contribution of HRM to the organizational performance. However, the focus then is often on the performance of private sector organizations. During the last decade public sector performance has become more and more an issue. Several innovations in the field are aimed to increase the quality of public service and to reduce costs at the same time. However, the existing research about the contribution of Human Resource Management (HRM) to support these developments has been scarce.

Over the years, researchers have suggested many HRM practices that have the potential to improve and sustain organizational performance. These practices include emphasis on employee selection based on fit with the company's culture, emphasis on behavior, attitude, and necessary technical skills required by the job, compensation contingent on performance, and employee empowerment to foster team work, among others. Pfeffer, (1998) has proposed seven HRM practices that are expected to enhance organizational performance. The practices proposed by Pfeffer (1998) are: Employment security; Selective hiring of new personnel; Self-managed teams and decentralization of decision making as the basic principles of organizational design; Comparatively high compensation contingent on organizational performance; Extensive training; Reduced status distinctions and barriers, including dress, language, office arrangements, and wage differences across

II. CONTENT ANALYSIS

1.1 Prior Studies on Human Resource Management

Ferris et al., (1990) made one of the first major attempts to examine how effective management of human resources might contribute to positive organizational performance. In their study of 2,236 firms from the U.S. construction industry, the Ferris group addressed the roles played by three important organizational functions and activities on firm performance: the status and importance of the HRM function, the role of unions and strategic planning. They found that firms that had HRM departments were generally high performers (i.e., larger total sales volume), firms that had a higher percentage of their workforce unionized also performed better than firms with a lower percentage and, finally, firms performed better when they engaged in more formalized strategic planning.

Past researchers such as Noe et al., (2000) contended that human resource management (HRM) is known as the central business concern, that shapes the behavior, attitudes, and performance of the employees, hence, HR practices are important tools for organizational performance. Hom and Griffeth, (1995) posited that when employees are not committed to their firms, this would lead to reduction in productivity, poor service quality provided, lost business opportunities, and subsequently increased administrative burden to the companies.

In a comparative study of strategic HRM practices among American-owned, Taiwan-owned and Japanese-owned firms,

Huang (1998) examines the strategic level of HRM at 315 Taiwanese business firms. Using the General Linear Model (GLM) and Scheffe multi-range test as methods of statistical analysis, the findings indicate that American owned businesses were discovered to engage in strategic human resource management (SHRM) more frequently than Japanese- or Taiwan-owned enterprises. A positive relationship was also found between the amount of capital resources available to firms and the extent to which they practiced SHRM. Huang also reported that firms engaging in SHRM received a higher rating than other firms on the indices of organizational morale, financial performance, and overall performance.

Som (2008) sampled 69 Indian companies with a view to examining the impact of innovative SHRM practices on firm performance. Using descriptive statistics and regression analysis, results indicate innovative recruitment and compensation practices have a positive significant relationship with firm performance. Their results also show that recruitment, role of the HR department and compensation practices seem to be significantly changing within the Indian firms in the context of Indian economic liberalization. The synergy between innovative HRM practices was not found to be significant in enhancing performance during the liberalization process.

Okpara and Pamela (2008) examined the extent to which organizations in Nigeria use various HRM practice and the perceived challenges and prospects of these practices. Data was collected from 253 managers in 12 selected companies in 10 cities. Their findings reveal that HRM practices, such as training, recruitment, compensation, performance Appraisal and reward systems are still in place and those issues of tribalism, AIDS, training and development and corruption are some of the challenges facing HRM in Nigeria

1.2 Training and Development

Past researchers have found evidence on the impact of training on productivity and where employees and employers were able to share the benefits from training. Lynch and Black (1995) whose research focused on the generality of training to organizational performance revealed that only off-the job (general) training improves on the performance whereas on the job training does not. This is further concurred by Barrett and O'Connell (2001) that general training has positive impact on firm performance whereas firm-specific training does not.

On the other hand, Nankervis, Compton and McCarthy (1999) were of the opinion that effective training would not only equip employee with most of the knowledge and skills needed to accomplish jobs, it would also help to achieve overall organization objectives by contributing to the satisfaction and productivity of employee. Past researchers such as Drummond (2000) revealed that training provides adequate criteria to an individual to perform better in a given task and subsequently contributes to the firm performance (Rothwell, Sullivan & McLean, 1995). However, Drucker (1999) commented that Training is an expensive way of attempting to enhance human productivity.

1.3 Staff Reward

Reward system provides financial reward, promotion and other recognition, in order to motivate employees to take risk, develop successful new products and generate newer ideas (Guptal and Singhal, 1993). Reward system encourages employee to become motivated, thereby increase their participation in contributing innovation ideas, which leading to high organizational innovation. Moreover, it is argued that in order to bring lasting and better results and to significantly contribute to the success of their organization, employees must be motivated, committed, and satisfied (Paul and Anantharaman, 2003; Paauwe, 2004). Additionally, it is accepted that unless the organization is able to retain its employees, it will not be able to capitalize on the human assets developed within the organization. Thus, employee retention and employee presence may have a positive impact on organizational effectiveness (Boselie, Paauwe, & Jansen, 2001).

Firms can affect the motivation of employees in several ways. They can use performance-based compensation to provide rewards to employees for achieving the specific goals and objectives of the firm. A substantial body of work has provided evidence that incentive-based compensation has an impact on firm performance (Milkovich and Boudreau, 1998). According to Wang (2005), innovative firms treat HRM practices as the organization's strategy to encourage team responsibilities, enhance organizational culture, and build up customer relationships through participation and empowerment. In turn, it will help to create and market new products and services (Gupta & Singhal, 1993).

Employees compare their rewards with the rewards of relevant others (Bloom & Michel, 2002). Unequal reward may cause competitive and undesired behavior. Equal and fair treatment will consequently remove an important cause of envy and competition among co-workers. So when the practices are better aligned, co-workers will be more inclined to cooperate than when practices are not well aligned.

1.4 Staff Appraisal

Comprehensive performance appraisal system forms the basic yardstick for assessing an individual's performance, highlight potential for future career advancement, most importantly to improve the performance (Mullins, 2002). Lecky (1999) defined performance appraisal system as a benchmark which is set against a specific task or performance. It requires the input and output such as remuneration, pay rise, level of expectation, promotion and managerial planning. In addition, it is a merit rating which should be beneficial to both parties and must be constantly reviewed to suit the requirement.

Dave and Wayne (2005) argued that performance appraisal is an instrument whereby an individual was retaliated by the assessment due to certain personal dissatisfaction, and it has adversely affected future performance. Nonetheless, study by Hassan (2007) has discovered that in Malaysia, the focus on employee development has yet to be the centre stage in organizations.

1.5 Organization Innovation

Organizational innovation has been widely defined as the creation of new idea and new behavior to the organization

(Damanpour & Gopalakrishnan, 2001). The dimensions of organizational innovation are extremely complex and multiple; it can be reviewed from two aspects: (1) breadth of innovation, which includes policies, system, administrative, processes, products, services, and others; (2) depth of innovation, which includes the importance, the degree of influence, effect on long term profitability, and others (Chuang, 2005). Fundamentally, there are two distinctive types of organizational innovation have been classified in most literature, namely technological innovation, and administrative innovation (Tan et al, 2010).

Chuang (2005) has further categorized technological innovation into secondary dimensions: product innovation and process innovation; while administrative innovation remains distinct from the other two. Under Mavondo, Chimhanzi and Stewart's (2003) study, organizational innovation was distinctively classified into three dimensions, namely: product innovation, process innovation and administrative innovation.

Product innovation is defined as the development and commercialization of new product to create value and meet the needs of the external user or the needs of the market (Damanpour & Gopalakrishnan, 2001). Product innovation is a systematic work process which drawing upon existing knowledge gained from research and practical experiences directed towards the production of new materials, products and devices, including prototypes. On the other hand, process innovation is viewed as a creation of new process or improvement to existing process (Leonard & Waldman, 2007).

Process innovation involves the implementation of a new significantly improved production or delivery method, which includes changes in techniques, equipment and/or software. Administrative innovation is viewed as performance derived from the changes to organizational structure and administrative process, reward and information system, and it encompasses basic work activities within the organization which is directly related to management (Chew, 2000; Damanpour and Evan, 1984).

Administrative innovation requires organizations to have verifiable routines and procedures in place for product design, manufacture, delivery, service and support (Sahlin-Andersson et al, 2000). Technological innovation was found to have strong impact and influence on firm performance (Lin et al, 2007). As stated by Hassan (2007), globalization and technological advancement are moving organizations to develop new business strategy and future directions.

According to Pratali (2003), technological innovation helps to improve the competitiveness of the companies and subsequently increase company value. Hitt, Hoskisson, and Kim (1997) further elucidated that the technology capabilities of the firms has vital influence on long-term performance of the firms. In addition, Dave and Wayne (2005) concluded that human resources regularly find new application of technology to improve their efficiency and their effectiveness in an effort to influence firm performance. Some scholars commented that innovation has mixed results. Some said that innovation leads to long-term growth for the companies (Li et al, 2007), while others commented that innovation will result in resource inefficiencies (Foster, 1986).

1.6 Organizational Performance

Organizational performance refers to both short term and long term measurable outcomes which contribute to the sustainability of the organization. These outcomes could include financial, human/social and environmental outcomes. However, the emphasis is on the way these outcomes contribute to the long term financial survival and adaptation of the organization. A study done by (Anastasia, 2008) on Measuring the impact of HRM on organizational performance, observes that there is a serious limitation that recent reviews of the literature points out is that the link between HRM and organizational performance is considered like a 'black box', i.e., lack of clarity regarding 'what exactly leads to what'.

The HRM policies (or systems) may influence organizational performance indirectly through HRM outcomes. However, a direct effect of HRM policies on organizational performance may also be present (Katou and Budhwar, 2007), implicitly accepting the arguments of Huselid and Becker (1996), who support that a causal relationship exists from HRM policies to organizational performance, and of Delery and Doty (1996), who further assume that the relationship between HRM policies and organizational performance is linear, thus implying that there is no synergic interdependence of the different HRM policies, but the effect of the HRM policies on organizational performance is additive (Becker and Gerhart, 1996).

III. THEORETICAL FRAMEWORK

2.1 Resource Based View

RBV argues that Human Resource is one of the organization's resources, a subset of which enable them to achieve a competitive advantage, and a subset of those that lead to superior long-term performance (Barney, 1986; 1991). HRM policies may play an important role in building the organization's human capital pool by developing its rare, inimitable and non-substitutable internal resources (resource-based view). According to the resource-based view, HRM policies have a direct impact on employee attributes such as skills, attitudes and behavior, the so-called HRM outcomes, which are subsequently translated into improved organizational performance (Boxal and Steeneveld, 1999).

2.2 Universalistic Theory

It is also referred to as the best practice model, which is based on the assumption that there is a set of superior/best HRM practices, and that adopting them will inevitably lead to superior organizational performance (Luthans and Summer, 2005). The notion of best practice was identified initially in the early US models of HRM, many of which mooted the idea that the adoption of certain 'best' human resource practices would result in enhanced organizational performance, manifested in improved employee attitudes and behaviors, lower levels of absenteeism and turnover, higher levels of skills and therefore higher productivity, enhanced quality and efficiency and of course increased profitability (Marchington and Wilkinson, 2008).

Here, it is argued that all organizations will benefit and see improvements in organizational performance if they can identify, gain commitment to and implement a set of best HRM

practices. Thus, universalistic perspective maintains that firms will see performance gains by identifying and implementing best practice irrespective of the product market situation, industry or location of the firm (Pfeffer, 1998). However, the notion of a single set of best HRM practices has been overstated. There are examples in every industry of firms that have very distinctive management practices, distinctive human resources practices which shape the core competences that determine how firms compete. What works well in one organization will not necessarily work well in another because it may not fit its strategy, technology or working practices.

According to Becker et al (2001), organizational high performance work systems are highly idiosyncratic and must be tailored carefully to each firm's individual situation and specific context in order to provide maximum performance. These high performance work practices will only have a strategic impact therefore, if they are aligned and integrated with each other and if the total HRM system supports key business priorities. This approach therefore ignores potentially significant differences between organizations, industries, sectors and countries.

2.3 Duality Theory of Job Satisfaction by Herzberg

The debate on job satisfaction started when Herzberg published his book "The Motivation to Work" (1959). This book was based on interviews conducted with engineers and accountants. The respondents were asked to narrate a story about the event when they went exceptionally bad or exceptionally good. According to those situations he divided work dimensions in two elements Motivators and Hygiene factors. All those factors that caused exceptionally good feelings were motivators and satisfying factors; achievement, recognition, work itself, responsibility, advancement, and growth. While recalling about the exceptionally bad events, they responded the following points, administration of the company and its policy, supervisory behavior, relationship with superiors, working environment, salary, and relationship with coworkers, relationships with subordinates, status, personal life, and safety measures.

Herzberg (1959) narrated the above as Hygiene factors and related these events with external context of the work, and the motivators are going to deal with internal mind state. He compared his theory with traditional approach in motivation that assumes that salary, supervision or company policy leads employees towards higher job satisfaction. According to Herzberg job satisfaction is not through improving these 10 hygiene factors but by escalating the six motivators. Moreover, an absence of the motivator factors will not cause job satisfaction e.g. when employees were not offered recognition or achievement or any other motivator for their work this will not cause the dissatisfaction of job yet they are not going to be motivated. The concept parallel to job satisfaction is not job dissatisfaction but no job satisfaction, and similarly opposite of

job dissatisfaction is not job satisfaction but no job dissatisfaction.

Herzberg's theory was severely criticized and pointed out by various researchers, as Vroom (1964) this theory was making people uncovering themselves and making them good by attributing positive events to internal factors and negative events to external events. Even (1964) also criticized his work as he said that this theory was based on a limited job range and examined only one aspect of the job attitude, but if critical incident method of interviewing is followed and used findings support the duality(Herzberg's) theory of job satisfaction.

2.4 Expectancy Theory

Vroom (1974) developed this theory on the assertion that tendency to act in a certain way depends on the expectation that the act will be followed by a given outcome and on the attractiveness of that outcome to the individual. There are three variables here: Attractiveness; importance that individual employee attaches to the potential outcome or reward that goes with the achievement of that job. Performance reward linkage is the degree to which the individual believes that performing at that level will lead to attainment of a particular desired outcome. Effort performance linkage is the perceive probability by the individual that exerting a given amount of effort will lead to performance.

The expectancy theory recognizes that there is no universal principle that explains what can motivate everyone. However the county management can motivate staff for good performance with the reward that employee's desire. They should also facilitate an atmosphere of good performance and good employee/employer relationship. This theory actually forms the theoretical framework of this seminar. For the contingency theory, there are no universal prescription of HR policies and practices. It is all contingent on the organization's context, culture and its business strategy (Wright and Snell, 2005).

IV. CONCEPTUAL FRAMEWORK

As Sammy (2013) asserts, a conceptual framework refers to a group of concepts that are systematically organized in providing a focus, rationale and a tool for interpretation and integration of information (Balachander and Soy, 2003). This is usually achieved in pictorial illustrations. A Conceptual Framework in this Seminar identifies both independent variables and dependent variable. The independent variables refer to the conceptualized factors or variables that may influence the outcome in the dependent variable. In this study, organization performance is hypothesized to be affected by training and development, staff reward, staff appraisal and information technology.

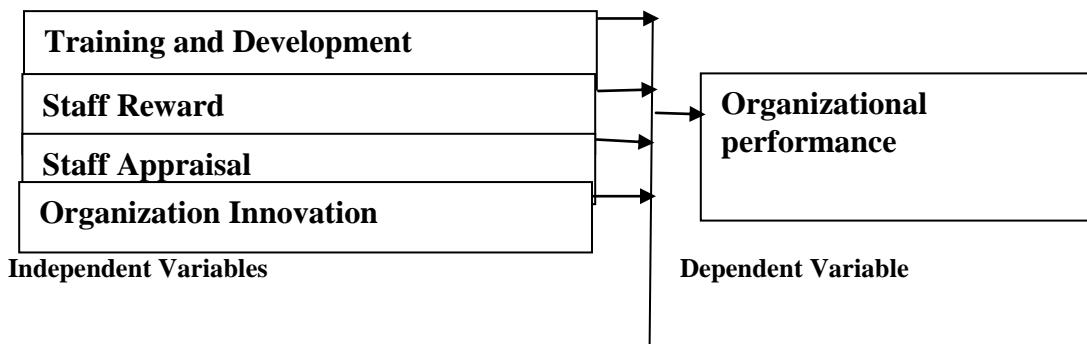


Figure 1: Conceptual framework

V. CONCLUSIONS AND RECOMMENDATION

There is a specific component in the ministry of devolution that addresses the public servant performance contracting where the specific senior staff in the Ministry is held accountable on the performance of the specific ministries. Hence this shows that adoption of human resource practices in the public sector has greatly improved. In an effort to address such theoretical developments in this area, researchers have proposed further studies to consider intermediate linkages between Strategic HRM and organizational performance .

Accordingly, a better understanding of the role of Strategic HRM in creating and sustaining organizational performance and competitive advantage should be achieved through further theoretical development and empirical evidence. The researchers have examined the way in which HR policies and practices may be used to provide coherent and comprehensive HR bundles. This has led to suggestions that there is one best way in which HRM should be delivered and moreover that this has a positive impact on organizational performance. Review examining how HR strategies can be aligned with wider organizational goals has also been examined.

Best fit HRM is the idea that HR practice should and does vary between organizations depending on business strategy or product market circumstances. This approach is useful not only for countering the more simplistic versions to reflect organizational reality-at least at a broad level. The approaches view HR as having an important role in supporting organizational strategy and still play an important role in developing SHRM. Generic HR processes can benefit from best practice theories while best fit should be applied when context matters to align management and employee interests.

Key recommendation of this seminar on human resource strategies in public sector are that: there is need for more discussion on the policies of Human Resource with the staff in the public service to improve of organizational performance, more public servants should sign the performance contract and reviews to be done on quarterly basis, more training and development to the specific ministry should be enhanced especially where specialized technical knowledge is needed for better performance of the ministry, there should be a review of reward policies to ensure the gap between the remuneration is on standards that are accepted by the Human Resource practitioners and there should be quick adoption of Human Resource strategies in the devolved system and separation of politics and

performance of the specific county function in order to improve the performance of the counties

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AUTHORS

First Author – Gerrard Charles Mutembei, PHD in Human Resource Management candidate, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya

Second Author – Ondabu Ibrahim Tirimba, PHD Finance candidate, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya

Mordanting Methods for Dyeing Cotton Fabrics with Dye from *Albizia Coriaria* Plant Species

Loum Janani ^{*}, Lukyambuzi Hillary ^{**}, Kodi Phillips ^{***}

^{*} Lecturer in Department of Textile and Ginning Engineering, Busitema University, PO Box, 236, Tororo, Uganda.

^{**} Department of Textile and Ginning Engineering, Busitema University, PO Box, 236, Tororo, Uganda

^{***} Department of Chemistry, Kyambogo University, PO Box 1, Kampala.

Abstract- The study investigated the effects of different methods of application of selected mordants on dyeing woven cotton with dyes from the stem bark of *Albizia coriaria*. The methods of application of mordants used includes; pre-mordanting, simultaneous mordanting and post-mordanting. The effects on cotton analyzed are color fastness to; light, washing, wet and dry rubbing and color characteristics on CIELab color coordinates. Aqueous extraction method was used to extract the dye. Some selected mordants were used for dyeing viz; alum, ferrous sulphate, and iron water. In the control dyeing without the use of mordants, very good fastness were registered with the following fastness ratings; for washing (4-5), dry rubbing (5), wet rubbing (5) and light (4). The natural dye is a substantive dye since it registered very good fastness grades without the use of mordants. The use of mordants improved color fastness to light from ratings of (4) to (5) and (6) for iron water and ferrous sulphate and a poor fastness of (3) was recorded for alum. Post-mordanting method registered the best overall fastness results and the best color strengths K/S values and color saturation values C. However, the most brilliant colors were registered with simultaneous mordanting method with all mordants. However, there was no observable effect of mordanting methods on the redness or yellowness of color.

Index Terms- *Albizia Coriaria*, color fastness, mordanting, substantive dye.

I. INTRODUCTION

Traditionally, dyes from plants were used for coloring silk, wool and cotton fibers but overtime these were replaced by cheaper synthetic dyes^[1]. Dyes from natural sources like plants, fungi, insects, animals and minerals are referred to as natural dyes. The majority of natural dyes are from plant sources namely; roots, berries, barks, leaves, seeds, woods and other organic sources such as fungi and lichens^[2]. With the invention of synthetic dyes in 1856, the prominence of natural dyes slacked because the synthetic dyes had some advantages over natural dyes like color fastness, good reproducibility of shades, brilliance of color and easy to use^[3]. The synthetic dye stuffs are suspected to cause allergies, and are carcinogenic and detrimental to human health^[4]. Natural dyes derived from plants have recently gained economic advantage over synthetic dyes because of their non-toxic and biodegradable nature^[5]. Due to the current eco-consciousness, researchers' attention has been shifted to the use of natural dyes for dyeing textile materials^[6].

Most natural dyes need chemical species called mordants for binding the dye to fabrics to improve color fastness. Mordants help in binding of dyes to fabric by forming a chemical bridge from dye to fiber thus improving the staining ability of a dye with increasing its fastness properties^[7]. The color fastness and characteristics of natural dyes on fabrics are influenced by the mordanting method applied whose effects vary with the source of the dye.

In Uganda, great potential exists for natural dyes from dye-yielding plants. In a recent study, it has been reported that several plant species in Uganda possess dye-yielding properties^[8]. *Albizia coriaria* is one of these plants with dye-yielding properties. *A. coriaria* is a pioneer species common in wooded grassland, woodland and thicket. Its absence in closed canopy rainforest is largely the result of its high light requirements. Its distribution range extends from West Africa through eastern, southern and parts of central Africa.

The extracts from *Albizia coriaria* plant species revealed the presence of tannin moieties in their molecular structures. Tannins have been reported to be the most important ingredients which are necessary for dyeing with natural dyes, especially to brown shades of color^[9]. The extract of the plant bark reveals the presence of steroids and triterpenoids, Coumarins, tannins, reducing sugars and alkaloids. Some of these compounds are associated to dye-yielding properties in plants.

In the present study, dye extracts from the stem bark of *Albizia coriaria* were used to dye plain woven cotton fabrics by application of various selected mordants and mordanting methods. In each case color fastness to washing, rubbing, light and color characteristics were determined.

II. MATERIALS AND METHODS

Materials

Desized, scoured and bleached plain weave cotton fabric (220 ends/dm, 180 picks/dm, 120 g/m²) from Nyanza Textiles Limited was used. Fresh stem bark of *Albizia coriaria* were collected from Busitema University compound, Busia-Uganda and brought to textile lab. Grey scale and blue dyed silk were used for color fastness rating.

Alum, Ferrous Sulphate, potassium dichromate, Ash water and Iron water were mordants used in dyeing. The following instruments were used; Analytical balance, Color data spectraflash photometer, manually operated Crockmeter, and Lauder-0-meter.

Fabrics pretreatment processes

Pieces of plain woven cotton fabrics with dimensions of (8 x 10 cm) each with an average weight of 1.41 g were scoured by washing them in sodium carbonate solution (0.5 gpl) and non-ionic detergent (Tweet® 80, 2 gpl) at 50°C for 25 minutes keeping the material to liquor ratio at 1:40. The scoured fabrics were thoroughly washed with tap water and dried at room temperature.

Extraction of dye

Dye was extracted from dried and pulverized stem bark of *Albizia coriaria* by aqueous method. The leaves were soaked in distilled water (400 cm³) in a beaker for four hours. The soaked plant materials were heated at 60°C for 30 min and temperature gradually raised to boiling temperature (90°C) and maintained at the boiling temperature for one hour to yield a dye extracts. The dye extract was left to stand for 30 min at ambient temperature and filtered [10]. The colored crude dye solution (150 cm³) was diluted with distilled water (50 cm³) and immediately used for dyeing.

Dyeing the cotton fabrics

Cotton fabrics were dyed using pre-mordanting, simultaneous and post-mordanting methods.

The scoured fabrics were soaked in clean water for 30 min prior to dyeing process.

In dyeing with pre-mordanting method, the pretreated cotton fabrics were soaked in a solution containing 10 % on weight of fabrics (o.w.f) of a mordant, at 60°C for 30 min with material-to-liquor ratio of 1:20. The fabrics samples soaked with mordant solutions were then dyed [11].

Dyeing with simultaneous mordanting method was done by putting the pretreated fabrics in a beaker (250 cm³) containing 10% on weight of fabric (o.w.f) of mordant and 20% o.w.f of sodium sulphate. The pH of each dye solution were maintained between 6 and 8 with 2 - 5% w/w of acetic acid (40% solution) monitored by test papers during the dyeing process. A material to liquor ratio (LR) of 1:20 was used in all dyeing [12]. This was done separately using each of the selected mordants.

In post-mordanting dyeing of cotton fabrics, the pretreated fabrics were dipped in a dye bath (150 cm³) and after 10 minutes, 20% on weight of fabric (o.w.f) of sodium sulphate was added. The dyeing was carried out for one hour at 50°C with intermittent stirring. The dyed samples were removed from dye

bath and squeezed to remove excess dye. The dyed fabrics were then soaked in a mordant solution (100 cm³) containing 10 % on weight of fabric (o.w.f) of a mordant at 60°C for 30 minutes with material to liquor ratio of 1:20 [10].

In all the above three methods, solutions for each of the selected mordants were separately made. The dyed samples were washed with soap solution (2 gpl) at 50°C for 10 minutes, rinsed with tap water and dried at room temperature.

Evaluation of color fastness

Wash fastness of the dyed samples were analyzed as per the standard method using a Launder-o-meter [13]. The wash fastness rating was measured using standard grey scale for loss of shade depth and staining.

Color fastness to dry rubbing and wet rubbing fastness were tested using a manually operated Crockmeter and grey scale [13]. Color fastness to light was evaluated with using MBTF Fade-o-meter. The fading of each sample was observed against the fading of blue wool standards (1-8) [13].

Color measurements

Color development and dye absorption potential of cotton fabrics were evaluated in terms of CIELab color coordinates; L (lightness), a (redness or greenness of color), b (yellowness or blueness of color), C (chroma) and H (hue angle), and K/S (color strength) values [14].

III. RESULTS AND DISCUSSIONS

Variable color shades were formed on the cotton fabrics dyed with extracts from the stem bark of *Albizia coriaria*. The variations in color shades were with respect to the mordants and mordanting methods employed.

Color fastness of the dye without the use of mordants

This was a control to determine color fastness of the dye without application of any mordant. As can be noticed in **Table 1** below, color fastness on the fabrics range from very good to excellent in the range of (4-5) and (5) against grey scale standard of 1-5 for washing and rubbing and respectively. A good light fastness grade of (4) against standard blue dyed wool of 1-8 was determined.

Table 1. Color fastness of the dye applied on cotton fabric without mordant

Wash fastness		Rub fastness				Light fastness	
CC	CS	Dry		Wet			
		CC	CS	CC	CS		
4-5	3-4	5	4-5	5	3	4	

CC=Color change, CS=Color staining

A slight staining of grade (3-4) was determined in washing with very slight and slight dry and wet rub staining of (4-5) and (3) respectively. Generally the color fastness obtained without application of mordant is suitable for dyeing cotton fabrics. From this piece of information it can be concluded that this dye is

classified as a substantive dye. ‘Substantive Dyes’ are those that dye the fibers directly and ‘Adjective dyes’ are those dyes mordanted with a metallic salt [15].

Effects of mordants and mordanting methods on color fastness

In dyeing the cotton fabrics some selected mordants were used viz; alum, ferrous sulphate, and iron water. All these mordants were applied on the fabrics using pre-mordanting, simultaneous mordanting and post mordanting methods separately. **Table 2** below contains data for color fastness to

washing, rubbing and light for the selected mordants using different mordanting methods. Color change and staining were determined for washing, dry and wet rub fastness.

Table 2: Color fastness of dyed cotton fabrics with *Albizia coriaria* dye using selected mordants and mordanting methods

Mordant 3% Conc	Method of Mordanting	Wash fastness		Rub fastness				Light fastness	
		CC	CS	Dry		Wet			
				CC	CS	CC	CS		
Alum	PREM	4*	4-5	5	4-5	5	3-4	3	
	SM.	3-4*R	3-4	5	4-5	5	4	3	
	POM	4-5 W	4-5	5	3-4	5	3	3	
Ferrous sulphate	PREM	4* R	4-5	5	3-4	5	3	6	
	SM	4-5 R	4	5	3-4	5	3	5	
	POM	4*R	3-4	5	3	5	1-2	6	
Iron water	PREM	3-4	3-4	5	4-5	5	3	3	
	SM	4	3-4	5	4-5	5	3	3	
	POM	4R	3-4	5	4-5	5	3	5	

CC=Color change, CS=Color staining:

Remarks: *=stronger, *R=Stronger and Reddish, W=Weaker, R=Reddish.

PREM=Pre-mordanting, SM=Simultaneous mordanting, POM=post-mordanting

Alum mordant produced no observable change in wash and rub color fastness properties in comparison to that without a mordant but a reduced light fastness from rating (4) to (3) was recorded for all methods. The mordanting methods used had no significant effect on the color fastness properties in this case. However, there was a slight decrease in wash staining of (3-4) and (4-5) for pre- mordanting and post-mordanting methods respectively. In wash fastness with alum, pre and simultaneous mordanting recorded stronger grade (4*) and stronger and reddish grade of (3-4*R) with a weaker grade of (4W) registered for post-mordanting.

Ferrous sulphate mordant produced a significant improvement in light fastness from moderate (4) in control to good (5) for simultaneous mordanting and very good rating (6) for pre mordanting and post mordanting. There was no remarkable change in both wash and rub fastness however, in pre-mordanting and post-mordanting methods, the shades became reddish (4-5R) and stronger and reddish (4*R).

The application of iron water mordant registered a poor light fastness from moderate (4) in control to fair (3) for both pre and simultaneous mordanting. However, post-mordanting registered a good light fastness of (5). For all mordanting methods, very good dry and wet rub fastness (5) were registered the same grade as in the control experiment. Wash fastness recorded for all the mordanting methods were inferior to the very good (4-5) in control with grades of moderate (3-4), good (4) and reddish (4R) for pre, simultaneous and post mordanting methods respectively. Iron water did not have any effect on staining from the use of all the mordanting methods.

In terms of color fastness rating obtained with the mordants used, post-mordanting method exhibited the best overall results. The mordant that recorded the best results in terms of fastness grades recorded are; ferrous sulphate, iron water, and alum in that order. The general improvement in fastness from the use of these mordants is as a result of the presence of strong metal coordination complexes formed inside the internal fiber structure between the mordant and dye fibers [16]. The iron species produced and deeper shades and alum produced lighter shades that varied with the method of application of mordant on the cotton fabrics. The deepest shades were registered with ferrous sulphate and iron water using post-mordanting method. A high quality colored fabric possesses an acceptable amount of color fastness rating of at least 3.0 on a five point grey scale [17]. Results of this study therefore demonstrates that dye from the stem bark of *Albizia coriaria* with light fastness rating of range (3) and (6) and wash and rub fastness grades of (3-4) and (5), meet minimum performance requirements for application on cotton fabrics.

Color characteristics based on CIELab color coordinates of dyed cotton fabrics.

The dyed fabrics were assessed for their color coordinates as reported in **Table 3** and the results are discussed with the aid of color space diagrams and surface color value graphs. Where L*=Lightness, a*=red-green, b*= yellow-blue, C*=chroma h° = Hue angle, CV-SWL= Color value at single wave length and it is equivalent to K/S (Color strength) in terms of value.

Table 3: The CIELab color coordinates of cotton fabrics dyed with crude dye extracts from *Albizia coriaria*.

Mordant	Mordanting Method	L*	a*	b*	C*	h°	CV-SWL
No mordant(control)	-	69.35	8.84	14.25	16.77	58.18	1.995
Iron water	PREM	53.41	3.75	8.59	9.37	66.4	3.667
	SM	60.98	3.82	10.17	10.86	69.41	2.452
	POM	53.38	4.07	10.47	11.23	68.75	3.713
Alum	PREM	70.61	6.6	17.15	18.37	68.96	1.986
	SM	69.48	6.51	14.07	15.5	65.18	1.825
	POM	67.86	7.27	16.43	17.97	66.13	1.938
Ferrous Sulphate	PREM	37.5	3.47	7.53	8.29	65.23	10.06
	SM	40.16	3.49	8.63	9.31	68	8.641
	POM	6.57	19.71	11.17	22.65	29.54	14.99

PREM= pre-mordanting, SM= simultaneous mordanting, POM= post-mordanting

As can be noticed from **Table 3** for pre-mordanting method, the color strengths (CV) recorded were; (3.667), (1.986), (10.06) for iron water, alum and ferrous sulphate respectively with control registering (1.995). In this case ferrous sulphate had the best color strength followed by iron water and alum had the lowest color strength falling below the control. In simultaneous mordanting methods color strength registered were (2.452), (1.825) and (8.641) for iron water, alum and ferrous sulphate respectively. Ferrous sulphate had the best color intensity followed by iron water. Alum had an inferior color strength which is even lower than the control. The post mordanting method gave the following color strength; (3.713), (1.938) and (14.99) for iron water, alum and ferrous sulphate respectively. In this case ferrous sulphate gave the highest color strength followed by iron water and alum had the lowest color strength. In all the mordanting methods alum had no positive contribution on color strength in fact its performance is below that in the control. The performance of the mordanting methods in terms of color strength is in the order; post, pre and simultaneous mordanting. Post mordanting method is therefore the method to be adopted in the application of dye from the stem bark of *Albizia coriaria* on cotton fabrics.

Dyes from *Albizia coriaria* produced darker shades ($L < 70$) with ferrous sulphate and iron water in the range of (37.5-40.16) and (53.38-60.98) respectively. Alum exhibited lighter shades ranging from (67.86-70.61). With all mordants, post- mordanting method produced lower L values hence deeper shades. Color shades formed by post-mordanting exhibited the highest degree of color saturation C of (11.23), (17.97) and (22.65) for iron water, alum and ferrous sulphate in that order with the exception of alum where pre-mordanting had a higher value of C (18.37). The net effect of alum high value of chroma and lightness is reflected in its high brilliant appearance.

Fabrics dyed with *Albizia coriaria* exhibited only positive "a" value for all the mordanting methods with post-mordanting of ferrous sulphate having the highest "a" value of (19.71) as shown in **Table 3**. The values of "a" and "b" placed the dyed

fabric with *Albizia coriaria* extract in the red-yellow quadrant of the color space diagram as shown in **Figure 1**. Post-mordanting with ferrous sulphate gave the lowest hue angle h° value of (29.54) redness of color. Most mordanting methods gave hue angle $h^\circ > 45^\circ$ implying yellowness of color. The shades are all closer to yellow than red.

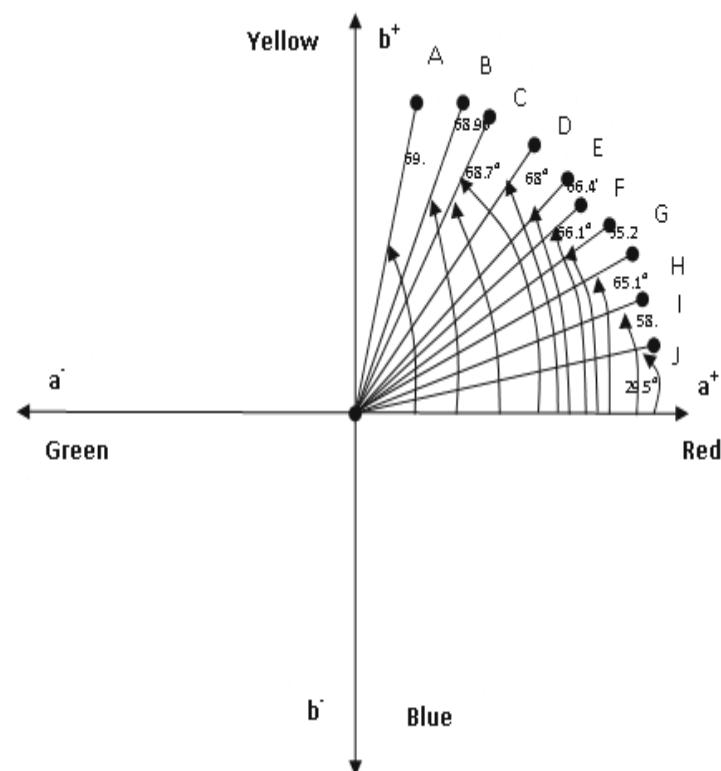


Figure 1: Location of colored fabric samples in the a-b color space diagram.

Key

A: simultaneous Iron water, B: Pre Alum, C:Post Iron water, D:simultaneous Ferrous sulphate, E: Pre Iron water, F: Post Alum, G:Pre Ferrous sulphate, H: simultaneous alum, I:No mordant, J:Post ferrous sulphate.

Control fabrics also gave a hue angle H (58.18) falling within the range of the mordanted fabrics. The mordanting methods used had no significant influence on the redness and yellowness of color shades formed.

IV. CONCLUSIONS

Dyes extracted from the stem bark of *Albizia coriaria* yielded various color shades with different mordants. The cotton fabrics dyed without the use of mordants exhibited a very good wash fastness of (4-5), a excellent dry and wet rub fastness of (5), and a moderate light fastness of (4). The dye is therefore substantive dye with good color fastness property. The application of mordants yielded various color shades with different mordants and mordanting methods without any observable improvement in dry and wet rub fastness however, with washing the shades turned redder. The formation of a single color with variable shades depending on mordant used classifies the dye as monogenetic dye. Upon application of mordants, there was general drop in light fastness with alum and iron water. Generally post-mordanting method recorded an overall best light fastness performance with ferrous sulphate and iron water. Color strength was enhanced by the application of post-mordanting methods across all mordants used but, more brilliant color shades was recorded for simultaneous mordanting method. The mordanting method used no significant influence on the redness and yellowness of color. It can be concluded that, to achieve excellent fastness and good color strength with dye from *Albizia coriaria*, post-mordanting is a method of choice.

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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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AUTHORS

First Author – Loum Janani, Lecturer in Department of Textile and Ginning Engineering, Busitema University, PO Box, 236, Tororo, Uganda., E mail: loumjanani75@gmail.com Tel: +256-712028843/ +256-754362397

Second Author – Lukyambuzi Hillary, Department of Textile and Ginning Engineering, Busitema University, PO Box, 236, Tororo, Uganda. Tel: +256-779231902

Third Author – Kodi Phillips, Department of Chemistry, Kyambogo University, PO Box 1, Kampala. Tel: 0783717177

Correspondence Author – Loum Janani, Lecturer in Department of Textile and Ginning Engineering, Busitema University, PO Box, 236, Tororo, Uganda., E mail: loumjanani75@gmail.com Tel: +256-712028843/ +256-754362397

Nonlinear observers for attitude estimation in gyroless spacecraft via Extended Kalman filter algorithm

Nor Hazadura Hamzah*, Sazali Yaacob*, Hariharan Muthusamy*, Norhizam Hamzah**

*School of Mechatronic Engineering, Universiti Malaysia Perlis, Perlis, Malaysia
**Astronautic Technology Sdn. Bhd., Selangor, Malaysia

Abstract: This paper designs an observer to estimate the spacecraft's angular velocity using only Euler angles attitude without gyroscope measurement. This work contributes as an alternative or backup system during unavailable gyroscope measurement due to faulty sensor or reduction of sensor hardware for cost reduction. In this work, the observer model for satellite attitude is derived in their nonlinear form, and the observability of the nonlinear system is investigated using Lie derivative. The performance of the designed observer is analyzed and verified using real flight data of Malaysian satellite by employing Extended Kalman Filter algorithm.

Index Terms- Nonlinear observer; Satellite attitude estimation; Extended Kalman Filter; Lie derivative

I. INTRODUCTION

Satellite attitude determination is one of the important aspects in Attitude Determination and Control System (ADCS) of a satellite. Satellite attitude is important to be determined in a satellite to be fed back to controller in accomplishing a specific satellite mission such as Earth observation, communication, scientific research and many other missions. However not all states are directly available may be due to faulty sensor or as a way to obtain a substantial reduction of sensors which represents a cost reduction.

In most practical implementations of ADCS, the angular velocity and attitude information of a spacecraft are obtained respectively from measurement of gyroscopes and attitude sensor such as sun sensor, star sensor, or magnetometer. However, gyroscopes are generally expensive and are often prone to degradation or failure [1]. Therefore, as an alternative or backup system to circumvent the problem of gyroless measurement, an observer can be designed to provide the information of angular velocity by using only the measurement of Euler angles attitude.

Since decades, a great number of research works have been devoted to the problem of estimating the attitude of a spacecraft based on a sequence of noisy vector observations such as [2][3][4][5]. Different algorithms have been designed and implemented in satellite attitude estimation problem. Early applications relied mostly on the Kalman filter for attitude estimation. Kalman filter was the first applied algorithm for attitude estimation for the Apollo space program in 1960s. Due to limitation of Kalman filter which work optimal for linear system only, several famous new approaches have been implemented to deal with the nonlinearity in satellite attitude system including Extended Kalman Filter (EKF) [6][7][4], Unscented Kalman Filter (UKF) [8][9][10], Particle Filter (PF)[11][12][13], and predictive filtering [14][15]. EKF is an extended version of Kalman filter for nonlinear system whereby the nonlinear equation is approximated by linearized equation through Taylor series expansion. UKF, an alternative to the EKF uses a deterministic sampling technique known as the unscented transform to pick a minimal set of sample points called sigma points to propagate the non-linear functions. EKF and UKF approaches is restricted assume the noise in the system is Gaussian white noise process. While, PF is a nonlinear estimation algorithm that approximates the nonlinear function using a set of random samples without restricted to a specific noise distribution as EKF and UKF. However, EKF was found as most widely used algorithm both in theory and in real practice by spacecraft community due to simplicity for implementation and theoretically attractive in the sense that it minimizes the variance of the estimation error.

In the open literature, spacecraft attitude estimation use different attitude representation either Euler angles, Rodrigues parameter, or quaternion parameter as their kinematic model [16]. Each kinematic model of different parameter is governed by different differential equation [17]. The researchers also studied the performance of estimated states by varying different type of sensor measurement such as gyroscope, magnetometer, sun sensor or star sensor. In this paper, an observer to estimate the angular velocity of a satellite using measurement of Euler angles attitude provided by attitude sensor is designed and implemented via EKF algorithm. EKF was used in this work due to its well-known and established algorithm and theoretically attractive in the sense that it minimizes the variance of the estimation error. While Euler angles is used to represent the satellite's attitude instead of quaternion and Rodrigues parameter as its straightforward physical interpretation for analysis. The performance of the nonlinear observer to estimate the attitude is also verified using real flight data of Malaysian satellite, RazakSAT.

The organization of this paper proceeds as follows. Section II presents mathematical model of nonlinear satellite attitude dynamic. Section III describes two important concepts related to nonlinear observer including system observability via Lie derivative and also EKF, an estimation algorithm used in the observer system. Section IV presents and discusses the results of the observer system which was tested and verified using actual flight data and Section V presents the paper's conclusions.

II. MATHEMATICAL MODEL OF NONLINEAR SATELLITE ATTITUDE DYNAMICS

Mathematical model of satellite attitude dynamics is described by both the dynamics equation of motion and kinematics equation of motion [18].

Dynamic equation of motion relates the angular velocity to the exerted torque as defined by Euler's Moment Equation [18][17]

$$I\dot{\omega} + \omega \times I\omega = T \quad (1)$$

Or similarly is written in component-wise

$$\dot{\omega}_x = -\left(\frac{I_x - I_y}{I_x}\right)\omega_y\omega_z + \frac{T_x}{I_x} \quad (2a)$$

$$\dot{\omega}_y = -\left(\frac{I_x - I_z}{I_y}\right)\omega_x\omega_z + \frac{T_y}{I_y} \quad (2b)$$

$$\dot{\omega}_z = -\left(\frac{I_y - I_x}{I_z}\right)\omega_x\omega_y + \frac{T_z}{I_z} \quad (2c)$$

with

$$I = \text{diag}[I_x, I_y, I_z], \dot{\omega} = [\dot{\omega}_x, \dot{\omega}_y, \dot{\omega}_z], \omega = [\omega_x, \omega_y, \omega_z], T = [T_x, T_y, T_z]$$

represent satellite's moment of inertia, angular acceleration, angular velocity and space environmental disturbances torque vectors respectively.

While, kinematic equation of motion relates the attitude parameter to the angular velocity. In this work, Euler angles parameter is used to represent the satellite's attitude as its straightforward physical interpretation for analysis. Euler angles are defined as the rotational angles about the body axis as follows: ϕ is rotational angle about X-axis (roll); θ is rotational angle about Y-axis (pitch); and ψ is rotational angle about Z-axis (yaw). The kinematic equation of Euler angles parameter using $\psi - \theta - \phi$ (or some literature use notation 3-2-1) sequence rotation is

$$\begin{bmatrix} \dot{\phi} \\ \dot{\theta} \\ \dot{\psi} \end{bmatrix} = \begin{bmatrix} [\omega_x + \omega_0 c\theta s\varphi] + s\theta t\theta [\omega_y + \omega_0 (c\theta c\varphi + s\theta s\varphi)] + c\theta t\theta [\omega_z + \omega_0 (-s\theta c\varphi + c\theta s\varphi)] \\ c\theta [\omega_y + \omega_0 (c\theta c\varphi + s\theta s\varphi)] - s\theta [\omega_z + \omega_0 (-s\theta c\varphi + c\theta s\varphi)] \\ \frac{s\theta}{c\theta} [\omega_y + \omega_0 (c\theta c\varphi + s\theta s\varphi)] + \frac{c\theta}{c\theta} [\omega_z + \omega_0 (-s\theta c\varphi + c\theta s\varphi)] \end{bmatrix} \quad (3)$$

where c , s and t denote cosine, sine, and tangent functions, respectively. While, ω_0 is the orbital rate of the spacecraft.

A complete formulation of the satellite attitude dynamics is obtained by combining both the dynamics equation of motion and kinematics equation of motion as follow

$$\begin{bmatrix} \dot{\omega}_x \\ \dot{\omega}_y \\ \dot{\omega}_z \\ \dot{\phi} \\ \dot{\theta} \\ \dot{\psi} \end{bmatrix} =
 \begin{bmatrix}
 -\left(\frac{I_z - I_y}{I_x}\right) \omega_y \omega_z \\
 -\left(\frac{I_x - I_z}{I_y}\right) \omega_x \omega_z \\
 -\left(\frac{I_y - I_x}{I_z}\right) \omega_x \omega_y \\
 [\omega_x + \omega_0 c \theta s \varphi] + s \theta t \theta [\omega_y + \omega_0 (c \theta c \varphi + s \theta s \varphi)] + c \theta t \theta [\omega_z + \omega_0 (-s \theta c \varphi + c \theta s \varphi)] \\
 c \theta [\omega_y + \omega_0 (c \theta c \varphi + s \theta s \varphi)] - s \theta [\omega_z + \omega_0 (-s \theta c \varphi + c \theta s \varphi)] \\
 \frac{s \theta}{c \theta} [\omega_y + \omega_0 (c \theta c \varphi + s \theta s \varphi)] + \frac{c \theta}{c \theta} [\omega_z + \omega_0 (-s \theta c \varphi + c \theta s \varphi)]
 \end{bmatrix} +
 \begin{bmatrix}
 \frac{T_x}{I_x} \\
 \frac{T_y}{I_y} \\
 \frac{T_z}{I_z} \\
 0 \\
 0 \\
 0
 \end{bmatrix} \quad (4)$$

For low Earth orbit satellite, gravity gradient torque must be taken into consideration as part of external torque since it is continuously acting on the spacecraft body and influence the satellite's attitude motion. The external torque dominated by gravity gradient torque is written as [17][19]

$$T = \begin{bmatrix} T_x \\ T_y \\ T_z \end{bmatrix} = \begin{bmatrix} 3 \omega_0^2 (I_z - I_y) s \theta c \theta c^2 \theta \\ 3 \omega_0^2 (I_z - I_x) s \theta c \theta c \theta \\ 3 \omega_0^2 (I_x - I_y) s \theta c \theta s \theta \end{bmatrix} \quad (5)$$

Hence, by substituting the gravity gradient torque in Equation (5) into Equation (4), the complete model of satellite attitude under Low Earth Orbit is

$$\begin{bmatrix} \dot{\omega}_x \\ \dot{\omega}_y \\ \dot{\omega}_z \\ \dot{\phi} \\ \dot{\theta} \\ \dot{\psi} \end{bmatrix} =
 \begin{bmatrix}
 -\left(\frac{I_z - I_y}{I_x}\right) \omega_y \omega_z + 3 \omega_0^2 \frac{(I_z - I_y)}{I_x} s \theta c \theta c^2 \theta \\
 -\left(\frac{I_x - I_z}{I_y}\right) \omega_x \omega_z + 3 \omega_0^2 \frac{(I_z - I_x)}{I_y} s \theta c \theta c \theta \\
 -\left(\frac{I_y - I_x}{I_z}\right) \omega_x \omega_y + 3 \omega_0^2 \frac{(I_x - I_y)}{I_z} s \theta c \theta s \theta \\
 [\omega_x + \omega_0 c \theta s \varphi] + s \theta t \theta [\omega_y + \omega_0 (c \theta c \varphi + s \theta s \varphi)] + c \theta t \theta [\omega_z + \omega_0 (-s \theta c \varphi + c \theta s \varphi)] \\
 c \theta [\omega_y + \omega_0 (c \theta c \varphi + s \theta s \varphi)] - s \theta [\omega_z + \omega_0 (-s \theta c \varphi + c \theta s \varphi)] \\
 \frac{s \theta}{c \theta} [\omega_y + \omega_0 (c \theta c \varphi + s \theta s \varphi)] + \frac{c \theta}{c \theta} [\omega_z + \omega_0 (-s \theta c \varphi + c \theta s \varphi)]
 \end{bmatrix} \quad (6)$$

III. NONLINEAR OBSERVERS FOR SPACECRAFT ATTITUDE ESTIMATION

A. Nonlinear Observers

A nonlinear observer is a nonlinear dynamic system that is used to estimate the unknown states from one or more measurements. Mathematically, the nonlinear observer design is described as follows. Given the actual nonlinear system dynamics and measurement described by continuous-time model [19]

$$\dot{x} = f(x) + w \quad (7)$$

$$y = h(x) + v \quad (8)$$

Then, the observer is modeled as

$$\begin{aligned} \hat{\dot{x}} &= f(\hat{x}) + L(y - \\ &\quad \hat{y}) \end{aligned} \quad (9)$$

$$\hat{y} = h(\hat{x}) \quad (10)$$

In Equation (7)-(10), $x \in R^n$ is the state vector and $y \in R^p$ is the output vector, w and v denote the noise or uncertainty vector in the state and measurement respectively. While \hat{x} and \hat{y} denotes the corresponding estimate and L is the gain matrix of the observer depending on the observer design.

In this work, the system is designed to estimate the satellite's angular velocity ($\omega_x, \omega_y, \omega_z$) by using Euler angles attitude (ϕ, θ, φ) measurement only. Hence the state vector is $x = [\omega_x, \omega_y, \omega_z, \phi, \theta, \varphi]^T$, while the state equation is

$$\begin{aligned} \dot{x} = f(x) = & \begin{bmatrix} \dot{\omega}_x \\ \dot{\omega}_y \\ \dot{\omega}_z \\ \dot{\phi} \\ \dot{\theta} \\ \dot{\varphi} \end{bmatrix} = \\ & \left[\begin{array}{l} -\left(\frac{l_z-l_y}{l_x}\right)\omega_y\omega_z+3\omega_0^2\frac{(l_z-l_y)}{l_x}s\phi c\phi c^2\theta \\ -\left(\frac{l_x-l_z}{l_y}\right)\omega_x\omega_z+3\omega_0^2\frac{(l_x-l_z)}{l_y}s\theta c\theta c\phi \\ -\left(\frac{l_y-l_x}{l_z}\right)\omega_x\omega_y+3\omega_0^2\frac{(l_y-l_x)}{l_z}s\phi c\theta s\theta \\ [\omega_x+\omega_0c\theta s\varphi]+s\theta t\theta[\omega_y+\omega_0(c\phi c\varphi+s\phi s\theta s\varphi)]+c\phi t\theta[\omega_z+\omega_0(-s\phi c\varphi+c\phi s\theta s\varphi)] \\ c\phi[\omega_y+\omega_0(c\phi c\varphi+s\phi s\theta s\varphi)]-s\theta[\omega_z+\omega_0(-s\phi c\varphi+c\phi s\theta s\varphi)] \\ \frac{s\phi}{c\theta}[\omega_y+\omega_0(c\phi c\varphi+s\phi s\theta s\varphi)]+\frac{c\phi}{c\theta}[\omega_z+\omega_0(-s\phi c\varphi+c\phi s\theta s\varphi)] \end{array} \right] \end{aligned} \quad (11)$$

and the measurement equation

$$y = h(x) = \begin{bmatrix} \phi \\ \theta \\ \varphi \end{bmatrix} \quad (12)$$

B. Observability Test

Observability is one of important concepts in estimation. Observability provides an indication of the state quantities that can be observed from measurements. If a system is not observable, this means the current values of some of its states cannot be determined through output of sensors measurement. Nonlinear observability is intimately tied to the Lie derivative [20]. The Lie derivative is the derivative of a scalar function along a vector field. The Lie derivative of a scalar function h with respect to vector field f , denoted $L_f(h)$ is given by

$$L_f(h) = \frac{\partial h}{\partial x} f(x) \quad (13)$$

Given a system as in Equation (7) and (8), the step for observability test of the nonlinear system is described as follows: [19]

Step 1: Compute a matrix, G of Lie derivative

$$G = \begin{bmatrix} L_f^0(h_1) & \dots & L_f^0(h_p) \\ \dots & \dots & \dots \\ L_f^{n-1}(h_1) & \dots & L_f^{n-1}(h_p) \end{bmatrix} \quad (14)$$

with Lie derivative is defined as

$$L_f^i(h) = \begin{cases} h & ; \text{ for } i = 0 \\ \frac{\partial}{\partial x} [L_f^{i-1}(h)]f & ; \text{ for } i = 1, 2, 3, \dots, n \end{cases} \quad (15)$$

Step 2: Compute the gradients operator on matrix G .

$$dG = \begin{bmatrix} dL_f^0(h_1) & \dots & dL_f^0(h_p) \\ \dots & \dots & \dots \\ dL_f^{n-1}(h_1) & \dots & dL_f^{n-1}(h_p) \end{bmatrix} \quad (16)$$

Step 3: Check the rank of matrix dG . Matrix dG must have rank n for the system to be observable.

C. Extended Kalman filter

In this work, EKF is used as the estimation algorithm in the nonlinear observer system due to its well-known and established algorithm and theoretically attractive in the sense that it minimizes the variance of the estimation error. EKF is an on-line, recursive algorithm trying to estimate the true state of an observable nonlinear system where only some noisy measurements are available. EKF algorithm is described as below. [18]

Let the continuous model in Equation (7) and (8) is transformed into the discrete-time model such that

$$\begin{aligned} x_k &= f(x_{k-1}) + \\ w_{k-1} \end{aligned} \quad (17)$$

$$y_k = h(x_k) + v_k \quad (18)$$

Here the subscript of the variables denotes the time step, while w_{k-1} and v_k are restricted assumed as Gaussian distributed noises with mean zero and covariance R_w and R_v respectively such that $w_{k-1} \sim N(0, R_w)$ and $v_k \sim N(0, R_v)$. Then, the estimated state is obtained through the following step:

Step 1: Set the initial state estimate $\hat{x}_0 = \hat{x}_{0|0}$ and variance $P_0 = P_{0|0}$.

Step 2: Repeat

(i) Prediction step (priori estimate)

$$\text{Jacobian of } f(x_{k-1}): \quad F_{k-1} = \left. \frac{\partial f}{\partial x} \right|_{\hat{x}_{k-1|k-1}} \quad (19)$$

$$\text{Predicted state estimate:} \quad \hat{x}_{k|k-1} = f(\hat{x}_{k-1|k-1}) \quad (20)$$

$$\text{Predicted covariance estimate:} \quad P_{k|k-1} = F_{k-1} P_{k-1|k-1} F_{k-1}^T + R_w \quad (21)$$

(ii) Update step (posteriori estimate)

$$\text{Jacobian of } h(x_k): \quad H_k = \left. \frac{\partial h}{\partial x} \right|_{\hat{x}_{k|k-1}} \quad (22)$$

$$\text{Kalman gain:} \quad K_k = P_{k|k-1} H_k^T [H_k P_{k|k-1} H_k^T + R_v]^{-1} \quad (23)$$

$$\text{Updated state estimate:} \quad \hat{x}_{k|k} = \hat{x}_{k|k-1} + K_k [y_k - h(\hat{x}_{k|k-1})] \quad (24)$$

$$\text{Updated covariance estimate:} \quad P_{k|k} = [I - K_k H_k] P_{k|k-1} \quad (25)$$

IV. RESULT AND DISCUSSION

This section investigates the performance of the designed observer to provide the information of the angular velocity during gyroless condition.

Before implementing the observer system, the nonlinear observability test is carried out to investigate whether the designed system is possible to be executed. The nonlinear observability test is carried out via Lie derivative with the aid of MATLAB using step described in Section III. The test has shown that

Rank of matrix $dG = 6$

implies that the system is full rank. Hence it is said that the system is locally observable everywhere for the system during gyroless condition and only Euler angles attitude information was available. The test proves that the satellite's angular velocity can be estimated using the designed observer.

The performance of the nonlinear observer designed in this work has been analyzed and validated using real sensors data from the RazakSAT satellite. RazakSAT is a Malaysian satellite which was launched into Low Earth Orbit near Equatorial in 2009. In the mission, the attitude was provided directly using sun sensor, one of the attitude sensor, while the angular velocity was provided by gyroscope sensor. The satellite's characteristics of RazakSAT are given in Table 1, which was provided by Astronautic Technology Sdn Bhd (ATSB), the Malaysian company that responsible for RazakSAT's mission.

Table 1: RazakSAT's characteristics.

Moment of inertia, I_x	25.4 kg.m ²
--------------------------	------------------------

Moment of inertia, I_y	26.2 kg.m ²
Moment of inertia, I_z	21.0 kg.m ²
Orbital rate, ω_0	0.001063 rad/s or 0.0609 deg/s

Figures 1, 2 and 3 show the real measurement of Euler angles attitude respectively around roll, pitch, and yaw angles as obtained by using sun sensor in RazakSAT mission. The available measurements are for about 6 orbits sequentially, available to the ground system at a sampling rate of about 1 minute.

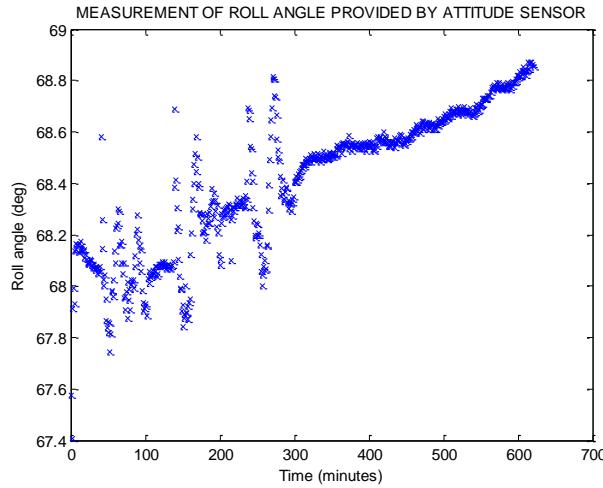


Figure 1: Real measurement of roll angle provided by attitude sensor.

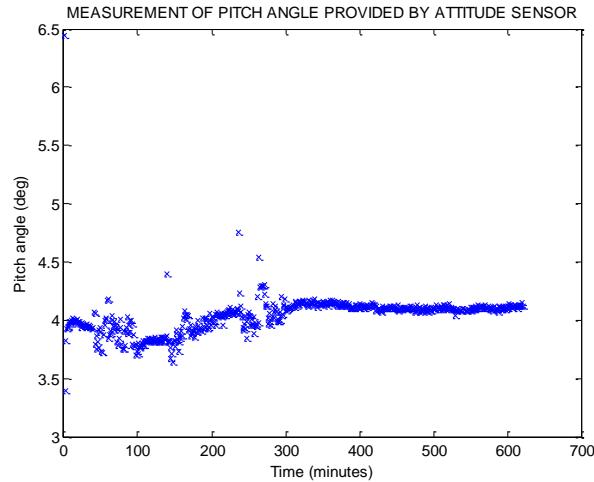


Figure 2: Real measurement of pitch angle provided by attitude sensor.

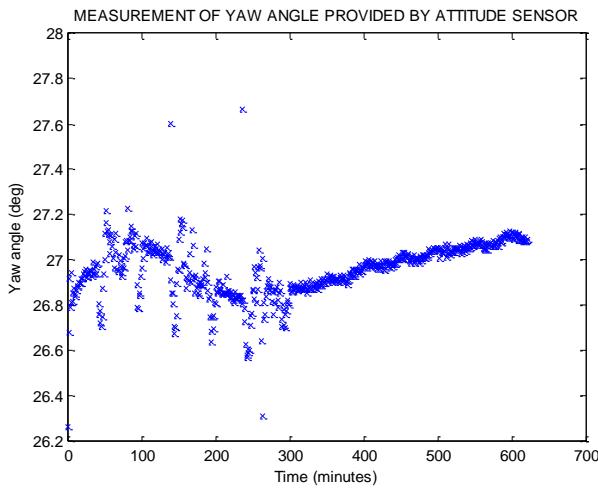


Figure 3: Real measurement of yaw angle provided by attitude sensor.

In order to validate and analyze the performance of the designed system, the estimated result is compared with the real sensor data of RazakSAT. Figures 4, 5, and 6 show comparison between the estimated angular velocities through the designed observer and the real angular velocities measurement provided by gyroscope in RazakSAT mission respectively around X-axis, Y-axis, and Z-axis. From all the three figures, it is observed that behaviour of the estimated states scattered randomly around zero about the first half of the period analysed. While in the second half of the period, the estimated states are not scattered randomly as to the first half period. However, the estimated angular velocity around X-axis and Z-axis seem deviate from zero values of the real states measured by gyroscope. This deviation may be due to mis-modeling or the influence of unmodeled space environmental disturbance torque including aerodynamic, solar radiation pressure and Earth magnetic torques.

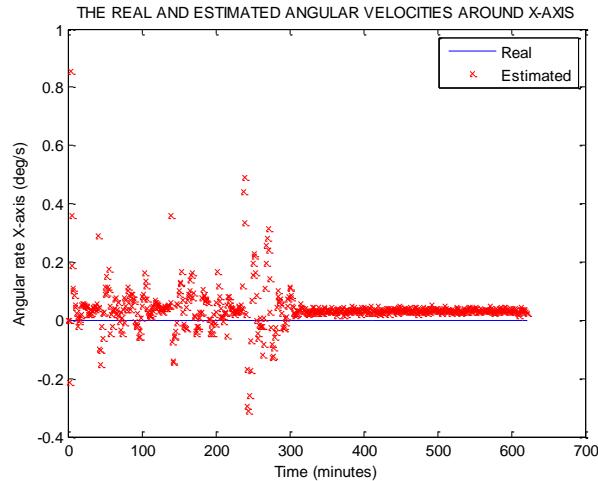


Figure 4: Comparison between the estimated and the real angular velocity around X-axis.

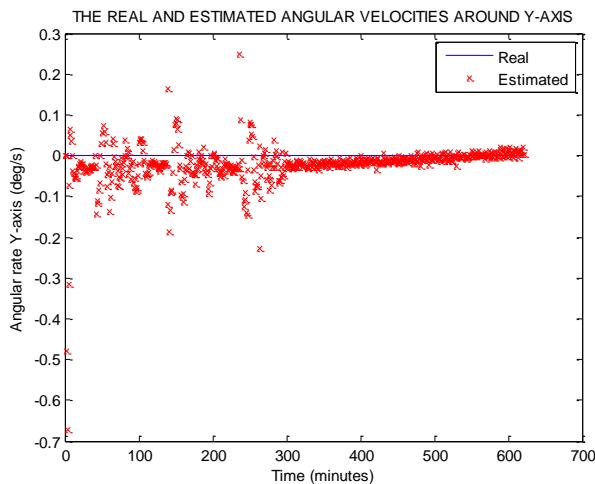


Figure 5: Comparison between the estimated and the real angular velocity around Y-axis.

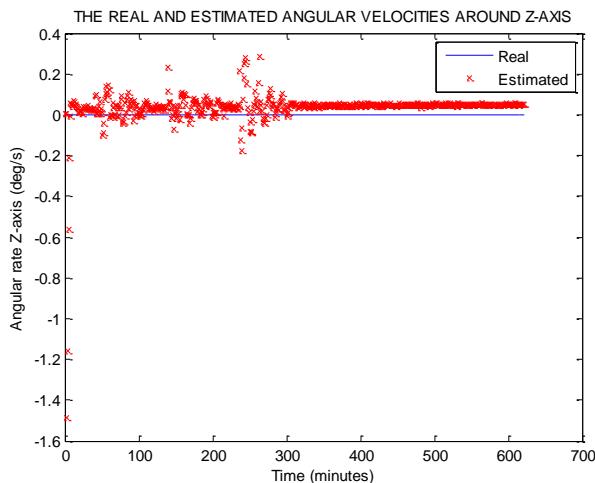


Figure 6: Comparison between the estimated and the real angular velocity around Z-axis.

Figures 7, 8 and 9 show the plot error of the estimated angular velocities when compared to the real angular velocities measured by gyroscope of RazakSAT respectively around X-axis, Y-axis, and Z-axis. From all the three figures, it is also observed that behaviour of the error scattered randomly around zero value for about the first half of the analyzed period, while in the second half of the period, the estimated states are less scattered randomly as to the first half period. However, the error around X-axis and Z-axis is seem to have constant value about -0.05 deg/s for the second half of the analysed period. While the error around the Y-axis for the second half of analysed period decrease with a tendency to stabilize around a zero value. This could be arising from the mis-modeling factor which ignores the effects of the space environmental disturbance torque as described before.

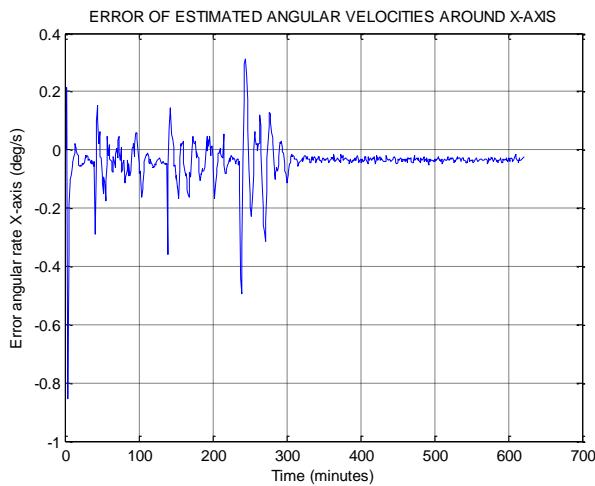


Figure 7: Error of estimated angular velocity around X-axis.

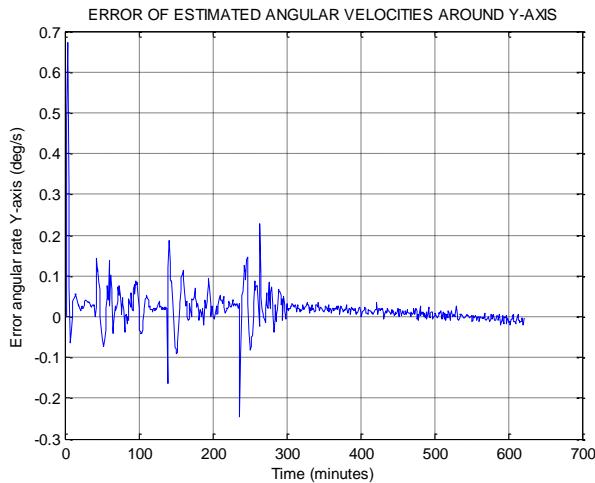


Figure 8: Error of estimated angular velocity around Y-axis.

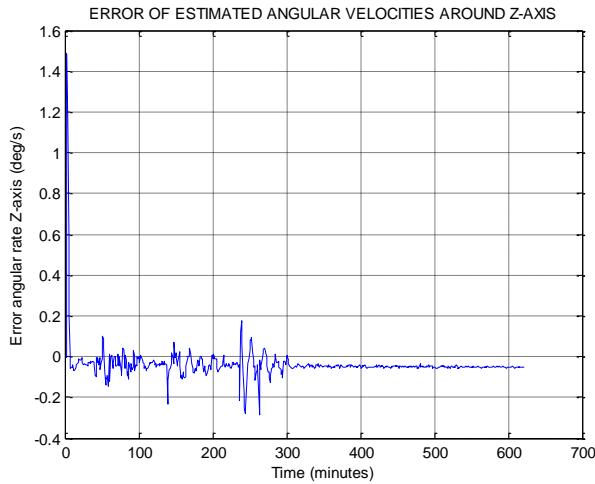


Figure 9: Error of estimated angular velocity around Z-axis.

Table 2 shows the Root Mean Squared Error (RMSE) of the estimated angular velocity compared to real angular velocity obtained by gyroscope measurement in RazakSAT mission. The result shows that the system is able to provide the information of angular velocity within 0.1 deg/s accuracy, which is suitable for moderate accuracy attitude determination mode such as during housekeeping and detumbling task, but unsuitable for pointing mode that requires more precise accuracy such as during imaging task.

Table 2: RMSE of the estimated angular velocity.

States	RMSE value
Angular velocity around X-axis, ω_x	0.0825 deg/s
Angular velocity around Y-axis, ω_y	0.0530 deg/s
Angular velocity around Z-axis, ω_z	0.0982 deg/s

V. CONCLUSION

In this paper, a nonlinear observer to provide the angular velocity information in gyroless condition was designed and developed using Extended Kalman Filter algorithm. The system observability is first investigated to check the possibility of the nonlinear system states estimation by employing test rank using Lie derivatives technique. The rank test shows that the designed observer is observable everywhere, and hence can estimate the angular velocity from the Euler angles attitude information only without the gyroscopes. The performance of the designed observer by employing Extended Kalman Filter algorithm is then investigated and validated using real flight data of RazakSAT, the Malaysian satellite. The result shows that the system is able to provide the information of angular velocity within 0.1 deg/s accuracy, which is suitable for moderate accuracy attitude determination such as during housekeeping and detumbling mode. The designed observer can be used as an alternative or backup attitude determination system of a Low Earth Orbit satellite during unavailable gyroscope measurement due to faulty sensor or reduction of sensor hardware for cost reduction.

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AUTHORS

First Author (Correspondence Author) – Nor Hazadura Hamzah received his MSc in Mathematics from Faculty of Sciences, University of Technology Malaysia, Malaysia in 2007. She is currently enrolled in the PhD programme in Mechatronics Engineering at University Malaysia Perlis, Malaysia. Her research interests include non-linear systems, observers, and spacecraft guidance, navigation and control systems. (hazadura@gmail.com)

Second Author – Prof. Dr. Sazali Yaacob received his MSc in System Engineering at University of Surrey and PhD in Control Engineering from University of Sheffield, UK in year 1987 and 1995, respectively. He is currently a Professor at University Malaysia Perlis. His research interests are in control, modelling and signal processing with applications in the fields of satellite, bio-medical, applied mechanics and robotics. (sazali22@yahoo.com)

Third Author – Dr. Hariharan Muthusamy, received his PhD in Biomedical Engineering from University Malaysia Perlis. He is currently a lecturer at University Malaysia Perlis. His research interests are in control, modelling and signal processing with applications in the field of bio-medical system. (hari@unimap.edu.my)

Fourth Author- Norhizam Hamzah, currently is a Senior Vice President at Astronautic Technology Sdn. Bhd. a Malaysian company under Government Linked Corporation, that responsible for Malaysian satellite missions. (hizam@atsb.my)

Effect of Gravitational Waves on Hydrogen in near-by Universe

Yash Mehta

Instrumentation Department, V.E.S. Institute of Technology

Abstract- This paper attempts to explain the postulate that 80% of light is unaccounted for in the current universe. [1]

It tends to pin the cause of the excess light observed by the Cosmic Origins Spectrograph on Gravitational waves, and how it interacts with the light in the near universe which could further augment the research going in this field and provide an alternate method of detecting these elusive waves that are considered to carry crucial data about the primordial universe and how it came into being.

According to observations made by the Cosmic Origins Spectrograph on board the Hubble Space Telescope which took the first ever image of the Cosmic web found that the universe is still missing 80% of its light in the local universe. [2] Astronomers are completely baffled as they still don't know the reason for this anomaly indicating that our current perceptions of the universe may not be completely true and therefore calls for a careful consideration on the matter.

So from where all this excess light is coming from? The most fascinating possibility is that an exotic new source, not quasars nor galaxies — which are the known sources of light in the universe — is responsible for the missing photons that tantamount to the excess light as observed in the study.

We know that Gravitational waves are a result of accelerating universe and as photons of light responds to this warping relevant in space-time fabric they tend to amplify the photons thereby supporting the results observed. [3]

Index Terms- Gravitational Waves, Hydrogen tendrils, re-ionization, 80% of light missing.

I. INTRODUCTION

Flustered because astrophysicist know that there are only two known sources for light in the universe: quasars, which are fueled by hot gas falling onto supermassive black holes over a million times the mass of the sun, and the hottest young stars and found that these so known sources of light are incompetent to match the findings by the Cosmic Origins Spectrograph which detected that the hydrogen tendrils that fills up the intergalactic space are lightning too much.

According to the paper "When these hydrogen atoms are struck by highly energetic ultraviolet light, they are transformed from electrically neutral atoms to charged ions. The astronomers were surprised when they found far more hydrogen ions than could be explained with the known ultraviolet light in the universe, which comes primarily from quasars. The difference is a stunning 400 percent." [4]

When the hydrogen atoms in deep space are bombarded with photons from around the universe, they are transformed from neutral atoms to ions. The type of light that is energetic enough to turn neutral hydrogen into hydrogen ions is called ionizing photon. Astronomers were stunned when they discovered that there were far more ionized hydrogen than which could be explained by the known sources, an astounding difference of 400 percent. Furthermore we know that almost always all the light from these young stars in galaxies are absorbed by the encompassing cloud of gas and dust which forms a cloak around the galaxies sometimes even feeding them. And the other source, the quasars are far less in number and intensity to create such an effect as to match the results.

1.1. Re-ionization:

Shortly after the Big Bang the universe was ionized due to which ordinary matter consisting of hydrogen was stripped apart of its electrons. Gradually the universe cooled down enough for the electron and proton to combine and form neutral hydrogen. This cooled gas goes on to form the first stars in the universe, but it is a rather painstakingly long process with many factors coming into considerations like what was the temperature, pressure of the gas, how rapidly this accretion disk was rotating, its angular velocity and so on. And therefore some time of the order of millions of years of magnitude must have elapsed before the first stars came into existence, implying that during this period the hydrogen remained intact.

Astronomers agree that the universe became fully re-ionized roughly 1 billion years after the Big Bang. About 200 million years after the birth of the cosmos, ultraviolet (UV) radiation from stars began to split neutral hydrogen into electrons and protons. It took another 800 million years to complete the process everywhere. This epoch of re-ionization marked the last major change to gas in the universe, and it remains ionized today, over 12 billion years later. [1]

And still strange enough this aberration occurs in only nearby and relatively well studied cosmos. When we point our telescopes to faraway galaxies i.e. billions of light years away everything seems to add up. A tacit implication is that the light needed to ionize hydrogen works in the early universe but comes apart locally.

1.2 Dark Matter

A previous possible explanation for this abstruse phenomenon came in light when scientists predicted dark matter culpable. The extra light is hypothesized to be given away when dark Matter — which is generally said to be at the peripherals of the galaxies and constitutes almost 27 percent of the universe—

decays to give out that extra supply of energy required for the observations to hold true. [5]

Dark matter is said to consist of WIMP (weakly interacting massive particles) which are said to be their own pseudo particle. Therefore when they come in contact they annihilate to produce gamma rays and additionally if they are unstable they could decay into standard model particle for example an antiprotons or positrons emanating from region of areas with high dark energy density. The detection of such a signal though is not a conclusive evidence for dark matter, as the production of gamma rays from other sources is not fully understood. [6]. And therefore we turn to gravitational waves that might provide another perspective for this phenomenon.

1.3. Gravitational Waves

Albert Einstein predicted the existence of gravitational waves in 1916 as part of the theory of general relativity. In Einstein's theory "Space and time are aspects of a single measurable reality called space-time. Matter and energy are two expressions of a single material. We can think of space-time as a fabric; the presence of large amounts of mass or energy distorts space-time – in essence causing the fabric to warp – and we observe this warping as gravity".^[6] [7]. A more massive moving object will produce more powerful waves, and objects that move very quickly will produce more waves over a certain time period. When large masses move suddenly, a region of the space-time curvature ripples outward, spreading as waves in much the way as ripples on the surface of an agitated pond. When two dense objects such as neutron stars or black holes orbit each other, space-time is stirred by their motion and gravitational energy ripples throughout the universe.^[6]

II. FINDING

We know that the universe is expanding at an accelerated rate, in formal terms, this means that the cosmic scale factor, given by

$$p(t) = p_0(t) * a(t)$$

has a positive second derivative, which follows directly from Newton's law of motion.

where,

$p(t)$: is the position of an object at any given time

$p_0(t)$: is the current position of the object, and

$a(t)$: the scale factor corresponding to $p(t)$, which explains how close or how far objects are in space.

Now since space is expanding there definitely ought to be a greater presence of Gravitational waves which follows implicitly from general relativity. We also know that photons are affected by gravitational fields not because photons have mass, but because gravitational fields (in particular, strong gravitational fields,) change the shape of space-time. The photons are responding to the curvature in space-time, not directly to the gravitational field.

To understand that why there is a sudden increase in light in the local vicinity of our own and nearby galaxies, we need to understand that gravitational waves are a by-product of the expanding universe i.e. greater the expansion the more packed and stronger these waves tend to be; and the universe is expanding at a relatively more accelerated rate in the local universe. However the orders of magnitude of how strong it is, is still on the very faint side and therefore it is very difficult to detect gravitational waves. But on other side Gravitational waves can travel over large cosmological distances without being damped and can pass through other matter, unlike radio waves which are easy to detect but gets scattered when travelling over large distances.

From a recent paper published in the New Journal of Physics, Niclas Westerberg, et al., from institutions in the UK and Italy scientists carried out an experiment where-in they tried to simulate space-time in lab using thin graphene sheets and illuminating it with intense short laser beams thus producing the equivalence of periodic expansion and contraction of space-time and can be likened to Gravitational waves. They also predicted through calculations that these gravitational waves may amplify electromagnetic radiation, producing large numbers of photons that can potentially be detected. [3]. If correct boundary conditions are available Gravitational waves can give rise to emission of photons.

The amplification observed is a kind of non-linear amplification where-in light of variable wavelength is emitted by optical parametric amplification process and is an attribute of some crystals. The input light beam of frequency w_s is divided non-linearly into two light beams such that $w_s=w_1+w_2$, where w_1 and w_2 are the two output light beams. These two lower-frequency beams are called the "signal" and "idler". [8]. The two output beams are comparatively weaker and more dispersed as compared to the input beam and to overcome this optical parametric amplification (OPA) is employed, wherein the input is w_s and w_1 . The OPA distributes energy such that energy from w_s is given to w_1 hence amplifying it and also creates a new beam with frequency such that $w_s=w_1+w_2$.

This new amplified beam that is obtained interacts with the hydrogen tendrils to create the observed result. However since the graphene sheet is wavelength thick only the oscillation does not occur inside the medium as in traditional parametric amplification but is rather the oscillation of the medium itself. Such parametric amplification are examples of the dynamic Casimir effect, in which photons are produced due to an accelerated or suddenly changing medium, which is analogous to accelerating space-time continuum.

III. CONCLUSION

This reasons all points to that probably gravitational waves can hold key to the excessive light found in the nearby cosmos i.e. this can explain why there is more light at relatively smaller astronomical distances relative to us. They tend to stir up the space-time continuum in periodic expansion and contraction and thus provides the necessary conditions for the photons of light to amplify and cause the excess of ionization of the hydrogen tendrils that floats the intergalactic space. Further due to rapid expansion of the universe that is accelerating at a faster rate for

greater values of the scale factor and the shift in the light due to Doppler shift explains as to why this excess light is found only in the near-by cosmos.

Furthermore according to the paper in which the results were published, it can open up completely new avenues to detect gravitational waves, whose finding would help us to know more about how our present day universe came into existent. It can offer a fundamentally very different perspective to pursue with greater diligence Gravitational Wave Astronomy that can help to decipher some of the greatest secrets of the universe.

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AUTHORS

First Author – Yash Mehta, B.E. (Final year), Vivekananda Educational Society Institute of Technology.
email - yashmehta16@yahoo.co.in

Approach for Mass Notification Device Testing

Brijesh Patil

Siemens Technology and Services Pvt. Ltd. , India Pune

Abstract- Diversity in devices, lack of systematic device testing strategy has always led to open questions in the customer's mind saying "Is the device tested correctly?"

Testing of any device integrated with System Under Test (SUT) is certainly different and more complex than testing any traditional software application, as it a comprehensive testing which includes device and the infrastructure of SUT. A systematic device testing approach plays a very important role in getting the device and its supporting traditional software application released in the market with in time ensuring high quality.

This white paper focuses on the lessons learnt and experiences shared along with some guiding principles that can be considered at the time of planning a systematic testing strategy. This strategy can be followed for any Mass Notification application that includes manual as well as automation testing approach in order to cover functional and non functional testing.

This paper will also revisit some of the most common pitfalls and pain points that often are snowed under during the test execution phase for any Mass Notification device.

Index Terms- Mass Notification Device Testing, Device Testing, Mass Notification, Systematic device testing approach.

I. INTRODUCTION

As the number and variety of Mass Notification Systems (MNS) along with the diversity in Mass Notification Devices has grown exponentially over the last few years, organizations need to ensure that every Mass Notification System meets a high quality bar in order to prevent revenue loss, productivity lost, and damage to the brand reputation. Comprehensive Mass Notification Systems' devices testing strategy is essential for getting your application to market on time and within budget.

Some of the key elements which can be considered for effectively testing of Mass Notification devices which are integrated with SUT are as follows:

- Categorization of device parameters - Define a systematic test strategy for each parameter of the device under test.
- Types of testing - Consider different types of testing required (functional, performance, security, and compliance).
- Target device selection- Create an optimal mix of simulator testing and physical device to maximize the test coverage.

- Test Automation - To reduce the cost of regression testing select an effective automation testing tool and maximize the use of automation.

The challenge of Mass Notification Devices testing can be effectively addressed by a test strategy that combines these elements with traditional best practices and processes for testing.

II. PROBLEM DEFINITION

It is generally observed that there is a lack of systematic approach while planning a test strategy for any device/s integrated with SUT which leads to many questions:

- Is the device tested properly?
- Is the software application (SUT) properly integrated with the device under test?
- Is the response time of the device as expected or can we improve on it? And so on.

III. STRATEGY FOR MASS NOTIFICATION DEVICE TESTING

A. Categorization of device parameters:

The very first thing that can be considered for the Mass Notification Device under test is to categorize its various parameters and then define a systematic test strategy for each parameter.

Below is the example of a Mass Notification device "Adaptive" (Display device)

Type Of device	Protocol	Firmware supported	Response time (Sec)	Type of text supported	Type of text color supported	Scalability
Adaptive (Display device)	TCP/IP	1.1	5	Times New Roman	Red	3,100,200

Here one of the biggest challenges of a MNS device testing is its ability to scale. Scalability testing helps to determine whether your SUT scales with the workload growth as the MNS device grows in numbers and complexity. Hence, scalability testing forms an essential part of the entire development and testing process of MNS.

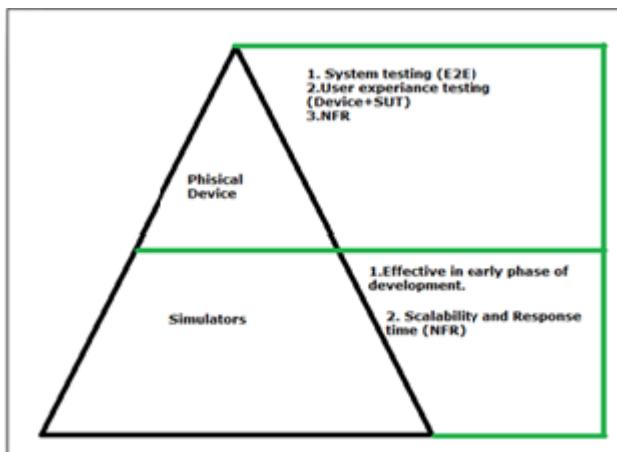
These factors can be further analyzed to develop specific test coverage i.e.

Device Factors	Type of testing
Protocol	TCP/IP 1. Network security testing 2. Firewall Testing
Firmware	1. Firmware compatibility testing 2. Performance testing w.r.t firmware
Response time	Functional and Non functional time (Performance testing)
Type of Text supported	Functional /compatible testing – to cover various fonts of text
Type of text color supported	Functional /compatible testing – to cover various supported text colors
Scalability	NFR –Non functional testing

B. Test Approach for Physical device Vs Simulators.

Use of simulators can be very effective in the early phase of development life cycle. Better test coverage can be achieved with respect to scalability and response time whereas testing on physical devices is very essential to understand the real time behavior of the device with the integrated software (SUT).

Below figure explains further how choice between Physical device Vs Simulators can help in planning a better test strategy.



IV. CHALLENGES WITH REAL DEVICE TESTING AND SIMULATORS

A .Challenges with real device testing:

Though testing with physical devices is recommended and generally followed, however it is observed that more challenges are encountered in this area. General issues faced while testing with real devices are as below:

Challenges and Recommendation for real device testing		
Sr.No	Challenges	Recommendation
1	Device Configuration complexity	Use of Automation scripts for configuration the device; however at the initial phase reference document containing all the configuration information can also be very helpful.
2	Network Connectivity issues	General practice is to have an independent test network where the devices and SUT should be configured.
3	Third party software dependency for configuring the device	Probably the solution would be to create automation scripts for configuring the third party software; however at the initial phase reference document containing all the

B. Challenges with simulator testing:

As discussed, earlier testing with simulators should be done in the early phase of the development life cycle, as simulators can be used to test the basic application functionality,

General issues faced while testing with simulators are as below:

Challenges and Recommendation while testing with simulators		
Sr.No	Challenges	Recommendation
1	SUT knowledge	Gain knowledge by conduction sessions with domain experts.
2	Deep knowledge of device and its integration with SUT	Conduct Domain knowledge sessions with System /Software Architect
3	Features in simulators Vs Features in actual device	Clarity in understanding and expectations from simulators at the same time it should be clearly communicated to the test team
4	Communication between Simulator and SUT	Granular level understanding of communication between SUT and actual device. E.g. Protocols/Fix Parameters/Input and Output format.
5	Simulator framework	Well defined logging framework was developed, which helped in differentiating the issue coming out from Simulators and SUT.

V. REAL TIME TEST DATA

To understand the MNS device test approach more practically we have used some real time test data, which was collected during the time of test from real MNS device and simulators.

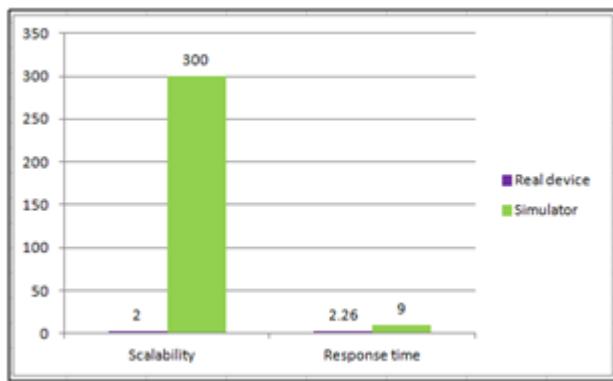
In the table for real time Mass Notification Device, we had focused on the response time of the single device, where as in the test coverage using simulators the focus was on scalability and on response time.

A. Results from real time Mass Notification device (Adaptive Display Device):

Device type	Total	Failed	Delivery Time(Ms)	Delivery Time(Sec)
Adaptive_Display_Driver	2	0	3300	3.3
Adaptive_Display_Driver	2	0	1847	1.847
Adaptive_Display_Driver	2	0	1793	1.793

B. Results from Mass Notification device simulator (Adaptive Display Device):

Device type	Total	Failed	Delivery Time(Ms)	Delivery Time(Sec)
Adaptive_Display_Driver	300	0	7153	7.153
Adaptive_Display_Driver	300	0	8956	8.956
Adaptive_Display_Driver	300	0	11000	11



VI. CONCLUSION

The successes of over all industries demonstrate that breakthroughs in quality begin with a change in attitude. By increasing expectations for Mass notification device testing and providing testers with an efficient test strategy, is one of the way which will significantly increase quality, improve customer satisfaction, and gain a competitive edge.

APPENDIX

Appendices, 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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AUTHORS

First Author – Brijesh Patil, Masters of Engineering (CAD/CAM), Siemens Technology and Services Pvt. Ltd. India (Pune), Brijesh.patil@siemens.com, Contact No:+919881125925

Assessment of Soil Erosion Susceptibility in Kothagiri Taluk Using Revised Universal Soil Loss Equation (RUSLE) and Geo-Spatial Technology

Kartic Kumar M¹, Annadurai R², Ravichandran P.T³

^{1,2,3} Department of Civil Engineering, S.R.M University, Chennai, Tamil Nadu, India

Abstract- Soil erosion is a serious environmental problem in Kothagiri Taluk. Many studies have been carried out to map shifting cultivation and areas susceptible to soil erosion. Mostly, estimated soil loss is taken as the basis to classify the level of soil loss susceptibility of area. The Revised Universal Soil Loss Equation (RUSLE) function is a commonly used erosion model for this purpose in Kothagiri Taluk. This research integrates the RUSLE within a Geographic Information System (GIS) environment to investigate the spatial distribution of annual soil loss potential in the Kothagiri Taluk. Both magnitude and spatial distribution of potential soil erosion in the catchment is determined GIS data layers including, rainfall erosivity (R), soil erodability (K), slope length and steepness (LS), cover management (C) and conservation practice (P) factors were computed to determine their effects on average annual soil loss. The rainfall erosive factor was developed from local annual precipitation data using a modified Fournier index: The topographic factor was developed from a Digital Elevation Model (DEM); the K factor was determined from a combination of the soil map and the geological map; and the land cover factor was generated from IRS LISS III images. The resultant map of annual soil erosion shows a maximum soil loss of 27.11 t h-1 y-1 with a close relation to built-up land areas, crop land and forest plantation on the steep side-slopes (with high LS). The derived soil susceptibility map from RUSLE model is classified into five categories ranging from very low to very high risk (< 3 to > 20 t h-1 y-1) depending on the calculated soil erosion amount. The soil erosion in each cell was calculated using the revised universal soil loss equation (RUSLE) by carefully determining its various parameters and classifying the study area into different levels of soil erosion severity. The high soil erosion probability zone was observed in areas with high terrain alteration, high relief and slopes with the intensity and duration of heavy precipitation during the monsoons. The soil erosion susceptibility map is linked to elevation and slope maps to identify the area for conservation practice in order to reduce the soil loss.

Index Terms- Soil erosion; RUSLE; GIS; Kothagiri, Western Ghats, Nilgiris

I. INTRODUCTION

Soil erosion susceptibility mapping is one of most important requirement for its planning management and conservation. Soil loss processes are site specific and differ in kind, intensity and aerial coverage of the affected area. Soil degradation and erosion are insidious processes, not readily apparent to farmers until the effects are severe and irreversible (Cleaver and Schrieber 1995) and a threat to long term soil productivity (Narain 2008; Bhattacharyya et al. 2007). Erosion and degradation not only decrease land productivity, but can also result in major downstream or off-site damage than on-site damage. Deforestation, wastelands and indiscriminate usage of cultivable lands have collectively induced soil erosion resulted in ecological imbalances. Soil erosion, generally associated with agricultural practices in tropical and semi-arid countries, leads to decline in soil fertility, brings on a series of negative impacts of environmental problems, and has become a threat to sustainable agricultural production and water quality in the Taluk. It has been estimated that in India about 5334 m-tonnes of soil are being removed annually due to various reasons (Narayan and Babu, 1983; Pandey et al. 2007).

Thus, soil erosion is one of the most critical environmental hazards of modern times. Vast areas of land now being cultivated may be rendered economically unproductive if the erosion of soil continues unabated. Information on the factors leading to soil erosion can be used as a perspective for the development of appropriate land use plan. Simple methods such as the universal soil loss equation (USLE) (Wischmeier and Smith 1978), the modified universal soil loss equation (MUSLE) (Williams 1975), or the revised universal soil loss equation (RUSLE) (Renard et al. 1997) are frequently used for the estimation of soil erosion from watershed areas. The use of GIS methodology is well suited for the quantification of heterogeneity in the topographic and drainage features of a watershed. The objectives of this research were to map erosion prone areas in the Kothagiri Taluk by using RUSLE and GIS techniques for the discretization of the Taluk into small grid cells and for the computation of physical characteristics of these cells such as slope, land use and soil type, all of which affect the processes of soil erosion in the different subareas of Kothagiri taluk. Further GIS methods are also used to estimate the soil erosion in individual grid cells. The area selected for the present study includes the most popular tourist centre in Tamil Nadu. The gathering of very large crowd over a short period of time in an ecologically sensitive area has resulted in various environmental problems. Though most of the study area is covered with forest, the area has undergone changes in the forest/land use and causes environmental degradation. Since majority of tourist prefers the traditional forest route, lower order forests face degradation and destruction. Hence, the present study was carried out with an objective to assess the annual

soil erosion rate and develop a soil erosion susceptibility map for Kothagiri Taluk using RUSLE and GIS techniques, which in turn can be used as a scalable model.

II. STUDY AREA

Kothagiri Taluk is located in Nilgiri district, which is a mountainous terrain in the North West part of the Tamil Nadu. The area has a mountainous character. The Taluk is highly undulating and exhibits the typical highland topography of Western Ghats, with a mean elevation of 1326 m above msl and a general northeast terrain slope. The topographical elevation values vary between 431m to 2629m. The study area covers 425.49 kms and lies between latitudes $11^{\circ} 10' 00''$ N to $11^{\circ} 42' 00''$ N and longitudes $76^{\circ} 14' 00''$ E to $76^{\circ} 02' 00''$ E (Figure. 1) and located at 70 km Northwest of Coimbatore city in Tamil Nadu. The study area receives rainfall both in southwest and northeast monsoons. The study area receives an annual average rainfall of 3046 mm and exhibits a wet climatic condition with a mean minimum and maximum temperature of 20.5° C and 30.7° C, respectively. The climate of the Kothagiri area is temperate and salubrious throughout the year. The pronounced wet seasons are during the north-east monsoon in October and November. The northeast monsoon is moderate, contributing nearly 40 percent of rainfall. Geologically, the area falls in the Precambrian terrain and charnockite and gneiss are the major rock types with lateritic over burden. Geomorphologically, the Taluk is characterised by steep structural hills, denudational hills, narrow gorges, intermontane valleys and precipitous escarpments with thick vegetation. The soil texture is gravelly clay followed by gravelly clay loam, which is well drained with very low permeability. The drainage pattern of the area is dendritic types are found in the study area.

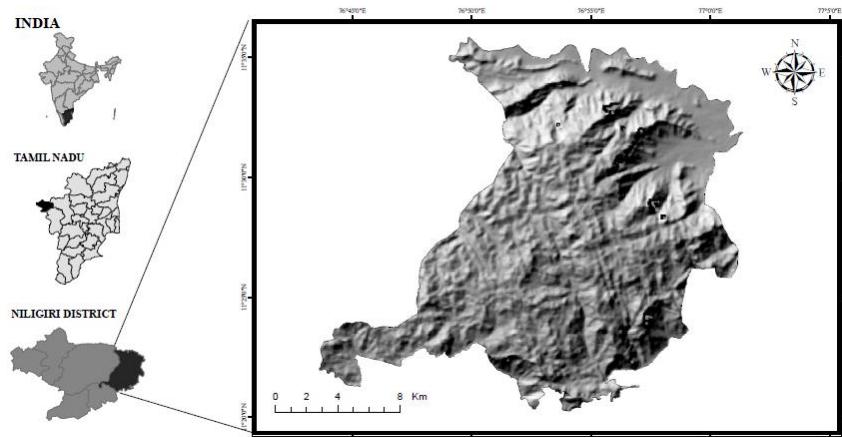


Figure 1: Study area location map

III. METHODOLOGY

The emergence of soil erosion models has enabled the study of soil erosion, especially for conservation purposes, in effective and acceptable level of accuracy. To estimate soil erosion and to develop optimal soil erosion management plans, many erosion models, such as Universal Soil Loss Equation/Revised Universal Soil Loss Equation (USLE/RUSLE), Water Erosion Prediction Project (WEPP), Soil Erosion Model for Mediterranean Regions (SEMMED), Areal Non-point Source Watershed Environment Response Simulation (ANSWERS), Limburg Soil Erosion Model (LISEM), European Soil Erosion Model (EUROSEM), Soil and Water Assessment Tool (SWAT), Simulator for Water Resources in Rural Basins (SWRRB), Agricultural Non-point Source pollution model (AGNPS), etc. were used in regional scale assessment. Each model has its own characteristics and application scopes (Boggs et al., 2001; Lu et al., 2004; Dabral et al., 2008). The dominant model applied worldwide to soil loss prediction is RUSLE, developed by Wischmeier & Smith (1978) because of its convenience in application and compatibility with GIS. The base map was prepared using Survey of India (SOI) toposheets on 1:50 000 scale. Remotely sensed data pertaining to IRS-P6, LISS-III digital data have been used for the study. Soil map of the study area was taken from District Soil Division, Coonour. Daily rainfall data for the year 2013 is collected from Metrological department Chennai. The toposheets covering the study area were scanned in TIFF format and imported in the ArcGIS 9.2 software where geo-referencing was done. The geo-referenced image of toposheets was used as background image for all on screen digitizing. The taluk boundary has been delineated by the District map. Scanned soil map was digitized based on grouping of soil properties. The contour map was prepared of digitized contour lines at 20m interval and combined with a rasterized spot height map for generating a Digital Elevation Model (DEM) and classified it. The RUSLE has been widely used for both agricultural and forest watersheds to predict the average annual soil loss by introducing improved means of computing the soil erosion factors (Wischmeier and Smith, 1978; Renard et al., 1997). The methodology used in the present work was the implementation of RUSLE equation in a raster GIS environment for the calculation of specific factors and annual soil loss of the area under investigation.

The climatic and terrain factors which are used in the equation were derived from rainfall data collected from Indian Meteorological Department (IMD) Chennai, satellite image, soil texture map of soil survey organization, Tamil Nadu and Survey of India (SOI) toposheets. IRS-P6 LISS-III digital data of the year 2012 with resolution of 23.5 m was used for assessment of vegetation parameters in the area. SOI toposheets were used to create the digital database for the boundary, drainage network and contour map (20 m intervals) of the study area.. The cell size of all the data generated was kept in to 20 m x 20 m, in order to make uniform spatial analysis environment in the GIS. This equation 1 is a function of five input factors in raster data format: rainfall erosivity; soil erodability; slope length and steepness; cover management; and support practice. These factors vary over space and time and depend on other input variables. Therefore, soil erosion within each pixel was estimated with the RUSLE. The entire analytical methodology follows the steps shown in Fig. 2. First, grid cell of rainfall, soil units, combined slope length and steepness and land use and practice management were prepared. Computed values for R, K, LS and CP were encoded into the respective units of the respective coverage.

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V. THE RUSLE MODEL

To one side from rainfall and runoff, the rate of soil erosion from an area is also strongly dependent on its soil, vegetation and topographic characteristics. In real situations, these characteristics are found to vary greatly within the various subareas of a Taluk. Therefore needs to be discretized into smaller homogeneous units before making computations for soil loss. A grid-based discretization is found to be the most reasonable procedure in both process based models as well as in other simple models (Beven 1996; Kothyari and Jain 1997). For this study, a grid-based discretization procedure was adopted. The 25 m grid size was adopted for discretization because it should be small enough so that a grid cell encompasses a homogeneous area. The dominant model applied worldwide to soil loss prediction is RUSLE, because of its convenience in application and compatibility with GIS (Millward and Mersey. 1999; Jain et al. 2001; Lu et al. 2004; Jasrotia and Singh, 2006; Dabral et al. 2008; Kouli et al. 2009; Pandey et al. 2009; Bonilla et al. 2010). Although it is an empirical model, it not only predicts erosion rates of ungauged areas using knowledge of the local characteristics and local hydroclimatic conditions, but also presents the spatial heterogeneity of soil erosion that is too feasible with reasonable costs and better accuracy in larger areas (Angima et al. 2003).Soil loss was computed based on RUSLE in GIS environment using ERDAS IMAGINE and ARCGIS Packages. The entire analytical methodology follows the steps shown in Figure. 2. First, grid cell of rainfall, soil units, combined slope length and steepness and land use and practice management were prepared. Computed values for R, K, LS, C and P were encoded into the respective units of the respective coverage. This coverage was overlaid and soil loss rate was calculated as per RUSLE equation (Eq (1)). These were further grouped into five major groups to show the erosion severity in relation to the spatial distribution and their aerial extent. RUSLE (Revised Universal Soil Loss Equation), was

developed by Renard et al. (1997); it keeps the USLE form, being improved the methods for calculating the terms of the mathematical equation. The RUSLE has been widely used for both agricultural and forest mountains to predict the average annual soil loss by introducing improved means of computing the soil erosion factors (Wischmeier and Smith. 1978; Renard et al. 1997). This equation is a function of five input factors in raster data format: rainfall erosivity; soil erodability; slope length and steepness; cover management; and support practice. These factors vary over space and time and depend on other input variables. Therefore, soil erosion within each pixel was estimated with the RUSLE. The RUSLE method is expressed as:

$$E = R \cdot K \cdot LS \cdot C \cdot P \quad (1)$$

where E is the computed spatial average of soil loss over a period selected for R, usually on yearly basis ($t \text{ ha-11 y-1}$); R is the rainfall-runoff erosivity factor (mm ha-11 h-11 y-1); K is the soil erodability factor ($t \text{ ha h ha-1 mm-1}$); LS is the slope length and steepness factor (dimensionless); C is the cover management factor (dimensionless, ranging between 0 and 1); and P is the erosion control (conservation support) practices factor (dimensionless, ranging between 0 and 1).

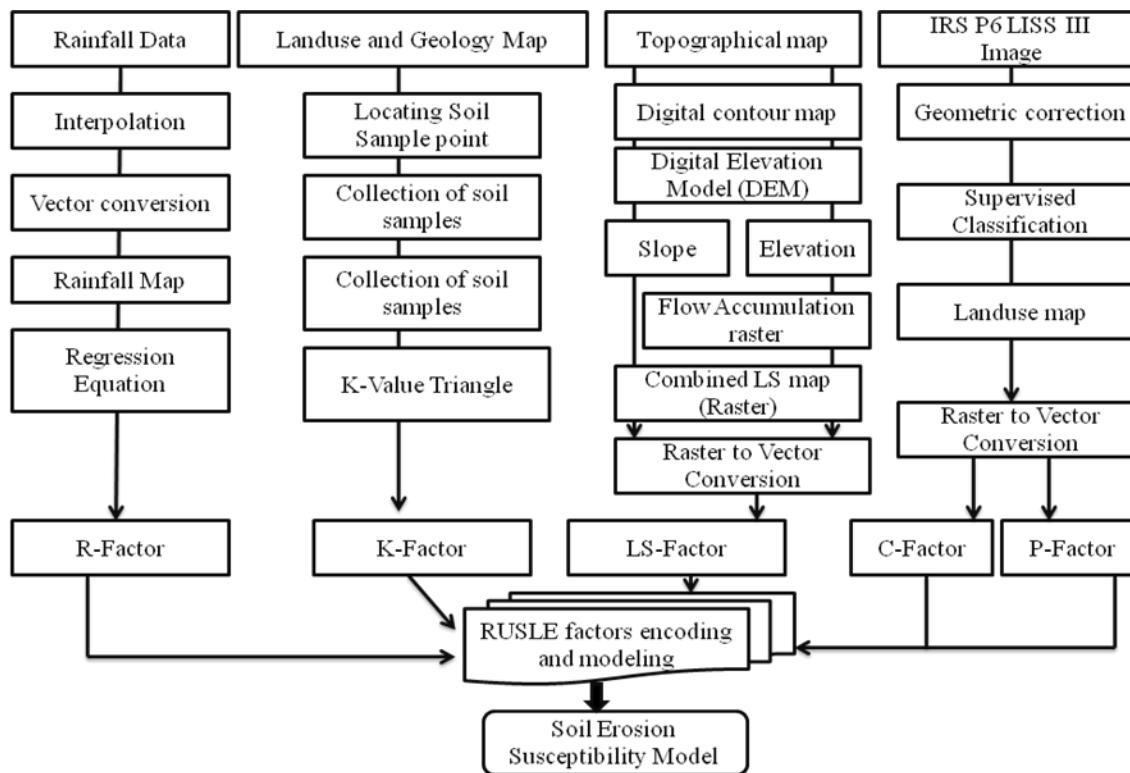


Figure. 2 Flowchart of the study for estimating soil erosion susceptibility map using the RUSLE-GIS mode

A.Rainfall Erosivity Factor (R)

Rainfall is a driver of soil erosion processes and its effect is accounted for by the rainfall-runoff erosivity factor (R) in the RUSLE equation. The R-factor accounts for the effect of raindrop impact and also shows the amount and rate of runoff associated with precipitation events. The R factor is computed as total storm energy (E) time the maximum 30-min intensity (I 30), or EI, and is expressed as the rainfall erosion index (Renard et al. 1997). Rainfall data for the Kothagiri Taluk were obtained from the Meteorological Department Chennai. Rainfall related data for the catchment spanned a period of 10 years. Rainfall data were imported into ArcGIS since all the weather stations had geographical co-ordinates. Annual and monthly rainfall data for the Kothagiri obtained over 12 years were used to calculate the R-factor in this study. The equation below developed by Wischmeier and Smith (1978) was used in the computation

$$R = \sum_{i=1}^{12} 1.735 \times 10^{(1.5 \log \frac{P_i^2}{P} - 0.8188)} \quad (2)$$

Where P_i is the monthly amounts of precipitation and p is annual precipitation. The annual summation of P_i^2/p is called the Fournier equation. In recent years, a number of interpolation methods have been developed in GIS that are suitable to model rainfall erosivity. Interpolation methods available in most GIS software include the inverse distance weighting (IDW), Kriging, Spline polynomial trend, and natural neighbour methods. In this study, the rainfall erosivity values for the different stations were used to interpolate a rainfall erosivity surface using the IDW technique available in ArcGIS 9.2. The IDW interpolation method was selected because rainfall erosivity sample points are weighted during interpolation such that the influence of rainfall erosivity is most significant at the measured point and decreases as distance increases away from the point. The IDW interpolation method is based on the assumption that the estimated value of a point is influenced more by nearby known points than those farther away (Weber and Englund 1992, 1994). In other words, the assigned weight is a function of inverse distance as represented in the following formula (Lam 1983).

$$f(x, y) = \frac{\left[\sum_{i=1}^{12} w(di) Z_i \right]}{\sum_{i=1}^N w(di)} \quad (3)$$

Where $f(x, y)$ is the interpolated value at point (x, y) ; $w(di)$ is the weighting function; Z_i is the data value at point i ; and di is the distance from point (x, y) . The interpolated values of any point within the data set are bounded by $\min(z_i) < f(x, y) < \max(Z_i)$ as long as $w(di) > 0$. The IDW interpolation method has been widely used on many types of data because of its simplicity in principle, speed in calculation, easiness in programming, and credibility in interpolating surfaces (Lam 1983)

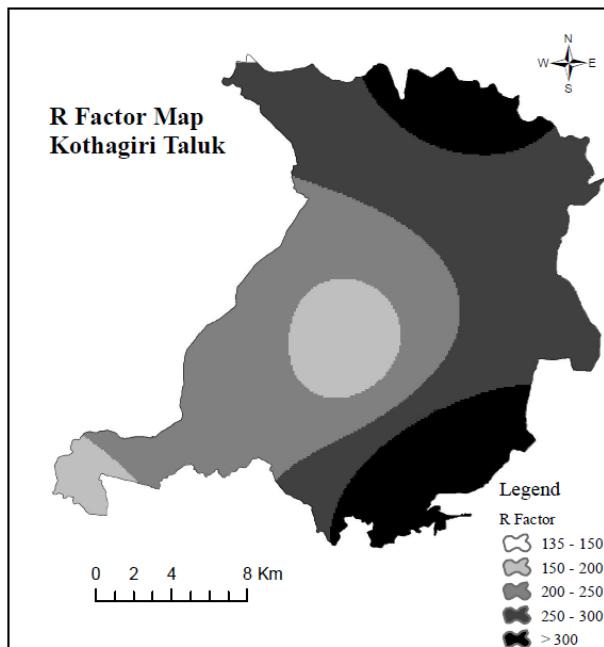


Figure 3: Rainfall-runoff erosivity factor (R)

Figure 3 shows the R factor map of the Kothagiri. The average annual R factor ranged from 150 mm ha⁻¹ h⁻¹ year⁻¹ to 450 mm ha⁻¹ h⁻¹ year⁻¹. The R values for the Kothagiri, Ooty and Mettupalayam ranged from 52 to 316, 30 to 280, and 30 to 550 mm ha⁻¹ h⁻¹ year⁻¹, respectively. There was more rainfall erosivity in the south and south east than in the southwest because rainfall erosivity is closely related to precipitation, which increases from south to north in the Taluk (Figure. 3).

B. Soil Erodibility Factor (K)

Soil erodibility factor (K) in the RUSLE equation is an empirical measure which expresses the inherent susceptibility of a soil to water erosion as determined by intrinsic soil properties. The K factor is rated on a scale from 0 to 1, with 0 indicating soils with the least susceptibility to erosion and whilst 1 indicates soils which are highly susceptible to soil erosion by water. The factor is defined as the rate of soil loss per rainfall erosion index unit as measured on a standard plot. A digital soil classification coverage captured from a soil map by the District geotechnical division was supplied by the National Bureau of Soil Science (NBSS), Nagpur for integration into the RUSLE computation. Soil forms present in the area include the loam, clay, clay loam and sandy loam. Small amounts of stable and well structured soils derived from dolerite are also found in the upper part of the Taluk. The topsoil is highly

vulnerable to erosion due to the dispersive character of the soils inherited from the underlying geology and is further exacerbated by the removal of vegetation. The loam and sandy loam soil forms of the lithic soil group and clay loam and clay soils of the oxidic soil group are, however, the most widespread soil types and were used to obtain a general characterization of the soil erodibilities in this study. These soils are predominately sandy loams and sandy clay loams. Fieldwork was conducted to collect soil samples to determine the particle size distribution where the loam, clay, clay loam and sandy loam soils are the dominant soil types. A total of 15 random samples were collected for each area with the dominant soil type; a soil map was used to determine the spatial distribution of the soil forms in the field. The co-ordinates for the soil sampling locations were collected using a Global Position System (GPS). Soil erodibility was calculated using Eq. 4 developed by Wischmeier and Smith (1978). The equation effectively describes soil erodibility as a function of the complex interaction between sand, silt, and clay fractions in the soil and other factors such as organic matter, soil structure and profile permeability class. In general, soils become less erodible with decrease in silt content, regardless of corresponding increases in the sand or clay fraction (Wischmeier and Smith 1978).

$$K = [(2.1 \times 10^{-4}(12 - OM) M 1.14 + 3.25 (S-2) + 2.5 (P-3)) / 7.59 \times 100] \quad (4)$$

Where K = soil erodibility factor (ton h MJ⁻¹ mm⁻¹), OM is soil organic matter content, M is product of the primary particle size fractions, M = (%silt + %very fine sand) x (100 - %clay), S is soil structure code, P is permeability class. The average soil erodibility for each soil type was computed and added to the soil classification shape file database in ArcGIS 9.2 software. The shape file was subsequently converted to a 20 m grid of soil erodibility. Areas dominated by loam, clay, clay loam and sandy loam forms were assigned a K value of 0.202, 0.232, 0.256 and 0.311, respectively. Different soil types are naturally resistant and susceptible to more erosion than other soils and are function of grain size, drainage potential, structural integrity, organic content and cohesiveness. Erodability of soil is its resistance to both detachment and transport. Because of thick forested nature of the Taluk, detailed field surveys of soils in the area were not possible. So a generalized soil texture map collected from the soil survey organization, Tamil Nadu, was used for the preparation of K factor map and the soil types are grouped into four major textural classes viz. loam, clay, clay loam and sandy loam. Each soil type was associated with a K factor assuming that the same soil type has the same K factor throughout the study area. The K factor map (Figure 4) was computed with the reclassification methods of the GIS.

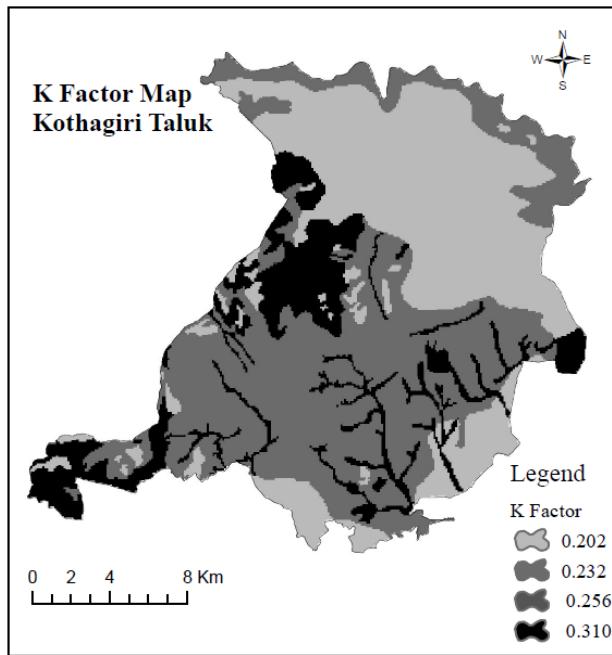


Figure 4: K factor map

C. Slope-Length (L) And Slope Steepness (S)

L factor, which is the function of 'slope length' along with the S factor (slope steepness), represents the topographical factor commonly expressed as LS factor. Many researchers have used these two L and S factors as the combined LS factor. Slope length, defined as "the distance from the point of origin of overland flow to either the point where the slope decreases to the extent that deposition begins or the point where runoff enters well defined channels" (Wischmeier and Smith 1978), is one of the difficult parameter to compute when estimating soil erosion unless an empirical field study is conducted.. S factor is basically the function of

the slope gradient. The slope steepness factor (S) relates to the effect of the slope gradient on erosion in comparison to the standard plot steepness of > 10 %. The effect of slope steepness is greater on soil loss compared to slope length. For this study, the combined LS factor was computed by means of ArcGIS spatial analyst extension. Twenty meter DEM (digital elevation model) of the study area was prepared by 20 m interval digitized contour from 1:50,000 scale topographic map of Survey of India. Topographic analysis was carried out using terrain analysis of ERDAS. Grid theme of elevation and slope prepared by 20 m DEM was used for preparing combined LS factor data of the study area. Combined LS factor was estimated using flow accumulation theme. The flow accumulation, which denotes the accumulated upslope contributing area for a given cell, was calculated by summing the cell area of all upslope cells draining into it. Computation was done from DEM using the watershed delineation tool available in hydrological modeling extension in arc view spatial analyst. This study uses a method proposed by Desmet and Govers (1996) to calculate the L and S factors. Besides inter rill and rill erosion, Desmet and Govers (1997) note through field observations that the two-dimensional approach of the RUSLE considers ephemeral gully erosion as a product of flow convergence. In this procedure, the RUSLE is adapted to a two-dimensional landscape in which the upslope length is substituted by the unit contributing area which is defined as the upslope drainage area per unit of contour length. A 20 m DEM created using contours was used to derive topographic variables such as slope length and steepness. The combined LS factor for the watershed was calculated and its spatial distributions in the different spatial gradients of the watershed were presented.

$$LS = (\text{Flow accumulation} \times \text{Cell size}/22:13)0:4 \times \sin \text{slope}/0:0896 \quad 1.3 \quad (5)$$

Where flow accumulation denotes the accumulated upslope contributing area for a given cell, LS = combined slope length and slope steepness factor, cell size = size of grid cell (for this study 20 m) and sin slope = slope degree value in sin. Figure 5 depicts the map of the LS factors, which ranged from 0.00 in the flat areas in the western part of the Taluk to 24.01 in the high-lands (elevation approximately 2,436 m) in the northern, northeastern, and southern parts of the study area, which had the steepest slopes, the greatest variability in elevation, and large LS values. The LS values were highest in the areas where the river forms deep valleys. These areas were mostly located in the upper part of the Taluk and also in the east and in the south (Figure 5).

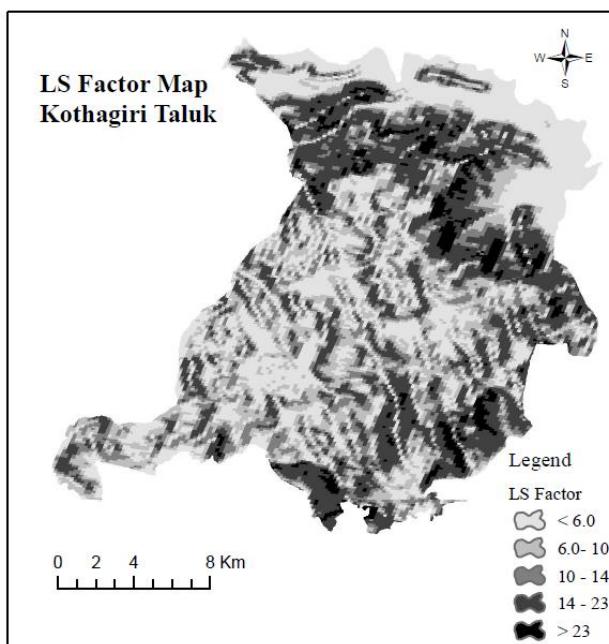


Figure 5: LS factor map

D. Cropping – Management Factor (C)

Cover Management Factor (C) factors that can be used to control soil loss at a specific site. The Cover Management Factor (C) represents the effect of vegetation and management on the soil erosion rates (Renard, Foster, Weesies, McDool, & Yoder, 1997). Cover Management Factor (C) is the ratio of soil loss of a specific crop to the soil loss under the condition of continuous bare fallow. The amount of protective coverage of a crop for the surface of the soil influences the soil erosion rate. C value is equal to 1 when the land has continuous bare fallow and have no coverage. C value is lower when there is more coverage of a crop for the soil surface resulting in less soil erosion. The crop management factor was calculated mainly from literature review, since there was not local data available regarding this factor. Based on the land use/cover classified image of Kothagiri Taluk, similar ecosystems were searched on

different bibliographical sources and therefore assigned to the ones existing in study area. The search was orientated to those areas with similar geographical settings. C factor ranges from 1 to approximately 0, where higher values indicate no cover effect and soil loss comparable to that from a tilled bare fallow, while lower C means a very strong cover effect resulting in no erosion (Pitt 2007). The land cover and management (C) factor is defined as the ratio of soil loss from land with specific vegetation to the corresponding soil loss from continuous fallow (Wischmeier and Smith 1978). A good estimation of the cover factor which only accounts for the vegetation cover can be derived rapidly from satellite imagery. Satellite imagery acquired during the rain season are more suitable for this application given that soil erosion is most active and vegetation cover is at its peak during this season. The effect of vegetation cover as a control on soil erosion is well established. Vegetation is regarded as the second most critical factor after topography used to derive the NDVI by computing the ratio (Band 4 - Band 3)/(Band 4 + Band 3). The NDVI is highly correlated with the amount of green biomass, and can therefore be applied successfully to provide information relating to the green vegetation variability. Studies by Van der Knijff (2000) and van Leeuwen (2003, 2005) provide a more refined and reasonable estimation of the C-factor using the NDVI. The IRS ID LISS III image was accurately rectified and terrain corrected using satellite which applies the geoference available in the ERDAS Imagine 9.1. The following equation was used to derive the C-factor in this study.

$$C = \exp \left[-\alpha \frac{NDVI}{(\beta - NDVI)} \right] \quad (6)$$

Where α and β parameters determine the shape of the NDVI curve. Reasonable results are produced using values of $\alpha = 2$ and $\beta = 1$.

Vegetated areas usual have NDVI values much greater than 0.1 while values less than 0 rarely contain vegetation and relate to non-photosynthetic materials such as water and bare soil (Figure 6). A lower vegetation threshold of 0.05 was set, below which vegetation was envisaged to be absent. The ability of NDVI in estimating vegetation cover was confirmed in the field through extensive ground truthing.

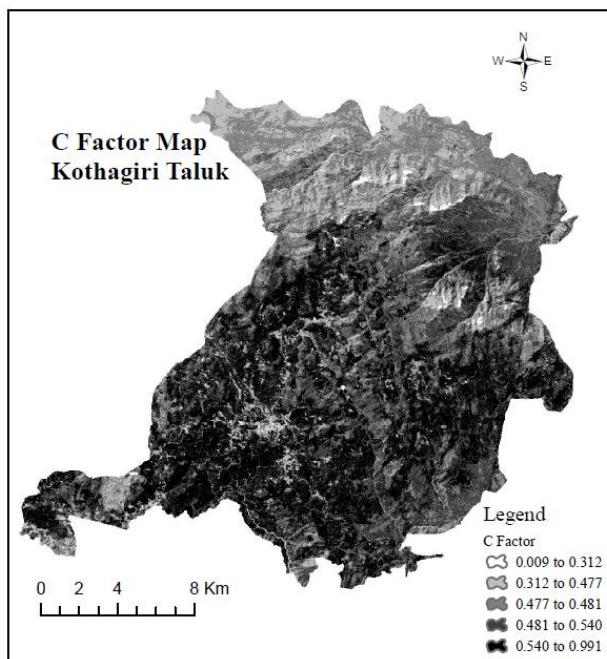


Figure 6: C factor map

E. Support Practice Factor (P)

The support practice (P) factor is the ratio of soil loss using a specific support practice to the corresponding loss with upslope and downslope tillage (Renard and others 1997). The conservation practice P factor is an important consideration of the RUSLE model. The support practice factor is defined as the ratio between soil loss with a specific support practice and the corresponding loss with upslope and downslope tillage. Renard and Forster (1983) explain that support practice essentially affects soil erosion through altering the flow pattern, gradients, or direction of surface runoff and by reducing the amount and rate of runoff. Information regarding conservation was obtained through field observations in the study area using a GPS. As in most agricultural lands in Taluk, agricultural practices in the study area consist of upslope and down slope tillage without any conservation support practices, such as contouring or terracing. In this study, remotely sensed data have been used to estimate the P factor distribution based on LULC classification results (Millward and Mersey 1999; Reusing and others 2000), assuming that the same land covers have the same P

factor values. An LULC map of the Kothagiri Taluk derived from the IRS ID LISS III full frame satellite images acquired on June 5, 2012 (route path 102 row 66,65), with a spatial resolution of 23.5-m, was used as the base map for determining the P factors. The digital image processing software ERDAS-Imagine was used to digitally interpret the satellite imagery. Reference data for classifying LULC in the study Taluk were collected from soil maps, aerial photographs, forest maps, and field studies. After synthesizing all of the information, the study area was classified into 10 LULC classes as follows: (1) Dense Forest, (2) Orchards, (3) Tea Plantation, (4) Vegetable cultivate areas, (5) Sholas, (6) Rangelands, (7) Forest Plantation, (8) Builtup lands. The supervised classification method (maximum likelihood) was used to extract the LULC classes as described by Lillesand and Kiefer (2000). The P factors used in this study were adopted from previous studies (Nalina 2014) that determined land classes using satellite data (Table 1). The accuracy assessment is generally compiled in the form of a confusion matrix in which the columns depict the number of pixels per class for the reference data, and the rows show the number of pixels per class for the classified image. From this confusion matrix, a number of accuracy measures, such as the overall, the user's, and the producer's accuracy, can be determined. The overall accuracy is used to indicate the accuracy of the entire classification (i.e. the number of correctly classified pixels divided by the total number of pixels in the error matrix), whereas the other two measures indicate the accuracy of individual classes. The user's accuracy is regarded as the probability that a pixel classified on the map actually represents that class on the ground or reference data, whereas the producer's accuracy represents the probability that a pixel on reference data has been correctly classified (Stehman and Czaplewski 1998). In our case, the overall classification accuracy was found to be 86.21 %, whereas the user's accuracy and producer's accuracy were 89.3 %, and 92.6 %, respectively. After creating the LULC map of the study area, the P factors for the land classes were entered as attributes and C factor map of the Kothagiri Taluk was generated using the reclassification method in the GIS. To remove the P factor from the soil erosion estimates, P was set equal to one as suggested by Wischmeier and Smith (1978). These conservancy zones were assigned a P factor of 0.03, (Figure 7) reflecting stringent conservation practice in these areas.

Table 1 .Average soil Loss from different landuse of Kothagiri Taluk.

Landuse	Crop Management Factor (C)	Area (Km ²)	Soil Loss (t ha ⁻¹ yr ⁻¹)	Losses (%)
Crop land	0.3	63.14	65.3	55.35
Dense Forest	0.04	87.811	4.6	3.90
Built-up Land	0	43.107	16.6	14.07
Tea Plantation	0.16	68.175	7	5.93
Sholas	0.3	33.709	6.32	5.36
Range lands	0.08	75.337	10.32	8.75
Orchards	0.42	9.259	2.4	2.03
Forest plantations	0.21	44.958	5.43	4.60

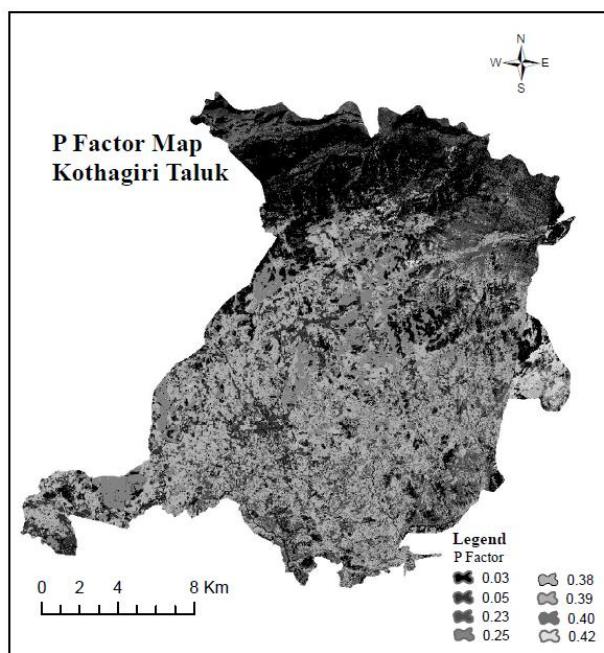


Figure 7: P factor map

V. RESULTS AND DISCUSSION

Soil erosion is still a serious problem in the Western Ghats of Kothagiri Taluk, and attempting different methods to evaluate soil loss at the watershed scale is necessary for sustainable land use and comprehensive Talukal development. RUSLE is often used to estimate average annual soil loss from an area. RUSLE model in GIS environment is a relatively simple soil erosion assessment method. ArcGIS 9.1 software was used to generate the spatial distribution of the RUSLE factors. The four factor layers (R, K, LS, and C) were all converted into grids using a 20-m data set of the Kothagiri taluk in the same reference system. Subsequently, these grids were multiplied in the GIS as described by the RUSLE function. Thus, the annual soil loss was estimated on a pixel-by-pixel basis, and the spatial distribution of the soil erosion in the studied taluk was obtained. To adopt the RUSLE, large sets of data starting from rainfall, soil, slope, crop, and land management are needed in detail. In developing countries all the necessary data are often not available or require ample time, money, and effort to prepare such data sets. RUSLE is a straightforward and empirically based model that has the ability to predict long term average annual rate of soil erosion on slopes using data on rainfall pattern, soil type, topography, crop system and management practices. In the present research, annual soil erosion rate map was generated for Kothagiri Taluk, a mountainous area, which represents most of the terrain characteristics of Western Ghats. Soil erosion mapping was modeled within Kothagiri Taluk, integrating the RUSLE with GIS. To predict average annual soil loss caused by sheet and rill erosion from the study, the parameters used in the RUSLE equation depend on soil characteristics, topography and landuse of the area. Based on this analysis, the amount of soil loss in the Taluk varies 0.54 to 27.11 t ha⁻¹ yr⁻¹. As shown in Figure. 9, the average annual soil loss of the Kothagiri has been found out to be 15.74 t ha⁻¹ yr⁻¹. A spatial location of the high soil erosion areas has been identified in this study. It also reveals that the potential soil loss is typically greater along the steeper slope and poor vegetation cover area. The Range land and dense forest of the Taluk are shown to be the least vulnerable to soil erosion. Tea plantation and sholas show medium soil loss. Other high soil erosion areas are dispersed throughout the Taluk and are typically associated with the landuse classes which have high erosion potential. In the higher elevation ranges, isolated pockets of open forest and dense forest have been cleared for agriculture, tea estates and horticultural crop lands. In this study, the highest amount of soil loss has been identified in the range lands and agricultural lands. Also urbanization and construction of roads in this area have affected the topography and increased the soil loss. This area has to be given special priority for the implementation of erosion control measures.

Potential annual soil loss is estimated from the product of factors (R, K, LS, C and P) which represents geo-environmental scenario of the study area in spatial analyst extension of Arc GIS software. The average soil erosion rate estimated for the upland of the Taluk ranges from 0.54 to 27.11 t h⁻¹ y⁻¹. Soil erosion rate calculated in these studies are found to be appropriate and matching. The results were also compared with the studies carried out in areas having similar geo-environmental and rainfall characteristics (Bacchi et al. 2000; Mati, 2000; Shiono et al. 2002; Lee and Lee, 2006; Yuksel et al. 2008; Adediji et al. 2010) and were found to be comparable with an annual average soil erosion rate of 12.63 t h⁻¹ y⁻¹. The assessed average annual soil loss of Kothagiri Taluk was grouped into different classes based on the minimum and maximum values and the spatial distribution of each class is presented in Figure 9. The grouping of different soil erosion severity zones was carried out by considering the field conditions. The results presented in Table 2 show that about 42% and 28% of the study area is classified as low potential erosion risk to very low potential erosion (3-5 t h⁻¹ y⁻¹, < 3 t h⁻¹ y⁻¹), while rest of the area is under moderate to very high erosion risk. In terms of actual soil erosion risk, the study area has 17% moderate (5-10 t h⁻¹ y⁻¹), 8.28 % (10 t h⁻¹ y⁻¹) high and 3.54 % (>20 t h⁻¹ y⁻¹) erosion risk levels. The spatial pattern of classified soil erosion risk zones indicates that the areas with high erosion risk are located in the east, and northwest part of the study area, while the areas with low erosion risk are in the north and south of the study area (Figure 8).

Table 2 : Soil erosion severity zones with erosion rate and area covered.

Soil erosion classes	Rate of Soil Loss (t ha ⁻¹ yr ⁻¹)	Area (km ²)	Losses (%)
Very High	>20	15.06	3.54
High	10- 20	35.23	8.28
Moderate	5-10	76.02	17.87
Low	3-5	179.12	42.10
Very Low	< 3	120.06	28.22

The results indicate that (as in Figure 9) erosion risk was generally low across all the LULC classes. However, traces of High erosion are available in the moderate forest class. From visual interpretation of the various factors, this was found to be due to the high erodibility of the soil group (Clay loamy) that intersects the sections of the moderate forest LULC Class. Also the forest class falls within the high rainfall zones of the study area which may contribute to high erosion within the forest cover class.

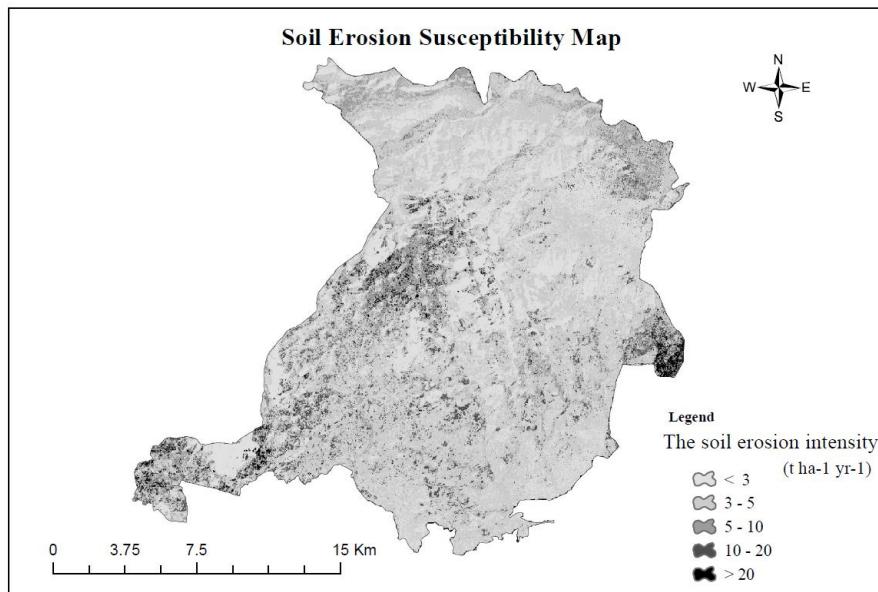


Figure 8: Soil erosion Susceptibility map

V. CONCLUSION

In this paper, a soil erosion model at Kothagiri Taluk with the integration of RUSLE and GIS tools has been developed to estimate the annual soil loss. Different components of RUSLE were modeled using various mathematical formulae to explore the relationship between erosion susceptibility, slope and LULC maps. The erosion map produced was then categorized into five different erosion risk classes. According to this model, approximately in 70 % of the Taluk has very low erosion risk to low erosion risk and 17% moderate erosion risk. But erosion risk is high and very high on 8.28 % and 3.54% respectively. Higher soil erosion was found to occur in the mid part of the study area. The soil texture in the affected area is coarse loamy to loamy skeletal. Hence soil detachment is higher. The very high and moderate erosion were found to be distributed mainly within the areas of high slope gradient and also sections of the moderate forest LULC class. The results indicated that areas within the cropping areas LULC class have a high erosion risk and this was due to the presence of an intersecting high erodibility soil group. This will improve the accuracy of the LULC maps and DEMs generated for land slopes calculations. It should be emphasized that the areas producing more erosion would need special priority for the implementation of soil erosion control measures. The predicted amount of soil loss and its spatial distribution can provide a basis for comprehensive management and sustainable land use for the entire Taluk. The ways of evaluating soil losses even with the lack of direct observation data presented in this paper could be useful for the land use decision makers in other part of the world. The soil loss map can be further classified into soil erosion susceptibility map. It can be used to identify the locations, where alternative soil conservation practices would be best applied. In general, it is clear from the results of this study that the developed model is beneficial for the rapid assessment of soil erosion susceptibility.

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AUTHORS

First Author – M.Kartic Kumar, Research Scholar, Department of Civil Engineering, S.R.M University, Chennai, Tamil Nadu, India.

Second Author – R.Annadurai, Professor and Head Department of Civil Engineering, S.R.M University, Chennai, Tamil Nadu, India

Third Author – P.T.Ravichandran. Professor, Department of Civil Engineering, S.R.M University, Chennai, Tamil Nadu, India.

Correspondence Author – M. Kartic Kumar. karthickumar.msm@gmail.com, Contact No: +919976890776.

Death Anxiety, Death Depression, Geriatric Depression and Suicidal Ideation among Institutionalized and Non-Institutionalized Elders

Godishala Sridevi¹& P. Swathi²

* Head f the Department, Child Development Center, GEMS Health Care, Masabtank, Hyderabad.

** Head of the Department, Department of Psychology, Osmania University, Hyderabad.

Abstract- The number of elderly people is growing very fast in both developed and developing Countries. The rapid change in the social and cultural values had made a tremendous impact on mental well being of elders. Death anxiety is a complicated factor that is experienced with variable severity during one's life, and is also influenced by a variety of factors such as environmental events, age, and sex. Death anxiety is an attitude that an individual holds towards death. It is defined as a negative and apprehensive feeling that one has when thinking about death and dying and is used interchangeably with fear of death. Several studies have shown that when death awareness and its associated anxiety are increased, individuals respond by defending and/or intensifying their cultural beliefs. Depression is a serious condition for people of all ages, but for older people depression is often associated with other co-morbid conditions, such as physical disability, dementia and anxiety that exacerbate the distress experienced by older people and their carers and studies also revealed that geriatric depression is prevalent in rural south India. Studies reveals that institutionalized elderly have more stress and less quality of life compared to non-institutionalized ones and non- institutionalized elderly had a higher life satisfaction than institutionalized and there is also gender difference.

Aim: The aim of the study is to investigate the death anxiety, death depression, geriatric depression and suicidal ideations among institutionalized and non-institutionalized elders.

Method: For the purpose the study which consists of 40 elders who are institutionalized at Warangal, and 40 elders who are staying with families at Warangal. The age range of the elders is 60 to 80 years and the informed consent was taken from the participants. The tools used are Death Anxiety Scale, Death Depression Scale, Geriatric Depression Scale (GDS) and The Modified Scale for Suicidal Ideation.

Results: The results shows that 47.5% elders are having mild death anxiety and 52.5% are having moderate level of death anxiety in both institutionalized and non-institutionalized elders. The institutionalized elders are having significant death depression, geriatric depression and suicidal ideation than non-institutionalized elders but there is no significant difference in death anxiety among institutionalized and non-institutionalized elders. There is no significant difference in death anxiety and death depression among institutionalized elders based on gender but non-institutionalized male elders are having significant death anxiety than female elders. The single elders are having

significant death depression, geriatric depression and suicidal ideation than coupled elders. There is no significant difference between death anxiety, death depression, geriatric depression and suicidal ideation based on age, SES, educational background of the elders and it is also found that rural elders are showing significant death depression than urban elders and urban elders are showing significant suicidal ideation than rural elders. There is correlation between death anxiety, death depression and geriatric depression.

Index Terms- Death Anxiety, Death Depression, Suicidal Ideation, Institutionalized & Non- Institutionalized Elders.

I. INTRODUCTION

The number of elderly people is growing very fast in both developed and developing Countries. The rapid change in the social and cultural values had made a tremendous impact on mental well being of elders. In the modern world elders are the mean of a burden on the family in all societies and cultures and mistreatment with elderly is common everywhere (Chokkanathan et al, 2008). Many families who lives in the urban localities are tend to send the elders in the institutions. Institutionalization provokes the feeling of loneliness and neglect in elders. Such living arrangements may have negative effects on the mental health of its residents, because placement is often accompanied by feelings of lack of control over one's own life, and inability to make decisions regarding daily issues (Ron, 2004). Death anxiety is an attitude that an individual holds towards death. It is defined as a negative and apprehensive feeling that one has when thinking about death and dying (Richardson et al., 1983) and is used interchangeably with fear of death (Feifel & Nagy, 1981; Wink & Scott, 2005). It also defined as "vague uneasy feeling of discomfort or dread generated by perceptions of a real or imagined threat to one's existence" (Moorhead et al., 2008). Several studies have shown that when death awareness and its associated anxiety are increased, individuals respond by defending and/or intensifying their cultural beliefs (Pyszczynski et al., 2004). A study revealed that 47.5% elders are having mild death anxiety and 52.5% are having moderate level of death anxiety and 40% of elders are having mild level of death depression and 60% of elders are having moderate level of death depression (Sridevi, 2014). It also found that there is no significant difference between death anxiety, death depression based on age, gender, SES, educational background of the elders

and the rural background elders are having more death anxiety and death depression than urban background elders (Sridevi, 2014).

Depression is a common but frequently unrecognized or inadequately treated condition in the elderly (Cindy & Helen 2011). In the elderly population, either in the institution or non institution, depression is the commonest mental illness (Nandi et al., 1997). Depression in the elderly is a widespread problem that is often not diagnosed and frequently under treated in Korea (Yang & Rim, 2006; Kim et al., 2009). The levels of depression of institutionalized Korean elderly are reported to be higher than those of community residing elderly (Oh & Choi, 2005; & Kim et al., 2009). Loneliness and worsening health have been shown to be risk factors for depressive symptoms. Cacioppo et al., (2006) reported that higher levels of loneliness were associated with more depressive symptoms in older adults. In the process of aging, elderly people experience decreasing physical function and worsened general health (Crews & Zavotka 2006; Bishop et al., 2006; & Kim et al., 2009). It has been found that when considering psychosocial status such depression has a relationship with health (Jeon, Kim, & Kim, 2005; & Kim et al., 2009). Residents in nursing homes have many physical and psychosocial needs, as elderly people who move into nursing homes experience a rapid change in their psychophysical balance (Degenholt et al., 2005; Scocco et al., 2006; & Kim et al., 2009). Recent studies found that the prevalence of depression was 56%, of which 23.2% had severe depression. Sixty percent of the female population and 52% of the male population were found to have depression. Some other study found that female participants would have lower death anxiety, and death anxiety levels would not differ between young adults and older adults (Chuin & Choo). Another study found that 69.5% females and 68.2% males had an average condition; while, 16.3% females and 19.6% males showed low level of death anxiety and whereas, 14.2% females and 12.2% males reported high death anxiety (Tavakoli et al., 2011). Prevalence of depression was found to be significantly higher among those chronic diseases, family conflicts, and lack of psychological support. There was no significant association with age, lack of financial support, literacy level, marital status and absence of a leisure time activity (Wijeratne, et al., 2000). The state of well being varies from 22.1% to 52.1% in the elders and the prevalence rate of mental morbidity is 89/1000 elders with geriatric depression accounting for 60/1000 (Rao, 1993). The study also revealed that geriatric depression is prevalent in rural south India. (Dubey, et al., 2011). Studies revealed that institutionalized elderly have more stress and less quality of life compared to non-institutionalized ones (Mathew et al., (2009). A study found that the institutionalized elders are having significant depression and suicidal ideation than non-institutionalized elders and single elders are having significant depression and suicidal ideation than coupled elders. Male elders are having more depression than female elders but in suicidal ideation female elders are having more than male elders. The study also revealed that there is no significant difference in depression and suicidal ideation between institutionalized elders and non-institutionalized elders based on age, educational background, socio economic status but urban elders are showing significant suicidal ideation than rural elders (Sridevi, 2014). The point prevalence of elderly suicidal ideation

was 6.1%. Female gender, age over 85 years, low level of education, single status, unemployment. No income, disability, current smoking, self-perceived bad to very bad health, depressive symptoms, various physical disorders (heart disease, diabetes, asthma, osteoporosis), and pain symptoms (joint pain, lower back pain, neck pain, sciatica, headache) were strongly associated with suicide ideation (Hsiang-Lin et al., 2011). The poor physical health including poor vision problems, hearing problem, and greater number of diseases and poor mental health especially in the form of depression are predictor of suicidal ideation in the elderly population (Yip et al., 2003). A research on the social networks of older persons in India to find the impacts of residency in old-age homes, gender differences, and joint and nuclear family residence. This research demonstrates that social networks are important for the welfare of older Indians, one can conclude that social policy that encourages the maintenance of robust networks throughout the life course may be worth pursuing. The analysis of the relationship between social network and gender suggests that current policies that can be seen as supporting gender inequality in terms of property may have a negative impact on the networks of older women (Willigen & Chadha, 2003). Some of the studies concluded that there is a need to pay interdisciplinary attention to the mental health of elderly residents of nursing homes, particularly in the preliminary stages of placement and adjustment (Ron, 2004). Previous findings also suggest that depression can be associated with an increased risk of incidence of dementia and ideation of suicide in the elderly (Devanand et al., 1996; Kim et al., 2009). Therefore, healthcare providers need to recognize the factors associated with depression in the institutionalized elderly so they can be prevented. Treatment for the elderly patients with depression should involve biopsychosocial dimensions targeting mood, cognition and functional ability at the same time (Cindy & Helen 2011).

II. METHODOLOGY

Aim: The aim of the study is to examine the death anxiety, death depression, geriatric depression and suicidal ideation among institutionalized and non-institutionalized elders.

Objectives:

1. To assess death anxiety, death depression, geriatric depression and suicidal ideation among institutionalized and non-institutionalized elders.
2. To assess death anxiety, death depression, geriatric depression and suicidal ideation among institutionalized and non-institutionalized elders based on type and gender of the elders.
3. To assess death anxiety, death depression, geriatric depression and suicidal ideation among institutionalized and non-institutionalized elders based on age, educational background, socio economic status and domicile of elders.

Hypothesis:

1. There would be significant difference in death anxiety, death depression, geriatric depression and suicidal ideation among institutionalized and non-institutionalized elders.

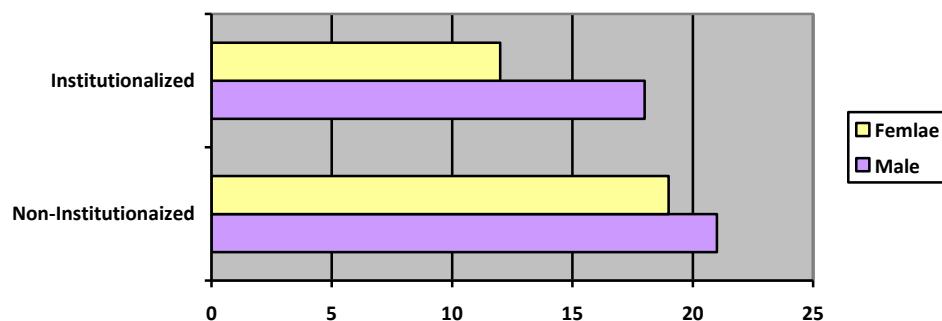
2. There would be significant deference in death anxiety, death depression, geriatric depression and suicidal ideation among institutionalized and non-institutionalized elders based on type and gender of the elders.
3. There would be significant difference in death anxiety, death depression, geriatric depression and suicidal ideation among institutionalized elders and non-institutionalized elders based on age, educational background, socio economic status and domicile of elders.

Procedure: The sample consists of 40 elders who are staying at old age home (Institutionalized) at Warangal, and 40 elders who are staying with their families (Non-Institutionalized) in the surroundings of Warangal. The tools Socio demographic data for the purpose of the study, Death Anxiety (DAS) developed by Templer D.I (1970), Death Depression Scale (DDS) developed by Templer et al., (1990), Geriatric Depression Scale (GDS) developed by Yesavage J.A. in 1983 and The

Modified Scale for Suicidal Ideation developed by Ivan W. Miller in 1991 were used in this study. The elders who were institutionalized, elders who were staying along with their family members, the age range of the elders is 60-80yrs with both genders, and the elders who are single, widows, diverse and couples were included in this study. The elders who have Alzheimer's and Parkinson disorder, neurological conditions, substance abuse, and having any past or present psychiatric history were excluded from the study. 40 samples collected from old age home and 40 samples collected who are staying with their family members. Informed consent was taken from the participants from who are willing to participate in this study. Mean, Standard deviation were calculated, student 't' test & 'F' test were used to find out the significance of difference between the elders for various variables selected for the study.

III. RESULTS & DISCUSSION

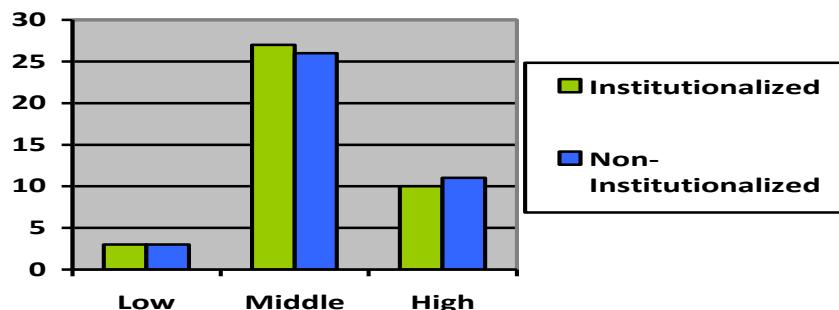
Graph-1: Institutionalized & non-institutionalized elders based on gender



The graph-1 gives demographic data of institutionalized and non institutionalized elders based on gender. It gives that Non-institutionalized female elders are 19 (48%), male elders are 21

(52%) and institutionalized female elders are 12 (30%), male elders are 18 (70%). In this sample male elders are more than female in both institutionalized and non-institutionalized elders.

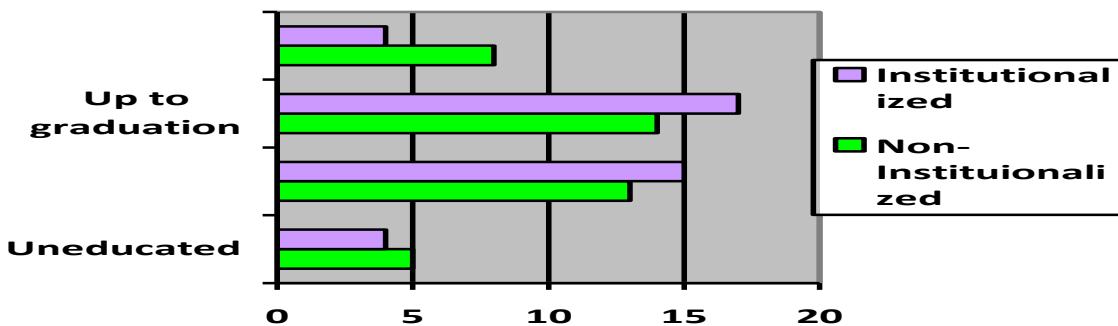
Graph-2: Socio Economic Status of Institutionalized & non-institutionalized elders



Graph-2 gives the socio economic status of non-institutionalized elders and institutionalized elders. The Non-institutionalized elders from low Socio Economic Status are 3(7.5%), middle SES are 26(65%), and high economic status are,

11(27.5%). The institutionalized elders from low SES are 3(7.5%), middle SES are 27(67.5%), and high economic status are, 10(25%). In this sample middle socio economic status elders are more than low and high socio economic status.

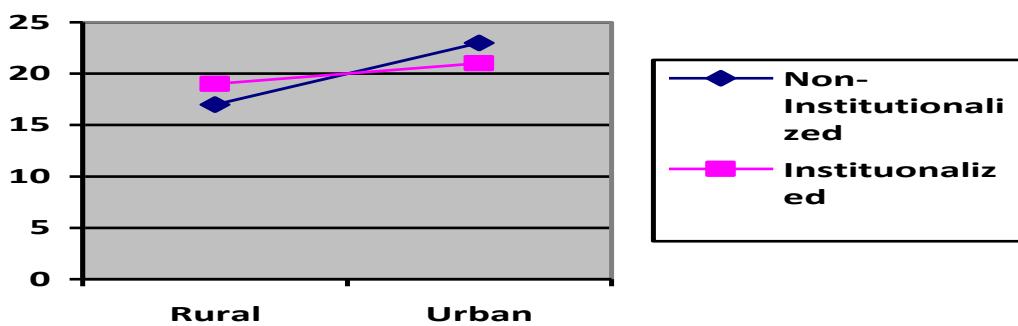
Graph-3: Educational Background of Institutionalized & non-institutionalized elders



Graph-3 gives the educational background of the institutionalized and non-institutionalized elders. Non-Institutionalized elders educational background such as uneducated are 5(11%), up to 10th class are 13(30%), up to graduation are 14(31%), and post graduation & above are

8(18%). Institutionalized elders educational backgrounds such as uneducated are 4(10%), up to 10th class are 15(38%), up to graduation are 17(42%), and post graduation & above are 4(10%). In this sample most of the elders are educated up to 10th class and graduated from both the groups.

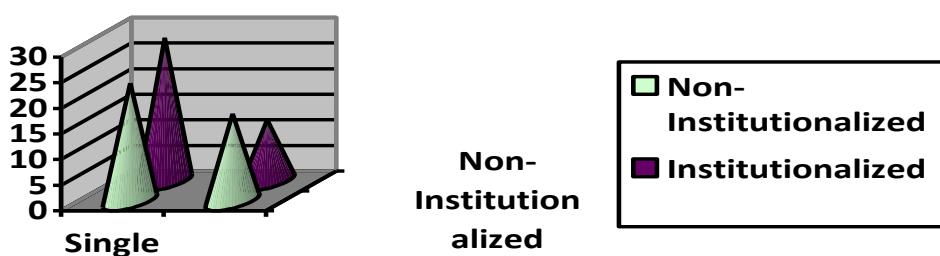
Graph-4: Domicile of Institutionalized & non-institutionalized elders



Graph-4 gives the domicile of the institutionalized and non-institutionalized elders. Non-institutionalized elders from rural background are 17(39%) and urban background are 23(52%).

Institutionalized elders from rural background are 19(47.5%) and urban background are 21(52.5%). In this sample most of the elders are belongs to urban background from both the groups.

Graph-5: Type of (Single/Coupled) Institutionalized & non-institutionalized elders



Graph-5 gives the type (Single/Coupled) of institutionalized and non-institutionalized elders. Non-Institutionalized single elders are 23(52%) and coupled elders are 17(39%).

Institutionalized single elders are 28(70%) and coupled elders are 12(30%). Most of the elders are single elders from both the groups.

Table-1: Means, SD and significance of death anxiety, death depression, geriatric depression & suicidal ideation in non-institutionalized and institutionalized elders

Item	Type	N	Mean	SD	t	df	
DAS	Institutionalized	40	7.35	1.92	0.387	78	0.7
	Non-Institu	40	7.17	2.11			
DDS	Institutionalized	40	9.5	2.81	3.17	78	0.003*
	Non-Institu	40	7.92	1.54			
GDS	Institutionalized	40	18.95	4.01	5.50	78	0.000**
	Non-Institu	40	14.70	2.76			
RSSI	Institutionalized	40	26.92	7.95	3.73	78	0.000**
	Non-Institu	40	20.75	6.78			

Table -1 gives the Means, SD and significance of death anxiety, death depression, geriatric depression and suicidal ideation in institutionalized and non-institutionalized elders. There is no significant difference in death anxiety among institutionalized and non-institutionalized elders. The Mean(\pm)SD scores of death anxiety in institutionalized elders is $7.35(\pm)1.92$ and in non-institutionalized elders is $7.17(\pm)2.11$. The both institutionalized and non-institutionalized elders are having same level of death anxiety. There is a significant difference in death depression among institutionalized elders and non-institutionalized elders. The Mean(\pm)SD scores of death depression in institutionalized elders is $9.5(\pm)2.81$ and in non-institutionalized elders is $7.92(\pm)1.54$. When the two groups

compared, the institutionalized elders are having significant death depression than non-institutionalized elders and it is significant at 0.00 level.

It also shows that there is a significant difference in depression and suicidal ideation among institutionalized and non-institutionalized elders. The Mean(\pm)SD scores of depression in institutionalized elders is $18.95(\pm)4.01$ and in non-institutionalized elders is $14.7(\pm)2.76$ and for suicidal ideation in institutionalized elders is $26.92(\pm)7.95$ and in non-institutionalized elders is $20.75(\pm)6.78$. When the two groups compared, the institutionalized elders are having significant depression and suicidal ideation than non-institutionalized elders and it is significant at 0.00 level.

Table-2: Significance of death anxiety, death depression, geriatric depression & suicidal ideation in Non-Institutionalized and institutionalized elders based on gender and type of elders (Single/Coupled)

Type	Item	Gender	Single/Coupled
Non-Institutionalized	DAS	0.000**	0.13
	DDS	0.75	0.001**
	GDS	0.00**	0.73
	RSSI	0.02*	0.04*
Institutionalized	DAS	0.69	0.202
	DDS	0.09	0.39
	GDS	0.578	0.04*
	RSSI	0.802	0.01*

Table -2 gives the significance of death anxiety, death depression, geriatric depression & suicidal ideation in institutionalized and non-institutionalized elders based on gender and type of elders. There is no significant difference in death anxiety and death depression among institutionalized elders based on gender but there is a significant difference in death anxiety among non-institutionalized elders based on gender. The Mean(\pm)SD scores of death anxiety in female institutionalized elders is $7.15(\pm)1.8$ and in male elders is $7.42(\pm)2.00$. The Mean(\pm)SD scores of death anxiety in non-institutionalized female elders is $5.68(\pm)1.82$ and in male elders is $8.52(\pm)1.28$.

For death depression in institutionalized female elders is $8.66(\pm)1.07$ and in male elders is $9.85(\pm)3.23$. The Mean(\pm)SD in non-institutionalized female elders is $7.84(\pm)1.57$ and male elders is $8(\pm)1.54$. It shows that the non-institutionalized male elders are having significant death anxiety than female elders and it is significant at 0.001 level. It also shows that there is no significant difference in death anxiety and death depression between institutionalized male and female elders. The institutionalized male and female elders are having same level of death anxiety and death depression among them. When the two groups compared; for total 80 elders, the Mean(\pm)SD scores of

death anxiety in female elders is $6.25(\pm)1.93$ and in male elders is $7.89(\pm)1.8$ and the Mean(\pm)SD scores of death depression in female elders is $8.16(\pm)1.43$ and in male elders is $9.06(\pm)2.78$. It shows that the institutionalized elders that male elders are having significant death anxiety than non-institutionalized elders and it is significant at 0.000 level. All the elders are showing same level of death depression among them.

There is a significant difference in depression and suicidal ideation among institutionalized and non-institutionalized elders based on gender. The Mean(\pm)SD scores of depression in female institutionalized elders is $19.5(\pm)3.5$ and in male elders is $18.71(\pm)4.23$. The Mean(\pm)SD in non-institutionalized female elders is $12.84(\pm)1.5$ and in male elders is $16.38(\pm)2.57$. For suicidal ideation in institutionalized female elders is $27.41(\pm)7.51$ and in male elders is $26.71(\pm)8.25$. The Mean(\pm)SD in non-institutionalized female elders is $17.38(\pm)7.95$ and male elders is $23.80(\pm)6.28$. It shows that the non-institutionalized male elders are having significant depression and suicidal ideation than female elders and depression is significant at 0.001 level and suicidal ideation is significant at 0.01 level. It also shows that there is no significant difference in depression and suicidal ideation between institutionalized male and female elders. The institutionalized male and female elders are having same level of depression and suicidal ideation among them. When the two groups compared; for total 80 elders, the Mean(\pm)SD scores of depression in female elders is $15.41(\pm)4.11$ and in male elders is $17.71(\pm)3.76$. It shows that the institutionalized elders are having significant depression and suicidal ideation than non-institutionalized elders and it is significant at 0.000 level.

It also gives that there is no significant difference in death anxiety among institutionalized and non-institutionalized elders based on type of elders but there is a significant difference in death depression among non institutionalized elders. The Mean(\pm)SD scores of death anxiety in single institutionalized elders is $7.6(\pm)2.09$ and in coupled elders is $6.75(\pm)1.35$. The Mean(\pm)SD in non-institutionalized single elders is $7.6(\pm)1.87$ and in coupled elders is $6.58(\pm)2.31$. For death depression the Mean(\pm)SD in institutionalized single elders is $9.75(\pm)3.14$ and in coupled elders is $8.91(\pm)1.78$. The Mean(\pm)SD in non-institutionalized single elders is $8.6(\pm)1.15$ and coupled elders is $7(\pm)1.54$. It shows that both institutionalized and non-institutionalized single and coupled elders are having same level of death anxiety. The non-institutionalized single elders are showing significant death depression than coupled elders and it is significant at 0.001 level. There is no significant difference in death depression among institutionalized elders which indicates that institutionalized single and coupled elders are having same level of death depression. When the two groups compared; single elders are having significant death anxiety and death depression than coupled elders. Death anxiety is significant at 0.01 level and death depression is significant at 0.001 level.

It shows that there is a significant difference in depression and suicidal ideation among institutionalized and non-institutionalized elders based on type of elders. The Mean(\pm)SD scores of depression in single institutionalized elders is $20.1(\pm)4.11$ and in coupled elders is $16.25(\pm)2.09$. The Mean(\pm)SD in non-institutionalized single elders is $14.56(\pm)2.38$ and in coupled elders is $14.88(\pm)3.27$. For suicidal ideation in

institutionalized single elders is $29.42(\pm)7.45$ and in coupled elders is $21.08(\pm)5.88$. The Mean(\pm)SD in non-institutionalized single elders is $22.65(\pm)6.77$ and coupled elders is $18.17(\pm)6.77$. It shows that non-institutionalized single and coupled elders are having same level of depression, but single elders are showing significant suicidal ideation than coupled elders and it is significant at 0.01 level. The institutionalized single elders are showing significant depression and suicidal ideation than coupled elders and it is significant at 0.01 level. When the two groups compared; single elders are having significant depression and suicidal ideation than coupled elders. Depression is significant at 0.01 level and suicidal ideation is significant at 0.001 level.

Table-3: Significance of death anxiety, death depression, geriatric depression and suicidal ideation among elders based on age, educational background, SES and domicile.

Item	Age	Education	SES	Domicile
DAS	0.927	0.309	0.685	0.241
DDS	0.625	0.074	0.626	0.004**
GDS	0.286	0.721	0.314	0.882
RSSI	0.204	0.473	0.629	0.047*

Table -3 gives the Means, SD and significance of death anxiety, death depression, geriatric depression and suicidal ideation in institutionalized and non-institutionalized elders based on age range of elders, education, Socio economic status and domicile of the elders. When the two groups compared there is no significant difference in death anxiety and death depression institutionalized elders and non-institutionalized elders based on age range of the elders. All the elders are having same level of death anxiety and death depression. The Mean(\pm)SD scores of death anxiety in uneducated, educated up to 10th class, graduated and post graduated elders are $7.88(\pm)2.31$, $7.28(\pm)1.8$, $7.41(\pm)2.14$ and $6.3(\pm)1.8$ respectively. The Mean(\pm)SD scores of death depression in uneducated, educated up to 10th class, graduated and post graduated elders are $7.88(\pm)1.61$, $8.21(\pm)1.75$, $9.58(\pm)3.13$ and $8.25(\pm)1.05$ respectively. The Mean(\pm)SD scores of death anxiety in low SES, middle SES, and high SES of elders are $6.66(\pm)2.25$, $7.37(\pm)1.82$, and $7.14(\pm)2.43$ respectively. The Mean(\pm)SD scores of death depression among low SES, middle SES, and high SES of elders are $7.83(\pm)2.78$, $8.7(\pm)1.71$, and $8.9(\pm)3.5$ respectively.

The Mean(\pm)SD scores of death anxiety in rural and urban background of elders are $7.55(\pm)1.91$, and $7.02(\pm)2.07$ respectively. The Mean(\pm)SD scores of death depression among rural and urban background of elders are $9.5(\pm)2.68$, and $8.04(\pm)1.89$ respectively. It shows that there is no significant in death anxiety and death depression among elders based on educational background, socio economic status and domicile. All the elders are having same level of death anxiety and death depression but rural elders are showing significant death depression than urban elders and it is significant at 0.05 level. It also gives the Means, SD and significance of Depression & suicidal ideation in institutionalized and non-institutionalized

elders based on age range of elders, education, Socio economic status and domicile of the elders. When the two groups compared there is no significant difference in depression and suicidal ideation between institutionalized elders and non-institutionalized elders based on age range of the elders. All the elders are having same level of depression and suicidal ideation. The Mean(\pm)SD scores of depression in uneducated, educated up to 10th class, graduated and post graduated elders are 18.22(\pm)2.53, 16.42(\pm)3.59, 16.74(\pm)4.55 and 16.91(\pm)4.71 respectively. The Mean(\pm)SD scores of suicidal ideation in uneducated, educated up to 10th class, graduated and post graduated elders are 25.33(\pm)7.76, 22.25(\pm)8.11, 25.22(\pm)7.59 and 22.83(\pm)8.91 respectively.

The Mean(\pm)SD scores of depression in low SES, middle SES, and high SES of elders are 19.83(\pm)9.02, 16.75(\pm)3.84, and 16.33(\pm)4.4 respectively. The Mean(\pm)SD scores of suicidal ideation among low SES, middle SES, and high SES of elders are 22.83(\pm)9.02, 23.49(\pm)8.1, and 23.85(\pm)7.45 respectively.

The Mean(\pm)SD scores of depression in rural and urban background of elders are 16.88(\pm)4.6, and 16.88(\pm)3.57 respectively. The Mean(\pm)SD scores of suicidal ideation among rural and urban background of elders are 21.88(\pm)8.52, and 25.43(\pm)7.2 respectively. It shows that there is no significant in depression and suicidal ideation among elders based on educational background, socio economic status and domicile. All the elders are having same level of depression and suicidal ideation. But urban elders are showing significant suicidal ideation than rural elders and it is significant at 0.01 level.

Table-4: Correlation of DAS, DDS, GDS and RSSI

Item	DAS	DDS	GDS	RSSI
DAS	1	0.364**	0.366**	0.351**
DDS	0.364*	1	0.264*	0.055
GDS	0.366**	0.264*	1	0.722**
RSSI	0.351**	0.55	0.722**	1

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

Table-4 gives the correlation of DAS, DDS, GDS and RSSI and they are correlated at 0.01 level and 0.05 level but there is no correlation found between DDS and RSSI.

IV. CONCLUSION

- The institutionalized elders are having significant death depression, geriatric depression and suicidal ideation than non-institutionalized elders and having same level of death anxiety in both elders.
- The single elders are having significant death anxiety, death depression, geriatric depression and suicidal ideation than coupled elders.
- The male elders are having significant death anxiety than non-institutionalized elders and all the elders are showing same level of death depression. There is gender difference on depression and suicidal ideation among institutionalized and non-institutionalized elders which

indicate that male elders are having significant geriatric depression and suicidal ideation than female elders.

- There is no significant difference in death anxiety, death depression, geriatric depression and suicidal ideation between institutionalized elders and non-institutionalized elders based on age, educational background, socio economic status and domicile of elders. All the elders are having same level of death anxiety and death depression but rural elders are showing significant death depression than urban elders and urban elders are showing significant suicidal ideation than rural elders.

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AUTHORS

First Author – Godishala Sridevi, Head f the Department, Child Development Center, GEMS Health Care, Masabtak, Hyderabad.

Second Author – P. Swathi, Head of the Department, Department of Psychology, Osmania University, Hyderabad.

Value Relevance of Accounting Information: An Empirical Study of Selected Indian Firms

Manisha Khanna

Research Scholar, Department of Business Management and Commerce, University Business School, Panjab University, Chandigarh, and Assistant Professor, Department of Commerce at Govt. PG College, Kalka

Abstract- The present study analyses the combined, individual, and incremental value relevance of accounting information produced by firms listed on the S&P BSE-500 for FY-2006 to FY-2010, and changes therein over a period of time. Results provide sufficient evidence that accounting information is value relevant for BSE-listed firms. The combined value relevance of accounting information represented by earnings per share and book value per share has declined while there have been insignificant changes in the incremental value relevance of accounting information.

Index Terms- Value relevance, earnings per share, book value of equity per share.

I. INTRODUCTION

Value relevance research is motivated by the fact that listed firms use financial statements as one of the major medium of communication with their shareholders and public at large. Market usually depends on financial reports prepared by the management of such firms. For making the financial reporting to be effective, information contained in the financial reports should be relevant and reliable (Barth *et al.*, 2001). Information is considered to be relevant when it influences the users' decisions to form predictions or help in confirming or correcting the past evaluations, while, it is considered reliable if can be depended upon to faithfully represent the transactions or events that it aims to represent without any undue error or bias (FASB, 1976). According to Barth *et al.* (2001) a value relevant information should have both the features of relevance and reliability.

The value of a firm is based on what the market perceives about its performance, and accounting disclosures provide the essential information so as to form the basis of such perception. Many studies have examined the value relevance of earnings per share (EPS), book value of equity per share (BVPS), and cash flows. Such studies have reported that earnings and book values have significant information content for equity valuation of a firm (e.g., Dechow, 1994; Cheng *et al.*, 1996; Pfeiffer *et al.*, 1998; Holthousen and Watts, 2001; Choi *et al.*, 2006; Kwon, 2009). Earnings and book values are considered more value relevant for firm's valuation than cash flows, as cash flows usually have severe matching and timing problems (Ohlson, 1995; Barth *et al.*, 1998; Collins *et al.*, 1999). Studies have also suggested that the value relevance of earnings and book values move inversely to one another, and that decline in value relevance of earnings is accompanied by increase in value

relevance of book values (Berger *et al.*, 1996; Burgstahler and Dichev, 1997; Collins *et al.*, 1997).

Research on value relevance of accounting information has lately drawn attention of both practitioners and academicians, specifically, during the global financial crisis of 2007-2009 reported by North America and European banks. Further, the recent scandals in India, such as the fraud at Satyam, have also highlighted the value relevance of accounting information for the Indian capital market (Krishnan and Krishnan, 2013). However, in India, the researchers have mainly focused on value relevance of financial statements with main focus on cash flow reporting (Vishnani and Shah, 2008; Srinivasan and Narsimhan, 2010).

II. LITERATURE REVIEW

This part of literature review has focused on studies that have examined the value relevance of accounting information. An accounting figure is value relevant if it has a significant strong predicted association with the stock prices or stock market indicators such as price-to-earnings or price-to-book ratios (Amir *et al.*, 1993). A large part of literature has identified earnings per share (EPS) and book value per share (BVPS) as the two most important accounting measures that have a significant positive association with market value of a firm, proxy by share prices (e.g., El-Gazzar *et al.*, 2006; Clarkson *et al.*, 2009; Oyerinde, 2009; Alfaraih and Alanezi, 2011; Khanagha *et al.*, 2011). Hunt *et al.* (1997) reported that the incremental explanatory power of BVPS has been found to be higher than that of EPS. The explanatory power of earnings and book value for stock prices in China had increased over time through 1992 to 1996 (Bao and Chow, 1999). Using a return and price model, Chen *et al.* (2001) examined the relationship between accounting information represented by EPS and BVPS, and stock price in the Chinese stock market during 1991-1998. Their findings showed that accounting information was value relevant according to both pooled cross-section and time-series regression.

Safajou *et al.* (2005) examined the empirical relationship of EPS and BVPS with stock market value, using the Ohlson (1995) model for the period 1997-2003. The results showed that there was a significant relationship between EPS, BVPS and price. Ragab and Omran (2006) investigated the value relevance of earnings and book values in the Egyptian market from 1998-2002 and explored that, based on both returns and price models, EPS and BVPS were all relevant and explained about 40 percent of the variation in stock prices. Qystein and Frode (2007) evaluated the value relevance of financial reporting over a period of 40 years highlighting that the value relevance of Norwegian

GAAP was non-declining throughout 1965-2004. Chandra and Ro (2008) found that the combined value relevance of earnings and revenues had stayed constant and that the value relevance of earnings had declined while the impact of revenues on price had not decreased. Pourheydari *et al.* (2008) compared the value relevance of book value and dividends versus book value and reported earnings in the Tehran Stock Exchange from 1996-2004. The results indicated that there was a positive relationship of dividends, book value, and earnings with stock market value. Dung (2010) tested the value relevance of financial statement information on the Vietnamese stock market. Results showed that the value relevance of accounting information was statistically meaningful, though somewhat weaker than in other developed and emerging markets. Filip (2010) investigated the impact of the mandatory IFRS adoption in Romania to show an increase in the value relevance of earnings post IFRS implementation.

Some studies have examined the value relevance of earnings and book values for voluntary early adopters of the International Accounting Standards (IASs). Bartov *et al.* (2005) examined the effect of adoption of IASs for their sample of 37 German companies using a linear pricing model. They employed a pre-post design and found an increase in the value relevance of earnings on switching from the German GAAP to IASs. Hung and Subramanyam (2007) explored the value relevance of re-statement differences for 80 voluntary (early) IASs adopters in Germany. They found that the combined value relevance of EPS and BVPS decreased after switch to the IASs. Barth *et al.* (2008), used a pre-post design for a sample of 319 firms that voluntarily adopted IASs between 1994-2003, found that the R^2 for the price level model increased from 28 percent to 40 percent in the adoption year relative to the pre-adoption year for the IASs adopters.

III. OBJECTIVES OF THE STUDY

- To determine the value relevance of accounting information represented by earnings and book values,
- To examine the changes in the value relevance of accounting information over a period of time.

IV. RESEARCH METHODOLOGY

The S&P BSE-500 Index constitutes the population for the present analysis. The study has been carried out for the financial years April 01, 2006 to March 31, 2011. Companies in the banking, insurance, finance industry, and central public sector enterprises (CPSEs) were eliminated due to their unique industry regulations. Finally, companies with missing data over the study period and financial year ending other than the fiscal year (April 01 - March 31) of a particular year were excluded from the analysis. These sample selection criteria resulted in a final sample of 241 firms with 1,205 firm-year observations over the five year study period for assessing the value relevance of accounting information.

The data required for the study relates to the stock price and financial reporting information, which has been obtained from the corporate database (PROWESSION) maintained by the Center for

Monitoring the Indian Economy (CMIE), annual reports of the companies, and the website of the BSE (<http://www.bseindia.com>), and Moneycontrol (<http://www.moneycontrol.com>). In order to examine the value relevance of accounting information, the measurement approach of value relevance has been used. According to this approach, value relevance of financial statements is measured by their ability to capture or summarize the information that has affected stock price summaries which makes them relevant in equity valuation. The Ohlson (1995) Price Valuation Model has been used in the present study to determine the value relevance of accounting information. This model expresses market price per share (MP) as a function of both earnings per share (EPS) and book value per share ($BVPS$). The following Value Relevance Models have been used to assess the value relevance of accounting information:

$$\text{Model 1: } MP_{jt} = \alpha_0 + \alpha_1 EPS_{jt} + \alpha_2 BVPS_{jt} + e_{jt}$$

$$\text{Model 2: } MP_{jt} = \beta_0 + \beta_1 EPS_{jt} + e_{jt}$$

$$\text{Model 3: } MP_{jt} = \gamma_0 + \gamma_1 BVPS_{jt} + e_{jt}$$

where

MP_{jt} = Market price per share of firm j in year t three months after the balance sheet date

EPS_{jt} = Earnings per share based on PAT for firm j in year t

$BVPS_{jt}$ = Book value of equity per share for firm j in year t

e_{jt} = Error term for firm j in year t

V. RESEARCH HYPOTHESES

Based on literature review, following research hypotheses have been formulated regarding value relevance of accounting information:

H1a: *There is a positive relationship between market value of a firm represented by share prices and accounting information represented by EPS and BVPS.*

H1b: *The incremental and combined value relevance of accounting information changes over a period of time.*

VI. ANALYSIS AND RESULTS

6.1 Descriptive Statistics

Descriptive statistics were generated for the sample used to test value relevance hypotheses. Table 1 provides descriptive statistics based on the panel cross-sectional times series using the full sample of 1,205 firm-year observations for the dependent and independent variables. The table shows the mean, median, standard deviation, minimum, and maximum for the variables of interest.

Table 1: Descriptive Statistics (n = 1,205)

Variable	Mean	Median	Standard Deviation	Minimum	Maximum
MP	41.051	21.067	57.402	0.706	583.058
EPS	2.567	1.468	4.030	-5.416	76.806
BVPS	13.305	9.025	13.028	0.106	93.121

Note: MP is the market price per share of firm j in year t three months after the balance sheet date. EPS is the earnings per share based on PAT for firm j in year t . $BVPS$ is the book value of equity per share for firm j in year t .

Table 1 shows that MP varied significantly, ranging from ₹ 0.706 crore to ₹ 583.058 crore with a mean (median) of ₹ 41.051 crore (₹ 21.067 crore). The table indicates that the mean (median) EPS during the study period is ₹ 2.567 (₹ 1.468 crore), ranging from a loss of ₹ 5.416 crore to ₹ 76.806 crore. The mean (median) $BVPS$ is ₹ 13.305 crore (₹ 9.025 crore), ranging from ₹

0.106 crore to ₹ 93.121 crore. Mean $BVPS$ is about five times higher than that of EPS . The mean values of MP , EPS , $BVPS$, tended to be higher than their respective median, indicating that the distribution was positively skewed.

6.2 Correlation Analysis

The correlation is examined to measure the association between the variables. Table 2 shows the Spearman correlation coefficients (above the diagonal) and the Pearson correlation coefficients (below the diagonal) for the panel data.

Table 2: Correlation Matrix (n = 1,205)

Variable	MP	EPS	BVPS
MP	1.000	0.800**	0.612**
EPS	0.652**	1.000	0.765**
BVPS	0.602**	0.689**	1.000

Note: ** Correlation is significant at the 0.01 level (two-tailed). * Correlation is significant at the 0.05 level (two-tailed). MP is the market price per share of firm j in year t three months after the balance sheet date. EPS is the earnings per share based on PAT for firm j in year t . $BVPS$ is the book value of equity per share for firm j in year t .

The correlation matrix shows, in line with expectations, a strong positive correlation between EPS and MP (0.800). The association between $BVPS$ and MP is also strong and positive (0.612) but less in magnitude than that of EPS with MP . Similar results are obtained for the Pearson correlation. EPS and $BVPS$ are also significantly positively correlated with each other.

information. Further, the significant regression coefficients of the independent variables are used as an indicator of value relevance of individual independent variables.

Consistent with past research, Adjusted R^2_T obtained from Model 1 yields the result of combined value relevance of accounting information while the Models 2 and 3 have been inserted so as to determine the individual value relevance of EPS and $BVPS$, as measured by their respective Adjusted R^2 's (Collins *et al.*, 1997). The Adjusted R^2_T (combined value relevance of accounting information) has been decomposed into two parts, viz., incremental explanatory power provided by EPS represented by Adjusted R^2_{EPS} , and incremental explanatory power provided by $BVPS$ represented by Adjusted R^2_{BVPS} . Table 3 presents the results of Generalised Least Square Random Effect Model for the panel and yearly cross-section regressions of MP on EPS and $BVPS$ jointly, individually, and incremental value relevance of EPS and $BVPS$.

6.3 Multivariate Analysis

6.3.1 Value Relevance of Accounting Information

The objectives of the study are to determine the value relevance of accounting information represented by EPS and $BVPS$, and changes therein over a period of time. Panel and yearly cross-sectional regressions of value relevance models are determined for this purpose. Yearly cross-sectional regressions help in examining the changes in the combined and incremental value relevance of EPS and $BVPS$. Adjusted R^2 is used as the primary indicator of the value relevance of accounting

Table 3: Panel and Yearly Cross-sectional Regressions of MP on EPS and $BVPS$

Model 1: $MP_{it} = \alpha_0 + \alpha_1 EPS_{it} + \alpha_2 BVPS_{it} + e_{it}$												
Model 2: $MP_{it} = \beta_0 + \beta_1 EPS_{it} + e_{it}$												
Model 3: $MP_{it} = \gamma_0 + \gamma_1 BVPS_{it} + e_{it}$												
Year	N	α_1	α_2	Adj. R^2_T (A)	F Statistics (p-value)	β_1	Adj. R^2_2 (B)	γ_1	Adj. R^2_3 (C)	Adj. R^2_{EPS} (A)	Adj. R^2 (C)	Adj. R^2_{BVPS} (A)
2006-2007	241	13.615*** (4.83)	1.126* (1.92)	0.611	56.06 (0.000)	16.384*** (8.57)	0.603	4.606*** (9.59)	0.458	0.153	0.008	
2007-2008	241	5.240*** (4.82)	1.392*** (3.53)	0.593	60.13 (0.000)	8.466*** (9.30)	0.556	2.932*** (10.95)	0.526	0.067	0.037	
2008-2009	241	12.409*** (7.35)	0.634** (2.47)	0.614	61.27 (0.000)	14.022*** (9.78)	0.604	2.652*** (9.65)	0.336	0.278	0.010	
2009-2010	241	10.206***	0.540*	0.532	37.91	12.256***	0.526	2.368***	0.416	0.116	0.006	

		(4.48)	(1.28)		(0.000)	(8.56)		(9.21)			
2010-2011	241	2.287*** (1.43)	1.520*** (4.65)	0.383	29.31 (0.000)	4.621** (2.09)	0.248	1.997*** (7.91)	0.341	0.042	0.135
Panel	1,205	5.855** (2.31)	1.124** (2.60)	0.470		7.768*** (3.26)	0.426	2.426*** (10.03)	0.362	0.108	0.044
Wald χ^2				123.09 (0.000)			10.65 (0.000)		100.60 (0.000)		

Note: *, **, *** Significant at 10%, 5%, and 1% (two-tailed) respectively. All regressions are performed with robust standard errors. t -statistics based on robust standard errors are reported in parentheses. MP is the market price per share of firm j in year t three months after the balance sheet date. EPS is the earnings per share based on PAT for firm j in year t . $BVPS$ is the book value of equity per share for firm j in year t .

As evident, coefficients on EPS and $BVPS$ are positive and significant at better than the 5 percent level in every year and 1 percent level in most of the years. In general, as the estimated coefficient for EPS declines from one year to the next, the estimated coefficient for $BVPS$ increases, and vice-versa. As can be observed, EPS response coefficient declines from 13.615 to 5.240 in 2007-2008 and $BVPS$ estimated coefficient increases from 1.126 to 1.392. Similarly, decline in EPS estimated coefficient from 10.206 to 2.287 in 2010-2011 is set-off by increase in $BVPS$ estimated coefficient from 0.540 to 1.520. The Adjusted R^2 of the yearly cross-sectional regressions of MP on EPS and $BVPS$ ranged from 0.383 in 2010-2011 to 0.614 in 2008-2009. The Adjusted R^2 of the yearly cross-sectional regressions of MP on EPS ranged from 0.248 in 2010-2011 to 0.604 in 2008-2009 while yearly cross-sectional regressions of MP on $BVPS$ ranged from 0.336 in 2008-2009 to 0.526 in 2007-2008.

The Adjusted R^2 for the panel cross-sectional time series regression indicates that EPS and $BVPS$ jointly explain about 0.470 of the cross-sectional variation in share prices. Overall, the results are significant for the regression coefficient as well as for the regression model ($Wald \chi^2 = 123.09; p < 0.01$). The coefficient estimates of EPS ($\beta = 5.855; p < 0.05$) and $BVPS$ ($\beta = 1.124; p < 0.01$) are significantly positive and consistent with past research (Collins *et al.*, 1997; Ou and Sepe, 2002), thus, confirming the value relevance of EPS and $BVPS$ for firms in the sample. The significantly positive coefficient estimates for the panel and yearly cross-sectional regressions support the conjecture that both EPS and $BVPS$ are significantly positively related to share prices. It indicates that a one unit increase in EPS is expected to generate 5.855 times unit increase in MP , while a unit increase in $BVPS$ is expected to generate a MP increase of 1.124 units per share.

Results of panel data of Value Relevance Model 2 shows that EPS individually explains about 0.426 of the variation in MP ($Wald \chi^2 = 10.65; p < 0.01$). The coefficient on EPS ($\beta = 7.768; p < 0.01$) is positive and significant at 1 percent level. Results of panel data of Value Relevance Model 3 reveal that $BVPS$ individually explains about 0.362 of the variation in MP . The coefficient on $BVPS$ ($\beta = 2.426; p < 0.01$) is also positive and significant at 1 percent level ($Wald \chi^2 = 100.60; p < 0.01$). It is also evident that the incremental value relevance of EPS (Adjusted R^2_{EPS}) is about 2.454 times more in magnitude than the incremental value relevance of $BVPS$ (Adjusted R^2_{BVPS}), i.e., 0.108 vs. 0.044. This is visible in results of yearly cross-sectional regressions also. The incremental explanatory power of EPS

increases and decreases over time but it always remains greater than the incremental explanatory power of $BVPS$ except for the year 2010-2011. In all the years under analysis, magnitude of coefficient on EPS is more than the coefficient on $BVPS$. Further, the value for Adjusted R^2 's obtained from Value Relevance Model 2 is more than that of Model 3 except for the year 2010-2011. Overall, these results confirm the findings of Oyerinde (2009) that EPS is the single accounting number that is reported most often in media and receives the most attention of investors.

Thus, the findings based on the price model strongly support H1a that *there is a positive relationship between market value of a firm represented by share prices and accounting information represented by EPS and BVPS*. The results for the Value Relevance Model 1 are also consistent with the findings obtained from the developed markets (Collins *et al.*, 1997; Francis and Schipper, 1999; Hellstrom, 2006). For e.g., in the present study, EPS and $BVPS$ jointly explained 0.470 of the cross-sectional variation in MP , which in the Collins *et al.* (1997), a benchmark in the value relevance literature, was 0.540. The yearly cross-sectional regressions of MP on EPS and $BVPS$ in the present study ranges from 0.383 to 0.614, which is also consistent with the findings of Collins *et al.* (1997), which obtained 0.502 percent to 0.754. These results suggest that BSE-listed companies have earnings and book values that generally display properties similar to those in developed markets.

In addition, when comparing the results of present study with those of previous studies in emerging markets, the EPS and $BVPS$ of BSE-listed companies appear more value relevant. For e.g., Ragab and Omran (2006) revealed that earnings and book values explained about 0.400 of the variations in stock prices during 1998-2002 in the Egyptian equity market, being 0.07 lower than results of present study. Similarly, Bae and Jeong (2007) investigated the value relevance of earnings and book values of the Korean firms during 1987-1998. Their results showed that earnings and book values explained 0.340 of the variations in security prices, which was 0.130 lower than for BSE-listed companies. Results of this study are also comparable with prior value relevance studies in India, which provide support for the value relevance of dividend, and return on net worth.

In summary, the findings for the price regressions provide convincing evidence that the EPS and $BVPS$ for the sample of BSE-listed firms reported played an important role in equity valuation for the period 2006-2010. The results confirm with those found in mature capital markets. Interestingly, the results

show that **EPS** and **BVPS** are more value relevant in India than other emerging markets. The results presented here are also more significant than those found by earlier Indian-based studies on value relevance.

6.3.2 Changes in the Combined and Incremental Value Relevance of Accounting Information

Studies based on the investigation of changes in the value relevance of earnings and book values have found that the incremental value relevance of EPS has declined over a period of time, but it has been offset by an increased incremental value relevance of BVPS. Thus, overall the combined value relevance of these two accounting measures has not declined (Collins *et al.*, 1997; Francis and Schipper, 1999; Lev and Zarowin, 1999, Jang *et al.*, 2002). In this section, it is determined whether there are

any significant differences across time in the combined or in the relative incremental value relevance of **EPS** and **BVPS**. The Adjusted R^2_T obtained from Value Relevance Model 1 and incremental value relevance of **EPS** (Adjusted R^2_{EPS}) and **BVPS** (Adjusted R^2_{BVPS}) were regressed on a time-trend variable (*TIME*). The significant regression coefficient of explanatory variable (*TIME*) has been used as an indicator of change in the combined and incremental value relevance of **EPS** and **BVPS**. The value relevance is expected to have declined (increased) over a period of time if the regression coefficient on *TIME* turn out to be significantly negative (positive). Table 4 presents the results of regressing combined, and incremental **EPS** and **BVPS** on *TIME*-trend variable.

Table 4: Regression of the Adjusted R^2_T , Adjusted R^2_{EPS} and Adjusted R^2_{BVPS} on a Time-trend Variable

									(i)
									(ii)
									(iii)
δ_0	δ_1	Adj. R^2	θ_0	θ_1	Adj. R^2	λ_0	λ_1	Adj. R^2	
0.702*** (12.97)	-0.052* (-2.70)	0.707	0.183* (2.55)	-0.017 (-0.97)	0.087	-0.028 (-0.81)	0.022 (1.43)	0.411	

Note: *, **, *** Significant at 10%, 5%, and 1% (two-tailed) respectively. All regressions are performed with robust standard errors. *t*-statistics based on robust standard errors are reported in parentheses.

The results from regressing the Adjusted R^2 values of combined and incremental **EPS** and **BVPS** on a time-trend variable demonstrate that there is a significant decline in the combined R^2 value over the sample period ($\delta_1 = -0.052$, $p < 0.10$). However, the coefficients on the *TIME* variable for incremental **EPS** and incremental **BVPS** suggest that there is an insignificant decline in the incremental value relevance of **EPS** ($\theta_1 = -0.017$) and an insignificant increase in the incremental value relevance of **BVPS** ($\lambda_1 = 0.022$) over the sample period. These results are not in conformity with prior research which has demonstrated a significant decline in the incremental value relevance of earnings, but has been offset by the increased incremental value relevance of book values (Collins *et al.*, 1997; Francis and Schipper, 1999; Lev and Zarowin, 1999, Jang *et al.*, 2002). Thus, these results do not hold **H1b**, i.e., **the incremental and combined value relevance of accounting information changes over a period of time**.

VII. CONCLUSION

Consistent with expectations, the findings based on the price regressions provide evidence of the value relevance of **EPS** and **BVPS** for a sample of 1,205 firm-year observations for FY 2006 to FY 2010 BSE-listed firms. The results for the combined price regression are also consistent with the findings obtained from the developed markets. In addition, when comparing the results of present study with those of previous studies in emerging markets, as well India, the **EPS** and **BVPS** of BSE-listed firms appear to be more value relevant. There has been a significant decline in the combined value relevance of accounting information over the

sample period. MP is the primary dependent variable while EPS and BVPS are the two key independent accounting measures used in the study. The study could be extended by including more independent variables like cash flows, dividends, etc., for examining variation in share prices or by conducting pooled analysis.

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AUTHORS

First Author – Manisha Khanna, Research Scholar, Department of Business Management and Commerce, University Business School, Panjab University, Chandigarh, and Assistant Professor, Department of Commerce at Govt. PG College, Kalka. E-mail: manishakhanna123@yahoo.com

The Story of Neglect of Jammu Region: An Analysis

Mamta Sharma and Natasha Manhas

Post Graduate Department of Political Science, University of Jammu

Abstract- Since its accession to the Indian union, Jammu and Kashmir is facing several inter-state and intra-state upheavals. As an enduring inter-state problem between India and Pakistan, Jammu and Kashmir attracted enormous international attention but comparatively its intra-state hostility got a lesser notice. This article, dealing with the historic debate of politics of regionalism, explores the Kashmir centric leadership and New Delhi's calculated denial of Jammu and Ladakh regions genuine demands. This article argues that both governments approach of denial is the major reason behind Jammu and Kashmir prolonging intra-state dispute which, through, the internal chaos, has maintained the cycle of unbridgeable "regional paradox". In this context, it examines that calculated rifts have been institutionalized in Jammu and Kashmir political system which constantly guides crises to recur. This discussion re-examines Jammu regional problem based on the historical record.

Index Terms- Region, Jammu, Crisis, Discontent, Agitation, Inter-state conflict, Politico-regional tension.

I. INTRODUCTION

The contemporary state is confronted of a variety of problems which are related to the socio-economic and political-cultural aspects of life. These problems are quite pressing and their impact in terms of mass poverty, deprivation, inequalities, alienation and violence is easily discernible. Among the various social divisions in contemporary era, regional divisions have probably raised some of the most complicated issues. Inter-provincial relations have profoundly affected the course of events in the state. In turn every political development has influenced inter provincial relations. In 1947, events in the sub-continent, independence of the country and its partition, affected different provinces differently, while divergent aspirations of the regions influenced the state's future course. The geographical factors of a region influence the political life of the people both directly as well as indirectly in more than one way. Firstly the topographic, climatic, pedagogical, vegetation and the resultant socio-cultural attributes of the inhabitants of an area give it a distinct physical personality of a region. The regional identity of a place promotes regionalism among its inhabitants. Secondly, the inter-regional physical barriers, long distances between the two regions inaccessibility, climatic variations and sharp socio-cultural differences between two regions hinder the process of inter-regional interactions and emotional integration among the people of such regions. Thirdly, the spatial distribution of human attributes such as ethnicity, language, religion, culture, caste, ideology etc in a regional pattern over an area gives its inhabitants a sense of distinct identity. The crux of regionalism

lies in the economic under development and coupled with the new development scheme that has generated a struggle among different groups and regions for acquiring more economic gains. The state of Jammu and Kashmir is comprised of three main regions Jammu, Kashmir and Ladakh. The internal politics of the state, marked by inter regional tensions, has influenced the attitude of the people on the question of their external affiliations. In each of the three regions of the state, a different attitude on the issue of accession can be clearly noticed from the very day of state's accession to India. A sort of local nationalism had developed in all the three regions of the state. People's alienation from the national identity has been a constant problem in Kashmir since long. They tend to give more importance to ethno-religious and regional identities than to considerations of united state and the nation. In Jammu and Ladakh regions, regionalism developed as a reaction to the politics of Kashmir valley where the special status propped the accession of the state to India. The people of Jammu and Ladakh took special status of the state as a special favour to the Kashmir valley and therefore, to the majority community of the state at the cost of minorities.

II. JAMMU REGION

The clash between Jammu and Kashmir regions has apparently been communal and ideological. They are different not only in language and culture but also in their predominant religion. The National Conference essentially represented the regional patriotism of Kashmir valley. It had confined its activities to that region mainly, because it was inhabited by its basic philosophy, i.e. regional patriotism of Kashmir. Moreover Kashmir leadership did not have much contact with and trust in Jammu workers of their party, which functioned in an adhoc manner with repeated changes in the composition of its communities at various levels in the region. The growth of regional consciousness in Jammu after independence was sharp and fast. The political and administrative set up between the state and the Indian union brought about in 1947, proved conducive to regional tensions.

Agitational politics of Jammu region is mainly an elite response in the context of the power politics of the state. The power politics has been so organized in the state that the political elite of Jammu region did not get much opportunity to either share the political power or to influence the decision making process. Hence they often resorted to politics of protest and agitation tactic's to overcome their invisibility. There is a perception about political dominance of Kashmir and Kashmir's. There is widespread feeling that one comes across in Jammu region that political decisions in the state are Kashmir oriented and in the allocation of resources in the Jammu region remains perpetually discriminated and yet, there is another context of

perceptions about deprivations. As per this perception the real deprivation lies in the peripheral areas of Jammu region. The politics of discontent is not as much defined by the context of regional discrimination as much as by the sub regional neglect. The first kind of discontent is targeted against Kashmir as the center of political power. It is a regional level discontent that manifests the absence of parity within the state among three regions of the state. This kind of discontent is either expressed in terms of regional imbalances, in economic and development terms. The basic deprivation of Jammu region has neither been psychological nor material but it has been the political one. Jammu region could never get properly represented in the structure of power. The structure of power in the initial years of popular rule reflected excessive concentration of power in the hands of Kashmir's political elite gradually; it became a norm that Jammu would at best have nominal share in power.

The tale of Kashmir's total domination over the state's politics and economy began when in 1951 Sheikh Abdullah's valley centric and valley based National Conference dispensation delinked Jammu and Kashmir from the census operations conducted that year throughout the country ignored the 1941 census report as well as the sea change undergone in the state's demographic landscape owing to the migration of over one lakh refugees from the Pakistan Occupied Kashmir and also the migration of thousands of Hindus and Sikhs from valley to Jammu region and delimited the constituencies for the legislative assembly in an irrational way. The Praja Parishad launched the first major agitation of Jammu in 1952. This agitation set the tone for protest politics of Jammu region. This agitation was a response to arbitrary nature of exercise of power by the political elite of Kashmir and gave vent to popular reactions against the anti Jammu attitude of power holders. The immediate factor, which led to the agitation, was the manipulation of Kashmir's political elite in electoral politics. The nomination papers of the candidates belonging to Praja Parishad for the first assembly elections were rejected on very trivial and flimsy grounds. This caused a lot of resentment against the power holders in Kashmir. Yet the actual protest was manifested against the Delhi Agreement of 1952 signed between the central government and state government led by Sheikh Abdullah. This agreement while accepting the special status of the state provided for the basis of its future relationship with the centre. The Praja Parishad launched the agitation under the slogan of "Ek Pradhan, Ek Vidhan and Ek Nishan" (one president, one constitution and one symbol). The main issue raised during the agitation was related to the status of Constituent Assembly of the state and the provisions of Article 370 of the Constitution of India. It was therefore, demanded that there should be complete extension of Constitution of India to the state and there should be no separate flag of the state. The 1952 agitation may be considered important for a number of reasons for analyzing Jammu's regional politics. It was the first open manifestation of the political discontent of the region. With this agitation, a new dimension was added to Jammu politics, which was otherwise insignificant in the totality of state politics and which was eclipsed by an over sensitivity to Kashmir, came to acquire some significance. This agitation not only brought the political leadership of the region to a negotiating point with the central authorities but it also led to political visibility of the region. Most significantly, the

discontent of Jammu region and divergent political aspirations within the state came to be acknowledged.

The immediate fall out of the 1951 exercise was the emergence of dispensation under which no persons from Jammu and Ladakh could ever become Chief Minister of the state of Jammu and Kashmir. The prime reason is that since Kashmir has more seats in the legislative assembly, the office of the Chief Minister is its sole preserve. A dispassionate scrutiny of all the reports which various delimitation commission submitted from time to time reveals that they did pass on the centre of political gravity to the Kashmir hands or they were designed to accommodate what may be termed as selfish contentions of a group of Kashmiri leaders and put the initiative for every aspect of the state's politico- administrative and economic structure on Kashmir. A Chief Minister depending upon the Kashmiri vote bank alone for gaining and retaining power was bound to cultivate the Kashmiri electorate by all sorts of administrative measures and do more and more for the valley. A policy of regional discrimination thus emerged. That is how a power structure came into being which ultimately led to regional imbalances. The Jammu region is inadequately represented in the state Civil Secretariat with just four commissioners cum secretaries out of about 35 and 10 percent in the rest of services. The proportion of Kashmiris and Jammuites in the regional services of Kashmir and Jammu is approximate 99:1 and 30:70 respectively. The youth of Jammu and Ladakh virtually find no employment in the 12 corporations whose headquarters are in the valley with 100 percent of their employees from Kashmir. These corporations include Jammu and Kashmir Forest Corporation, Jammu and Kashmir Agro Industries Corporation, Jammu and Kashmir State Road Transport Corporation, Jammu and Kashmir Handloom Development Corporation, Jammu and Kashmir State Financial Corporation, Jammu and Kashmir Tourism Corporation, Jammu and Kashmir Minerals Development Corporation, and Jammu and Kashmir Industrial Development Corporation and Jammu and Kashmir Horticulture Produce and Marketing Corporation. All the major industrial units such as HMT watch factory, the telephone factory, the television factory and cement factory are in the valley. The valley is not at all suitable for the cement factory because every kind of raw material needed for it has to be imported from Jammu region.

Under development in the Jammu region which has few rivals as far as scenic beauty is concerned and which is highly rich in charming values, fascinating waterfalls, springs and holly shrines is also evident in spheres relating to tourism, roads and electrification. Over 90 percent of the state's tourism budget is spent in the valley every year. Despite the fact that the number tourists who visit Jammu region every year is 10 times more than those going to the Kashmir valley. The same story of neglect is true of roads also. Inter regional disparities become all the more clear when one compares the percentage share of different regions in the length of roads. The same story of neglect is in rural electrification, irrigation facilities, power generation etc. Right from the day of state's accession to the Indian dominion, funds for development schemes have become the sole privileges of the valley alone, with Jammu and Ladakh getting crumbs.

The simmering volcano in Jammu erupted again when four demonstrating students were killed in police firing on October 16-17, 1967 against the evil designs of shifting Agricultural and

Ayurvedic College to Srinagar. Initially these colleges were to be established at Jammu. Another major agitation was occurred in 1978. It started from peripheral area of Poonch and soon assumed regional dimensions. This agitation started from Poonch district as a protest against irregularities in the appointment of teachers in Poonch. A couple of months after agitation started, it assumed serious proportions and got the support of all the parties except Congress (I). Protesting against regional imbalances, these parties demanded appointment of a commission by retired judge of the Supreme Court to go into the question of regional imbalances. Joining of almost whole of Jammu region in this agitation was indicative of prevailing discontent in this region. While analyzing the Poonch agitation, Balraj Puri pointed out: It was a spontaneous protest in the whole of Jammu region, which indicates a deeper problem. It was not merely a protest against loss of an innocent young life or against the alleged irregularity in the recruitment of primary teachers in the district. The intensity of popular reaction only indicates that the discontent was much deeper.

In order to look into the grievances of Jammu region, the central government appointed a commission of inquiry, the Sikri Commission which after making a thorough study of the prevailing situation in the state agreed that "there existed discrimination and favouritism in the field of development, employment and education in the context of different regions, which was giving rise to irritations and tensions among the people of state". The 1978 agitation was a purely regional response to Jammu's discontent. It was first such agitation of Jammu region which did not remain confined to core areas of Jammu region but on the contrary spread itself throughout the whole region.

The period of 1967 to 1990 witnessed the emergence of a number of outfits and all in the name of the people of Jammu region. These included Panthers Party, Jammu Mahasabha, Jammu People Front and Jammu Mukti Morcha. The state government set up with much fanfare four commissions to placate the people of Jammu as well as to look into the demand for the creation of more districts in the state. These were the Gajendragadkar Commission (1967), the Qadri Commission (1972), the Sikri Commission (1979), and Wazir Commission (1981). The commission constituted in 1967 and 1979 were to look into the complaints of the people of Jammu and recommend measures which could rectify the regional imbalances and harmonies in inter-regional relations.

The commissions dealing with regional disparities and inter regional animosities, particularly the Gajendragadkhar Commission, candidly admitted injustice to the Jammu region and recommended several steps to ensure Jammu's and Ladakh's effective and real participation in the state's political and economic processes. The Gajendragadkhar Commission, recommended creation of a statutory development board at state level and statutory development regional boards, one each for Jammu, Kashmir and Ladakh. Some of the other recommendations of the Gajendragadkar Commission included division of the functions of each head of department on a regional basis, creation of regional recruitment boards, establishment of full fledged university for Jammu region, opening of a separate medical college at Jammu, introduction of

'a uniform prices of food grains throughout the state and uniformity in the quantum in the food grains rations issued.

However, what were most significant were the observations of the Gajendragadkar Commission that "the main cause of irritation and tension was the feeling of political neglect and discrimination from which certain regions (Jammu and Ladakh) of the state suffer. Even if all the matters are equitably settled, we feel that there would still be a measure of discontent unless the political aspirations of different regions are satisfied". It's yet another significant comment was that "although the Jammu and Kashmir state has been a single political entity for over hundred years, it cannot be denied that geographically, ethnically, culturally and historically it is composed of three separate homogeneous regions namely Jammu, Kashmir and Ladakh.

The governments bid to rationalize the century old durbar move again kicked up regional passions in Jammu region. The people of Jammu region protested against this order describing it as part of conspiracy to divide the state government between the two regions of Jammu and Kashmir. They maintained that the linking of two regions of the state was through the durbar move. They charged that the government's decision was blatant discrimination against the people of Jammu region and reflective of perpetuating Kashmi'sr domination over the people of Jammu. The Bar Association of Jammu also condemned the government's decision and called off its 37 days long agitation. Meanwhile Jammu Mukti Morcha launched an agitation on March 2, 1990 to achieve the objective of forming a separate Jammu state. The leaders of Mukti Morcha believe that with the backing of the central government, the Kashmiri rulers have always manipulated their permanent dominating positions in all walks of life and thus denied Jammu its due share in political power and economic development. They have come to the conclusion that no halfway measures like Regional Development Boards, Regional Autonomy, the Jammu sub-state within the framework of the state of Jammu and Kashmir, can provide a durable solution. They, therefore, believe that the only remedy of all ills of inter-regional relations of the state is its trifurcation. In February, 1998 the peoples of Jammu region again felt alarmed over the percentage of students from Jammu region selected in the MBBS/BDS list of Jammu and Kashmir State which was comparatively very low as compared to the preceding years. This selection list however was not solely responsible for the agitation, there was always hue and cry over selection of candidates in MBBS/BDS and other professional courses. The resentment among the people engulfed the entire Jammu region. Notwithstanding the number of agitations of whatsoever nature, Jammu protests politics reveals the generally available apathy as well. The apathy becomes significant when one notes the intensity of discontent that prevails in this region. Discontent at the sub-regional level is the manifestations of the deprivation and marginalization faced by these areas. Discontent at the sub-regional level is a very complex phenomenon. It is defined by both by peripheral situation of the sub-regions within the Jammu region as well as by its peculiar ethno cultural basis.

III. CONCLUSION: THE ROAD AHEAD

To embark on the path of regional peace and harmony the state government and New Delhi must first understand the

pursuit of monolithic state system which is not accommodative. Therefore, it is not congruent to the regional aspirations of Jammu and Ladakh also. On their part, both of these regions look at Kashmir region as a client to the central government. Undoubtedly, Kashmir strengthens India's secular character as well as acts as hedge to Pakistani's "two nations theory", thus it surfaces heavily in New Delhi's decision making. These political and strategic calculations favour the majoritarian Kashmiri community and diametrically act against Jammu and Ladakh's genuine demands. In the name of national interest, New Delhi pushed three regions into a prolonged protracted zero sum game in which Kashmir enjoys superiority within the state and outside support from New Delhi. Now the uphill task before the decision makers is that whether Jammu and Kashmir three regions will be able to recover from six decades old preservative political system in which Kashmir centric leadership had triumphed. A recent three member team of interlocutors however is a good move in this direction. By having a multi focal attitude to resolve various issues, interstate and intra-state, will uplift confidence level of the people that will strengthen institutionalization of the state.

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AUTHORS

First Author: Mamta Sharma P.hD Research Scholar,
Department of Political Science, University of Jammu,
mamtasharma2021987@gmail.com.

Second Author : Natasha Manhas,P.hD Research Scholar,
Department of Political Science, University of Jammu,
natashamanhas85@gmail.com

Correspondence Author – Priyadarshni Girls Hostel, University of Jammu., Contact nos-9797324156, 9797513967

Optimum Utilisation of Continuous Miner for Improving Production in Underground Coal Mines

Vijaya Raghavan*, Dr Syed Ariff**, Paul Prasanna Kumar***

*Department of Mining Engineering, Dr.Thimmaiah Institute of Technology, Oorgaum, Kolar Gold Fields-563120

**Assistant Professor, Professor, Senior Lecturer.

***Department of Mining Engineering, Dr.T.Thimmaiah Institute of Technology, Oorgaum, Kolar Gold Fields-563120

Abstract- Conventional underground coal mining relies upon the use of continuous miners in order to extract coal reserves from underground coal seams. In combination with the continuous miners- shuttle cars are used to transport the extracted coal from the face to a transfer point (feeder breaker). From there the coal is typically tipped onto the underground conveyor system, which transports the coal to the surface in order to be distributed to customers. Effective management of the cutting, loading and tipping cycles utilised will serve as a possible area for productivity improvement.

I. INTRODUCTION

The phenomenal growth of the Indian coal mining Industry was entirely due to opencast mining, which proved to be more productive and economical to cope with growing demand of coal. With economic liberalization and consequent reduction of import duty on coal, India can no longer rely on opencast mining alone. Introduction of broad scale mechanization in underground coal sector, the production from which otherwise remained stagnant has become imperative with an aim to improve the overall quantity of coal bridge the ever increasing demand-supply gap of coal. At present, there is a need to introduce technology in Indian coal mines to boost the production from underground with due regard to the cost of production, productivity and safety.

With the increase in coal demand and growing awareness towards sustainable development, the coal industry has drawn a consensus over the need for increased production from underground coal mines. From the current share of 15 per cent, the industry aims to reach a total coal production of 30 per cent from underground mines by 2030.

The Indian coal industry is the world's third largest in terms of production and fourth largest in terms of reserves. Around 70% of the total production is used for electricity generation and the remaining by the steel, cement and other heavy industries. Coal is also used as fuel for domestic purposes. Despite having one of the largest reserves, the Indian coal industry does not hold a position in the league of global energy suppliers. This can be attributed to the soaring domestic demand.

In India the underground coal production is nearly 20% of the total coal production of the country. This is despite the fact that about 70% of the country's coal reserve is amenable to be worked by underground methods. This shows the slow pace of technology induction in underground coal mines and there is enormous scope for improvement. To meet the ongoing demand

of coal in the country, immediate attention is required for improvement in the production from underground mines.

Underground mining needs to adopt mechanisation to reach the desired coal production levels. In this respect, the Continuous miner technology in board and pillar mining is the best option, which does not require virgin areas, whereas it can also be applied where development has already been done. Since board and pillar system is a well-proven technology in India. This technology helps in achieving high production and faster rate of extraction with safety.

II. LITERATURE REVIEW

2.1 Introduction

Coal seams can be mined both by underground methods and surface mining methods depending On certain conditions like:

- Thickness of seam
- Dip of seam
- Depth of occurrence
- The ratio of overburden to coal (stripping ratio)

There are two basic methods of underground coal mining methods. They are: i) Bord and Pillar method ii) Longwall method. Although the basic principles remain the same, there could be many variants of these two methods.

In India, about 98% of underground output of coal is obtained by Bord and Pillar method and barely about 2% by longwall methods. The other countries where Bord and Pillar method predominates are Australia, USA and South Africa.

2.2. Bord and Pillar Method

Fundamentally, the bord and pillar method of mining coal seams involves the driving of a series of narrow headings in the seam parallel to each other and connected by cross headings so as to form pillars for subsequent extraction, either partial or complete, as geological conditions or necessity for supporting the surface, may permit. Ideally, the pillars should be square but they are sometimes rectangular or of rhombus shape and the galleries surrounding the pillars are invariably of square cross-section.

The bord and pillar method of mining is suited to work flat coal seams of average thickness and at shallow depths. Coal seams of 1.8 to 3 m thickness are best suited for this method, though the method has been successful in thinner seams also down to a thickness of 1.2 m and in thicker seams up to 4.8 m in thickness. In seams with gradients of more than 1 in 4 difficulties

are encountered in maneuvering machines. Most of the bord and pillar method of coal mining has been done in depth range less than 300 m as at greater depths pillars experience crush. However, in India in some cases the depth of mining for bord and pillar method has been around 600 m, though mining at such depths is beset with the problems of strata control. Sometimes, low strength of coal limits the depth to which bord and pillar mining can be done.

2.3. Longwall Method of Mining

The high productivity and production associated with Longwall method of mining has made this method the most popular method of mining. The current trend is towards adopting this method of mining.

The Longwall method of mining coal involves the extraction of the panel of coal to be worked by advancing the face forward (in the case of advancing Longwall) on a wide front leaving behind the roadways serving it which are supported by packs of stone or other pickings in the area of extraction. The face is retreated on the roadways driven before opening out the face and as the face is retreated backwards, the goaf is allowed to cave in or it is filled and the gate roadway is lost in the goaf. This method can be employed almost in all geological conditions, though it is eminently suited for working thinner seams, i.e., seams less than 1.8 m thick. On the lower side, seams of up to 0.3-0.35 m thickness have been worked by this method. Coal from a Longwall especially in a thin seam is the cheapest coal a mine can produce. It is also desirable that thick seams (more than 4.8 m) be worked by this method in slices of 2 to 3 m. It can be practiced in seams at depth and also in gassy seams or seams prone to spontaneous heating.

2.4. Productivity:

Traditionally, the output per man shift measured in terms of tonnes in coal mines in India, has been low when compared to other major coal producing nations. Though the opencast mines have recorded a consistent increase in productivity over the years, the underground OMS is hovering around 0.7 t. The geo-mining and socio economic conditions in some of the developed countries are much different than ours. Targets for the productivity should be based on the prevailing conditions, optimum level of mechanization, automation, cost considerations, constraints or continued availability for imported items, etc. There is a need for benchmarking productivity targets for mining operations.

III. METHODOLOGY

3.1. Overall working of bord and pillar method of mining using Continuous Miner:

The bord and pillar method of mining is the older and traditional method of underground coal mining. This method is sometimes called room-and-pillar mining. Coal is removed from the working faces as the rooms are advanced. Cross-cuts, connecting the rooms are also mined leaving pillars of coal for support. The rooms and cross-cuts are typically about 20 feet wide and of a height consistent with that of the seam. Prior to the development of continuous mining technology, the conventional

room and pillar method was composed of undercutting the coal, drilling, blasting, and loading.

3.2. Development

In case of Bord and Pillar, two sets of galleries, one normally perpendicular to the other, are driven forming pillars between them of size that currently depends on depth and size (width) of the gallery. The ultimate method of pillar extraction presently does not influence shape and size of pillar. However, the ultimate method of pillar extraction should also be taken into consideration while forming these pillars. This is one of the important factors for deciding the size and shape of the pillar. In the present scene of underground mine development by Bord and Pillar system, mostly square pillars are being formed of size dictated only by depth and width of galleries under the Coal Mine Regulations.

3.3. Support system during development

Considering that roof falls causes the largest number of mine accidents, it was decided a few years ago to support a 9 m length of a gallery immediately out bye of the working face. These supports may be temporary or permanent in nature. If temporary, they can be replaced by permanent supports, if the roof conditions so dictate or can be taken out completely, if the roof stratum is found to be self supporting. However, the current trend is to consider that practically no strata is self-supporting for the size of development galleries normally driven. Now, mine managements have to necessarily prepare support plans for the mine as a whole. The above stipulation and the past experience have encouraged installation of roof bolts in Indian Coal mines. Roof bolting as the sole system of support has been accepted by Directorate of Mines Safety for mine development galleries. Roof bolting, now, is beginning to be accepted as the sole system of support in depillaring areas and for certain geo-mining and operating conditions. Conventional supports in depillaring areas can be reduced if roof bolts are also used. Shiftable hydraulic roof bolting machines are being popular.

3.4. Pillar extraction

After pillars have been formed on the Bord and Pillar system, consideration has to be given to the extraction of coal pillars; the operation is known as pillar extraction. It is also referred to as depillaring. In a method of depillaring, known as the caving method, the coal of pillars is extracted and the roof is allowed to break and collapse into the voids or the de coaled area, known as goaf. As the roof strata about the coal seam break, the ground surface develops cracks and subsides, the extent of damage depending upon depth, thickness of the seam extracted, the nature of strata, thickness of the subsoil and effect of drag by faults. Depillaring with stowing is a method of pillar extraction in which the goaf is completely packed with incombustible material and generally plasticized where it is necessary to keep the surface and strata above the seam intact after extraction of coal. The following circumstances would require adoption of depillaring with stowing:

- Presence of water bearing strata above the coal seam being extracted. Enormous quantities of water beyond the economic pumping capacity may enter the mine through cracks in the strata.

- Railways, rivers, roads, etc. situated on the surface, which cannot be diverted.
- Presence of fire in a seam above the seam to be extracted.
- Existence of one or more seams of marketable quality extractable in the near future.
- Restrictions imposed by local or Government authorities for the protection of the surface.
- Extraction of the full thickness of a seam thicker than 6 m, as thicker seams cannot be extracted fully by caving method.
- Extraction of seams very prone to spontaneous heating, of very gassy nature or liable to pumps.
- Surface buildings which cannot be evacuated.
- Tanks, reservoirs, etc. which cannot be emptied.

3.5. Principles of Pillar extraction techniques

The principles of designing pillar extraction techniques are given below:

- Roof exposure at one time should be minimal. In the Indian coalfields, where caving is practiced, 60-90 m² exposure is normally allowed. But in stowing districts the exposure may be increases up to 90-100 m².
- The size of the panel should be such as depillaring can be completed within the incubation period. This period commonly varies between 6-9 months. But there are some seams in which fire has not occurred even thought depillaring has been going on for more than two years and yet there are some seams in which spontaneous heating has been reported within three to four months of the commencement of depillaring. In a lignite mine spontaneous heating took place within a few weeks only.
- The extraction line should be so arranged as to facilitate roof control. In practice o diagonal line, or step diagonal line of face is common. In special cases a steep diagonal line of face or even straight line of face has been selected. Diagonal or step diagonal line of face provides protection as the working places are supported by solid pillars and also when the roof caves, there is less risk of goaf flushing into the working faces. It is also claimed that diagonal line of extraction helps in the caving of the roof. In the panel worked in conjunction with hydraulic sand stowing-diagonal line of face is prepared as it facilitates water drainage without flooding the working faces in the lower level.
- The single lift extraction is limited to height of 4.8 m or less. If the thickness of the seam is more than 4.8 m, the extraction is done in multi-lifts and in that case hydraulic sand stowing is insisted upon. Seams up to 4.8 m thick can be mined by caving in one pass.
- Whatever the method of extraction, the working area is systematically supported by cogs and props.

3.6. Factors affecting production capacity of the system

The continuous miner system has got enormous capacity if deployment is done at suitable place. However following factors which influence the production capacity of the mining system are as below:

3.6.1. Seam Thickness

Seam thickness determines the availability of coal per meter of cut by continuous miner .low thickness seam yields lesser amount of coal per meter in comparison to thicker seam .hence ,the low height seams requires more frequent change of place of continuous miner and ultimately appreciable loss of productive time of continuous miner .thus ,the productive capacity of the system reduces with reduction in seam thickness .

3.6.2. Gallery Width

This is another important factors which determines the success or failure of the continuous miner technology .continuous miner and shuttle cars combination can maneuver the gallery width of 4.8m ,the maximum permissible gallery width as per CMR ,1957, but with a great difficulty .the equipments of this technology can work more efficiently and higher operational safety ,if the gallery width is more than 5m, say up to 6.0m ,or 6.6m depending up on the condition of strata .with increase in the gallery width ,the continuous miner can cut more amount of coal from a place during the same time period thereby improving the capacity.

3.6.3. Roof Condition

Prevailing condition of roof dictates the requirement of support .the weaker roof requires high support density in comparison to good roof. Not only this, in case of weaker roof the cut out distance will also be much less than that of good roof, thereby increasing in unproductive place changing time and ultimately affecting the production performance of the technology as we know the continuous miner advancement is dependent up on the cycle -time for supporting the freshly exposed cut out area by roof bolts, this is also one of the important factor for determining the production capacity of this system.

3.6.4. Pillar Size

The size of the pillars, barring the operational parameters of the equipments, predominately affects the cycle time which in turn adversely affect the production performance of the technology. The tramping distance increases with the increase of pillar size. Bigger pillar may pose more problems during the time of final extraction than the small pillars.

3.6.5. Cut out Distance

The cut out distance determines the availability of amount of coal at one place, higher the amount of coal at one place better will be the utilization of continuous miner by avoiding the unproductive shifting time to the other face. Higher the cut out distance lesser number of faces requires to be cut for an optimum production.

Besides production capacity is also affected by some mine dependent factors which can be summarized as under

- Roof support system
- Travelling time
- Awaiting shuttle car
- Machine breakdowns and insufficient maintenance
- Out-bye coal clearance
- Power unavailability

- Pick changing
- Poor roof/floor condition etc.

IV. CASE STUDY

4.1 Field Investigations

4.1.1 General Details of Venkateshkhan 7 Mine

- The mine was worked with 2 separate sections. I.e. Anandkhani section and Venkateshkhan section.
- The above sections are separated by a fault of 40 m throw on the rise side of vk7 Inc tunnels.
- Both the sections are having interconnections at 9, 10, 11 and 12 cross-cuts through index seam.
- Anandkhani section was isolated.

The vk7 mine boundary is fixed by considering two major faults of about 160 m throw. Towards south side and 80 m towards north side

Seams present in the Venkateshkhan 7 section:

Four seams are present in this mine. These seams are

- Top seam
- Index seam
- King seam
- Bottom seam

Surface features

Surface features at VK 7 mine are

- PWD road to Vijayawada.014
- Assisted railway siding.
- Coal handling plant.
- Venkateshkhan colony.
- General Manager's office, timber yard, exploration dept, petrol bunk.
- 220 kva transmission lines (proposed for rerouting).

- Tellavagunallah (proposed for diversion).

4.1.2. Location

The mine is situated between north latitude $17^{\circ} 27' 07''$ to $17^{\circ} 30' 24''$ and east longitude $80^{\circ} 40' 00''$ to $80^{\circ} 41' 30''$ as covered in survey of India topo sheet No.: 65C/10 & 11 of Khammam district in A.P. It is at a distance of 297 kms from Hyderabad. The nearest railway station, Bhadrachalam road, a branch line from Dornakal on Kazipet –Vijayawada section of the south central railway, was of about 10kms away from the mine.

4.1.3. Topography

The terrain is gently sloping towards east. The average ground level is about 138m above MSL. The maximum and minimum MSL is about 119m and 157m respectively.

Brief Description of VenkateshKhani No.7 Incline:

Mine started on	= 15-8-1954
Entries	= through strike tunnels and man winding shaft
Mine take area	= 748 Ha
Non forest land	= 155 Ha
Forest land	= 593 Ha

The vk7 mine boundary is fixed by considering two major faults of about 160m throw towards south side and 80m towards north side. The mine was worked with two separate sections .i.e. ANANDKHANI section and VENKATESH KHANI section separated by a fault of 40m throw. ANAND KHANI section was isolated.

4.1.4. Geology of Present Seams

The following shows the geology of different seams in vk7 incline :

Table 4.1: Geology of the Different Seams in Vk7 Incline.

Seam	Thickness	Parting	Min.Depth	Max.Depth	RMR	Gradient
Queen	8-11 m		62 m	357 m	52	1 in 7.5
		20 m				
Index	1.2 m		80 m	220 m	-	-
		22 m				
King	6.5-10.5 m		125 m	426 m	62	1 in 7.5
		5-6 m				
Bottom	3-6 m		149 m	298 m	42	1 in 7.5

4.1.5 Technology Being Worked

- Depillaring with remote LHD's (caving).
- Continuous miner non-caving yield pillar method.
- Road headers & Longwall 1985-2004
- Blasting gallery 1998 -2006
- Conventional depillaring 2006-2009
- SDL's 2004-2009

- Continuous miner 2006 (Still Working)

4.1.6 Major Installations/Important Machinery Of The Mine

- Man winding shaft commissioned in 1974 upto bottom seam to a depth of 266 m.
- Man riding system installed in the year 1990, from 291 of king seam(shaft level) to 881 of top seam.(1.80 kms)
- Nitrogen flushing plant of 500cu m/hour.
- SDL's 3 no's.

- One no. B. G. Unit.
- Conveyors from CHP to BG panels and proposed continuous miner panel.
- 1000 t strata bunker at 1Dip/27 Level.
- Two no's of sand stowing plants.

4.2. Support System

4.2.1. Roof support of original galleries.

All the original galleries will be widened to 6.5m / 7.5m. After widening of original galleries, it shall be kept supported by 1.80m long fully resin grouted tor steel roof bolts. Distance between two bolts in the same row shall not be more than 1.50 m and between the two rows of bolts shall not be more than 1.50m. Wherever required the galleries will be widened upto 6.5/7.5m to remove the weathered rib sides up to a solid rib for bolting with the GRP bolts. These 7.5 m wide galleries will be supported with an additional bolt in a row.

4.2.2. Supporting of the sides

Supporting along the dip: Along the North and South side of a dip 1.8m long GRP bolt shall be fixed at roof level to hold Steel/Plastic wire mesh of a height of 2.0m. Two more side bolts shall be fixed at 1.0m interval to secure the side with mesh. The distance between the bolts in the same row shall not be more than 1.0m. Such bolts shall be fixed along the sides at an interval of 1.50m as shown on the SSR plan.

4.2.3. Support along level:

Support along rise & dip side of level: To support the rise & dip side of level, Steel/Plastic wire mesh shall be used. The mesh shall be used upto 2.0 m from roof. Along the rise & dip side of level, mesh shall be fixed by 1.8m long GRP bolt at roof level. Two more side bolts shall be fixed at 1.0m interval to secure the sides with mesh. The distance between the bolts in the same row shall not be more than 1.0m. Such bolts shall be fixed along the rise & dip side of level at an interval of not be more than 1.50m as shown on the SSR plan. This support system shall be followed along the rise & dip side of all levels as shown on the SSR plan. Additional bolts shall be installed across the slips and geological disturbances as shown on the plan.

4.2.4. Supporting geologically disturbed area

All dykes, visible slips and breaks in the roof will be supported with 2.40m long fully resin grouted bolts as shown on the plan in addition to the SSR for original galleries as per para 2.0.

4.2.5. Support of ledges and overhangs:

Ledges and overhangs which cannot be dressed down and made safe shall be supported with 2.4m long fully resin grouted steel bolts

4.2.6. Quality of support:

Strata reinforcement support system components to be used, shall confirm to the standard prescribed in IS 1786 – 2008 or British Standard 7861 (Part 1)1996 (Specifications for roof bolting) or latest revision thereof.

Short Encapsulation Pull Test (SEPT) shall be conducted for every new batch of resin capsules. Resin bond strength shall be

130 KN for 300 mm encapsulation for more than 50% of bolts tested.

The standard and parameters of the roof bolts and its assembly to be used in mines should be maintained as prescribed in the DGMS circular No. DGMS/S&T/Tech. CIR.(Approval) No.3, Dhanbad, 3rd June 2010

The diameter of the roof bolt shall not be more than designed diameter $\pm 4\%$ by mass as specified under IS 1786 – 2008 or as per the standard given in BS 7861 (Part 1) 2008. The difference of diameter between the hole and the roof bolt (annular space) shall be not less than 3.0mm and not more than 6.0mm.

Each hole shall have one set of resin capsules – one fast setting and the other slow setting with 23-24mm diameter (tolerance 5%).

The standard composition and properties required for cement capsules to be used as grouting material in roof bolting in mines shall be maintained as per DGMS circular No. DGMS/Tech.Cir. (Approval) No.4 Dhanbad, 15th June 2010

4.2.7. Monitoring of roof bolts

To check the efficacy of the support system in the workings, anchorage testing will be done. Effective organization under the supervision of a Rock Bolt Engineer will be set up for regular anchorage testing, tightening and also for ensuring proper system of support, monitoring of roof sagging, etc. At least 10% of the installed bolts will be subjected to anchorage testing (at random), after 1 hour of installation by applying a minimum of 12T load, under the direct supervision of Overman /Under manager/Asst. Manager (First Class) and the results will be recorded in the prescribed format (DGMS (Tech) (S&T) circular No 3 of 1996)

Testing will be carried out under the properly supported roof, with a suitably designed anchorage testing machine. All directives given in the DGMS (Tech) (SAPICOM) circular No 3 of 1996 will be strictly complied. Bolts shall be pre-tensioned at a torque of 70 – 120 Nm. Results of all such tests will be recorded in a bound paged book kept for the purpose and signed by the officer-in-charge. The report will be scrutinized by the manager at least once in seven days and corrective action will be taken whenever necessary. All the provisions of Regulation 109 and 110 of the CMR 1957 regarding setting and withdrawal of supports as applicable herein will be complied with.

4.3 Working Details CMP-5A :

The following are some of the details of Continuous miner panel – 5A

Panel started on	07.03.2012
Panel completed on	23.06.12
Extraction period	109 days
No. of Pillars	20
Panel length and breadth	231 m & 170
Area of the panel	39,000 sq.mtrs
Coal extractable in the panel	2,43,100 T
Coal extracted In the panel	1,69,500 T
% of extraction	70%
Main fall occurred at	21,150 sq.mtrs

4.4 Working Details CMP-5B :

The following are some of the details of Continuous miner panel – 5B

Panel started on	08.07.2012
Panel completed on	13.10.12
Extraction period	96days
No. of Pillars	20
Panel length and breadth	233 m & 179
Area of the panel	41,707 sq.mtrs
Coal extractable in the panel	2, 18,790 T
% of extraction	73.00%
Main fall occurred at	21,550 sq.mtrs

Table.5.1: Comparison of continuous miner and LHD production in percentages

Sl.No	Technology	Production (%)									
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	
1	LHD	44.05	32.3	40.58	45.99	41.15	33.37	40.98	43.78	39.88	
2	CM	55.95	67.7	59.42	54.01	58.85	66.63	59.02	56.22	60.12	

5.2. Breakdown Analysis: The detailed study of breakdown analysis indicates the following

Continuous Miner panel - 5A:

- We observed that major percentage of breakdown in continuous miner is due to gathering problem i.e., 50.14%. Which includes gathering cylinder pin out, gathering head gear box prob, gathering spray nozzle jam.(Table.6)
- Apart from gathering problem, there are other problems like hydraulic and cutter problems which accounts 24.32% and 11.32% of breakdowns respectively.
- Here we observed electrical problem is main in shuttle car i.e,99.16%

Continuous miner panel – 5B:

V. RESULTS AND DISCUSSION

5.1 Production Analysis:

The detailed study of production analysis indicates the following:

- The production from LHD and Continuous miner technology is been analyzed. The continuous miner technology is giving better production comparing to LHD (3No.), in some cases its production is double.
- The Table no.5.1 indicates the production percentage of continuous miner technology and LHD, in which production of 8th months is been, analyzed at VK7 mine.

Table 5.2.1 and table 5.2.2 shows the total percentage of breakdown, idle hours and working hours of CMP-5A and CMP-5B panels respectively.

Table.5.2.1: Percentage of Breakdown Continuous miner CMP 5A

Sl.No	Classification of Breakdown	Percentage (%)
1	Electrical problem	7.65
2	Cutter problem	11.32
3	Conveyor Problem	4.1
4	Gathering problem	50.14
5	Traction	2.47
6	Hydraulic	24.32
7	Chassis	0
	Total	100

Table.5.2.2: Percentage of Breakdown Continuous miner CMP 5B

Sl.No	Classification of Breakdown	Percentage (%)
1	Electrical problem	0
2	Cutter problem	3.18
3	Conveyor Problem	1.9
4	Gathering problem	48.23

5	Traction	24.49
6	Hydraulic	22.2
7	Chassis	0
	Total	100

Table.5.2.3: Percentage of Breakdown Shuttle Car CMP 5A

Sl.No	Classification of Breakdown	Percentage (%)
1	Electrical problem	99.12
2	Conveyor Problem	0
3	Traction	0.88
4	Hydraulic	0
5	Chassis	0
	Total	100

Table.5.2.4: Percentage of Breakdown Shuttle Car CMP 5B

Sl.No	Classification of Breakdown	Percentage (%)
1	Electrical problem	100
2	Conveyor Problem	0
3	Traction	0
4	Hydraulic	0
5	Chassis	0
	Total	100

Table.5.2.5: Breakdown, Idle, Working Hours (percentage) of the CMP 5A

Sl.No	Month	Percentage (%)
1	Breakdown hours	6.32
2	Idle Hours	37.47
3	Working Hours	56.21

Table.5.2.6: Breakdown, Idle, Working Hours (percentage) of the CMP 5B

Sl.No	Month	Percentage (%)
1	Breakdown hours	5.73
2	Idle Hours	42.81
3	Working Hours	51.46

The breakdown, idle and working hours of the continuous miner panel 5A (As shown in fig.5.2.1) and the continuous miner panel 5B(As shown in fig.5.2.2) indicates that the idle hours is more compare to breakdown hours of the machine.

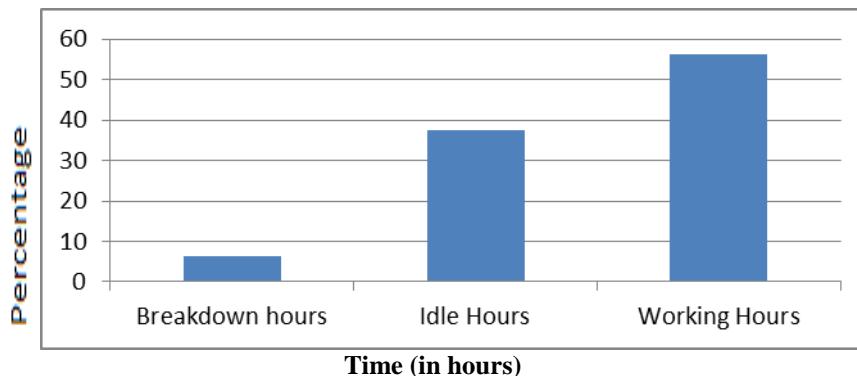


Fig.5.2.1: shows Breakdown, idle, working hours (percentage) of the CMP 5A

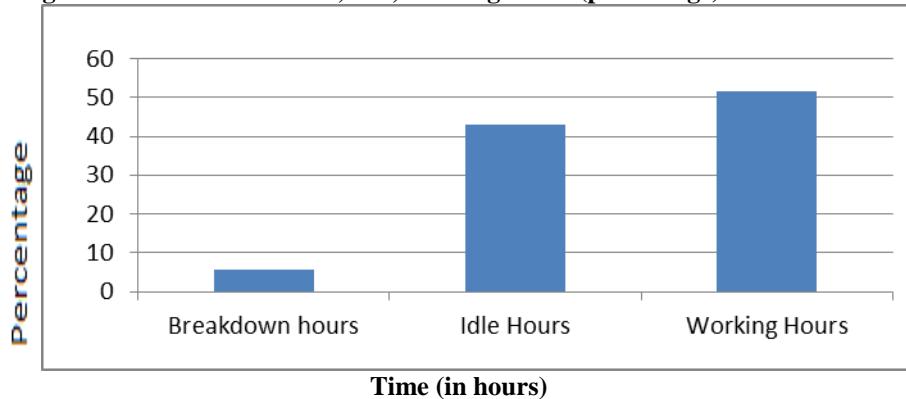


Fig5.2.2: shows Breakdown, idle, working hours (percentage) of the CMP 5B

5.3. Reliability Analysis:

The Table 5.3.1 and Table 5.3.2 are showing the breakdowns under various head in respect of the equipments of CM for CMP 5A,CMP 5B panels in VK7 mine, which are elaborated as below.

- Continuous miner has undergone the breakdowns; majority of those breakdowns is from gathering problem, which is followed by other problems like hydraulic, traction, cutter, electrical and conveyor problems.
- The reliability analysis is being done, in which the probability of failure P(F) is been calculated, the overall probability of failure for continuous miner is 0.0955.

The reliability of continuous miner after calculating is 0.9044.

- Shuttle car have also got some breakdowns, the major one is due to the electrical problem, the other one is because of traction problem.
- The reliability analysis is also been done for shuttle car, the overall probability of failure P (F) of which is 0.0163. The reliability of shuttle car after calculating is 0.9836.

Table 5.3.1: Reliability analysis of Continuous Miner

Sl.No	Classification of Breakdown	Hours	P(F)	%P(F)
1	Electrical problem	10.08	0.003598214	0.36
2	Cutter problem	19.23	0.006864449	0.69
3	Conveyor Problem	7.99	0.002852156	0.29
4	Gathering problem	131.57	0.04696597	4.68
5	Traction	36.5	0.013029246	1.3
6	Hydraulic	62.18	0.022196124	2.22
7	Chassis	0	0	0
Total			0.095506159	

Probability of failure P (F) = Breakdown Hours / Total Working Hours

Total P (F) = 0.0955
 Reliability = 0.9044

Table 5.3.2: Reliability analysis of Shuttle Car

Sl.No	Classification of Breakdown	Hours	P(F)	%P(F)
1	Electrical problem	45.51	0.016245507	1.62455
2	Conveyor Problem	0	0	0
3	Traction	0.25	0.0000869	0.00869
4	Hydraulic	0	0	0
5	Chassis	0	0	0
	Total		0.016332407	

Probability of failure P (F) = Breakdown Hours / Total Working Hours

Total P (F) = 0.0163
 Reliability = 0.9836

VI. CONCLUSION & RECOMMENDATIONS

6.1 Conclusion:

Continuous miner technology will drastically increase the production, productivity and safety in the underground mining. It is convenient with both caving as well as non-caving method of mining.

Using continuous miner technology high production can be achieved. It can be utilized for development as well as depillaring of developed pillars. It can give an average of 74-75% of extraction.

The machine has worked for an average of only 54.78 %.The machine can give good production rates if we can increase the working hours. This technology promises greater safety. The proper utilization of the equipments can give greater production rate

The reliability analysis shows that the machine is reliable about 95.56% where as probability of failure is only 4.45% .this indicates, it is more reliable.

6.2 Recommendations:

The following are the recommendations for effective utilization of method are:

1. Regular inspection has to be done to reduce unproductive time.
2. Immediate action to be taken on major impacting problems.
3. Belt conveyor idlers jamming have to be reduced.
4. The availability of the face has to be provided in order to reduce idle time of the machine. It is about 28%.
5. Proper layout has to be prepared for shuttle car to minimize the waiting time of machine.
6. Shifting of equipments should be done properly such that time can be reduced.
7. Properly manage the time, for all the cycle operations

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- [18] www.teara.govt.nz
- [19] www.scclmines.com

AUTHORS

First Author – Vijaya Raghavan, Assistant Professor,
 Department of Mining Engineering, Dr.Thimmaiah Institute of Technology, Oorgaum,

Kolar Gold Fields-563120, Email ID-
raghavan_pp@rediffmail.com

- Started Professional Qualification with a Diploma in Mining Engineering from School of Mines, K.G.F in 2002,
- Bachelor of Engineering in Mining Engineering from Vishvesvaraya Technological University, Belgaum in 2006,
- Master of Engineering in Environmental Engineering from Sathyabama University, Chennai in 2010 and
- Presently Pursuing PhD in Mine Environmental Engineering From National Institute of Technology Karnataka, Suratkal, Mangalore, Karnataka.
- Working as Assistant Professor & Head, Department of Mining, Dr TTIT, K.G.F
- AREA OF INTEREST: Drilling and Blasting Mine Environmental Engineering, Rock Mechanics.

Second Author: Dr Syed Ariff, Assistant Professor, Professor, Senior Lecturer.

Third Author: Paul Prasanna Kumar, Department of Mining Engineering, Dr.T.Thimmaiah Institute of Technology, Oorgaum, Kolar Gold Fields-563120

Variability of pollutant build-up parameters in different land uses of Guwahati City, Assam, India

Abeda Khatun*, Krishna Gopal Bhattacharyya**, Hari Prasad Sarma**

*Department of Environmental Science, Gauhati University, Guwahati-781014, Assam, India

**Department of Chemistry, Gauhati University, Guwahati-781014, Assam, India

**Department of Environmental Science, Gauhati University, Guwahati-781014, Assam, India

Abstract- Urban stormwater runoff carries pollutants that collect on impervious surfaces such as oil, dirt, chemicals, and lawn fertilizers directly to receiving water bodies (surface water, seepage water and ground water), where they seriously harm water quality. This study investigated the variability of pollutant build-up parameters in five different land use types. For this purpose stormwater samples were collected from five different land use types; residential, commercial, recreational, heavy traffic and industrial, around Guwahati city, Assam (India) and analysed to measure different build-up parameter. It was found that distribution of stormwater pollutants is highly influenced by the surrounding land use type. Coefficient of variation (CV) is derived for each of the selected build-up parameters for the different land uses. Industrial land uses showed relatively higher values of CV, indicating the highly variable nature of the pollutant build-up parameters within the same land use.

The main objective of the present study was to investigate the variability of pollutant build-up parameters in different land uses and thus to find out the influence of land use in urban stormwater pollution.

Index Terms- Coefficient of variation, Impervious surfaces, Pollutant build-up, Urban stormwater runoff.

I. INTRODUCTION

Build-up is the process by which dry deposition accumulates on impervious surfaces. Urban land use plays an important role in stormwater quality by influencing pollutant generation, build-up and wash off (Liu et al., 2012). Concentrations of pollutants from urban stormwater runoff are closely related to various types of land use because human activity is different according to land use (Goonetilleke et al., 2005). In literature, urban areas have been classified into main roads (including parking lots and airports), roofs, residential areas, commercial areas, industrial areas, parks and lawns, and open, undeveloped areas, all of which generate stormwater of different quality which transports different pollutants. Hvítved-Jacobsen et al. (2010) divided them into six specific groups, depicted in Table 1.

It has been proved that, site specific, climatic and other local variables play an important role in stormwater characterization (Barbosa et al., 2012). As precipitation washes and transports the pollutants away, the stormwater flow quantity is characterized by the frequency, intensity, duration, amount and pattern of the precipitation (Hvítved-Jacobsen and Yousef, 1991). The build-up of pollutant depends on several factors such as- antecedent dry periods, land use, traffic, population density, street cleaning practices etc. In this study the variability of pollutant build-up parameters are considered with respect to different land uses.

Table 1. Characterization of stormwater pollutants

Pollutant group	Parameter	Sources	Comments
Solids (suspended solids, SS)	TSS	Pavement wear; construction sites or rehabilitation works; atmospheric fallout; anthropogenic wastes, etc.	60-80% of SS in stormwater could be less than 30 mm diameter. Other sewer solids are present in CSO. Solids also accumulate within the sewer system and may be discharged at different times. Heavy metals and PAHs are bond to the smaller particles (e.g.: 100-250 mm)
Heavy metals	Cu, Zn, Cd, Pb, Ni and Cr	Vehicles parts and components; tire wear; fuel and lubricating oils; traffic signs and road metallic structures. Industries may also be an important source of heavy metals.	They are relevant because of toxic effects. Generally the focus is on copper (Cu), zinc (Zn); cadmium (Cd) and lead (Pb). The relevance of Pb is minor in countries using unleaded gasoline
Biodegradable organic matter	BOD5 and COD	Vegetation (leaves and logs) and animals such as dogs, cats and birds (either fecal contributions or dead bodies)	Organic matter (OM) from stormwater is less biodegradable (dominated by plant material), therefore is also less problematic for the environment than the OM. from CSO.
Organic micropollutants	They are numerous. Among them: PAHs, PCBs, MTBEs, endocrine disrupting chemicals	e.g.: PAH: incomplete fossil fuel combustion; abrasion of tire and asphalt pavement, etc. Phthalate esters: urban construction plastic materials	Presently, a large number of compounds (over 650 identified) are discharged in trace concentrations and sometimes there is no accurate chemical determination method available for them.
Pathogenic microorganisms	e.g.: Total coliforms; Escherichia coli	Contributions from cats, dogs and birds	Stormwater sources are much different than domestic wastewater contribution in the case of CSOs
Nutrients	Nitrogen and Phosphorous (e.g.: total Kjeldahl N; NO ₂ +NO ₃ ; total-P; soluble-P)	Fertilizers and atmospheric fallout	Nutrients can cause not only eutrophication problems but also water discoloration, odors, toxic releases and overgrowth of plants.

(Hvitved-Jacobsen and Yousef, 1991; Wanielista and Yousef, 1993; Burton and Pitt, 2002; Bjoerklund, 2011; Eriksson et al., 2005; Lau and Stenstrom, 2005; McCarthy et al., 2008; Hvitved-Jacobsen et al., 2010; Barbosa et al., 2012).

II. METHODOLOGY

A. Study area

This study was carried out in Guwahati city, Assam, India, located approximately along 26°11' N latitude and 92°49' E longitude. The city covers an area of 216 km² consisting of mainly commercial and residential areas, and some amount of

industrial area. The population of Guwahati has increased from 809,895 in 2001 to 963,429 in 2011 with an increase in population density from 3736 persons per sq. km. to 4445 persons per sq. km. respectively (Borthakur and Nath, 2012). The climate of the city for most part of the year is hot and wet, with a dry winter and a rainy season from April to mid October. The mean annual rainfall is nearly 160 cm. The location map of the study area is presented in Fig.1.

BASE MAP OF THE STUDY AREA

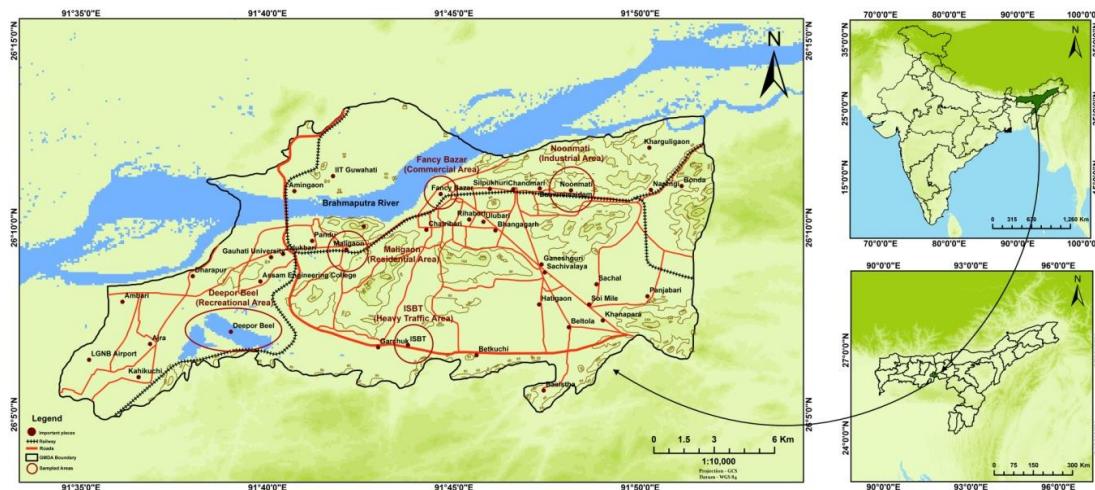


Fig. 1. Location map of the study area

Guwahati being the gateway of North East region is undergoing rapid urbanisation and the urban population is increasing day by day. The problem of stormwater pollution is becoming worse because of population growth, which results in increased impermeable surfaces. One of the most horrible problems in the city is the lack of proper drainage and sewerage system. The drains are not properly constructed and maintained. Some of them are linked with the waste water outlets of the residential units by small drains. In most part of the city, the important roads are lined by inadequate open surface drains and in many places there are no drains at all. During the rainy season, most parts of the city remain submerged under water and thus, the surface water of the city gets polluted by stormwater. Throughout the city, no proper planning has been introduced in residential, commercial, industrial, public and semi-public areas and due to this, the water environment of the city is severely affected. Occurrences of landslide and flesh flood are more common in the area due to improper construction work and tree-felling. Besides these, there are no facilities for groundwater recharge, rainwater harvesting and have no channel characterisation throughout the city. Currently, there are no stormwater quality management procedures in place.

B. Sampling and analysis

Sampling sites were selected on the basis of surrounding land use and land cover in five land use zones, namely, Industrial, Commercial, Recreational, Residential and Heavy Traffic zones. Grab samples of runoff were manually collected from the downstream direction of the runoff in the designated sampling sites in the respective zones during the rainfall event. Each sample was tested within 24 h of collection and all testing was conducted according to the test methods specified in the Standard Methods for the Examination of Water and Wastewater (APHA, 2005). Samples collected at each study location was analysed for Calcium (Ca^{2+}), Magnesium (Mg^{2+}), Potassium (K^+), Chloride (Cl^-), Sulphate (SO_4^{2-}), Total Suspended Solids (TSS), Nitrate-Nitrogen (NO_3^- -N), and Phosphate (PO_4^{3-}).

(K^+), Chloride (Cl^-), Sulphate (SO_4^{2-}), Total Suspended Solids (TSS), Nitrate-Nitrogen (NO_3^- -N), and Phosphate (PO_4^{3-}).

C. Analysing the Variability of Build-up Parameters

Variability of build-up parameters is expressed by using the coefficient of variation (CV). CV describes the variation of dataset. A high CV value represents a high variation in the dataset and vice versa. CV is obtained by the standard deviation being divided by mean of the dataset. It is denoted as a percentage (Hamburg, 1994).

III. RESULTS AND DISCUSSION

After analyzing the pollutant build-up parameters and their distribution in all samples collected from the different land uses, the average pollutant concentration for each land use type was determined (Table 2). It is observed that the pollutant concentrations vary considerably with land use pattern which indicates the influence of land use in stormwater pollution.

Results show a higher concentration of Calcium (Ca^{2+}) and Sulphate (SO_4^{2-}) in industrial land use areas comparing to other land uses. Sulphate can be obtained naturally or as a result of municipal or industrial discharges. When naturally occurring, they are often the result of the breakdown of leaves that fall into a stream. Point sources include sewage treatment plants and industrial discharges such as tanneries, pulp mills, and textile mills (Bhattacharjee and Bhattacharyya, 2010). Higher concentration of Magnesium (Mg^{2+}) and Chloride (Cl^-) are found in recreational areas compared to other land uses. The main sources of Magnesium in natural water are rocks, sewage and industrial wastes. Sources of Chloride are atmospheric precipitation, sedimentary rocks and industrial and domestic sewages. The high chloride content may lead to high blood pressure for people who use it, may harm metallic pipes and structures as well as growing plants (Ramadevi et al., 2009).

Table 2. Average Stormwater Quality parameters

Land use	Parameters (mg/L)							
	Ca ²⁺	Mg ²⁺	Cl ⁻	SO ₄ ²⁻	K ⁺	NO ₃ ⁻ -N	PO ₄ ³⁻	TSS
Residential	15.76	6.97	22.96	12.41	20.08	11.43	0.18	1671
Commercial	19.87	7.50	23.86	27.05	13.47	11.12	0.13	5119
Industrial	21.03	11.34	23.43	66.43	26.35	15.30	0.31	8365
Heavy Traffic	20.34	7.27	22.28	19.31	10.33	2.57	0.12	3763
Recreational	18.33	12.09	29.96	13.71	13.01	4.65	0.15	987

The results of the study demonstrated higher concentration of Nitrate nitrogen (NO₃-N) in the industrial zone followed by residential and commercial zones, sources of which can be residential sewage, human excreta and pet waste in the residential zone, nitrogen based commercial fertilizers, decay of vegetables and fruits residue in the commercial zone and industrial wastewater, industrial emission, nitrogen containing raw materials and industrial processes in the industrial zone. Nitrification is the major source of nitrate in the environment. Nitrate nitrogen (NO₃-N) levels exceed Indian National Standards (EPA, 1986) in some of the land use locations.

Highest concentrations of Phosphate (PO₄³⁻) and Total Suspended Solids (TSS) are found in industrial areas. TSS values also exceed Indian National Standards (EPA, 1986) which may be due to the introduction of rock and soil fragments, dirt and debris, decaying plant and animal matter, industrial wastes, and sewage etc. from street, commercial, residential and industrial areas into the runoff. The comparison of maximum, minimum and average recorded concentrations for each of the pollutants build-up parameters are shown in the Fig. 2.

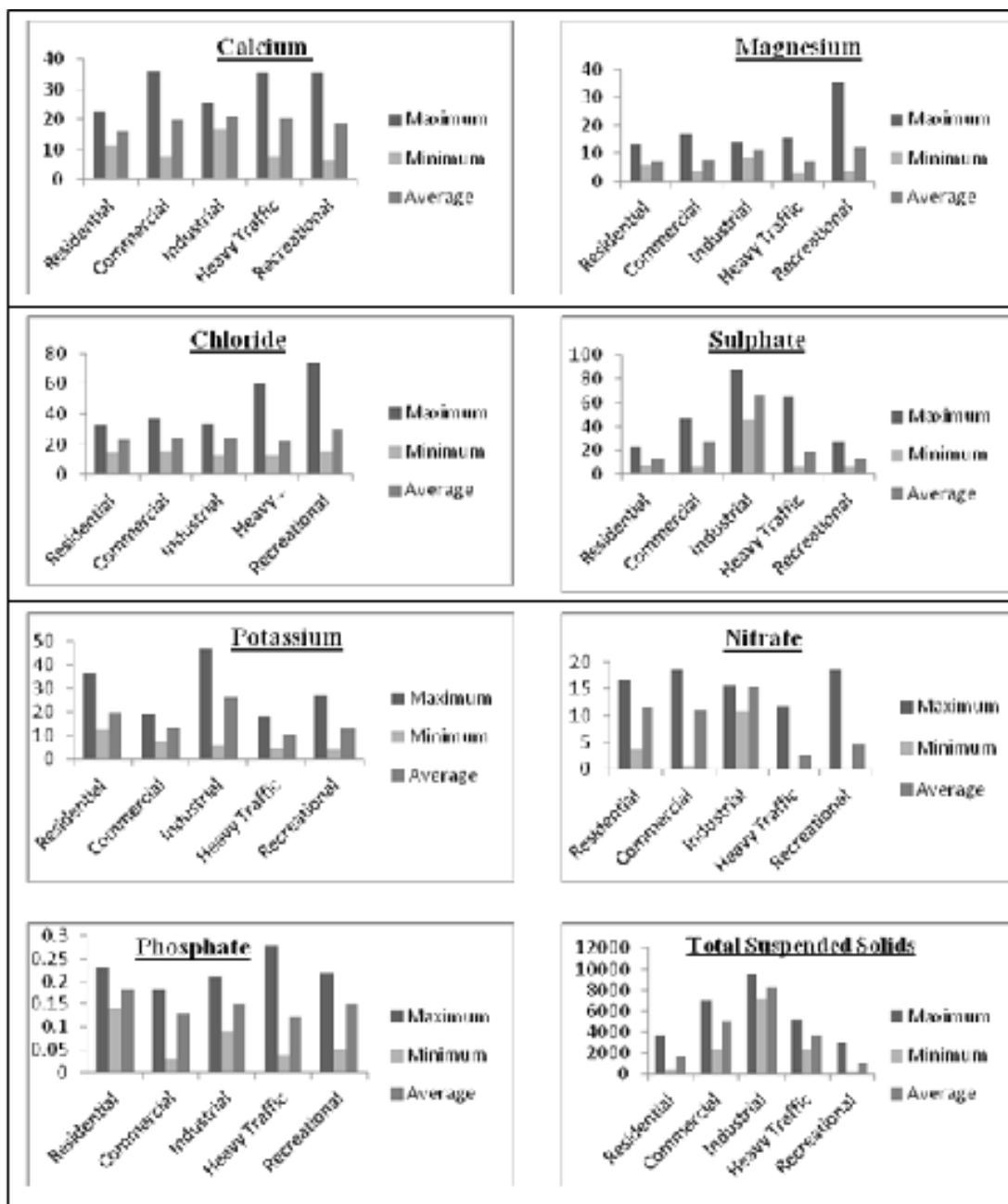


Fig. 2. Comparison of water quality parameters in different land use

A. Comparison of variability in pollutant build-up parameters

Three selected main land use patterns; residential, industrial and commercial, were considered for comparison of variability. CV of the pollutant build-up parameters are derived for these three main land uses. Fig. 3 gives a comparison between the CV values of build-up parameters for different land uses. Except for Calcium in residential and in industrial land uses and phosphate in residential land use, all other build-up parameters show

relatively higher CV values (greater than 30%). As per reference, a dataset with CV greater than 10% is considered as having a high variation (Hamburg 1994). This confirms the high variation of build-up parameters even within the same land use. Potassium (K^+) in industrial land use displays the highest CV value (more than 100 %) and thus, the stormwater has the maximum variability of potassium.

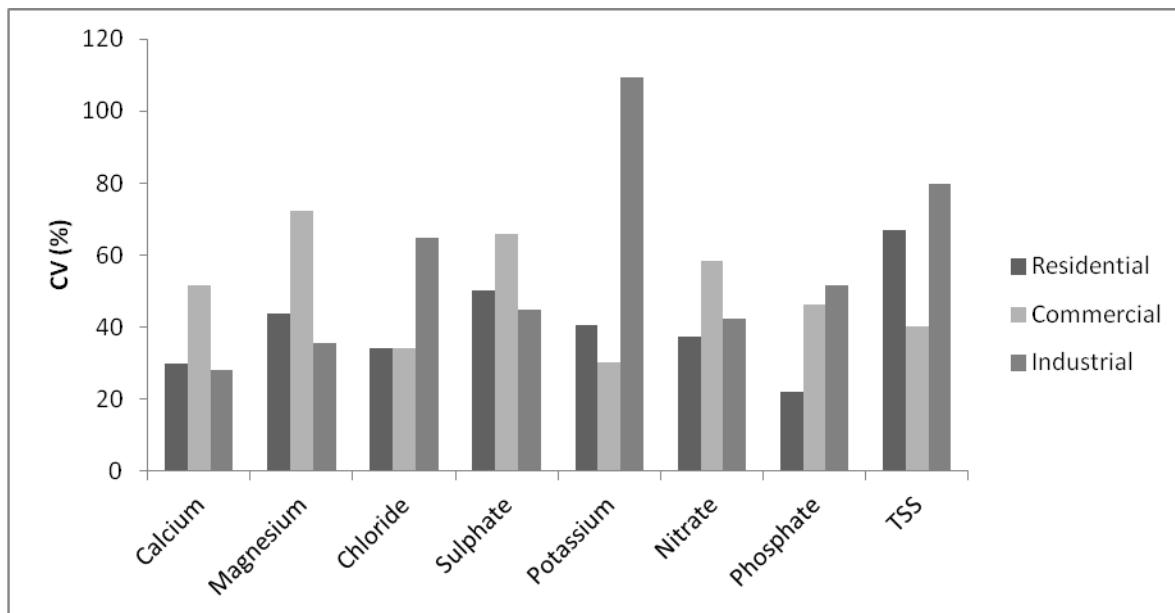


Fig. 3. CV of different build up parameters

IV. CONCLUSION

This study was undertaken to investigate the variability of pollutant build-up parameters in five different land uses of Guwahati city, Assam (India). From the study, following conclusions are derived:

- (i) Pollutant build-up varies considerably with land use pattern which indicating influence of surrounding land use in stormwater pollution.
- (ii) Pollutant build-up parameters vary even within the same land use which confirms the highly variable nature of build-up not only with land use but also due to site specific characteristics.
- (iii) Nearly all pollutant build-up parameters have relatively higher variability and build-up rate in Industrial land use than the other land uses. However, commercial land use shows higher variability of Ca^{2+} , Mg^{2+} , SO_4^{2-} and NO_3^- than other land uses but their build-up rate is higher in Industrial land uses.
- (iv) Industrial land use could be identified as the areas of critical pollution and hence these areas should be treated as important for applying best management practices (BMPs).

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AUTHORS

First Author – Abeda Khatun, Department of Environmental Science, Gauhati University, Guwahati-781014, Assam, India, Corresponding author; E-mail: itsmeabida@gmail.com

Second Author – Krishna Gopal Bhattacharyya, *Department of Chemistry, Gauhati University, Guwahati-781014, Assam, India

Third Author – Hari Prasad Sarma, Department of Environmental Science, Gauhati University, Guwahati-781014, Assam, India

PVA - Assisted Synthesis and Characterization of Nano α -Alumina

Neethumol Varghese*, Manjusha Hariharan*, Dr. A. Benny Cherian*, Dr. P.V. Sreenivasan*, Jenish Paul*, Asmy Antony. K.A**

*Department of Chemistry, Union Christian College, Aluva, Ernakulum (DIST), Kerala, India, 683102

**Department of Chemistry, St. Xavier's College for Women, Aluva, Ernakulum (DIST), Kerala, India, 683101

Abstract- This paper is trying to explore the effect of polyvinyl alcohol (PVA) on the synthesis of nano α -alumina particles. α - Al_2O_3 is widely used and studied as high temperature structural material, electronic packaging, corrosion resistant and translucent ceramics. Sol-gel method was adopted for synthesis. PVA was used as surface stabilizing agent. The results indicated that the addition of PVA affected the particle size and reduces the degree of aggregation. The X-ray diffraction (XRD) patterns for nano powders indicated the presence of a single phase nano α - Al_2O_3 particles. The surface morphology of aluminium oxide nano particles was characterized using Scanning Electron Microscopy (SEM) which shows that the particles are having irregular spherical shape. The formation of alumina nano particles were also confirmed by Fourier Transform Infrared (FTIR) and UV-visible spectrometry measurements. A plausible mechanism is proposed for the formation of alumina nano particles and is expected that this synthetic technique can be extended to obtain other metal oxides.

Index Terms- Nanoparticles, α -alumina, sol-gel, polyvinyl alcohol, synthesis.

I. INTRODUCTION

Nanoparticles constitute a crucial and intensive area of research and development in the burgeoning field of nanotechnology. The attraction of nanoparticles lies in the myriad characteristics which can be achieved by reducing suitable materials from the bulk to the nanometer size. Alumina is one of the most widely used ceramic materials and owing to its special properties, such as high elastic modulus, thermal and chemical stability, high strength, toughness and excellent dielectric properties; alumina has been regarded as a material of outstanding performance, especially under tension or bending conditions. In contrast to metals and polymers, however, the thermal stability of ceramics above 700 °C makes them suitable materials for high temperature applications^[1].

In recent years, considering their diverse properties, substantial research works have been conducted for the preparation of alumina nanoparticles^[2-4]. It is well known that the physical and mechanical characteristics of alumina nano particles are largely governed by the particle size, morphology, surface and phase homogeneity and these can be controlled by selecting a proper synthetic route. Several attempts have been conducted to control the characteristics of the resulting alumina powders, including the introduction of surface controlling agents.

The introduction of polymer in the system has attracted more attention and has been used to prepare both ceramic particles and metal oxide nano particles^[5].

Alumina exists in several metastable crystalline structures: η -, γ -, δ -, θ -, β -, κ -, χ , and α -alumina. According to Gitzen^[6], γ - Al_2O_3 transforms to δ - Al_2O_3 when calcined above 800 °C. The δ - Al_2O_3 transforms to θ - Al_2O_3 , when calcined above 1000 °C. Finally, θ - Al_2O_3 transforms to α - Al_2O_3 , when calcined above 1100 °C. However, the presence of impurities alters the barrier of phase transformations. Factors such as particle size, heating rate, impurities and atmosphere may influence the sequence of phase transformations of alumina^[7].

Various wet chemical methods such as co-precipitation^[8], hydrothermal^[8]; sol-gel technology^[9] and combustion method^[10, 11] have been developed for the synthesis of nano alumina. Wu et al.^[12] prepared the alumina gel from $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ by NH_4OH , where plate-like nano α - Al_2O_3 particles were crystallized by heating around 900 °C. Pathak et al.^[13] synthesized the nano crystalline alumina powder by a chemical reaction using citric acid and ammonia at 1200 °C. Wen et al.^[14] and Yen et al.^[15] prepared α - Al_2O_3 nano powder using $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ and NH_4OH as precursors. Yen et al.^[16] and Yu et al.^[17] reported Al_2O_3 nano powder preparation by calcination of boehmite. Pang et al.^[18] synthesized alumina nano powder with AlCl_3 using aqueous NH_4OH as precipitant. Pacheco et al.^[19] reported α - Al_2O_3 nano powder prepared by sol-gel method. Wang et al.^[20] synthesized α - Al_2O_3 at 1100 °C via accelerator-free polyacrylamide gel system, prepared at 80 °C and compared their route with other methods such as precipitation and calcination methods. They observed that the particle size of nano powders produced by sol-gel method was smaller than that of the nano powders made by other methods.

The present study tends to synthesize nano sized Al_2O_3 using sol-gel method by controlling the particle size distribution and shape employing polyvinyl alcohol (PVA). The PVA is a water-soluble synthetic polymer. It has the idealized formula $[\text{CH}_2\text{CH}(\text{OH})]_n$. It is known that size of the nano particles can be controlled easily through the use of polymers in the system. Sol-gel synthesis offers relatively inexpensive scale processing of mixed oxide materials with a good control over the stoichiometry and morphology which helps to tailor the required materials on atomic scale to suit specific applications. The synthesis by this method generally produces α - Al_2O_3 by calcination at high temperature. The work also investigates the effect of PVA additions on morphology of the alumina nano particles.

II. EXPERIMENTAL

2.1 Synthesis of alumina nanoparticles

The nanoparticles were prepared by the sol-gel technology. All chemicals used were analytical reagents. Aluminium chloride, AlCl_3 (s.d.fine-CHEM Ltd., Mumbai), 25% NH_3 solution (s.d.fine-CHEM Ltd., Mumbai) and polyvinyl alcohol (Loba Chemie Pvt. Ltd.) were used as raw materials for the synthesis of nano alumina.

0.1 M alcoholic AlCl_3 solution was prepared, followed by addition of 25% ammonia solution. The resulting solution turned to a white sol. This was followed by the addition of PVA (0.5M). The sol was stirred continuously using a magnetic stirrer until it became a transparent sticky gel. The gel was allowed to mature for 24 hours at room temperature. The resultant gel was heat treated at 100 °C for 24 hours which leads the formation of light weight porous materials due to the enormous gas evolution. Dried gel was, then calcined at 1200 °C for 4 hours and finally, the calcined powders were crushed using mortar and pestle to get the fine homogeneous dense powder. The same procedure was repeated without employing PVA and the results were compared.

2.2 Characterization

The structure of particles was investigated using X-ray diffraction using PANalytical, XRD machine (DY-1656). Monochromatic $\text{CuK}\alpha$ radiations were used as a source of 40 kV/35 mA power and the pattern was recorded in the 2θ range of 3°– 80° with a scan step of 0.02 in a scan time of 65.6 seconds. IR spectrophotometer (Shimadzu, FTIR-8900, Japan) was used for obtaining IR spectra (KBr) operating in the 400–4000 cm^{-1} range. The transmission spectra of the films were measured by an ultraviolet-visible spectrophotometer (Shimadzu, UV-1800) with a wavelength range 200 nm - 1100 nm and the optical band gap was measured from the transmission spectra. The morphology of particles was investigated using Scanning Electron Microscopy (Hitachi, JEOL-JSM 5800) [22].

III. RESULTS AND DISCUSSIONS

3.1 XRD Analysis

X-ray diffraction patterns were taken to examine the crystal structure of the synthesized nano alumina particles. The average crystallite sizes of synthesized samples were calculated from the full width at half maximum (FWHM) of the peaks using Debye-Scherrer formula:

$$D = 0.9\lambda / \beta \cos \theta$$

Where, D - crystallite size, λ - wavelength of $\text{CuK}\alpha$ radiation, β - corrected full width half maximum (FWHM) of the diffraction peak, θ – Bragg's angle of the X-ray diffraction peak.

The peaks in the pattern significantly indicate the formation of crystalline nano sized $\alpha\text{-Al}_2\text{O}_3$ powders. The average crystalline size of nano alumina particles without PVA was in the range of 35 - 45 nm and the PVA assisted nano alumina was in the range of 20 – 30 nm. Three main reflections were obviously observed at 2θ angles around 35 ° (104), 43 ° (113) and 57 ° (116). The peaks in the pattern significantly supported the

formation of nano sized $\alpha\text{-Al}_2\text{O}_3$ (corundum) from JCPDS file (77- 2135). Figure 1(a) and 1(b) shows XRD pattern of $\alpha\text{-Al}_2\text{O}_3$ nanoparticles without PVA (AI) and with PVA (API) respectively.

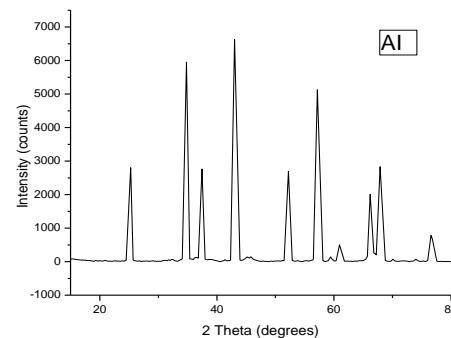


Figure 1(a) XRD pattern of nano Al_2O_3 without PVA

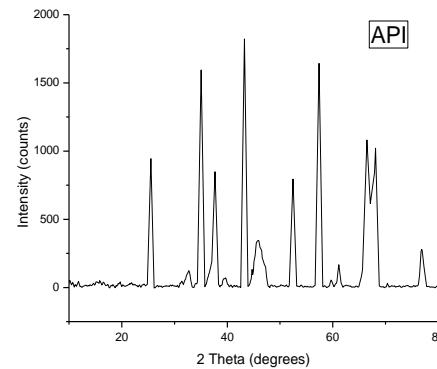


Figure 1(b) XRD pattern of nano Al_2O_3 with PVA

3.2 FTIR analysis

For nano alumina synthesized with and without PVA, an intense band centered around 3500 cm^{-1} and the other around 1600 cm^{-1} was assigned to O-H stretching and bending modes of water or alcohol respectively. The wide band appearing between 500 cm^{-1} and 900 cm^{-1} corresponds to the vibrational frequencies of co-ordinate O-Al-O bond. This wide band was divided into two peaks. The peaks in the region 500 – 750 cm^{-1} were assigned to v- AlO_6 and the other at 800 cm^{-1} was assigned to v- AlO_4 in nano Al_2O_3 [23].

However, the prominent difference between the two kinds of powders was in the depth of the Al-O bond appearing between 500 cm^{-1} and 900 cm^{-1} . For the nano powders synthesized with PVA, the peak in the region 500–750 cm^{-1} was much sharper than in the samples without PVA, indicating more crystalline Al-O bonds [24]. Figure 2(a) and 2(b) shows FTIR spectra of $\alpha\text{-Al}_2\text{O}_3$ nanoparticles without PVA and with PVA respectively.

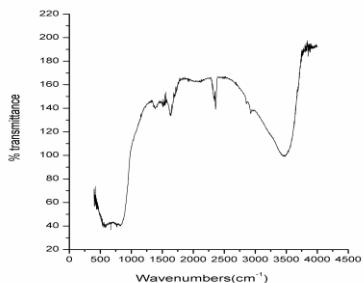


Figure 2(a) FTIR spectrum of nano Al_2O_3 without PVA

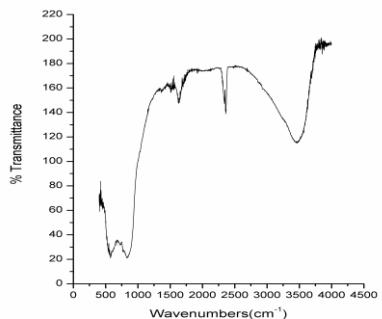


Figure 2(b) FTIR spectrum of nano Al_2O_3 with PVA

3.3 UV-visible analysis

Figure 3 shows the UV-visible absorption spectra of Al_2O_3 nano particles suspended in deionized water [25]. A strong absorption peak between 200 nm and 400 nm was clearly observed which confirmed the presence of Al_2O_3 nano particles. UV-visible absorption spectroscopy is one of the important tools to probe the energy band gap. The absorption peak of nano alumina without PVA was found at around 242 nm and 382 nm [Figure 3(a)]. PVA capped alumina nano particles had absorption peaks at 242 nm and 377 nm. A blue shift of about 5 nm was observed with addition of PVA. Band gap of the nanoparticles is calculated from

$$E = hc / \lambda$$

where, E is Band gap energy, h is Planck's constant, c is velocity of light; λ is wavelength of absorption edge in reflectance spectra. Band gap energy of PVA capped alumina nano particles (3.30eV) is slightly greater than for the uncapped alumina nanoparticles (3.25eV). This showed the decrease in particle size of alumina in presence of PVA [26].

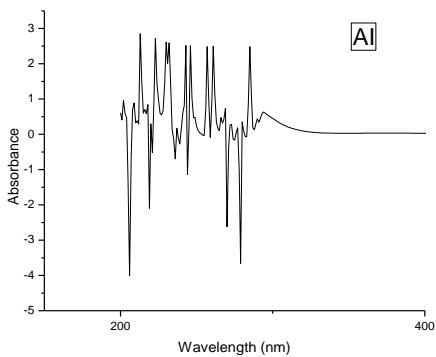


Figure 3(a) UV-visible Spectra of nano Al_2O_3 without PVA

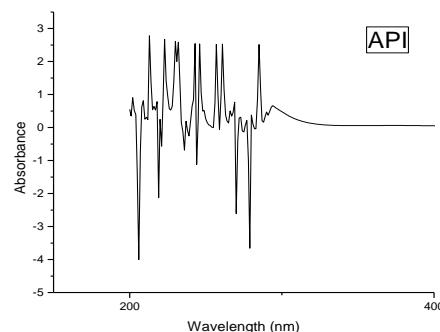


Figure 3(b) UV-visible Spectra of nano Al_2O_3 with PVA

3.4 SEM Analysis

Scanning electron microscope is a very useful tool for studying morphology of nano powders. Figure 4(a) and 4(b) shows SEM pictures of α - Al_2O_3 nanoparticles without PVA and with PVA respectively. For nano alumina particles synthesized without PVA, only a little dispersion with lot of agglomeration was observed which appears to be a major problem in producing nano powders. As shown in figures, by adding PVA, less agglomeration occurs. Particles capped with PVA possessed a better dispersion than the particles synthesized without PVA [27].

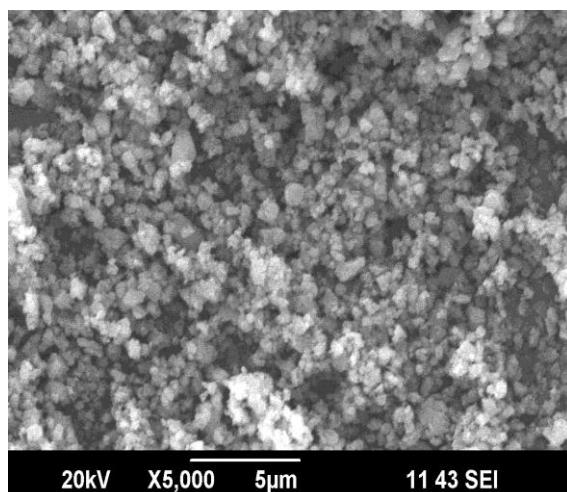


Figure 4(a) SEM of nano Al_2O_3 without PVA

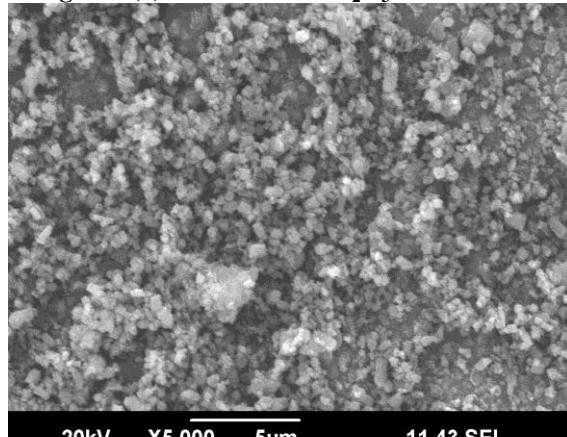


Figure 4(b) SEM of nano Al_2O_3 with PVA

IV. CONCLUSIONS

Nano crystalline Al_2O_3 powders have been synthesized by sol-gel method employing PVA. This is a direct and efficient route, extendable to other metal or alloy oxide nano particles and has the potential to be further scaled up towards production of large quantities. The synthesized alumina powders were characterized using XRD, FTIR, UV-visible spectroscopy and SEM. The XRD pattern revealed that the synthesized nano alumina particles were crystalline in nature and had more stable corundum phase. The addition of PVA produced nano sized alumina with small size distribution. FT-IR analysis confirmed that the synthesized alumina nano powder had the characteristic wide band appearing between 500 cm^{-1} and 900 cm^{-1} which corresponds to the vibrational frequencies of Al_2O_3 . UV-visible absorption peaks between 200 nm and 400 nm was clearly observed which supported the formation of Al_2O_3 nano particles. The increase in band gap energy revealed the decrease in particle size with addition of PVA. The SEM images also indicated less aggregation for the PVA addition. Alumina powders obtained at the nano metric scale, may have superior properties as compared to the powders obtained in larger particle sizes and can be used in medical applications as a biomaterial.

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AUTHORS

First Author: Neethumol Varghese, Research Scholar, Union Christian College (MG University, Kottayam), Aluva, Ernakulam Dist, Kerala, India, 683102., Email: neethumol84@gmail.com

Second Author: Manjusha Hariharan, Research Scholar, Union Christian College (MG University, Kottayam), Aluva, Ernakulam Dist, Kerala, India, 683102. , Email: manjushahariharan@gmail.com

Third Author: Dr. A Benny Cherian, Associate Professor Union Christian College, (MG University, Kottayam), Aluva,

Ernakulam Dist, Kerala, India, 683102., Email:
bennycherian@gmail.com

Fourth Author: Dr. P.V Sreenivasan, Associate Professor,
Union Christian College (MG University, Kottayam), Aluva,
Ernakulam Dist, Kerala, India, 683102., Email:
sreeniucc@gmail.com

Fifth Author: Jenish Paul, Assistant Professor, Union Christian
College (MG University, Kottayam), Aluva, Ernakulam Dist,
Kerala, India, 683102., Email: jenishpaul@gmail.com

Sixth Author: Asmy Antony K.A, Assistant Professor, St.
Xavier's college for women (MG University, Kottayam), Aluva,
Ernakulam Dist, Kerala, India, 683101., Email:
asmy.antony30@gmail.com

Correspondence Author: Neethumol Varghese **Email:**
neethumol84@gmail.com, **Contact Number:** +919774192551

Significant of Information Rich Contents in Technology based Marketing Communication Channels to reach Knowledge savvy customers

Dr. Chammika Mallawaarachchi

University of Visual and Performing Arts, Sri Lanka

Abstract- Purpose of this paper is to document the finding on content marketing initiatives were taken to promote the concept by well-establish content marketers via the Internet. Of that purpose, twelve months period were continuously read and engaged with contents providers and also discussed with content readers who engage with informative and knowledge savvy contents. As a result, the methodology of the research was basically literature review. But due to very limited published literature of the subject because of the concept is very new to the Internet marketing arena the study was carried case study manner but not really a comprehensive case study. Therefore, aim of the study was to see how content marketing is serving a technology savvy and the Internet era customers to acquire the needed knowledge from their loyal content providers. So, during the time period, it was highly shown that the new concept influenced in many ways to the online marketing arena especially in marketing communication because contents increased skills and the knowledge of customers who shared with instead of disturbing or influencing to purchase or subscribe those contents. Therefore, to meet that purpose the study was mainly concerned to find how information rich and knowledge oriented contents were created, the ways of structuring the created content, communication platforms and channels were used to deliver contents, and designing of communication strategies towards to oversee how significant of information rich contents are influencing knowledge savvy customers.

Index Terms- Content Marketing, Information Context, Marketing Communication, Knowledge Marketing, Knowledge Customers, Social Media, Internet Marketing, Marketing Strategies

I. INTRODUCTION

Today concepts of marketing are drastically changing therefore to compete in order to survive in the knowledge competitive advantage of online marketers become more complex. The scenario further advance because of customer's attitudes on products and services and ways of engage with marketing messages. As a result, communication channels become more important whilst the content which is carried rich information. Of that, online marketing which is mainly on social networking environment to reach targeted customers have to consider two tasks which were: to use relevant and appropriate marketing communication channels; and to share information and knowledge rich contents and have to perform differently by

marketers. Then those will comprehend positive communication towards contents and strengthen customer satisfaction. And most importantly, it enhances competition among marketers because sustain of online marketing depends on positive engagements of customers, so it is essential in social networking.

Therefore, a new concept which is content marketing, information and knowledge rich contents in various formats becomes the most suitable and acceptable marketing mechanism to engage with technology and knowledge savvy customers who search marketing massages for their needs with limited time and less efforts. Therefore, it is well-known to customers that content marketers are sharing information and knowledge but not selling products and services where traditional marketers are doing. Similarly, content marketers aware that the importance of customer interactions with contents which lead to return on investments.

Further, in midst 20th century, despite of the size of marketing campaign most of marketers realize that traditional marketing channels are dying because of knowledge explosion in marketing and knowledge competition among the marketers. This situation is further enhanced by the sophisticated information communication technology. As a result, most of online marketers have taken action to promote their products and services via content marketing platforms while publishing information rich contents free of charge. At the same time, they won hearts of customers. Under these circumstances, customer engagements with platforms of social networks increased and marketers are enhanced to grab vast opportunities to reach target customers without any obstacles.

Consequently, in fact, social networking sites of content marketing connect billions of customers across the continents to discuss and share their thoughts on products and services and even trade online. All of these opportunities create a positive atmosphere towards development and sustain of content marketing therefore rich contents become more powerful tool to reach desired audience than producing very costly advertisements. Further, become known content Tremens (2007) claims "contents sharing via social networks are not provided sufficient and appropriate information and knowledge, they can destroy company images, and sales can plummet, and even can ruin the entire company". Of that, in most situations where social networking atmosphere marketers were thinking differently to engage with target audiences with relevant and appropriate communication channels because customers are capable to analyze and review what marketers are shared via information communication platforms. As a result, nowadays customers do

not expect interrupting marketing campaigns instead look for friendly and informative services. So that content marketing becomes a very attractive and competitive word among most of the marketers in social networking and online communities.

Therefore, content marketing is a new marketing strategy which involves contents, communication channel and customer together at the same time. As a result, content marketers, especially, are providing most required information and knowledge which sought by customers.

Content marketing is a new concept which is still debating among online marketers, because it has bended all most available marketing concepts and ideas. As a result, marketers use various words to define what content marketing is. Palazzo, Barrett, Newt (2009) document that commonly used terms which are: custom publishing, custom media, customer media, customer publishing, member media, private media, branded content, corporate media, corporate publishing, corporate journalism and branded media are very commonly used by online marketers to define content marketing. Of that, to find a boarder and informative definition on content marketing somewhat difficult however Brogan (2008) and Ferguson (2009) define content marketing is “a technique of creating and distributing relevant and valuable content to attract, acquire, and engage a clearly defined and understood target audience with the objective of driving profitable customer action”. While, Palazzo (2008) it defines “the art of understanding exactly what customers need to know, and delivering it to them in a relevant and compelling way to grow business”. In another viewpoint, Decker (2012) highlights “creating or curetting non-product content that would be informational, educational, entertaining, and publishing it to contact points with customers to get their attention, to focus on the topic around solution, and pull them closer to learning more about”. Further, Haines (2014) explains “publicly and freely sharing information about business and industry which include text, video, audio and online events.”

Therefore, it can be further define that content marketing which provides potential information, knowledge, skills, intelligent and wisdom that customers are seeking, without selling products and services purposely. Of that, content marketing broadly Mallawaarachchi (2010) defines “an art of sharing information and knowledge with customers and prospects without selling products and services”

A common word in marketing which is customer is dramatically changing because now marketers have to involve with delivering promising messages which give solutions to their problems on products and services. Of that in the environment of content marketing, many customers are well educated on marketing massages than before as a result well-known to them what messages have required information and can it enhances their knowledge further. Therefore, marketers have to design their massages for specific customer segments by tailoring contents towards customer-centric, multi-channels instead of product-centric and single communication platforms which leads to synchronize marketing strategy across email, print and online channels. Therefore, one of a key issue in content marketing is to identify specific customers and their marketing needs, for an example; desired products brand, types of contents which carry rich information, are critical and important. And most importantly, access and sharing with niche customers because

communication channels of content marketing are more specific so general audiences may not have required skills to cope with. Therefore, customers in content marketing seem treated as unique so it is necessary to segment customers into groups and match these groups with products and services to meet their needs.

However, to identify customers, it is also very important in content marketing that to introduce a well defined communication strategy which requires best channels for communication. These channels should identify the unique requirements of each customer because of high customer expectations with bended knowledge. Mapping of all these however is a challenge, but by effective platforms of social media networks will persuade target audiences to engage with products and services differently. Communication platforms which are online or offline can use with multiple contents that may be text, audio, video or imagery formats. However, platforms which use in communication are crucial because those may functions as bridge for driving customers to contents and driving contents to customers. However, to use efficient and appropriate communication platforms, it is important give customers to decide when and how they can access information; ensure that information is consistent in all channels; and allow customers to move seamlessly from one channel to another. Therefore, beside rich contents, sustainable communication platforms enable customers to engage with, same time, permission base marketing ensures that marketers interact with customers legally and responsibly.

II. CONTENTS IN CONTENT MARKETING

The most appropriate communication platforms and customers are identified; other task is to define the contents of the products and services which is going to share with customers because it is not just any contents but should be valuable and relevant in content marketing. So, to engage with desired customers, contents have to offer solutions to their problems and to lead successful, productive, and enjoyable, if not most of the contents can be ignored. Therefore, contents which have to be smart and authoritative because those contents can communicate differently. As a result, most of content marketers spend more than 30% from the total budget on marketing to create and execute contents. For an example, Junta42 which is a well established content marketing company reported that 56% of marketers were increased their content marketing spending in year 2008 and just only 4% decreased compared to the year 2009.

Therefore, Palazzo (2008) explains that “contents on products and services are mostly using mechanism to communicate with customers in social marketing”. As a result, to communicate with customers, most of content marketers are basically approaching two types of contents which are an editorial contents and commercial contents. Berry (1995) defines that editorial content is a type of content that traditionally has been receiving from well-known publishers whereas, classified ads, catalogues, directories and yellow pages are commercial contents.

However, Palazzo and Franz (2009) urge that it is better to use both type of contents because they might lead to a successful

marketing. Further, they suggest that with good understanding of internal and external factors contents can be created with the greater components which are based on customer behavioral, essential, strategic, and target oriented respectively. Behavioral element shows that the important of having a very clear and definite purpose to communicate with their customers and what actions are expected to be taken by customers. As a result, content which is sharing has to provide relevant and valuable information what customers are really looking for to meet their behavioral actions. Upon completion the second component which is essential has to be addressed because content which is shared have to enhance knowledge or gain benefits from that by customers. As a result, other components which are strategic and target can execute all efforts lead to overall business strategy and link content strategy to bottom line results which are respectively meet targets.

As a result, following concerns are more important to consider which contents may help achieve marketing goals and may integrate with other marketing strategic initiatives. Because contents can create precisely however, those may truly want to relevant to the targeting audience and marketing goals. Simultaneously, marketer may keen to understand professional roles to review customers' view on contents to lead them towards to contents. Therefore, Cohen (2006) mentions factors on to create contents that "how does this content relate to our brand; is it consistent with the brand image that trying to project; how will it extend reach; and how can it be used to expand revenues"

III. CONTENT STRUCTURE IN CONTENT MARKETING

Upon developed contents there has to be a meaningful content structure because that leads to create, capture, deliver, customize and manage smooth functions of the business process. An appropriate content structure enhances proper content management and document management which directly link to effectiveness of content relationship. Therefore, this would be a positive impact to decide the amount of contents, types of content, ownership of content and life cycle of content. As a result, key components of content structural are an integration, organization, searching ability, and traceability because inconsistency may lead to tarnish content image. Of that, either structural or un-structural contents have to well manage and to prioritize to promote content structural relationship. The importance of structured contents are Ashen den (2001) highlights "effective content management demands that the content is well structured and organized before it is put into any software tools. Disorganized content that is automated will simply give disorganized content faster. Therefore, it is better to understand the content, its variability, its creation, and its archive cycles".

Therefore, following content structures are mainly can be used in content in content marketing strategies are concerned which are:

- a. controlled contents seem to be either structured or unstructured, however, contents and relationships are under revision control;
- b. uncontrolled contents are not under revision control and may exist in any information storage system;

- c. structured contents form of structured storage systems like databases, spreadsheets etc, and
- d. Unstructured contents refer to documents and other electronic/physical media containing the information.

Despite types of contents, structuring of contents is a process and a fashion because once identified what types of contents and its structure similarly has to consider that way of sharing, using and re-using and maintain of contents. This process can illustrate in figure one against four ways of content structures in content marketing.

Figure 1- stages of the content structuring

At the initial process which is producing of content an innovative and dynamic task because creation of new knowledge is a started point and various skills may have to meet together to produce attractive and effective content. Therefore, producing of content is very crucial in content marketing because in one hand there should be opportunities it to use in multi communication channel and other hand it has to be met search engine optimization. This scenario is very important with social networking and online communities because customers share contents with their followers as a result it is better to have facilities to synchronies and asynchronies. Therefore, in a social networking environment, customers make comments on products lively so that content markets can make changes of the contents easily. So it supports for new knowledge creation and information processing while producing better contents.

Content sharing which has to process internally and externally because how strong created content can be tested internally among employees, departments, business processes and at the second round externally with communication platforms. As a result, different stakeholders may view shared contents various angles and may suggest what to share and not in a dynamic way.

Contents which are current and up-to-date may create opportunities to re-use in many occasions and in various formats. However, contents with reusable facilities better equipped with easy to find and easy to share because reusability of contents require standardized formats and effectively search in any time. Contents are informative and searchable at the same time if contents can convertible as desired it creates incredible customer satisfaction because there are more opportunities them to publish in online and offline. So that having already published the desired contents no worries on advanced tools on converting or technical requirements for customers. As a result, customers once converted content then easily can maintain while creating opportunities to update, archive or delete.

IV. COMMUNICATION STRATEGIES IN CONTENT MARKETING

Communication strategies of content marketing needed regular change because an optimized informative content can influence customer's positive interaction with products and services. The important of this scenario Palazzo and Newt (2008) highlight "the Internet marketing no proper marketing communication strategies than no marketing at all". Further, Palazzo (2008) describes "a good content marketing strategy

which offers best solutions on the problems of customers and transfer trusted knowledge. Importantly, one customer's need may vary to other therefore, marketing communication strategies are not working in same way so get through, need to communicate differently. Therefore, Palazzo, Pets (2009), Sky me (2000) point that "to implement effective and appropriate communication strategies that need to identify behavior of customers with great purpose, and delivering contents must strategic and targeted". As a result, implementing of integrated marketing communication strategies is a complex task however Moonie (2004), Samar (2001) highlight that however it is important because search engine optimization is a new trend in marketing communication. Therefore, search engines help to attract customers then contents need provide informative contents them to interact with.

V. ISSUES, CONTROVERSIES, PROBLEMS IN CONTENT MARKETING

Dynamic but chaotic functional situation of content marketing can see varied challenges in content creation, content sharing and usage, and important and usefulness of the content. Of that those may more relevant with customization, speediness, flexibility, sustainability and value in content marketing.

Customization is relationship in between contents and customers who engaged with because when customers are allowed to engage with contents in great manner, marketers can identify whether shared contents are relevant and appropriate. At the same time, it streamlines the communication process.

Speed is in many angles important in content marketing because customers want the best products and services instantly. So customers like to engage with desired products and services anywhere in the world at any time to accomplish marketing tasks. Therefore, maintain of required speediness is crucial because it enhances balance in between information and customer relationship which shows: all contact initiated by customers is good contact and should be perceived as an interest in the content shared, or an opportunity for the marketer to learn; all contact should be answered instantly if possible, and if not absolutely no longer than 24 hours after the initial contact; and always reply with an aura of respect, appreciation and sincerity. One of the uttermosts important factors is flexibility because in a dynamic and competitive marketing atmosphere flexibility may show contents sustainable and improvise. Therefore, flexibility connects with the element of speediness which implies the entire necessary morale fiber of company to being alert, swift, proactive and always ready in a world where nothing is still. In fact, therefore, marketers may have to concern new trends, competitors and new technologies to keep flexibility of contents without any obstacles. However, flexibility does not only imply external factors, but first and foremost, it is an internal attribute to be able to change and adjust the company in response to something that is outside.

Uncertain content marketing environment which is fast changing and dynamic the prerequisite requirement is to concern on sustainability because while conduct comprehensive and breakthrough experiments on sustainability can reduce risk and can review responses to new strategic initiatives accurately.

All of the above synergy aspects ultimately create value for contents which high speed equals high value, high level of

customization equals high value, and sustainability and continuous improvement ensure high value over time. All interconnected with each other and lead to relationship on entre content marketing process.

VI. SOLUTIONS AND RECOMMENDATIONS

Information structural relationship

Basically, a buyer-seller relationship, a seller-maintained relationship, a buyer-maintained relationship, and discrete exchanges of relationship, may concern to strengthen informational structural relationship because in social networking no string relationship in between and among components, it affects to the entire informational relationship. The important of all levels relationship Broody et.al (1997) suggest that it can maintain in four levels which are "a technology based tool of database marketing, between businesses and its customer retention, a form of 'customer partnering' in the design of a product or service offering and incorporating everything from databases to personalized services, loyalty programs, brand loyalty, internal marketing, personal and social relationships and strategic alliances". Further, Dwyer (1987) documents that the information structural relationship awareness, exploration, expansion, and commitment may better to consider because Payne (1995) prospects, customers, clients, advocates, members, and partners also should consider not only informative contents. Whereas, Kilter (1997) suggests that suspects, prospects, first time customers, repeat customers, clients, members, and partners suggests that suspects, prospects, first time customers, repeat customers, clients, members, and partners are also important. In contrary, Berry (1995) stated three characteristics which are variability, complexity, involvement important for customers to desire continuity with the same provider.

Therefore, informational structural relationship mainly can maintain to secure loyalty of customers towards contents, to keep sustain of competitive advantage and social bonds.

Social Media Structural Relationship

The collective assembly of web properties in general can identify as social media which comprise texts, images, videos and audios in association with interaction, networking and technology. Therefore, social media structural relationship involves online communities and social networks to boost public relations, sales promotions, customer services and marketing. Therefore, various social media platforms can structure together to buildup relationship such as collaborative networks (*Wikipedia*), content communities (*YouTube*), social networking sites (*Face book*), and virtual game and social world (*War craft and Second Life*) largely and this is a new trend. For example, if relationship builds well then it allows to add external links in a wide range of different media including text (*Book Crossing*), photos (*Flicker*), videos (*YouTube*), and PowerPoint presentations (*Slide share*).

As a result, with proper mechanism on social media structural relationship, information rich contents may share with business to business (B2B), business to customers (B2C), and most importantly customer to customer (C2C). A recent past, the most successive content marketer "*Blendtec*" who manufacturers kitchen appliances became popular by producing inexpensive but

very attractive and informative video “*Will it blend?*” and watched by millions of people.

Content Management Structural Relationship

Content management structural relationship leads to capture, manage and distribute the selected contents effectively and efficiently to target customers therefore, created content which has to format well to share with different communication platforms because good content management will lower overall content production and sharing costs and increase the amount of relevant content available online and lead to higher site utilization.

Therefore, comprehensive content management makes easier information utilization in a common interface and enables good marketing practices throughout. Most importantly, it really supports process based knowledge management to increase operational efficiency and collaboration among all users.

VII. CONCLUSION

Knowledge competitive atmosphere customers' knowledge on products and services is drastically increasing because of advanced and complex information communication technologies, therefore new marketing concepts and ideas are influencing to existing marketing phenomenon. As a result, new marketing concept which is content marketing, increasing skills and knowledge of desired customers with information rich contents on products and services via social networking, is born. Especially, irrespective of size of a marketer this concept hugely welcomed by both marketers and customers because customers become active participants, contributors, and a third party marketer, while marketer becomes a loyalty service provider to the customer so this bound shown that at any point may not possible to deviate. As a result, content marketing shows that Piñata-style marketing, swing the air and if lucky contents hit the target group, is dying instead of punch marketing style which reach target groups with content preciseness, is playing a vital role. Of that, to reach target customers contents have to be more precise and suite with communication platforms to engage with competitive marketing environments while maintain good relationship in social media networks because no proper linkages may face problems in outbound marketing situations. Further, the Internet based marketing which is demographically segment into niche fragmentation and tangible assets into intangible assets are very important with knowledge and information technology savvy customers.

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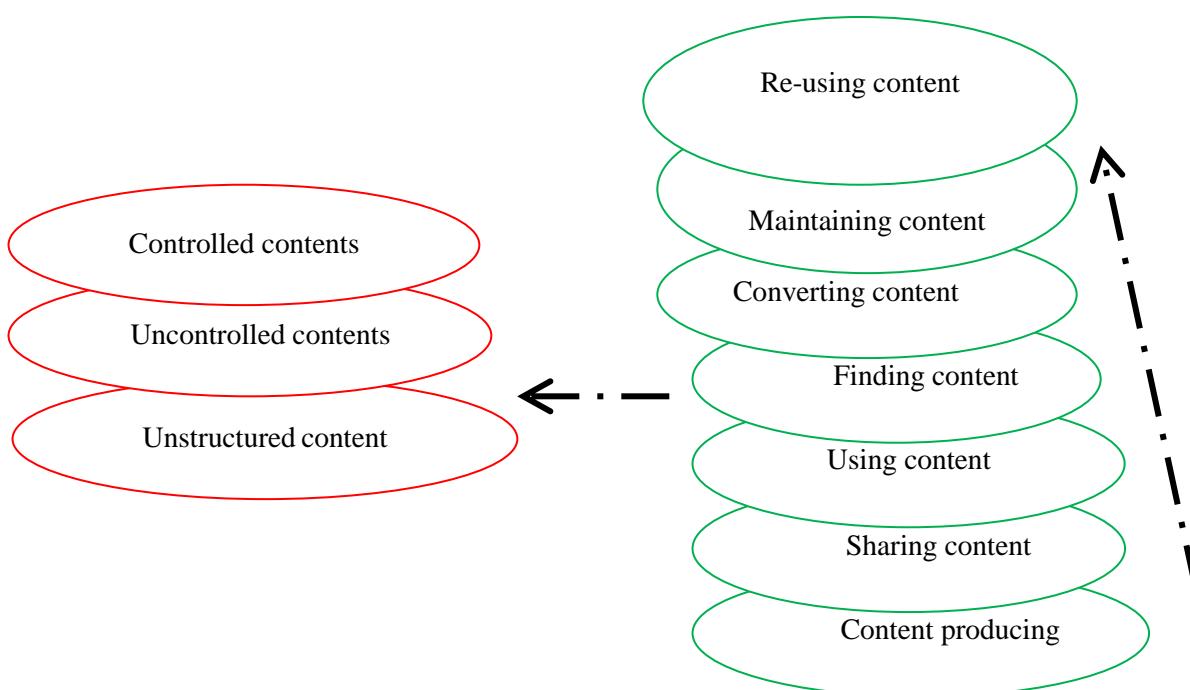
KEY TERMS & DEFINITIONS

Content Marketing, Internet Marketing, Marketing Communication, Social Networking, Internet Customer

AUTHORS

First Author – Dr. Chammika Mallawaarachchi, University of Visual and Performing Arts, Sri Lanka

Figure 1- stages of the content structuring



Does Practicing Good Governance Enhance the Public Trust Towards the Lebanese Government?

Hassan Alaaraj*, Fatimah Wati Ibrahim**

*,** School of Economics, Finance and Banking, College of Business, Universiti Utara Malaysia, Kedah Darul Aman, Malaysia

Abstract- The objective of this paper is to examine empirically the influence of good governance practices on the public trust in Lebanon. It presents a theoretical research framework to understand this relationship supported by literature review from recent studies. A survey was conducted among SMEs in the capital Beirut, where 400 questionnaires were distributed among managers and employees resulting 94 percent usable response rate. The research hypothesis was accepted through analyzing the data by SPSS and SEM. The main findings indicate that good governance practices have a positive and significant influence on public trust in Lebanon ($p<0.001$). Future studies are recommended to extend the empirical research in terms of good governance practices and more specifically at the level of sample and geographical distribution.

Index Terms- Good governance, Public trust, Lebanon

I. INTRODUCTION

Trust is considered as one of the most significant aspects in the implementation of government strategies for any country. In order for citizens to trust their government, the latter must achieve its ambitious targets to develop and provide the efficient quality of public services. In the absence of trust, citizens become suspicious about their political system and disaffected with the existing order (Diamond, 2007).

According to Kim and Kim (2007), trust in government is influenced by numerous factors mainly efficiency and effectiveness, responsibility, integrity and accountability, openness, participation and transparency. However, no reform will build trust unless governments change their way of governance in a more efficient, transparent and accountable manner that respect law and public interest as well (Diamond, 2007).

As most of developing countries in the Middle East region, Lebanon suffers from weakness in the good governance level. This is because of the high corruption index that indicates lack of transparency as reported by different studies (Marcel, 2013; IIF, 2005). In 2012, Lebanon was ranked at the 128 position among 176 countries regarding the corruption perception index (Bank Med, 2013; CPI, 2012; The Daily Star, 2011) and it was also reported that the government's transparency of policymaking in Lebanon was listed the 104th among 135 countries in the world (The Heritage Foundation, 2013).

Moreover, other aspects of good governance such as efficiency and accountability are not presented properly within the Lebanese government because of different reasons mainly

insufficient and unqualified employees, outdated offices' equipment and over centralized procedures (Dawlati, 2013).

However, the Lebanese government has been implementing recently a series of reforms to fight the widespread of corruption and enhance the good governance which in turn increases the efficiency of government sector and advance the public trust towards it (US Commercial Services, 2012; Kefela, 2011; IIF, 2005).

Consequently, the aim of this paper is to determine empirically the influence of good governance practices on the public trust in Lebanon and present a practical case study that can be advantageous for developing more reforms not only in Lebanon, but in the surrounding region as well.

II. LITERATURE REVIEW

Conceptually, trust is perceived at interpersonal and organizational levels in which fairness, confidence, risk taking and expectations are considered its main constructs (Colesca, 2009; Erturk, 2008). Trust in public sector is essential for the functioning of government especially that it has become increasingly associated with governance. Public administration has examined trust as a basic ingredient of social capital in that it helps create networks between people in a community and helps to make these networks function smoothly (Walker et al., 2008).

In addition, Welch et al. (2005) argued that trust in government is typically measured in terms of citizens' subjective judgments based on their experience. They have also suggested that citizens' trust will arise when they touch the government's competency, reliability and honesty while meeting their needs. Thus, good governance is how the governments interact with the citizens and who will be involved in the process. It is an exercise of transformative, administrative, political, social and economical authority to meet the requirements of the law, openness regulations, transparency and accountability (UNESCAP, 2012; Ferguson & Popescu, 2006; ANAO, 2003).

Thus, governments are always in need to respond the demands of citizens to improve the efficiency and boost the effectiveness of their public services (Siddiquee, 2008). Lot of studies has been conducted in terms of different dimensions of good governance. For instance, Egwuonwu (2011) focused on the behavioral aspects of governance which consists of accountability, justice, transparency, genuine disclosures, integrity and high performance. Others discussed good governance in terms of equity, efficiency, sustainability, transparency, accountability and security (Khan, 2013, Kefela, 2011). Since these dimensions are applicable in various

perceptions of good governance, it is significant to study their implementation in the government sector as to achieve the objectives of this research.

A. Efficiency

In the meaning of good governance, it is saving and protecting the environment by manageable use of the natural resources (UNESCAP, 2012).

B. Transparency

Transparency is the process of making decision and it is properly implemented through the regulations and rules (UNESCAP, 2012). In other words, it is the disclosure of any related information to the interested stakeholder on timely manner (Salin & Abidin, 2011).

C. Accountability

Accountability is considered as a key prerequisite of good governance for both public and private institutions (UNESCAP, 2012). Accordingly, Khan (2013) described accountability as an open government that support good level of social and political objectives of authority, sharing, respecting the rights and empowering the equity. Thus, governments must find a balance between the requirements of accountability to the society and those of state governments (Kluvers, 2010).

By practicing these dimensions of good governance, governments can improve the public trust by making the processes throughout their institutions more efficient, transparent and accountable (Park & Blenkinsopp, 2011). Such institutional enablers for enhancing trust are theoretically derived from the institutional trust theory which is primarily conceptualized as trust in the rules, roles and norms of an institution independent of the people occupying those roles (Smith, 2011; Zucker, 1986).

Based on the above discussion, the theoretical framework of this research is developed as shown in figure I and the main research hypothesis is proposed.

H_1 : good governance has a positive and significant impact on public trust in government

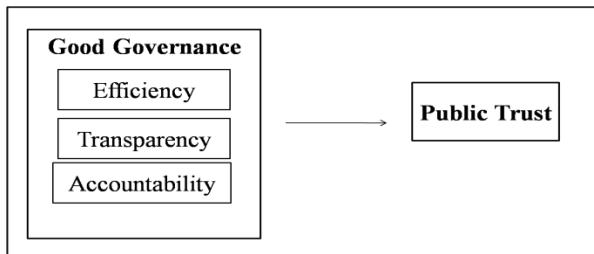


FIGURE I: THEORETICAL RESEARCH FRAMEWORK

III. METHODOLOGY

To achieve the research objectives, a quantitative methodology was applied through conducting a survey among the public of Lebanon. According to previous studies, selecting the target population is highly influenced by the respondents' characteristics such as education, career, skills and to which extent they are interacting with the research concepts. Therefore,

a sample of educated and skilled employees from small and medium sized enterprises (SMEs) who are in regular contact with government services would be a representative sample for survey.

Consequently, 400 questionnaires were distributed randomly among the SMEs in the capital Beirut. Out of the returned questionnaires, only 375 questionnaires were usable and applicable for analysis presenting 94% response rate. A total of 36 items were derived from valid and reliable previous studies constituting the questionnaire used in this survey (Jalali & Khorasani, 2012; Grimmelikhuijsen, 2012; Park & Blenkinsopp, 2011; Al-Zoubi et al., 2011; Agrawal et al., 2007; Welch & Hinnant, 2003). The respondents were asked to rate their level of agreement based on 6-likert scale that ranged from strongly disagree to strongly agree.

IV. RESULTS

The collected data were analyzed using SPSS and AMOS software. Primarily, the demographic statistics of respondents showed that the 60% of respondents were males and 49.3 % were between 41 and 50 years old. Moreover, 49.6% of the respondents have a master degree and 45.1% with very good information and communication technology (ICT) skills. This indicates that the selected sample for this research is highly representative with educated and qualified respondents.

The descriptive statistics of the research variables illustrated that the public of Lebanon fairly agree on how the government is practicing good governance and the extent to which they trust this government since the average mean is around 4 for all variables (PT: 4.4; EF: 4.2; TRN: 3.9; ACC: 4.5).

The items used in this study consistently represented their corresponding latent constructs with composite reliability and cronbach's alpha coefficients greater than 0.7 ($0.77 < \alpha < 0.93$) as suggested by Hair et al. (2010). In addition, the validity of items was confirmed by explanatory factor analysis (EFA) where the measured items had loadings on their corresponding components and above 0.5 as suggested by Hair et al. (2010). Confirmatory factor analysis (CFA) was also used to detect the convergent validity where items having loadings greater than 0.5 were deleted. The developed structural model of this study which is shown in figure II has revealed goodness of fit indices above thresholds that were suggested by Hair et al. (2006) and presented in Table I.

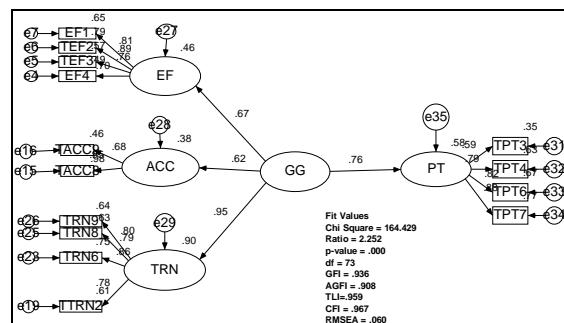


FIGURE II: THE RESEARCH STRUCTURAL MODEL

TABLE I: THE GOODNESS OF FIT INDICES OF THE STRUCTURAL MODEL

	CFI >0.90	GFI >0.90	AGFI > 0.90	TLI > 0.90	RMSEA < 0.08
Goodness of Fit Indices	0.967	0.936	0.908	0.959	0.060

The proposed hypothesis was tested through SEM tool where the results obtained are illustrated in Table II.

TABLE II: HYPOTHESIS TEST RESULTS (REGRESSION WEIGHTS)

	Estimate	S.E.	C.R.	P
EF <--- GG	1.000			
ACC <--- GG	0.633	0.093	6.791	***
TRN <--- GG	1.209	0.119	10.133	***
PT <--- GG	0.741	0.090	8.227	***

* P < 0.001

The results showed that the regression weight for good governance in the prediction of public trust is significantly different from zero at the 0.001 level. Thus, the research hypothesis is accepted.

V. DISCUSSION

The results obtained from this survey have shown a significant relationship between practicing good governance and the public trust in the Lebanese government. The respondents have fairly agreed on the application of good governance in Lebanon especially at the level of accountability that showed the highest mean value with 4.54, followed by efficiency 4.23 and the lowest mean value for transparency 3.92.

Such results are supported by previous studies (Kim & Kim, 2007; Welch & Hinnant, 2003; Bouckaert & Walle, 2003) who asserted the significant effect of good governance on public trust. For example, some researchers found several important interdependencies between trust and accountability (Ammeter et al., 2004; Thoms & Scott, 2002).

In addition, Bouckaert and Walle (2003) found that participation, accountability and transparency build trust because it identifies the public interests and makes actions more predictable. Welch and Hinnant (2003) also suggested that people who are using internet more frequently are more satisfied with transparent government web sites which contribute to higher levels of trust in government.

Particularly, good governance has shown lot of enhancement efforts in Lebanon in terms of accountability such as measuring

citizens' ability to participate in government selection, freedom of expression, freedom of association and free media. Also, government effectiveness and regulatory quality was achieved through measuring market-friendly policies and laws. Moreover, the civil society and public authorities are cooperating on specific reform activities in terms of control of corruption and enhancing transparency (Mansour, 2012; Saidi, 2012; TI, 2010).

Overall, Lebanon has come close to attain good governance as a whole, where Lebanese government must manage and govern efficiently to reform civil services by introducing greater public transparency requirements and expanding the opportunities for citizen involvement in monitoring public sector activities. This in turns enhance the public trust in government through achieving a set of ultimate goals within the reform of government sectors.

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AUTHORS

First Author – Hassan Alaaraj, PhD Scholar in Economics, Universiti Utara Malaysia, araj.hassan@hotmail.com

Second Author – Fatimah Wati Ibrahim, Professor in Economics, Universiti Utara Malaysia, fatimah@uum.edu.my

Correspondence Author – Hassan Alaaraj, araj.hassan@hotmail.com

The role of the food risk and the sociodemographic variables on the attitude to healthy foods

Gatri Emna ¹, Ben Rached Kaouther ², Moulins Jean-Louis ³

¹ Departement Of Marketing PhD ,Student, Tunis El Manar University

² Departement of Marketing, Professor, Tunis El Manar University

³ Departement of Marketing, Professor, Aix-Marseille University

Abstract- This research is interested in the changes of the eating habits of the consumer further to numerous health crisis. The consumer became more and more aware of the impact of the food on the health and more and more distrusting. This distrust led the consumer to healthier food product such as: relieved or enriched products and the dietary products etc., which brings the form and well-being in order to minimize the risk.

In this context, a quantitative study of Tunisian consumers studied the effect of dietary risk as well as sociodemographic variables on attitudes toward healthy foods.

Index Terms- Attitude, Healthy foods Perceived risk, Sociodemographic variables.

I. INTRODUCTION

In recent years, the growth of the food sector requires a particular consideration [1]. Indeed, preserving the complexity of the behavior of the consumer, it is difficult to generalize the food habits of this one because a multitude of factors enter into account [2]. In particular, the sharp drop of the risk acceptability threshold following the improvement in the condition of life (Peretti-Watel, 2001). Also, the use of new technologies in the agri-food sector cause a mass production and standardization image that takes away the production of food to the final consumer [4]. In fact, the modern food is no longer identifiable and it has become, as the expression of Fishler (1976) an «OCNI» «(edible Object not identified).

As well as, the successive food crisis (the mad cow crisis, the avian flu, the GMOS...) translates the mistrust of the consumer related to the food and the perception of new risks" the consumer eater must then satisfy two conflicting imperatives: to vary its supply (which impels him to innovate) as well as to ensure both its nutritional balance and its food security" (NAC, 2006). In this context the "eat well" is defined by a double aspect which is not only "eat healthy", relating to a consumption of fresh products in order to maintain the nutritional balance but also "eat safe" in ought to minimize the risk of intoxication and the fear of the poisoning (GMOS) [5]. Under these mutations, the industrials can see the opportunity to explore a new field of food innovation with the aim of getting closer to consumers hence the emergence of healthy food products

II. THEORETICAL BACKGROUND

The place of the health dimension in food consumption

Many authors consider the health dimension as a multidisciplinary approach [6]. To better understand the place occupied by the health dimension, it would be interesting to do appeal to several disciplines in the social sciences who have studied this relationship in the food context.

The health dimension in the anthropology is apprehended according to the three strands of anthropology to know the paradox of the omnivore, the principle of incorporation and the thinking classification [6].

(A)The paradox of the omnivore: «The omnivore should be both innovative and conservative" (Fischler, 1994). Starting from this principle, the human being is faced with two contradictory situations: to vary its diet in order to maintain the nutritional balance at the same time to choose foods which minimize the fear of poisoning and the nutritional risk.

(B) The principle of incorporation: this incorporation is not only corporal but it makes account of a triple phenomenon namely: a biological phenomenon because we become what we eat, whenever we incorporate a food, "life and health that are at stake.; a social phenomenon which manifests in the place of the consumer in his entourage and finally a psychological phenomenon to the extent that "some magical thinking that induces the passage of food in the body which involves a transfer of physical, behavioral or moral properties" [4].

(C) The thought classification: the classification thinking is organized by categorization in the form of a "mental encyclopedia" to facilitate the identification of foods [7].This phenomenon has aim to classify the food into two categories: the consumable and non-consumable (Poulain, 2000).

The health dimension in the marketing approach has been studied according to two opticals: optical product and optical consumer [6].

(A) Optical product: Ravoniari (2012) based on the characteristics of the product, has emerged health according to two aspects: the health is an attribute of the quality of the food and health is considered as a benefit from the consumption of the product.

- An attribute of quality

The quality can be subjective or objective [8]. Several authors point out the distinction between these two forms: the subjective quality linked to the experience of the consumers and the individual beliefs whereas the objective quality is evaluated by the technical and functional characteristics of the product [9]. In this context, Ophuis & Trijp (1995) have placed the health dimension among the attributes of the quality of the food product, extrinsic and intangible, because these cannot be

evaluated only after the experience of the consumption of the product and not after the purchase experience.

The health aspect makes sense in the dietetic and nutritional value (Panigyrakis, 1989). As noted by Ravoniarison (2012) the health dimension is characterized by "its lack of harmfulness and its energy intake."

- A benefit of the product

At this level the health dimension is considered as "an added value, the particular of certain components present, inherently or otherwise, property in the food (natural or processed), which may bring or maintain a beneficial effect on health" [6].

The health benefit is apprehended in two aspects (1) the health benefit is considered "an objective characteristic favorable to health, quantified and scientifically proven" and at the same time (2) it may be considered as a perceived subjective quality relating to each individual experience.

This subjectivity is mainly due to the desired benefits, which in turn determined following an exploratory study by Arts-Chiss and Guillon (2003). These authors segment the market according to health food in "four distinct product benefits" (see table 1) [10].

Table I: Typology of consumers on the basis of the profits product on the market of health (Arts-Chiss and Guillon, 2003)

PROFITS PRODUCTS	EXAMPLES OF PRODUCTS CONCERNED
Balance and Health	Products lean ; fortified products; functional foods
Taste and Safety	Labelled products
Fitness and Nature	Dietetic products; functional foods; fat products; organic Products
Nature and tradition	Biological

(B) Optical consumer: By studying the consumer behavior, the health dimension can take two forms: health care is a desired objective and health is an attitudinal characteristic.

- An object of consumption

In this context, the health aspect translates into a motivational status, beyond obtaining gustative pleasure, the consumer having a goal is a positive health effect [6]. In the same order of ideas, some authors adds that "the health may exceed the status of simple attribute of the product" and is part of the personal goals of the consumer, and to achieve a goal "health", the consumer is faced with a multitude of choices, including practice of sport or well follow a healthy diet [11].

The purpose "health" is available in four attached goals namely: the balance, the security, the prevention of diseases and the correction of dietary [11].

- A characteristic of consumer attitudes

Besides of the motivational aspect, the health dimension has been identified among the characteristics notable attitudinal factors of the consumer [6]. Roininen et al (1999) have determined a grid of attitudinal factors related to health from three axis: a general health interest, light product interest, and natural products interest.

Specificities of Healthy Foods: Concepts and Definitions

Some authors say that at present, healthy foods are not intended only to satisfy hunger and provide necessary nutrients, but also prevent diseases concerning nutrition and improve the physical and mental well-being of consumers [12].

While the food market undergoes a stagnation in developed countries, the healthy food market is one of the growing segments of the food. Research has estimated that the food market is growing at a rate of 15–20% p.a. and is worth 60 Million dollars annually [6].

According To Ravoniarison (2010) there is no typology neither definition nor unanimous appellation of health foods, some authors speak of functional foods, other speak of products of nutrition-health or even of products to health claim.

Healthy food is "products of any medication or medical devices claim a beneficial action for health" [13].This is a product that is at the border of the food and medical product.

The position of how healthy food were presented can be seen in Figure 1.These foods may correspond to very different valuations on the part of consumers, ranging from the called negative motivations (medical, symbolically associated with the disease) to the more positive motivations (well-being, symbolically associated with the pleasure).

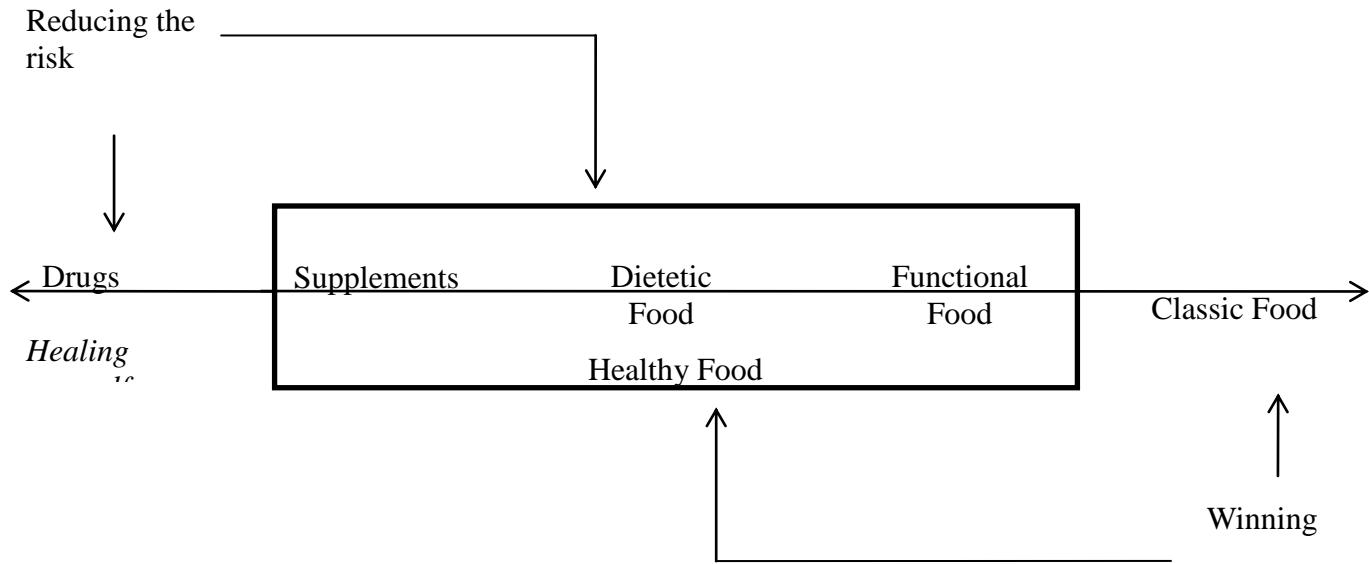


Figure 1: The positioning of healthy foods

Attitude

There have been several studies that have focused on attitude and its role to explain the consumer's purchase behavior. The concept of attitude can be one of many predictors of purchase process (Ajzen, 1991).

An attitude, by definition, is a favourable or unfavourable predisposition towards an object [14]. In other words, attitude is defined as a consumer's tendency to evaluate a particular entity with some degree of favour or disfavor (Eagly & Chaiken, 1993). In terms of understanding how consumer's attitudes, it is important to require the three dimensions of attitude such as: cognitive, affective and conative (Ajzen, 1993; Eagly & Chaiken, 1993).

Perceived risk

In practical terms, the perceived risk reveals a segmentation criterion or targeting strategies to reduce risk on specific segments (Peter & Tversky, 1979)³.

The purchase of products under the theme food / health is considered a risky choice, as healthy foods are unfamiliar products against conventional products and consumers lack information on these goods [14]. The concept of "risk perception", first proposed by Baur in 1960, is a two-dimensional

concept consisting of two components: 1) uncertainty about the ability of new products to meet consumer expectations and 2) the importance of the consequences if the performance of the product does not conform to the minimum expected".

In other words, Roselius, (1971)⁴ define perceived risk as "consumer's subjective assessment of the consequences of wrong decisions or a product will not offer all the expected benefits" Different researchers provides a summary of various dimensions of perceived risk and proposed that risk resulting from his types (Jacoby & Kaplan, 1972).

Jacoby et Kaplan(1972) classified five types of risk as: (1) financial, (2) performance, (3) psychological, (4) physical and (5) social.

Beyond five types of risk , Roselius (1971) added two types of losses: risk time and opportunity risk.

With regards to food products, Kapferer (1998), Dandouau (1999) and Brunel (2000) mention five types of risks perceived by customers (1) physical, (2) psychological (3) social financial (4) and (5) performance.

In this way, some authors defined these types of risk as follows:

Performance risk arises when "the food products have not benefits requested by customer", financial risk occurs when

³Volle.P(1995)

⁴ Snoj B(2004)

"customers worry that money losses as a result of purchasing food products", physical risk, also referred to as healthy risk can be defined as "a risk that the product gives consumers the danger", social risk is the possibility that "the food product derogate of consumer from his friend's group" [15].

The perceived risk can be understood through one or two main dimensions: functional risk, that is to say, the performance (Jacoby and Kaplan, 1972) and then the financial risk and psychological risk [16]. However, Derbaix showed that these dimensions depend on the type of product studied [17].

In summary, our research model, which will be described in the following section, derives its theoretical foundations from prior research in the theories of the consumer's perceived risk [15] [16] [17].

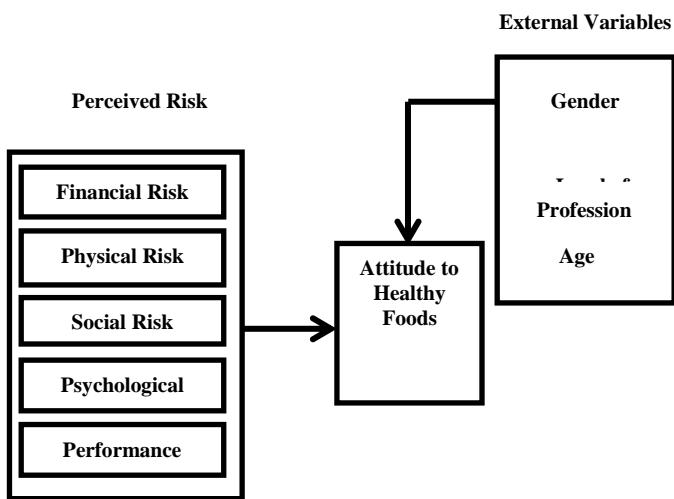


Figure 3: Research Model

Research Hypothesis

Effect of perceived risk on the attitude toward healthy foods

The research started exploring the field of healthy foods by examining perception and attitudes of consumer to these products [10].

Many papers highlighted that the importance of the concept of perceived risk as a vital risk of food consumption [17] [15].

Research has supported the attitude-risk relationship, showing that risk do have a negative impact on consumer's attitude toward food product [16], the hypotheses will be made as follows:

H1: The Perceived risk negatively influences the consumer attitude to healthy foods

H1.a: The financial risk negatively influences the consumer attitude to healthy foods.

H1.b: The physical risk negatively influences the consumer attitude to healthy foods

H1.c: The risk of performance negatively influences the consumer attitude to healthy foods.

H1.d: The psychological risk negatively influences the consumer attitude to healthy foods.

H1.e: The social risk negatively influences the consumer attitude to healthy foods

Effect of sociodemographic variables on the attitude

For determining link of customer's attitude, with sociodemographic variables consisting of: gender, profession, age, level of education [18] [12] [8]. It is therefore hypothesized that:

H2.a Women have a more favorable attitude towards healthy food than men.

H2.c: There is a relationship between profession and the consumer attitude to healthy foods.

H2.b: More age increases more the attitude towards healthy foods increases

H2.d: More level of education increases more the attitude towards healthy foods increases.

III. METHODOLOGY

At this level, we will expose the methodology to be followed in order to meet the objectives of the research and present the results of the survey conducted on field from a sample composed of 150 individuals whose 56.7 per cent are women and 42.7 per cent are men. More than half of the sample (54 %) is aged between 21 and 35 years while only 7% of respondents have more than 60 years, 25.3 per cent of them are students, 21.3 per cent of senior executives and 20.7 per cent are middle managers.

Wishing to measure the perception of the risk on healthy foods, we used the scale of measurement for Stone and Mason (1995) after having adapted it to the needs of our study. All items were measured on a 5point Likert scale, anchored at 1= strongly disagree and 5= strongly agree (Annex 1).

The differential semantic scale is appropriate to measure the attitude toward the healthy foods, it is intended to measure the direction and intensity of the attitude with expressions literally opposed between them there is a point of neutrality (Table2).

Table 2: Scale of attitude

Overall Attitude	Items
	Unfavorable / Favorable
	Bad /Good
	Negative /Positive

The goal of purification and reliability of the measurement scales is to determine the dimensionality and the reliability of the measurement scales used through Principal component analysis (ACP) and Cronbach's alpha coefficients (Annex2).

Table 3. Dimensionality and internal consistency of the measurement scales

Variable	Number of items	Cronbach's Alpha
Attitude	3	$\alpha = 0.840$
Perceived risk	15	$\alpha = 0.930$

IV. RESULT AND ANALYSIS

Effect of perceived risk on the attitude toward healthy foods

The relationships that may exist between the attitude and the perception of risk are the subject of the first five assumptions namely H 1.a, H 1.b, H 1.c, H 1.d and H 1.e (Tab4)⁵.

H1.a: The financial risk negatively influences the consumer attitude to healthy foods.

The ANOVA table shows that the obtained model is significant. (Meaning = $0.012 < 0.05$) as well, Beta is equal to (-0.205). Therefore the financial risk has a slight negative impact on the attitude toward healthy foods.

H1.b: The physical risk negatively influences the consumer attitude to healthy foods.

The ANOVA table shows that the obtained model is significant. (Meaning = $0.011 < 0.05$) and Beta is equal to (-0.209). Therefore the physical risk has a slight negative impact on the attitude toward healthy foods.

H1.c: The risk of performance negatively influences the consumer attitude to healthy foods.

In this case, the obtained model is not significant. That is to say the risk of performance has no impact on the consumer attitude to healthy foods.

H1.d: The psychological risk negatively influences the consumer attitude to healthy foods.

In this case, the adjusted R-square is (0.020) this means that psychological risk accounts for only 2% of the variance of the dependent variable "consumer attitudes towards healthy foods." The ANOVA table shows that the resulting model is significant. (Meaning = $0.046 < 0.05$) Thus Beta is equal to (-0.163). So the psychological risk has a slightly negative impact on the attitude toward healthy foods.

H1.d: The social risk negatively influences the consumer attitude to health foods

The resulting model is not significant. The social risk has no impact on the attitude toward healthy foods.

Effect of sociodemographic variables on the attitude

These assumptions have studied the link between attitude and each type of sociodemographic variables. These assumptions are H 2.a, 2.b H, H 2.c, 2.d H

H2.a: Women have a more favorable attitude towards healthy food than men

According to the results of averages comparison test, the t-test is equal to 0,829 above the threshold (0.05), therefore, we accept H0 ; that is to say, the averages are equal in the two groups. This means that the consumer attitude to healthy food does not vary as a function of the gender. The health concern affects both men and women with the same degree.

To test the remaining hypothesis, variance analysis (one-way ANOVA) has been used out to investigate the relationship between a metric variable (attitude) and non-metric variable has more than two categories namely (the level of education, occupation and age).

The results of the test shows that these variables: Level of education, occupation and age do not have any significant

influence on consumers' attitudes toward healthy foods therefore the hypothesis H2.b, H2.c and H2.d are overturned (so the hypothesis, H2.b, H2.c and H2.d are set aside). Tab3(Annex3).

V. CONCLUSION

At the end of this research we were interested in changes that have affected the food and the feeding behavior of consumers, these last few years.

To cope with these changes in the pattern of consumption of food products, the manufacturers are trying to meet the expectations of consumers, marketers of the agri-food continually innovating by developing new products benefiting from an attribute health and well-being (developing new products boasting an attribute health and well being)

Our contributions on empirical plan can be summarised as follows: we noted a certain awareness of the link between food and health, and an orientation towards the consumption of healthy foods. But the consumer remains suspicious and collects the minimal risks that affect slightly its attitudes to healthy foods. This is explained by the lack and the contradiction of information concerning these products at the level of their manufacturing and their composition [19]. This leads the consumer to research of the credibility and reliability of the part of the food industry.

The relationships between the sociodemographic variables and the attitude toward healthy foods have been overturned which contradicts the results of some research [8] [12] [18].

The variable age: Our hypothesis is overturned this is worth saying that there is no consistency between the age and the attitude toward the healthy foods. In a general way the older people more likely to favor the health dimension in order to minimize the risk of certain diseases [6]. However our research has shown that the health concern affects all the age groups in the same way. This is coherent with the work carried out by many authors [20] which have emphasized that "The more young people are focusing on the health pole to the detriment of the social pole" but on its side, it would be interesting to understand the origins of this outcome, if it is "the result of an effect of age or generation ". In the same context, young people are more interested in healthy food in the purpose to have the physical form and promote the well being and energy [6].

The gender variable: many authors show that women generally pay more attention to the food than the men [19] [6] [20].

In other words women accept a degradation in terms of the organoleptic properties in order to have a health benefit (Poulsen, 1999 and Verbeke, 2005). This attitudinal divergence surveys do not reflect on how is the consequence of a sociological source: "women are thus more affected by the social pressures urging for slimmin » [6]. They are attached to the nutritional values while men are more sensitive to the "values of comfort and abundance" associated to the pleasure, [20]

The result of our research shows that the averages between groups (man and women) are equal. This is convergent with a study carried out recently with the Italian consumers which is not highlighting any link between the frequency of the consumption of functional foods and the gender [19]. The men are also looking for healthy food but they are looking more particularly of

⁵ Annex3

functional foods "targeting of specific effects" while women are interested in a variety of products [21].

Level of education and income: Many are the authors who put in relationship the socio-economic variables and the food behavior. In the opposite, other research obtain no link between the level of studies and the attention to nutritional labelling (Jensen et al. 1996).

In the same context, Niva (2008) explains that this weighting of effects of socio-economic factors in the food depends on the type of food.

The results as regards the influence of sociodemographic variables on the attitude toward the health foods remain controversial since it is a new trend in the area of food. This distinction is reflected by the cultural difference as well as the effect of the psychological variables in other words "the eater international does not exist; in contrast, there are strong local characteristics that generate strong international disparities "

The main limitation of this research relates to the size and the structure as well as to the geographical extent of the sample (150 persons resident in Greater Tunis). This sample does not allow to generalize the results on the whole of the population studied. The limited size of the sample could also be the source of a lack of precision in the results.

By elsewhere in the framework of future research, it would be interesting:

- To increase the sample size in order to be able to specify the results.
- To develop a scale to measure health risk specific to the context of Tunisia
- To explore other factors that may influence the purchase of health foods to know the conscience of health, food security, the perceived relevance of healthy eating.

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AUTHORS

First Author – Gatri Emna is Currently Ph.D student in the Faculty of Economic Sciences and Management of Tunis, Univesity of Tunis El Manar.Email: gatriemna@gmail.com

Second Author – Ben Rached Kaouther, Professor in the Faculty of Economic Sciences and Management of Tunis, Univesity of Tunis El Manar.

Third Author – Moulins Jean-Louis, Professor, CRET-LOG, Aix-Marseille University.

Design of Automated Low Cost String Hopper Machine for Medium Scale Industry

B D N Mendis, Nimali T Medagedara, D C Wijewardene

The Open University of Sri Lanka

Abstract- Currently, many types of string hopper machines are available in Sri Lanka. One is a rotary type and the other one is the lever type string hopper machine. Rotary type machine which is available in the local market has a main drawback of having to remove the cylinder for each batch of 100 string hoppers [1]. For this task handle should be rotated until the rack comes to its uppermost position which makes the operator fatigued and consumes more time.

Another one is the lever type string hopper machine which is operated by a lever mechanism connected to a piston. Disadvantage of this machine is for each 15 hoppers, the cylinder should be refilled.

This paper discusses the design of an automated low cost string hopper machine to be used in medium scale industry.

The designed new machine has an ability to stop the string hopper mold rotator at the required position, ease of feeding, and better accessibility for cleaning. The proposed machine is also is affordable in price, particularly for the small and medium scale string hopper manufacturers.

Index Terms- Design, Automated, Low cost, String Hopper Machine

I. INTRODUCTION

String hoppers are a traditional meal in Kerala, Tamil Nadu and Sri Lanka consisting of rice flour pressed into noodle form and then steamed.

Before making string hoppers we have to pass several steps. Normally this is a manual process. In Sri Lanka there are a lot of individuals involved in string hopper manufacturing industry, using the traditional string hopper press or with the modern hand operated lever type press. It is a very tedious and time consuming process.

In string hopper manufacturing industry, the flour mixture is formed into strings using extrusion process. In the extrusion process a material is pushed through a die of the desired cross-section. It is a very common application in food processing.

The main parameters required for automating the string hopper making process has been taken into consideration when designing the machine.

First the flour mixture should be feed into the machine. Then the empty molds should be placed at the proper place where the flour strings are forming. When the machine is switched on, the flour mixture should be extruded to form the flour strings. While the strings are forming, the mold should be rotated. When the mold is filled up to the required amount, further forming of the

strings should be stopped. Then the mold with the string hopper is shifted away from the extruding unit.

II. DESIGN AND CALCULATIONS

2.1 Design for the extruder

This machine is designed to be used for batch production process. Due to this, material (flour mixture) is loaded to the machine in batches manually. A piston extruder is selected to extrude the flour mixture as it is easy to clean when compared with the single or twin screw extruder.

2.2 Design of the cylinder

The “cylinder” is the vessel in which the flour mixture is compressed by a piston. Bottom of the cylinder has the extruding die. After daily production, the cylinder should be washed and cleaned. Therefore the cylinder is made out of stainless steel. The cylinder capacity of the design is considered to be 100 string hoppers, totaling up to 1.5kg flour mixture.

The density of the flour mixture is found experimentally as 1072kgm^{-3} . Therefore the dimensions of the cylinder are calculated as 6cm diameter and a height of 50 cm.

2.3 Extruding die

The string hoppers available in the market have a 5-7cm diameter approximately. Change in the 5cm diameter of the extruding die may affect the appearance of the string hopper which is produced from the proposed design. Therefore the diameter of the extruder die was selected as 5cm. Cylinder die is fixed to the cylinder from a threaded end cap.

2.4 Design of the piston

A piston is used to compress the flour mixture in the cylinder which makes the flour mixture to squeeze through the tiny holes in the extruding die. Piston contacts directly the flour mixture. Therefore piston should have hygienic conditions. Plastic materials such as HDPE or LDPE which are hygienic have a low strength [2]. Due to this stainless steel was selected, which has a high strength and hygienic qualities.

When the piston compresses the flour mixture, the mixture can squeeze through the piston clearance. To eliminate this, a rubber seal was fixed to the piston. This NBR-food grade rubber has hygienic conditions and it has a lower price when compared with the other material.

2.4.1 Design of the piston driving system

The rack and a pinion mechanism, is used to drive the piston as it has a higher overall efficiency.

2.4.2 Piston force calculation

Piston force is required the piston to compress the flour mixture through the extruder die. For this, the speed or the time of the strings falling from the extruding die was experimentally detected and it was about 5s.

2.5 Motor selection

The actual required power of the piston was calculated for the design and a 4 Pole induction motor[3] with a 1400 rpm was selected. Rated power of the selected motor is 0.18kW.

2.6 Power transmission system

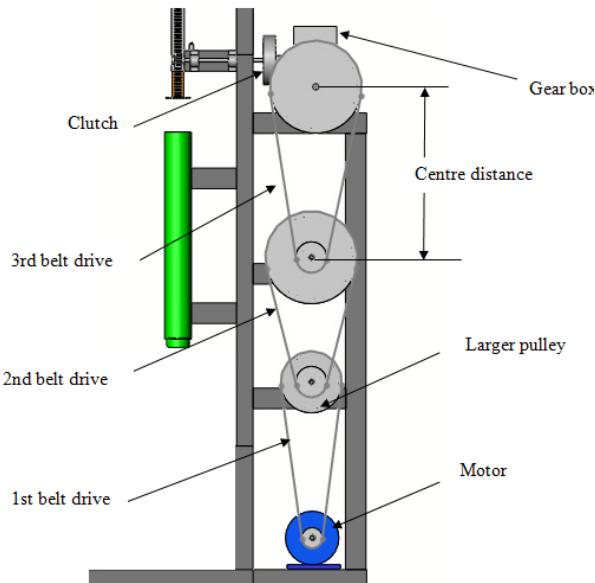


Fig.1.0 Configuration of the power transmission system

Fig.1.0 shows the method used to transmit power to the pinion. Power of the motor is transmitted to the pinion through belt drives, worm gearbox, speed reducer and an electromagnetic clutch.

2.7 Pneumatic system

A pneumatic system can be used instead of the mechanical piston driving system. Pneumatic system consists mainly with a pneumatic cylinder, air compressor and a pressure regulator[4]. Pneumatic cylinder is operated from compressed air. But when the cost is considered mechanical piston driving system is favorable to drive the piston as the total amount for the pneumatic system is approximately 50,000 rupees including the compressor.

2.8 Mold rotator



Fig.2.0- Mold rotator

Mold rotator which shows in Fig.2.0 is a disc which rotates around its centre under the extruding die. Mold rotator consists of a mold holder, limit switch, disc and a driven wheel. Mold holder is a plastic disc fixed to the limit switch and the limit switch is fixed to the disc which is connected to the driven wheel. Before producing a string hopper, an empty mold should be kept on the mold holder manually.

2.8.1 Cutting unit

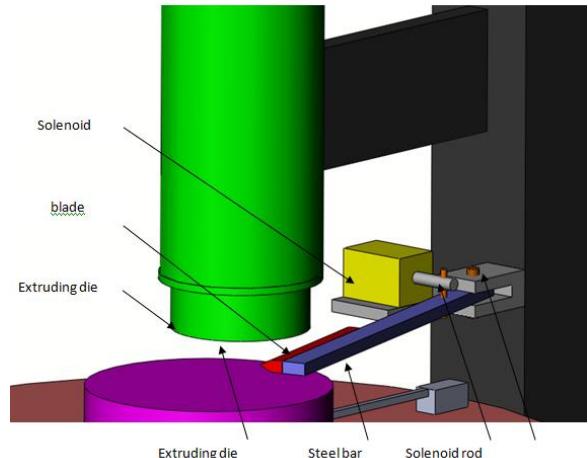


Fig.2.0- Cutting unit

Fig.2.0 is an image of the cutting unit. The cutting unit cut the strings which are linked between the mold and the die. This unit consists mainly with a solenoid actuator[5] and a blade. Solenoid energizing and de-energizing is controlled by the electronic control unit.

To operate the devices, relay switches were used. The relay switches for the solenoids must have a 5V input voltage and 12V output voltage and for the clutch and the motor have a 5V input voltage and 24V output voltage. Therefore the final relay switch was selected according to the requirements of the clutch.

III. CONCLUSION

1. In this project, a new automated low cost string hopper machine was designed and was avoided several problems which was identified in existing machines in local market.
2. In this design making the mold shift away from the extruding die the problem of inability to stop the mold rotator was eliminated. Also at the end of the daily production, the cylinder and the extruding die can be disassembled from the machine for cleaning purposes. To avoid the problem of trapping the flour mixture inside the cylinder a die was designed to before compress it by piston.
3. It can be concluded that the new designed string hopper machine has made the string hopper manufacturing an easy task for medium scale industry.

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AUTHORS

First Author – B D N Mendis, The Open University of Sri Lanka

Second Author – Nimali T Medagedara, The Open University of Sri Lanka

Third Author – D C Wijewardene, The Open University of Sri Lanka

Factors Associated to Teachers' Motivation towards the Implementation of Learning Supervision in Secondary School

Ahmad Kamal Ariffin, Abd. Rahman Idris (PhD), Zuraidah Abdullah (PhD)

Department of Education, University of Malaya, Malaysia

Abstract- The purpose of the study was to identify the motivational factors on teachers towards the implementation of learning supervision in secondary school. The assessment of teachers' motivations towards learning supervision was measured by questionnaires developed based on literature that encompasses of 48 items in related to the related domain. The participants of the study were 65teachers from two secondary schools in Raub, Pahang. The result of the study suggests that there are about five factors that may involve in measuring the teachers' motivations towards the learning supervision in school that is (i) Systematic reporting on learning supervision, (ii) Environmental support and (iii) Training on learning supervision, (iv) Well planned on academic and co-curricular activities and (v) Support and encouragement. Thus, any changes in our educational system that can promote to the higher levels of teacher motivation should be improved to ensure the objective of learning in school can be achieved.

Index Terms- Motivation factor, secondary school, learning supervision, factor analysis.

I. INTRODUCTION

Malaysia's education system has set a policy that the implementation of co-curricular is the "teachers' primary responsibilities" in every school. Meanwhile, headmaster and principal plays an important role in the implementation of learning supervision in classroom. But this role can be support or help by the second leader in line after the principal and the committee subject leaders (SPI. KPM Bill. 3 / 1987). The purpose in the implementation of learning supervision is to assist the school education management in seeing the effectiveness of teaching and learning in the classroom. The results from the implementation of learning supervision in school will help to stimulate teachers' growth and a means of helping teachers to achieve excellence in their teaching. Furthermore, this implementation will also help to improve the learning and teaching situation in the school with a proper plan from teachers and school administrators.

Educational activities need supervision and inspection to achieve educational objective. Supervision and inspection are good machineries to upgrade teachers into required standard. Teachers need supervision and inspection to work harder no matter their level of experience and devotion. Without supervision, teachers and school administrators will backslide rapidly in their performance. The main purpose of this study was

to identify the implementation of learning supervision level in secondary school throughout Malaysia. Hence, the results from this study shall help identify the actual planning side, implementation, reportage, teacher responses and post-mortem implementation. Apart from that, factors which influenced teachers' motivation on the implementation of learning supervision in school will be identified. The study presents the results of teachers' perception carried out on two secondary schools located in Raub, Pahang using a questionnaire based assessment. The outcomes of the study should assist in identifying particular instructional aspects that require adjustment and improvement, and aim to provide a better understanding on teachers' motivation towards learning supervision.

II. LITERATURE REVIEW

According to Ogunsaju (1983), supervision is a way of stimulating, guiding, improving, refreshing, encouraging and overseeing certain groups of people with the hope of obtaining their cooperation in order for the supervisors to be successful in their task of supervision. It is the practice of monitoring the performance of teachers involved, noting the merit and demerits and using befitting techniques to ameliorate the flaws while still improving on the merits thereby increasing the standard of schools and achieving educational goals.

Adepoju (1998) defines school supervision as the process of bringing about improvement in instruction by working with people who are working with pupils. It has also been described as a process of stimulating growth and a means of helping teachers to achieve excellence in teaching. Supervision in school therefore is a vital process and combination of activities that are concerned with the teaching and improvement of the teaching in the school framework. Improving the supervision of instruction in school is of great concern to Ministry of Education in Malaysia. According to Educational Act (1996), the main purpose of learning supervision is to ensure the level of teaching among teachers' meet the required standard. Supervision in school therefore is a vital process and combination of activities which is concerned with the teaching and improvement of the teaching in the school framework.

Realizing on the importance of supervision in deciding the effectiveness of co-curricular management implementation, most schools have made the supervision process as one of the main task which undertaken by the administrator (Rahimah, 1986; Hussein, 1993; Hamsah, 2003; Aminuddin, 2005). But the

question whether the teacher understands and prepares being supervised by their teaching. For administrator on the other hand, supervision implementation are carried out by using proper steps and approach (Hamdan and Lim, 2007). If learning supervision was implemented by the administrators according to the scheduled time, the arise issue whether the supervision gives impact on the teachers' motivation and thus have an impact on students' achievement (Halimah, 2006).

Research by Lim Yeong Chying (2007) against 120 teachers from six technical secondary school in Penang finds teachers were lack of exposures towards concept and purpose of supervision. Therefore, recommended teachers to be given exposure on this matter which will be implemented continuously in order to develop their potential and increase their professionalism. Hamdan and Lim (2007) in a study of 217 respondents consists of teachers in relation to their perceptions of supervision implementation among teachers in SJK Cina Zon Tiram, Johor has raised issues regarding the teacher's misunderstanding on the process and concept of supervision in school. According to them, the misunderstanding will create a negative perception by teachers and can be seen as a trick to them. If this happens, the instructional leadership role will be doubted and questioned. This matter can indeed happen because school administrator is the instructional leadership in school who had delegated the learning supervision implementation to the second leader line consists of senior assistant school.

According to a study conducted by Che Mohd Norazizul (2007) and Shafira Wan (2011) on the implementation of supervision practices among trainee teachers, he found out that there are a few of supervisor who practiced autocratic system when doing their supervision. He also found that there are supervisors who required their trainee teachers to teach according to their way of teaching. By right, the supervisor should encourage their trainees to teach in their own way since teaching is actually an art. The trainees should not be restricted with their supervisor teaching style and its up to them to implement any creative activities in order to achieve the objectives of teaching and learning in the classroom. Meor Ibrahim and Norziana (2008) on 92 trainee teachers from the Faculty of Education, Universiti Teknologi Malaysia 2007/2008 found that the supervision of teaching methods among teachers, the level of supervision practices among teachers by school counselors is only average. Therefore, this matter should be taken seriously in order to identify reasons for getting moderate level whereas the objective of supervision in schools is to produce the best quality of supervision.

According to Sullivan and Glanz (2000), the supervisors inability to practices effective supervision can lead stress and discomfort to the teachers. Supervisor should consist of experienced and skilled teachers. Supervisor skills and experienced can create an interest and satisfaction among the teachers who being supervised (Lovell and Wiles, 1983). Experience and skills will also raise confidence among the supervisors. According to Sergiovanni and Starrat (1998), supervisors need to nurture confidence from all the teachers who will be supervised. This statement is similiar to the assertion by Arrendondo et. al. (1995) saying that without trust from the teachers towards their supervisors, the objective of improving the experience and teaching skills in the school will be impossible to

achieved. It explained further by Sergiovanni and Starrat (1998), instructional leadership must identify the teachers' needs and provide training or course to them on the concept and objectives of supervisory implementation in schools. Teachers will feel more confident and motivated when they are given advance training courses for their professional development.

III. METHODOLOGY

The study surveyed the teachers in two secondary schools in Raub, Pahang. The main objective of the study was to identify the motivational factors on teachers towards the implimentation of learning supervision level in secondary school. The assessment of teachers' motivations towards learning supervision was measured by questionnaires developed based on literature. The questionnaire encompasses of 48 items in related to the factors that may contribute to teachers' motivation towards learning supervision. The questionnaire was divided into three major parts. Section A is related to the schools' background and Section B is the respondents' demographic profile. Meanwhile sections C are the items that evaluate the implementation of learning supervision in school. A five-point Likert scale for each item was used for the questionnaire. Choice of response were from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating higher measures of agreement of each item factor. Based on the Likert scale used, respondent are able to evaluate their perception towards the item factors asked to them. According to the literature, there are many measurement of Likert scale has been used by researcher and it is depend on the purpose of the research conducted. The range of Likert scale used is wider in order to provide an opportunity and freedom to respondents to give their perception towards statement tested. According to Sekaran (2006) the variations in respondents' answer provided by Likert scale is very important. Byrne (2010) however stated that if the numbers of response categories are wider and close to a normal distribution of data, the question of whether the data types are ordinal or interval can be ignored. Hence, for the purpose of the study, the researcher was be able to proceed the analysis using parametric tests method. All data that had been collected were analyzed by using *Statistical Package for the Social Sciences* (SPSS) Software. Factor analysis has been applied in order to investigate the implementation of different factors which may motivates the teachers' interest in teaching.

IV. RESULTS & DISCUSSION

There are about 65 completed questionnaires were collected. Respondents of the study consists of 21 (32.3%) male and 44 (67.7%). Majority of the respondents were Malay (87.5%) and the rest was Chinese (7.8%), and Indian (4.7%). The distributions of respondents' age group was equally distributed. Majority of the respondents were having bachelor degree and the teaching experience among the teachers were also equally distributed among each group. Table 1 shows the distribution of respondents under study based on their demographic informations. This result is important for the researcher to identify the respondents

behavior towards certain aspects pertaining to their demographic informations.

Factor analysis has been applied in order to investigate the different factors which may contribute to teachers' motivations towards the learning supervision. The Kaiser-Meyer-Olkin measures of sampling adequacy was calculated at 0.725, which considerably higher and satisfy. A scree plot was generated and indicate that the number of dimension lay between six factors only (Figure 1). Principal component extraction was used based on Kaiser's criterion, produce five factor components (Table 5). The sixth factors has been omitted due of having only two items which considerable not suitable to be constructed as single factor. Many of the communalities values indicate very high value (Table 5). Communalities values that below than 0.6 was omitted from the analysis. Furthermore, eigen values ranged from 7.567 for first factor to 1.256 for the ninth factor and the solution accounted for 78.15% of the total variance in the questionnaire. For the factor analysis, the components for each factor are defined in Table 6 . Therefore, variables were ordered and grouped accordingly (Table 6) and interpretative labels. Five factors suggested for the items domain were (i) Systematic reporting on learning supervision, (ii) Environmental support and (iii) Training on learning supervision, (iv) Well planned on academic and co curricular activities and (v) Support and encouragement.

The first domain is defined by six items. From the items obtained that falls under this domain, it seems reasonable to identify it is a *Systematic reporting on learning supervision* domain. In this context, the items in this dimension can be characterised under the implementation of systematic reporting on learning supervision in school. The second domain is defined

by nine items and it seems that the domain suits for representing the group of *Environmental support*. The nine items is suits to be grouped in this domain since it is related to the school environmental support towards the learning supervision in school. The third domain is defined by Training on learning supervision since most of the grouped items fall under this domain related to the issue of environmental support. The fourth domain is defined as *Well planned on academic and co curricular activities* since most the items fall under this domain that was related to the school administrative planning whether in academic or co curricular activity. The last domain that was been identified through the study was *Support and encouragement*. There are only three items grouped under this domain and all three items are related to the support and encouragement.

Despite of the possible limitations of the study, it has clear implication for future research. A major limitation that can be obtained from the study is that the strategy on data collection was not investigated directly on teachers' motivations towards learning supervision, but rather was based on the teachers' perceptions. Future research should too focus on an investigating involving the classroom observations by independent observers on the teachers. Besides that, it would be important in such of doing extensive analysis on the relations of motivational aspects towards learning supervision. The factor that significantly contributes to the teachers motivational factors on learning supervision are another possible analysis suggested for the future research.

The findings from the study could be beneficial to us in order to strengthen the understanding of the role of strategy use in learning supervision process without neglecting the factors that can contribute to the teachers' motivations.

V. FIGURES AND TABLES

Table 3: Respondents' Demographic Profile

Variable		Frequency	Percent
Gender	Male	21	32.3
	Female	44	67.7
	Total	65	100.0
Race	Malay	56	87.5
	Chinese	5	7.8
	Indian	3	4.7
	Others	0	0.0
	Total	64	100.0
Age	< 25 years old	2	3.0
	26-30 years old	15	22.7
	31-35 years old	13	19.7
	36-40 years old	11	16.7
	40-45 years old	14	21.2
	> 45 years old	11	16.7
	Total	66	100.0
Professional Qualification	Teaching Certificate	8	13.1

Academic Qualification	Admin Diploma	17	27.9
	Bachelor in Education	35	57.4
	No Certificate	1	1.6
	Others	0	0.0
	Total	61	100.0
Teaching Experience	SPM / STPM	0	0.0
	Diploma	3	5.8
	Bachelor Degree	43	82.7
	Master	6	11.5
	Philosophy Doctor	0	0.0
Teaching Experience in Current School	Total	52	100.0
	> 1 year	3	4.6
	2 - 5 years	12	18.2
	6 - 10 years	15	22.7
	11 - 15 years	14	21.2
	16 - 20 years	11	16.7
	> 21 years	11	16.7
	Total	66	100.0
	> 1 year	8	12.1
	2 - 5 years	26	39.4
	6 - 10 years	14	21.2
	11 - 15 years	13	19.7
	16 - 20 years	4	6.1
	> 21 years	1	1.5
	Total	66	100.0

Table 4: Results of Kaiser – Meyer – Olkin (KMO) measure and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.				.725
Bartlett's	Test	of	Approx. Chi-Square	3162.584
Sphericity		df		1128
		Sig.		.000

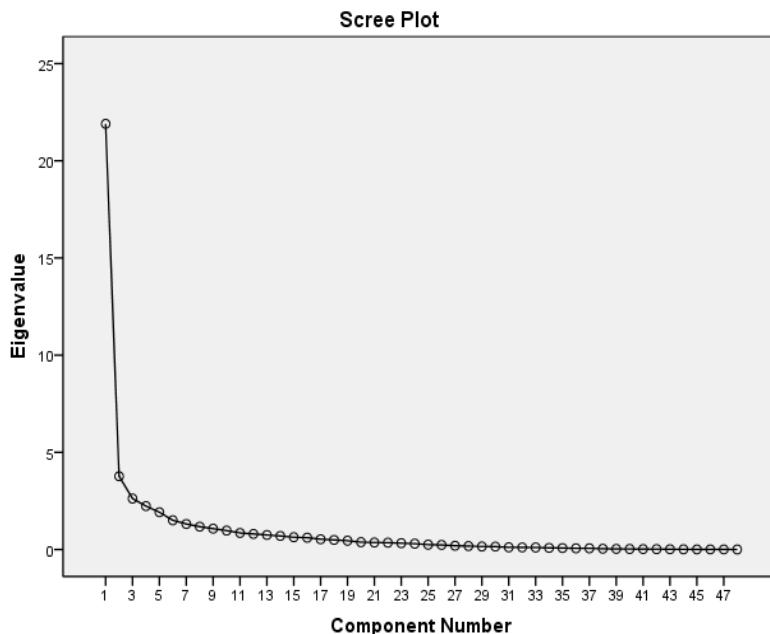


Figure 7: Scree Plot

Table 5: Total Variance Explained

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	21.900	45.626	45.626
2	3.769	7.852	53.478
3	2.622	5.463	58.941
4	2.234	4.654	63.595
5	1.919	3.999	67.593
6	1.504	3.133	70.727
7	1.313	2.736	73.463
8	1.177	2.452	75.915
9	1.073	2.235	78.151
10	.975	2.032	80.183
11	.854	1.779	81.962
12	.800	1.667	83.629
13	.748	1.557	85.187
14	.699	1.456	86.643
15	.633	1.319	87.962
16	.609	1.269	89.232
17	.530	1.104	90.335
18	.495	1.032	91.367
19	.456	.950	92.317
20	.378	.787	93.103
21	.359	.749	93.852

22	.351	.732	94.584
23	.327	.680	95.264
24	.302	.628	95.893
25	.250	.521	96.414
26	.236	.492	96.906
27	.194	.403	97.310
28	.180	.374	97.684
29	.156	.326	98.010
30	.151	.314	98.323
31	.114	.237	98.560
32	.111	.232	98.792
33	.105	.218	99.009
34	.085	.177	99.186
35	.077	.161	99.347
36	.063	.132	99.479
37	.062	.128	99.607
38	.043	.089	99.697
39	.030	.062	99.759
40	.029	.060	99.819
41	.022	.047	99.865
42	.019	.039	99.904
43	.014	.030	99.934
44	.010	.021	99.954
45	.008	.017	99.971
46	.006	.013	99.985
47	.004	.009	99.993
48	.003	.007	100.000

Table 6: Rotated Sums of Squared Loadings

Component	Rotated Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	7.567	15.764	15.764
2	7.382	15.379	31.143
3	6.929	14.435	45.578
4	6.557	13.660	59.238
5	3.145	6.552	65.790
6	1.652	3.442	69.231
7	1.630	3.397	72.628
8	1.395	2.907	75.535
9	1.256	2.616	78.151

Table 7: Items Component Matrix

	Component				
	1	2	3	4	5
A1			.709		
A3			.683		
A4					.799
A5					.789
A7			.733		
A9			.805		
A10			.770		

A11	.631
B13	.646
B15	.652
B16	.669
B19	.734
B23	.661
C26	.773
C27	.626
C28	.730
C30	.623
C31	.627
C33	.772
C34	.634
C35	.618
C36	.626
C37	.634
D41	.761
D42	.781
D43	.778
D44	.765
D45	.822
D46	.730
D47	.683
E50	.626
E51	.674

Table 8: Domain for each items after Factor Analysis

Domain 1 Systematic reporting on learning supervision			
1	0.761	D41	
1	0.761	D41	Supervision report were managed by curriculum committee systematically and excellently.
2	0.781	D42	Supervision report were provided not more than 7 days for ensuring the quality of the information to be steady and accurate
3	0.778	D43	Teachers were given training in execution report of a program
4	0.765	D44	Documentation system of supervision report used ISO 1998-2000 quality system
5	0.822	D45	PIBG (PARENTS AND TEACHERS ASSOCIATION) cared about the findings of supervision report
6	0.73	D46	Post mortem meetings were organized systematically and results of the report were discussed
Domain 2 Environmental support			
1	0.646	B13	Principal always concerned in creating conducive learning and teaching environment
2	0.652	B15	Pricipal sought for financial resources to strengthen the teaching and learning environment
3	0.669	B16	School environment is peaceful, comfortable and safe
4	0.734	B19	Good communication between teachers and school management
5	0.661	B23	School has complete educational equipment
6	0.634	C34	Teachers and PIBG were briefed on the school strategies and goals of the curriculum and academic program
7	0.618	C35	School administrators always take care of the teachers and students welfare and safety for each academic and curriculum program
8	0.626	C36	School administrators provides financial and infrastructure support
9	0.634	C37	PIBG provides financial and infrastructure support
Domain 3 Training on learning supervision			
1	0.709	A1	Teachers involved in the supervision training plan before carried out the supervision implementation at school
2	0.683	A3	Teachers were being coached on the supervision method
3	0.733	A7	Preparation of training supervision was implemented throughout the year
4	0.805	A9	Satisfied with the training preparation before the implementation of supervision
5	0.77	A10	Teachers are satisfied with the module training course in preparation for the teacher before being supervised

- 6 0.631 A11 Teachers can obtain information and related guidelines on the Practice of Teaching Supervision easily
 7 0.73 C28 Execution of curriculum and academic programme were implemented according to calendar that has been documented since the beginning of the year

Domain 4			
Well planned on academic and co curricular activities			
1	0.773	C26	Teachers understand on the purpose of the learning supervision in school
2	0.623	C30	School administrators monitor the implementation of curriculum development and academic programs
3	0.627	C31	Teachers were happily involved with the planning of curriculum and academic programs
4	0.772	C33	All teachers and PTA were briefed on the objectives and goals of the curriculum and academic programs
5	0.683	D47	Teachers aware of the importance of supervision reports and presented in curriculum management meeting
6	0.626	E50	Principals explained the criteria of teachers who provide excellent teaching in the classroom
7	0.674	E51	Principal often remind the awards that will be gained by teacher if they give excellent services

Domain 5			
Support and encouragement			
1	0.799	A4	Teacher are encouraged to share their teaching and learning skills among others
2	0.789	A5	Supervisory practices in teaching and learning among colleagues are encouraged by the school administrators
3	0.626	C27	Teacher knows and understands the importance of academic programs such as extra classes

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AUTHORS

First Author – Abd. Rahman Idris (PhD) , (Department of Education,University of Malaya, Malaysia)

Second Author – Ahmad Kamal Ariffin, (Department of Education,University of Malaya, Malaysia)

Third Author – Zuraidah Abdullah (PhD), (Department of Education,University of Malaya, Malaysia)

The Role of Information Technology to Support Knowledge Management Processes in Higher Education of Malaysian Private Universities

Zainab Amin Al-Sulami ^{*}, Abdullah Mohammed Rashid ^{**}, Norashikin Ali ^{***}

^{*} College Of IT, University Tenaga Nasional Kajang, Selangor, Malaysia

^{**} College Of IT, University Tenaga Nasional Kajang, Selangor, Malaysia

^{***} College Of IT, University Tenaga Nasional Kajang, Selangor, Malaysia

Abstract- The consideration of knowledge as an important asset that has a valuable position more than the physical asset leads to an increase in the implementation of knowledge management in business organizations and higher education institutions. The knowledge assets need to be implemented efficiently and effectively in the higher education institutions to increase the education level as well as the competitive advantage. The information technology plays an important role to support the knowledge management processes like the processes of acquisition, conversion, sharing, utilization, and application. The stakeholders of higher education institutions should perceive the role of information technology in implementing the KM processes successfully .This study investigates the role of information technology in implementing the KM processes in Malaysian private university as a case study . A quantitative and qualitative approach has been used in this paper for data collection to gain insights into the case that being investigated. A questionnaire has been used to collect data from 46 technical employees in Malaysian private university and the interview has been conducted with three head managers of the technical departments. The results indicates that weak information technology infrastructures that lead to weak implementing of KM processes .The main aim of this paper is to highlight the importance of IT to achieve a successful KM processes that lead to successful KMS . Some recommendations has been given to increase the integration between the IT and KM processes and to give each KM processes the IT infrastructure and services that compatible with it systematically and organizationally.

Index Terms- Knowledge management , knowledge management system, knowledge management processes and information technology.

I. INTRODUCTION

The growing use of knowledge in businesses, education and health contributes to the emergence of the theory of knowledge management (KM) and knowledge management systems (KMS) [1]. The terms KM and KMS are used interchangeably in organisations with KM initiatives. KM is defined as a systematic approach in managing knowledge through KM activities such as knowledge creation, storage, dissemination, and application while KMS is defined as information systems that support KM activities [2]. To

understand the concept of KM, the definition of knowledge is necessary. Although there is no fixed definition of Knowledge, the general definition is a combination of experience; values and expert insight that assist evaluate and incorporate new experience and information [3].Generally knowledge is divided into two types: explicit and tacit knowledge. Explicit knowledge is experience and skills, which are easy to be captured, retrieved, shared and used because it can be expressed in words and numbers that can be managed more easily. Tacit knowledge is defined as knowledge that resides in the people's mind that includes experience, thinking, competence, commitment and deed [4] .Tacit knowledge is the most valuable knowledge since it combines information with experiences, skills and understanding of people, which can help people to find best solutions and reduce opportunities of repeating mistakes [5]. It is important to distinguish these types of knowledge because the goal of KM is to convert tacit knowledge to explicit knowledge [6]. (KM) is considered as one of the most important parts of any organization and a complement to the organization activities.

Previous studies have identified various KM processes. For example, [7] identified key processes of KM such as finding existing knowledge, creating new knowledge, packaging knowledge created, and externally using existing knowledge. [1] Identified KM processes as acquisition, identification, dissemination, and application. Thus, information systems designed for support and augmentation of KM need to complement and enhance the KM activities in organisations. Many industries with KM initiatives rely on IT as an important enabler. Companies like Hewlett Packard, Dell, and Siemens use IT in various ways to aid their KM activities. For example, they use IT for finding an expert or a recorded source of knowledge using online directories and searching databases, access to information pass projects. Although IT has been demonstrated to aid KM activities in business industries, there is a lack of empirical study on how IT supports KM activities in higher learning institution. [8] Conducted a study on the role of IT to support KM in higher education without providing empirical data. Thus, the objective of this study is to investigate the role of IT to support KM processes in higher education by conducting an empirical study on one higher education in Malaysia. We investigated the current situations of KM processes and the real status of IT system that support these processes.

II. LITERATURE REVIEW

1. Knowledge management in higher education

Universities are recognised as organisations that are knowledge-intensive as their business success relies on intellectual capital. Most of the activities in the universities are knowledge-based activities that involve creation, and transfer of knowledge among their employees especially among lecturers, and students. Thus, universities do have a significant level of knowledge management activities but have not had any formal KM practices. Therefore, it is important to recognise these, and use them as foundations for further development, rather than to invent a whole new paradigm [9].

Although the interest in KM is rapidly growing, KM is still considered as a new concept that has been merely implemented in higher education institutions. Implementing KM processes such as sharing, conversion, utilization and acquisition of both tacit and explicit knowledge in higher education can lead to significant improvement [10]. These processes are considered as the nature of the member staff job inside universities. Therefore, the higher education should adopt the KM and use KM best practices in their universities as a means to continuously save their knowledge asset due to the risk of loss the knowledge without a management system that can preserve it systematically and organizationally. However, the most important challenge of KM implementation in higher education is to convert the tacit knowledge that resides in individual's academic staff mind and make it explicit knowledge widely and easily available to staff member [6].

The KM implementation in higher education can help to achieve the following advantages:

- Increase competitive advantage for responsive to the research grants, improvement the libraries , E learning and directly react to commercial opportunities [10].
- Reduce the amount of time required to conduct the researches [10].
- Reduce the wasted resource time and costs which are spent to administrative the universities [10].

2. Knowledge management processes

Knowledge management (KM) consist of various processes that are established to manage the knowledge flow efficiently and effectively. It can be defined as managing the corporation's knowledge through a systematically and organizationally specified process for acquiring, organizing, sustaining, applying, sharing and renewing both the tacit and explicit knowledge of employees to enhance organizational performance and create value [11]. Many previous studies identify different processes and mechanism to manage the knowledge successfully inside the organizations environment. First of all, knowledge needs to be obtained in the organization through the process of acquisition [12] or through the generation process [11]. The acquired knowledge need to enter another process in order to use it efficiently, this process called the conversion process [13] or codification process [11] which is responsible of standardising and categorizing knowledge. Eventually this codified knowledge need to be available to be used by the organization employees. The process that is responsible of making the knowledge available to use is called the distribution process [14] or it called

the sharing process [15] .after the knowledge shared successfully, it need to apply and implement practically in the organization ,this process is called the application process [2] and utilisation [16],[15]. Accordingly, the knowledge management life cycle as it is demonstrated in the literature review consist of processes of knowledge acquisition, conversion, sharing and application [13].

a. Knowledge Acquisition

Knowledge acquisition is a fundamental process in the KM implementation. It is the process that enables an organization to obtain the knowledge from external sources. External knowledge sources are important and one should therefore take a holistic view of the value chain [17]. Sources include suppliers, competitors, partners/alliances, customers, and external experts that can extend well outside the firm. Knowledge acquisition capabilities consist of processes and techniques for collecting information and creating knowledge from internal and external sources. Acquisition of external knowledge indicates the identification function, which represents the "generator" of intelligence for the organization. External environmental signals are identified, and information on those signals are gathered and transmitted across the organizational boundary. The more knowledge that can be collected in the firm, the better the acquisition capability works. Information and knowledge may be acquired through several processes from various sources, by learning, when observing other organizations, by implementing knowledge possessing components and by intentional search and monitoring. The speed of a firm's efforts to identify and collect knowledge can determine the quality of a firm's acquisition capabilities. The greater the effort, the more quickly the firm will build requisite capabilities [18].

b. Knowledge Conversion

The knowledge conversion is a critical process that play important role in the knowledge life cycle. It means converting the knowledge from one form to another form, tacit knowledge to explicit knowledge which is one of the most difficult processes due to the difficulty of converting the tacit knowledge that is embedded in the human mind to a formal structural knowledge that can be dealt with directly. In this process it is important to know what the knowledge that can be converted is and what is the kind of knowledge that is more easily transferable. [19]defined four types of conversion processes are that considered the most important processes to convert the knowledge efficiently from the tacit to explicit and vice versa. these processes can be classified as Tacit-to-tacit (socialisation) - individuals acquire knowledge from others through dialogue and observation, Tacit-to-explicit (externalisation) - the articulation of knowledge into tangible form through elicitation and documentation, Explicit-to-explicit (combination) - combining different forms of explicit knowledge, such as that in documents or databases explicit-to-tacit (internalisation) - such as learning by doing, where individuals internalise knowledge into their own mental models from documents.

c. Knowledge Sharing

Knowledge sharing is considered one of the fundamental KM activities, It can be defined as a multitude of processes including exchanging knowledge skills, experience, and

understanding [20].The ultimate function of knowledge sharing is to spread and make knowledge accessible and usable between the employees in the organization environment and it requires the willingness of employees to share their knowledge . Thus, knowledge sharing between employees and within and across teams allows organizations to exploit and capitalize on knowledge-based resources [11]. The sharing process can lead to many advantages that can minimize the completion of new product development projects, team performance, organization innovation capabilities, and organization performance. These advantages will increase sales growth and revenue from new products and services [21].Thus, the right activation of knowledge sharing process may produce many advantages that enhance the performance of the organization broadly and the employee's effort particularly.

d. Knowledge Utilization application

The knowledge application can be defined as the organization's ability to effectively apply the existing knowledge to create new knowledge and to take action from the basis for achieving competitive advantage from knowledge-based assets [2]. [22] identified three primary mechanisms for the knowledge application to integrate the existing knowledge to create organizational capability: directives (specific set of rules, standards, procedures, and instructions developed through the conversion of specialists' tacit knowledge to explicit and integrated knowledge for efficient communication to non-specialists), organizational routines (the development of task performance and coordination patterns, interaction protocols, and process specifications that allow individuals to apply and integrate their specialized knowledge without the need to communicate what they know to others), and self-contained task teams (teams of individuals with prerequisite knowledge and specialty are formed for problem solving -in situations in which task uncertainty and complexity prevent the specification of directives and organizational routines). Thus, technology can support knowledge application by embedding knowledge into organizational routines. In these operations it can improve and support the knowledge application by facilitating the capture, updating, and accessibility of the knowledge and thus, lead to enhance the speed of knowledge integration and application.

3. Knowledge Management Systems in Higher Education

Information technology is considered a backbone enabler that supports the KM processes and implementations robustly [23] .By applying the IT, the KM converts directly into KMS. [2] Defined KMS as "IT-based systems developed to support and enhance the organizational processes of knowledge creation, storage/retrieval, transfer, and application". The IT infrastructures provide many facilities and tools that enable the implementations of KM by converting the old traditional tools and techniques that were used to manage the knowledge into modern forms. These tools and techniques can be grouped into one or more of the following categories: business intelligence, knowledge base, collaboration, content and document management, portals, customer relationship management, data mining, workflow, and search [24]. The IT infrastructures enhance the KM processes inside many organizations such as

business, health care and industries by providing many attractive features such as Interactivity, Mobility, Convertibility, Connectivity and Globalization. However, the IT has not yet been implemented widely in the higher education's institutions. Although the tools and services of IT infrastructures are used commonly in the higher educations' such as emails, blogs, and network technologies, they are not formally categorized as KMS. Therefore, the people in the higher educations like teachers, students, researchers need KMS that are formally implemented to enhance the learning progress and to support the knowledge transfer activities inside the various higher educations' institutions. This achievement can lead to minimize the total cost and maximize the organization performance simultaneously.

Nonaka and Takeuchi's SECI model is the most standard model that is used in KM theories. Knowledge in this model can be converted from one form to another ,converting progress can be implemented by Appling (SECI) the four processes which are Socialisation, externalization, combination, and internalisation processes.(1)socialisation(from tacit knowledge to tacit knowledge),(2)Externalisation (from tacit knowledge to explicit knowledge),(3)combination(from explicit knowledge to explicit knowledge),and(4)internalisation (from explicit knowledge to tacit knowledge). However, the conversion processes needs IT support to transfer Nonaka and Takeuchi's SECI model from its theoretical exist into a real practical usage inside the higher educations' institutions. [8] Identified and classified different IT tools and types that fit to each conversion process of SECI model. Furthermore, by distinguishing the suitable IT type for each conversion process, different types of knowledge can then distinguished to be used in the appropriate process. The IT types for each conversion process are classified in the figure 1 based on the roles of information technologies for each method of knowledge conversion in SECI model [8] .

Tacit to Tacit Knowledge Via Socialization	Tacit to Explicit Knowledge Via Externalization
Lecturer shares tacit knowledge with students directly through face to face interaction such as through discussion, observation, imitation and practice	Articulate tacit knowledge about academic, research and administration procedures into explicit form via policy, models, reports and etc. (e.g. administrative rules, program structure for undergraduates and postgraduates, and program requirements)
Information Technology: video conferencing – distance learning ,virtual postgraduate supervision Internet-Community of Practice (CoP) Knowledge directories-consultation, advice electronic discussion forum/collaborative tools - exchange of ideas and allow that ideas to be stored for later retrieval	Information Technology: Knowledge repository- store rules, policies, solutions, work flows, processes, research reports, the result of discussion by academicians in workshops Explicit

Explicit to Tacit Knowledge Via Internalization	Explicit to Explicit Knowledge Via Combination
Consolidate knowledge gained and internalize the knowledge by embedding own's beliefs and values. Associated with the learning process and making use of that knowledge.	Knowledge are combined, analysed, rearranged, added, categorized, and exchanged via students' performance analysis, end of semester report, assessments strategy (e.g. assignment, final exam, lab exercises, class project)
Information Technology: electronic discussion forum/collaborative tools, Blog – story telling method of sharing experiences social media-opinions, ideas and feedback	Information Technology: Portal Blogs Electronic document management systems- access information, store new knowledge

FIGURE 1: The roles of information technologies for each method of knowledge conversion in SECI model [8].

By implementing the IT type's classification for each knowledge conversion, the learning and teaching progress will speed up, the flow of the knowledge can be freely managed and eventually The KMS can be implemented efficiently and effectively in the higher educations' institutions in Malaysia. Accordingly, this study investigates the current KM processes and the IT role in implemented KM in higher education institution as an empirical study that are conducted based on the theoretical study of classifying the role of IT for each conversion process in SECI [8].

III. RESEARCH PURPOSE

This research conduct under the scope of what is the current situation of KMS processes and implementations in UNITEN university, what is the real level of IT in KM implementation, to achieve the research purpose, the literature review demonstrate the effective KM processes that are needed to manage the knowledge contents and the importance of IT to manage the KM processes in order to maximize the overall performance of the organizations efficiently. However, KMS may not implement efficiently due to the weakness of IT system, and the incompatibility between the IT system and the organization objectives. Therefore, the current situation of KM processes and the role of IT as enabler that support the KM processes inside UNITEN working activities will be investigated.

Table 1: Reliability Statistics

Cronbach's Alpha	N of Items	NO of Respondents	% included Respondents
.97	44	46	100%

2. Descriptive Analysis

This section presents the descriptive analysis of the questionnaire parts; knowledge acquisitioning, knowledge conversion; knowledge sharing, knowledge application/utilization, and information technology.

IV. DATA COLLECTION AND ANALYSIS

This research uses both quantitative approach (questionnaire) and qualitative approach (interview) to collect research data as the following:

- Questionnaire adopted from [25] study are used to collect data from technical employees inside UNITEN University based on 7-likert scale (1 for Strongly Disagree (SD), 2 for Disagree (D), 3 for Tend to Disagree (TD), 4 for Neutral (N), 5 for Trend to Agree (TA), 6 for Agree (A) and 7 for Strongly Agree (SA). The questionnaire consists from 44 items divided into 5 sections; (1) knowledge acquisitioning, (2) knowledge conversion, (3) knowledge sharing, (4) knowledge application/ utilization, and (5) IT system. The numbers of responses for this questionnaire were 46 responses.
- Interview designed are used to collect data from head managers of technical department inside UNITEN University based on open questions in order to analyze the real situation of KMS processes. The interview contain 30 question divided into two section; (1) knowledge management processes, and (2) challenge of knowledge management processes inside UNITEN university. The interview respondents are three head managers from technical department.
- Data gathered through questionnaires were submitted to a set of statistical analyses tools, using Statistical Package for Social Sciences (SPSS) version 20. According to the research purposes performed several of analyses which are: (1) Reliability analysis. And (2) descriptive analysis.

V. QUESTIONNAIRE FINDINGS

1. Questionnaire reliability

Reliability is used to describe the overall consistency of a measure. A measure is said to have a high reliability if it produces similar results under consistent conditions. For example, measurements of people's height and weight are often extremely reliable [26]. In statistics, coefficient alpha is the most frequently method used for calculating internal consistency that used as a measure of reliability for the dependent variable of the study, when $\alpha > 0.7$, that indicates satisfactory internal consistency reliability [27]. Table2 shows that coefficient alpha is .97 for the scaled variables which contain 44 items (part 2, 3, 4 and 5) and 46 respondents.

a. Knowledge Acquisition

This variable consists from 12 items to measure the organization processes of acquiring the needs of knowledge to support working activities. Table 1 shows that the respondents' answers means are agree with items number 1, 5 and 9 and trend to agree with items number 2, 3, 4, 6, 7, 8, 10, 11, and 12.

Table 1: Descriptive Analysis of Knowledge Acquisitioning

Item No	Item	SD	D	TD	N	TA	A	SA	Mean
1	Our organization has processes for acquiring knowledge	0	1	0	9	4	28	4	5.52
2	Our organization has processes for generating new knowledge from existing knowledge	0	2	0	10	4	26	4	5.39
3	Our organization has processes for acquiring knowledge about our suppliers	0	2	0	11	7	25	1	5.21
4	Our organization uses feedback from projects to improve subsequent projects	0	3	0	8	2	31	2	5.39
5	Our organization generates new knowledge through collaboration with business partners	0	2	2	5	6	26	5	5.45
6	Our organization has processes for acquiring knowledge about new products and services within our industry	0	2	1	9	6	23	5	5.34
7	Our organization has processes for acquiring the knowledge about competitors within our industry	0	1	1	9	7	24	4	5.39
8	Our organization has processes for benchmarking performance	0	3	1	4	6	29	3	5.43
9	Our organization has teams devoted to identifying best practice	0	1	0	7	3	27	8	5.71
10	We regularly carry out environmental scanning for the purpose of acquiring knowledge	0	2	2	10	5	23	4	5.23
11	We encourage employees to document their experiences	0	1	2	9	8	22	4	5.30
12	We routinely benchmark ourselves against our competitors	0	2	2	6	10	24	2	5.26

According to table 1, the responses show that the UNITEN has clear processes to acquire the tacit and explicit, the UNITEN generate explicit and tacit knowledge supporting external resources, and the UNITEN has teams to identify the best ways to develop the tacit knowledge. Also, UNITEN has clear vision to classify the explicit knowledge for best knowledge identifying. On the other side, the employees are not clearly sure of the following issues of knowledge acquiring:

- UNITEN is active in generation of new tacit and explicit knowledge to support the existing situation of knowledge.
- UNITEN is active about acquiring feedback of knowledge implementation benefit.

- UNITEN is active in provide collaborating sharing to acquire new solution of tacit and explicit knowledge.
- UNITEN is active in archive the tacit knowledge of expert employees
- UNITEN is active in manage the tacit and explicit knowledge based on structured method for purpose of efficient acquiring of knowledge

b. Knowledge conversion

This variable consists from 7 items to measure the organization activities of knowledge conversion processes (tacit and explicit knowledge). Table 2 shows that the respondents' answers means are agree with items number 15 and trend to agree with items number 13, 14, 16, 17, 18, and 19.

Table 2: Descriptive Analysis of Knowledge conversion

Item No	Item	SD	D	TD	N	TA	A	SA	Mean
13	In our organization, the knowledge of individual is record in an structured way, so that others in the organization may be benefit from it.	0	3	0	9	9	23	2	5.19
14	In our organization the knowledge is represented in standard way.	0	4	0	6	7	25	4	5.32
15	In our organization the knowledge is cataloged for easy retrieval	0	6	2	11	7	17	3	5.45
16	Our organization has process for integrating knowledge from different resources	0	0	3	11	4	25	3	5.17
17	In our organization the knowledge is organized in a useful way.	0	1	2	5	10	23	5	5.28
18	Our organization has process for replacing out dated knowledge.	0	0	4	11	6	23	2	5.06
19	Our organization has process for filtering (i.e. exciting out only the most useful knowledge)	0	2	2	11	3	22	6	4.93

According to table 2, the respondents are not sure of the following points:

- In UNITEN the knowledge is represented in standard way.

- In UNITEN the knowledge is categorized for easy conversions.
- UNITEN has process for integrating knowledge from different resources.
- UNITEN organize the knowledge in a useful way.

- UNITEN has process for replacing out dated knowledge.
- UNITEN has process for filtering (i.e. exciting out only the most useful knowledge)

This variable consists from 8 items to measure the organization activities of knowledge sharing processes in order to motivate the employees to adopt the knowledge that deal with businesses strategies. Table 3 shows that all items means are trend to agree.

c. Knowledge sharing

Table 3: Descriptive Analysis of Knowledge Sharing

Item No	Item	SD	D	TD	N	TA	A	SA	Mean
20	Our organization has systems and venues for people to share their knowledge with others in the company	0	5	0	11	4	23	3	5.02
21	Our employees regularly share knowledge with their superiors	0	5	1	10	10	14	5	4.93
22	Our employees regularly share knowledge with their subordinates	0	8	0	6	8	17	7	5.06
23	Our employees regularly share ideas with other employees even if they are based in different departments	0	4	4	11	3	20	4	5.30
24	Our organization has processes for distributing knowledge throughout the organization	0	4	2	9	7	20	4	5.23
25	Our organization has processes for exchanging knowledge between individuals	0	1	0	8	13	23	1	5.26
26	Our organization makes knowledge accessible to those who need it	0	2	1	10	8	21	4	5.15
27	Our organization promotes sharing of knowledge between work groups/teams	0	3	2	7	10	16	8	5.00

According to table 3, the responds are not sure of the following issues:

- UNITEN motivates the employees through share knowledge through the organization.
- UNITEN supports the collaborative sharing of knowledge among individuals.

- UNITEN supports the employees' readiness of knowledge through share the employees nee of knowledge.

On the other hand, there are integrations problems to address the following processes:

- Applying knowledge learned from experience.

- Matches sources of knowledge to problems and challenges.

d. Knowledge Application/Utilization

This variable consists from 9 items to measure the organization systemically processes in order to ensure the business value of working activities. Table 4 shows that the respondents are agree with item number 34 and trend to agree with all other items.

Table 4: Descriptive Analysis of Knowledge Application/Utilization

Item No	Item	SD	D	TD	N	TA	A	SA	Mean
28	Our organization has process for applying knowledge learned from experiences.	0	4	3	6	8	19	6	5.02
29	Our organization has process for using knowledge to solve new problems.	0	4	3	7	10	19	3	5.06
30	Our organization matches sources of knowledge to problems and challenges	0	2	4	8	10	21	1	5.02
31	In our organization knowledge is used to improve efficiency.	0	1	6	8	10	16	5	5.06
32	Our organization effectively applies knowledge to deal with changing competitive conditions.	0	3	1	11	8	18	5	5.13
33	Our organization quickly applies knowledge to critical competitive needs.	0	1	6	8	5	20	6	5.19
34	We use our organization assets to solve problem quickly	0	4	3	14	6	15	4	5.80
35	Our organization has process for using knowledge in the development of new products and services.	0	2	5	6	10	21	2	5.06
36	Our organization has process for converting knowledge into action plans.	0	4	4	7	4	24	3	5.0652

According to table 4, the responses show that UNITEN focus on solves the problems quickly as a main strategy of UNITEN services. However, UNITEN are not clear of improves the services efficiency and changing competitive conditions. The responses show that there are no efficient processes to:

- Using knowledge to solve new problems.

- Using knowledge to develop new products and services.
- Convert knowledge into action plans.

e. Information Technology

This variable consists from 8 items to measure the IT services and infrastructures roles in knowledge management

implementations. Table 5 shows that the respondents are agree with item number 24 and trend to agree with all other items.

Table 5: Descriptive Analysis of Information Technology

Item No	Item	SD	D	TD	N	TA	A	SA	Mean
37	Our IT systems are modular	0	2	2	10	6	22	4	5.21
38	Our IT systems use commonly agreed IT standards	0	2	2	8	5	23	6	5.36
39	We have a high degree of integration among our IT applications	0	3	3	8	2	23	7	5.30
40	Our IT system support the conferencing meeting between employees	0	5	0	7	4	22	8	5.34
41	There are electronic Blogs to share the knowledge for employees	0	3	4	12	6	18	3	4.89
42	The notifications of knowledge delivered using electronic contacts such as emails and mobiles	0	3	0	5	4	22	12	5.69
43	The knowledge delivered through employees accounts of university	0	5	0	5	5	27	4	5.32
44	The employees trained to use knowledge management systems practically i.e. workshops	0	4	3	7	3	17	12	5.34

According to table 5, the employees are sure that UNITEN use the IT system to deliver the notifications that support the KM through many applications such as e-mails and mobile messages. On the other hand, the employees are not sure clearly about the following issues of using IT systems in working environment.

- UNITEN has active electronic blogs to share the knowledge for employees.
- UNITEN has online conferencing to support the meeting among employees.
- UNITEN train the use of knowledge using practical approach to support IT services.

Actually, the responses show that the employees are not sure that there is a standard IT system to gain benefit of KM implementation. However, this shows that the notification of

knowledge delivered supporting external IT services in order to share the knowledge at right time.

Normally, the organization address business objectives using efficient IT system, services, and application to share the right knowledge to the right employee at right time in order to support the working activities based on business objectives. The responses show that there are no efficient IT solutions to support business objectives in UNITEN which represent a bold challenge of KM implementation benefit in UNITEN.

f. Interview Analysis

Table 6 presents the findings of interview of this study based on IT roles in UNITEN.

Table 6: Findings of KM Process based IT roles

Processes of KM	IT
Acquiring	The tacit knowledge managed based on the tasks roles of employees i.e. technical, mechanicals and fitters.

	<p>The explicit knowledge stored as instructions documents.</p> <p>The archiving processes of explicit knowledge has specific duration per year. The systems not open any time.</p>
Conversion	<p>The socialization processes adopted to transfer the old tacit knowledge to new employees.</p> <p>The training is the main method that used to develop the tacit knowledge of employees.</p>
Sharing	<p>The explicit knowledge shared with employees as clear instruction manually. The electronic sharing of explicit knowledge adopted in some cases through employees accounts.</p> <p>The employees need to have advance permissions to access the explicit knowledge.</p>
Utilizing	<p>The Tacit knowledge evaluated through assessment system called KPI and manual observing. KPI is system to evaluate the employees' achievements each semester.</p>

VI. FINDINGS DISCUSSION

1. Questionnaire Discussion

According to relations between items 37, 38, 39, 40, 41, 43, and 44 in part 5 and items 2, 3, 4, 6, 7, 8, 10, 11, and 12 in part 1, there is weak integration between knowledge acquiring and IT system in UNITEN. There are no standard IT processes to generate new tacit and explicit knowledge to support the existing situation of knowledge, acquire feedback of knowledge implementation benefit, provide collaborating sharing to acquire new solution of tacit and explicit knowledge, archive the tacit knowledge of expert employees, and manage the tacit and explicit knowledge based on structured method for purpose of efficient acquiring of knowledge

According to relations between items 37, 38, 39, 40, 41, 43, and 44 in part 5 and items 13, 14, 16, 17, 18, and 19 in part 2, there is weak integration between knowledge conversion and IT system in UNITEN. The knowledge is not represented in standard way and it is not categorized for easy conversions, there are no standard process for integrating knowledge from different resources and for replacing out dated knowledge, there are no process for filtering (i.e. extracting only the most useful knowledge), and finally The knowledge is not organized in a useful way

According to relations between items 37, 38, 39, 40, 41, 42, 43, and 44 in part 5 and items 20, 22, 23, 24, 25, 26 and 27 in part 3, there is weaker integration between knowledge sharing and IT system in UNITEN. There is simple information technology that used to support the sharing process such as Email and mobile. Actually, these simple systems have many problems. For example, there are no support for the collaborative sharing of knowledge among individuals and there are no support for the employees' readiness of knowledge through share the employees

need of knowledge .accordingly there is no standard information technology to enhance knowledge sharing process inside UNITEN.

According to relations between items 37, 38, 39, 40, 41, 42, 43, and 44 in part 5 and items 28, 29, 32, and 36 in part 4, there is not clear support from information technology to UNITEN Application/Utilization. Accordingly, there are no efficient processes for using knowledge to solve new problems, develop new products with new services, and to convert knowledge into action plans. This means there is no standard IT system to support the KM processes in UNITEN.

2. Interview Discussion

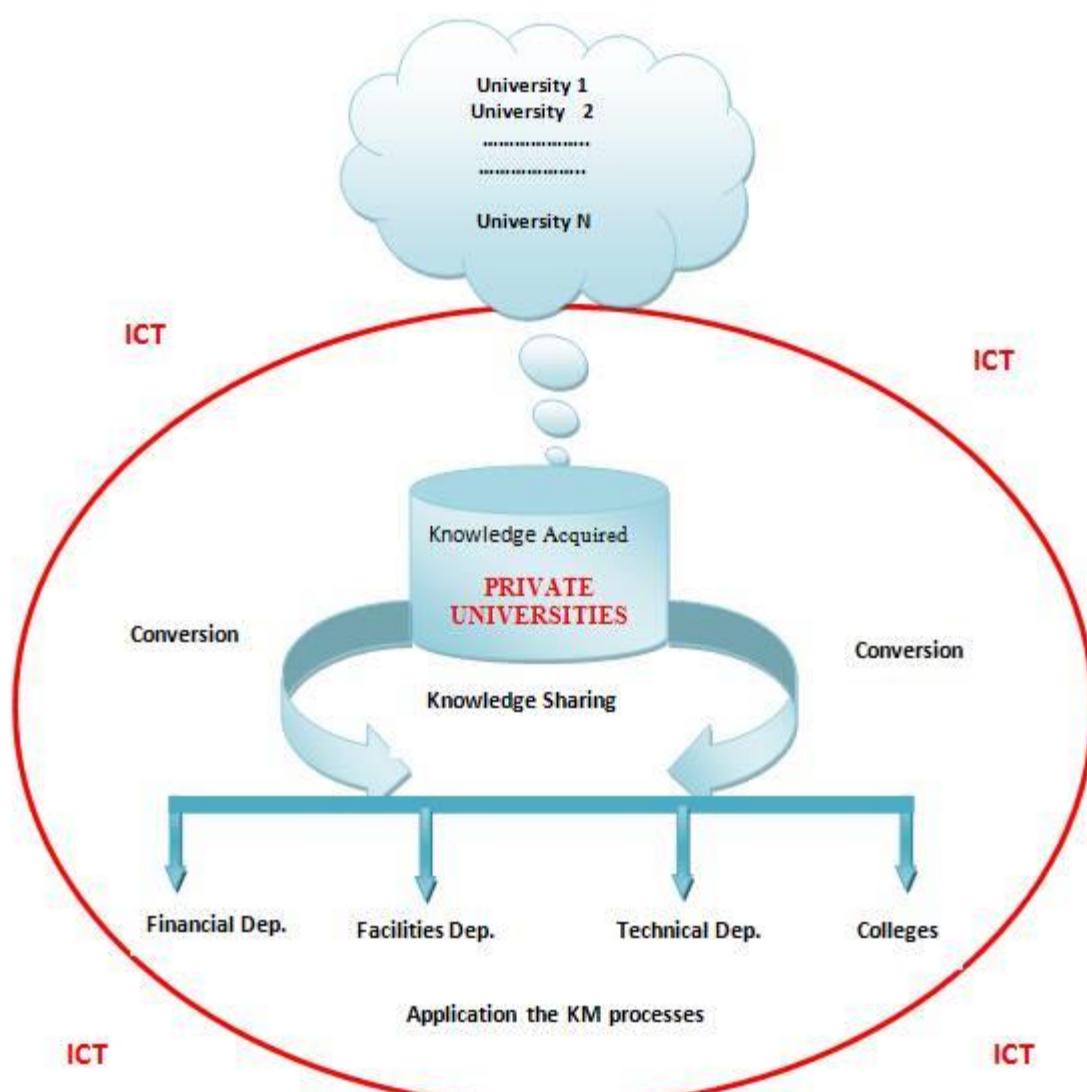
The conducted study in this paper reveals the current situations of the KM processes and the current status of IT system inside UNITEN University; accordingly, much challenge has been discovered and investigated to have a whole picture of the difficulties that faced the KM implementation in UNITEN. The investigation clarifies that UNITEN university doesn't have effective documentation system to carry the related work and activities, this shows by storing the explicit knowledge as instructions documents that can only provide abstract information that doesn't have a meaningful value to the organization. This kind of documentation can lead to minimize the efficiency of KM implementation. Thus, lead to minimizing the outcome performance of UNITEN University. On the other hand ,the poor and limited interactivity between the system of standard instructions (KPI) and the employees lead to minimizing the employees effort especially and the organization performance generally, this weaknesses in the interactivity can be realized through the current drawbacks that the (KPI) system can open for updating the knowledge in a certain period of time and not for the entire year and the employees need to have advance permissions to access the explicit knowledge. In

addition to the previous drawbacks, the IT roles are not implemented efficiently in KM processes, the IT system does not support the KM process due to many reasons which are the IT system are not integrated well within KM processes, the IT system is incompatible with the current KM processes, and the IT system are not implemented correctly inside the KM processes. Therefore, most explicit knowledge in UNITEN departments are still archived as hard copies. These challenges are addressed carefully and specific recommendations are highlighted to resolve the weaknesses aspects in KM processes and the IT system inside the UNITEN University.

VII. RECOMMENDATIONS

The data analysis demonstrates that, the UNITEN have limitations in KM processes that lead to KM disadvantage. To

solve these problems and enhance the KM implementation in term of knowledge conversion, sharing, Knowledge Utilization, and ICT, we propose that UNITEN should using integration IT system support all the KM processes which are acquire the knowledge ,knowledge conversion, knowledge sharing, Knowledge Utilization, and using ICT to as enabler to KM implementation in UNITEN. This system have to provide systematic services such as (1) acquire knowledge from other universities have success KM implementation , (2) conversion the acquired knowledge based on support the education processes or support the UNITEN development ,(3) share the knowledge based on where can benefit inside UNITEN for example used in Collage , facilities or Technical , (4) all these processes performed under IT , the IT have to help in acquiring ,sharing and conversion processes as the figure 1.2 view these processes.



VIII. CONCLUSION

Successful KM in any organization requires that, this organization should implement KM processes (Acquiring,

Sharing , conversion and Utilization) the knowledge, as well as there are many required factors to support the KM implementation such as (culture, IT systems, competition , intelligent , managerial strategies) in order to get an efficient KM implementation . In UNITEN there are strengths and weaknesses

aspects in KM implementation. UNITEN has clear processes to acquire the knowledge, while there are lack procedures in the other processes such as knowledge conversion, knowledge sharing and Knowledge Utilization. Furthermore, IT system not integrated with KM system inside UNITEN .The drawback processes need to addresses and the challenge need to solve in to overcome for all barriers of KM system then get highest benefit. Finally, this study recommendation can offer several solutions to achieve the KM system objective that belongs to UNITEN University.

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AUTHORS

First Author – Zainab Amin Al-Sulami, College Of IT University Tenaga Nasional, Kajang, Selangor, Malaysia, zainabamin2014@yahoo.com

Second Author – Abdullah Mohammed Rashid, College Of IT University Tenaga Nasional, Kajang, Selangor, Malaysia, Abdall_rshd@yahoo.com

Third Author – Norashikin Ali, College Of IT, University Tenaga Nasional, Kajang, Selangor, Malaysia, shikin.uniten@gmail.com

The Role of Ethical Practice in Recruitment in Improving Performance of an Institution

(A case study of ethics in recruitment of the police service in Kenya and resultant performance in stemming insecurity since 2010)

Henry Peter Gommans ^{*}, Joseph .M.Musumbu ^{**}

^{*} Supply Chain Professional/Lecturer), Mount Kenya University/Tradewinds Kenya Limited
^{**} Scholar, Mount Kenya University

Abstract- The concept ethical practice is defined as the adherence and honour of morals, beliefs and values of a profession one is subscribed to. It also encompasses helping others who have been subjected to biased making of decisions. In the world, there is an overriding worry when it comes to the management of human resource in organizations. The International Civil Service Commission (ICSC) has linked poor performance of organizations in the world to unethical management of human resources, and more so during the recruitment processes. This project evaluates possibilities of poor performances in the police service in Kenya in stemming insecurity over the last four years, to unethical practices in the service. Specifically, the paper evaluates the implications of unethical police recruitments in Kenya over the last four years to overall performance of the police force in Kenya. This paper employs qualitative research methodology as a way of collecting data to qualify the hypothesis; that the unethical practice in the recruitment of the police service in Kenya has resulted to high levels of insecurity. Specifically, this project utilized focus group discussions, key informant interviews, participant observations, and case studies. Interviews involved two human rights individuals, two willing police officers stationed in Nairobi, three government officers at EACC and two Kenyan politicians. Three stations used during the 2014 police recruitment exercise were chosen for getting field notes.

I. INTRODUCTION

R Background of the study

Recruitment or placement is regarded as the foremost part of any organization. It is regarded as the most important policy in management of human resource in an organization, and this is because without it, an organization exists in void. According to ICSC Secretariat (August 2001), every other recruitment should not only be based on some shared principles, but also should conform to internationally accepted practices. Any recruitment exercise should be devoid of corruption, nepotism or favouritism. A report prepared by Transparency International in the year 2009, dubbed the Corruption Perceptions Index (CPI), ranked Kenya as one of the nations in the world which is most corrupt (Ndegwa, November 19, 2009). Overall, Kenya was given a score of 2.2, meaning that the perception on corruption, and especially bribery was very. In regard to institutions, the police service in Kenya has over the years led as an institution most corrupt, not only in Kenya, but the whole of East Africa.

According to Herbling (September 2, 2012), the police department in Kenya was the most corrupt institution in the whole of East Africa in the year 2012. Other than corruption, the police force in Kenya has been attributed shadowy deals such as protecting drug lords, illegal execution of prominent individuals and partaking in thefts in Kenya.

Arguably, the initiation part of corruption and indiscipline in the Kenyan police service starts at the recruitment or selection stage. As would be discussed in this paper, over the years, every other recruitment process is riddled with bribery, nepotism and favouritism. This paper has linked rampant bribery and other unethical practices during police recruitments in Kenya over the last four years to high level of insecurity in the country. Through use of case studies, focus group discussions, interviews and observations, unethical practices is the root cause of insecurity.

1.1. Statement of the problem

Over the years, Kenya police has been attributed to all manner of negative assertions. In the year 2007, the police service was heavily accused for illegal executions of persons and group of persons perceived to be disturbing normalcy in the country. Specifically, the police was accused with extra-judicial killings of the Mungiki sect members in Nairobi and its environs. Such acts and many others preceding and afterwards has given local and international observers conclude that there is a lot of rot in the police force. Recently, the terrorism menace has increased, and so are runaway insecurity, conspired thefts, undemocratic disruptions of lawful demonstrations and picketing, and highly acclaimed corruption in the police force. In this regard therefore, the paper answers the questions; *does the rot and incompetence of the police service in Kenya stem from unethical practice during national recruitment exercises?*

1.2. Research hypothesis

In any organization in the world, staffing remains the single most important step of improving performance of an organization. In essence therefore, if a recruitment exercise is bungled, wrong people would be put into the organization, and such would be a starting point of a downward trend in terms of performance. The rot in the police service in Kenya can be attributed to the recruitment exercises; whereby, majority of those who make it to the police force pay their way in. In this regard therefore; *Unethical practices during national recruitment exercises of police force in Kenya has led to low performance of the service.*

1.3. Research objectives

1. To investigate the link between high levels of conspired thefts and low morale of the police force in Kenya.
2. To find out whether increased insecurity trends in the country is attributable to incompetence and unwillingness to stem it out.
3. To evaluate the trends in the recruitment exercises in Kenya and whether they are riddled with nepotism, bribery, tribalism and favouritism.
4. To link incompetence and poor performance in the police service to presence of individuals who do not have the passion to be in the service other than monetary gains.

1.4. Research questions

1. What are the attributes of the police service in Kenya in terms of their capabilities to stem out runaway insecurity, increased presence of outlawed groups and terrorism?
2. How is the police service in Kenya rated in terms of bribery during recruitment services and general performance?
3. How rampant is corruption or lack of it in the police force, and more so during the selection and recruitment of security personnel in Kenya.
4. What are some of the unethical tendencies that are attributable to recruitment of the police service in Kenya?
5. What links exist in the police service in Kenya in regard to incompetence of security personnel in Kenya and claims of unethical practices during national recruitment exercises of police service in Kenya?

1.5. Assumption of the study

This research is based on assumption that the tendencies of unethical practices that were noted in the selected case studies and reference points were representative of a wider trend in Kenya. The study also makes assumption that the selected respondents were not biased in the answers they gave, and that their views were representative of the whole of the professions they represented.

1.6. The scope of the study

This study was limited to the police service in Kenya. The focus was on the recruitment of police into the police service in Kenya in the year 2014. The outcome is linked to the rampant rise of insecurity in Kenya for the past four years. Reports from various local and international sources have been used in this study to qualify the relationships between ethical or unethical practice during recruitments of police officers in Kenya and the performance, or lack of it for police service for the past four years.

1.7. Ethical consideration of the study

There are a number of ethical considerations that were made in this study so as to come up with a most representative analysis of the police in Kenya, and the link of poor performance to unethical practices during recruitment drives.

1. The policing profession is a most sensitive profession, and thus a lot of information gathered in the course of this study could not be included in this study.

2. Enough authority from relevant policing institution had to be consulted during the whole of the study.
3. As a matter of necessity, the results of this study had to be shared with relevant heads of various policing institutions in Kenya, and their views of whether to publish were sought.

II. LITERATURE REVIEW

2.0. Introduction to Literature review

The focus of this paper is the strong links that exists between poor strategies in recruitment of people into an organization and resultant poor performance. Organizations all over the world take enough time in strategizing on how to get the right people in their organizations. This is because haphazard recruitment can result to having incompetent staffs and having people whose interest is not embedded on improving the performance of an organization. In this regard therefore, it is paramount to put measures and principles that are to be used during any recruitment exercise.

Specifically, this paper looks at how, Kenyan police service has over the years lost its glory in terms of performance, simply because their recruitment exercises are riddled with unethical practices such as bribery, nepotism, favouritism and tribalism. The literature review analyzes both theoretical and conceptual frameworks as a way of finding the strong link between performance of an organization, and recruitment exercises.

2.1. Theoretical framework

2.1.1. Introduction to theoretical framework

As underlined in this project, the focus is on the underlying relationships between poor performance of police in Kenya and the unethical practices that are rampant during recruitment drives. In this regard, unethical practices such as embedded discriminations, bribery, tribalism, favouritism and nepotism has been studied to cause rising trends of insecurity and general poor performance of the police service in Kenya. This section looks at some of the core theories that help create this link. The following theories have been evaluated to create this link, namely; the retention theory, the attribution theory, implicit personality theory, the objective factor theory, the critical contact theory, and the subjective factor theory.

2.1.2. Retention theory

This theory is most applicable in an organization setting, and concerns itself with the ability to hold employees in an organization. This is a most critical part of any organization; because, the ability to retain qualified employees in the organization makes the organization attain stability. According to Larson, Lakin and Bruiniks (1998), a well strategized recruitment process helps in building a good foundation of a company in terms of performance. More so, this is because the recruitment process will yield a good work base, which is highly talented and passionate about the working of the organization. Logan (2007) has also studied on how good management of Human Resource can help in attaining good retention of workforce, with the starting point of management being at the recruitment stage.

As expounded and understanding of this theory, it is clear that failure to strategize during recruitment can yield a bad workforce. Retention is mostly through good absorption, and if this is not capitalized during recruitment, stability of the

company would be compromised. Logan (2007) puts it that Human Resource management starts at the recruitment point. If such an exercise is bungled, a company would be full of non-talented persons and those not passionate about what they are assigned to do. It is highly important to set good standards during the recruitment drive so as to have a workforce committed to the ideals and values of the organization, and for good retention capacity.

2.1.3. Attribution theory

This theory helps in attaching some meaning to the behavior of other people, or even how people think. In explaining how people behave, internal attributions have to be evaluated, especially in personality traits. An environment or a situation can give a person a particular trait, which overall can give someone a defined attribution. According to Anderson (2001), an interviewee during recruitment must be evaluated on the kind of behavior he or she has. In this regard, if a bad behavior is recruited into the workforce, it means that the stability of the company and general performance are compromised.

Attribution theory is highly applicable in explaining low performance of the police service in Kenya. Attributions of individuals recruited into the police service can be driven either by motivation or by emotions. Mostly, it is recommended that individuals absorbed into the police force are driven by motivation as opposed to emotions. Emotional driven attributions can encompass a need to make quick money, or a need for revenge. Such individuals would only lower performance of the police service as opposed to adding value. Corruption and other unethical deals during recruitment helps have such kind of attributions into the police, and as such should be avoided.

2.1.4. Implicit Personality theory

Implicit Personality theory helps in defining biases and specific patterns that individual acquires when making a decision or an impression about something with low information on it. This theory was developed by Renato Tagiuri and Jerome Bruner in the 1950s when they considered some external impressions or traits developed by individuals (Cash, 2013). It is all about stereotypes that individuals develop towards something, and therefore, if a person with negative stereotypes towards an institution is recruited into an organization, such an individual can only lower performance of the organization as opposed to adding value to it. It is critical that when an organization is carrying out a selection and recruitment drive, factors such as passion to perform should be considered. Those whose main aims are material gains instead of contributing to value addition should be discarded at the recruitment stage.

All selection and recruitment methods should have utility and validity (London, 2001). It is important to be choosy during recruitment, with the criteria being on those whose ability to add value is high. However, when ethics are not considered, possibilities that are that individuals put into the workforce are limited in terms of ability to add value. Such should be the case whenever there is a recruitment drive of the police service. In most cases, with an example of the Kenyan police recruitment drives, acts of terrorism become rampant, and it is hard to determine whether those who have been put into the police service are capable of delivering and securing people.

2.1.5. Objective factor theory

Objectivity is an important consideration in any decision making process. By definition, objectivity means considering all sides of prevailing situations before coming up with an informed decision. As well, before an individual decides to work for a particular organization, he or she must have evaluated all possibilities and need of working for the organization. According to Christians (2012), most of the factors that are chosen by individuals wishing to work in an organization include the location, the levels of salaries or wages, the nature of work and opportunities present for growth. The theory suggests that individuals apply for a job mostly based on the attributes of the organization and the tangibility of the job (Christians, 2012). However, the issue of money has always come in, and a number of individuals would do anything to be in the organization. Such a situation is highly prevalent during police service recruitment drives, where, individual would consider bribery as a way of getting the job.

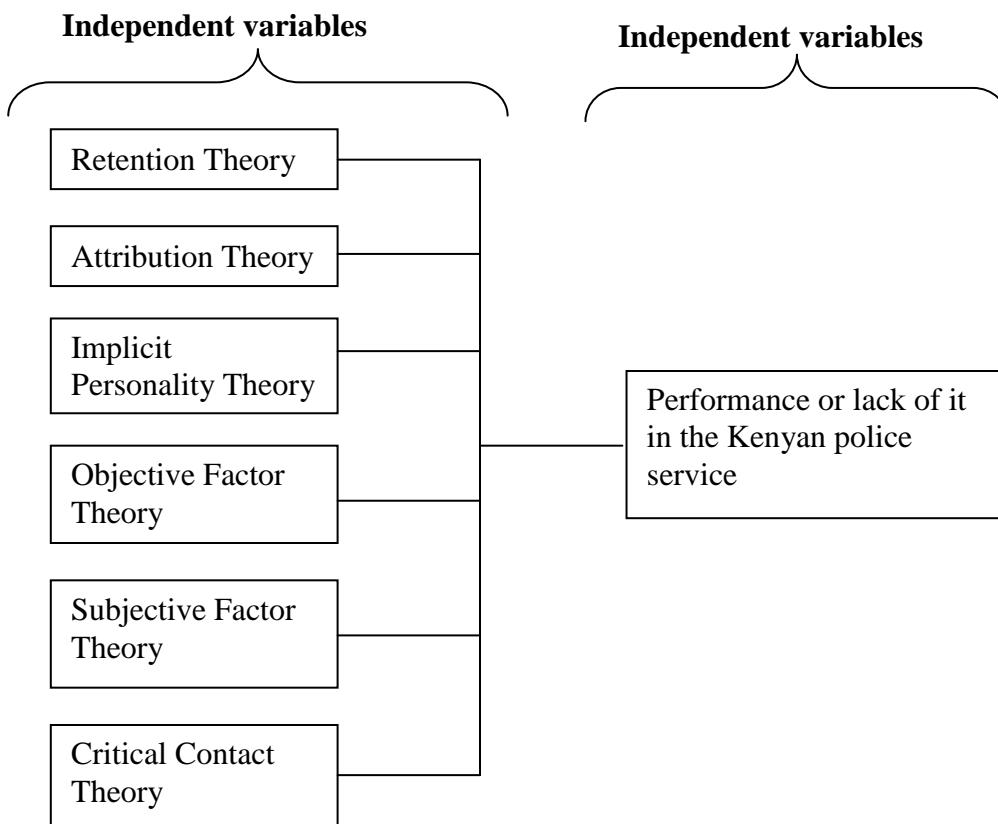
2.1.6. Subjective factor theory

As opposed to the objective factor theory, the subjective factor theory looks at the personality and the compatibility of a person with the image an organization is known for. It is also a very critical factor to be considered when choosing the company to work for. Wilson (2008) is of the view that an individual should first of all evaluate whether the company or institution he or she is wishing to join has the attributes he or she possess. For example, in the police force, not everybody has a sense of responsibility in securing people, and such people should not be allowed to be in the organization. However, in most cases, the people who are recruited are those who have 'bought' their way in, through favouritism, tribalism or bribery. Such a sad situation only begets low performance of the police force. In Kenya, over the years, rampant insecurity tendencies have been reported, and not that the police service does not have enough resources, but individuals in this force lack compatibility with the service.

2.1.7. Critical contact theory

This theory is relevant where the objective and subjective factors theories are not applicable. A person may lack information about a particular company. This theory asserts that an individual may lack critical differentiates of a various job opportunities prevalent and does not have significant contact with a company. Employment of such a person is mostly based on his or her presentation during the interview. Basing on the argument of non-performance in an organization, an individual who fails to understand what is needed in a job may fail to have significant contribution to it. As per the discussion, an individual may lack requisite knowledge about what is needed for a person getting into the police service in Kenya. Such an individual, even after intense training will still not add value to the service. Such individuals should be filtered right at the recruitment stage.

Fig. 1: Theoretical Framework



2.1.8. Ethical competency

The concept of Ethical competency is the ability to identify an ethical problem and commit one to resolving it. Problem solving and reasoning are most critical in this concept. Ethical competency involves a lot of components, and which ought to be adhered to by recruiting individuals and those being recruited. First, he or she must have the competency of evaluation and fact gathering, where, there must be competency to collect as well as examine some relevant facts about a decision to be made (Watson, March 2013). Secondly, the individuals must have creative alternatives to solve underlying problems as well as make creative decisions. Thirdly, the individuals must be able to foresee some of the potential consequences that can result when some decisions are made, and as such, offer remedies before the consequences are realized.

Ndambuki (September 2001) in the report, *Public Service Competency Assessment Framework* in Kenya writes that all ministries and government institutions in Kenya must adhere to specified levels of competencies when recruiting individuals. Such is applicable in recruitment processes of the police service in Kenya, where, only competent individuals are absorbed into the police force. Failure to have such would result to a non-prepared police force that cannot tackle bedeviling problems of insecurity in Kenya. More often, these competencies are not applied; instead, a number of unethical practices such as corruption and favouritism are applied during police recruitment drives.

2.1.9. Commitment - self efficacy, education

There is a strong link between good systems of high level performance practices at work places and the organizational performance. When the performance of practices is high, the resultant is a high performing organization (Huselid, 1995). High level performance of individuals takes commitment; and such is comprised with high level self efficacy and education. A well educated work force, and which has self efficacy means that the performance is high, and so is the performance of the organization. in essence, education and self efficacy are two components that have to be considered when recruiting individuals into the organization. Failure to do so means that the organization would be riddled with individuals who fail to comply with the values of the organization, hence low performance.

Commitment during recruitment drives has to be evaluated. The levels of self determination of individuals being recruited, and their education are utmost relevant for an organization. There are levels of education that are set for each and every other organization, whether private or public, and for a police force in Kenya, the standard is a specific KCSE grade. Other than the grade, it is utmost important to evaluate the preparedness of the individuals to undertake the hard tasks that characterize the police service, such as securing the livelihoods of Kenyans as they go about their work. Any recruitment exercise should be

devoid of other considerations other than the preparedness and education of the individuals.

2.1.10. Year 2012

The month of January 2012 saw the killing of a member of the Community Peace and Security Team, based in Hagadera camp. The attack also claimed a number of police officers. On March 10, 2012, six people were killed, while more than 60 got injured when a grenade was hurled at people in the Machakos bus station.

On 29th April 2012, God's House of Miracles Church, based at Ngara Estate was attacked, where one person died and more than 10 injured. On Tuesday 15th May 2012, three grenades were thrown at Bella Vista club in Mombasa, killing one person and injure five. The militant also indiscriminately fired at people, killing one woman and injuring two night guards.

May 28, 2012 saw a blast go off within Assanand's House along Moi Avenue, injuring more than 25 people. Sunday 24th June 2012 had a grenade attack at a Jericho Beer Garden located in Mishomoroni Mombasa County, killing 3 people and more than 30 injured. July 1st 2012 had masked gunmen attacking two churches in Garissa killing 17 people and injuring more than 50; while one person was killed on 3rd August 2012 and six others injured in Eastleigh.

On 30th September 2012, a boy aged 9 years was killed by a grenade in a Sunday school along Juja road. Ten people were killed on November 18 2012 and 25 injured in Eastleigh, and on Wednesday 5th December, one person was killed in Joska area, Eastleigh.

2.1.11. Year 2013

Amongst other security lapse incidences, the year saw the most tragic terrorism incidence when masked Al-Shabab gunmen stormed a popular shopping mall in Nairobi, the Westgate mall, killing more than 65 people, and injuring hundreds of people. This 21st September 2013 incidence is quoted as a major one, because it attacked a major area harbouring affluent people in the society, including foreigners.

There were a number of other terrorist incidences therefore after; for example, on 13th December 2013, double blasts were reported in Wajir, a town on the North Eastern side of Kenya. The following day, a hand grenade was thrown towards a minibus in Eastleigh, where four people were killed and 36 others injured.

2.1.12. Year 2014

A number of terrorists' attacks have happened so far. Notable areas which have been attacked are Gikomba, Likoni in Mombasa, Lamu/Mpeketoni, Pangani, Githurai and Eastleigh among others.

2.2. Case studies on ethical recruitment practices of police services, and performance

2.2.1. Police Recruiting and Its Impact on Corruption: Report by E.M.U School of Police Staff and Command – Detroit Police Department

Allen (May 2003)

The report is a research project that was submitted by Lieutenant Daniel Allen of the Detroit Police Department in March 2007. The research report identified a number of flaws that are prevalent during hiring or recruitment practices in the

cities put under research, namely; Detroit, Los Angeles, Cleveland, Chicago, New Orleans and Miami. The report qualifies a popular assertion that police are always vulnerable to corruption and mostly applicable during recruitment of the police personnel.

Mediocrity of the police force in the cities under study is seen to emanate from the recruitment process. When a police officer is recruited using dubious means, there will ever be temptations to engage in some corrupt deals in the course of working. Such practices mentor police personnel that it is okay to engage in corruption and other forms of unethical practice, and such can lower the performance of the police service. To end the trend, the chain has to be cut at the recruitment process. The recruiting individuals should not demand to be bribed by the new recruits as such a situation would corrupt the minds of the recruits.

2.2.2. Baragoi: Failing Internal and External Accountability – Report

The report dubbed, *Document – Kenya: Police Reform in Kenya: "A Drop in the Ocean*, published by Amnesty International evaluates a number of situations where the police service in Kenya has failed. More significant is the analysis of how failure to have internal and external accountability led to Baragoi killings of police trainees. The killings happened on November 10, 2012, and in that fateful day, Kenya woke up to news that more than forty (40) police officers lost their lives in Baragoi forest. This forest is surrounded by an arid area, mostly inhabited by Turkana and Samburu ethnic communities. The analysis of these killings pointed to a failure of lack of both external and internal accountabilities of the police force.

As put in the report, a number of reforms have been neglected in the police force, to an extent that there was no clear command system before the more than 40 newly recruited individuals were sent to face hardened bandits. The pointer is lack of accountability and a rot in the whole system of the police force. Up to the present day, those responsible of sending newly trained personnel to the forest, instead of experienced police have not been held accountable. It is a pointer of the depth corruption in the police service has gone.

2.2.3. Corruption at The Kenya Police Airwing: A Mars Group Publication

Mars Group Kenya (2007)

The report by Mars Group Kenya alerted Kenyans of an attempt by the Government, and indeed the Kenya Police Airwing to overall some four Russian helicopters by a colossal amount of Ksh. 840 million. By any standard, such an amount is huge considering the helicopters were in operation for 9 years; from 1998 to 2007. Mars Group Kenya took upon itself to notify Kenyans of what the police service in Kenya is squandering money. The money is contributed by Kenyans, and so it should be used for the purposes it is intended. Such levels of corruption exist in the police service, and unless there are prudent measures to curb this, Kenya will continue losing millions and millions of taxpayers' money.

The report is critical of how corrupt the police service in Kenya is. Looking at the figures quoted to replace the four Russian helicopters, it is easy to understand why the police service in Kenya is said to be the most corrupt in the whole of

East Africa. In essence, corruption starts at the recruitment stage, where, those being recruited are put through some unethical deals such as bribery, tribalism and nepotism among other negative vices. Possibly, all police departments in Kenya are corrupt. This begs the answer; *where does the vice start showing its head?* It can only be at the recruitment stage.

2.2.4. EACC Report: Corruption and Unethical Practices in Countrywide Recruitment of Police Officers

This report was prepared by the Ethics and Anti-Corruption Commission (EACC) and investigated various situations where corruption prevails during police recruitments in Kenya. The report looks a number of cases where individuals are exposed to corruption during recruitment of police officers. In virtually all situations, there are corruption tendencies, and the respondents give situations where they think that unethical tendencies are applied during recruitment. Overall, this report notes that unethical behaviours have social, economic, cultural and political effects. When corruption is practiced at the recruitment stage, the ripples effect is that the officers will carry on with the tendencies to their work places.

In one of the case studies, Chotara, a foreign student is conducting a research on corruption tendencies in the Kenyan military as well as the capacity of the military to carry out its duties effectively. He seeks information from Kerich Maarufu, one of the public officers stationed at the department, who attends to his requests. Chotara is not surprised that Kerich wants him to bribe him so that he can attend to. The astonishment is that the nature of information Chotara was seeking did not require much commitment, but instead, he is required to 'give something' in exchange of information. Such is the sorry state of security departments in Kenya. Corruption tendencies are operated openly, and in any case, every other police officer or a military person feels compelled to engage in it because 'every other person is doing it.'

2.2.5. Report: Corruption exposing Kenya to Terrorism – Experts

Odula (May 29, 2014)

This case study looks at experts' evaluation of increased terrorism in Kenya and the link with the rot in the police force. According to Odula (May 29, 2014), there is a strong link between the deadly terrorist attacks that have happened over the years in Kenya and the deep rooted corruption in the police force systems. Odula (May 29, 2014) notes that the system graft is at the core of the inability of the state to respond to the terrorist attack and insecurity in general. John Githongo, one of the experts who gave their views in this report point to a well coordinated corruption network that is hard to break, unless there is commitment and will to cut the chain. As analyzed by Githongo, the country is paying heavily the price of corruption with the 'blood.'

Terrorism acts in Kenya can be attributed to the rot prevalent in the police force, which starts at the recruitment stage. Indeed, if corruption is not started right at the initiation stage, police officers would not have guts to ask for bribes from terrorist and other criminals. Corruption in Kenyan police service is deeply embedded, and did not start a decade ago (Odula, May 29, 2014). The rot in national security started during pre-colonial era. Even then, police officers who were recruited by the colonial masters

would ask for bribe or partner in crime for a fee. The ruling elite in the country are much aware of what happens in the police force, but are unwilling and not committed it. As put by Githongo in Odula (May 29, 2014), Kenya will continue to suffer from terrorism unless the mindsets of police officers are changed right at the start.

2.2.6. Kenya: Police Abuse Nairobi's Refugees – Human Rights Watch Report

Human Rights Watch (May 29, 2013)

This report was prepared by the International Human Rights Watch Organization and highlights the depth of human rights abuse amongst police to the Nairobi's refugees. Refugees in Nairobi, who are under the watch of International organizations, have been subjected to torture and abuse by police officers, who are supposed to guard them. The Kenyan authority has failed to open investigations into the abuses. This is a pointer that the Kenyan authority collaborates in what happens in the refugees' stations. Unbelievably, the police officers engaging in such acts do not feel remorse, and unleash terror on the refugees. The refugees in Kenya have ever remained under uncertainties on whether they can be relocated to other countries. More so, the torture they are subjected to is making them lose faith in Kenyan environment as a safe haven for their stay.

The abuse of refugees in Kenya, and especially Kenyan capital, Nairobi does not only involve beating up. Refugees, especially those who have come from the war torn Somalia are asked for money for their protection. Their wealth is stolen by the police manning them in areas such as Eastleigh area in Nairobi. At times, hundreds of police officers would descend on areas housing refugees and subject them to torture such as rape, beating, extortion and stealing.

2.2.7. Kenya immigration, Police take bribes, Vulnerable to terrorism: Guul Group report

The Guul Group (May 29, 2014) produced a report that analyzes corruption at the Kenyan immigration points, the vulnerability of the country to terrorism and the tendency of police in Kenya to always taken bribes. A police officer in Kenya is willing to break ethics of the police service just to take a bribe. Such a bribe can result to huge damages such as building being brought down by terrorism. A terrorist is all aware of how corrupt the police officers in Kenya are corrupt, and thus can easily sneak a grenade into a building and blow it up. As put by Guul Group (May 29, 2014), Kenya may continue to see a string of terrorist attacks simply because there is unwillingness to end corruption in the system.

Al-Shabab continues to be blamed for terrorist attacks in Kenya. The terrorist group is dominant Somalia, but has found a good playing ground in Kenya. Despite having immigration points on the boarders of Kenya, these terrorists still find their way into the capital city of the country. An immigration officer; probably because of how he or she was introduced during his or her hiring is willing to take a bribe from a suspected Al-Shabab individual so that the terrorist can sneak the bombs into the country. This level of corruption will continue to ruin Kenya if stringent measures are not undertaken. The rot in the police force can only be eliminated when individuals are being recruited.

2.2.8. Recruitment into Police Service – The State of New Jersey

Journal by the Department of Law and Public Safety

The Police Service in the State of New Jersey has set stringent measures that have to be used during recruitment of police officers. The measures are outlined in the website, which serve as a guideline of what an individual wishing to be recruited into the police force must have, or should not have. Other than the common requirement an individual should have such as a right age; good level of education, American citizenship and the driver's license, those recruiting individuals must check the background information of the recruit. This is a unique set of recruitment, but which makes the police force in New Jersey worth emulating.

Every other employment in the New Jersey police service as a trooper must have compressive requirements, categorized under background information. Critical in these are; high levels of integrity, high levels of responsibilities, sound moral character, high level of dependability, reliability and be of sound judgment. These values are known when a person is taken through a number of interview steps. Recruiting individuals know too well that failure to look into these critical requirements would make the police service in New Jersey be riddled with corrupt individuals. The measures put in this police department are worth emulating. They can help stem out corruption and unethical practices.

2.2.9. Tackling Police Corruption in Kenya – IWPR Report

This report was compiled by the Institute for War and Peace Reporting (IWPR). As written by Wanjala (August 6, 2013), the way to end corruption amongst police officers in Kenya is to have tighter discipline, better payment and instilling greater accountability. The report notes that corruption has double sides; those engaged and those engaged into. For example, a driver in Kenya roads knows too well that traffic police officers takes bribes, and thus such a mind has been inculcated into his or her mind, and is willing to give money to the police officer.

If corruption is to be terminated completely, Kenyan authorities must be willing and committed to fight it. If there can be greater accountability, police officers would fear to engage in corruption. If there could be stringent measures during recruitment, the recruited individuals would not get a mind that they can earn easy money when they start their work. It would take courage to ask for a bribe, hence improving commitment to work diligently. The resultant would be a high performing police force in Kenya. Various public and private organizations can combine efforts to fight the vice until it is completely stemmed out. It is the only way to put Kenya back to stability.

III. METHODOLOGY

3.0. Introduction to Methodology

This study was done to assess the relationship between corruption experienced during recruitment of police officers, and the overall neglect this institution has practiced in its core mandate of protecting people. In order to come up with a quality analysis, only qualitative approaches were done; as opposed to combining both quantitative and qualitative approaches. The respondents in this research were successful and unsuccessful

recruits during the 2014 police recruitment drive, and selected experts. Case studies were used to qualify the relationship, while interviews, focus group discussions and observations were used to get quality information from concerned individuals.

3.1. Research design

This research project utilized descriptive research design, with a specific focus of qualitative approach. In this study, case studies, interviews, focus group discussions, and naturalistic observations were utilized. This approach was most favoured as it gave the researcher a clear direction to investigate the relationships of the variables. In this regard, the researcher was able to go to the field and take notes, as well as engage interested parties to discuss underlying issues of police recruitments and how unethical behaviours during the exercises are resulting to rampant insecurity in the country.

A number of case studies were selected, and which helped in qualifying the data collected on the field, through, interviews, quality focus group discussions, and observations among others. The case studies used concern high levels of corruption in Kenya, and how the trends in unethical behaviours stem from the starting stage of hiring/recruitment of police officers into police service.

3.2. Research sampling

Selective sampling method was chosen to get stations as places of studies during the recruitment exercise of 2014. These stations were; Kamukunji in Nairobi City County, Baricho in Kirinyaga County and Nakuru town in Nakuru County. It was important to use selective method of sampling in this study as it helped in getting maximum results. For example, in Nairobi and Nakuru Counties, the fact that the areas are cosmopolitans was critical in getting diverse views regarding the overall process. On the other hand, Kirinyaga County is in the rural areas of Kenya, hence, the expectations were that the researcher would get uniform data or information regarding corruption, or lack of it during the recruitment drive.

3.3. Methods of data collection

This research project utilized a number of methods of data collection. The chosen methods were found to be most suited, considering that the research design used is qualitative one. The methods of data collection in this research study included; focus group discussions, key informant interviews, participant observations, and case studies.

3.4. Methods of data analysis

In this research study, qualitative data analysis was used as a way of making significant meanings to the relationship of corruption during recruitment drives of police officers in Kenya, and resultant corruption and inefficiencies at work places. More specifically, this research employed the open and selective processes of qualitative data analysis. These methods were found to be important to this particular study as information gathered was categorized and then scrutinized to bring about commonalities and the sense needed. Particularly, the analysis of data involved the researcher asking himself questions relating to collected information, making critical comparisons and then looking for differences and similarities present in the information gathered.

IV. RESULTS AND ANALYSIS OF DATA

4.1. Data from Interviews

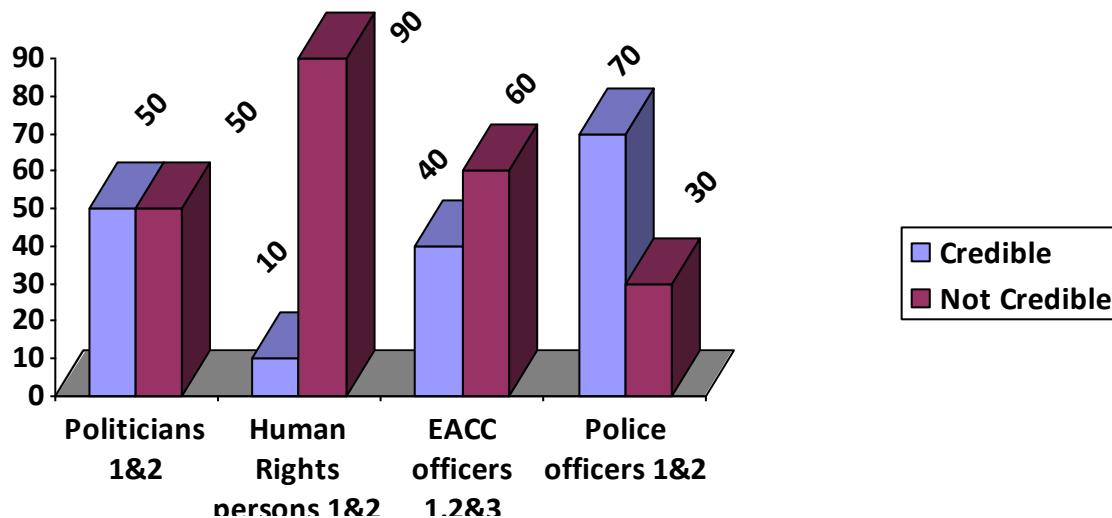


Fig. 3: Bar graph showing preferences of police recruitment exercises in Kenya

	Politicians	Human rights defenders	EACC officers	Police officers
Credible	50	10	40	70
Not Credible	50	90	60	30

Table 1: Table showing preferences of police recruitment exercises in Kenya

From the graph above, it is clear that preferences of the nature of police recruitments in Kenya vary. Specifically, it can be seen that politicians and the police officers do not see much of lack of credibility in the recruitment exercises that are done in Kenya. However, as can be seen from the responses of human rights persons and EACC officers, there is little credibility of police recruitment in Kenya. Going by the division in opinion from the interviews, it is clear that it is hard to deduce whether there is credibility or not. However, it is easy to separate the mind sets of those approving police recruitments in Kenya and those who do not. Essentially, the police officers and politicians are likely to favour the recruitments, but the human rights persons and EACC officers, whose opinions can be widely accepted, do not see much of credibility in any of the recruitment processes in Kenya.

4.1.2. Link between unethical behaviour during recruitment of police officers and the rot in the police force

Just as analyzed above about the credibility of the recruitment exercises of hiring police officers in Kenya, the same opinions were replicated when they were asked on whether there is a link between the unethical behaviors witnessed during recruitment drives and low performance in the police force. While the human rights defenders and EACC officers noted of a link, the police officers and the politicians saw little link

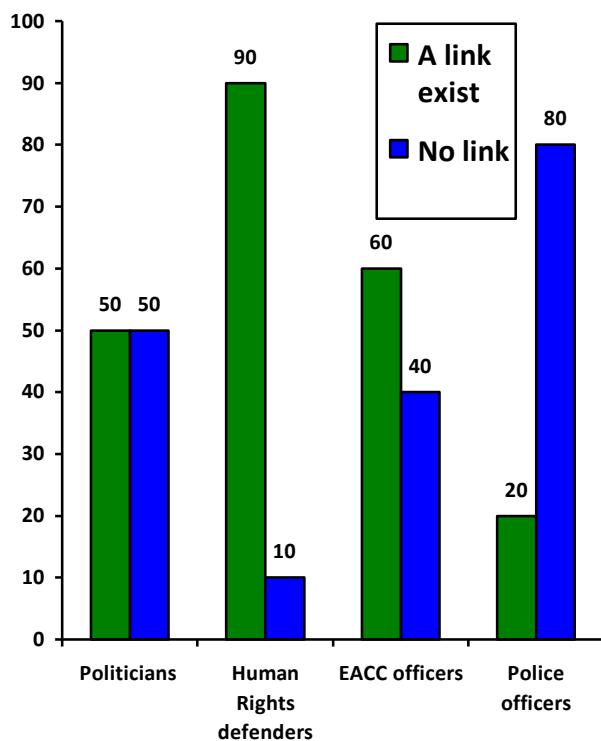


Fig. 4: Bar graph showing link between lack of ethics in recruitment and performance of the police force in Kenya

	Politicians	Human rights defenders	EACC officers	Police officers
A link exists	50	90	60	20
No link exists	50	10	40	80

Table 2: Table showing preferences of police recruitment exercises in Kenya

4.1.3. Unethical behaviors during recruitment exercises

	Unethical behaviours	Vote (out of 10) respondents
1	Bribery	10
2	Nepotism	7
3	Tribalism	7
4	Torture	4
5	Other forms of unethical behaviours	2

Table 3: Table showing votes of unethical behaviours prevalent during recruitment of police officers in Kenya

4.2. Data from Focus Group Discussions

4.2.1. Unethical behaviours during recruitment of police

A group of 5 individuals, 2 males and 3 females were picked by the researcher after the 2014 contested recruitment drive to discuss the outcomes of the exercise. From the discussion, it was clear that the exercise was marred by corruption tendencies, and the police officers were not shy to ask as high as Ksh. 150,000. The discussion also touched on the levels of tribalism that was prevalent, and mostly in Nairobi. It mattered who were in charge of the exercises, where, most of those picked were from the tribe of the police officer. It was clear that nepotism was practiced,

and to some, the exercise was just for formality purposes. Instead, the names were picked even before the exercise started.

4.2.2. The rot in the police force and the relationship with unethical behaviours during recruitments

The respondents in this method of collecting information were in agreement that what was exercised during the recruitment drive of the police was the reason behind low performance of the police officers in Kenya. Essentially, the participants noted that corruption at the immigration department as well as various police stations in Kenya was to blame for rampant terrorist attacks. The group wondered how a person can go ahead to commit a crime just few metres from a police station.

The group noted that if the trend is not cut in earnest, it would be hard to fight crime in this country. Those who are being recruited into the police force are shown in those early stages what the police force is commonly known for; corruption. If an individual can agree to pay as much as Ksh. 150,000 to get recruited, little can deter him or her from asking for a bribe from a criminal. The trend has to be ended, and it has to be now.

4.3. Data from Observations

The researchers were stationed in three major areas of recruitment; Kamukunji in Nairobi County, Nakuru town in Nakuru County and Baricho in Kirinyaga County. The researchers were able to pick a number of observations, which qualified the assertions that the rot in the police force in Kenya stems right from the first stage of having individuals into the police force. In Nairobi for example, very many youths were turned away, despite appearing to qualify on all areas. It was not very clear what extra the recruiting police officers were checking other than external features, academic qualifications and medical requirements.

Some of the individuals who were turned away lamented favouritism. While investigating form a distance, the researchers were able to note disturbing incidences, where, an individual who fails the required height was qualified and those whose height are way above the required were dismissed. In Kirinyaga, there were those who did not even participate in the race, and were qualified to the last stage before final picking. The favouritism was widespread and not limited to the three counties under study.

4.4. Data from case studies/reports

4.4.1. 2014 recruitment exercise

As reported by Citizen TV on July 19, 2014, the Kenyan investigative body, EACC came with a report that summarized the police recruitment drive as characterized by corruption and other unethical behaviours. The commission noted that it had credible evidence showing that the police recruitment was highly marred by corruption, and thus recommended that the National Police Service nullify the entire process. It also recommended that those responsible be held accountable.

4.4.2. County bribery – the Standard

The Standard Newspaper of November 13th 2013 as written by Geoffrey Mosoku noted that Uasin Gishu County topped as the most corrupt regional government in the year 2013. This information was contained in a report on national Survey on Corruption and Ethics 2012. Other counties in the top list included Embu, Samburu, Nairobi, Meru, Nyamira, Tharaka-Nithi, Narok and Mombasa. Those counties least with corruption incidences were Baringo, Marsabit, Taita, Busia, Turkana, Vihiga, West Pokot, Isiolo, Siaya and Taita Taveta. In Baringo alone, the average bribe is Ksh. 20,075, Kirinyaga Ksh 15,914 while Nakuru is Ksh 8,466. This is a clear show of how corruption in the police departments across the country is prone to corruption. The creation of counties was meant to devolve development to regional areas; however, this has been seen to even devolve corruption especially amongst police departments.

4.4.3. Westgate Mall Attack – Corruption and Ineptitude in the police service

September 2013 was a tough month for Kenyans as the country realized how terrorism can cripple the economy of a county. However, what did not come to into light for many

Kenyans is how corruption and ineptitude led to the attack. According to the report produced by the National Assembly of Kenya, the investigating arm of the government had warned of an impending attack, but the information was not acted upon. The highest probability is that somebody at the top of command did not want to act on the information; with the results being the 21st September 2013 Westgate attack. Virtually every day, there is insecurity incidences reported. These ranges from road carnage on our roads, violent robberies, heist thefts among others. These are good pointers of how the country is unsafe despite having significant number of police officers in Kenya.

V. RECOMMENDATIONS AND CONCLUSION

5.1. Introduction

This study has studied a possible link between the ethical or unethical practice during recruitment of police officers in Kenya and the performance, or lack of it in regard to security of people in Kenya. The choice of this area of study was significant as it roots out the underlying problem that has been witnessed over years in Kenya during recruitments. Those exercises in Kenya are always prone to unethical practices. This study analyzed this link and concluded that the unethical practices have resulted to high level of insecurity in Kenya.

5.2. Conclusion

Ethics require individuals to uphold values that are set by various professions. Those in the police force are required to adhere to certain terms of work, including not engaging in corruption. The vice is the evil of everything good going bad, including insecurity in Kenya. It has been noted that the rot in the police force starts at the recruitment stage, and therefore, to end it, it is upon all involved to uphold ethics and redirect energy to fighting insecurity.

5.3. Recommendations

As has been studied, corruption is seen to stem right from the recruitment stage. Corruption as a form of unethical practices should not be allowed to be initiated at the recruitment stage. As a way of ending the vice, it is recommended that relevant authorities make stringent measures to hold accountable those who are seen to engage in corruption. Both the recruiting police officers and the individuals being recruited should be charged with abuse of office and corruption. Any form of corruption is bad and should not be tolerated.

Secondly, it is prudent that the government of Kenya should design a good programme that would educate aspiring police officers of how to uphold ethics during recruitment and after they are absorbed into the police force. Such a programme could include holding seminars for all interested before they undergo the recruitment exercise, and another one for the ones who have qualified to become police officers. Such a programme would ensure that ethics are upheld everywhere, and it would be a way of ending corruption once and for all.

5.4. Suggestion for further researches

This research study did not cover all sectors of insecurity in Kenya. In the course of the study, a number of other factors emerged as resulting to rise of insecurity in Kenya. The following are suggestions for further researches:

1. The role of motivation for police officers in Kenya in stemming out insecurity

2. The role of technological use in East African police services in fighting new faces of terrorism in East Africa.

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AUTHORS

- First Author** – Henry Peter Gommans (Supply Chain Professional/Lecturer), Mount Kenya University/Tradewinds Kenya Limited e-mail: henrygommans@gmail.com
Second Author – Joseph .M.Musumbu (Scholar), Mount Kenya University, e-mail: musumbujoseph@yahoo.com

The Insemination Rates of some Anopheline and Culicine Populations in the Makurdi Area of Benue State, North Central Nigeria.

¹Manyi, M. M, ²Onekutu, A and ³Azua, E.T

¹Applied Entomology and Parasitology Unit, Department of Biological Sciences, Federal University of Agriculture P M B 2373, Makurdi, Benue State, Nigeria.

²Agricultural Entomology Unit, Department of Biological Sciences, Federal University of Agriculture P M B 2373, Makurdi, Benue State, Nigeria.

³Environmental Science Unit, Department of Biological Sciences, Federal University of Agriculture P M B 2373, Makurdi, Benue State, Nigeria.

Abstract- Studies on the insemination rates of mosquito populations in Makurdi, Benue State, Nigeria were carried out using four mosquito infested localities: High-level, Wurukum, North- bank and Wadata, over a 12 month period. A total of 4,320 adult female mosquitoes, comprising anopheline and culicine species were identified and dissected using standard procedures. Of these, 1,040 (24.1%) were *Anopheles gambiae* sensu lato (s.l.); 641 (14.8%) were *Aonopheles funestus* Giles and 2,418 (56.0%) of the mosquitoes were *Culex quinquefasciatus* Say while 221 (5.1%) were tagged ‘unidentified’ species of *Anopheles* mosquitoes. Chi-square statistic showed a significant difference between the mosquito species and their abundance

($P < 0.05$). The overall mosquito population was found to be highly inseminated (88.9%) which varied significantly

(χ^2 test, $P < 0.05$) across the localities with *Culex quinquefasciatus* having the highest insemination rate of 51.2%, followed by *Anopheles gambiae* s.l. which had insemination rate of 21.6%, while 11.6% of the *Anopheles funestus* were inseminated. Meanwhile, the ‘unidentified’ *Anopheles* species had the lowest insemination rate of 4.5%. There was a significant difference between the insemination rates and the mosquito

species (χ^2 test, $P < 0.05$). In terms of localities, the order of insemination was: Wadata (99.3%) > North-bank (97.7%) >High-level (91.1%) > Wurukum (70.5%) respectively. There was also a significant difference between the insemination rates of the mosquito species across the localities from where they

were caught (χ^2 test, $P < 0.05$). The findings indicate that the residents of Makurdi are potentially prone to mosquito bites and that *Anopheles gambiae*, *Anopheles funestus* and *Culex quinquefasciatus* were the major mosquito vectors in the study area. This work may provide an entomological baseline data that is required for evaluation and implementation of vector control interventions in Makurdi.

Index Terms- *Anopheles*, *Culex*, Mosquitoes, Insemination, Makurdi, Nigeria.

I. INTRODUCTION

There have been several reports on the effects of insemination on the circadian flight activity of mosquito species (Jones and Gubbins 1977&1978, Gomuiski, 1990). Bill (2003) defines insemination rate as ‘the percentage of female mosquitoes that are carrying spermatozoa in their spermathecae at a given period’.

It has been reported that after insemination the first peak of activity of a mosquito population is greatly reduced and the secondary phase of activity is enhanced (Jones and Gubbins, 1978).

Jones and Gubbins (1977&1978) also reported that once inseminated, the flight and biting activity of female mosquitoes would change, shifting the peak of activity from dusk to a later time in the night. They reasoned that the behavioural changes observed in the inseminated females were a direct consequence of the transference of the male accessory gland substance called Matrone that is activated by insemination. Gomuiski (1990) opined that the changes in behavior due to insemination could be particularly important in a species such as *Anopheles gambiae* in which mating and feeding take place at entirely different sites.

Under normal conditions, female *Anopheles gambiae* are inseminated only once in their life time and usually 2-3 days after emergence (Goma, 1963) and that further insemination is suppressed by the action of the matrone, which quickly makes the female refractory to subsequent matings. However, it is believed that this mechanism may fail if the female mates with another male before the matrone takes effect in the female (Graig, 1967).

When female *Anopheles gambiae* and other species are inseminated, they normally receive mating plugs which block the entrances of the spermathecal ducts, mechanically preventing insemination (Giglioli and Manson, 1966). Nevertheless, a number of mosquito species including *Aedes aegypti* and several *Culex* species, exhibit a degree of polyandry prior to the first gonotrophic cycle (Gomuiski, 1990). The present study therefore, aims at determining the insemination rates of some anopheline and culicine mosquitoes in Makurdi with a view to establishing their flight and biting potential which would further help in the designing of mosquito control programmes in the study area.

II. MATERIALS AND METHODS

Study Area

Makurdi is the capital of Benue State and is located in the middle belt, North of Central Nigeria. It is situated between longitude 8°35'E and 8°41'E and latitude 7°45'N and 9°52'N, characterized by undulating rolling plain with irregular river valleys and ridges with steep slopes. According to the federal republic of Nigeria official gazette of 2006 population census, published in 2010, Makurdi had the population of 297,398 people (comprising 157, 295 males and 140,103 females); and the town is placed 106.4m above sea level (National Meteorological Agency, 2011).

Makurdi is an urban setting which lies within the Benue trough, intersected by the river Benue which is a major source of water, with other net-works of streams, standing pools, over filled and blocked drainages. Over grown bushes and fields, even

around residential homes and offices are easily noticeable in Makurdi which provide suitable breeding sites for mosquitoes throughout the wet season (April-October) and dry season (November-March). There is also characteristic high temperature in Makurdi, (30°C-39°C), which aids in the speedy development and hatching of mosquito eggs. It is suspected that temperature may have an impact on transmission of vector diseases in the selected localities (High-level, Wurukum, North-bank and Wadata) throughout the year.

The above localities were selected for mosquito sample collection because they are the most populated parts of Makurdi town and they have more breeding sites for mosquitoes in the area; they also have a closer proximity to river Benue in the study area (Fig. 1).

Other detailed geographical and regional indices of the study area have been provided by Udo (1981) and Nyagba (1995).

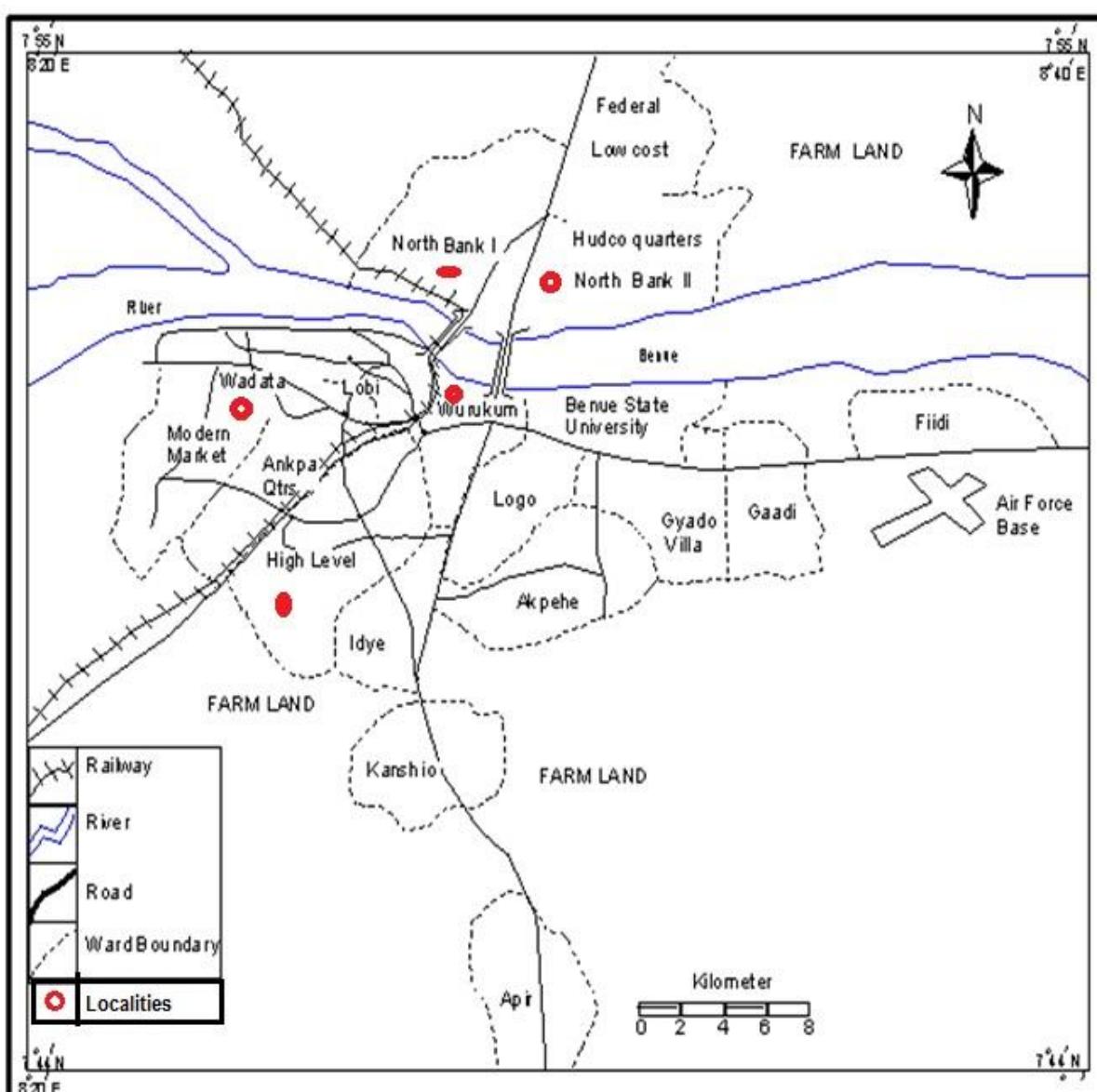


Fig.1. Map of Makurdi town Showing the Study Localities.
(Source: Benue State Ministry of Lands and Survey, Makurdi, 2012)

Ethical Consideration and Collection of Mosquito Samples

Mosquito samples were collected from a total of forty (40) households, ten (10) from each locality in the study area using a randomised design.

Verbal informed consent was obtained from the head of each of the randomly selected households before their houses were accessed for mosquito collection in all the study localities. All mosquito samples were collected using standard procedures as provided by WHO (1975). Sampling units were randomly selected from the four localities and due to the present security challenges in Nigeria, the mosquito samples were collected with the help of "fly boys" who were recruited from the respective study localities.

The mosquitoes were collected from 6 am to 9 am and 6 pm to 9 pm from living rooms in the study localities, either alive or dead. These periods for sample collection were chosen because previous studies have shown that most mosquitoes enter houses to feed at early hours of the night and struggle to go out in the early hours of the day to rest outdoors (Laumann, 2010; Service, 2012).

The mosquitoes were collected from dark corners, walls, ceilings, clothing and other objects inside living rooms using mouth-aspirators (sucking tubes) with the help of battery-operated torch-lights (Service, 1976; Dandalo, 2007); pyrethrum spray collection (PSC) was also used for mosquito collection, which involved the laying of white cloth on the floor and on surfaces of immovable furniture in the houses. The houses were then sprayed using BAYGON (1.0% propoxur, 0.1% imiprothrin and 98% propellant/solvent) as described by Dandalo (2007). After 10 minutes, the cloth was removed and inspected outdoors for knocked down mosquitoes. Window trap method was also used where applicable: The trap consisted of a cage made of 1 ft³ framework of wire which was covered with mosquito netting. A narrow entrance funnel of ¼ in diameter was made at one end and a string was tied from its narrow end to the four corners of the trap to support the funnel (Service, 1976; Dandalo, 2007). The window traps were now installed in the houses and inspected on daily basis for mosquito collection. The suitability of the sampling methods was determined based on the nature of the houses to be sampled. The mosquito specimens collected from the different capture methods were sorted out separately using forceps and kept in holding tubes, inside cooling boxes, and carried to the laboratory on the same day or the following day for characterization, identification, dissection and examination using methods as in Ungureanu, (1972); WHO (1975); Goodman *et al.* (2003); Aigbodion and Nnoka, (2008) and Abeyasingha *et al.* (2009). Those mosquito samples that could not be processed on the same day were refrigerated and dissected on the following day according to the methods of Ungureanu (1972).

Even though, the mosquito population for this study was only drawn from indoor-resting mosquitoes, which were expected to be only females, some male mosquitoes were also caught along with the females. Male mosquitoes were therefore, distinguished from the females using key morphological features as described by Service (2012).

Identification of Mosquito Samples

Dissecting microscope was used for detailed observation and identification of the mosquitoes with particular reference to the head, thorax, wings and hind-legs according to Gilles and Coetzee, (1987) and Coetzee (1989). Morphological characteristics such as length of maxillary palps, wing spots, leg shape, mouthparts and abdominal end model as presented by Coetzee (2000), Oguoma *et al.* (2010) and Service (2012) were used to identify the *Anopheles* species that co-exist in Makurdi. Observations of the morphological features were made at $\times 40$ magnification of the microscope.

Preparation of Mosquitoes for Dissection

Live blood fed mosquitoes were killed with chloroform, ether or carbon (IV) oxide while unfed mosquitoes were collected in a test tube and while at the bottom, the end of the tube was rubbed sharply against the palm of the hand to stun the mosquitoes according to the WHO standard of 1975.

After immobilization, each mosquito was placed on a slide and held by one wing while the legs were being removed one at a time and after wards, the other wing was pulled off.

The mosquito was then placed on a fresh dry slide and arranged in a more suitable position for dissection of the stomach/abdominal region and salivary glands as described by WHO (1975) and as adopted by Abeyasingha *et al.* (2009). A mosquito dissection CD titled: 'Mosquitoes and Malaria' (1988): courtesy of the Nigerian Institute of Medical Research (NIMR), was also used as a guide during the dissection session.

Extraction of Spermathecae for Determination of Insemination Rate

The intention here was to identify the fertilized and unfertilized females and establish the insemination rate among the mosquito population sampled as described by WHO (1975). The seventh abdominal segment of the mosquitoes were teased with the dissecting needle under a dissecting microscope ($\times 6$) to isolate the tiny spermathecae. These were isolated and transferred to another slide with a drop of normal saline to avoid drying up of the specimen.

A cover slip was then placed on the slide and viewed with a $\times 40$ objective of a dissecting Olympus inverted microscope. A gentle pressure was applied to the cover slip with the dissecting needle and the spermathecae (depicted in Fig. 1) were crushed to view for spermatozoa. The thread-like spermatozoa were seen to exhibit a rotational movement in an inseminated female mosquito while no such movements were observed in those female mosquitoes that were not inseminated.

Statistical Analyses of Data

The Predictive Analytical Software (PASW) Version 18 was used in running Chi-square statistic on the data collected. Significant levels were measured at 95% confidence level with significant differences considered at $p < 0.05$.

The Chi-square statistic was used to test for homogeneity across sample localities so as to determine whether or not the nature of the sample localities affected the distribution of data across them.

III. RESULTS

A total of 3,841 (88.9%) out of the 4,320 mosquitoes dissected in this study were inseminated (carrying spermatozoa in their spermathecae) while 479 (11.1%) were not inseminated. Statistically, there was a significant difference ($\chi^2 test, p < 0.05$) between the inseminated and non-inseminated mosquitoes dissected. The rate of insemination also varied significantly ($\chi^2 test, p < 0.05$) across the four localities (Table 1).

It was found that mosquitoes from Wadata locality had the highest insemination rate of 99.3% while Wurukum area had the least insemination rate of 70.5%. Specifically, of the 1,128 mosquitoes dissected from High-level locality, 1,028 (91.1%) were inseminated, 401 (35.5%) of which were *Anopheles* species while 627 (55.6%) were *Culex quinquefasciatus*.

At Wurukum, 841 (70.5%) out of the 1,193 mosquitoes dissected were inseminated; 20 (1.7%) were ‘unidentified’ *Anopheles* species, 148(12.4%) were *Anopheles gambiae* s.l; 161(13.5%) were *Anopheles funestus* while 512 (42.9%) were *Culex quinquefasciatus* respectively.

The insemination rates were significantly different ($\chi^2 test, p < 0.05$) between *Culex quinquefasciatus* and all the *Anopheles* species from the four localities. There was also a significant difference ($\chi^2 test, p < 0.05$) between the percentage insemination within *Anopheles gambiae* complex and *Anopheles funestus* mosquitoes.

In the North-bank locality, 70 (8.4%) of the ‘unidentified’ *Anopheles* species were inseminated, 119 (14.3%) of the *Anopheles gambiae* were inseminated, 105 (12.6%) of the *Anopheles funestus* were inseminated while of the 526 *Culex quinquefasciatus* dissected from this locality, 521(62.5%) were inseminated.

Both nulliparous and parous mosquitoes showed insemination across the two genera of mosquitoes dissected. In the Wadata locality, a total of 604 (51.8%) out of the 610 *Anopheles* species dissected were inseminated whereas 553 (47.5%) out of the 555 *Culex quinquefasciatus* dissected were inseminated.

Table 1. Parity Rate of the Mosquitoes Dissected from different Localities in Makurdi

Study Locality	Number Dissected	Number Parous (%)	Number Nulliparous (%)
High-Level	1,128	1,121(99.4)	7(0.6)
Wurukum	1,193	1,128(94.5)	65(5.4)
North- Bank	834	626(75.1)	208(24.9)
Wadata	1,165	1,114(95.6)	51(4.4)
Total	4,320	3,989 (92.3)	331 (7.7)

Parous vs nulliparous: $\chi^2 = 3097.445, d.f = 1, P = 3.841$

Table 2: Insemination Rates of *Anopheles* and *Culex* Mosquitoes from four Study Localities in Makurdi.

Study Locality	Number Dissected	Mosquito species/Insemination Rates (%)					Total Number Inseminated (%)
		Unidentified <i>Anopheles</i> spp.	<i>Anopheles gambiae</i>	<i>Anopheles funestus</i>	<i>Culex quinquefasciatus</i>		
High-Level	1,128	52(4.6)	239(21.2)	110(9.7)	627(55.6)		1,028(91.1)
Wurukum	1,193	20(1.7)	148(12.4)	161(13.5)	512(42.9)		841(70.5)
North-Bank	834	70(8.4)	119(14.3)	105(12.6)	521(62.5)		815(97.7)
Wadata	1,165	51(4.4)	426(36.6)	127(10.9)	553(47.5)		1,157(99.3)
Total	4,320	193(4.5)	932(21.6)	503(11.6)	2,213(51.2)		3,841(88.9)

(a) Species: $\chi^2 = 2465.952, d.f = 3, P = 7.815$ (b) Locality: $\chi^2 = 81.873, d.f = 3, P = 7.815$

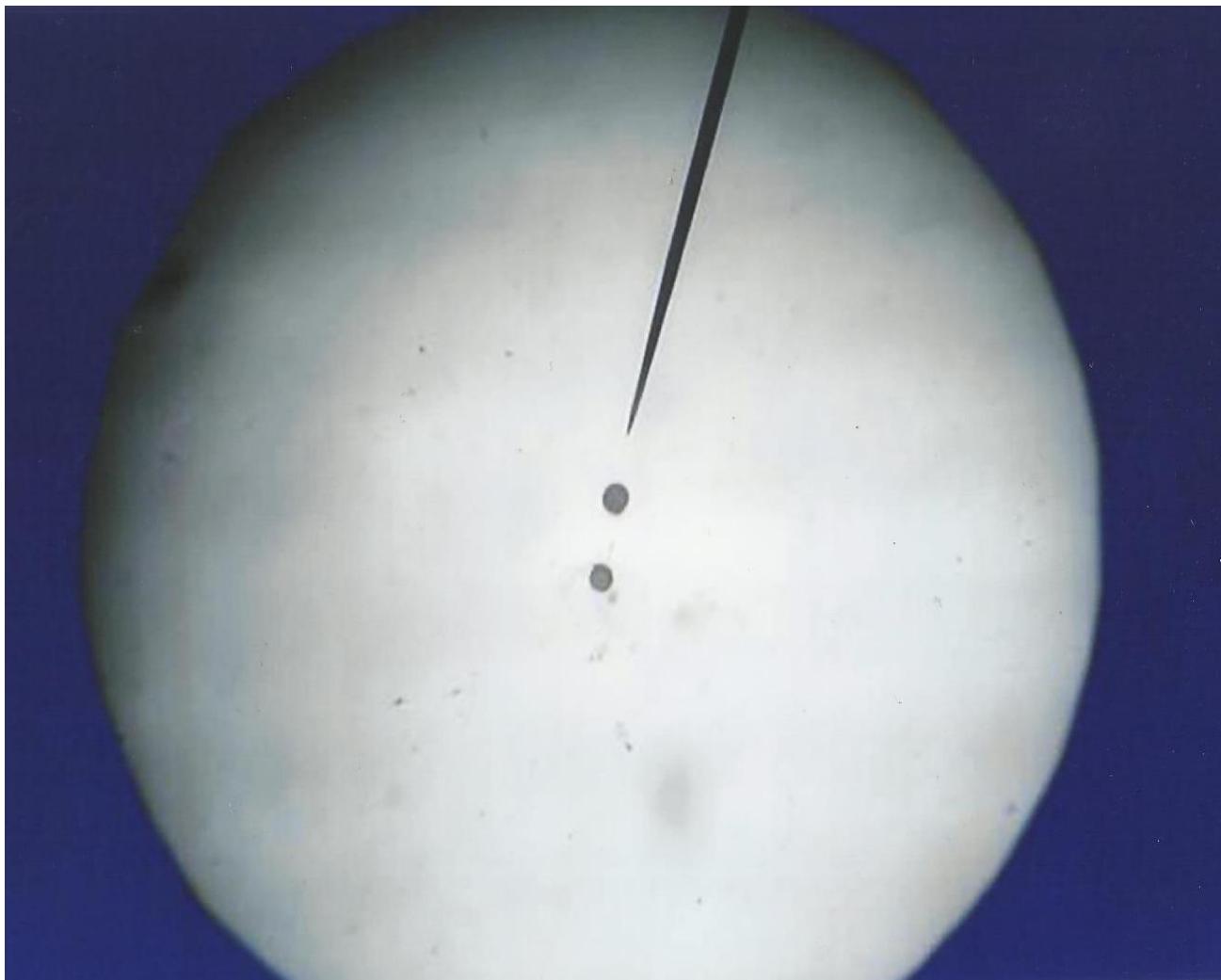


Fig. 1. A Photomicrograph showing two spermathecae from a dissected *Culex quinquefasciatus*.

IV. DISCUSSION

The overall insemination rate in this study was found to be 88.9%, with the highest insemination rate of 99.3% occurring at Wadata locality. Wurukum locality had the least insemination rate of 70.5% while North-bank and High-level localities had 97.7% and 91.1% insemination rates respectively. The proportion of female mosquitoes inseminated in this study were 21.6% in *Anopheles gambiae*, 11.6% in *Anopheles funestus*, 4.5% in 'unidentified Anopheles species' and 51.2% in *Culex quinquefasciatus* respectively.

Similar insemination rates have been reported elsewhere by various authors; Goma (1963) observed insemination rates of 44.7%-66.1% in *Anopheles gambiae* complex. Ibrahim (1994) also found high insemination rates of 73% in *Anopheles gambiae* and 90% in *Anopheles funestus* in the Jos area. Similarly, Inyama *et al.* (2003) had the proportion of female mosquitoes inseminated in parts of Plateau State as: 73.8% in *Anopheles gambiae*, 73.9% in *Anopheles funestus*, 83.2% in 'unidentified' *Anopheles* species and 97.9% in *Culex quinquefasciatus* respectively.

The high insemination rates of the mosquitoes reported in the present study, irrespective of the species, imply that their activity in terms of biting and flight would be greatly enhanced at night than during the dusk. This is in accordance with the findings of Jones and Gubbins, (1977 and 1978) who reported that once inseminated, the flight and biting activity of female mosquitoes would change, shifting the peak of activity from dusk to a later time in the night. They reasoned that the behavioural changes observed in the inseminated females was a direct consequence of the transference of the accessory gland substance called Matrone that is activated by insemination.

This may explain the writer's observation that mosquito populations in this study area were higher during the night catches than the morning catches. This also translates to increased biting potential at night by these species in the study area.

It has already been confirmed that insemination in female mosquitoes stimulates oviposition, modifies biting activity, increases the rate of blood meal digestion and possibly enhances longevity (Jones and Gubbins, 1977, 1978). Therefore, if the findings of Jones and Gubbins are accepted then, the high

insemination rates across the four localities surveyed in the present study show that the mosquitoes would have higher oviposition potentials, implying increase in vector populations in the study area. Similarly, their biting behavior would increase, indicating more chances of parasite acquisition and subsequent transmission. The inseminated female mosquitoes in the study area would also live longer than the non-inseminated females (Jones and Gubbins, 1977, 1978) thus, having more gonotrophic cycles to enhance transmission. Gomulski (1990) opined that the changes in behavior due to insemination could be particularly important in a species such as *Anopheles gambiae* in which mating and feeding take place at entirely different sites. This is indicated in the present study because the population of *Anopheles gambiae* that was inseminated (982/4320, 21.6% was higher than that of *Anopheles funestus* (503/4320, 11.6%). Although *Culex quinquefasciatus* had an overall higher insemination rate of 51.2% (2213/4320), this could be attributed to the numerous breeding sites that were abundant in the study area, in favour of this species hence their increased population and insemination.

Both nulliparous and parous females showed insemination across the two genera of mosquitoes dissected in this study from all the four localities. *Culex quinquefasciatus* females were seen with 2-3 spermathecae as against the single spermatheca that was observed in *Anopheles* females. This agrees with the findings of Service (2012) who stated that *Anopheles* mosquitoes have only 1 spermatheca while *Culex* mosquitoes have a minimum of 2 and a maximum of 3 spermathecae. Inyama *et al.* (2003) stated that high insemination rate in a mosquito population would mean high parity rate. Therefore, the high parity observed in this study and the subsequent high infection may be due to the age of the mosquitoes and changing biting habits of the different mosquito species.

V. CONCLUSION

The overall insemination rate in the mosquito population dissected was found to be 88.9%. This is the percentage of females that had undergone mating with the male mosquitoes before they were caught and dissected. If the findings of Jones and Gubbins (1977 & 1978) that ‘inseminated female mosquitoes have increased flight and biting activities at night’ are acceptable, then the high insemination rate of 88.9% obtained in the present study would translate to increased biting potential at night by the mosquito species in the Makurdi area. It is therefore, recommended that the breeding sites of the mosquito species in this area should be cleared or eliminated to prevent them from building up their populations in the various localities. Living rooms should be well secured with door and window nettings to prevent mosquitoes from entering houses to bite, especially at night. Hence the use of Insecticide Treated bed Nets (ITBNs), insecticidal sprays, effective mosquito repellent creams, screening of windows and doors, wearing of long sleeves and other personal protection practices against mosquito bites should be employed by the inhabitants of Makurdi.

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AUTHORS

First Author – Manyi, M. M, Applied Entomology and Parasitology Unit, Department of Biological Sciences, Federal University of Agriculture P M B 2373, Makurdi, Benue State, Nigeria., E-mail: manyimanasseh@rocketmail.com +2348068128355

Second Author – Onekutu, A, Agricultural Entomology Unit, Department of Biological Sciences, Federal University of Agriculture P M B 2373, Makurdi, Benue State, Nigeria.

Third Author – Azua, E.T, Environmental Science Unit, Department of Biological Sciences, Federal University of Agriculture P M B 2373, Makurdi, Benue State, Nigeria.

Linear Minimum Variance Unbiased Estimation of Individual and Population slopes in the presence of Informative Right Censoring

Viswanathan.N*, Ravanan.R**

*Department of Statistics, Presidency College, Chennai 600005, India

** Department of Statistics, Presidency College, Chennai 600005, India

Abstract- Estimation of individual and population slopes using Linear Minimum Variance Unbiased Estimation by Wu and Bailey (1988) is applied for incomplete longitudinal studies. In these studies the right censoring process is considered informative, in which the number of observations made for each subject is assumed to vary depending on the rate of change or slope of the individual response variable. This process of 'missing not at random' poses problems in the estimation of the slope parameters. The proposed method provides better estimates under different parametric models for the censoring distribution. The method's performance is studied through a simulation study under Standard Normal and Uniform censoring distributions.

Index Terms- Cumulative distribution function, Empirical Bayes estimation, Standard Normal distribution, Probit function, Informative Right censoring, Simulation.

I. INTRODUCTION

Characterization of rate of change in the study variable over time is of primary interest in longitudinal studies, where repeated measurements of the study variables are taken on the subjects. The rate of change of these variables over time is one of the primary interests of the researchers, as it helps us track the individuals who are at risk or those who need immediate attention. The classical methods of estimation fail under the condition of 'missing not at random' or when the censoring distribution is dependent on the rate of change of the study variable of the individual subject. Longitudinal studies prolong for many years and entail dropouts due to deaths, migration and related factors. There are several proposed methodologies to accommodate incomplete data by Orchard and Woodbury (1982), Kleinbaum (1973) and Laird and Ware (1982). These methods assume patterns that accommodate dropouts that are independent of the study variable. In this paper, the pattern of missing data considered is related to the study variable.

The term 'informative right censoring' in the context of slope estimation refers to the situation where the censoring probability of each individual relates to his or her underlying rate of change (Wu and Bailey, 1988). They showed that under a linear random effect model the weighted least square estimate of slope can be severely biased if the right censoring process is informative, although it is most efficient if the censoring process is non-informative. In an effort to reduce the bias introduced by the presence of informative right censoring, Wu and Carroll

(1988) derived a Probit Pseudo-Maximum Likelihood Estimator (PPMLE) of the population rate of change under a linear random effect model where the right censoring process follows a probit function, both of initial value and of the slope of the individual subjects. Wu and Bailey (1989) adapted a conditional linear model approach and proposed a Linear Minimum Variance Unbiased (LMVUB) and Linear Minimum Mean Square Error (LMMSE) estimators of the population rate of change, which they showed were competitive with the PPMLE in their simulation study. The present study focuses the effectiveness of the LMVUB estimator under different censoring distributions, whose parameter depends on the rate of change of the individual study variable. LMVUB estimator is compared with the general Empirical Bayes estimator, Un-weighted and Weighted estimators. To measure its effectiveness, the study considers both the individual and population slopes. Simulation results are considered and inferences are made, with suggestions for the future research.

II. THE ESTIMATION PROCEDURE

The LMVUB estimator is derived from the general case of the Empirical Bayes estimation procedure. This model assumes that there are n subjects and that for each subject i ($i = 1, 2 \dots, n$) the following conditions hold:

$$(i) b_{i,ols} | \beta_i, t_{im_i} \sim N(\beta_i, V_i)$$

$$(ii) \beta_i | \gamma_0, \gamma_1, t_{im_i} \sim N(\gamma_0 + \gamma_1 * t_{im_i}, A)$$

where $b_{i,ols}$ is the Ordinary Least Square (OLS) estimate of the slope and t_{im_i} is the maximum time the i^{th} subject is followed up.

$$V_i = \text{Var}(b_{i,ols}) = \frac{\sigma_e^2}{\sum_{j=1}^{m_i} (t_{ij} - \bar{t}_i)^2}, \text{ where } \sigma_e^2 \text{ is a known constant}$$

and $A = \text{Var}(\beta_i)$ is also assumed to be known. Let $(t_{i1}, t_{i2}, t_{i3}, \dots, t_{im_i})$ denotes the vector of time points for the i^{th} subject. It is assumed that the last measurement time, t_{im_i} is the

censoring time. The marginal distribution of $b_{i,ols}$ is given by $b_{i,ols} | \gamma_0, \gamma_1, t_{im_i} \sim N(\gamma_0 + \gamma_1 t_{im_i}, A + V_i)$, where γ_0 and γ_1 are the parameters of the censoring distribution. The posterior distribution of β_i given $b_{i,ols}$ is

$$\beta_i | b_{i,ols}, \gamma_0, \gamma_1, t_{im_i} \sim N(\beta_i^*, V_i(1 - B_i)),$$

where $\beta_i^* = (1 - B_i)b_{i,ols} + B_i(\gamma_0 + \gamma_1 t_{im_i})$, with $B_i = \frac{V_i}{V_i + A}$

$$\text{Let } \gamma = \begin{pmatrix} \gamma_0 \\ \gamma_1 \end{pmatrix}$$

$$X' = \begin{pmatrix} 1 & 1 & 1 & \dots & 1 \\ t_{1m_1} & t_{2m_2} & t_{3m_3} & \dots & t_{1m_n} \end{pmatrix}$$

and Here the second row represents the individual censoring time of the subjects.

$$\text{Let } D = \begin{pmatrix} \frac{1}{V_1 + A} & 0 & 0 & \dots & 0 \\ 0 & \frac{1}{V_2 + A} & 0 & \dots & 0 \\ 0 & 0 & \frac{1}{V_3 + A} & \dots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \dots & \frac{1}{V_n + A} \end{pmatrix}$$

$$\text{and } B = \begin{pmatrix} B_1 & 0 & 0 & \dots & 0 \\ 0 & B_2 & 0 & \dots & 0 \\ 0 & 0 & B_3 & \dots & 0 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & \dots & B_n \end{pmatrix}$$

The parameter γ is estimated using the Weighted Least Square (WLS) method and is given by

$$\hat{\gamma} = (X'DX)^{-1} X'DB$$

The Empirical Bayes estimate for the individual slope is given by

$\hat{\beta}_{i,eb} = (1 - B_i)b_{i,ols} + B_i(\hat{\gamma}_0 + \hat{\gamma}_1 t_{im_i})$; $i = 1, 2, 3, \dots, n$. Its matrix representation is given by

$$\hat{\beta}_{eb} = (1 - B)b_{ols} + B X(X'DX)^{-1} X'DB$$

The corresponding estimator of the population slope is

$$\hat{\beta}_{pop,eb} = \frac{1}{n} \sum_{i=1}^n \hat{\beta}_{i,eb}$$

given by $B_i = 1$ results in the LMVUB estimation.

The assumption of a conditional linear model is given by $b_{i,ols} | t_{im_i} = \tau_0 + \tau_1 t_{im_i} + \varepsilon_{t_{im_i}}$ with $E(\varepsilon_{t_{im_i}}) = 0$ and $Var(\varepsilon_{t_{im_i}}) = \sigma_{\varepsilon}^2$

$$\text{Then, } LMVUB(\beta) = \hat{\tau}_0 + \hat{\tau}_1 E(t_{im_i})$$

If $\hat{B}_i = 0$, it reduces to the Unweighted estimator and its

population slope is given by $\hat{\beta}_{uwt} = \frac{1}{n} \sum_{i=1}^n b_{i,ols}$. The weighted

individual slope estimator is $\hat{\beta}_{i,wt} = (1 - B_i)b_{i,ols} + B_i \hat{\beta}_{wt}$ with the corresponding population slope estimator

$$\hat{\beta}_{wt} = \frac{\sum_{i=1}^n (1 - B_i)b_{i,ols}}{\sum_{i=1}^n (1 - B_i)}$$

III. SIMULATION STUDY

The simulation study is carried out to compare the performance of the four estimators: Empirical Bayes, LMVUB, Weighted and Unweighted Estimators. The study compares both individual and population slopes. Simulations are carried out for a setting similar to that already proposed and discussed in the literature by Wu and Baily (1988). R software is used to perform the simulation process. Parameters used in the simulation are similar to those of Wu and Baily, who obtained the estimates from a feasibility study for an anti-photolytic replacement therapy trial conducted by the Workshop on the Natural History of Piz Emphysema. The study variable in this trial is rate of decline in the FFV measurements. We generated 1000 data set, each containing 100 observations, according to the following specifications:

Measurement error standard deviation $\sigma_{\varepsilon} = 155$; slope standard deviation $\sigma_{\beta} = 91$; the expected slope $\beta = -90$. It is assumed that the study duration extends to 3 years with 4 measurements for each year. Further it is assumed that right

censoring occurs only at the middle of each year, after the second measurement. The probability of right censoring or censoring distribution during a specified time interval $(0, t_j)$, given the slope β_i to be $\Phi(\eta_{0j} + \eta_1\beta_i)$, where $\Phi(\cdot)$ is the cumulative probability distribution function of $N(0, 1)$. The censoring parameter for different time intervals are denoted by η_{0j} , $j=1, 2, 3$. The simulations are carried out under 3 different conditions:

- (1) $\eta_1 = 0.00$, $\eta_{01} = -1.41$, $\eta_{02} = -0.71$ and $\eta_{03} = -0.25$; (2)
- $\eta_1 = -0.0113$, $\eta_{01} = -3.04$, $\eta_{02} = -2.04$ and $\eta_{03} = -1.38$; and (3) $\eta_1 = -0.0138$, $\eta_{01} = -3.26$, $\eta_{02} = -2.26$ and $\eta_{03} = -1.60$; in the above scenario, the first set of parameters correspond to non-informative right censoring and the second and third conditions correspond to Informative right censoring. The simulation process is carried out with the following sequence.

$$(1) \beta_i \sim \text{Normal}(-90, 91^2);$$

$$(2) \Pr(T < t_{ij} | \beta_i) = \Phi(\eta_{0j} + \eta_1\beta_i); \text{ and}$$

$$(3) b_{i,ols} | \beta_i, t_{im_i} \sim \text{Normal}(\beta_i, V_i), \text{ where}$$

$$V_i = \text{Var}(b_{i,ols}) = \frac{155^2}{\sum_{j=1}^{m_i} (t_{ij} - \bar{t}_i)^2}$$

The criteria used to evaluate the performance are bias and two types of Mean Square Error MSE (a) and MSE (b) defined respectively as:

$$\text{Bias (a)} = \frac{1}{R} \sum_{r=1}^R (\hat{\beta}_r - \beta)^2$$

$$\text{MSE (a)} = \frac{1}{R} \sum_{r=1}^R (\hat{\beta}_r - \beta)^2$$

$$\text{MSE (b)} = \frac{1}{nR} \sum_{r=1}^R \sum_{i=1}^n (\hat{\beta}_{ir} - \beta_{ir})^2,$$

where R is the total number of replications, and n is the number of observations in each data set. MSE (a) measures the closeness of the estimator to the population slope and MSE (b) measures the closeness of the estimator to the individual slopes.

3.1 Random Generation of Censoring Distribution:

The censoring distribution, corresponding to the random variable m_i is generated using the assumption $\Pr(T < t_{ij} | \beta_i) = \Phi(\eta_{0j} + \eta_1\beta_i)$. Thus, the censoring distribution for each subject varies as β_i varies from subject to subject. As Φ denote the cumulative distribution function of standard normal variate, the following procedure is used to generate m_i values.

- i. Four observations are made in three years amounting to maximum (m_i) = 12
- ii. Also it is assumed that right censoring occurs only at the middle of each year after the second measurement. This implies m_i takes values 2, 6, 10, 12.
- iii. For each of the three years the normal cumulative probabilities with varying η_{0j} $j=1, 2, 3$ are calculated.
- iv. The probability for $m_i = 2$ is taken as the cumulative probability calculated for $j=1$. The probability for $m_i = 12$ is taken as the difference between unity and the cumulative probability calculated for $j=3$. The probability for $m_i = 6$ is taken as the difference between the cumulative probabilities for $j=2$ and $j=1$. The probability for $m_i = 10$ is taken as the difference between the cumulative probabilities for $j=3$ and $j=2$.
- v. In case of Uniform cumulative distribution function the upper and lower limits of the distribution are fixed by

$$\text{Lower limit} = \text{Minimum}(\beta_i) * \eta_1 + \text{Minimum}(\eta_{01}, \eta_{02}, \eta_{03})$$

$$\text{Upper limit} = \text{Maximum}(\beta_i) * \eta_1 + \text{Maximum}(\eta_{01}, \eta_{02}, \eta_{03})$$

The above procedure represents one of the ways of implementing $\Pr(T < t_{ij} | \beta_i) = \Phi(\eta_{0j} + \eta_1\beta_i)$ to generate random values for m_i .

Simulation results corresponding to standard normal censoring distribution are provided in Table 3.1. This summarizes results regarding bias and mean square error. The result reveals, irrespective of Informative or Non-Informative right censoring process, the LMOVUB performs better compared to the other three estimators. By observing the MSE corresponding to population and individual slopes, the LMOVUB estimator has

Table 3.1. Comparisons of bias and mean square error: Unweighted, Weighted, Empirical Bayes and LMVUB for Standard Normal distribution

Estimator	Bias	MSE(a)	MSE(b)*10 ⁻³
$\eta_1 = 0.0000$			
Unweighted	-0.713	1726.493	143.784
Weighted	-0.822	1001.403	90.243
Empirical Bayes	-0.723	1381.582	93.525
LMVUB	-1.077	196.721	20.665
$\eta_1 = -0.0113$			
Unweighted	0.143	450.750	62.763
Weighted	-0.151	329.512	50.330
Empirical Bayes	-0.001	366.759	51.184
LMVUB	-1.678	209.013	21.747
$\eta_1 = -0.0138$			
Unweighted	-3.051	2426.362	208.347
Weighted	-2.226	1352.662	122.453
Empirical Bayes	-2.655	1875.357	126.923
LMVUB	-0.981	199.412	25.403

the minimum MSE, followed by Weighted, Empirical Bayes and Unweighted estimators in that order. This trend is similar in both the population and individual slopes. Also to be noted is the magnitude of reduction in the MSE values. In case of Non-informative right censoring the MSE corresponding to the second best weighted estimator for population slope is nearly five times as that of the LMVUB estimator. In case of the individual slopes the MSE of Weighted estimator is 4.4 times as that of the LMVUB estimator.

In the presence of informative right censoring with $\eta_1 = -0.0113$, the LMVUB performs better compared to the other three estimators. The MSE has a similar pattern in this case, but with a reduced margin of the multiplicative factors. Considering the population slope the MSE of the second best weighted estimator is nearly 1.6 times as that of the corresponding LMVUB estimator. For the individual slopes the MSE of the weighted estimator is nearly 2.3 times as that of the corresponding LMVUB estimator.

With the scenario of informative right censoring with $\eta_1 = -0.0138$, the MSE of the population slope for the second best

weighted estimator is nearly 6.8 times as that of the corresponding LMVUB estimator. For the corresponding individual slopes the MSE of the weighted estimator is nearly 4.8 times as that of the corresponding LMVUB estimator.

Comparing the bias in all the three scenarios, it is seen that the Empirical Bayes estimator performs better than LMVUB estimator in cases with $\eta_1 = 0$ and $\eta_1 = -0.0113$. In case of $\eta_1 = -0.0138$, the bias of the LMVUB estimator is the minimum. In most of the estimators, it is seen that ‘over estimation’ of the parameters takes place.

Simulation results corresponding to the Uniform censoring distribution are provided in Table 3.2. In this case again, the dominance of LMVUB estimator can be seen in all but the case for population slope with $\eta_1 = 0$. By observing the MSE corresponding to population and individual slopes, the LMVUB estimator has the minimum, followed by Weighted, Empirical Bayes and Unweighted estimators in that order. This trend is similar in both the population slope and

Table 3.2. Comparisons of bias and mean square error: Unweighted, Weighted, Empirical Bayes and LMVUB for Uniform (0, 1) distribution

Estimator	Bias	MSE(a)	MSE(b)* 10^{-3}
$\eta_1 = 0.0000$			
Unweighted	-1.664	2299.828	323.741
Weighted	-1.502	1742.747	218.174
Empirical Bayes	-1.664	2299.828	219.751
LMVUB	-1.664	2299.828	37.186
$\eta_1 = -0.0113$			
Unweighted	1.577	42774.760	3719.962
Weighted	2.331	25818.270	1827.279
Empirical Bayes	1.803	36202.530	1860.097
LMVUB	3.215	1330.802	27.432
$\eta_1 = -0.0138$			
Unweighted	22.441	62192.720	5227.073
Weighted	18.884	39459.710	2548.442
Empirical Bayes	21.340	55627.260	2592.110
LMVUB	4.249	2499.359	20.384

as well in the individual slopes. Also, this pattern is similar to that of the one seen using the Standard Normal cumulative distribution.

In case of Non-informative right censoring with the population slope, the weighted estimator has the least MSE. The other three has marginally higher values. In case of the individual slopes the MSE of Weighted estimator is 5.9 times as that of the LMVUB estimator that has the minimum MSE.

In the presence of informative right censoring with $\eta_1 = -0.0113$, the LMVUB performs better compared to the other three estimators. Considering the population slope the MSE of the second best weighted estimator for the population slope is nearly 19.4 times as that of the corresponding LMVUB estimator. For the individual slopes, the MSE of the second best weighted estimator is nearly 66.6 times as that of the corresponding LMVUB estimator.

The scenario of informative right censoring with $\eta_1 = -0.0138$, the MSE of the population slope for the second best weighted estimator is nearly 15.8 times as that of the corresponding LMVUB estimator. For the corresponding individual slopes the MSE of the weighted estimator is nearly 125 times as that of the corresponding LMVUB estimator.

Comparing the bias in all the three scenarios, it is seen that the Weighted estimator performs better in the non-informative situation, Unweighted estimator performing better in case of informative right censoring with $\eta_1 = -0.0113$ and the LMVUB

performing better in the case of $\eta_1 = -0.0138$. In the case of the Uniform censoring distribution for most of the estimators 'over estimation' of the parameter values takes place.

IV. DISCUSSION

Comparison with respect to the MSE under simulation study reveals the better performance of LMVUB estimator as an alternative to that of the Unweighted, Weighted and Empirical Bayes estimators in both the informative and Non-informative Right censoring scenarios. LMVUB estimator performs better in estimating both individual and population slopes. This advantage of LMVUB may be the result of the conditional linear modelling of the observed slopes with the censoring time that provides a better judgement of the rate of change in the response variable. As Little (1988) pointed out in the context of conditional linear models, the main idea of the Empirical Bayes estimator adapted here is to shrink not towards a common mean but towards a regression line where the mean is a linear function of the censoring time.

The comparison with respect to the Standard Normal cumulative and Uniform distributions indicates the effectiveness of LMVUB in the changing pattern of the dropouts. In case of the Uniform distribution the dropouts are spread in a more even manner compared to that of the Normal distribution that has a monotonic dropout pattern. LMVUB is capable of accommodating both the patterns and has minimum MSE in both

the scenarios. Wu and Bailey (1989) show that the conditional expectation of the slope, given the censoring time, is a monotonic function of the censoring time under the linear random effects model with probit censoring distribution.

Further theoretical work is necessary in the areas of testing the presence of informative right censoring. This requires estimating the standard errors for the population and individual slopes. The case when the variance parameters are unknown needs to be addressed separately. Subjects with one observation need to be accommodated, may be using other than slope construct, to fully utilize the available information.

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AUTHORS

First Author – Viswanathan.N, M.Sc., Assistant Professor,
Department of Statistics, Presidency College, Chennai, email-
visustats10@gmail.com

Second Author – Dr. R. Ravanan, M.Sc., M.Phil., Ph.D.,
Associate Professor & Head, Department of Statistics,
Presidency College, Chennai, email-ravanana.stats@gmail.com

Load Balancing in a Network

Rahul Godha ^{*}, Sneh Prateek ^{**}

^{*} Cisco Systems, Bangalore, India

^{**} Akamai Technologies, Bangalore, India

Abstract- This paper introduces a new mechanism for load balancing in a network. Load balancing is a computer networking method for distributing workload across multiple computing resources such as computers, a computer cluster network links, central processing units or disk drives. Load Balancing is usually provided by dedicated software or hardware, such as a multilayer switch or Domain Name System Sever Process. There are various algorithms to perform load balancing. In this paper we will discuss how to perform load balancing using heaps and discuss the advantage and disadvantages of using this method to perform load balancing.

Index Terms- Load Balancing; Heaps; Network .

I. INTRODUCTION

Load imbalance is an insidious factor that can reduce the performance of a parallel application significantly. For some applications, load is easy to predict and does not vary dynamically. However, for a significant class of applications, load representations by pieces of computations vary over time, and may be harder to predict. This is becoming increasing prevalent with emergence of new-sophisticated applications.

This new method of load balancing using heaps will automatically and dynamically distribute traffic across multiple servers. It will enable us to achieve greater levels of fault tolerance and improved performance seamlessly providing the required amount of load balancing capacity needed to distribute network traffic.

Rest of the paper is organized as follows: Section 2 gives an overview, background and real life applications of load balancing using heaps. Advantages and disadvantages are discussed in Section 3. Section 4 concludes the paper with references at the end.

II. BACKGROUND

Load characteristics in dynamic applications can change it is important to incur less overhead due to load balancing. Otherwise benefit of load balancing is lost in the overhead. Therefore, we evaluate quality of load balance, cost of the load balancing strategy and the total application time.

III. RELATED WORK

Load balancing has been studied extensively in the literature. For applications with regular load, static load balancing can be performed where load balance is achieved by carefully mapping the data onto processors. Numerous algorithms have

been developed for statically partitioning a computational mesh. These model the computation as a graph and use graph partitioning algorithms to divide the graph among processors. Graph and hyper-graph partitioning techniques have been used to map tasks on to processors to balance load while considering the locality. They are generally used as a pre-processing step and tend to be expensive. Our algorithm is employed where the application work has already been partitioned and used to balance the computation load imbalance that arises as the application progresses. Our algorithm also takes into consideration the existing mapping and moves tasks only if a processor is overloaded.

For irregular applications, work stealing is employed in task scheduling and is part of runtime systems such as Cilk Work stealing is traditionally used for task parallelism of the kind seen in combinatorial search or divide-and-conquer applications, where tasks are being generated continuously. A recent work by Dinan et al. scales work stealing to 8192 processors using the PGAS programming model and RDMA. In work that followed, a hierarchical technique described as retentive work stealing was employed to scale work-stealing to over 150K cores by exploiting the principle of persistence to iteratively refine the load balance of task-based applications. CHAOS provides an inspector-executor approach to load balancing for irregular applications. Here the data and the associated computation balance is evaluated at runtime before the start of the first iteration to rebalance. The proposed strategy is more focused towards iterative computational science applications, where computational tasks tend to be persistent.

Dynamic load balancing algorithms for iterative applications can be broadly classified as centralized, distributed and hierarchical. Centralized strategies tend to yield good load balance but exhibit poor scalability. Alternatively, several distributed algorithms have been proposed in which processors autonomously make load balancing decisions based on localized workload information. Popular nearest neighbor algorithms are dimension-exchange and the diffusion methods. Dimension-exchange method is performed in an iterative fashion and is described in terms of a hypercube architecture. A processor performs load balancing with its neighbor in each dimension of the hypercube. Diffusion based load balancing algorithms were first proposed by Cybenko and independently by Boillat. This algorithm suffers from slow convergence to the balanced state. Hu and Blake proposed a non-local method to determine the flow, which is minimal in the L^2 -norm but requires global communication. The token distribution problem was studied by Peleg and Upfal where the load is considered to be a token. Several diffusive load balancing policies, like direct neighborhood, average neighborhood, have been proposed. In a sender-initiated model is compared with receiver-initiated in an

asynchronous setting. It also compares Gradient Method, Hierarchical Method and DEM (Dimension exchange). The diffusion based load balancers are incremental and scale well with number of processors. But, they can be invoked only to improve load balance rather than obtaining global balance. If global balance is required, multiple iterations might be required to converge. To overcome the disadvantages of centralized and distributed, hierarchical strategies have been proposed. It is another type of scheme, which provides good performance and scaling.

In our proposed algorithm, global information is spread using a variant of gossip protocol. Probabilistic gossip-based protocols have been used as robust and scalable methods for information dissemination. Demers et al. use a gossip-based protocol to resolve inconsistencies among the Clearinghouse database servers. Birman et al. employ gossip-based scheme for bi-modal multicast, which they show to be reliable and scalable. Apart from these, gossip-based protocols have been adapted to implement failure detection, garbage collection, aggregate computation etc.

IV. LOAD BALANCING USING HEAPS

At every sub-network level maintain a max. heap, which stores the score(threshold-load) on every server. We will also a buddy heap in sync with this primary heap for redundancy.

4.1 IMPLEMENTATION

We will store the information (threshold – load on server) for each server at sub-network level. We can organize this information using a max heap. So the next request will always be routed to server at the top of the max heap. After this the heap will change in real time as the (threshold – load on server) will change for the server to which the request went to, hence the heap will have to re-ordered accordingly every time a request has been routed.

To make this system more dynamic and efficient we need to know real time what will be the load initiated by each request. To do this we can use machine learning and build a system, which will record the load caused by each new request. In this way this system will keep on evolving.

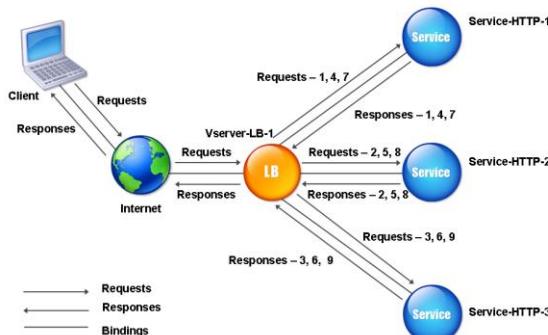


Fig1: Traditional Load Balancing

This is what a traditional load balancer does it distributes requests among the various servers. Now with our idea of load balancing the load balancer will store and maintain a max heap and redirect the request to the server whose score (threshold-load) is maximum.

The ones with scores <0 are overloaded hence no requests will be redirected to these servers.

V. ADVANTAGES

- 1) The algorithm since it uses heap the search time will be order of O(n).
- 2) The algorithm helps achieve higher levels of fault tolerance. It automatically detects unhealthy servers and only routes traffic to healthy instances.
- 3) It is secure. You can create an internal (non-internet facing) load balancer to route traffic using private IP addresses within your virtual network.
- 4) It is robust as we have a buddy heap in sync, so we can immediately failover.

VI. DISADVANTAGES

- 1) To make the reordering of the heap faster, we need to know load on each of the servers beforehand. Periodic polling of the servers to determine their load can help in this regard.
- 2) Keeping a buddy in sync can be taxing. Again periodic syncing might help.

VII. CONCLUSION

We have presented Load Balancing using heaps, a novel algorithm for distributed load balancing, It includes a max. heap which stores the threshold-load information on the nodes of the heap. The request is redirected to the server at the top of the heap.

We have listed down the advantages of using heaps against traditional load balancing algorithms. We also listed down the advantages and disadvantages of using this approach.

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AUTHORS

First Author – Rahul Godha, Cisco Systems, Bangalore, India
Second Author – Sneh Prateek, Akamai Technologies, Bangalore, India

Back- Pressure Algorithm Using Shadow Queues in Communication Networks

Arathy Sankar, Rahul Jiwane

Computer Engineering, Pillai Hoc College of Engineering and Technology

Abstract- Network coding has been recently applied to wireless networks to increase throughput. Back-pressure type algorithms based on the algorithm by Tassiulas and Ephremides have recently received much attention for jointly routing and scheduling over multi-hop wireless networks. we explore the performance of backpressure routing and scheduling for TCP flows over wireless networks. TCP and backpressure are not compatible due to a mismatch between the congestion control mechanism of TCP and the queue size based routing and scheduling of the backpressure framework.

We decouple the routing and scheduling components of the algorithm by designing a probabilistic routing table that is used to route packets to per-destination queues. The scheduling decisions in the case of wireless networks are made using counters called shadow queues.

Index Terms- Back-pressure algorithm, Congestion control, Probabilistic routing table, Shadow queues.

I. INTRODUCTION

Network has recently been shown to improve performance compared to that of routing for multicasting information over wired and wireless networks. Most of the work in network coding to date assumes a flow model for transmission in which sources generate, at fixed rates, data that is then transmitted over a network with fixed link capacities. However, in real networks, traffic is usually bursty because either the sources generate traffic in bursts or the network nodes employ queuing and scheduling across multiple sessions.

Wireless systems have emerged as a ubiquitous part of modern data communication networks. demand for these systems continues to grow as applications involving both voice and data expand beyond their traditional wireline service requirements. Inorder to meet the increasing demand in data rates that are currently being supported by high-speed wired networks composed of electrical cables and optical links, it is important to fully utilize the capacity available in wireless systems, as well as to develop robust strategies for integrating these systems into a large scale, heterogeneous data network.

Dynamic algorithms with network coding for multicast in wired and time-varying wireless networks showed that random network coding can be applied in such a dynamic setting[1].

Routing, scheduling, and power control in networks with bursty traffic has recently received significant attention in the context of wireless networks. Much of the recent work in this area builds on the ideas that describe algorithms for routing and scheduling flows using queue sizes, or differences in queue size between the queues at the source and the destination of a link, as the metric to select between different flows. Such an approach is usually said to be back-pressure based since heavily loaded nodes downstream push back and slow down the flow coming down from nodes upstream. Such a back-pressure approach is generally optimal in the sense that it allows transmission at the maximum possible arrival rates into the network for which the queues at the various network nodes are still stable. We presented dynamic algorithms with network coding for multicast in wired and time-varying wireless networks.

We summarize our main results below.

- Using the concept of shadow queues, we decouple routing and scheduling. A shadow network is used to update a probabilistic routing table which packets use upon arrival at a node. The back-pressure-based scheduling algorithm is used to serve FIFO queues over each link.
- The routing algorithm is designed to minimize the average number of hops used by packets in the network. This idea, along with the scheduling/routing decoupling, leads to delay reduction compared with the traditional back-pressure algorithm.

II. SYSTEM OVERVIEW- BACKPRESSURE ALGORITHM

The backpressure algorithm was introduced in [1] as a scheduling policy that maximizes the throughput of wireless multihop networks. Assuming slotted time, the basic idea of backpressure scheduling is to select the “best” set of noninterfering links for transmission at each slot. We now describe this idea in a 4-node network with two flows, black and gray, from node to , depicted in Fig. 1. Each node maintains a separate queue for each flow. For each queue, the number of backlogged packets is shown. Assume that we have two link sets, and , shown as continuous and dashed lines, respectively. The links in each set do not interfere and can transmit in the same time slot.

Backpressure routing is an algorithm for dynamically routing traffic over a multi-hop network by using congestion gradients. The algorithm can be applied to wireless communication networks, including sensor networks, mobile ad hoc networks (MANETS), and heterogeneous networks with wireless and

wireline components. Backpressure principles can also be applied to other areas, such as to the study of product assembly systems and processing networks. This article focuses on communication networks, where packets from multiple data streams arrive and must be delivered to appropriate destinations. The backpressure algorithm operates in slotted time. Every time slot it seeks to route data in directions that maximize the differential backlog between neighboring nodes. This is similar to how water flows through a network of pipes via pressure gradients.

The backpressure algorithm can be applied to multi-commodity networks (where different packets may have different destinations), and to networks where transmission rates can be selected from a set of (possibly time-varying) options. Attractive features of the backpressure algorithm are: (i) it leads to maximum network throughput, (ii) it is provably robust to time-varying network conditions, (iii) it can be implemented without knowing traffic arrival rates or channel state probabilities. However, the algorithm may introduce large delays, and may be difficult to implement exactly in networks with interference. Modifications of backpressure that reduce delay and simplify implementation are Improving Delay and Distributed Backpressure.

We develop a new adaptive routing algorithm built upon the widely studied back-pressure algorithm. We decouple the routing and scheduling components of the algorithm by designing a probabilistic routing table that is used to route packets to per-destination queues. The scheduling decisions in the case of wireless networks are made using counters called shadow queues. The results are also extended to the case of networks that employ simple forms of network coding. In that case, our algorithm provides a low-complexity solution to optimally exploit the routing–coding trade

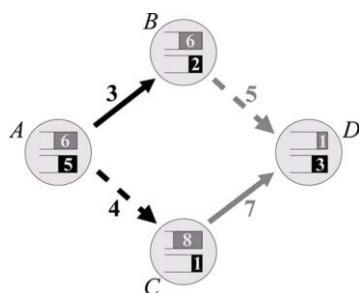


Fig. 1. Backpressure scheduling in a network with two flows, black and gray, from to . Links in sets (continuous) and(dashed) can be scheduled in the same slot.

III. INDEPENDENT SOURCES CASE: PROBLEM AND APPROACH

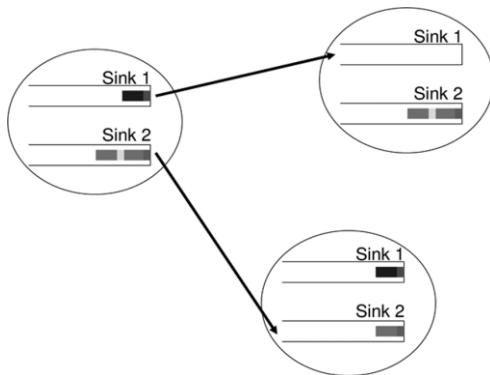


Fig. 2. An example illustrating a physical broadcast transmission with two virtual transmissions, for a multicast session with two sinks. Each oval corresponds to a node. The left node broadcasts a physical packet received by the two right nodes, one of which adds the packet to the virtual queue for sink 1, and the other, to the virtual queue for sink 2.

A. WIRED NETWORKS

We first describe the capacity region and back pressure policy for independent sources on wired networks, deferring proofs of the results to Section V, which generalizes these results to the wireless case. We present these results separately for the wired case as they are simpler and provide useful intuition. The main difference between the wired and wireless scenarios is that in a wired network all links are point-to-point links with fixed transmission rates, whereas in a wireless network, links could be point-to-multipoint with mutually dependent transmission rates.

A. Notation

We denote by the capacity of link . We use to denote average virtual flow rate, over link , from to . We use to denote average physical flow rate for session over . For brevity of notation, we use the convention that any term with subscript equals zero unless, and any term with superscript equals zero unless .

B. Capacity Region With Intrasession Network Coding

Let be the set of all source rate vectors such that there exist variables satisfying The variables for a (session, sink) pair define a flow carrying rate at least from each source node to in which virtual flow that is intended for is not retransmitted away from network coding allows flows for different sinks of a common multicast session to share capacity by being coded together [1], so the total usage of link by session need only be as large as the maximum virtual usage by individual sinks of the session. The flow constraints given above provide a characterization of the capacity region.

C. Achievability

The following back-pressure policy stabilizes the network for all input rates within the capacity region. It is a special case of the back-pressure policy for wireless networks described and analyzed. The intuition behind the policy is that it chooses, for each link at each time slot, the session with the maximum total weight of virtual transmissions, summed over the session's sinks.

Back-Pressure Policy for Wired Networks: For each time slot and each link we have the following.

- Session scheduling: one session is chosen.

B. Use of Simulation software

Existing Back-pressure algorithm is only reducing the queue and packet delay in the network. But it is not address the congestion control in high speed network. So we need to concentrate the back pressure with congestion control based packet priority in the network. Back-pressure with shadow queue is used. It leads the reduction of delay in networks.

IV PROPOSED SYSTEM

The routing algorithm is designed to minimize the average number of hops used by packets in the network. This idea, along with the scheduling/routing decoupling, leads to delay reduction compared with the traditional back-pressure algorithm. The algorithm can be applied to wire line and wireless networks. Extensive simulations show dramatic improvement in delay performance compared to the back-pressure algorithm.

Using the concept of shadow queues, we partially decouple routing and scheduling. A shadow network is used to update a probabilistic routing table which packets use upon arrival at a node. The same shadow network, with back-pressure algorithm, is used to activate transmissions between nodes; however, first, actual transmissions send packets from FIFO per-link queues and, second, potentially more links are activated, in addition to those activated by the shadow algorithm.

V CONCLUSION

The back-pressure algorithm, while being throughput optimal, is not useful in practice for adaptive routing since the delay performance can be really bad. In this paper, we have presented an algorithm that routes packets on shortest hops when possible, and decouples routing and scheduling using a probabilistic splitting algorithm built on the concept of shadow queues introduced. By maintaining a probabilistic routing table that changes slowly over time, real packets do not have to explore long paths to improve throughput, this functionality is performed by the shadow "packets." Our algorithm also allows extra link activation to reduce delays.

The algorithm has also been shown to reduce the queueing complexity at each node and can be extended to optimally tradeoff between routing and network coding.

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AUTHORS

First Author – Arathy Sankar , M.E Pursuing, B.E in Computer Engineering, Pillai HOC College of Engineering And Technology, arathy11sankar@gmail.com.

Second Author –Rahul Jiwane, M.E in Computer Engineering, Pillai HOC College of Engineering And Technology

The Perceived Impacts of Tourism on the Small Scale Entrepreneurs

(Case of World Heritage City Dambulla, Sri Lanka)

Ruhan Ranasinghe

School of Tourism Management, Sichuan University, China

Abstract- This study investigates the socio-economic impact of tourism on small scale entrepreneurs and their enterprises in UNESCO World Heritage City of Dambulla, particularly along the profile of tourism related entrepreneurship; impact of tourism in existing business establishment, impact of tourism on the personal improvement of entrepreneurs; impact of cityhood of Dambulla to tourism and perception extent to which tourism and entrepreneurship have addressed the socio-economic goals of the entrepreneurs. Descriptive method of inquiry was of most appropriate to approach the present research problem and was adopted in the study. A self administered questionnaire survey was employed to collect the needed primary data. Several interviews conducted to probe into the details were also of expedient to collect needed primary data. Descriptive analytical approach with the help of frequency count and percentage were used to analyze the collected data. Findings revealed that most of the respondents are in the middle age, more female entrepreneurs, married, and Buddhists. Most have up to O/L education level, and had been in business for more than 15 years. Tourism in existing business with cityhood to tourism in Dambulla City indicates a "satisfying" impact however, tourism on the personal improvement of the entrepreneurs revealed a "not so satisfying." Entrepreneurs' perception extent to which tourism and entrepreneurship have addressed their socio-economic goals have been achieved to an "average extent". Most entrepreneurs are female and more experienced in business. Their courage and hard work serves as their strength to nurture and improve their skills in managing their business. The impact of tourism and entrepreneurship in the existing businesses show that were developments that increased their income, personal improvement of the entrepreneurs had been enhanced with the opportunities in attending training programmes, workshops and conferences to develop their business; and Dambulla now booming due to the presence of tourists. Entrepreneurs' perceived that tourism and entrepreneurship have enhanced their socio-economic condition.

Index Terms- Small Scale Enterprises, Impact, Innovation, Socio-economic, Dambulla

I. INTRODUCTION

The impact in the social and economic development in UNESCO World Heritage City of Dambulla has its consequences and advantages affecting the lives of the people in terms of money and relationship to other people. Consequently,

the development of ventures that seeks to improve the lives of the townsfolk is indispensable. In Dambulla City, tourism has evolved into an entrepreneurial climate, both for the existing and newly established businesses. The most famous of these are those that explicitly identify with the small lodgings, guest houses, telecommunication shops, tourist shops, handicrafts, local cuisines, homestay and other services to tourists of some of them are unlawful. Not only tourism has provided legitimate income for most businesses, it has also created a socioeconomic impact into the townspeople and their simple lives.

Tourism entrepreneurship practice's first responsibility to the society is to operate at a profit. Business is the wealth creating and wealth-producing organ of the society, but what is most important is that management realizes that it must consider the impact of every business policy and business action upon society (Kairi, 2007). It has to consider whether the action is likely to promote the public good, to advance the basics beliefs of society, to contribute to its stability, strength and harmony is the ultimate responsibility of tourism-entrepreneurship practices to itself, to the enterprise, to the Dambulla heritage, to their society and to their way of life. The key concept to successful entrepreneurship is innovation. It refers to new or different ways of doing things when an individual creates a new product or when he sells a current product in a different approach (Robert et al, 2009).

The data would be established to develop skills and entrepreneurial practices that may improve the lives of people, the business prone individuals in particular. For another, assessment studies should be able to uncover possibilities that can address the opening of the programs in tourism and entrepreneurship that enhance employment in Dambulla City. The findings of the study therefore would help the relevant parties in developing small scale business that would be insightful in a need-driven development of old and new markets suitable for the needs of the tourists.

II. THEORETICAL BACKGROUND

To have a greater insight into the concepts of socio-economic impact of tourism on and entrepreneurship, ideas from related authorities and experts were incorporated as basis of understanding.

Tourism has grown to be an activity of worldwide importance and significance during last several decades. In many Island countries, tourism is the largest commodity in

international trade. In others, it ranks among the top industries. Tourism has indeed grown to become a major social and economic force in the world (Kairi, 2007). The rapid growth of tourism in the twentieth century has produced both problems and benefits for destination countries. It has had visible impact on the socio-cultural and socio-economic environment. Although tourism can bring economic advantages to a destination country, it also brings with serious long-term problems which, without careful control and planning, can threaten the society (Robert et al, 2009).

The social impacts of tourism should not be confused with the popular term "social tourism". The objective of social tourism is to ensure that it is accessible to all people. Social impact of tourism refers to the changes in the quality of life of residents and of tourist destination (Sebastian and Rajagopalan 2009). Many tourism projects have been proven to be economically feasible but have not been developed because of the lack of the right amount of type of financing. The number of government agencies which provide specific financial incentives for tourism projects play dual roles as stimulators and entrepreneurs. The main objectives of the most of these incentive programs are to help business carry out tourism-development projects that may have been delayed because of lack of assistance (SLTDA, 2009).

The heritage promotion programme of Cultural Triangle demonstrates how cultural conservation can be used to achieve sustainable economic development. Now, Dambulla is a vibrant center for trade and tourism as its cultural treasures and agro-based industries continue to fuel the economy that has grown

significantly in a short span of time. Today, the powerful images, and sounds of modern sophisticated living have established their marked presence: business and residential infrastructure, cars, traffic, and communications. The present makes Dambulla pliant and flexible; the past makes it enduring and strong (The Island News, 2012). Innovation has become the operative word in business. Dimensions in entrepreneurship began emerging because of the flexibility it conjures for the economic development of third world countries. These are vendors who put all the work into products that will and may be known across its nation or abroad when they put on the right attitude and much enthusiasm into the venture they are doing (Business Today, 2010).

Being hard working opportunity seekers, entrepreneurs acquire more profits. Moreover, in the process, they also create better goods and services for the consumers. Through their innovation they contribute to the improvement of the standard of living. Thus, they do not only help the economy, they also help the society (Sebastian and Rajagopalan, 2009). Still another aspect of the study is the educational system that should emphasize in its curriculum the importance of local entrepreneurship. By and large, Sri Lankans are employee oriented, especially for white-collar jobs or some clerical work predominantly in public sector offices. Many are not risk-takers. Many of our society are afraid to put up their own business because of the possibility of bankruptcy. Such lack of entrepreneurial spirit, particularly among professionals, has encouraged foreigners to take advantage of our cheap labor and rich natural resources (Matheisan et al, 2006).

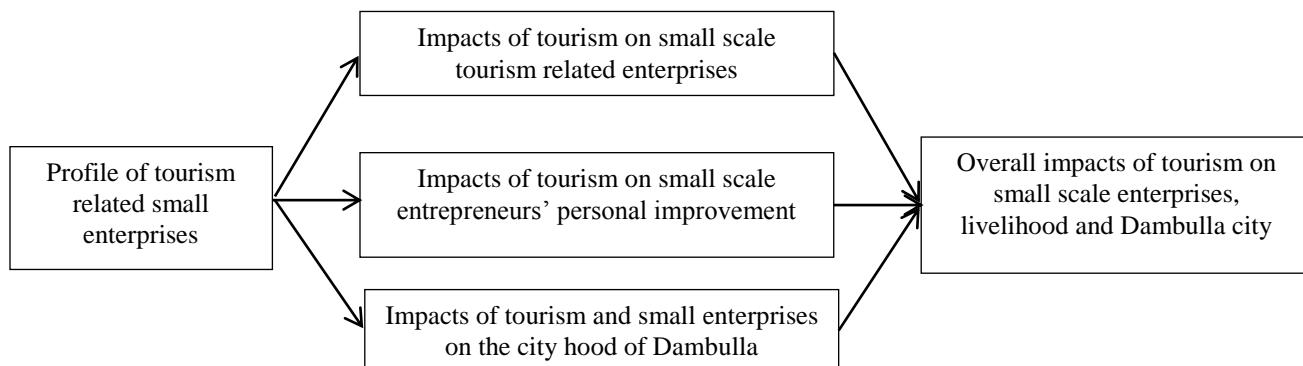


Figure 1. Conceptual Framework

Objectives of the Study

This study aimed to determine the social economic impact of tourism and entrepreneurship in Dambulla within the city limits of Dambulla. Specifically, it sought to answer the following questions:

- What is the profile of tourism related small entrepreneur in terms of: a. age; b. sex; c. civil status; d. educational attainment; e. religion; and f. number of years in business?

- What is the level of assessment of the socio-economic impact of tourism and entrepreneurship as to:

- Tourism in the existing business establishment in terms of: a. income; b. increase in clientele; c. competition; d. taxes; e. employment; f. local patronization; g. expansion; h. government assistance; and i. market opportunities?

- Impact on the personal improvement of the entrepreneurs in terms of: a. opportunity to attend seminars, workshops and conferences; b. opportunity to interact with tourists and competitors; c. working schedule and work load; and d. decision making?

- Impact of the citihood of Vigan to tourism in terms of: a. liveliness of the place; b. effect towards the simple lives of people; and c. increase in number of tourists?

- To what extent has tourism and entrepreneurship addressed the socio – economic goals of entrepreneurs as to:

- Improvement in entrepreneurial skills; 3.2 Improvement in productivity; 3.3 Improvement in interaction and communication; and 3.4 Increase in income?

III. METHODOLOGY

This cross sectional study was completed within September 2013 to May 2014. A total of 65 entrepreneurs involved in various tourism related ventures composed the sample for this study. The respondents are entrepreneurs from the different business perspectives and different areas yet their business based in Dambulla City. Descriptive analytical method of research was more appropriate in order to reflect the respondent's views as much as possible.

Research Design

The design used in the study was descriptive survey method of research. Both quantitative and qualitative approaches were employed to make the findings more relevant to the context. The profile of tourism-related entrepreneur was described, and the impact of tourism in the existing establishment, impact on the personal improvement of the entrepreneurs, impact of the cityhood of Dambulla to tourism were characterized, and the extent to which tourism and entrepreneurship addressed their socioeconomic goals was examined.

Unit of Analysis

The unit of analysis for the present study was small scale tourism related entrepreneur. In addition several detail interviews were conducted with officials and key figures in the area to create a solid background to the data collection tool.

Research Instrument

The research instrument design to collect required data was adopted form several previous studies and modified as appropriate to the present study context. The data collection tool composed of three parts:

Part I was designed to gather information required to profile the small scale tourism entrepreneurs.

Part II dealt with the respondent's perception on the factors which affect tourism related entrepreneurial practices, and

Part III dealt with the perceived extent to which tourism and entrepreneurship addressed the socio-economic goals of entrepreneurs. Observation and interview were also utilized in the study. Data gathered in the study were analyzed through the use of frequency count, percentage and weighted mean.

The Study Setting

The present Dambulla city known as Rangiri Dambulla is of pivotal in the history of Sri Lanka. Not only today right throughout the Sri Lankan history Dambulla has been of primarily significant as a cultural, religious and administrative stronghold. Major attractions of the area include the largest and best preserved cave temple complex of Sri Lanka, and the Rangiri Dambulla International Stadium, famous for being built in just 167 days. The area also boasts the largest rose quartz mountain range in South Asia, and the Iron wood forest, or Na Uyana Aranya. Ibbankatuwa prehistoric burial site near Dambulla cave temple complexes is the latest archaeological site of significant historical importance found in Dambulla, which is located within 3 kilometers of the cave temples providing evidence of the presence of indigenous civilisations long before the arrival of Indian influence on the Island nation. At the Ibbankatuwa Prehistoric burial site near Dhambulla, prehistoric

(2700 years old) human skeletons were found on scientific analysis to give evidence of civilisations in this area long before the arrival of Buddhism in Sri Lanka. Evidence of ancient people living on agriculture have been detected in this area for over 2700 years according to archaeological findings. (750 BC).

At present Dambulla is a significant economic centre for the distribution of vegetable and other consumables to the economy and as a result all kinds of financial institutes and facilities are presence. As a touristic centre it has numerous businesses catering to tourism industry which range from multinational companies, national level giants, medium size organizations and small scale business operators.

IV. RESULTS AND DISCUSSION

Based from the data gathered and interpreted, the following findings were revealed:

Personal Profile of the Respondents

The data shows that majority of the respondents are of the middle-aged group from forty two (41) years old and above. It can be inferred that there are more female than male in the small scale tourism entrepreneurial world whereby 65 percent are female and 35 percent are male. Majority of the entrepreneurs in Dambulla are married whereby 23 percent are single, 66 percent are married and or 11 percent are widowed. Out of the total sampled 69 percent are Buddhists, 16 percent are Islam, 9 percent is Catholic and 6 percent other religions.

It is inferred that most entrepreneurs are up to O/L in education concern whereby 8 percent is graduates, 23 percent is secondary Advanced Level passed, 27 percent trained from vocational school and 42 percent up to Ordinary level of education. Most of the entrepreneurs have been in business for more than fifteen (15) years.

The socioeconomic impact of tourism and entrepreneurship

Assessment of the impact of tourism in the existing business establishments The weighted mean for the perception on the impact of tourism in existing businesses is 2.55 which is interpreted as "satisfying". In the component: my income increased since tourist began visiting Dambulla was rated "satisfying" with a mean rating of 3.25. The following components: Tourist comprise majority of my customers ($x = 3.0$); There are opportunities to market my products now that Dambulla is a city ($x = 3.0$); I have more competitors now, than before Dambulla was proclaimed a city ($x = 2.75$); I am paying more taxes than before ($x=2.75$); I intend to expand my business in the future ($x=2.5$). The respondents found the rest of the components: Local people also patronize my products ($x=2.0$); There is government assistance available for my business ($x=2.0$); and I am employing more helpers for my business than before ($x=1.75$) are "not so satisfying".

The impact of tourism on the personal improvement of the entrepreneurs

The weighted mean for the impact on the personal improvement of the entrepreneurs is 2.3 which is interpreted as "not so satisfying". In the component: There are opportunities to interact more with tourist and competitors through social events and activities was rated "satisfying" with a mean rating of 3.0 In

the components: The other components: Decision making now is much more important because of the needs of tourist and local townsfolk now that Dambulla is a city ($x=2.5$); I am given the opportunity to attend training sessions, workshops, conferences for the development of my business ($x=2.25$) and working schedule and work load are reasonably allocated ($x=1.75$) are all found "not so satisfying".

The Impact of Cityhood in Dambulla City

The weighted mean for the impact of cityhood to tourism in Dambulla is 2.62 which is interpreted as "satisfying". In the component: there are more places to visit and enjoy in Dambulla now than before was rated "satisfying" with a mean rating of 3.25; Dambulla is more alive now that it is a city ($x=3.25$) rated as "satisfying". The following components: Dambulla's cityhood has affected better on the simple lives of the townsfolk ($x=2.25$); and more tourists come to Dambulla since it became a city ($x=2.29$) which were rated as not "satisfying".

The impact of tourism on Enterprises in achieving Socio-economic Goals

As a whole the entrepreneurs' perception extent to which tourism and entrepreneurship have addressed their socio-economic goals have been achieved to an "average extent" with an over all mean of 3.06.

V. CONCLUSIONS AND RECOMMENDATIONS

Most entrepreneurs come from the middle-aged group and show that because of their age, they are more experienced in going into business. Females are more inclined entrepreneurs and risk takers than males as per the findings. Most of them already have their own families and that going into business gives them a better chance to provide for their families and the hope of giving them a brighter future. Religion is one of the factors not directly related to the respondent's perception in going to business but some have believed that their hard work, dedication and honesty have helped them to reach their success in the business. Now, education is a big factor in creating a business. Most of them got the medium educational attainment they could obtain under the circumstances and raised their chance of making a business in tourism segment. Others who have not been able to get the chance of a good education went into vocational schools and ventured into business just to maintain their basic needs and provide their children good education. Some of the respondents have been in business for the longest time but are still struggling in their lives and others who are just at the beginning of their venture are seemingly more successful than the ones who have been in business longer than they have been.

The impact of tourism and entrepreneurship in the existing business establishment shows that there were developments in business. Since Dambulla became a City, tourism and entrepreneurship was enhanced. Business income increased; more tourist come to see Dambulla; healthy competition for business; opportunity to expand their business and opportunity to market their products and seek government assistance. Moreover, some entrepreneurs need to hire more workers to help them in their business and which will also give these workers the opportunity to earn their own income; wanting the government to

assist them in their related entrepreneurial activities and practices through the conduct of more training for them. They also explore on the products marketable to both tourists and townsfolk. On the impact of tourism and entrepreneurship on the personal improvement of the entrepreneur, business people are now given the opportunity to interact with more costumers and competitors to build good sense of business relationship among them; thorough and sound decision making on how to improve their business developing their skills and enhancing their responsibility and attitude towards work opportunity to attend training programmes, workshops and conferences for the development of their business. In the expansion of their business, they situate themselves in a thorough planning and decision by considering their capital, location and projected sales profit before pushing through; see to it that working schedule and workload be reasonably allotted to give them time for their families. Their need to attend training programmes, conferences and workshops to improve themselves and their business management is most wanting. On the impact of cityhood to tourism in Dambulla City, there are now more tourist sports to enjoy than before; Dambulla is more alive now that it is a city; cityhood has affected better the simple lives of the town's folks; and more tourist come to Dambulla since it became a city. There are now more tourist places to go to and enough recreational places to visit n Dambulla, nonetheless tourist operators should be directed to improve their facilities to make the visit of tourists more comfortable and enjoyable. Moreover, regular inspection of tourist spots by the Department of Health and Central Provincial Tourism Ministry should be ensured to keep them sanitized and clean.

Entrepreneurs' perception extent on tourism and entrepreneurship have enhanced their socio-economic condition in the following goals: improvement in productivity; improvement in entrepreneurial skills; improved interaction with tourists and customers and increase in their income thus improve themselves and their lifestyle. On the basis of the findings and conclusions, the following recommendations are advanced:

The business sector should be encouraged to invest in "rent a car" business in answer to the problem of inadequate and inconvenient transportation pointed out by the tourists. The office of the Central Provincial Tourism Ministry should organize tour guide groups equipped with the necessary training to at least who can speak English fluently. To be able to meet the needs of a steadily increasing number of tourist arrivals, more lodging and foodservice establishments should be put up. Such establishments should have adequate provisions for the necessary amenities and should necessarily be observed for required level of quality standards directed by the Sri Lanka Tourism Development Authority. Subsequent studies will hopefully shed light on this dilemma and provide new insights in this research area.

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AUTHORS

First Author – JPRC Ranasinghe, BSc, PGDM, MBA, PhD (Reading), School of Tourism Management, Sichuan University, China, ruwan@uwu.ac.lk

Oguchi Approximation of a mixed spin-2 and spin-5/2 Blume-Capel Ising ferrimagnetic system

Hadey K. Mohamad

Department of Physics, Al-Muthanna University, Samawa 550, Iraq.

Abstract- By using the Oguchi approximation(OA), we study a mixed spin-2 and spin-5/2 Blume-Capel Ising ferrimagnet with different single-ion anisotropies on a simple cubic lattice. It has been carried out Oguchi method and calculated the free energy of a mixed spin ferrimagnetic model from the partition function. By minimizing the free energy, it has been obtained the equilibrium magnetizations and the compensation temperatures. The existence and dependence of a compensation temperature on the crystal field is mainly investigated.

Index Terms- Mixed-spin Blume-Capel Ising model; Oguchi approximation; Ferrimagnet; Crystal field; Compensation points.

I. INTRODUCTION

Recently, a lot of efforts has been directed to the ferrimagnetic materials, specially due to their great potential for technological applications [1,2]. In a ferrimagnetic material two inequivalent moments, interacting antiferromagnetically, can give rise to a zero spontaneous magnetization below its critical temperature[3]. Then, a special point which is called spin compensation temperature can appear at a temperature below the

critical one (T_c), where the sublattice magnetizations cancel exactly each other[4-8]. T. Kaneyoshi et al have proposed that a diluted mixed spin-2 and spin-5/2 ferrimagnetic Ising system on honeycomb lattice can explain the characteristic temperature dependence of magnetization observed at low temperatures in the molecular-based magnetic material,

$AFe^{II}Fe^{III}(C_2O_4)_3[A = N(n - C_n H_{2n+1})_4, n = 3 - 5]$ [9]

. Y. Nakamura et al observed that the effect of external magnetic fields on the lattice possibly leads to a compensation transition[10]. The authors of [11], in this respect, investigated the magnetic properties of a mixed spin-2 and spin-5/2 Ising ferrimagnetic system in the phase diagram and in the compensation temperature. It is worth to note that a mixed-spin Ising ferrimagnetic system on a simple cubic lattice in which the two mixing sublattices have spins two ($0, \pm 1, \pm 2$) and spins five-half($\pm 1/2, \pm 3/2, \pm 5/2$), has not been examined within Oguchi approximation(OA). So, instead of using the decoupling approximation, we have introduced the concept of a correlation behaviour to understand the corporative effects exhibited by such systems. We found that the system considered exhibits the compensation phenomenon at low temperatures. Our results show the possibility of many compensation points at low temperatures depending on certain values of anisotropies near by

the boundaries of order-phase transitions in the ground-state structure of the system.

II. THEORY

The mixed-spin ferrimagnetic Ising model, which is considered, consists of three-dimensional sublattices S_i and S_j with spins $S_i^A = 0, \pm 1, \pm 2$ and $S_j^B = \pm 1/2, \pm 3/2, \pm 5/2$ respectively. In this research, the system is described by the Oguchi approximation[12], that:

$$H = -JS_i^A S_j^B - D_A \sum_i (S_i^A)^2 - D_B \sum_j (S_j^B)^2 - (h_i S_i^A + h_j S_j^B) \quad (1)$$

with,

$$h_i = J(z-1)m_B, \quad h_j = J(z-1)m_A$$

where, and $J < 0$. J is the exchange interaction between spins at sites i and j. z is the number of nearest neighbouring spins and the sublattice magnetizations m_A and m_B are the thermal averages of S_i^A and S_j^B , respectively, i.e., $m_A = \langle S_i^A \rangle$, and $m_B = \langle S_j^B \rangle$. Taking the eigenvalues of the Hamiltonian(1), one can obtain the sublattice magnetizations per site (Appendix I). D_A, D_B are the anisotropies, i.e., the crystal fields, acting on the spin-2 and spin-5/2 respectively. The knowledge of the partition function(Z) allows to express the relations for thermodynamic quantities. Then, the free energy of the model is defined as[13],

$$F \equiv -k_B T \ln Z \quad ; \quad Z = \sum_{i,j} e^{-\beta H} \quad (2)$$

where F is the free energy of H given by relation (1), $\beta = \frac{1}{K_B T}$. The sublattice magnetization per site is obtained by minimizing the free energy (Eq.2) which is given by Appendix 1. It is worth noting that the ferrimagnetic case shows that the signs of sublattice magnetizations are different, and there

may be a compensation point at which the total longitudinal magnetization per site[11,14], that

$$M = \frac{1}{2}(m_A + m_B)$$

is equal to zero.

III. RESULTS AND DISCUSSIONS

In this work, we examine the magnetic properties concerning spin compensation temperatures of the three-dimensional mixed spin-2 and spin-5/2 ferrimagnetic Blume-Capel Ising model. First, let us study the phase diagram of the mixed-spin ferrimagnetic system with different crystal fields through which, we interest to consider the characteristic magnetic properties of the system.

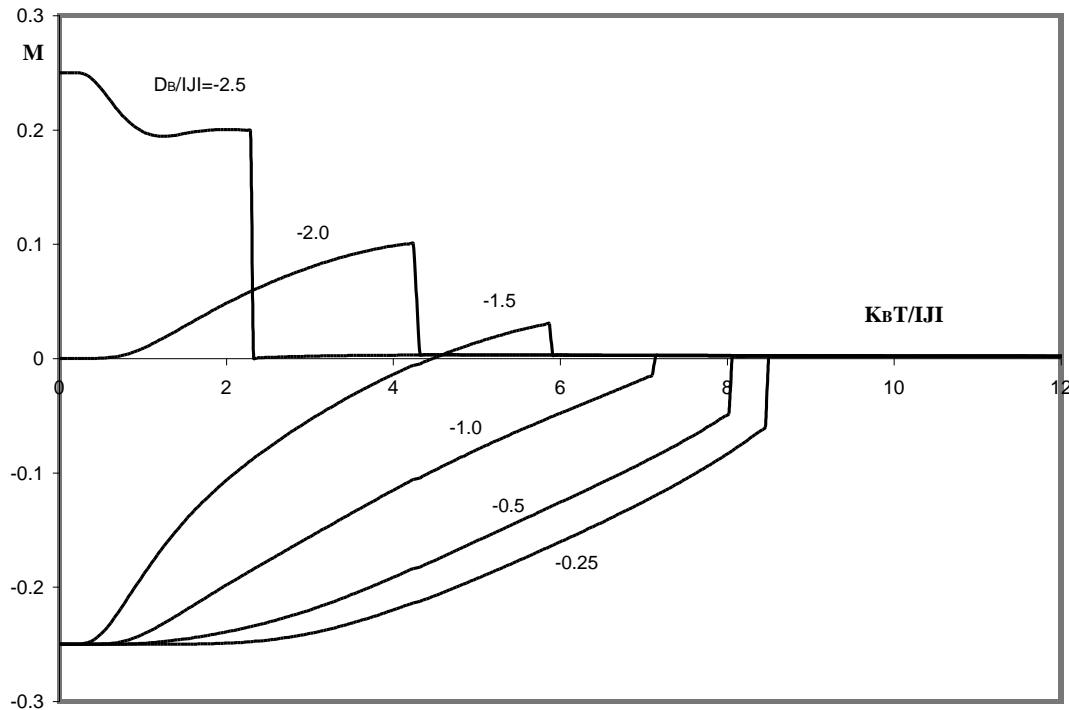


Fig.1. Thermal variations of the total magnetizations M for the mixed-spin Blume-Capel Ising ferrimagnet with the coordination number $z=6.0$, when $D_A/|J|=-1.0$, with various values of $D_B/|J|$.

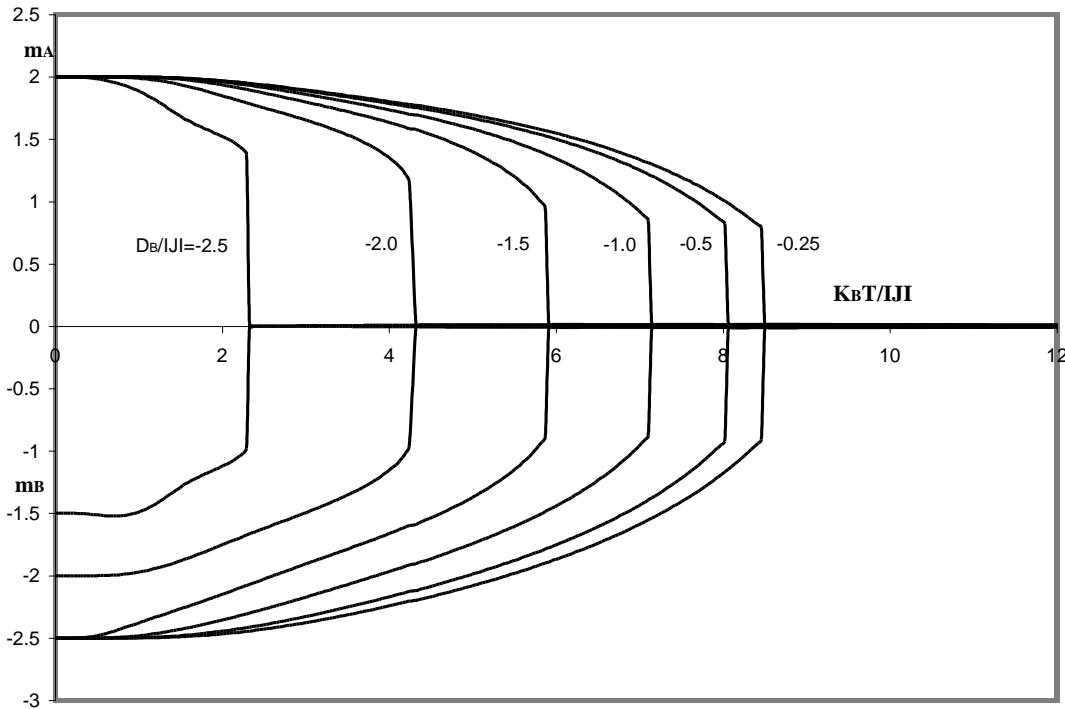


Fig.2. Thermal variations of the sublattice magnetizations for the mixed-spin Blume-Capel Ising ferrimagnet with the coordination number $z=6.0$, when $D_A / |J| = -1.0$, with various values of $D_B / |J|$.

Fig.(1), and Fig.(2) stand for the total magnetization and sublattice magnetizations versus the absolute temperature for the values of $D_A / |J| = -1.0$, respectively. As shown in the figures, the system may exhibit one compensation point in the phase diagrams depending on the values of crystal fields($D_B / |J|$), in the range $-2.5 \leq D_B / |J| \leq -0.25$. We report an interesting feature of compensation temperatures for $D_A / |J| = -1.0$, and for the value $D_B / |J| = -1.5$. The result shown in the Fig.(3) is consistent with that derived from Fig.(2). As is seen from the figure, in the region where the system may

show a compensation point, the spin-2 sublattice magnetization is more ordered than the spin-5/2 sublattice magnetization below the compensation temperature. As the system is heated up, the direction of residual magnetization may switch. That is to say, due to entropy some spins can flip their directions[2]. Thus, the spin-5/2 sublattice magnetization becomes more ordered than the spin-2 sublattice magnetization for temperatures above the compensation temperature. So there is an intermediate temperature such that the cancellation is complete($M = 0$)[11,14].

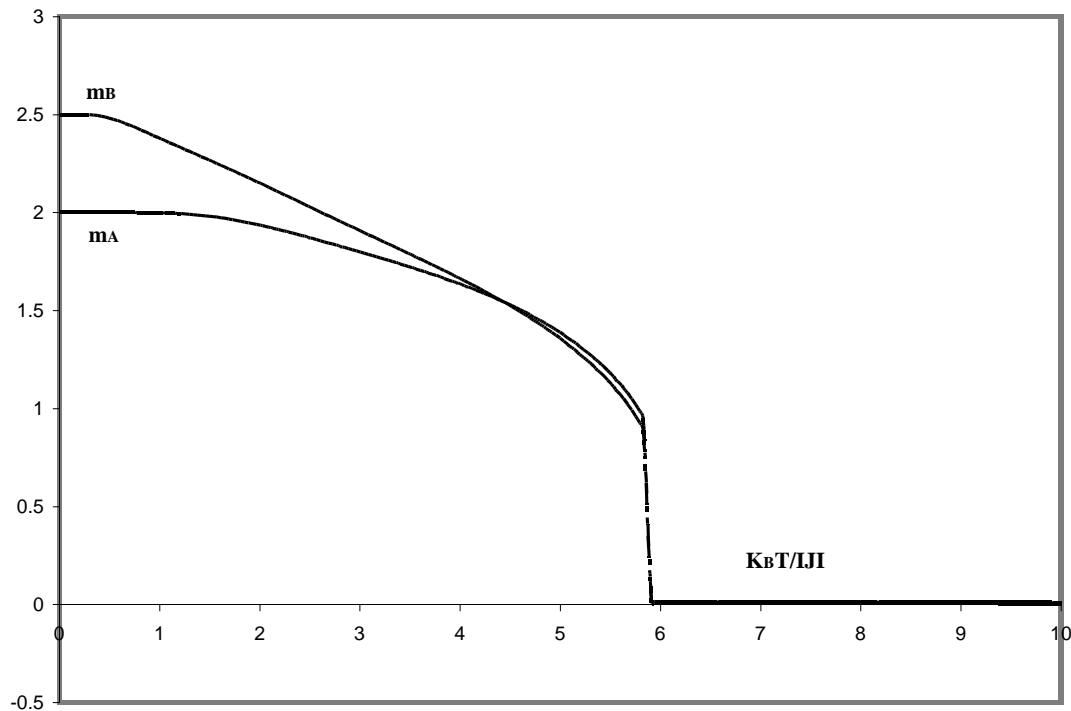


Fig.3. Thermal variations of the sublattice magnetizations for the mixed-spin Blume-Capel Ising ferrimagnet with the coordination number $z=6.0$, when $D_A / |J| = -1.0$, and $D_B / |J| = -1.5$.

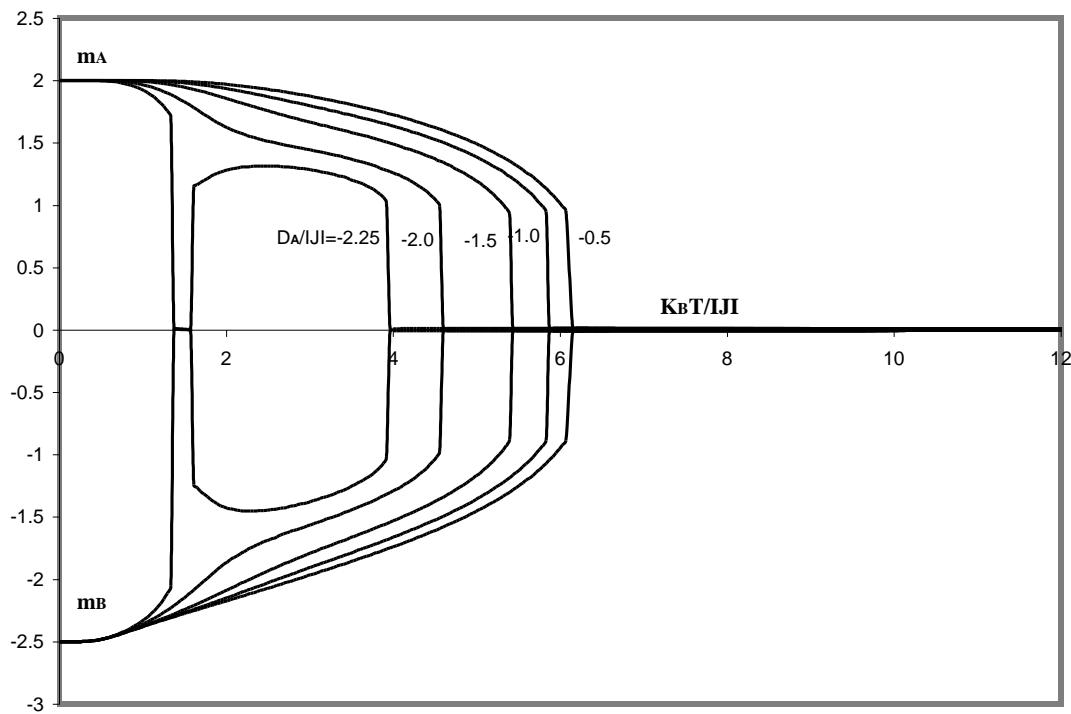


Fig.4. Thermal variations of the sublattice magnetizations for the mixed-spin Blume-Capel Ising ferrimagnet with the coordination number $z=6.0$, when $D_B/|J| = -1.5$, with various values of $D_A/|J|$.

Fig(4) expresses the characteristic behaviours of m_A, m_B as a function of $k_B T$ for different values of $D_A/|J| = -2.25, -2.0, -1.5, -1.0, -0.5$, where the system may exhibit three or many compensation temperatures, when $D_A/|J| = -2.25$, and $D_B/|J| = -1.5$. Our results are obtained in a microscopic model describing the magnetic behaviors of this mixed-spin system that shows remarkable insight compared to [9,10]. It is worth noting that we have introduced the concept of a correlation behaviour. As is seen in Figs.(4),(5)), when the value of the negative crystal field on A-

atoms is relatively large, a compensation point may be existed. So, the possibility of many compensation points is found when the negative crystal fields acting on A-atoms increase. The author of [9] investigated the mixed spin-5/2 and spin-2 Ising model on a honeycomb lattice, which may exhibit a compensation point when the value of the positive single-ion anisotropy, i.e., the crystal field on B-atoms(spin-2) is relatively large in the layered system on the basis of MC simulation. Whereas, the effective-field approximation predicts the existence of a compensation temperature, but only for relatively small transverse fields, in the absence of crystal field[10]. One can compare our results with that ones published in refs.[9,10].

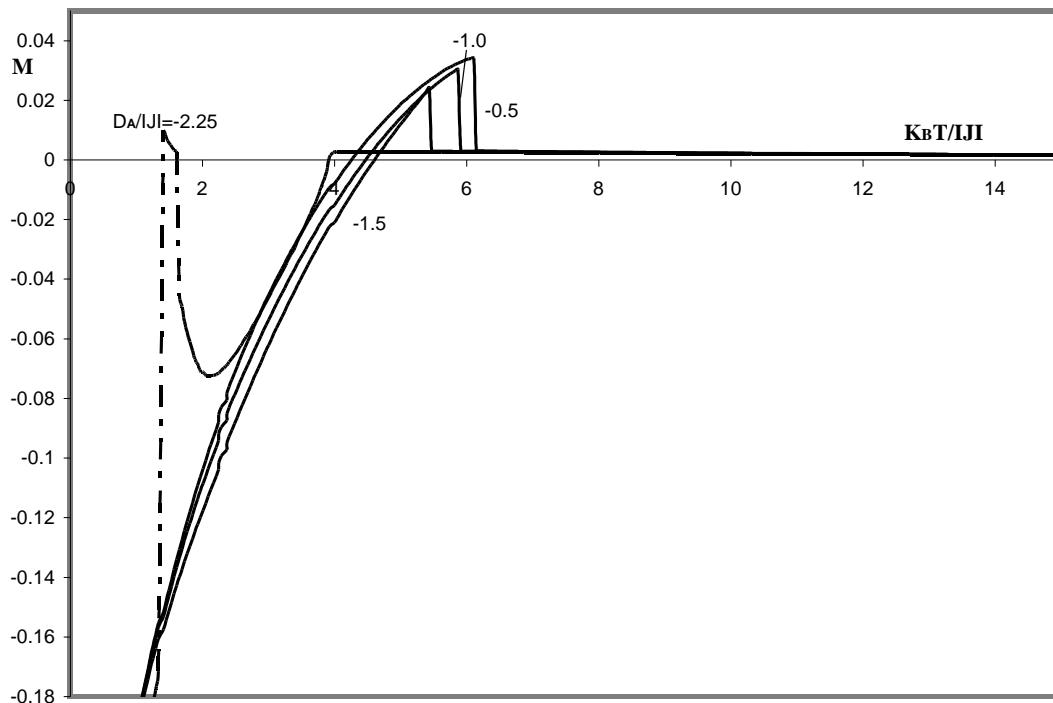


Fig.5.The temperature dependences of the total magnetization M for the mixed-spin Blume-Capel Ising ferrimagnet with the coordination number $z=6.0$, when $D_B/|J| = -1.5$, with various values of $D_A/|J|$.

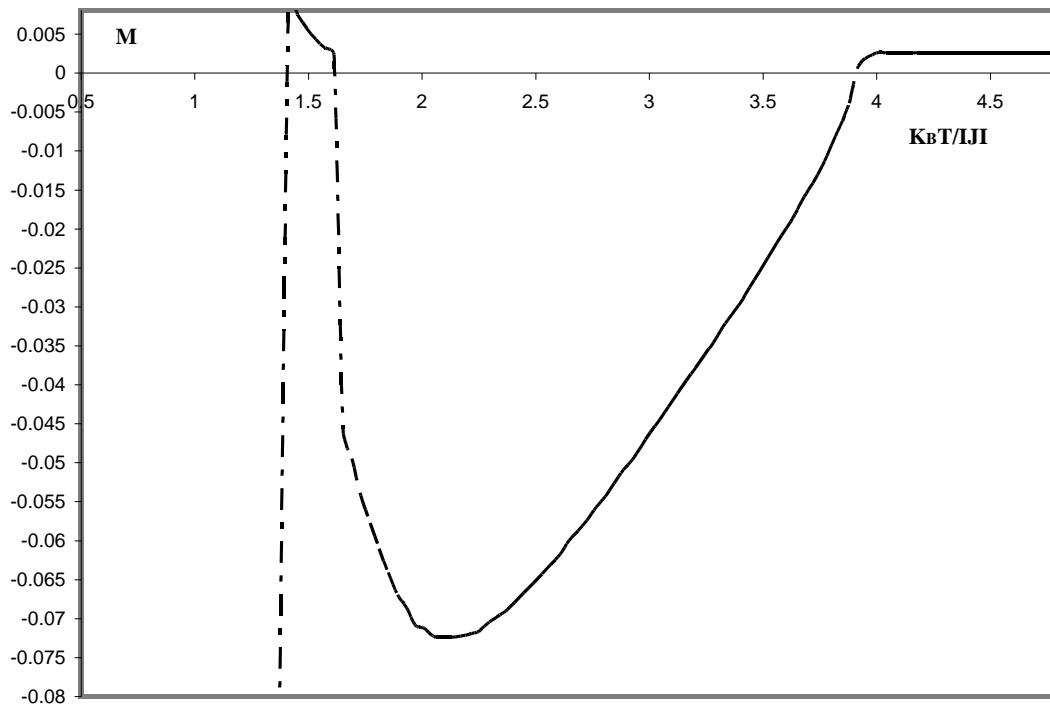


Fig.6. A close view of the temperature dependence of the total magnetization M for the mixed-spin Blume-Capel Ising ferrimagnet with the coordination number $z=6.0$, when $D_B/|J|=-1.5$, and $D_A/|J|=-2.25$,

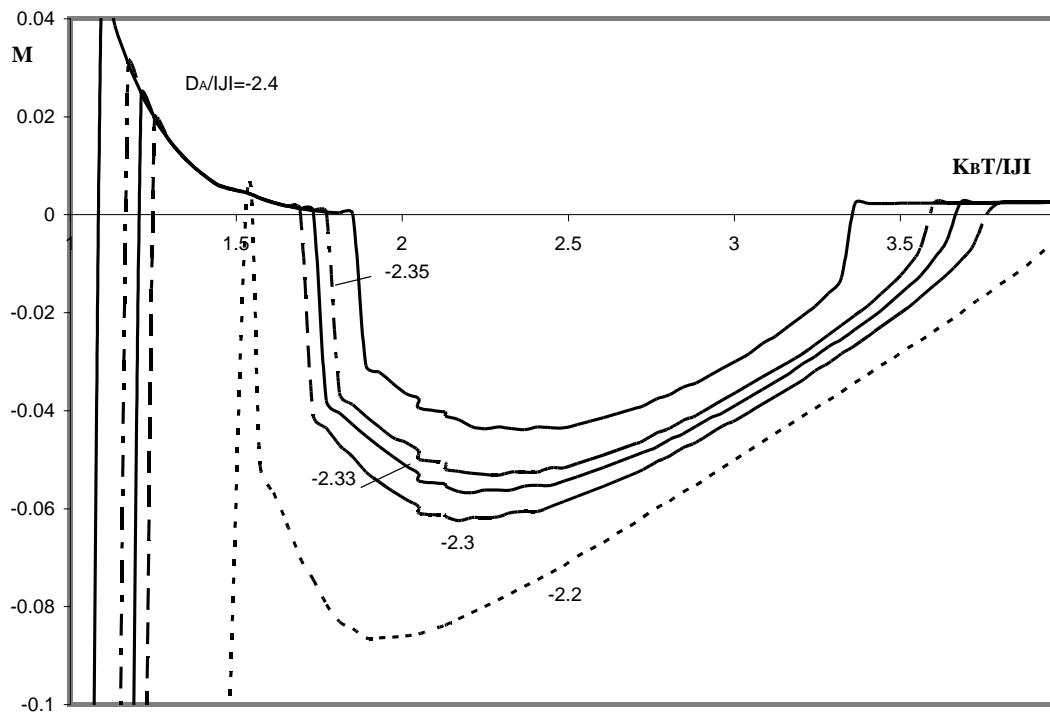


Fig.7. The temperature dependences of the total magnetizations M for the mixed-spin Blume-Capel Ising ferrimagnet with the coordination number $z=6.0$, when $D_B/|J|=-1.5$, with various values of $D_A/|J|$.

Fig.(5) may show a characteristic feature for the temperature dependencies of M in the system for different values of crystal fields acting on A-atoms, with a fixed one of $D_B / |J| = -1.5$.

Fig.(6) expresses a close view of the compensation behaviour derived from Fig.(5), for the mixed-spin Blume-Capel Ising ferrimagnet with the coordination number $z=6.0$, when $D_B / |J| = -1.5$, and $D_A / |J| = -2.25$.

Now, let us examine the system in the range $-2.4 \leq D_A / |J| \leq -2.2$. As is seen from the Fig.(7), the present system may clearly exhibit many compensation points for the M curves labeled $D_B / |J| = -1.5$, with different values of D_A , at $T \neq 0$, which is classified after Neel as the W-type[1]. One can compare our results with those obtained in the mixed spin-2 and spin-5/2 systems[9,15], in which the models show one compensation temperature, respectively. Also, we find that the transition (or critical) temperature depends strongly on the values of anisotropies D_A , D_B acting on the A-atoms and B-atoms, respectively, where the transition temperature can be determined by requiring that the sublattice magnetizations m_A , m_B (Appendix I) tend to zero continuously as the temperature is close to the Curie point. So, we observe that, for the values of crystal fields on A-atoms $D_A / |J| < -2.2$, the transition temperature may be decreased. However, by using the Oguchi

approximation, it has been obtained clear and characteristic behaviors of the molecular-based magnet $AFe^{II}Fe^{III}(C_2O_4)_3[A = N(n - C_nH_{2n+1})_4, n = 3 - 5]$ [3, 9,10].

IV. CONCLUSION

We have investigated the compensation phenomenon of a mixed-spin Blume-Capel Ising ferrimagnetic system composed of $S_i^A = 2$ and $S_j^B = 5/2$, in the application of crystal field. In this work, we have applied OA to the study of a simple cubic lattice to investigate interesting features, one can observe Figs.(4,5,7). Particularly, it has been studied the effect of single-ion anisotropy, i.e., the crystal field on an existence of compensation temperature. So, our results predict the possibility of many compensation points at low temperatures depending on the negative values of crystal fields(Figs.(6,7)). However, as far as we know, up to now no studies have been made concerning the spin compensation phenomenon of the mixed spin-2 and spin-5/2 Blume-Capel Ising model on the basis of OA. Finally, we can conclude that the crystal field plays a relevant role in the existence of the compensation temperature and it is useful to note that the approximation presented can be used to obtain important results for three-dimensional lattices. It is worth to note that we found unusual behaviours will stimulate experimental and theoretical works on the system which is considered.

APPENDIX I

By using the Oguchi Approximation, the sublattice magnetizations of the mixed-spin Blume-Capel Ising systems are given:

$$\begin{aligned}
 m_A = & (2(a_1 \sinh(g_1) + b_1 \sinh(g_2) + b_2 \sinh(g_3) + c_1 \sinh(g_4) + c_2 \sinh(g_5)) + (\exp(-3\beta DA))(a_2 \sinh(h_1) \\
 & - a_3 \sinh(h_2) + b_3 \sinh(h_3) - b_4 \sinh(h_4) + c_3 \sinh(h_5) + c_4 \sinh(h_6))) / (a_1 \cosh(g_1) + \exp(-5\beta J) + b_1 \cosh(g_2) + b_2 \cosh(g_3) + c_1 \cosh(g_4) + c_2 \cosh(g_5) + (\exp(-3\beta DA))(a_2 \cosh(h_1) \\
 & + a_3 \cosh(h_2) + b_3 \cosh(h_3) + b_4 \cosh(h_4) + c_3 \cosh(h_5) + c_4 \cosh(h_6)) + (\exp(-4\beta JD)(cosh(h_7) + \cosh(h_8) + \cosh(h_9))), \\
 m_B = & (0.5(5(a_1 \sinh(x_1) + a_2 \sinh(x_2) + a_3 \sinh(x_3) + \sinh(x_4)) + (3\exp(-4\beta DB))(b_1 \sinh(y_1) \\
 & - b_2 \sinh(y_2) + b_3 \sinh(y_3) + b_4 \sinh(y_4) + \sinh(y_5)) + (\exp(-6\beta DB))(c_1 \sinh(z_1) - c_2 \sinh(z_2) + c_3 \sinh(z_3) \\
 & - 4\sinh(z_4) + \sinh(z_5))) / (a_1 \cosh(x_1) + \exp(-5\beta J) + a_2 \cosh(x_2) + a_3 \cosh(x_3) + \cosh(x_4) + (\exp(-4\beta DB))(b_1 \cosh(y_1) + b_2 \cosh(y_2) + b_3 \cosh(y_3) + b_4 \cosh(y_4) + \cosh(y_5)) \\
 & + (\exp(-6\beta DB))(c_1 \cosh(z_1) + c_2 \cosh(z_2) + c_3 \cosh(z_3) + c_4 \cosh(z_4) + \cosh(z_5))), \\
 \text{where,} \\
 x_1 = & 5\beta J(z-1)mA ; x_2 = 3.75\beta J(z-1)mA ; x_3 = 1.25\beta J(z-1)mA ; x_4 = 2.5\beta J(z-1)mA ; y_1 = 4\beta J(z-1)mA ; y_2 = \beta J(z-1)mA ; \\
 y_3 = & 2.75\beta J(z-1)mA ; y_4 = 0.25\beta J(z-1)mA ; z_1 = 3\beta J(z-1)mA ; z_2 = 2\beta J(z-1)mA ; z_3 = 1.75\beta J(z-1)mA ; \\
 z_4 = & 0.75\beta J(z-1)mA ; z_5 = 0.5\beta J(z-1)mA ; x_{11} = 5.0\beta J(z-1)mA ; x_{22} = 3.75\beta J(z-1)mA ; x_{33} = 1.25\beta J(z-1)mA ; x_{44} = 2.5\beta J(z-1)mA ; \\
 y_{11} = & 4.0\beta J(z-1)mA ; y_{22} = \beta J(z-1)mA ; y_{33} = 2.75\beta J(z-1)mA ; y_{44} = 0.25\beta J(z-1)mA ; y_{55} = 1.5\beta J(z-1)mA ; z_{11} = 3\beta J(z-1)mA ; \\
 z_{22} = & 2\beta J(z-1)mA ; z_{33} = 1.75\beta J(z-1)mA ; z_{44} = 0.75\beta J(z-1)mA ; z_{55} = 0.5\beta J(z-1)mA ; \\
 g_1 = & 4\beta J(z-1)mB ; g_2 = 3.2\beta J(z-1)mB ; g_3 = 0.8\beta J(z-1)mB ; g_4 = 2.4\beta J(z-1)mB ; \\
 g_5 = & 1.6\beta J(z-1)mB ; h_1 = 3\beta J(z-1)mB ; h_2 = \beta J(z-1)mB ; h_3 = 2.2\beta J(z-1)mB ; \\
 h_4 = & 0.2\beta J(z-1)mB ; h_5 = 1.4\beta J(z-1)mB ; h_6 = 0.6\beta J(z-1)mB ; h_7 = 2\beta J(z-1)mB ; \\
 h_8 = & 1.2\beta J(z-1)mB ; h_9 = 0.4\beta J(z-1)mB ; a_1 = \exp(5\beta J) ; a_2 = \exp(2.5\beta J) ; \\
 a_3 = & \exp(-2.5\beta J) ; b_1 = \exp(3\beta J) ; b_2 = \exp(-3\beta J) ; b_3 = \exp(1.5\beta J) ; b_4 = \exp(-1.5\beta J) ; \\
 c_1 = & \exp(\beta J) ; c_2 = \exp(-\beta J) ; c_3 = \exp(0.5\beta J) ; c_4 = \exp(-0.5\beta J) ; d_1 = (2\beta J(z-1)mB + 2.5\beta J(z-1)mA) ;
 \end{aligned}$$

$d2=(2\beta J(z-1)mB-2.5\beta J(z-1)mA)$; $d3=(2\beta J(z-1)mB+1.5\beta J(z-1)mA)$; $d4=(2\beta J(z-1)mB-1.5\beta J(z-1)mA)$; $d5=(2\beta J(z-1)mB+0.5\beta J(z-1)mA)$;
 $d6=(2\beta J(z-1)mB-0.5\beta J(z-1)mA)$; $d7=(\beta J(z-1)mB+2.5\beta J(z-1)mA)$;
 $d8=(\beta J(z-1)mB-2.5\beta J(z-1)mA)$; $d9=(\beta J(z-1)mB+1.5\beta J(z-1)mA)$; $d10=(\beta J(z-1)mB-1.5\beta J(z-1)mA)$;
 $d11=(\beta J(z-1)mB+0.5\beta J(z-1)mA)$; $d12=(\beta J(z-1)mB-0.5\beta J(z-1)mA)$;
 $d13=(2.5\beta J(z-1)mA)$; $d14=(1.5\beta J(z-1)mA)$; $d15=(0.5\beta J(z-1)mA)$; $k1=\beta (5J+4DA+6.25DB)$;
 $k2=\beta (-5J+4DA+6.25DB)$; $k3=\beta (3J+4DA+2.25DB)$; $k4=\beta (-3J+4DA+2.25DB)$;
 $k5=\beta (J+4DA+0.25DB)$; $k6=\beta (-J+4DA+0.25DB)$; $k7=\beta (2.5J+DA+6.25DB)$;
 $k8=\beta (-2.5J+DA+6.25DB)$; $k9=\beta (1.5J+DA+2.25DB)$; $k10=\beta (-1.5J+DA+2.25DB)$; $k11=\beta (0.5J+DA+0.25DB)$; $k12=\beta (-0.5J+DA+0.25DB)$; $k13=(6.25\beta DB)$;
 $k14=(2.25\beta DB)$; $k15=(0.25\beta DB)$;

The free energy of the model is defined as :

$$F \equiv -k_B T \ln Z ,$$

that,

$$\begin{aligned}
 Z= & 2(\exp(k1)\cosh(d1)+\exp(k2)\cosh(d2)+\exp(k3)\cosh(d3)+\exp(k4)\cosh(d4) \\
 & +\exp(k5)\cosh(d5)+\exp(k6)\cosh(d6)+\exp(k7)\cosh(d7)+\exp(k8)\cosh(d8)+\exp(k9)\cosh(d9)+\exp(k10)\cosh(d10)+\exp(k11)\cosh(d11)+\exp(k12)\cosh(d12)+\exp(k13)\cosh(d13)+\exp(k14)\cosh(d14)+\exp(k15)\cosh(d15))
 \end{aligned}$$

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AUTHORS

First Author – Hadey K. Mohamad , B.Sc., M. Sc , PhD., Department of Physics, College of Science, Al-Muthanna University, Samawa, Iraq., PHONE: +9647808152704 e-mail:hadeyk2002@yahoo.com

Assessment of Drinking Water Quality of Alau Dam Maiduguri, Borno State, Nigeria

Amos Hyeladi *, Joshua Ezekiel Nwagilari **

* Department of Geography and Planning University of Jos, Plateau State, Nigeria

** Department of Geography and Planning University of Jos, Plateau State, Nigeria

Abstract- This work assessed the quality and use of water from Alau Dam Maiduguri, Borno State on the physical, chemical and microbiological parameters. Raw water sample were collected at River Ngadda, Lake Alau, domestic, industrial and irrigation water use points from Alau as well as treated water from Alau Dam as supplied to households by Borno Water Corporation. Using purposive sampling technique, Six (6) samples were taken and analysed for physical parameters: colour and turbidity. Chemical parameters: phenolphthalein, total Alkalinity, total hardness, calcium hardness, magnesium hardness, chloride, sulphate, fluoride, nitrites, PVC estimate, TDS, Free chlorine, magnesium, calcium, copper, lead ,zinc and Iron. Microbiological parameters: Aerobic Mesophilic count, coliform, E. coli count and P. aeruginosa. The result shows that the value for some of the parameters are within the maximum limits of World Health Organisation (WHO) and National Agency for Food, Drug Administration and Control (NAFDAC) standards while some parameters especially, turbidity for treated water as well as PH, turbidity of some, untreated water and microbiological parameters for, all untreated water were above maximum limits prescribed by WHO and NAFDAC. Therefore, the research has revealed that Alau Dam, Maiduguri suffers from pollution as a result of in-stream uses and on-site activities, thus, outbreak of communicable diseases has been experience in the area, mitigating these problems on human health and environment.

Index Terms- Alau dam, water quality, Maiduguri

I. INTRODUCTION

The sources of water for any specific purpose are not as important as the suitability of the water for the desired purpose. With increasing human population, industrialization, urbanization and the consequent increase in demand for water for both domestic and industrial Introduction

Uses, the attendant increase in the implication of polluted water on man and the environment have been severally studied (Asiwaju-Bello and Akande, 2004; Ige et al; (2008).

Water quality is determined by the physical and chemical limnology of a reservoir (Sidnei et al; 1992) and includes all physical, chemical and biological factors of water that influences the beneficial use of the water. Water quality is important in drinking water supply, irrigation, fish production, recreation and other purposes to which the water must have been impounded (Moshood, 2008). Notwithstanding, many people in developing countries do not have access to safe and clean drinking-water or

adequate amount of water for basic hygiene, due to water pollution from agricultural, industrial and other human activities. As pointed out by (Dabi and Dadan-Garba, 2009) that such level of pollution is visible in Nigerian cities and it have serious impacts on human health and well-being since about 80 percent of all diseases and more than one-third of all deaths in developing countries are caused by contaminated water. The MDG drinking-water target will be exceed by 2015, but the sanitation target will be missed by about 1 billion people. It further states that, 2.2 million people in developing countries, most of them children die every year from diseases associated with lack of access to safe drinking-water, inadequate sanitation and poor hygiene. And half (1/2) of the world hospital beds are filled with people suffering from water related illness. In Nigeria despite the generous endowment of surface and groundwater, which are capable of meeting demands, sanitation receives far less attention than water supply. Urban sanitation is in a dismal state and improving the situation requires better-formulated policies and a massive injection of investments. The poor state of the water and sanitation sector in Nigeria is related in the high infant mortality and morbidity rates for the country. Mortality rates for infants and children under five years old were 100 and 201 per 1000 live birth respectively. The three major causes were malaria, diarrhea and acute respiratory infections, all of which are related to unclean water and inadequate sanitation. Together with typhoid, these diseases account for more than 70 percent of all mortality and morbidity in Nigeria. In recent times, Maiduguri has experience an outbreak of cholera that many lives were lost. Thus, the research intent to look at the quality of water of the lake (dam) and supply to various parts and that supposedly treated and supplied to households.

II. STUDY AREA

Maiduguri is the capital of Borno state located between latitude $10^{\circ}00'$ and $14^{\circ}00'$ north of the equator and longitude $11^{\circ}30'$ and $14^{\circ}45'$ east of the Greenwich Meridian. The state lies some 355m above sea level and it occupies a total area of 50,778 sq km lying within the sudan-sahalian zone of Nigeria. It is the largest town in the North-Eastern area of Nigeria. The relief of the study area is basically a plain surface founded on the Chad Basin and broken by the valleys of both Ngadda and Yedseram rivers. The relief of Maiduguri lies on the vast open plain which is relatively flat or gently undulating. The landscape is developed on the young sedimentary rocks of the Chad formation. This formation is overlain by sand drifts which may be up to 90 metres thick. The extensive plain contains no prominent hill and

attains an elevation of about 350m above sea level (Ijere and Daura, 2000).

Lake Alau a dam constructed by the Lake Chad Basin Authority depends on run off and annual flow of two rivers: River Ngadda which rises some 20km in Askira-uba after having descended the Precambrian hill, crossed the alluvial plain (Chad formation) and become confused with the course of River Yedseram that runs into the Sambisa Swamps areas of Borno state (Ijere and Daura, 2000).

Alau Dam, a water reservoir constructed across river Ngadda to store water during seasonal floods in undulating low land of the south of Konduga village. Apart from the dam which provide water, there are intake works at Alau Raw Water pumping Station having 3 pumps (2 on duty and 1 standby) with flow per pump 540 l/sec and discharge pressure of 55m; a transmission line for raw water with pipe size of 800mm diameter with total length of 12.5km to the water treatment plant. The plant is designed to treat 67,000m³/day and pump 15,000, 000 gal/day with flow of 775 l/sec. The treatment plant has 32 ground reservoir each with capacity of 16, 750M³, 2 overhead concrete tanks each with capacity of 4,500M³, 4 flat bottom clarified tanks, rapid gravity sand filters, chemical treatment section, power supply system PHCN and 2 generators of 100 KVA and high lift pumps.

III. METHODS AND MATERIALS

The nature of the data was of infinite because it was derived from continues distribution of river flow and dam. The data was, however reduced from continues distribution to discrete by taking water samples at six (6) points within the following locations as listed below:

Table I. Locations of Sampling points of Alau Dam

Locations	Samples	Symbols
Water from River Ngadda	I	WRN
Water from Lake Alau	II	WLA
Domestic water use point from Alau Dam	III	WDU
Irrigation water use point from Alau	IV	WIU
Industrial water use point from Alau Dam	V	WIN
Treated water from Alau dam supplied to household	VI	WTS

Note: symbols were not used in details, only the samples in Roman numerals as representation of the sampling points

The method used for data collection for the purpose of this research followed a purposive sampling approach based on the procedure stated in the NAFDAC Guidelines for Drinking Water Quality in Nigeria. Based on this, water samples were collected for quality analysis by using a fetcher tied to a rope and dipped

into the water and poured inside a plastic bottles capped and labelled with respect to their points of collections and uses to which the raw water from the dam is put to as well as the treated water from the treatment plant was collected from the tap ready for supplied to households. Samples collected in bottles were transferred from the collection points to the laboratory in a cooler to maintain steady temperature of the water.

The samples of water were collected and subjected to laboratory analysis, using all the required materials, equipment and procedures as practiced in a standard laboratory. The following parameters of water were analyzed:

- i. Physical parameters: colour, odour, taste
- ii. Chemical parameters: PH, total hardness, calcium hardness, total dissolved solids, dissolved carbondioxide, chloride, fluoride, nitrite, sulphate, free chloride; trace metals; copper, lead, zinc, iron, calcium and magnesium;
- iii. Biological parameters: coliform count, E.coli count and P.auriginosa.

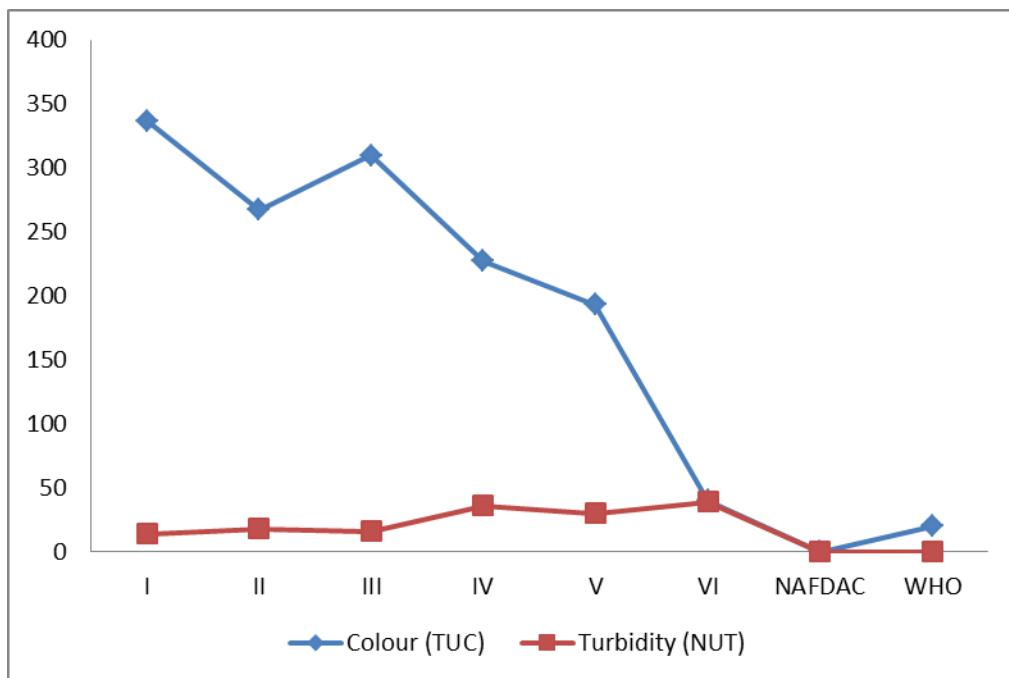
These parameters are considered as the most common contaminated found in water used households in the study area which causes cholera outbreak almost every year, typhoid fever, skin irritation, bilherziosis etc. determining the levels of these parameters in water used by the households in the study area will help in assessing the portability or quality of the water from the dam for human consumption and other uses.

The results of the laboratory analysis were compared with that of WHO and NAFDAC, maximum limits of water quality parameters for drinking water; these are World and national standard for quality drinking water.

IV. RESULT AND DISCUSSION

Figure 1.reveals that colour of untreated water at sampling points I-V are 337, 267, 310, 227, and 193 Hazen's scale in mg/l respectively, which are all above WHO and NAFDAC specified limits of 15 and 20 Hazen, mg/l standards for colourless water. Taste and odour for all the samples were not detected while turbidity shows the following 14, 18, 16, 36 and 30 NTU mg/l for the sampling points. The turbidity value for sampling points I,II and III falls within the specified limits of 5-25 NTU by WHO and NAFDAC while at points IV and V where both above the maximum limit of the Regulatory Standard. Colour of the treated water (sampling point VI) is 40 Hazen scale mg/l which is above WHO and NAFDAC limits of 15 and 20 Hazen's scale mg/l specified standard. Taste and Odour where not detected from the treated water while the turbidity is 39 NTU mg/l was found to be above specified limit of 5 and 25 NTU by WHO and NAFDAC, respectively.

Figure 1. Physical Parameters sampling points of Alau Dam in compare with NAFDAC and WHO



Source: author's research and lab analyses (NAFDAC's Lab) Maiduguri, 2012.

Note: WRN, WLA, WDU, WIU, WIN and WTS symbols were not used to represent sample points

Table II: Chemical Parameters sampling points of Alau dam in compare with NAFDAC and WHO

CHEMICAL PARAMETERS	I	II	III	IV	V	VI	WHO	NAFDAC
PH	8.886	8.399	8.78	8.182	8.436	7.763	6.5 - 8.5	6.5 - 8.5
DCD (mg/l)	1	1	2	1	1	4	-	50
Total Alkalinity (mg/l)	72	64	60	52	48	36	-	100
Chloride (mg/l)	13	7	13	8	9	12	-	250
Total hardness (mg/l)	40	52	32	40	48	52	-	100
Calcium hardness (mg/l)	25	32	20	25	30	30	-	50
Magnesium hardness (mg/l)	19	20	12	15	18	22	-	50
Sulphate (mg/l)	10	10	5	10	10	0	500	250
Fluoride (mg/l)	0.2	0.4	0.2	0.2	0.4	0.2	1.5	1.3
Nitrate (mg/l)	0.03	0.03	0.03	0.03	0.02	0.02	50	3
TDS (mg/l)	220	260	200	260	200	240	500	500
Free Chlorine (mg/l)	0.16	0.17	0.15	0.14	0.19	0.12	0.4	0.3
Copper (ppm)	0.21	0.32	0.19	0.41	0.19	0.12	2	2
Calcium (ppm)	2.17	2.26	3.1	2.14	1.96	1.12	200	75
Zinc (ppm)	0.01	-	-	0.09	0.03	-	3	5
Iron (ppm)	0.16	1.3	0.37	0.41	0.34	-	0.3	0.3

Magnesium (ppm)	3.16	2.93	2.63	2.14	3.71	1.06	150	50
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Source: author's research and lab analyses (NAFDAC's Lab) Maiduguri, 2012.

Note: WRN, WLA, WDU, WIU, WIN and WTS symbols were not used to represent sample points.

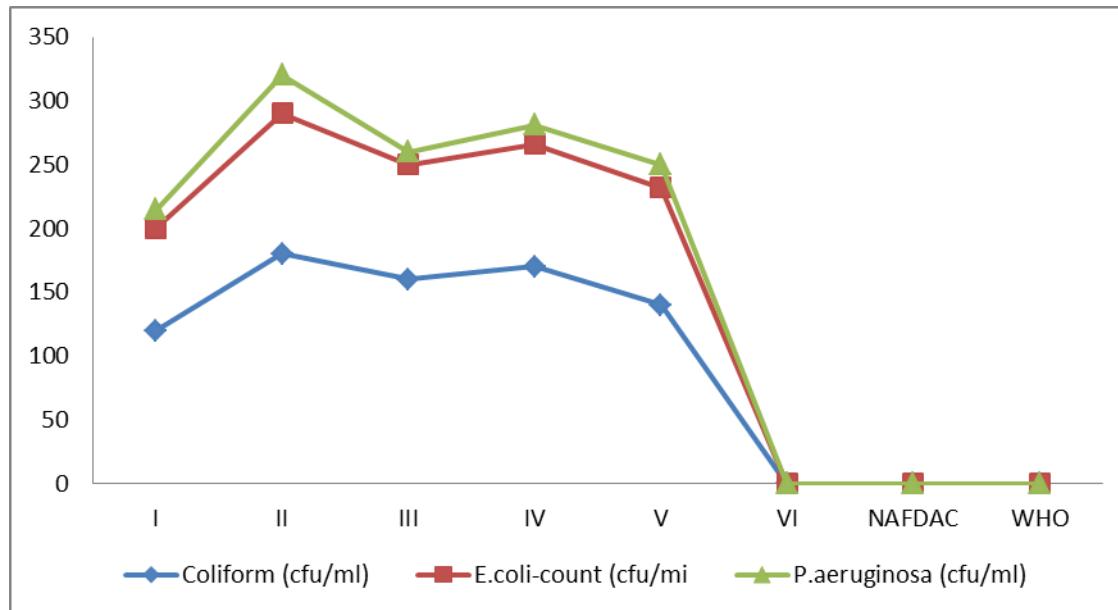
Table 2. indicate the following about chemical parameters for untreated water: the PH for water samples at points I-V are 8.886, 8.399, 8.780, 8.182 and 9.436 respectively, all the PH are within the WHO and NAFDAC limits of 6.5-8.5 except for sampling points 1 and 3 which are above the standard; the amount of Dissolved Carbon-dioxide (DCD) for the sampling points are 1.0, 1.0, 2.0, 1.0 and 1.0 mg/l which are below the maximum value of 50mg/l as stipulated by WHO and NAFDAC; Acidity, phenolphthalein Alkalinity and PVC estimate were not seen in all the sampling points of untreated water; Total Alkalinity in the untreated water for sampling points I-V are: 72, 64, 60, 52 and 48 mg/l respectively are within the maximum limit of 100mg/l as specified by NAFDAC while WHO has no specification; chloride content in the untreated water were found to be 13, 7, 13, 8 and 9mg/l for sampling points I-V, but all are far below the maximum limit of 250mg/l by NAFDAC specification while WHO has no specification; Total hardness for sampling points are 44, 52, 32, 40 and 48 mg/l respectively, all are within the maximum limit of 100mg/l NAFDAC specification while WHO set no guidelines; calcium hardness peaked at point II, followed by point V then I, IV and III corresponding to 32.0, 30.0, 25.0, 25.0 and 20.0 mg/l are below NAFDAC maximum limit of 50mg/l while WHO set no standard; magnesium hardness for sampling points I-V are 19.0, 20.0, 12.0, 15.0 and 18.0mg/l respectively and all are below 50mg/l as maximum limit set by NAFDAC while WHO set no standard; sulphate content is generally low in the untreated water for sampling points I-V, all have uniform value of 10mg/l except at point 3 with the value of 5 mg/l. They are far below maximum limit of 250mg/l and 500mg/l standard set by NAFDAC and WHO respectively; Fluoride at sampling points I, III and IV assumed uniform value of 0.2 mg/l while point 2 and 5 has the same value of 0.4mg/l. And they are within the maximum limit of 1.5 and 1.3 mg/l standard of WHO and NAFDAC; Nitrites value of 0.030 mg/l was recorded for points I-IV with the least at point V having 0.020 mg/l and all within maximum limits of 5.00 and 3.00 mg/l standard of WHO and NAFDAC respectively; Total dissolved solids is peaked at points II and IV followed by point I, then III and V with the following values 260, 220mg/l; and all are below maximum limit of 500 mg/l standard for both WHO and NAFDAC.

Free chlorine for sampling points I-V are 0.16, 0.17, 0.15, 0.14 and 0.19 respectively, they are below the maximum standard of 0.40 and 0.30 set by WHO and NAFDAC; Copper is

peaked at point 4 followed by points, II, I then III and V in descending order with following values; 0.41, 0.32, 0.21 and 0.19mg/l which are below maximum limit of 2.0mg/l standard for WHO and NAFDAC; Calcium is quite low compared to WHO and NAFDAC standard of 200 and 75mg/l respectively, sampling points I-V have the following values; 2.17, 2.25, 3.10, 2.14 and 1.96 mg/l; The values are below the maximum limit of 0.01mg/l standard of WHO and NAFDAC; Zinc peaked at point 4 followed by point V then I corresponding to values of 0.09, 0.03 and 0.01 mg/ respectively, the units are all below the maximum limits of 3.00 and 5.00mg/l standard by WHO and NAFDAC while at points II and IV no trace of Zinc was detected; Iron peaked at point 2 followed by points 4, 3, 5 and 1 in descending order with corresponding values of 1.30, 0.41, 0.37, 0.34 and 0.16, mg/l. The iron content in water samples at points II, III and IV are above the maximum limit of 0.30 mg/l but at points I and V the values are below limit of NAFDAC and WHO; Magnesium for sampling point I-V are 3.16, 2.93, 2.63, 3.14 and 3.71mg/l respectively with it peak at point V, but all are below the maximum limits of 150 and 50mg/l standard for WHO and NAFDAC.

The PH of the treated water (sampling point 6) is 7.763 is within the stipulated limits of (6.5-8.5) as standard for both WHO and NAFDAC; Total dissolved solids (TDS) at point VI is 240mg/l, far below the maximum limits of 500mg/l Regulatory Standard; Total Alkalinity; Total hardness, Magnesium hardness and Calcium hardness for sampling point VI were 36mg/l, 52mg/l, 22.0mg/l, and 30.0mg/l are all below the maximum limit of 100mg/l, 100mg/l, 50mg/l and 50mg/l respective standard set by NAFDAC while WHO has no specification. Chloride, fluoride and Nitrites at sampling point VI are 12mg/l, 0.2mg/l and 0.020mg/l respectively, are below maximum limit of 250mg/l, 1.5 and 1.3 mg/l and 50 and 3.0mg/l standard by WHO and NAFDAC. Magnesium and Calcium content in water sample at point VI are 1.06 and 1.12 mg/l respectively, compared with maximum limits of WHO and NAFDAC standard of 150 and 50 mg/l for magnesium, 200 and 75mg/l for calcium both are far from the maximum. Free chlorine is 0.12 mg/l below the maximum limits of 0.4 and 0.30mg/l of WHO and NAFDAC, Copper and Dissolved Carbon-dioxide (DCD) at sampling point VI are 0.12 and 40mg/l respectively, they are below maximum limit of WHO and NAFDAC standard of 2.0mg/l for Copper and 50mg/l for DCD.

Figure2. Biological Parameters sampling points in Alau dam in Compared with NAFDAC and WHO.



Source: author's research and lab analyses (NAFDAC's Lab) Maiduguri, 2012.

Note: WRN, WLA, WDU, WIU, WIN and WTS symbols were not used to represent sample points

Figure 2.reveals that Aerobic mesophilic count for untreated water samples was peaked at point 2 with 430cfu/ml followed by point IV then V, I and III in descending order having 410, 370, 360 and 300cfu/ml respectively. Coliform was highest at point II with 180cfu/ml by 170, 160, 140 and 120cfu/ml corresponding to points IV, III, V and 1. Also point II recorded the highest *E. coli* count of 110cfu/ml followed by 96, 90 and 80cfu/ml for points IV, V, III and I respectively. *P. aeruginosa* also is peaked at point II followed by point V then I and IV with least at point III corresponding 30, 18, 15, 15 and 10cfu/ml respectively.

There is an indication that the microbiological parameters found in the untreated water from the Alau Dam are related to some of these diseases; cholera, typhoid fever, diarrhoeal, bilharziasis, skin irritation among others, due to the fact that, villages around Dam are using the raw water for their domestic usage.

The treated water (sampling point VI) has 110cfu/ml for Aerobic mesophilic count, which both WHO and NAFDAC have not set standard. Coliform, *E. Coliform* and *P.aeruginosa* all these were zero (0) i.e. not detected from the treated water which correspond to both WHO and NAFDAC standard for household water quality. This indicated that treated water from Alau dam meet the accepted standard of WHO and NAFDAC for biological parameters whereby, could be used for any domestic, industrial and agricultural uses without any health implications.

In conclusion, the colour and turbidity both have value above the standards of WHO and NAFDAC. These could be attributed to the pumping action taking place at the pumping station located close to the dam. During the pumping process, the water is being mixed thoroughly and when it get to the treatment site the water is coloured and turbid. Hence, this call for addition

of more Alum, that is, calcium carbonate (CaCO_3) during the treatment processes.

The analysis for chemical parameters shows that: PH, DCD, Total Alkalinity, TDS, Total, hardness, calcium hardness, magnesium hardness, magnesium, calcium, free chlorine, chloride, sulphate, Fluoride, Nitrites and copper their values were found to be above and within the standards of WHO and NAFDAC.

Microbiological parameters which includes: Acrobic Mesophilic count, coliform, *E.Coli* count and *P. auriginosa* are very high values for microbial parameters with exception of sampling point V. Aerobic mesophilic count which signifies the amount of need oxygen by the Aerobic bacteria is peaked, the water from Lake Alau dam. These could be due to irrigation, fishing and animal grazing activities as well as washing of plates, clothes and bathing taking place in and around the lake.

The river serves as the only sources of large surface water for Maiduguri metropolitan city and its environs. This makes the water in the dam to suffer heavy pollution as a result of irrigation, fishing, grazing and domestic usage. Hence, the problem of cholera outbreak almost every year as well as typhoid fever, diarrhea, dysentery, bilharziasis (painful urination) and skin irritation that is common among the inhabitants of the area may be associated with use of untreated (raw) water from Alau Dam.

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AUTHORS

First Author – Amos Hyeladi, Department of Geography and Planning University of Jos, Plateau State, Nigeria, Email : hyelpat@gmail.com, Phone Number: +2348067642047

Second Author – Joshua Ezekiel Nwagilari, Department of Geography and Planning University of Jos, Plateau State, Nigeria, Email: joshuae870@gmail.com, Phone Number: +2348039380206

Gambler's or the Hot-Hand: Illusion or Real?

George Munene Macharia ^{*}, Ondabu Ibrahim Tirimba ^{**}

^{*} PhD Finance Candidate Jomo Kenyatta University of Agriculture and Technology, Kenya
^{**} PhD Finance Candidate Jomo Kenyatta University of Agriculture and Technology, Kenya

Abstract- This paper reviews literature of the Gambler's and the hot hand fallacies and the possible differences inherent in explaining investor behaviour. The Gambler's fallacy is built on the belief that the more you lose, the higher your next probability of winning in the near future; whereas the hot hand is built on the belief that the more the chances you get right now, the more likely you will get right even in the future. These beliefs are erroneous since they go contrary to the equal chances attributed to the probability of flipping a fair coin according to laws of probability. The investors tend to believe that the performance of a mutual fund is a combination of the manager's ability and luck will, at first, underestimate the likelihood that a manager of average ability will exhibit a streak of above- or below-average performance. Both Gamblers' and hot hand fallacies are illusions and ideal to a level of factual outcome which remains paradoxical. To a given level of accuracy, the paper based on the existing researches tends to give more weight unto the realness cast in the hot hand fallacy as opposed to the gambler's fallacy. However, there is no conclusiveness as to the wellbeing or vagueness of either given that both are heuristics, investors making judgments on how things appear rather than how statistically likely they are.

Index Terms- Heuristic, Gambler's Fallacy, Hot Hand Fallacy, Illusion

I. INTRODUCTION

The causal link between the gambler's fallacy and the hot hand fallacy is a common intuition in psychology. Some suggestive evidence comes from an experiment by Edwards (1961), in which subjects observe a very long binary series and are given no information about the generating process. Subjects seem, by the evolution of their predictions over time, to come to believe in a hot hand.

The hot-hand fallacy is a belief in the continuation of streaks. An alternative and closely related definition involves the agent's assessed auto-correlation of the signals (Rabin and Vayanos, 2009). Gilovich, Vallone, and Tversky (1985) and Tversky and Gilovich (1989a, 1989b) both give evidence on the hot-hand fallacy.

The Gambler's fallacy is exhibited in the works of Clotfelter and Cook (1993) and Terrell (1994) who study pari-mutuel lotteries, where the winnings from a number are shared among all people betting on that number. They find that people avoid systematically to bet on numbers that won recently. This is a strict mistake because the numbers with the fewest bets are those with the largest expected winnings.

Evidence linking the hot-hand fallacy to a belief in time-varying human skill comes from the casino-betting study of Croson and Sundali (2005). They show that consistent with the gambler's fallacy, individuals avoid betting on a color with many recent occurrences. Consistent with the hot-hand fallacy, however, individuals raise their bets after successful prior bets.

1.1 Hot Hand And Gamblers' Concepts

1.1.1 The Gambler's Fallacy

According to the formalized model by Rabin and Vayanos (2010), the gambler's fallacy arises from an expectation that outcomes in random sequences will soon exhibit systematic reversals. Many financial decisions are based on beliefs concerning the likelihood of uncertain events. The gambler's fallacy which is also known as the Monte Carlo fallacy or the fallacy of the maturity of chances refers to the mistaken belief that if something happens more frequently than normal during some period, then it will happen less frequently in the future; likewise, if something happens less frequently than normal during some period, then it will happen more frequently in the future (presumably as a means of *balancing* nature).

Many people fall under the spell of the "gambler's fallacy", expecting outcomes in random sequences to exhibit systematic reversals. When observing flips of a fair coin, for example, people believe that a streak of heads makes it more likely that the next flip will be a tail. Gambler's fallacy arises out of a belief in a "law of small numbers", or the erroneous belief that small samples must be representative of the larger population. According to the fallacy, "streaks" must eventually even out in order to be representative.

In situations where what is being observed is truly random (i.e. independent trials of a random process), this belief, though appealing to the human mind, is false. This fallacy can arise in many practical situations although it is most strongly associated with gambling where such mistakes are common among players.

The use of the term *Monte Carlo fallacy* originates from the most famous example of this phenomenon, which occurred in a Monte Carlo Casino in 1913 when the ball fell in black 26 times in a row. This was an extremely uncommon occurrence, although no more or less common than any of the other 67,108,863 sequences of 26 red or black. Gamblers lost millions of francs betting *against* black, reasoning incorrectly that the streak was causing an "imbalance" in the randomness of the wheel, and that it had to be followed by a long streak of red.

The gambler's fallacy can be illustrated by considering the repeated toss of a fair coin. With a fair coin, the outcomes in different tosses are statistically independent and the probability of getting heads on a single toss is exactly 1/2 (one in two). It follows that the probability of getting two heads in two tosses is

1/4 (one in four) and the probability of getting three heads in three tosses is 1/8 (one in eight).

Croson and Sundali (2005) conducted a research on decision making under uncertainty where they demonstrate that intuitive ideas of randomness depart systematically from the laws of chance. Two such departures involving random sequences of events have been documented in the laboratory, the gambler's fallacy and the hot hand. This study presents results from the field, using videotapes of patrons gambling in a casino, to examine the existence and extent of these biases in naturalistic settings. We find small but significant biases in our population, consistent with those observed in the lab.

1.1.2 Explaining why the probability is 1/2 for a fair coin

If one flips a fair coin 21 times, then the probability of 21 head is 1 in 2,097,152. However, the probability of flipping a head *after having already flipped 20 heads in a row* is simply 1/2. This is an application of Bayes' theorem. This can also be seen without knowing that 20 heads have occurred for certain (without applying of Bayes' theorem). Consider the following two probabilities, assuming a fair coin:

- probability of 20 heads, then 1 tail = $0.520 \times 0.5 = 0.521$
- probability of 20 heads, then 1 head = $0.520 \times 0.5 = 0.521$

The probability of getting 20 heads then 1 tail, and the probability of getting 20 heads then another head are both 1 in 2,097,152. Therefore, it is equally likely to flip 21 heads as it is to flip 20 heads and then 1 tail when flipping a fair coin 21 times. Furthermore, these two probabilities are equally as likely as any other 21-flip combinations that can be obtained (there are 2,097,152 total); all 21-flip combinations will have probabilities equal to 0.521, or 1 in 2,097,152. From these observations, there is no reason to assume at any point that a change of luck is warranted based on prior trials (flips), because every outcome observed will always have been as likely as the other outcomes that were not observed for that particular trial, given a fair coin. Therefore, just as Bayes' theorem shows, the result of each trial comes down to the base probability of the fair coin: 1/2

1.1.3 Non-examples of the fallacy

There are many scenarios where the gambler's fallacy might superficially seem to apply, when it actually does not. When the probability of different events is *not* independent, the probability of future events can change based on the outcome of past events (see statistical permutation). Formally, the system is said to have *memory*. An example of this is cards drawn without replacement. For example, if an ace is drawn from a deck and not reinserted, the next draw is less likely to be an ace and more likely to be of another rank. The odds for drawing another ace, assuming that it was the first card drawn and that there are no jokers, have decreased from 4/52 (7.69%) to 3/51 (5.88%), while the odds for each other rank have increased from 4/52 (7.69%) to 4/51 (7.84%). This type of effect is what allows card counting systems to work (for example in the game of blackjack).

1.1.4 Variations of the gambler's fallacy

Some researchers believe that there are actually two types of gambler's fallacy: Type I and Type II. Type I is the "classic" gambler's fallacy, when individuals believe that a certain outcome is "due" after a long streak of another outcome. Type II gambler's fallacy, as defined by Keren and Lewis (1994) occurs

when a gambler underestimates how many observations are needed to detect a favorable outcome (such as watching a roulette wheel for a length of time and then betting on the numbers that appear most often). Detecting a bias that will lead to a favorable outcome takes an impractically large amount of time and is very difficult, if not impossible, to do; therefore people fall prey to the Type II gambler's fallacy (Keren and Lewis, 1994). The two types are different in that Type I wrongly assumes that gambling conditions are fair and perfect, while Type II assumes that the conditions are biased, and that this bias can be detected after a certain amount of time.

Another variety, known as the retrospective gambler's fallacy, occurs when individuals judge that a seemingly rare event must come from a longer sequence than a more common event does. For example, people believe that an imaginary sequence of die rolls is more than three times as long when a set of three 6's is observed as opposed to when there are only two 6's. This effect can be observed in isolated instances, or even sequentially. A real world example is that when a teenager becomes pregnant after having unprotected sex, people assume that she has been engaging in unprotected sex for longer than someone who has been engaging in unprotected sex and is not pregnant (Oppnheimer and Monin, 2009)

1.2.1 Hot hand Fallacy

The "hot-hand fallacy" (also known as the "hot hand phenomenon" or "hot hand") is the fallacious belief that a person who has experienced success with a random event has a greater chance of further success in additional attempts.

1.2.2 Hot hand fallacy discovery

Three men discovered the fallacy, with Thomas Gilovich and Amos Tversky acting as the primary investigators. Gilovich's primary focus was on judgment, decision-making behaviors and heuristics (Gilovack, 2012); while Amos Tversky came from a cognitive and mathematical psychology background (Tversky, 2012). The pair collaborated with Robert Vallone, a cognitive psychologist, and all three became pioneers of the hot hand fallacy theory. Their study, "The Hot Hand in Basketball: On the Misperception of Random Sequences" (1985), investigated the validity of people's thoughts on "hot" shooters in basketball.

The "Hot Hand in Basketball" study provided a large body of evidence that disproved the theory the basketball players have "hot hands", that is, that they are more likely to make a successful shot if their previous shot was successful.

The study looked at the inability of respondents to properly understand randomness and random events; much like innumeracy can impair a person's judgment of statistical information, the hot hand fallacy can lead people to form incorrect assumptions regarding random events. The three researchers provide an example in the study regarding the "coin toss"; respondents expected even short sequences of heads and tails to be approximately 50% heads and 50% tails (Gilovich, Tversky and Vallone, 1985). The study proposed two biases that are created by the kind of thought pattern applied to the coin toss: it could lead an individual to believe that the probability of heads or tails increases after a long sequence of either has occurred (known as the gambler's fallacy); or it could cause an individual to reject randomness due to a belief that a streak of either outcome is not representative of a random sample (Gilovich, Tversky and Vallone, 1985).

The first study was conducted via a questionnaire of 100 basketball fans from the colleges of Cornell and Stanford. The other looked at the individual records of players from the Philadelphia 76ers during the 1980–81 seasons. The third study analyzed free-throw data and the fourth study was of a controlled shooting experiment. The reason for the different studies was to gradually eliminate external factors around the shot. For example, in the first study there is the factor of how the opposing team's defensive strategy and shot selection would interfere with the shooter. The second and third take out the element of shot selection, and the fourth eliminates the game setting and the distractions and other external factors mentioned before. The studies primarily found that the outcomes of both field goal and free throw attempts are independent of each other (Gilovich, Tversky and Vallone, 1985).

In the later studies involving the controlled shooting experiment the results were the same; evidently, the sense of being "hot" does not predict hits or misses (Gilovich, Tversky and Vallone, 1985).

1.2.3 Hot-hand consumers

There are more places than sport that can be affected by the hot-hand fallacy. A study conducted by Joseph Johnson et al. examined the characteristics of an individual's buying and selling behavior as it pertained to the hot hand and gamblers' heuristic. Both of these occur when a consumer misunderstands random events in the market and is influenced by a belief that a small sample is able to represent the underlying process (Roney and Trick, 2009).

To examine the effect of the hot hand and gambler's heuristic on the buying and selling behaviors of consumers, three hypotheses were made. Hypothesis one stated that consumers that were given stocks with positive and negative trends in earning would be more likely to buy a stock that was positive when it was first getting started but would become less likely to do so as the trend lengthened. Hypothesis two was that consumers would be more likely to sell a stock with negative earnings as the trend length initially increased but would decrease as the trend length increased more. Finally, the third hypothesis was that consumers in the buy condition would be more likely to choose a winning stock over those in the selling condition (Roney and Trick, 2009).

The results of the experiment did not support the first hypothesis but did support hypotheses two and three, suggesting that the use of these heuristics is dependent on buying or selling and the length of the sequence. This means that those who had the shorter length and the buying condition would fall under the influence of the hot-hand fallacy (Roney and Trick, 2009). The opposite would be in accordance with the gambler's fallacy which has more of an influence on longer sequences of numerical information. This particular study explores a portion of the possibilities that the hot hand and gambler's fallacies affect other aspects of consumers' potential behavior, especially when selling instead of buying, because it is a more complex task.

1.2.4 The Hot-hand or the gambler's fallacy?

A study was conducted to examine the difference between the hot-hand and gambler's fallacy. The gambler's fallacy is the expectation of a reversal following a run of one outcome (Roney

and Trick, 2009). Gambler's fallacy occurs mostly in cases in which people feel that an event is random, such as rolling a pair of dice on a craps table or spinning the roulette wheel. It is caused by the false belief that the random numbers of a small sample will balance out the way they do in large samples; this is known as the law of small numbers heuristic.

The difference between this and the hot-hand fallacy is that with the hot-hand fallacy an individual expects a run to continue (Roab, Markus and Gigerenzer, 2011). There is a much larger aspect of the hot hand that relies on the individual. This relates to a person's perceived ability to predict random events, which is not possible for truly random events. The fact that people believe that they have this ability is in line with the illusion of control (Roney and Trick, 2009).

In this study, the researchers wanted to test if they could manipulate a coin toss, and counter the gambler's fallacy by having the participant focus on the person tossing the coin. In contrast, they attempted to initiate the hot-hand fallacy by centering the participant's focus on the person tossing the coin as a reason for the streak of either heads or tails. In either case the data should fall in line with sympathetic magic, whereby they feel that they can control the outcomes of random events in ways that defy the laws of physics, such as being "hot" at tossing a specific randomly determined outcome (Roney and Trick, 2009). They tested this concept under three different conditions. The first was person focused, where the person who tossed the coin mentioned that *she* was tossing a lot of heads or tails. Second was a coin focus, where the person who tossed the coin mentioned that *the coin* was coming up with a lot of heads or tails. Finally there was a control condition in which there was nothing said by the person tossing the coin.

Roney and Trick (2009) assert that the participants were also assigned to different groups, one in which the person flipping the coin changed and the other where the person remained the same. The researchers found the results of this study to match their initial hypothesis that the gambler's fallacy could in fact be countered by the use of the hot hand and people's attention to the person who was actively flipping the coin. It is important to note that this counteraction of the gambler's fallacy only happened if the person tossing the coin remained the same (Roney and Trick, 2009). This study shed light on the idea that the gambler's and hot hand fallacies at times fight for dominance when people try to make predictions about the *same* event (Roney and Trick, 2009).

1.2.5 Why the "Hot Hand" May Be Real After All

Jeffrey Zwiebel, a Stanford Finance professor finds that hot streaks in sports are no illusion. Economists should take heed. Sports fans, rejoice: You may have been right all along about hot streaks. They aren't a figment of your imagination.

Contradicting academic studies dating back 30 years, researchers at Stanford, Berkeley, and Harvard are now finding that a "hot hand" in basketball or baseball is not a statistical illusion. In fact, hot streaks can help predict a player's likelihood of getting another hit or sinking another basket (Zwiebel, 2013).

Perhaps surprisingly, this has implications for a raging debate in finance about the rationality, or lack of it, in markets. In a major new study of baseball data, Jeffrey Zwiebel at Stanford Graduate School of Business and Brett Green at

University of California's Haas School of Business at Berkeley find that hot hands are real and have predictive power. Why would business professors jump into a sports debate? Because the "hot-hand fallacy" has become a staple in arguments by supporters of behavioral economics to argue that individuals can be irrational. For example, the behaviorists have argued that investors often get lured into bad decisions by seeing patterns that aren't real. According to the behaviorists, investors make a wide range of cognitive mistakes that range from overconfidence in their own abilities to a tendency to over-react to news.

That critique gained a lot of traction in the wake of the mortgage bust and the great financial crisis. A 2009 paper lays out the theory and potential financial applications of the hot-hand fallacy. A 2012 paper argues that the hot-hand fallacy explains why people pay for useless investment advice. And in a brand new paper, German scholars even found evidence that people who believe in the hot-hand fallacy are more at risk of long-term unemployment.

Zwiebel (2013) says the earlier researchers were too quick to conclude that the belief in a hot hand was evidence of a cognitive or behavioral mistake. Most likely, what's really at work is not so much a mistake but an "equilibrium adjustment" around the hot-handed player, similar to the kinds of equilibrium adjustments that occur in finance and economics.

"The behavioral camp jumps too quickly to the conclusion that almost all sports fans and participants are under a dumb illusion that there are hot hands," (Zwiebel, 2013) says. "They have jumped to that conclusion because it fits their story that everyone is making cognitive mistakes and that these mistakes are extraordinarily pervasive."

Investment bankers have been criticized for underestimating the risks of subprime mortgages, for being irrational in their optimism. But it's possible that their excessive risk-taking wasn't irrational as much as it was encouraged or even subsidized by regulatory policies, such as those that protected banks considered "too big to fail." The difference between those two diagnoses of the financial crisis leads to very different proposals for reform. "One can portray the financial crisis as being triggered by a bunch of mistakes, or one can portray it as the consequence of risky decisions that were made based on the incentives and subsidies in the system," he says. "I see it as more of the latter."

II. CONCLUSION

'Gambler's Fallacy' occurs when an individual erroneously believes that the onset of a certain random event is less likely to happen following an event or a series of events. This line of thinking is incorrect because past events do not change the probability that certain events will occur in the future. This line of thinking represents an inaccurate understanding of probability because the likelihood of a fair coin turning up heads is always 50%. Each coin flip is an independent event, which means that any and all previous flips have no bearing on future flips. This can be extended to investing as some investors believe that they should liquidate a position after it has gone up in a series of subsequent trading session because they don't believe that the position is likely to continue going up.

Rabin (2002) and Rabin and Vayanos (2010) outline a model in which believers of "the law of small numbers" – i.e. those who

believe that a small sample of signals represents the parent population from which it is drawn (Tversky & Kahneman, 1971) – will be willing to pay for services by financial analysts after observing randomly occurring streaks of profitable financial performances predicted by these professionals. This fallacious belief in the hot-hand of a financial expert arises as a consequence of the gambler's fallacy, which is defined as an individual's tendency to expect outcomes in random sequences to exhibit systematic reversals. The authors suggest that an investor who believes that the performance of a mutual fund is a combination of the manager's ability and luck will, at first, underestimate the likelihood that a manager of average ability will exhibit a streak of above- or below-average performance. Following good or bad streaks, however, the investor will revert to overestimate the likelihood that them manager is above or below average, and so in turn will over-infer that the streak of unusual performance will continue (Gilovich et al., 1985).

The implication of this is that believers of the law of small number will be happy to pay for real-time price information provided by experts, such as stockbrokers or managers of actively-managed funds, even when it is well-documented that actively-managed funds do not outperform their market benchmark on average (Fama, 1991).

While the Gambler's fallacy investors tend to belief that events exhibit systematic reversals, the hot hand counterparts tend to argue that there are more chances of making a winning investment decision if you have been doing it right before. Both Gamblers' and hot hand fallacies are illusions and ideal to a level of factual outcome. However, Gamblers being the opposite of hot hand means that the two cannot happen one and the same time. Both are fallacies ideal to certain circumstances and an illusion to others. Whereas Gamblers can be ideal in some situation, hot hand can be an illusion in such a situation, the opposite is true.

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AUTHORS

- First Author** – George Munene Macharia, PhD Finance
Candidate Jomo Kenyatta University of Agriculture and Technology, Kenya
- Second Author** – Ondabu Ibrahim Tirimba, PhD Finance
Candidate Jomo Kenyatta University of Agriculture and Technology, Kenya

The Effect of Initial Public Offers on Long run Stock Performance: Evidence from the Nairobi Securities Exchange

Evalyne Wambui Wamari

School of Business, Jomo Kenyatta University of Agriculture and Technology

Abstract- The main objective of any business is to maximize shareholders' wealth therefore this study endeavored to find out whether Initial Public Offers (IPOs) actually help a firm to achieve this objective in the long run. This study thus sought to find out the long run performance of a company's stock after it goes public. The study therefore looked at variables that show the performance of the stock in the long run such as share price, earnings per share and price earnings ratio of the stock. The study analyzed seven companies which went public between 2000 and 2006 using the Buy and Hold Abnormal Returns (BHAR) model. Observations were made on a yearly basis over six years to allow the researcher to analyze (BHAR) for the period of six years. The study drew data from balance sheets and the Income statements and information from the Nairobi Securities Exchange (NSE) on the companies' earnings.

Hypothesis testing was done using the student's t-test at 95% confidence level to find whether there is significant under performance of IPOs in the long run. The trend analysis findings showed that share price, price earnings ratio and the overall stock performance decreased in the long run after IPO. However the earnings per share increased after IPO. The buy and hold abnormal returns decreased in the long run after IPO; however the test of significance findings at 5 % level of significance showed that the decrease in stock performance after IPO was not significant. Generally the finding showed that the stock under performs in the long run after IPO but not significantly.

Index Terms- Long run, Initial Public Offer, Stock performance, Buy and Hold Abnormal Returns

I. INTRODUCTION

As a firm becomes large, private financing through self-financing or use of debt may be inadequate to raise capital to fund expansion; this is the point at which it is optimal to go public, even though there are substantial costs associated with "outside" equity. Private firms therefore can raise money by offering securities for sale to the public for the first time. This is called an initial public offering and through the initial public offering a firm is said to have gone public (Ritter, 1991).

Mbui (2001) explains that the decision to list is explained mainly by the need to raise funds for expansion and growth without the interest burden of funds borrowed from lending institutions, to improve the liquidity of their securities and also to increase the public awareness about the company and its products.

Many companies are desirous of making an initial public offering, the main reason being to raise equity capital and to create a public market in which shareholders of the company can convert some of their wealth into cash at a future date (Bessler and Thies, 2007). This is in line with the main objective of any business which is to maximize shareholders' wealth. However, the decision as to whether or not to participate in the IPO rests with stock market investors. Further, investors would be interested to know how long they should maintain ownership of the stock so as to reap the maximum benefit out of it. This is possible only if they understand the nature of the performance of the stock over time.

II. RESEARCH ELABORATIONS

Numerous studies have examined the performance of initial public offerings (IPOs) in several different markets and the majority of the studies have shown underperformance in the long run. (Ritter, 1998; Durukan, 2002; Bessler and Thies, 2007; Goergen et al, 2007; Kirkulak, 2008; Ljungqvist, 1997). Several studies have however shown positive abnormal returns in the long run (Kiymaz, 1996; Ozer, 1999). Lee et al (1996) found IPOs in Australian markets from 1976 - 1989 also underperformed in three years.

There are three common explanations for this underperformance. Miller (1977) assumes that there are constraints on shorting IPOs, and that the investors have heterogeneous expectations on the value of the firm. The most optimistic investors buy the IPO, and their valuation determines the first trading day's price. As the divergence in opinion about the firm's value becomes smaller, the valuation of the most optimistic investors and hence the trading price will be lowered, resulting in long-run underperformance.

Another explanation is the fads in the IPO market (Aggarwal and Rivoli, 1990; Shiller, 1990; Loughran and Ritter, 1995). During these periods investors become overly optimistic about the firm's value, and push the price higher than the fair value. Issuers are able to take advantage of these "windows of opportunity" to sell the stocks at a higher price.

The third explanation is "window dressing," which postulates that firms manipulate their accounting numbers to make the firms look better before public offering; thus beguiled investors will pay a higher price than the fair one. In the long-run investors learn the true value of the firm and the stock price will fall back (Teoh, Welch and Wong, 1998)

Bessler and Thies (2007) investigated the long run performance of IPOs in Germany between 1977 and 1995. Their findings suggested that the subsequent financing activity in the equity market is the most important factor for determining the future performance of an IPO. Durukan (2002) confirmed the anomaly that the IPOs provide abnormal initial returns in his study of the Istanbul Stock Exchange. The return analysis also generated results that support the fads hypothesis. That is, the long-term returns are negatively associated with short-term returns. Kiyamaz (1996) and Ozer (1999), who also investigated IPO performance in the Istanbul Stock Exchange showed that the IPOs do not underperform the market in the long run as is the case in majority of the other markets. Goergen et al, (2007),

found that small firms behave differently from large firms and suffer from worse long-run performance than large firms.

Kirkulak (2008) found out that Japanese IPOs underperform in the long-run. The results suggest that although Venture capital-backed companies have high initial returns, they perform significantly worse over a three-year time horizon than non-Venture capital-backed companies. Ritter (1998), documented that the earnings per share of companies going public typically grows rapidly in the years prior to going public, but then actually declines in the first few years after IPO. In Africa, evidence of IPO underperformance has also been documented by Michael and Ivan (1987) and Alli et al. (2010).

III. FINDINGS

4.1 Long run effects of IPO on share price

Table 4.1 Share Price

Company / Years	1	2	3	4	5	6
Kenya Reinsurance	28.5	23.5	20.5	21.75	16.85	15.52
Access Kenya	23.25	20.75	20.25	13.5	5.15	6.28
Scangroup Limited	24.75	29.75	26	26.5	45.6	41.5
Kengen	39.25	26	24.5	14.55	17.1	13.55
Equity Bank	139	150	176	14.35	26.75	16.4
Mumias Sugar Co.	26.6	12.7	6	12.85	7.15	8.52
Eveready East Africa Ltd	17.95	7.95	3.5	2.6	3	1.75
Total P/E ratio	299.3	270.65	276.75	106.1	121.6	103.52
Mean share price	42.75714	38.66429	39.53571	15.15714	17.37143	14.78857

Table 4.1 shows the share prices of the companies under the study over a period of six years. Year one represents the first year after the company goes public all the way up to the sixth year of listing. All the stocks showed a decline in the prices of

stocks. The short run period, that is, three years shows decline of the prices with a small margin but from the third year the prices drop drastically. The share price of stocks therefore decreases in the long run.

Trend of Share Price

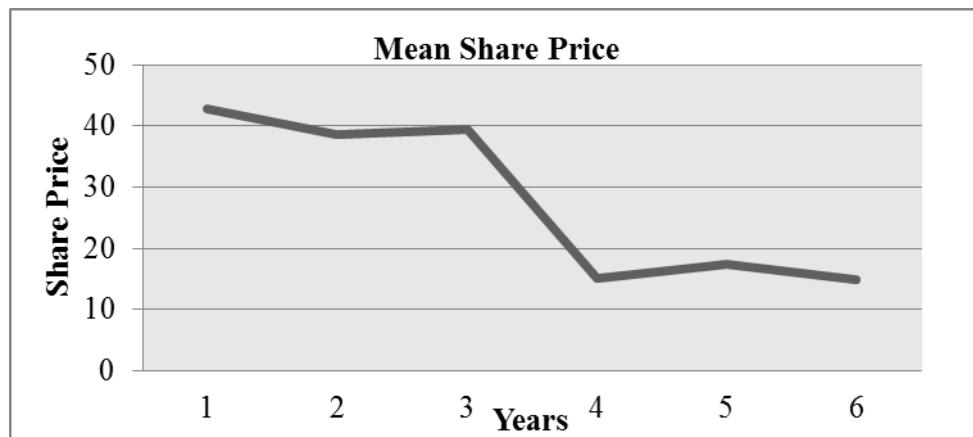


Figure 4.1: Trend of Mean Share Price

Figure 4.1 shows the mean share price of the stocks from the first year after listing up to the sixth year. It is evident from the analysis that share price declines but remains relatively stable for

the first three years and from the third year the mean share price is seen to decline steadily up to the sixth year. Generally, the overall mean share price of the stocks decreased after companies

go public. From the trend in the figure above, it is evident that share price of stocks underperforms in the long run period.

4.2. Long run effects of IPO on Earnings per share

The earnings per share is also an indicator of the performance of a stock. This ratio shows the earnings for each

share of the company. Table 4.2 shows the earning per share of the seven companies under the study from the first year after initial public offer up to the sixth year.

Earnings per share was calculated as: Earnings per share = Total earnings attributable to ordinary shareholders/Outstanding shares

Table 4.2 Earnings per Share

Company Years	1	2	3	4	5	6
Kenya Reinsurance	1.5987	1.9847	1.6865	1.8547	1.9847	2.568
Access Kenya	1.76954	2.2547	1.700125	1.81547	2.36587	2.3658
Scangroup Limited	1.14987	1.36587	1.76854	1.765987	2.1547	1.6584
Kengen	1.9754	1.72364	1.74879	1.78547	1.874	1.91487
Equity Bank	2.01254	1.5987	1.729897	1.847	1.6559	2.03654
Mumias Sugar Co.	1.3658	1.9874	1.6987	1.75647	2.5987	1.8759
Eveready East Africa Ltd	1.15478	1.8547	1.674	1.795487	2.6587	1.97451
Total EPS	11.02663	12.76971	12.006552	12.620584	15.29257	14.39402
Mean EPS	1.57523	1.824244	1.7152217	1.8029405	2.1846528	2.056289

Table 4.2 shows the earnings per share over a period of six years for the seven companies under the study. The mean EPS for all the companies under the study showed that the earnings per share increases from the first year after the IPO. In the

second year however there is dilution as can be seen by the decrease, but from the third year the earnings per share increases steadily. In the first three years there is an increase but with a small margin, in the long run however the increase in the ratio is much more significant.

Trend of Earnings per Share

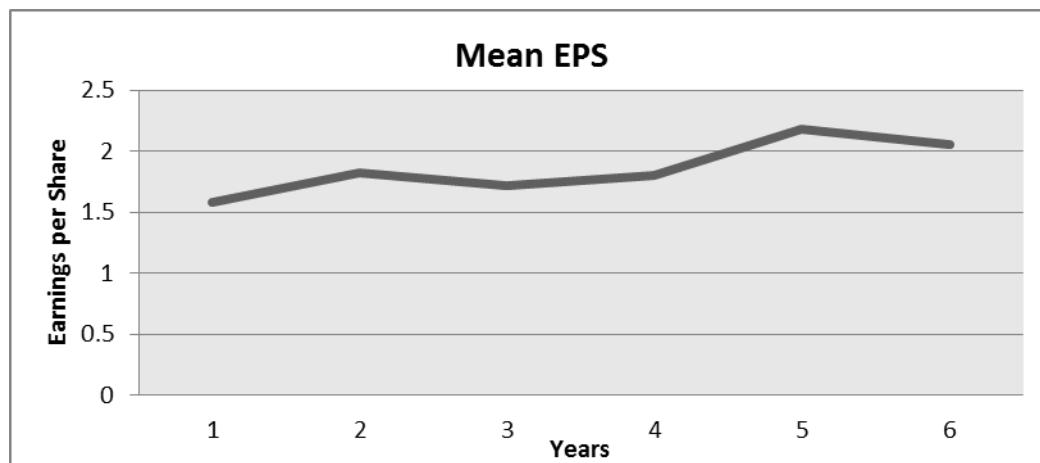


Figure 4.2 Mean Earnings per Share

Figure 4.2 shows the mean earnings per share of the companies' after listing in the NSE. The trend shows the EPS increase after the first year then becomes steady and increases again in the fourth year. Generally, the EPS increases after the IPO. This shows that the earnings increased relative to the number of outstanding shares. From the trend in figure 4.2, it is evident that the EPS increases in the long run after IPO.

4.3 Effects of IPO on Price-to Earnings Ratio

The price earnings ratio shows the future expectations of investors therefore it was used as an indicator of stock performance in this study. The researcher analyzed the price earnings ratio of the seven companies from the first year after the companies went public up to the sixth year. The table below shows Price earnings ratio of the seven companies for six years after initial public offer.

Price-to Earnings Ratio was calculated as: Price-to Earnings Ratio = Market Price per Share/ Earnings per Share

Table 4.3 Price-to Earnings Ratio

Company Years	1	2	3	4	5	6
Kenya Reinsurance	0.9487	0.8547	0.83547	0.769854	0.824971	0.785794
Access Kenya	0.9147	0.89745	0.886547	0.7985	0.796547	0.802547
Scangroup Limited	0.84597	0.9147	0.81254	0.85471	0.856947	0.779854
Kengen	0.81647	0.79854	0.78654	0.81647	0.769854	0.723658
Equity Bank	0.86944	0.84756	0.8547	0.78974	0.89745	0.85476
Mumias Sugar Co.	0.79845	0.814579	0.9147	0.838745	0.75981	0.83471
Eveready East Africa Ltd	0.87654	0.83547	0.8249	0.759482	0.8197	0.795647
Total P/E ratio	6.07027	5.962999	5.915397	5.627501	5.725279	5.57697
Mean P/E ratio	0.867181	0.851857	0.845057	0.803929	0.817897	0.79671

Table 4.3 shows the P/E ratio of the seven companies under the study from the first year after listing in the NSE up to the sixth year. The researcher calculated the mean Price earnings ratio for all the companies so as to show the general effect of IPO

on the P/E ratio in the long run. The mean P/E ratio showed decrease from the first year after listing and the decrease is constant up to the sixth year. The researcher then used this data to create a trend of the mean P/E ratio.

Trend of Price earnings ratio

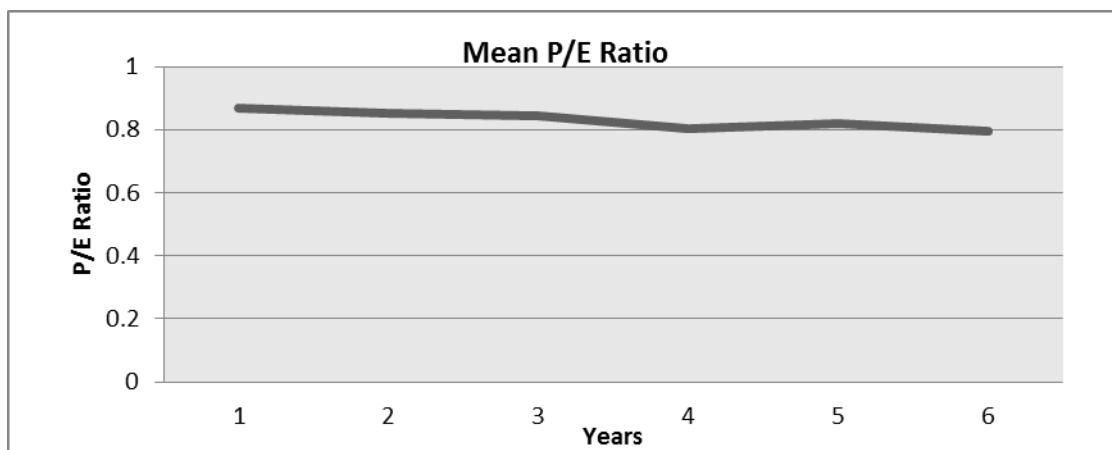


Figure 4.3: Trend of mean Price earnings ratio

Figure 4.3 shows the mean price earnings ratio of the companies'. From the figure, it can be observed that the P/E ratio decreases at a slow rate from the first year after the IPO. The trend shows a decline in the ratio over the six years under the study though not at a high rate. Generally the trend shows a decrease in the mean P/E ratio. This shows that the investors expect lower returns in the long run after a company is listed in the NSE.

4.4 Overall Stock Performance

The researcher analyzed the overall stock performance of the companies under the study. This was done using the results of the share price, earnings per share and price earnings ratio, specifically the mean that was used to create a trend in figures 4.1, 4.2 and 4.3. The analysis was necessary so as to show the combination of the three aspects and to come up with a trend. Table 4.4 shows the mean of share price, EPS and P/E ratio for all the six years analyzed in this study. The final column shows the mean of the three aspects that were used to show stock performance in this study.

Table 4.4 Overall Stock Performances

Years	Mean price	share	Mean Ratio	P/E	Mean EPS	Overall Stock performance
1	42.75714		0.8671814	1.5752329		15.0665181
2	38.6642857		0.851857	1.8242443		13.780129

3	39.535714	0.845056	1.7152217	14.0319972
4	15.157142	0.8039287	1.8029406	5.9213371
5	17.371428	0.817897	2.1846529	6.79132597
6	14.7885714	0.79671	2.0562886	5.88052333

Table 4.4 shows the mean of the Share price, EPS and the P/E ratio from the first year after the companies were listed in the NSE up to the sixth year. It is evident that the performance is relatively stable in the first three years because there is decrease in performance in the second year but improvement is seen in the third year. From the fourth year however there is decline in

performance of the stocks with a large margin as can be seen by the drop from 14.031997 to 5.921337. The performance of the stocks can be seen to be poor as compared to the short run performance. The researcher then used a line graph to create a trend of the overall stock performance.

Trends in Overall Stock Performance

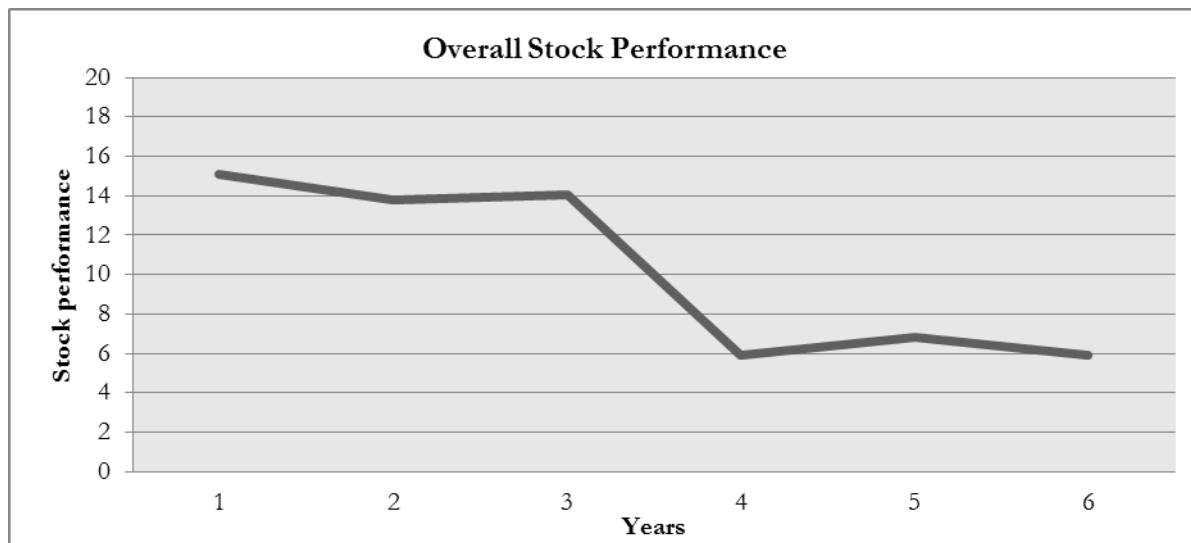


Figure 4.4: Trend of overall Stock performance

Figure 4.4 shows the overall stock performance of the seven companies under the study based on the mean share price, mean EPS and the mean P/E ratio over a period of six years. From the figure, the overall stock performance of companies declines after the companies are listed. The second year shows some stability but then there is a sharp decline from the third year.

It is evident that the first three years there was slightly poor performance but in the long run period, that is, the six years the stock performance is poor. This shows that the long run performance of stocks is generally poor.

4.5 Buy and Hold Abnormal Returns

The buy and hold abnormal returns have been used as the basis of study for most empirical studies about long run performance of stocks. The researcher therefore calculated the BHAR to investigate whether the stocks underperformed in the long run. The researcher calculated buy and hold abnormal

returns (BHAR) of all the seven companies under the study annually from the first year after the companies listed in the NSE up to the sixth year.

Stock Returns

In order to calculate Buy and Hold Abnormal Returns, the return of the stock is subtracted from the return of the IPO.

$$BHAR = \frac{1}{N} \sum_{i=1}^N [(\prod_{t=1}^T (1 + R_{i,t})) - (\prod_{t=1}^T (1 + R_{M,t}))]$$

Where N is the number of stocks and $R_{M,t}$ is the benchmark return at time t.

Stock returns were calculated as: Dividend per share/ Stock nominal price

Table 4.5 Buy and Hold Abnormal Returns

Company / Years	1	2	3	4	5	6
Kenya Reinsurance	2.45614	4.2553191	4.8780487	5.74712643	10.9792284	8.1673201
Access Kenya	1.2903225	1.9277108	1.97530864	2.222222	0	2.1834116

Scangroup Limited	3.02521008	2.88461538	1.96078431	1.13821138	1.6867469	1.7309228
Kengen	3.07692307	3.67346938	3.43642611	2.9239766	3.6900369	3.4971035
Equity Bank	1.43884892	1.3333333	1.70454545	2.78745644	2.9906542	4.87804878
Mumias Sugar Co.	0	8.6141766	2.56934	3.618677	2.9790209	2.6530447
Eveready East Africa Ltd	0	0	0	0	0	0
Total BHAR	11.28744457	22.68862456	16.52445321	18.43766985	22.3256873	23.10985148
Mean BHAR	1.61249208	3.24123208	2.36063617	2.63395284	3.1893839	3.30140735

Table 4.5 shows the buy and hold abnormal returns calculated annually over a period of six years. Some of the companies such as Kenya Reinsurance, Access Kenya and Equity Bank showed increase in BHAR from the first year after listing up to the sixth year. There are other companies that showed decrease in the abnormal returns such as ScanGroup Limited, Kengen and Mumias Sugar Co.

Eveready East Africa results were exceptional as they showed that the company did not record any buy and hold abnormal returns from the first year after listing in the NSE. This is because since the company went public it had not offered

dividends for its shareholders for the entire period of six years. This meant that the researcher did not have a figure for dividend per share in the calculation thus the results showed no abnormal returns.

It was therefore necessary to calculate the mean buy and hold abnormal returns for all the seven companies. The mean BHAR showed decrease from the first year after listing. There was increase in the returns in the third year then a steady decrease after that. The researcher then used a line graph to show the trend on the buy and hold abnormal returns.

Trend of Buy and Hold Abnormal Returns

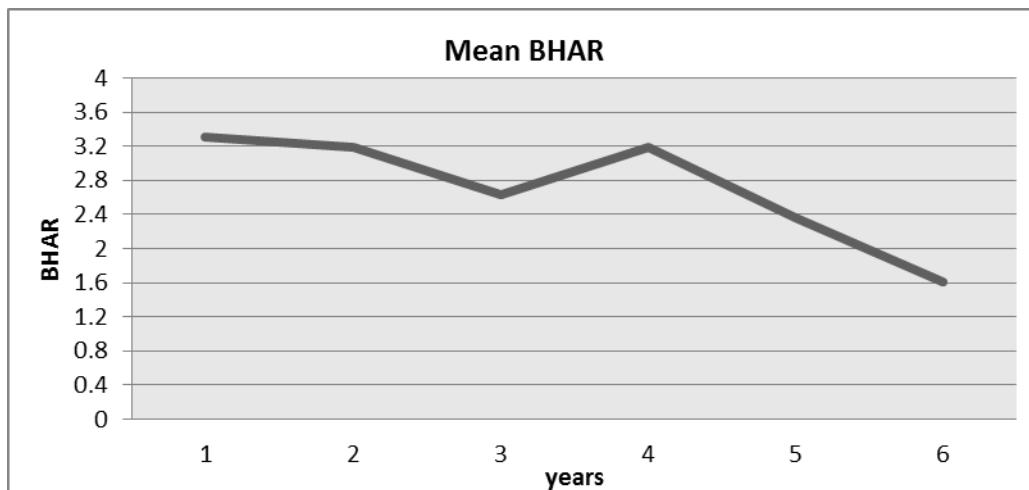


Figure 4.5 Trend of mean Buy and Hold Abnormal Returns

Figure 4.5 shows the trend of the mean buy and hold abnormal returns of the seven companies under the study from the first year after listing in the NSE up to the sixth year in the post IPO years. The buy and hold abnormal returns decline in the first three years rises in the fourth year then declines steadily. Generally, there is a decline in buy and hold abnormal returns in the long run after the companies go public. This shows that the stocks of the companies underperform in the long run as is evident from the trend.

4.6 Tests of Significance

Hypothesis testing on whether the effect of IPO in the long run was significant was done using MS Excel t test two sample means with unequal variances for each category and yielded the following results. The tests were done at a 95% level of significance using the 't' student test.

4.6.1 Share price 't' Statistic

Hypothesis testing was done to establish whether the effect of IPO on share price in the long run is significant.

H_0 : There is no significant effect of IPO on share price of companies quoted at Nairobi Securities Exchange in the long run.

H_A : There is a significant effect of IPO on share price of companies quoted at Nairobi Securities Exchange in the long run.

	<i>Variable</i>
Mean	28.0457138
Variance	0.000255791

Observations	7
Hypothesized Mean Difference	0
Df	7
t Stat	-4.032479368
P(T<=t) one-tail	0.002490057
t Critical one-tail	1.894578604

The share price 't' statistic computed was -4.03248 and the p value was 0.00249 and fell in the critical region, implying that we reject the null hypothesis that there is no significant effect of IPO on share price of stocks in the long run and accept the alternative hypothesis that there is a significant effect of IPO on share price of stocks in the long run.

4.6.2 Earnings per share 't' Statistic

	<i>Variable</i>
Mean	1.8954473
Variance	0.002688529
Observations	7
Hypothesized Mean Difference	0
Df	5
t Stat	0.634863596
P(T<=t) one-tail	0.2767141
t Critical one-tail	2.015048372

The computed earnings per share t statistic was 0.63486 and the p value was 0.27671 and fell in the acceptance region thus accept the null hypothesis that there is no significant effect of IPO on earnings per share of companies in the long run.

4.6.3 Price earnings ratio 't' Statistic

Hypothesis testing was done to establish whether the effect of IPO on price earnings ratio in the long run is significant.

	<i>Variable</i>
Mean	0.711804
Variance	0.000654
Observations	7
Hypothesized Mean Difference	0
Df	7
t Stat	-2.31975
P(T<=t) one-tail	0.026707
t Critical one-tail	1.894579

The computed price earnings ratio test statistic was -2.31975 and the p value was 0.026707 and fell in the critical region thus reject the null hypothesis and accept the alternative hypothesis that there is a significant effect of IPO on price earnings ratio of companies in the long run.

4.6.4 Stock performance 't' Statistic

Hypothesis testing on whether there is a significant under performance of IPO in the long run of companies after going

Hypothesis testing was done to establish whether the effect of IPO on earnings per share in the long run is significant.

H_0 : There is no significant effect of IPO on earnings per share of companies quoted at Nairobi Stock Exchange in the long run.

H_A : There is a significant effect of IPO on earnings per share of companies quoted at Nairobi Stock Exchange in the long run.

H_0 : There is no significant effect of IPO on price earnings ratio of companies quoted at Nairobi Stock Exchange in the long run.

H_A : There is a significant effect of IPO on price earnings ratio of companies quoted at Nairobi Stock Exchange in the long run.

	<i>Variable</i>
Mean	0.711804
Variance	0.000654
Observations	7
Hypothesized Mean Difference	0
Df	7
t Stat	-2.31975
P(T<=t) one-tail	0.026707
t Critical one-tail	1.894579

public was done using MS Excel t test two sample means with unequal variances for each category and yielded the following results.

The tests were done at a 95% level of significance using the two tail test.

H_0 : There is no significant underperformance of stocks in the long run post-IPO.

H_1 : There is a significant underperformance of stocks in the long run post-IPO.

<i>Variable</i>	
Mean	10.24530512
Variance	0.002465867
Observations	7
Hypothesized Mean Difference	0
Df	8
t Stat	-1.327926278
P(T<=t) one-tail	0.110419532
t Critical one-tail	1.859548033

The computed stock performance test statistic was -1.3279263 and the p value was 0.1104195 and fell in the acceptance region thus accept the null hypothesis that there is no significant underperformance of stocks in the long run post-IPO.

IV. CONCLUSIONS

The study has shown that the overall stock performance in the long run after going public under perform in terms of trend analysis but not significantly. Companies that are private should start thinking of going public to reap the benefits associated with it. Though there substantial costs associated with going public, companies should not shun from the process since it has numerous benefits.

The study has shown that the stock performance of companies is poor in the long run based on the buy and hold abnormal returns. This should however not put to a halt the process of going public. There is the need to look at other motivators. Some of the motivators include; raising public capital to finance growth; allowing firms to have access to external financial sources; improved visibility and reputation i.e. the social capital to help the company to venture into new entrepreneurial opportunities.

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AUTHORS

First Author – Evalyne Wambui Wamari, CPA (K), MBA (finance) student, Jomo Kenyatta University of Agriculture and Technology, evawamari@gmail.com

Publications Violence in sport in Tunisia: the itinerary of a hateful sportization

Bedhioufi Hafsi*, Abidi Aymen** & Kumar Serge Rogert***

*Director of ISSEP Ksar Saïd, University of Manouba, Tunis, Tunisia

**Student of doctorate in ISSEP, Ksar Saïd, University of Manouba, Tunis, Tunisia

*** Academic university of Singapore

Abstract- In our study on the route of violence in sport in Tunisia, we opted for two complementary approaches. One quality that has been enabled us to raise slogans and song lyrics supporters. Analysis of lyrics and songs reveals the specific forms that take violence in football stadiums. The use of qualitative techniques allowed us to define the population to be studied and concepts while placing them in the context of sport. We performed 600 questionnaires sent to football fans from different clubs playing in first and second division championship four areas of Tunisia, which are: (T1 includes the clubs: North and Grand Tunis, T2 includes the clubs : Central and Central East, T3 has the clubs: North West and Central West, T4 has the clubs: South). Comparing different results shows a significant difference between the responses of the supporters of the different territories, the paradox of this study.. the supporters of the different territories regret acts of violence. While they say they commit and most of the time during derbies. We note that catalyst element of violence is the refusal the defeat of the favorite team. Such violence is also expressed in the slogans and chants in stadiums.

Index Terms- Football, Sport, Slogan, Violence

I. INTRODUCTION

Sports ethics is ideally based on the democratization of sport. Sport is no longer a privilege of a social class. According to motivations, aspirations, personal goals and opportunities of the moment we are practitioners, consumers of practices or sports events. Many researchers have put forward this new social and sporting configuration which is based on merit or outcome. "In the result, I demonstrated my ability or my disability" (Brohm, 1992, pp. 182-183). The profit and performance is not the prerogative of the players on the area of game just as well as committees of supporters. Furthermore, the establishment of committees of supporters will therefore initiate the legitimacy of the construction of identity and belonging in different registers, on records opposition between northwest and great Tunis; between two cities (Tunis, Sousse), inside a city (Jarra and Manzel; Bab souika and Bab Jdid) even within the crowd of supporters (Ultras Red Brigades). The organization committee of supporters and cleavages that divide the reflected emergence of violence. Violence that results in actions and words.

II. METHODS

Given the complexity of the field of study we chose two approaches: one quantitative and the other qualitative. The population covered by this study includes 600 football fans from different clubs playing in the first and second division. They are spread over four areas of Tunisia (T1 includes the clubs of North and Grand Tunis, T2 includes the clubs of Central and Central East, T3 has the clubs of North West and Central West, T4 has the clubs of South . subjects all had the distinction of belonging to a group of football fans. these young fans are recruited from all walks of life. Some of them have lived a little adventurous life and did various odd jobs. Others have stable and even comfortable situations sometimes. This sampling is therefore the most likely to meet our design goal, insofar as their answers might be more pronounced than those of another population. Performing qualitative interviews occurred throughout the field and allowed the collection of qualitative information. It contained the fans, or the person who has not participated in the quantitative survey, and key informants, people who hold or held a particular function within the club. These include old and new steering committee members, and committee supporters, coaches, equipment guards and officials of sports facilities. As part of our study, each privileged informant was considered both as occupying a special place in the sports landscape, allowing him to give specific advice and distanced. These key informants generally express themselves individually. Our goal is to raise slogans and song lyrics supporters. The use of qualitative techniques allowed us to define the population to be studied and concepts while placing them in the context of sport. One of the major challenges of our study was to identify issues that are valid for four territories and bring in the most faithful way possible in order to subsequently make comparisons. The qualitative survey included questions about the meaning of the songs and violent slogans by football spectators.

III. RESULTS

Songs and lyrics: Verbal abuse, threats and insults

To rebuild the complex reality of physical or verbal violence, we must study the texts of songs and slogans in stadiums. These texts (words) describe the specific forms that took violence in the rivalry, and specify which person was using violence against any other, under what authority and for what reason? Let's look at a few slogans and songs: Insults involving sexual domination "Yaatiha ASBA litoile: fuck the star." There is no worse insult for a man than that which affects the sexuality of his mother and the family honor "Jiblou Oukhtek: it brings your sister." The qadhf is prohibited if it is based only on presumptions or unsubstantiated rumor as is the case in the stadiums. Qadhf regulation, according to fuqaha appears fundamentally linked to the question of affiliation that involves the composition of the groups, their "honor" and exchanges them (Larguèche E, 1983).

The study of the evidence shows that the construction of the violence is beautiful and real and not artificial. Before each meeting supporters' groups are preparing the stands of stadiums for the great mass sports in the afternoon. Banners and flags adorn the stage favorite team. Assignment of members of groups and roles are thoroughly completed: animation of the platform, launch and management of songs. The fans are selling in the words of the refrain: "i never dam ouella boulis oukafny khater yaarafni, millikhar ana chkoun: never dam or police arrest me because he knows me." The lyrics talk about excavations suffered by supporters at the stadium entrances and ways in which they steal items. "Nzid nkadrou ilka al ASBA kif i farkasni ouella i wakafni bi reinforcements: I respect him and he finds sex when I search with reinforcement."

Opposing fans are routinely accused of deficient or deviant sexuality. "Helpless," "sissy," "soft band", but above "fagot", "asshole", etc. In matches between teams of Tunis and the Sahel supporters chanted "Sahli is Hawi: Sahelian helpless" they retort "Jiblou Oukhtek: it brings your sister." The accusation of homosexuality remains a classic of the injury in the stadiums, "Barra nayk going to fuck you."

In footballing environment, as elsewhere, there is little insults that leave indifferent. Insults are evidence of dissatisfaction and contempt hurt. "Alyoum ranna fi al Assima zahyn nadhkou alykoum are jboura minna ghayrin: today we are ecstatic to capital is teasing you o backlog envy us." The chorus of a song fans of Esperance Sportive de Tunis means several things: as a provocation lyrics using stereotypes: the supremacy of the people who live in the capital city and belong to the world and evolved as opposed to those regions within the country.

Sport can therefore appear as an apparatus ethnic domination, cultural or religious. However, in a country where the political issue is very much alive, the motivations behind the clashes, in the case of physical and verbal abuse are the order of the search for an identity. The fans of the team Avenir Sportif de Kasserine, 80s, had a slogan that said "ahoum ahoum frachiche ahoum; Frachiche veiled veiled. "This slogan advanced regional imbalance long overshadowed by the political and policy denigration of this population. Appeal to these tribal origins "pranks" supporters sought a nuanced identity. The stadium became by force of circumstances, as part of expression of bitterness and difficulties of everyday life. The fans who go to the stadium after a week of hard work for some, an overflowing idleness for others find a framework to express unhappiness. The songs and slogans sports fans of Thala describe in these terms the conditions facing the youth in the practice his favorite sport: hay Jitt al mermada bard or thalg or jammada: here is the persistent cold, snow and frost. "Furthermore, "I personally believe, said Denis Müller, one can not distinguish, so decided and radical violence in society and violence in football. Violence in society and violence in football obviously maintain close relationships "(Malatesta and Jaccoud, 2011, p. 46).

Catalysts elements of violence: Acceptance or refusal to accept defeat

We understand that one of the causes of violence is not accepting defeat. This feeling can be explained by the degree of commitment of the fans. The involvement of different members of the fan groups is Continuum that goes from a relative lack of commitment to a moderate engagement and ultimately a promise. The heterogeneity of supporters appears by the lack of involvement

in voluntary activities (such as transportation, participation in dakhla) and very little contact with other actors (executive committee, coaches, players etc ...). In moderate commitment, supporters are firm in their guidelines, supporting and helping fans to set realistic goals, while contributing also financially. The "over-commitment" occurs when supporters beyond their participation in the sporting life of the club, not knowing separate their own desires and needs from those of the club. Some fans place too much emphasis on winning or losing, rather focus on the fun of the show. They want to be enthusiastic, but do not know how to express it in an efficient way. Others, trying to raise expectations and ambitions but irrational way that can provoke the bear guilt and frustration on failure where the violence. 52% of our population in the northwest and west-central region is not at all accepte defeat, even in derby. This region is also known by a tribal appearance. In the northern region and large tunis 48% do not accept at all the loss and a significant percentage of 38.6% in Derby. The importance of this percentage can not explain is the fact that in this region there are the classic derby tunien championship footbal (Esperance Sportive de Tunis, Club Africain, Tunisia stadium and Athletic Club Bizertain). The reputation of the clubs in this category nopus lets say that among supporters there is a sense of superiority that suggests that other clubs can not equaled their SEMA. It is important to note that in the south there was a percentage of 52% acceptance of defeat. This percentage can be explained by the territorial disparity.

Acceptance or refusal of defeat among the various categories of our population is highly significant (Chi-square = 226.909, p <0.01)

Table 1: Acceptance or refusal to accept defeat

	T1	T2	T3	T4
I do not accept at all the defeat	48,00%	26,67%	52%	24%
I accept defeat	2,67%	6,67%	18%	52%
I do not accept defeat in a derby	38,67%	32,00%	22,00%	19,33%
I sometimes accept defeat during the derby	4,00%	30,00%	6,00%	4,67%
win or lose a match is similar for me	6,67%	4,67%	2,00%	0,00%

Deliberate acts of violence involvement

We seek in this first specific question to highlight three major concepts that have been identified during the qualitative work first personal involvement in acts of verbal and physical violence. We find that the percentage of participation in the verbal and physical abuse of a conscious and deliberate manner is important in all regions.

From this analysis the difference between the groups was highly significant (Chi-square = 161.455, p <0 .01)

Table 2: Participation in organized scenes of verbal or physical violence at meetings

	T1	T2	T3	T4
Yes	74,67%	80,00%	76,67%	80,67%
No	25,33%	20,00%	23,33%	9,33%

The enabling environment for violence

It is not enough to engage in acts of violence, but in what context? The largest percentages were recorded during the derby matches. This violence is usually accompanied by attack people and property. It is described as violent frustration. At these meetings the violence is not transient or a detail but a reality. The violence occurred during derby matches. As we point out that against the supporters of the clubs southern state not to commit violence when traveling. We can explain this by the fact that once again the disparity of clubs over large areas and the limited number of clubs belonging to the same level. By cons, in this region recording the largest 68,67% of the eruption of violence at derby percentage.

The difference between our samples is highly significant (Chi-square = 143.609, p < 0.01)

Table 3: Background to the production of violence

	T1	T2	T3	T4
Moving outside	20,00%	20,00%	48,00%	0,00%
during a derby	56,67%	40,00%	14,00%	68,67%
home	23,33%	40,00%	38,00%	31,33%

Regrettable violence

The bear can hardly claim afterwards that he did not really intend to offend the other, but he may regret or apology to the abused or insulted party. This observation is verified by our study population. We note that in the study population of the territories south of Tunisia is that feeling of regret afterwards is strong.

The difference between the responses of our population is very significant for (Chi-square = 95.723, p < 0.01)

Table 3: Expressing regret for participation in organized violence

	T1	T2	T3	T4
I do not regret what I did	0,00%	6,00%	6,00%	6,00%
I regret the violence	90,00%	70,00%	80,00%	43,33%
sometimes I regret what I've done	10,00%	24%	14,00%	50,66%

IV. CONCLUSION

After the Tunisian revolution of 17 December 2010, the only institution to have been spared the protest is sporting institution. The Islamist party "Ennahdha" majority in the Constituent following the elections of October 23, 2011, appointed a former football star of the decade of the 80s and analyst chain Quatarie "El Jazeera Sport" to head the Ministry of Youth and Sports. Sport escape criticism. "This seems to indicate that sport is a particularly strong social authority and protected by the alliance between ideological strata" (Brohm, 1992, p. 372). In addition, the meetings take place behind closed doors since the revolution in 2011 Despite the lack of spectators each week stadiums record more than one violent event. At the resumed trainings of the football team "Olympique Kef" after his defeat Mach, derby northwest, against "Olympique de Beja» players were attacked by supporters came to demonstrate their discontent the result and the delivery of new recruits after the winter mercato (Essabah Journal, February 21, 2013). The meeting, which pitted the team Kaouafel Gafsa and Gabésien Stadium, Derby South, had a dramatic end after the victory of the home team. A player from the visiting team has taken a security guard, spat and insulted when the latter prevented him from attacking the referee. The security guard filed a complaint against the aggressor. Players and coaches have refused the player to be accompanied to the police station for questioning and have spent more than four hours on the bus to the stadium to protect their foal (Attounissia, February 20, 2013). The National Amateur League at its meeting Tuesday, February 19, 2013, decided to punish coach gafsi stage, sit on the bench for 24 games following his assault of the assistant referee. Other financial and sporting sanctions against the team of torch Sahline after incidents that marred the encounter flameau Sahline and club Maktar following the pitch invasion by fans. Violence erupted in the stadium not even the presence of spectators. During the Cup final in Tunisia, in locker rooms, August 11, 2013, the players of the winning team Etoile Sportive du Sahel held regionalist remarks about the players of the opposing team the Sporting Club Sfax. And again in the final of the Tunisian Cup for 2014 edition, these players reoffend do the same on the stadium of "Rades" in front of the same team. It is now legitimate to reconsider the assumption that fans are potentially responsible for the violence. What is the message that violence in stadiums today?

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AUTHORS

First Author – Bedhioui Hafsi, Director of ISSEP Ksar Saïd, University of Manouba, Tunis, Tunisia
Email: bedhioufiha@yahoo.fr

Second author: ABIDI Aymen PhD, Institute Superior of Sport and physical Education Tunis .Tunisia.
Email: aymenabidi27@yahoo.fr

Third author: Serge Rogert Kumar.
Email. erjser.serge@ijsr.org

Mordanting Methods for Dyeing Cotton Fabrics with Dye from *Albizia Coriaria* Plant Species

Loum Janani*, Lukyambuzi Hillary**, Kodi Phillips***

* Lecturer in Department of Textile and Ginning Engineering, Busitema University, PO Box, 236, Tororo, Uganda.

** Department of Textile and Ginning Engineering, Busitema University, PO Box, 236, Tororo, Uganda.

*** Department of Chemistry, Kyambogo University, PO Box 1, Kampala

Abstract- The study investigated the effects of different methods of application of selected mordants on dyeing woven cotton with dyes from the stem bark of *Albizia coriaria*. The methods of application of mordants used includes; pre-mordanting, simultaneous mordanting and post-mordanting. The effects on cotton analyzed are color fastness to; light, washing, wet and dry rubbing and color characteristics on CIELab color coordinates. Aqueous extraction method was used to extract the dye. Some selected mordants were used for dyeing viz; alum, ferrous sulphate502, and iron water. In the control dyeing without the use of mordants, very good fastness were registered with the following fastness ratings; for washing (4-5), dry rubbing (5), wet rubbing (5) and light (4). The natural dye is a substantive dye since it registered very good fastness grades without the use of mordants. The use of mordants improved color fastness to light from ratings of (4) to (5) and (6) for iron water and ferrous sulphate and a poor fastness of (3) was recorded for alum. Post-mordanting method registered the best overall fastness results and the best color strengths K/S values and color saturation values C. However, the most brilliant colors were registered with simultaneous mordanting method with all mordants. However, there was no observable effect of mordanting methods on the redness or yellowness of color.

Index Terms- *Albizia Coriaria*, color fastness, mordanting, substantive dye.

I. INTRODUCTION

Traditionally, dyes from plants were used for coloring silk, wool and cotton fibers but overtime these were replaced by cheaper synthetic dyes^[1]. Dyes from natural sources like plants, fungi, insects, animals and minerals are referred to as natural dyes. The majority of natural dyes are from plant sources namely; roots, berries, barks, leaves, seeds, woods and other organic sources such as fungi and lichens^[2]. With the invention of synthetic dyes in 1856, the prominence of natural dyes slacked because the synthetic dyes had some advantages over natural dyes like color fastness, good reproducibility of shades, brilliance of color and easy to use^[3]. The synthetic dye stuffs are suspected to cause allergies, and are carcinogenic and detrimental to human health^[4]. Natural dyes derived from plants have recently gained economic advantage over synthetic dyes because of their non-toxic and biodegradable nature^[5]. Due to the current eco-consciousness, researchers' attention has been shifted to the use of natural dyes for dyeing textile materials^[6].

Most natural dyes need chemical species called mordants for binding the dye to fabrics to improve color fastness. Mordants help in binding of dyes to fabric by forming a chemical bridge from dye to fiber thus improving the staining ability of a dye with increasing its fastness properties^[7]. The color fastness and characteristics of natural dyes on fabrics are influenced by the mordanting method applied whose effects vary with the source of the dye.

In Uganda, great potential exists for natural dyes from dye-yielding plants. In a recent study, it has been reported that several plant species in Uganda possess dye-yielding properties^[8]. *Albizia coriaria* is one of these plants with dye-yielding properties. *A. coriaria* is a pioneer species common in wooded grassland, woodland and thicket. Its absence in closed canopy rainforest is largely the result of its high light requirements. Its distribution range extends from West Africa through eastern, southern and parts of central Africa.

The extracts from *Albizia coriaria* plant species revealed the presence of tannin moieties in their molecular structures. Tannins have been reported to be the most important ingredients which are necessary for dyeing with natural dyes, especially to brown shades of color^[9]. The extract of the plant bark reveals the presence of steroids and triterpenoids, Coumarins, tannins, reducing sugars and alkaloids. Some of these compounds are associated to dye-yielding properties in plants.

In the present study, dye extracts from the stem bark of *Albizia coriaria* were used to dye plain woven cotton fabrics by application of various selected mordants and mordanting methods. In each case color fastness to washing, rubbing, light and color characteristics were determined.

II. MATERIALS AND METHODS

Materials

Desized, scoured and bleached plain weave cotton fabric (220 ends/dm, 180 picks/dm, 120 g/m²) from Nyanza Textiles Limited was used. Fresh stem bark of *Albizia coriaria* were collected from Busitema University compound, Busia-Uganda and brought to textile lab. Grey scale and blue dyed silk were used for color fastness rating.

Alum, Ferrous Sulphate, potassium dichromate, Ash water and Iron water were mordants used in dyeing. The following instruments were used; Analytical balance, Color data spectraflash photometer, manually operated Crockmeter, and Lauder-0-meter.

Fabrics pretreatment processes

Pieces of plain woven cotton fabrics with dimensions of (8 x 10 cm) each with an average weight of 1.41 g were scoured by washing them in sodium carbonate solution (0.5 gpl) and non-ionic detergent (Tweet® 80, 2 gpl) at 50°C for 25 minutes keeping the material to liquor ratio at 1:40. The scoured fabrics were thoroughly washed with tap water and dried at room temperature.

Extraction of dye

Dye was extracted from dried and pulverized stem bark of *Albizia coriaria* by aqueous method. The leaves were soaked in distilled water (400 cm³) in a beaker for four hours. The soaked plant materials were heated at 60°C for 30 min and temperature gradually raised to boiling temperature (90°C) and maintained at the boiling temperature for one hour to yield a dye extracts. The dye extract was left to stand for 30 min at ambient temperature and filtered [10]. The colored crude dye solution (150 cm³) was diluted with distilled water (50 cm³) and immediately used for dyeing.

Dyeing the cotton fabrics

Cotton fabrics were dyed using pre-mordanting, simultaneous and post-mordanting methods.

The scoured fabrics were soaked in clean water for 30 min prior to dyeing process.

In dyeing with pre-mordanting method, the pretreated cotton fabrics were soaked in a solution containing 10 % on weight of fabrics (o.w.f) of a mordant, at 60°C for 30 min with material-to-liquor ratio of 1:20. The fabrics samples soaked with mordant solutions were then dyed [11].

Dyeing with simultaneous mordanting method was done by putting the pretreated fabrics in a beaker (250 cm³) containing 10% on weight of fabric (o.w.f) of mordant and 20% o.w.f of sodium sulphate. The pH of each dye solution were maintained between 6 and 8 with 2 - 5% w/w of acetic acid (40% solution) monitored by test papers during the dyeing process. A material to liquor ratio (LR) of 1:20 was used in all dyeing [12]. This was done separately using each of the selected mordants.

In post-mordanting dyeing of cotton fabrics, the pretreated fabrics were dipped in a dye bath (150 cm³) and after 10 minutes, 20% on weight of fabric (o.w.f) of sodium sulphate was added. The dyeing was carried out for one hour at 50°C with intermittent stirring. The dyed samples were removed from dye

bath and squeezed to remove excess dye. The dyed fabrics were then soaked in a mordant solution (100 cm³) containing 10 % on weight of fabric (o.w.f) of a mordant at 60°C for 30 minutes with material to liquor ratio of 1:20 [10].

In all the above three methods, solutions for each of the selected mordants were separately made. The dyed samples were washed with soap solution (2 gpl) at 50°C for 10 minutes, rinsed with tap water and dried at room temperature.

Evaluation of color fastness

Wash fastness of the dyed samples were analyzed as per the standard method using a Launder-o-meter [13]. The wash fastness rating was measured using standard grey scale for loss of shade depth and staining.

Color fastness to dry rubbing and wet rubbing fastness were tested using a manually operated Crockmeter and grey scale [13].

Color fastness to light was evaluated with using MBTF Fade-o-meter. The fading of each sample was observed against the fading of blue wool standards (1-8) [13].

Color measurements

Color development and dye absorption potential of cotton fabrics were evaluated in terms of CIELab color coordinates; L (lightness), a (redness or greenness of color), b (yellowness or blueness of color), C (chroma) and H (hue angle), and K/S (color strength) values [14].

III. RESULTS AND DISCUSSIONS

Variable color shades were formed on the cotton fabrics dyed with extracts from the stem bark of *Albizia coriaria*. The variations in color shades were with respect to the mordants and mordanting methods employed.

Color fastness of the dye without the use of mordants

This was a control to determine color fastness of the dye without application of any mordant. As can be noticed in **Table 1** below, color fastness on the fabrics range from very good to excellent in the range of (4-5) and (5) against grey scale standard of 1-5 for washing and rubbing and respectively. A good light fastness grade of (4) against standard blue dyed wool of 1-8 was determined.

Table 1. Color fastness of the dye applied on cotton fabric without mordant

Wash fastness		Rub fastness				Light fastness	
CC	CS	Dry		Wet			
		CC	CS	CC	CS		
4-5	3-4	5	4-5	5	3	4	

CC=Color change, CS=Color staining

A slight staining of grade (3-4) was determined in washing with very slight and slight dry and wet rub staining of (4-5) and (3) respectively. Generally the color fastness obtained without application of mordant is suitable for dyeing cotton fabrics. From this piece of information it can be concluded that this dye is classified as a substantive dye. ‘Substantive Dyes’ are those that

dye the fibers directly and ‘Adjective dyes’ are those dyes mordanted with a metallic salt [15].

Effects of mordants and mordanting methods on color fastness

In dyeing the cotton fabrics some selected mordants were used viz; alum, ferrous sulphate, and iron water. All these mordants were applied on the fabrics using pre-mordanting,

simultaneous mordanting and post mordanting methods separately. **Table 2** below contains data for color fastness to washing, rubbing and light for the selected mordants using

different mordanting methods. Color change and staining were determined for washing, dry and wet rub fastness.

Table 2: Color fastness of dyed cotton fabrics with *Albizia coriaria* dye using selected mordants and mordanting methods

Mordant 3% Conc	Method of Mordanting	Wash fastness		Rub fastness				Light fastness	
		CC	CS	Dry		Wet			
				CC	CS	CC	CS		
Alum	PREM	4*	4-5	5	4-5	5	3-4	3	
	SM.	3-4*R	3-4	5	4-5	5	4	3	
	POM	4-5 W	4-5	5	3-4	5	3	3	
Ferrous sulphate	PREM	4* R	4-5	5	3-4	5	3	6	
	SM	4-5 R	4	5	3-4	5	3	5	
	POM	4*R	3-4	5	3	5	1-2	6	
Iron water	PREM	3-4	3-4	5	4-5	5	3	3	
	SM	4	3-4	5	4-5	5	3	3	
	POM	4R	3-4	5	4-5	5	3	5	

CC=Color change, CS=Color staining:

Remarks: *=stronger, *R=Stronger and Reddish, W=Weaker, R=Reddish.

PREM=Pre-mordanting, SM=Simultaneous mordanting, POM=post-mordanting

Alum mordant produced no observable change in wash and rub color fastness properties in comparison to that without a mordant but a reduced light fastness from rating (4) to (3) was recorded for all methods. The mordanting methods used had no significant effect on the color fastness properties in this case. However, there was a slight decrease in wash staining of (3-4) and (4-5) for pre- mordanting and post-mordanting methods respectively. In wash fastness with alum, pre and simultaneous mordanting recorded stronger grade (4*) and stronger and reddish grade of (3-4*R) with a weaker grade of (4W) registered for post-mordanting.

Ferrous sulphate mordant produced a significant improvement in light fastness from moderate (4) in control to good (5) for simultaneous mordanting and very good rating (6) for pre mordanting and post mordanting. There was no remarkable change in both wash and rub fastness however, in pre-mordanting and post-mordanting methods, the shades became reddish (4-5R) and stronger and reddish (4*R).

The application of iron water mordant registered a poor light fastness from moderate (4) in control to fair (3) for both pre and simultaneous mordanting. However, post-mordanting registered a good light fastness of (5). For all mordanting methods, very good dry and wet rub fastness (5) were registered the same grade as in the control experiment. Wash fastness recorded for all the mordanting methods were inferior to the very good (4-5) in control with grades of moderate (3-4), good (4) and reddish (4R) for pre, simultaneous and post mordanting methods respectively. Iron water did not have any effect on staining from the use of all the mordanting methods.

In terms of color fastness rating obtained with the mordants used, post-mordanting method exhibited the best overall results. The mordant that recorded the best results in terms of fastness grades recorded are; ferrous sulphate, iron water, and alum in that order. The general improvement in fastness from the use of these mordants is as a result of the presence of strong metal coordination complexes formed inside the internal fiber structure between the mordant and dye fibers [16]. The iron species produced and deeper shades and alum produced lighter shades that varied with the method of application of mordant on the cotton fabrics. The deepest shades were registered with ferrous sulphate and iron water using post-mordanting method. A high quality colored fabric possesses an acceptable amount of color fastness rating of at least 3.0 on a five point grey scale [17]. Results of this study therefore demonstrates that dye from the stem bark of *Albizia coriaria* with light fastness rating of range (3) and (6) and wash and rub fastness grades of (3-4) and (5), meet minimum performance requirements for application on cotton fabrics.

Color characteristics based on CIELab color coordinates of dyed cotton fabrics.

The dyed fabrics were assessed for their color coordinates as reported in **Table 3** and the results are discussed with the aid of color space diagrams and surface color value graphs. Where L*=Lightness, a*=red-green, b*= yellow-blue, C*=chroma h° = Hue angle, CV-SWL= Color value at single wave length and it is equivalent to K/S (Color strength) in terms of value.

Table 3: The CIELab color coordinates of cotton fabrics dyed with crude dye extracts from *Albizia coriaria*.

Mordant	Mordanting Method	L*	a*	b*	C*	h°
No mordant(control)	-	69.35	8.84	14.25	16.77	58.18
Iron water	PREM	53.41	3.75	8.59	9.37	66.4
	SM	60.98	3.82	10.17	10.86	69.41
	POM	53.38	4.07	10.47	11.23	68.75
Alum	PREM	70.61	6.6	17.15	18.37	68.96
	SM	69.48	6.51	14.07	15.5	65.18
	POM	67.86	7.27	16.43	17.97	66.13
Ferrous Sulphate	PREM	37.5	3.47	7.53	8.29	65.23
	SM	40.16	3.49	8.63	9.31	68
	POM	6.57	19.71	11.17	22.65	29.54

PREM= pre-mordanting, SM= simultaneous mordanting, POM= post-mordanting

As can be noticed from **Table 3** for pre-mordanting method, the color strengths (CV) recorded were; (3.667), (1.986), (10.06) for iron water, alum and ferrous sulphate respectively with control registering (1.995). In this case ferrous sulphate had the best color strength followed by iron water and alum had the lowest color strength falling below the control. In simultaneous mordanting methods color strength registered were (2.452), (1.825) and (8.641) for iron water, alum and ferrous sulphate respectively. Ferrous sulphate had the best color intensity followed by iron water. Alum had an inferior color strength which is even lower than the control. The post mordanting method gave the following color strength; (3.713), (1.938) and (14.99) for iron water, alum and ferrous sulphate respectively. In this case ferrous sulphate gave the highest color strength followed by iron water and alum had the lowest color strength. In all the mordanting methods alum had no positive contribution on color strength in fact its performance is below that in the control. The performance of the mordanting methods in terms of color strength is in the order; post, pre and simultaneous mordanting. Post mordanting method is therefore the method to be adopted in the application of dye from the stem bark of *Albizia coriaria* on cotton fabrics.

Dyes from *Albizia coriaria* produced darker shades ($L < 70$) with ferrous sulphate and iron water in the range of (37.5-40.16) and (53.38-60.98) respectively. Alum exhibited lighter shades ranging from (67.86-70.61). With all mordants, post- mordanting method produced lower L values hence deeper shades. Color shades formed by post-mordanting exhibited the highest degree of color saturation C of (11.23), (17.97) and (22.65) for iron water, alum and ferrous sulphate in that order with the exception of alum where pre-mordanting had a higher value of C (18.37). The net effect of alum high value of chroma and lightness is reflected in its high brilliant appearance.

Fabrics dyed with *Albizia coriaria* exhibited only positive "a" value for all the mordanting methods with post-mordanting of ferrous sulphate having the highest "a" value of (19.71) as shown in **Table 3**. The values of "a" and "b" placed the dyed fabric with *Albizia coriaria* extract in the red-yellow quadrant of the color space diagram as shown in **Figure 1**.

Post-mordanting with ferrous sulphate gave the lowest hue angle h° value of (29.54) redness of color. Most mordanting methods gave hue angle $h^\circ > 45^\circ$ implying yellowness of color. The shades are all closer to yellow than red.

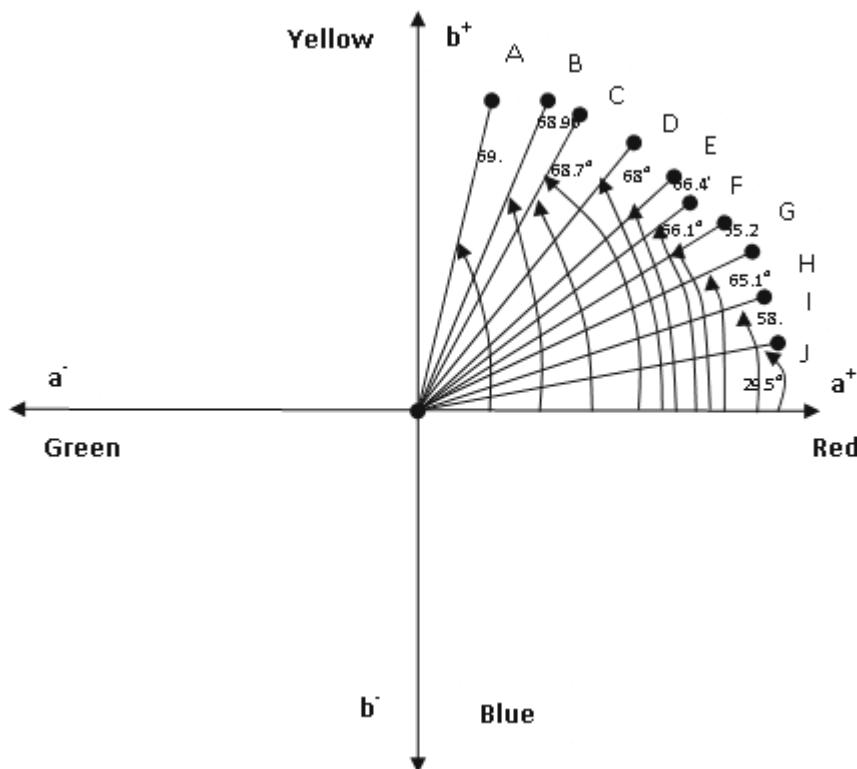


Figure 1: Location of colored fabric samples in the a-b color space diagram.

Key

A: simultaneous Iron water, B: Pre Alum, C:Post Iron water, D:simultaneous Ferrous sulphate, E: Pre Iron water, F: Post Alum, G:Pre Ferrous sulphate, H: simultaneous alum, I:No mordant, J:Post ferrous sulphate.

Control fabrics also gave a hue angle H (58.18) falling within the range of the mordanted fabrics. The mordanting methods used had no significant influence on the redness and yellowness of color shades formed.

IV. CONCLUSIONS

Dyes extracted from the stem bark of *Albizia coriaria* yielded various color shades with different mordants. The cotton fabrics dyed without the use of mordants exhibited a very good wash fastness of (4-5), a excellent dry and wet rub fastness of (5), and a moderate light fastness of (4). The dye is therefore substantive dye with good color fastness property. The application of mordants yielded various color shades with different mordants and mordanting methods without any observable improvement in dry and wet rub fastness however, with washing the shades turned redder. The formation of a single color with variable shades depending on mordant used classifies the dye as monogenetic dye. Upon application of mordants, there was general drop in light fastness with alum and iron water. Generally post-mordanting method recorded an overall best light fastness performance with ferrous sulphate and iron water. Color strength was enhanced by the application of post-mordanting methods across all mordants used but, more brilliant color shades was recorded for simultaneous mordanting method. The mordanting method used no significant influence on the redness

and yellowness of color. It can be concluded that, to achieve excellent fastness and good color strength with dye from *Albizia coriaria*, post-mordanting is a method of choice.

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AUTHORS

First Author – Loum Janani, Lecturer in Department of Textile and Ginning Engineering, Busitema University, PO Box, 236, Tororo, Uganda., E mail: loumjanani75@gmail.com Tel: +256-712028843/ +256-754362397

Second Author – Lukyambuzi Hillary, Department of Textile and Ginning Engineering, Busitema University, PO Box, 236, Tororo, Uganda. Tel: +256-779231902

Third Author – Kodi Phillips, Department of Chemistry, Kyambogo University, PO Box 1, Kampala. Tel: 0783717177

Texture Enhancement of Plants IR Images Using Genetic Algorithm

Nitin Gupta¹, Randhir Singh², Parveen Lehana^{3*}

¹Dept. ECE, Sri Sai College of Engineering and Technology, Pathankot, Punjab, India.

²Dept. ECE, Sri Sai College of Engineering and Technology, Pathankot, Punjab, India.

³*Dept. of Physics and Electronics, University of Jammu, Jammu, India.

Abstract- Image enhancement technique means to process a given image so that the resultant image is more suitable than the original image. It sharpens image features such as edges, boundaries, or contrast to be more helpful for display and analysis. Approaches to texture enhancement are usually categorized as structural, statistical, model-based and transform methods based. Genetic Algorithm (GA) is the most powerful unbiased optimization technique for sampling a large solution space. The GA may be adopted to achieve better results and faster processing time in some specialized applications. In this paper, the effect of GA on the enhancement of the texture of plants infrared (IR) images has been investigated. The investigations showed that the image texture stabilizes after 50 iterations and there is hardly any change in the brightness of the image.

Index Terms- Digital image processing, IR images, Genetic algorithm, Mutation, Texture enhancement, Contrast enhancement.

I. INTRODUCTION

In digital image processing image enhancement plays an important role. Genetic algorithm (GA) is one of the most accepted, quick and easy techniques for image enhancement of digital images [1]. Image Enhancement technique means to process a given image so that the resultant image is more suitable than the original image. The input image can be from any image capturing device. There are various methods which can enhance the original image without losing its inherent properties. Digital image enhancement techniques provide large number of choices for improving the visual quality of images [2]. It sharpens image features such as edges, boundaries, or contrast to be more helpful for display and analysis. The main purpose of image enhancement is to modify various image attributes to make the original image more suitable for any given task and for a specific observer. Fig. 1 shows basic structure of image enhancement strategy [3].

Texture has great significance in digital image processing. Textures are a pattern of non-uniform spatial distribution of differing image intensities, which focus mainly on the individual pixels that make up an image. Texture can be defined as the spatial or visual patterns formed by the surface characteristics of an object that manifests itself as color or grayscale variations in the image [4, 7]. Each surface has its own texture, some objects can be said to have unique textures (e.g. skin or sand). Analysis

and matching of texture can be carried out in spatial or the frequency domain. Commonly used texture features are gray-level co-occurrence matrices, local binary patterns (LBP), Markov random fields, and Gabor wavelets [5, 6, 8]. Fig. 2 shows the different textures of plants.



Fig. 1 Image enhancement



Fig. 2 Different textures of plants

Approaches to texture analysis giving useful information for enhancement are usually categorized as structural, statistical, model-based, and transform methods based. Structural approaches represent texture by well-defined primitives (micro texture) and a hierarchy of spatial arrangements (macro texture) of those primitives. The advantage of the structural approach is that it provides a good symbolic description of the image; however, this feature is more useful for synthesis than analysis tasks. In contrast to structural methods, statistical approaches do not attempt to understand explicitly the hierarchical structure of

the texture. Statistical approaches compute different properties and are suitable if texture primitive sizes are comparable with the pixel sizes. Model based texture analysis using fractal and stochastic models, attempt to interpret an image texture by use of, respectively, generative image model and stochastic model. Transform methods of texture analysis, such as Fourier and wavelet transforms represent an image in a space whose coordinate system has an interpretation that is closely related to the characteristics of a texture (such as frequency or size) [9].

In many applications images are distorted due to the atmospheric aberration mainly because of atmospheric variations and aerosol turbulence [10, 11]. New algorithmic strategies have been investigated to enhance the visual quality of IR images. The idea has been to model the infrared (IR) image pixels as an input-output system with IR image as the input and a similar IR image as the output [12].

In this paper, the effect of GA on the enhancement of the texture of plants IR images has been investigated. The details of GA have been presented in the next section. The methodology adopted for the investigations is discussed in Section III. The results and discussions are presented in Section IV followed by conclusion in Section V.

II. GENETIC ALGORITHM

GA [13] is a relatively a new standard for search, based on principles of natural selection. For the first time these algorithms had been introduced by John Holland in 1960s [14, 15]. The simplest form of GA involves three types of operators: selection, crossover (single point), and mutation.

Selection This operator selects chromosomes in the population for reproduction. The fitter the chromosome, the more times it is likely to be selected to reproduce.

Crossover This operator randomly chooses a locus and exchanges the subsequences before and after that locus between two chromosomes to create two offspring. For example, the strings 10000100 and 11111111 could be crossed over after the third locus in each to produce the two offspring 10011111 and 11100100. The crossover operator roughly mimics biological recombination between two single-chromosome (haploid) organisms.

Mutation This operator randomly flips some of the bits in a chromosome. For example, the string 00000100 might be mutated in its second position to yield 01000100. Mutation can occur at each bit position in a string with some probability, usually very small (e.g., 0.001) [14].

They employ natural selection of fittest individuals as optimization problem solver. Optimization is performed through natural exchange of genetic material between parents. Offspring's are formed from parent genes. Fitness of offspring's is evaluated. The fittest individuals are allowed to breed only. In computer world, genetic material is replaced by strings of bits and natural selection replaced by fitness function. Matting of parents is represented by cross-over and mutation operations.

A simple GA consists of following steps:

Step 1. Determine the number of chromosomes, generation, and mutation rate and crossover rate value

Step 2. Generate chromosome-chromosome number of the population, and the initialization value of the Genes chromosome-chromosome with a random value

Step 3. Process steps 4-7 until the number of generations is met

Step 4. Evaluation of fitness value of chromosomes by calculating objective function

Step 5. Chromosomes selection and crossover.

Step 6. Mutation

Step 7. New Chromosomes (Offspring)

Step 8. Solution (Best Chromosomes) [17].

Each iteration of this process is called a generation. A GA is typically iterated for anywhere from 50 to 500 or more generations. The entire set of generations is called a run. At the end of a run there are often one or more highly fit chromosomes in the population. Since randomness plays a large role in each run, two runs with different random-number seeds will generally produce different detailed behaviors. GA researchers often report statistics (such as the best fitness found in a run and the generation at which the individual with that best fitness was discovered) averaged over many different runs of the GA on the same problem.

III. METHODOLOGY

The plant images were digitally recorded in both normal and IR light conditions. Five types of plants having different textures were selected. The IR images were taken using IR camera with VGA resolution. The images were taken at different orientations of the plants. While taking the IR images, the visible lights were totally switched off. For each plant nine IR images were taken using by fixing the camera at a distance of three feet from the plants. Different textures of plants were taken. The enhancement of images was carried out using GA. The genes of the algorithm were composed of four intensity ranges and two modification factors leading to a total of 10 genes per DNA. A total of 10 DNA were initially taken. The initial values of the genes were randomly initialized. The investigations were carried out by varying the number of iterations.

IV. RESULTS AND DISCUSSIONS

The experiment was conducted on infrared image. The investigations were carried out for iteration numbers 1 to 1000 for the input images. Fig. 3 shows the unprocessed input images and the corresponding processed enhanced images at different values of iteration numbers 1, 50, 100, 150, 200, 300, 500, 700, and 1000 respectively. From Fig. 3 and Fig. 4, it can be observed that the enhancement in the texture of the image increases with the successive iterations up to 50th iterations. The image texture becomes to stabilize or after 50 iterations and there is hardly any change in the brightness of the image. Therefore, 50 iterations are chosen as the stopping criterion for the proposed algorithm.

It may be observed from the images that after enhancement more details of the texture structure is prominently highlighted by the GA which may be further used for automatic identification of plants and quality assessment in agriculture.

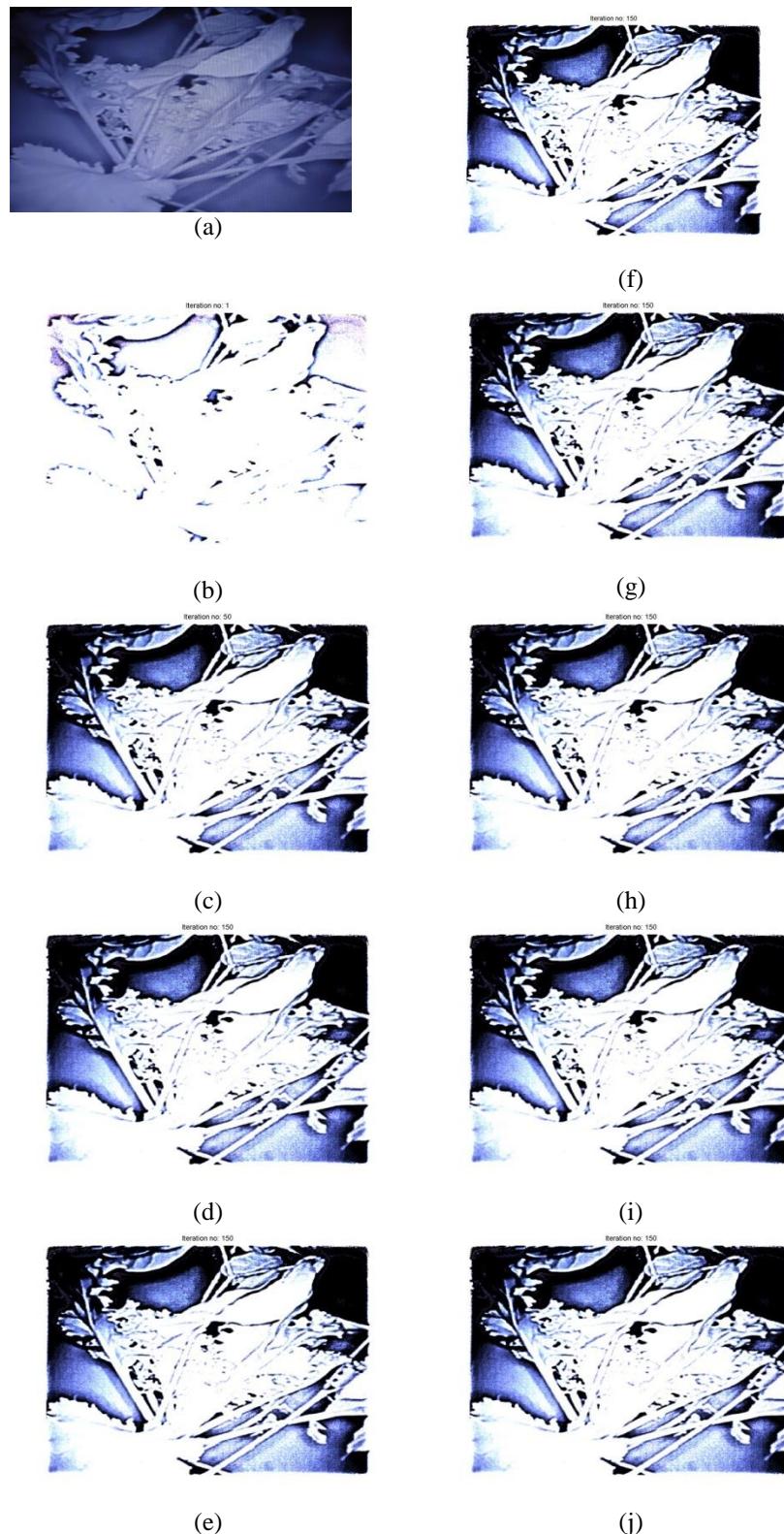


Fig. 3. Original and processed images. (a) unprocessed IR, (b) iteration no. 50, (c) iteration no. 100, (d) iteration no. 150, (e) iteration no. 200, (f) iteration no. 300, (g) iteration no. 400, (h) iteration no. 500, (i) iteration no. 700, (j) iteration no. 1000.

V. CONCLUSION

Investigations were carried out to enhance the texture plants using IR images with genetic algorithm. It was observed that GA can be used as a very prominent unbiased optimization method for texture enhancement of plant images. The method may be made automatic and robust for plant identification and quality assessment in agriculture industry.

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AUTHORS

Er. Nitin Gupta received his B.E. Degree in Electronics and Communication Engineering from Model Institute of Engineering and Technology, Kot Balwal Jammu (J&K) affiliated to Jammu University, Jammu. He is presently doing M. Tech in Electronics and Communication Engineering from Sri Sai College of Engineering and Technology, Pathankot, Punjab.

Er. Randhir Singh received his M.Tech. in Electronics and Communication Engineering from Beant College of Engineering and Technology, Gurdaspur, Punjab affiliated to Punjab Technical University, Jalandhar. He is presently working as H.O.D, Electronics and Communication Engineering Department, Sri Sai College of Engineering and Technology, Pathankot and pursuing PhD in signal processing. His research interests include speech signal processing, digital signal processing, image processing, analog and digital communication, electronics and control systems, etc. He has more than a dozen of research papers to his credit. He has guided several M.Tech. students in electronics.

Dr. Parveen Lehana received his Master's Degree in Electronics from Kurushetra University in 1992. He worked as lecturer in Guru Nanak Khalsa College, Yamuna Nagar, Haryana and A. B. College Pathankot, Punjab. He is UGC-CSIR-NET-JRF in both Physical Sciences and Electronic Science. He did his Ph.D. from IIT Bombay in Electrical Engineering and presently working as associate Professor in the department of Physics and Electronics, University of Jammu. He has a good experience of guiding M.Tech., M.Phil., and Ph.D. students. He has more than 150 research papers to his credits. His fields of interests are speech signals processing, computer vision, nanotechnology, and microwaves.

The Effect of Policy Implementation, Leadership, and Professionalism Apparatus against SME Development Effectiveness in Semarang District

Monica Henny Sudaryati*, E. Koswara Kertapradja**, Musa Hubis**, Dewi Sulistyani**

* Graduate Program Satyagama University, Jamsostek Tower B Lt 12 Jl. General Gatot Subroto No. 38 Jakarta 12710, Indonesia

Abstract- The government's policy towards SME has not been an impact on the effectiveness of the development of SME, as well as a lack of leadership and professional personnel.

The purpose of the study to analyze how much influence the implementation of policy, leadership, professionalism apparatus either individually or jointly to the effectiveness of SME development in Semarang District.

The research model used in this study is a model that attempts to explain the position of explanatory variables. which investigate and influence of one variable with another variable. Collecting data using a questionnaire with a population of government officials, small business owners, employees of the cooperative department of industry and commerce and SME and 350 samples, obtained by stratified random sampling technique, data analysis using simple and multiple linear regression .

Based on the analysis, it was found that partial, Policy Implementation effect is 75.4%, 9.4% Leadership, and 74.6% of Professionalism apparatus . These three variables significantly affect the effectiveness of 79% of SME development together in Semarang District. From these results the leadership role has small support because the lack of leadership factors and is functionally relevant to the SME that has an independent nature.

Index Terms- implementation of policy, leadership, professionalism apparatus, and SME development effectiveness

I. INTRODUCTION

In Indonesia economic development SME sector which is always described as having an important role, because the majority of the population is still poorly educated and live in areas of activity in small businesses, both in the traditional and modern sectors. In February 2014 the working population in elementary schools continued to dominate the 55.5 (46.80%), junior namely 21.1 million (17.82%) (Press Release No. 38/05 / Th. XVII, May 5 2014)

SME has a strategic role in the development of the national economy, as well as contribute to the economic growth and employment also play a role in the industrial development results, as well as SME in Semarang District.

But on the other hand there are also a variety of issues in the development and empowerment of clusters in Semarang District, such as:

1. Not able to meet market demand,
2. Less capital
3. Less production facilities
4. Technology still modest
5. The lack of knowledge of the Internet, and websites information technology
6. Production costs are still relatively high
7. Weak partnership network
8. Not optimal support production facilities, etc.

This identified various issues of interest to the research, the researchers wanted to participate to contribute in overcoming the obstacle of SME that act became the backbone of the Indonesian economy, especially in Semarang regency. SME has a strategic role in the development of the national economy, as well as in economic growth and employment also play a role in industry development outcomes.

The research interested in conducting research on the Processing Industry sector, because the sector with the most potential cultivated and labor intensive compared to other sectors, in the Semarang District.

II. PROBLEM IDENTIFICATION

The issue in this study can be formulated as follow:

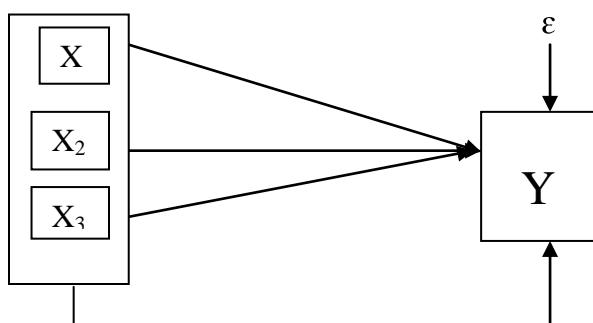
- 1) How much influence the effectiveness of policy implementation towards SME development in Semarang District ?
- 2) How much influence the effectiveness of leadership in the development of SME in Semarang District?
- 3) How much influence the professionalism of officers on SME development in Semarang District?
- 4) How much influence the implementation of policy, leadership, and professionalism of the officers on SME development in Semarang District.

III. METODOLOGY RESEARCH

A. Research Method

The method used in this study is the analysis of simple and multiple linear regression, with X as the independent variable (independent) and Y as the dependent variable (dependent). Variabel studied and analyzed are:

The independent variable is the implementation of policy, leadership, Professionalism apparatus and the dependent variable is the effectiveness of SME development.



Specification :

X₁: Government policy, as the independent variable

X₂: Leadership, as an independent variable

X₃: Professionalism Apparatus, as independent variables

Y : Effectiveness of SME development, as the dependent variable

ε : Epsilon, that other factors outside of X₁, X₂, X₃ are influential, to Y, but not examined

B. Discussion

According to the analysis described above that a factor influencing the effectiveness of SME development in Semarang district is the implementation of policy, leadership, professionalism apparatus and it has proven very significant.

In the discussion of the results of this study and also the results of the analysis proved that the effectiveness of policy implementationi SME development in Semarang district which amounted to 0,782, a significant and positive impact on the effectiveness of SME development in Semarang District indicated by the coefficient of determination 0.754 or 75.4% and the remaining 24, 6% by other things that are not investigated.

Pressman and Wildavsky in their paper entitled Implementation (1973), they stated that the extent of implementation can be successful depends on the linkages between the various organizations and departments at the local level are involved in the implementation. Therefore cooperation, coordination and control plays an important role. If the actions depend on the links of the chain of implementation, the level of inter-agency cooperation is needed in order to the chain should be close to 100%,.

There is a positive and significant impact on the effectiveness of leadership development of SME in Semarang Regency. It is seen the results of variable X₂ Leadership (0.068) significant and positive impact on the effectiveness of the SME development is shown by the coefficient of determination 0.094 or 9.4% can be explained by the model variables and leadership (91.6%) by the variables studied. This shows that the real impact on the effectiveness of leadership development of SME Semarang regency.

Greenleaf (2002: 15) defines a servant leader is a leader who cares for the growth and dynamics of his followers and community life and therefore he put these things in comparison to the achievement of personal ambition and his favorite course or pattern.

From the results of the analysis showed that the variables of professionalism apparatus (X₃) of (0.91) and a significant effect on the effectiveness of the SME development positif indicated by the coefficient of determination 0.746 or 74.6 of the model can be explained by variables Professionalism and 25.4% by other things not examined.

Professionalism in view (Korten and Alfonso, 1981) measured by the expertise possessed by a person in accordance with the needs of the tasks assigned to an individual organization. Ability, innovation, and responsiveness become motivating factors profesioanilme. Professionalism is very influential forces in an effort to realize the effectiveness of SME development.

Simple linear regression line formed between policy implementation variables (X₁) leadership (X₂), professionalism apparatus (X₃) with the effectiveness of the development of SMEs (Y) in Semarang district $0,405X_1 + 0,405X_1 + 0,068 X_2 + 0,467X_3$. The statistical results showed that the implementation of policy, leadership, profesioalisme forces contribute significantly to the development of SME in the district efektfitas Semarang.

Recapitulation of the beta coefficient values are divided into primary factor, supporting factors and reinforcing factors. The main factor was the professionalism apparatus (X₃) is the implementation of policies supporting factor (X₁) and the amplifier is the leadership factor (X₂).

IV. CLOSING

The conclusion based on the research of results, are:

Implementation of policies significantly by 75.4% on the development of SME in Semarang Regency. This gives the meaning that the policy implementation role determines the success or failure of the development of SME in Semarang Regency. Positive influence showed that with the implementation of appropriate policies, the development of the SME will bring progress to SMEs and the public at large.

2. Leadership affects 9.4% of the effectiveness of SME development in Semarang Regency. This shows that the presence of leaders who have little concern for SME will have an impact on the development of SMEs in Semarang Regency. The development of SME is not only dependent on the leaders, because they have had a pretty high spirit of independence. Guidance from the government to SME remains absolutely necessary as a form of responsibility to the mandate of the 1945 Constitution.

3. Professionalism influential forces by 74.6% on the development of SME in Semarang Regency. This shows that the presence of Professionalism officers who have concern for SME will have an impact on the development of SME in Semarang Regency. Professionalism plays a role to further strengthen the effectiveness of the development of SME, especially in this era of globalization, competition is quite sharp should be complemented with quality professionalism.

4. Implementation of policies, Leadership, Professionalism influential forces for 79.1% of the effectiveness of SME development in Semarang Regency. However, the effectiveness of the development of SME is still not maximal, because to be effective it requires adequate facilities and infrastructure, as well as the role of leaders who are loyal to the job. Development of SME in the form mutually beneficial partnerships with large businesses.

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AUTHORS

First Author – Monica Henny Sudaryati, Doctor student, Satyagama University and email : moncalesa@yahoo.co.id

Second Author – Prof.Dr. E. Koswara Kertapradja, Lecturer Science of Government, Satyagama University.

Third Author – Musa Hubis,MS.DIP.ING,DEA, Lecturer Science of Government, Satyagama University and email : hubeis.musa@yahoo.com

Fourth Author – Dr.Ir. Dewi Sulistyani, MM, Lecturer Science of Government, Satyagama University and email : dewisulistyan@gmail.com

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Evaluation of Quality Characteristics of Goat Milk Yogurt Incorporated with Beetroot Juice

D.A.P.R. Damunupola*, W.A.D.V. Weerathilake* and G.S. Sumanasekara**

* Department of Livestock and Avian Sciences, Faculty of Livestock, Fisheries and Nutrition, Wayamba University of Sri Lanka, Makandura, Gonawila 60170, Sri Lanka

** Ministry of Economic Development, 464/A, T.B. Jaya Mawatha, Colombo 01000, Sri Lanka.

Abstract- Production of goat milk has increased worldwide due to its numerous health benefits. Goat milk is a rich source of proteins, vitamins, minerals as well as many short and medium chain fatty acids. Goat milk has better digestibility, lower allergenicity and suitable for those who suffer from lactose intolerance. Considering those health benefits, current study was carried out to produce a goat milk yogurt and identify the plausibility use of beetroot juice to mask the goaty flavor. Yogurt samples were stored at 4°C and physicochemical evaluation was conducted for 21 days at the interval of seven days. Addition of beetroot juice into goat milk increased moisture content and lowered total solid content while fat, protein and ash contents were non-significant during the storage. The titratable acidity of plain goat milk yogurt and beetroot yogurt decreased from 0.91% to 0.80% and 0.85% to 0.84% respectively where as pH increased from 4.45 to 4.54 for plain goat milk yogurt and 4.34 to 4.64 for beetroot yogurt after 21 days of storage. Highest microbial count was observed after 14 days of storage; 18.70×10^6 for plain yogurt and 17.56×10^6 for beetroot yogurt. Sensory evaluation revealed that 4% is the most preferred beetroot juice concentration out of 4%, 6% and 8%. Ninety eight percent panelists preferred to consume beetroot yogurt and most of them were willing to pay Rs.45/- for the new product.

Index Terms- Yogurt, goat milk, beetroot, physicochemical, health benefits

I. INTRODUCTION

Goat is considered as the poor man's cow. In the developing world, goat can fulfill the difference between malnourished and healthy sustaining diet [1]. Production of goat milk worldwide has increased in recent years. It has many beneficial effects for human health. The nutritional and healthy values of fermented milk and beverages were well-described [2]. France is the highest goat milk producing country while Spain, Greece and Turkey are in second, third and fourth respectively [3].

There are many more value added products made of goat milk such as butter, frozen yogurt, and the manufacture of fluid goat milk products including low fat, fortified or flavored milks, cultured products such as buttermilk or yogurt, frozen products such as ice cream, condensed milk and dried milk products [2]. Composition of goat milk varies according to different factors including diet, breed, individuals, parity, season, feeding, management environmental conditions, locality, stage of

lactation, and health status of udder [4]. Table 01 shows the composition of goat milk.

Table 01. Average nutrient composition of goat milk

[3] = Yangilar (2013); [10] = Domagala *et al.*, (2007); [11] = Gaddour *et al.*, (2013); [12] = Bano *et al.*, (2011); [13] = Pegler, (2005)

Composition	[3]	[10]	[11]	[12]	[13]
Fat (%)	3.8	3.2	3.96	4.1	5.14
Solids-non-fat (%)	8.9	7.54		9.91	9.92
Lactose (%)	4.1	4.72		4.38	5.28
Protein (%)	3.4	2.78	3.13	3.96	
Casein (%)	2.4	2.28			4.06
Non-protein N (%)	0.4	0.31			
Ash (%)	0.8	0.82	0.78	0.71	0.93

Goat milk has high protein content, higher vitamin A and B contents, a higher content of free amino acid Taurine, and a higher proportion of short to medium chain fatty acids and considerable amount of calcium and phosphorous. However, the average goat milk consumption is not significantly different from cow milk. Goat milk with its low lactose content is more suitable for those who suffer from lactose intolerance often caused by cow's milk [5]. Overall, adult daily dietary nutrient recommendations for essential amino acids would be met equally or exceeded by a 0.5L goat milk consumption compared to cow milk [6]. Furthermore, caproic, caprylic, capric and other medium chain fatty acids have been used for the treatment of malabsorption-related syndromes, intestinal disorders, coronary diseases, premature infant nutrition, cystic fibrosis and gallstone problems because of their unique metabolic ability to provide energy while at the same time lowering, inhibiting and dissolving cholesterol deposits [3, 7].

Goat milk has many special characteristics that can be attributed to number of health benefits. Goat milk's nutritional properties and lower allergenicity in comparison to cow milk, especially in non-sensitized children, has led to an increased interest in goat milk as a functional food, and it now forms a part of the current trend to healthy eating in developed countries [3]. Furthermore, it has beneficial effects for health maintenance, physiological

functions, in the nutrition of children and elderly people. Goat milk has better digestibility, alkalinity, buffering capacity and certain therapeutic values in medicine and human nutrition. There are some technological advantages of goat milk in comparison to cow milk, for instances; smaller fat globule size, which provides a smoother texture in derived products, lower amount of α_{s1} -casein, resulting in softer gel production, a higher water holding capacity and a lower viscosity [3].

Beetroot (*beta vulgaris*) contains potassium, magnesium, iron, vitamin A, B₆ and C, folic acid, carbohydrates, protein, antioxidants and soluble fiber. Beta-cyanin is the compound that gives beetroot its purplish red colour and is also a powerful antioxidant. It helps to reduce the oxidation of LDL-cholesterol and does not allow it to deposit on the walls on artery. This protects the heart from potential heart attacks and stroke. Beta-cyanin contain in beetroot also helps to slow the growth of tumors and give protection against cancers. Coles and Clifton (2012) have found that, 500g of beetroot everyday reduces a person's blood pressure within six hours [8]. Nitrate is the special ingredient in beetroot which lowers blood pressure and may help to fight heart disease. Additionally, drinking beetroot juice could boost brain power and may treat dementia through increasing oxygen uptake by the body. On the other hand, yogurt is one of the most popular fermented milk product manufactured from milk of different animal species including goat with a number of promising health effects and was originated in 6000 B.C.[9].

Hence, it can be hypothesized that the incorporation of beetroot juice into goat milk yogurt can enhance nutritional value of the yogurt in addition to the health benefits. Therefore the aim of the current study was to incorporate beetroot juice into the goat milk yogurt in order to mask the goaty-flavor of milk as well while attracting more consumers by using the colour of beetroot and to determine the physical, chemical, microbiological and sensory characteristics of the new product.

II. MATERIALS & METHODS

Yogurt preparation

Fresh raw goat milk was obtained from local farms in Sandalankawa and Bibiladeniya, North Western province, Sri Lanka. Food-grade ingredients including sugar, gelatin and beetroot were purchased from a grocery shop in Makandura. Yogurt preparation was carried out at the laboratory of Food Science and Technology, Wayamba University of Sri Lanka.

The beetroot was washed, peeled off and chopped into small pieces. The juice was extracted by blending and straining respectively. The beetroot juice was then heated at 80°C for 15 minutes. Three concentrations; 4%, 6%, and 8% were prepared using the heat treated beetroot juice.

The goat milk was cream separated in order to obtain the desired fat content (2.5%) for the yogurt which was then pasteurized at 85°C for 30 minutes. Eight percent (8%) of sugar was added during the last 5 minutes of the pasteurization. The heated milk

was mixed with 1% gelatin and then cooled to 43-45°C. The commercial yogurt starter culture (0.2 g/1L) contains 1:1 ratio of *Streptococcus thermophilus* and *Lactobacillus bulgaricus* was inoculated to the mixture. The raw milk was divided into four equal portions; one for control and the other three for the experiments. Beetroot juice was added to the experimental milk samples at 4%, 6% and 8% levels. The samples were then incubated at 45°C for nearly 5 hours and stored in a refrigerator at 4°C until used.

Sensory evaluation

Two sensory evaluations were carried out using untrained panel including 50 panelists from Wayamba University of Sri Lanka. Yogurt samples were served in randomized order in yogurt cups coded with three random digits. The most preferred goat milk yogurt incorporated with different beetroot juice concentrations (4%, 6%, 8%) was determined during the first sensory evaluation using a ranking test according to the preference.

Second sensory evaluation was conducted using a 5 point hedonic scale in which a cow milk yogurt along with a plain goat milk yogurt were used as controls against the beetroot juice added goat milk yogurt products. The intention was to evaluate the sensory parameters including colour, body and texture, goaty flavor, odor and overall acceptability.

Proximate analysis

The yogurt samples were analyzed for moisture and fat content using sand pan technique [14] and Gerber method [15]. Whereas the crude protein, ash content and total soluble solids contents were determined according to the AOAC Protocols [16].

Chemical analysis

The pH of the yogurt samples were measured using a pH meter (Eutech instrument, model 510, Malaysia), whereas acidity was determined by titration with 0.1N NaOH [16]. Yogurt samples were monitored for pH and acidity after fermentation for 1, 7, 14 and 21 days at 4°C of storage.

Microbiological analysis

Prepared yogurt samples were analyzed for total bacterial count, total coliform count, and yeast and mold count after fermentation for 1, 7, 14 and 21 days. One gram of yogurt sample was diluted with 9mL of distilled water. Peptone water was used for the serial dilution. Total bacterial count was determined using plate count agar, and incubated at 37°C for 48h. Colony counter was used for the enumeration of total bacterial count. Culture tubes with MacConkey broth was used as the medium for the determination of coliform, and incubated at 37°C for 48h. Presence of air bubbles in the Durham tubes or any colour change indicated the positive results of coliform. Yeast and mold count was determined by inoculating the samples on potato dextrose agar and incubated at 25°C for 5 days.

Statistical analysis

Yogurt samples were analyzed statistically for chemical and proximate analysis using t-test by SAS 9.2 version. Sensory evaluation was recorded with five point hedonic scale and data obtained were analyzed using Chi-square in SAS 9.2 version and Kruskal-Wallis Test in MINITAB 15. All the significances were determined at $\alpha = 0.05$.

III. RESULTS & DISCUSSION

Sensory evaluation

The results of the first sensory evaluation shown that most preferred beetroot juice added yogurt was the one with the lowest concentration (4%) of beetroot juice having a significant difference ($P<0.05$) compared to 6% and 8% concentrations. Results from the sensory tests for the colour, body and texture, goaty flavor, odor and overall acceptability of yogurts are shown in Table 02. The panelists were able to distinguish a significant difference ($P<0.05$) in all attributes among the three yogurt samples. Cow milk yogurt gained higher acceptance for all attributes tested. Beetroot juice was added to the goat milk yogurt with the intention of enhancing the colour and it was proved by gaining a higher score for the colour of beetroot yogurt (3.82) than the plain goat milk yogurt (3.6).

A reduction of the scores for body and texture was observed in both goat milk and beetroot yogurt. A higher score for goaty flavor in beetroot yogurt than goat milk yogurt was observed indicating a higher acceptability for the flavor of the new product. It may be due to the masking ability of the peculiar flavor by the addition of beetroot juice. Analysed results for odor showed slightly higher score for beetroot yogurt than goat milk yogurt indicating that through the incorporation of beetroot juice, the odor has decreased up to some extent. Average overall acceptability scores ranged from 3.24 to 4.38 among the three yogurt samples. Moreover, the results showed that the overall acceptability of beetroot yogurt was not significantly different ($P>0.05$) from goat milk yogurt although beetroot yogurt gained a higher overall acceptability.

According to Berridge (1996), preference assessments are dependent on the psychological or functional components of pleasure of eating as complexity of neuron system, determined the liking extent unconsciously [17]. However, 98% of the panelists preferred to consume beetroot yogurt. From those who preferred, 74% were willing to pay Rs.40/- for the new product whilst 18%, 2% and 6% were willing to pay Rs.45/-, Rs.50/- and Rs.55/- respectively.

Proximate Analysis

Higher moisture content was observed in beetroot juice added goat milk yogurt than in the control (Table 03). Water contained in the beetroot juice contributed to the final moisture content of the yogurt. A certain amount of moisture in the milk and beetroot

juice was lost during the heating process. Similar results were reported for goat's milk *dadih* incorporated with tropical- fruit puree [5]. Bonding between the water and the milk protein occurred to a certain extent and it might resulted in lower amounts of moisture, compared with the actual moisture content. The fat content was not significant between the yogurt samples. The beetroot used for the incorporation with the yogurt, contained very low levels of fats. The fat content of the beetroot juice added goat milk yogurt was contributed primarily by the fat present in the goat milk. Jenness (1980) has mentioned that the fat content in goat milk (4.1%) varies according to the breed and there is a higher digestibility of goat milk compared to cow milk due to the smaller size of the fat globules, having a great surface area, and lipase in the gut supposedly able to attack the lipids faster [4].

The protein content of the yogurt samples were not significant as the protein in beetroot was not considerable enough to contribute for the evaluated yogurt sample. No significant differences in ash content were observed among the yogurt samples. Total solid content was significantly higher ($P<0.05$) in the control yogurt which is probably due to the higher amount of lactose present in the control (Table 03). Moreover, the beetroot juice contained more water than solid matters which contributed to a low total solid content.

Table 02.Sensory attributes of cow milk, goat milk and beetroot juice incorporated yogurt samples

Attributes	Cow milk yogurt	Goat milk yogurt	Beetroot yogurt
Colour	4.08 $\pm 0.82^a$	3.6 $\pm 1.16^b$	3.82 $\pm 0.74^{ab}$
Body &	4.08 $\pm 0.90^a$	3.56 $\pm 0.99^b$	3.18 $\pm 0.97^b$
Texture			
Goaty flavor	4.18 $\pm 0.85^a$	2.94 $\pm 0.85^b$	3.18 $\pm 0.96^b$
Odor	4.22 $\pm 0.76^a$	3.16 $\pm 1.02^b$	3.22 $\pm 0.85^b$
Overall acceptability	4.38 $\pm 0.63^a$	3.24 $\pm 0.89^b$	3.42 $\pm 0.95^b$

Mean values in the same row with different letters are significantly different ($P<0.05$). n=50

Table 03.Physicochemical characteristics of plain and beetroot incorporated goat milk yogurt

Composition	Plain goat milk yogurt	Beetroot yogurt
Moisture (%)	75.04 $\pm 0.43^a$	79.08 $\pm 0.60^b$
Fat (%)	2.36 $\pm 0.05^a$	2.46 $\pm 0.05^a$
Protein (%)	4.47 $\pm 0.01^a$	4.59 $\pm 0.09^a$
Ash (%)	0.92 $\pm 0.06^a$	0.93 $\pm 0.02^a$
TS (%)	23.56 $\pm 0.40^a$	20.42 $\pm 0.22^b$

Mean values in the same row with different letters are significantly different ($P<0.05$).

Chemical analysis

The results of the changes in pH during the storage period of two yogurt samples are illustrated in the Figure 1. A significant difference in the pH change was observed at day 7 of storage at 4°C; whereas the results showed that the addition of beetroot juice into goat milk did not make a significant effect ($P>0.05$) during the rest of the storage period. Seelee *et al.*, (2009)

reported that goat milk supplemented with 3% skim milk powder had a slight decrease in pH during the storage at 4°C over three weeks [18]. The decrease of pH was observed throughout the storage period and this may be due to the growth of bacteria that converts lactose into lactic acids.

Titratable acidity (TA) of beetroot juice added yogurt increased gradually compared to the control during the storage at 4°C for 3 weeks (Figure 2). The rich source of sugar provided by the beetroot juice may serve as a suitable substrate for the growth of microbes. The TA of the two yogurt samples were significantly high ($P<0.05$) at the first day and similar changes were observed for at 1,7,14 and 21 days of storage.

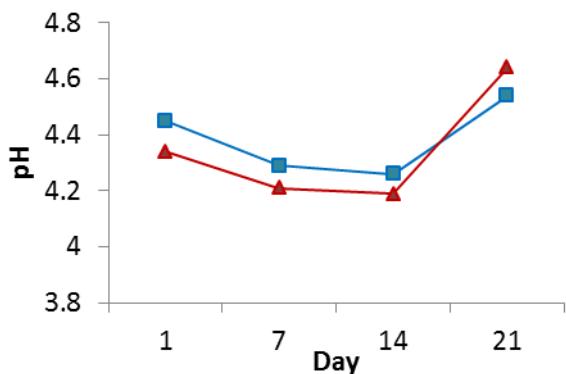


Figure 1. Changes of pH of control yogurt (□) and beetroot incorporated yogurt (△) during storage.

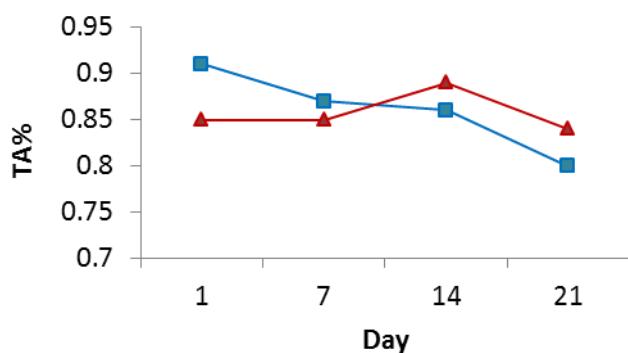


Figure 2. Changes in titrable acidity of control yogurt (□) and beetroot incorporated yogurt (△) during storage.

Microbiological analysis

The data on the total microbial count in control and beetroot juice incorporated yogurt samples showed (Table 04) an insignificant difference during the day 1 and 21, whereas the means for the total bacterial count were significantly different ($P<0.05$) during day 7 and 14. Peak of the total microbial count was observed at 14 days of storage for control and beetroot juice added yogurt ($18.70 \times 10^6 \pm 0.10 \times 10^6$ and $17.56 \times 10^6 \pm 0.11 \times 10^6$) respectively. Total microbial count showed a reduction after 21 days of storage ($6.96 \times 10^6 \pm 0.15 \times 10^6$ and $6.66 \times 10^6 \pm 0.15 \times 10^6$). This may be due to the inhibition of the growth of

microorganisms as a result of acid production. According to Tamime (1990) as cited in Seelee (2009) during fermentation, *S.thermophilus* produced lactic acid and formic acid which activate the growth of *L. bulgaricus* that produced diacetyl and acetaldehyde. These compounds reported to give the typical yogurt flavor [18]. Coliform were absent during the 21 days of storage life whilst 1-2 yeast and mold colonies were observed during the latter part of the storage period.

Table 04. Results for the microbial count of plain and beetroot juice added goat milk yogurt

Day	Plain goat milk yogurt		Beetroot incorporated goat milk yogurt		
	TPC ($\times 10^6$) CFU/g	Coliform & Yeast & mold	TPC ($\times 10^6$) CFU/g	Coliform & Yeast & mold	
1	4.76 ± 0.05	Nil	4.70 ± 0.10	Nil	Nil
7	8.10 ± 0.10	Nil	11.03 ± 0.05	Nil	Nil
14	18.70 ± 0.10	Nil	17.56 ± 0.11	Nil	Nil
21	6.96 ± 0.15	Nil	6.66 ± 0.15	Nil	Nil

IV. CONCLUSION

Results suggest that the incorporation of beetroot extract could mask the goaty-flavor and goaty-odor of the yogurt made from goat milk. Four percent (4%) incorporation level of beetroot juice preferred most by the panelists against 6% and 8%. Moreover, addition of beetroot juice did not change the pH and titratable acidity significantly compared to plain yogurt made from goat milk. Based on the results it can be concluded that the inclusion of beetroot juice increase the consumer preference. Therefore, it can be concluded that the incorporation of beetroot juice may be a promising method to mask the goaty-flavor and goaty-odor associated with goat milk yogurt while enhancing the consumer preference.

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AUTHORS

First Author – D.A.P.R. Damunupola,B.Sc, Department of Livestock & Avian Sciences, Wayamba University of Sri Lanka, email: <poshirasangi@gmail.com>.

Second Author – W.A.D.V. Weerathilake, Mphil;B.Sc.Special (Hons), Department of Livestock & Avian Sciences, Wayamba University of Sri Lanka, email: <dammika_kandy@yahoo.com > .

Third Author – G.S. Sumanasekara, B.V.Sc,Ministry of Economic Development, email: <sagarika_sumanasekara@yahoo.com>.

Correspondence Author – W.A.D.V. Weerathilake,email: < dammika_kandy@yahoo.com>, Tel: +94 (0)77 989 4142

Effect of fibre geometry on the tensile properties of thermoset jute fibre composites

Rejaul Hasan*, Rishad Rayyaan**

*Department of textile technology, National Institute of Textile Engineering and Research

**Department of textile technology, The University of Manchester

Abstract- Thermoset composites made from jute woven fabric, jute non-woven mat and jute carded-sliver have been manufactured in this project. For manufacturing different composite laminates, four & nine layers of woven fabric, one & two layers of non-woven mat and three layers of carded sliver have been used. Various tensile properties (tensile strength, tensile modulus & elongation at break percentage) have been investigated according to ASTM D3039 as functions of preform architecture (woven, non-woven and sliver) and direction of applied load. Each of the three different composites exhibited reinforcing effect to the epoxy matrix system. It has been found that in terms of stiffness sliver reinforced composite shows the highest stiffness and non-woven composites shows the lowest stiffness. In terms of strength, non-woven reinforced composite shows the lowest values. The strength of woven and sliver reinforced composites have been found to be almost similar.

Index Terms- Jute composites, epoxy, jute fibre, tensile properties, fibre architecture

I. INTRODUCTION

Composite materials have been already established as superior and unique in the world of modern engineering materials in comparison with the conventional metallic alloys[1, 2]. Superior specific strength and stiffness, corrosion resistance, high specific modulus made them most attractive and suitable for different high-tech engineering application [3]. Composite materials already came a long way to replace the conventional materials like wood and metal with its wonder properties. Among different types of composites, fibre reinforced composites are most important one. The technology of fibre reinforced composites has come of age with the advancement in aerospace applications [4]. Now after meeting the challenge of aerospace sector, it shows the potentiality to cater from domestic to industrial applications. Because of good performance, versatility and special advantage during processing; fibre reinforced composites demand is increasing rapidly in last few decades [5].

The fibre reinforced composites made from synthetic fibres are not biodegradable and environment friendly. That is why with the increase of environmental consciousness; the uses of synthetic fibre reinforced composites are now critically considered [6]. Apart from this, scientists are looking for some cheap reinforcing materials to cut down the high cost of fibre reinforced composite materials [4]. Natural fibre with biodegradability, environment friendly characteristics and low cost are presenting themselves to serve this purpose. Also natural fibre composite shows their great potentiality as structural materials due to its low density, good specific properties and low abrasiveness [7].

Various natural fibres such as flax, hemp, jute, sisal and few others are now being used as reinforcement in composites. Among all, jute is one of the cheapest and commercially most available fibres, especially in the tropical countries like Bangladesh or India [6, 8]. High cellulose content and low micro-fibril angle of jute fibre make it very suitable to use as reinforcement [9]. The composites from jute fibre reinforcements are not suitable for high tech applications such as aerospace, but it can serve some other needs such as interior parts of automobiles, furniture's, partitions etc.

There is a long history of jute fibre reinforced composites research. Several important researches have been recognized to characterize jute fibre reinforced composites. Long jute fibre, short jute fibre, jute woven fabric, jute knitted cloth, jute sliver, Jute 2D & 3D preforms has been used as reinforcement for composites manufacturing in different research [10, 11]. Along with this, different resin system has also been used by different research groups. These investigations were targeted to find the optimum fibre contents, best reinforcing structures, suitable matrix systems etc for jute fibre reinforced composites [12, 13]. There were few researches which investigated the combination of jute fibres with other natural or synthetic fibres (hybrid composites) to improve the mechanical properties of reinforced composites [14-18].

One of the major limitations of jute fibre reinforced composites is its lower mechanical properties compared to glass or carbon fibre composites. Different fibre treatment such as alkali treatment, permanganate, peroxide, silane oxidization, detergent wash, acetone wash, treatment with N, N-Dimethylaniline, chemical coating has been applied on jute fibre before using as reinforcement to improve the mechanical performance of composites [6, 19, 20]. Post-treatment of composites was also found to be a successful technique to improve the mechanical performance of jute fibre reinforced composites [21]. Several approach of interfacial modification is been observed to improve the composites properties [22-24].

Table 1 Properties of Epoxy Resin

Resin	Araldite LY563
Hardener	Aradur 3486

Curing cycle	80° C for 8 hrs.
Tensile Strength	70 - 74 MPa (in cured state)
Tensile Modulus	2.8 – 3.0 GPa (in cured state)

In fibre reinforced composites, fibres have been reinforced in polymer matrix in different forms and structures. One of the most economical techniques of using the fibre inside a polymer matrix is using of “Textile Preforms”. Textile preforms are structures made from fibre strands using different traditional textile technique and machinery. This is the most effective way of handling fibres without any distortions before impregnation in resin [2, 25, 26].

In this study, composites made using woven fabric, non-woven matt, and carded sliver as reinforcements have been used to characterize their tensile properties. In each different composites, the fibre architectures are different and the focus of study is to determine the effect of this change of architecture into the composite mechanical properties.

II. Experimental Procedure

A. Jute Preforms

1×1 plain jute woven fabrics (15 yarns in warp and 15 yarns in weft), having area density of 245 ± 5 GSM and average thickness of 1 ± 0.1 mm; Needle-punched non-woven jute mats, having area density of 567.4 ± 5 GSM and thickness of 5.38 ± 0.3 mm and Jute carded slivers of count 46 KTex were sourced from Janata Jute Mills Bangladesh.



Figure 1: Jute Preforms Structure

There is a woven 3×3 mesh (3 ends & 3 picks per inch) inside the non-woven mat and the ends and picks has same strength. The carded slivers used here were withdrawn from the jute yarn manufacturing line, just after carding process.

B. Resin System:

Epoxy resin ARALDITE LY564 and Hardener ARADUR 3486, sourced from Huntsman Ltd was used as the matrix system.

C. Fabrication of laminates:

Composite laminates from jute preforms and epoxy resin system were prepared in vacuum bagging technique (VBT). The preforms are cut in necessary dimension and dried at 80 deg C for 1H to remove the moisture from the pre-forms.



Figure 2: Infusion of vacuum bagged reinforcement

After drying, different layer of preforms were vacuum bagged for resin infusion. Preform layers were stacked in 0° direction with each other for different laminates manufacturing. The preforms were laid on a steel plate or mould and the total assembly was then covered with a flexible bagging material. Then vacuum was drawn and finally the assembly was infused with the properly degassed resin & hardener mixture. This infused assembly was then cured in vacuum oven at 80° C for 8H. After the completion of curing, the bagging materials were removed and the laminate was taken out of the mould.

D. Preparation of specimens for Tensile Test:

Tensile test specimens were prepared from laminates as per ASTM standard, shown in table 2.

Table 2: Composite laminates specification

Reinforcement Types	Number of Layers	Specimen ID	Laminates Test Direction
Woven Fabric	4 layer	W1	Along warp
	4 layer	W2	Along weft
Non-woven Mat	1 layer	N1	Along MD
	1 layer	N2	Along CD
	2 layer	N3	Along MD
Carded Sliver	3 layer	S	Longitudinal direction

E. Tensile test

Tensile tests have been carried out following ASTM D3039 standard on Instron Machine (Model: INSTRON-5569). 2 mm/min cross-head speed using 50kN load cell. Specimen gauge length was 25 cm and strain gauge distance was 50 mm.

III. Result & Discussion

Table 3 shows the tensile modulus & fibre volume fraction of jute woven, non-woven and carded sliver reinforced composite laminates. All the three different kinds of composites showed reinforcing effect in the epoxy resin system. Tensile modulus of woven composites is 247% higher, non-woven composites is 164% higher and Sliver composites is 308% higher compare to bare epoxy (2.8 GPa).

Table 3: Tensile modulus & fibre volume fraction of jute fibre reinforced epoxy composite laminates

Specimen ID	Fibre volume fraction (%)	Tensile Modulus, GPa
W1	24.0 ± 0.2	5.27 ± 0.2
W3	26.0 ± 0.1	6.25 ± 0.1
W _{wp} = (W1+W3)/2	25 ± 0.2	5.76 ± 0.2
W2	24.0 ± 0.1	7.9 ± 0.1
W4	26.0 ± 0.1	8.24 ± 0.2
W _{wf} = (W2+W4)/2	25 ± 0.2	8.07 ± 0.2
W = (W _{wp} + W _{wf})/2	25 ± 0.2	6.91 ± 0.2
N1	23.8 ± 0.1	4.38 ± 0.2
N3	25.4 ± 0.1	4.9 ± 0.1
N _{md} = (N1+N3)/2	24.6 ± 0.1	4.64 ± 0.2
N2	23.8 ± 0.1	4.27 ± 0.2
N4	25.4 ± 0.1	4.8 ± 0.1
N _{cd} = (N2+N4)/2	24.6 ± 0.1	4.54 ± 0.2
N = (N _{md} + N _{cd})/2	24.6 ± 0.1	4.59 ± 0.2
S	17 ± 0.2	8.61 ± .3

As the fibre volume fraction of different composites were not equal, fibre bundle stiffness was calculated for comparison which shows less error% than normalisation. This calculation was carried out on the basis of simple rule of mixture. From the composites strain data, fibre bundle strength has also been calculated. Fig 3 presents the fibre bundle stiffness and figure 4 presents the fibre strain versus strength. Table 4 shows the fibre bundle strength calculated from fibre modulus of composites.

Table 4: Fibre Bundle Strength & Fibre Strength of Jute fibre reinforced epoxy composite laminates

Specimen ID	Tensile Modulus, GPa	Fibre Bundle Stiffness in GPa	Strain%	Strength, in MPa
W	6.91 ± 0.2	8.7 ± 0.2	1.60%	138.4 ± 0.2
N	4.59 ± 0.2	5.6 ± 0.2	1.20%	67.0 ± 0.2
S	8.61 ± 0.3	9.8 ± 0.3	1.30%	127.4 ± 0.3

The uniform and unidirectional fibre assembly in carded sliver made the sliver reinforced composites stronger than non-woven composites & woven composites. In carded sliver, fibres are arranged in almost parallel to each other without any twist & with a little entanglement. There is no crimp or waviness in the fibre assembly. Carded sliver when reinforced in polymer matrix, a uniform stress transfer from matrix to fibre occurred due to longer fibre length and continuity of fibre. This resulted in the fibre bundle strength of carded sliver reinforced composites highest among the three. Breaking extension of sliver composites is less than woven composites which gives comparatively lower stain and eventually lower fibre strength in the sliver composites.

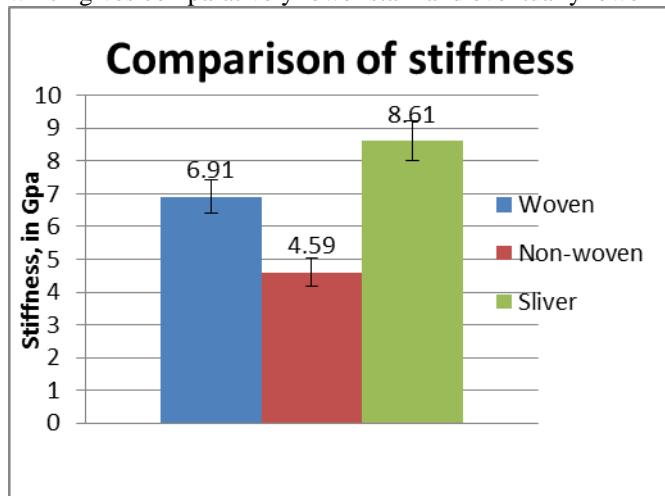


Figure 3: Fibre Bundle Strength in different jute preform reinforced laminates.

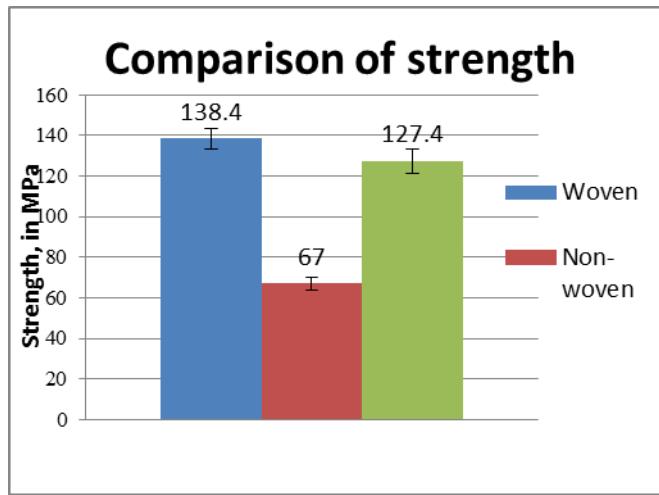


Figure 4: Fibre strain vs. Fibre Strength for different jute preform reinforced laminates.

Woven fabric is the assembly of numbers of parallel and interlaced spun yarn. In spun yarn, fibre remains well oriented & twisted around the yarn axis (warp yarn twist/inch 4.5 and weft yarn twist/inch 5.5 here) (Fig 5). The insertion of twist increases the strength of the fibre assembly. On the other hand, the interlacement of the yarn during weaving brings a certain amount of crimp in the woven fabric structure (warp way 22.8 ± 0.71 deg and wet way 22.0 ± 0.06 deg here) (Fig-5). Due to crimp, the packing of the fibre assembly in the composite is not as efficient as of single fibre assembly in carded sliver. Moreover, due to the mechanical action during weaving

operation kink band forms in the fibre; which further reduces the strength of the fibre[27, 28]. These can be reported as the significant reason of lower fibre bundle strength of woven composites compared to sliver composites. Because of the twisted & interlaced fibre strands in woven fabric, breaking extension is higher for woven composites. This causes highest strain in woven composites and gives the highest fibre strength as well compared to other composites.

The lowest strength of non-woven mat reinforced composites can be explained by its random fibre orientation. In non-woven mat, short fibres remain randomly oriented, locally interlaced, untwisted and discontinuous (Figure-5). Due to these reason when non-woven mat is reinforced in polymer matrix; stress transfer from matrix to fibre is not uniform. This could be the probable reason of lowest fibre bundle strength of non-woven composites compared to others. Due to short & randomly oriented fibre, breaking extension of non-woven composites is lowest among all, that give lowest strain and finally lowest fibre strength among all the three types of composites.

IV. Conclusion

Fibre architecture has a significant influence on the tensile properties of jute fibre reinforced epoxy composites. The most important observations from the investigation are:

1. Jute woven fabric, non-woven matt & carded sliver bring the reinforcing effect in epoxy system. Woven composites achieved 247% (6.91 GPa), Non-woven composites 164% (4.59 GPa) and sliver composites 308% (8.61 GPa) higher tensile modulus compared to bare epoxy modulus (2.8 GPa).
2. Sliver composites showed the highest fibre bundle strength (9.8 GPa) and non-woven composites achieved lowest fibre bundle strength (5.6 GPa); woven composites remained in between (8.7 GPa).
3. Woven composites strain is higher (0.016mm/mm) compared to non-woven (0.012 mm/mm) and sliver (0.013 mm/mm)
4. Fibre strength is found highest for woven composites (138.4 MPa) and lowest for non-woven composites (64.0 MPa). Fibre strength for sliver composites is 127.4 MPa.
5. The theoretical tensile modulus and experimental tensile modulus are coherent, which depicts the accuracy of experiment carried out. However the experimental data deviates because of non-uniform fibre dispersion in the matrix system and poor fibre-matrix interfacial bonding.

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Authors

First Author - Rejaul Hasan, BSc in Textile Technology (The University of Dhaka), MSc in Textile Technology (The University of Manchester), Research Associate in National Institute of Textile Research, Bangladesh.

rejaul_hasan87@yahoo.com

Second Author – Rishad Rayyaan, BSc in Textile Technology (The University of Dhaka), MSc in Textile Technology (The University of Manchester), PhD in textile composites (The University of Manchester).

rishad.rayyaan@manchester.ac.uk

Correspondence author – Rishad Rayyaan, rishad.rayyaan@manchester.ac.uk; +447835315488.

Wireless Power Transmission for Wireless Sensor Networks

Harshil Sheth, Aishwarya Karnik, Darpan Damani

Department of Electronics and Telecommunication, Dwarkadas J. Sanghvi College of Engineering

Abstract- Wireless sensor network is an arrangement of sensors used to monitor and record environmental parameters like temperature, sound, pressure etc and send it to a remote destination for further processing. For these networks, a major limitation is a limited lifetime due to battery constraints which acts as a barrier for large scale deployment. One solution to this problem is wireless transfer of power, also called as 'WiTricity'. In this article we review basics of Wireless sensor network and WiTricity as a solution to energy constraints.

Index Terms- Witricity, Sensor nodes, Topologies, Resonance, Magnetic induction.

I. INTRODUCTION

We live in a world of wireless devices. However battery charging technologies are still wired which requires a charger to be plugged into electrical wall output on one end and the device to be connected at the other end. Another option we

have is using batteries for power sources directly. This is mostly used in wireless sensor network configurations. However, a vital limitation associated to it is that these batteries have to be replaced frequently and hence they cannot be installed in hard to reach locations.

What if we could use rechargeable batteries such that it gets recharged wirelessly on its own? This next generation concept of wireless transfer of power is called witricity. Wireless power transfer (WPT) achieves the same goal but without the hassle of wires. The use of solar energy in energy harvesting WSNs can also be one option and its implementation has increased for practical applications; this is because of the fact that solar panels are easily available and they have a higher energy density as compared to other energy harvesting techniques. This high energy density allows the development of smaller sensor nodes. However, solar power strongly depends on sunlight and can therefore hardly harvest energy during the nighttime and the amount of harvested energy depends on the weather.

1. Wireless Sensor Network System Overview

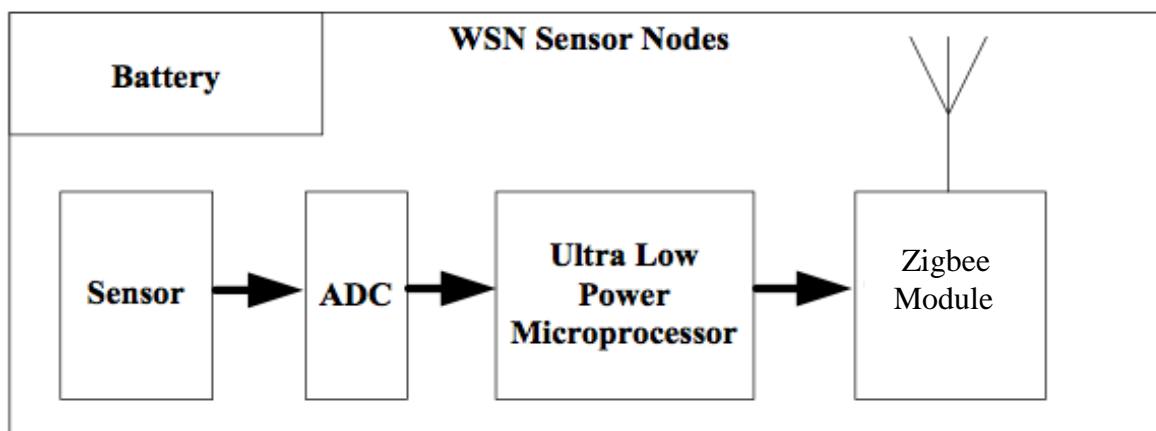


Fig:1.1 Basic Block diagram of Wireless sensor Node.

A WSN can be generally described as a network of nodes that cooperatively sense changes in environmental parameters and may control the environment, enabling interaction between persons or computers and the surrounding environment. The obvious advantage of wireless transmission is a significant reduction and simplification in wiring and harness. Many communication technologies, such as IrDA, Bluetooth and ZigBee, GSM/GPRS (General Packet Radio Service etc., have been developed for different situations. Nowadays, a kind of real time systems in which multiple sensors connected simultaneously to one gateway unit become necessary, and they are transformed into wireless sensor networks (WSNs). The data is forwarded, possibly via multiple hops, to a Sink (sometimes denoted as *controller* or *monitor*) that can use it locally or is connected to other networks (e.g., the Internet) through a *gateway*. The nodes can be stationary or moving. They can be aware of their location and can also be homogeneous.

As shown in fig 1.1, system architecture consists of multiple sensors and zigbee module on sender side and receiving zigbee module serially connected to microcontroller through which it drives output devices. [2]

We use ZigBee modules based on IEEE 802.15.4/Zigbee Wireless Personal Area Network (WPAN) standard to build low power, low maintenance WSN. Small size, low power, low cost and long battery life are the reason for using Zigbee. Zigbee works with three major devices: 1) Zigbee Coordinator: This is the major part of a Zigbee module there is exactly one coordinator in each network. This device scans the RF signals and thereby selects the one which has minimum traffic. 2) Zigbee Router: It acts as an intermediate device passing the data from other zigbees. 3) Zigbee End Device: It can talk to the parent node but it cannot relay data from other devices. The coordinator is generally programmed with a Personal Area Network Identifier ID (PAN ID). When the device joins the Zigbee network it receives a Network Address which can be used with PAN to communicate. Once this procedure is completed the device starts communicating. Analog to Digital Conversion feature of Zigbee is used to collect analog data from each sensor. The sensors are used for sensing purpose and may vary according to the application this analog data from the sensors is converted into digital data and is given to the microprocessor. The Wireless Sensor Node architecture is further connected to multiple such nodes to hereby form a Wireless Sensor Network.

II. DIFFERENT TOPOLOGIES

Bus Topology:

In this topology, there is a node send message to another node on the network sends a broadcast message onto the network that all other nodes see, but only the intended recipient actually accepts and processes the message. Bus topology is easy to install but congestion of traffic and single path communication. However, bus networks work best with a limited number of nodes. If more than a few dozen nodes are added to a network bus, performance problems will likely result.[5]

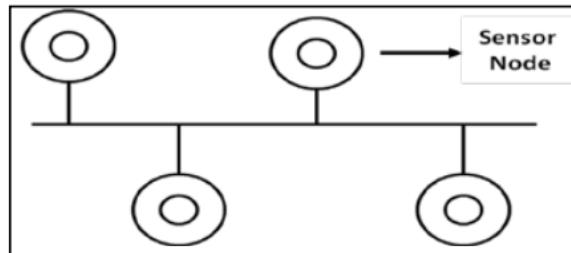


Fig.2.1 Bus Topology.

Tree Topology:

The network use a central hub called a root node as the main communication router. In the hierarchy, central hub is one level below from the root node. This lower level forms a star network. The tree network can be considered a hybrid of both the Star and Peer to Peer networking topologies as shown in Fig 2.2. In sensor network path may be single hop or multi hop, sensor node for getting data sense the environment and sent them to the sink and sensor forwards them to its parent after receives data messages from its children. It is important to find an optimal shortest path tree with maximum lifetime and shorter delay but slightly high time complexity and but more suitable for distributed implementation. [5]

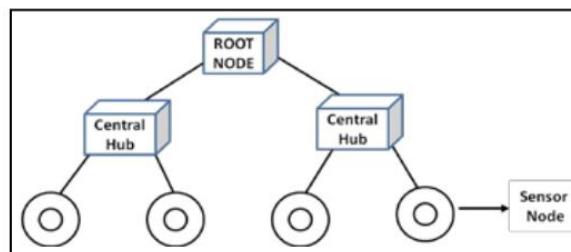


Fig. 2.2: Tree Topology

Star Topology:

Star networks are connected to a centralized communication hub (sink) and the nodes cannot communicate directly with each other.

The entire communication must be routed through the centralized hub. Each node is then a "client" while the central hub is the "server or sink" as shown in Fig. 2.3. But there is disadvantage of single path communication.

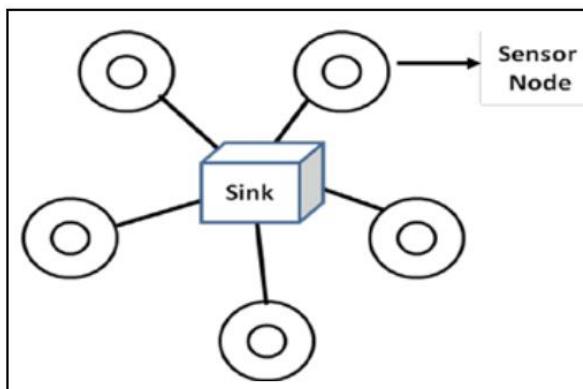


Fig. 2.3: Star Topology

Ring Topologies:

In a ring network, every node has exactly two neighbors for communication purposes. All messages travel through a ring in the same direction (either “clockwise” or “counterclockwise”). A failure in node breaks the loop and can take down the entire network. [5]

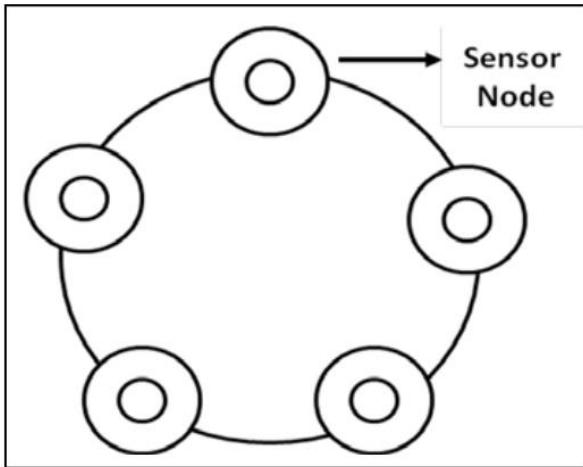


Fig. 2.4: Ring Topology

Mesh Topology:

Mesh topologies involve message can take any of several paths) A mesh network in which every node connects to every other is called a full mesh and there is partial mesh networks also exist in which some devices (nodes) connect only indirectly to others from source to destination. [5]

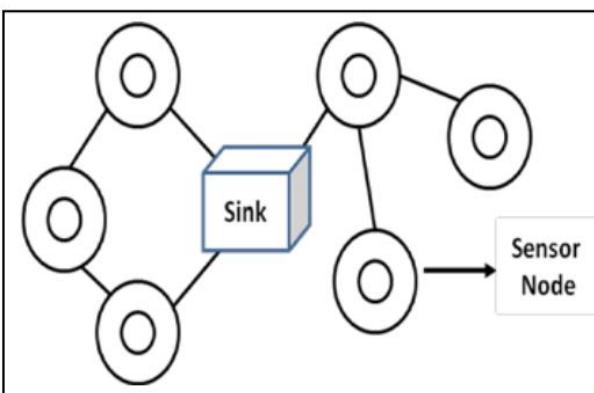


Fig. 2.5: Mesh Topology

Circular Topology

In this topology, there is a circular sensing area and that the sensing area has a sink (at center). The sensor nodes sense the event of Interest and transmit these data to the sink. The nodes are randomly deployed with uniform density all around the sink as shown in Fig.2.6. Depending on the distance of a node from the sink and the transmission range of the nodes, data have to traverse single or multiple hops before being received by the sink. The circular web topology is easy to establish, easy to maintain, and more efficient [5].

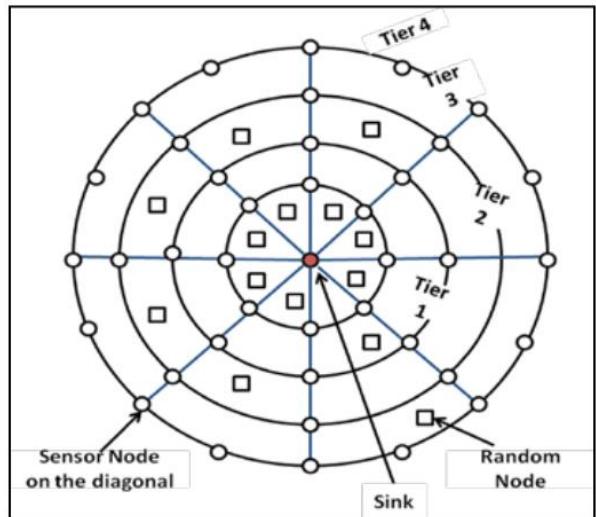


Fig. 2.6: Circular Topology

Grid Topology:

The sensor network field dividing into grids is shown in Fig 2.7. The network area is partitioned into non-overlapping square grid with same size. There should be at least one and only one node in working state in each grid at any time.

In order to extend the network life time, the nodes in a grid should work in turn. Inside each grid, one node is selected as a grid head which is responsible for forwarding routing information and transmitting data packets. Routing is performed in a grid-by- grid manner. Grid-based multi-path routing protocol intended to route packets fast, utilize and extend sensor nodes energy in addition to avoiding and handling network congestion when happens in the network.[5]

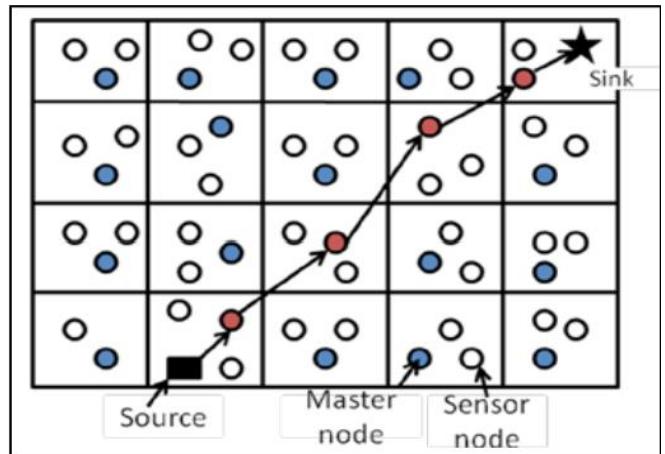


Fig. 2.7: Grid Topology

III. WIRELESS SENSOR NETWORKS

Wireless sensor networks can more broadly be defined as several nodes which can communicate with one another via wireless links. There by transferring data via multiple hops to a sink which uses it locally or maybe connected to a network via internet to a gateway. These nodes can be static or dynamic. [1]

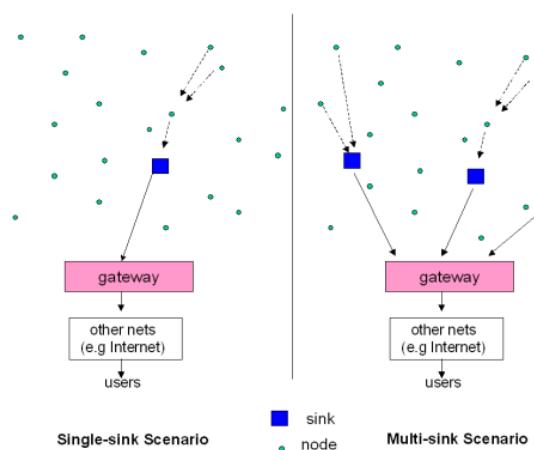


Fig: 3.1 (a) Single-sink Scenario (b) Multi-sink Scenario.

Wireless sensor networks are of two major types depending on the number of sinks they use. Figure 3.1 shows both the networks. The left part single sink wireless sensor network where the major issue lies with the fact that here several nodes causes the amount of data gathered by the sink to increase. Once the capacity of the sink is attained the network size cannot be augmented. The other type of network as shown in the fig 3.1 on its right is a multiple-sink network. In principle, a multiple-sink WSN can be scalable (i.e., the same performance can be achieved even by increasing the number of nodes), while this is clearly not true for a single-sink network. In many cases nodes send the data collected to one of the sinks, selected among many, which forward the data to the gateway, towards the final user. From the protocol viewpoint, this means that a selection can be done, based on a suitable criteria like, minimum delay, maximum throughput, minimum number of hops, etc. Therefore, the presence of multiple sinks ensures better network performance with respect to the single-sink case (assuming that the same number of nodes is deployed over the same area), but the communication protocols must be more complex and should be designed according to suitable criteria. [1]

IV. WiTRICITY

What is WiTricity?

WiTricity is nothing but wireless electricity. Transmission of electrical energy from one object to another without the use of wires is called as WiTricity. WiTricity ensures that cell phones, laptops, iPods and other power hungry devices get charged on their own, eliminating the need of plugging them in everytime. WiTricity technology is transferring electric energy or power over distance without wires with the basics of electricity and magnetism, and work our way up to the WiTricity technology. Even better, because of WiTricity some of the devices won't enquire batteries to operate. No, this concept of wireless electricity is not new. In fact it dates back to the 19th century, when Nikola Tesla used conduction-based systems instead of resonance magnetic fields to transfer wireless power. Further, in 2005, Dave Gerding coined the term WiTricity which is being used by the MIT researchers today. Moreover, we all are aware of the use of electromagnetic radiation (radio waves) which is

quite well known for wireless transfer of information. In addition, lasers have also been used to transmit energy without wires. However, radio waves are not feasible for power transmissions because the nature of the radiation is such that it spreads across the place, resulting into a large amount of radiations being wasted. And in the case of lasers, apart from requirement of uninterrupted line of sight (obstacles hinders the transmission process), it is also very dangerous. [3]

The Concept

WiTricity works on the principle of magnetic induction i.e a loop or coil of conductive material like copper, carrying an alternating current (AC), is a very efficient structure for generating or capturing a magnetic field. If a conductive loop is connected to an AC power source, it will generate an oscillating magnetic field in the vicinity of the loop. A second conducting loop, brought close enough to the first, may "capture" some portion of that oscillating magnetic field, which in turn, generates or induces an electric current in the second coil. The current generated in the second coil may be used to power devices. This type of electrical power transfer from one loop or coil to another is well known and referred to as magnetic induction. Some common examples of devices based on magnetic induction are electric transformers and electric generators [4]. Energy coupling occurs when an energy source has a means of transferring energy to another object. Magnetic coupling occurs when the magnetic field of one object interacts with a second object and induces an electric current in or on that object. In this way, electric energy can be transferred from a power source to a powered device. However, as in case of a transformer, the distance between the coils as well as their alignment plays an important role in deciding the amount of energy transferred and the amount of energy lost to the surrounding. Thus we use resonators to eliminate distance and placements constraints such that maximum power transfer is achieved. Resonators work on the principle of resonant coupling, i.e., by having magnetic resonant coils operate at the same resonance frequency so that they are strongly coupled via non radiative magnetic resonance induction. Under resonant coupling, energy can be transferred efficiently from a source coil to a receiver coil while losing little energy to extraneous off-resonant objects. Compared to inductive coupling, magnetic resonant coupling can achieve higher transfer efficiency while significantly extending the charging distance from a very close range (i.e., distance less than the coil diameter, usually several centimeters) to several times the coil diameter.

WiTricity in WSN

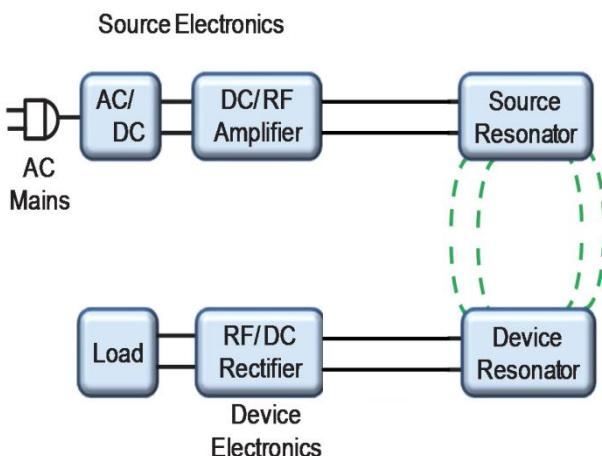


Fig 4.1 Block diagram of wireless energy transfer system

The above block diagram illustrates principle of WiTricity in WSN. It is generally used in applications where node installations are done at hard to reach areas and hence frequent replacement of batteries is not feasible. The charging station consists of an ac to dc converter which converts AC mains into Dc. This is amplified using several stages of amplifier and fed to a resonator circuit. The input resonator at the charging node and the destination resonator at the sensor node operate at the same frequency. Hence the input signal generates a magnetic field in the resonator and an equivalent magnetic field is induced at the receiver resonator. This causes an electric current to be induced at the destination node which is converted to DC signal and thus used for charging the on board battery.

This principle is used in two ways depending on the requirement of the application. In some applications a charging station is installed to continuously charge nearby nodes. Resonant coupling allows several destination nodes to be charged using a single source node. Thus if the controller or monitor station is near to the installed network, charging station can be installed along with monitoring devices or it can be installed separately near sensors. In other applications, such as military, node to node charging is also possible. If battery level in one node falls below threshold, it checks for nodes with greater power levels around its vicinity. Transfer of energy takes place from one node to other using transceivers.

V. CONCLUSION

In this article, we reviewed the basics of wireless sensor networks and its various architectures. As a focus application we considered WiTricity to eliminate the most crucial drawback of WSN, that of power constraints thus reviewing the basic concept of WiTricity and its working principle. Since its inception, extensive research has been carried out towards the development of this technology. Yet, a lot of areas still need development to design a complete product based on it. The most important finding is that once properly designed, a Wireless power transfer technology, such as magnetic resonant coupling, can offer a WSN infinite lifetime. Tesla once predicted in 1906: "The transmission of power without wires will very soon create an industrial revolution and such as the world has never seen

before." This pronouncement was ahead of its time then, but will soon become a reality.

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AUTHORS

First Author – Harshil Sheth, Department of Electronics and Telecommunication, Dwarkadas J. Sanghvi College of Engineering, Email: harshilsheth619@gmail.com

Second Author – Aishwarya Karnik, Department of Electronics and Telecommunication, Dwarkadas J. Sanghvi College of Engineering, Email: karnikaishwarya1802@gmail.com

Third Author – Darpan Damani, Department of Electronics and Telecommunication, Dwarkadas J. Sanghvi College of Engineering, Email: darpandamani93@gmail.com

Physico – Chemical Analysis of Paper Industry Effluents in Jammu city (J&K)

Angelika Sharma*, Anu Ramotra **, and H.S. Sehgal***

* Assistant Professor, Department of Environmental Sciences, Central University of Jammu (India)

** M.Sc. Environmental sciences, IV Semester Student, Central University of Jammu (India)

*** HOD, Department of Environmental Sciences, Central University of Jammu (India)

Abstract- Physico- Chemical Characteristics of Paper Industry Effluents located in Bari Bramana, District Samba, Jammu and Kashmir, were analyzed for the parameters such as pH, Turbidity, Total suspended solids, Total dissolved solids and Electrical conductivity for treated as well as untreated effluents. Of all parameters Turbidity and Total Suspended solids for both treated and untreated effluents were above the permissible limits.

Index Terms- Effluents, Pulp and Paper mills, Total dissolved solids , Total suspended solids.

I. INTRODUCTION

Man has been using the natural resources since beginning of civilization .The primitive man was totally depend on natural resources for his existence. With the increase in population, the over exploitation of the resources led to its destruction (Kuzhali,2012) . Many of the industries are totally depend on natural resources for their raw material. This over dependence is the cause of various environmental problems such as pollution of land, water, and air.

Pollution refers to an undesirable changes in the physical, chemical or biological characteristics of our environment namely; air, water, and soil(Kuzhali,2012). Industrial waste resulting from all manufacturing industries are a major cause of air, water, and land pollution.

Among the 17 most polluting industries identified by MOEF (ministry of environment and forests) , paper industry is one amongst them. The pulp and paper industry is one of the oldest industries in our country . But there has been a tremendous expansion in this industry during the last 25 years (Gupta., 2013)

Paper mill is a major industrial sector utilizing a huge amount of ligno- cellulosic materials and water during the manufacturing process, and release chlorinated lingo sulphonic acids, chlorinated resin acids, chlorinated phenols and chlorinated hydrocarbons in the effluents(Chopra and Kumar, 2011). The making of the paper requires large amount of water which is used at various stages such as wood preparation,

pulping, pulp washing, screening, washing, bleaching and coating operations. Among these processes, pulping especially chemical pulping generates a high strength of waste water .Such waste water having high COD and BOD values which disturbs the ecological balance of the environment, so paper making is water intensive process .

India has 550 paper mills currently which use waste paper as a raw material. The demand for the paper and paperboard by the year 2006-07 in India was 3.8 million tons/year and 4.9 million tons/year at the end of year 2010references.

The present recovery and utilization of waste paper by paper mills in India is 3.0 million tonnes annually, which translates to a recovery of 27% of the total paper and paper board consumed. This recovery rate is very low as compared to other developed nations like Germany-73%, Sweden-69%, Japan-60%, Western Europe-56%, USA-49%, and Italy-45% same (Indian Paper Manufactures Associations (IPMA), 2010). Due to inadequate availability of indigenous waste paper, India mills rely heavily on imported waste paper to meet the raw material demand. According to an estimate, the import of waste paper has increased from 5.1 million USD in 1980 to one billion USD in 2011. India imports around 4.0 million tonnes of waste paper annually which is about 57% of its requirements (Indian Paper Manufactures Associations (IPMA), 2010),

II. METHODOLOGY

2.1 collection of samples

The effluents was collected in previously cleaned plastic containers . These effluents was collected from Jammu paper mills located in Bari Brahmana sector(SIDCO complex), district Jammu ,India, at a distance of about 5 km from central university of Jammu. Bari Brahmana (SIDCO complex) is located at $32^{\circ}38'38.5''N$ and $74^{\circ}54'19.5''E$ (fig.1) the sampling was carried for APRIL month ,2014. The collected samples was analyzed for physico-chemical characteristics by using the standard methods.

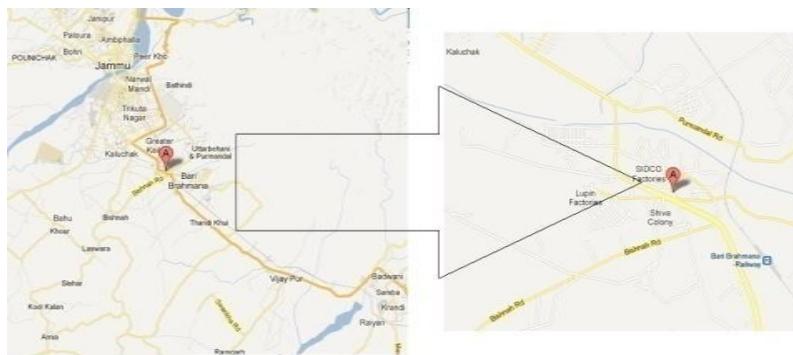


Fig 1. showing the location of Sideo complex Bari Brahmana , J&K

2.2 PHYSICO CHEMICAL ANALYSIS OF EFFLUENTS

The samples collected from the paper mill was brought for the physicochemical analysis in laboratory for the following parameters and analysed using standard methods given in table 1

Table-1. Analytical methods for physico-chemical parameters of pulp and paper mill effluents.

S.NO.	Physico-chemical parameters	Method applied for laboratory analysis
1.	pH	pH meter
2.	Turbidity	Nephelometer
3.	Electrical conductivity	Potentiometry
4.	Total dissolved solids (TDS)	Gravimetric, oven drying at 105°C
5.	Total suspended solids (TSS)	Gravimetric, residue drying 105°C

III. RESULTS AND DISCUSSION

The paper mill produces variety of writing and printing paper using waste-paper as raw material. The average production of paper in the mill is around 50,000 tonne per year to produce huge different varieties of paper. The wastewater generated from the paper mill consists of white water from stock preparation, paper machine and from the bleach section .The wastewater for analysis have been collected from the inlet which is more polluted and from the outlet, that after treatment.

The results for the pH, turbidity, electrical conductivity, TDS (Total dissolved solids), TSS (Total suspended solids) have been analyzed before and after treatment and compared with the Indian standard value and have been revealed in table 2

3.1 pH

Table2. Physico-Chemical Analysis of Paper Industry Effluents

S.NO.	PARAMETER S	TREATED SAMPLE	UNTREATED SAMPLE	INDIAN STANDAR DS (BIS)
1	pH	6.7± 2	7.5±0.8	5-9

The average pH value for treated effluents have been recorded as 6.7 and for untreated effluents value as 7.5 . The acidic nature of treated effluents is due to the presence of acids which is used while treating them and Alkaline nature of untreated effluent is due to the presence of chemicals such as hydrogen peroxide, caustic soda, and soap used while pulping the waste (Tripathi et al. 2013)

3.2 Turbidity

The average value for turbidity recorded for both treated as well as untreated effluents is 161 NTU and 299NTU respectively which have been found to be higher than the BIS prescribed limit (Tripathi et al. 2013)

3.3 Electrical Conductivity

Electrical conductivity is a useful indicator to show the salinity or total salt content of the effluents. The average electrical conductivity value for the treated effluent have been recorded as 195.9ppm and for untreated effluent as 196.95 ppm . The EC value of untreated effluent is higher than the BIS prescribed limit i.e., 1000µs. It is due to the presence of ions (Kuzhali et al. 2012).

3.4 Total Dissolved Solids

The average TDS value have been recorded as 1,244mg/L for treated effluents and 1,049mg/L for untreated effluents. The TDS value for both the treated as well as for untreated effluents were found to be lower than the BIS prescribed limit.(Kesalkar et al. 2012)

3.5 Total Suspended Solids

The TSS value have been recorded as 476mg/L for treated and 665mg/L for untreated effluents which have been found to be higher than BIS prescribed limit. The higher mean value of tss is due to the addition of different chemicals during pulping and bleaching processes .(Kesalkar et al. 2012)

		(6.5-6.9)	(6.7-8.4)	
2	Turbidity(NTU)	161± 8 (153-169)	299±10 (309-289)	10
3	Electrical Conductivity(μ s)	311.93±314 (291.6-544)	300.83±159 (272.8-508.7)	1000 μ s
4	Total Dissolved Solids(mg/L)	1244±244 (1488-1000)	1049±374 (1423-675)	2,100mg/L
5	Total Suspended Solids(mg/L)	476	665	100mg/L

IV. CONCLUSION

The paper mill is growing fast and produces different varieties of paper. But on the other hand paper mill also contribute to pollution because of production of high quantity of waste water during the manufacturing of paper. On the basis of above discussion it is concluded that Turbidity and Total

Suspended solids for both treated and untreated effluents were above the permissible limits as there was absence of sophisticated treatment plant which could reduce the TSS and Turbidity level.

Hence proper strategies should be used to treat the effluents prior to its disposal to the environment.

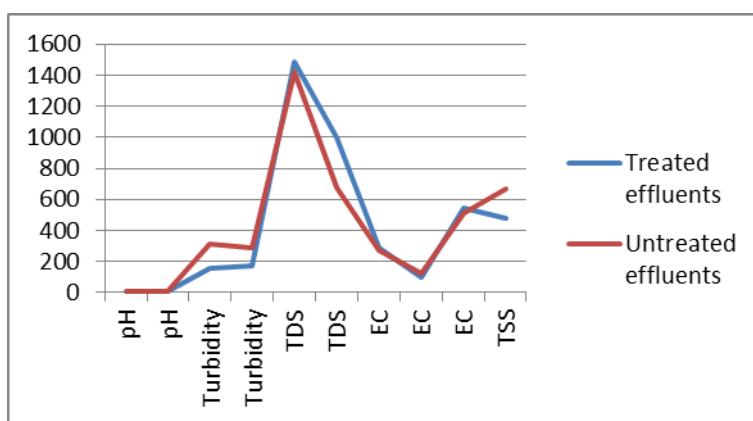


Fig 2. Showing the values of physico-chemical parameters for Treated and Untreated Effluents

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AUTHORS

First Author – Angelika Sharma, Assistant Professor,
Department of Environmental Sciences, Central University of
Jammu (India) angelikasharma@gmail.com

Second Author – Anu Ramotra, M.Sc. Environmental sciences,
IV Semester Student, Central University of Jammu (India)
ramotra19@gmail.com

Third Author – H.S. Sehgal, HOD, Department of
Environmental Sciences, Central University of Jammu (India)
drhs sehgal9@gmail.com

Ecthyma Gangrenosum: A Rare Cutaneous Manifestation Caused by *Pseudomonas Aeruginosa* in a Previously Healthy Newborn

DR.Vikram Ramalingam, DR.Samikannu Ramesh, DR.Ramanathan

Department of Paediatrics ,Rajah Muttiah Medical College and Research Institute,Annamalai University ,India.

Abstract- Ecthyma gangrenosum (EG) is a cutaneous lesion classically associated with potentially fatal pseudomonal septicemia in immunocompromised patients. Other bacterial and fungal pathogens have also been implicated in EG. EG typically occurs in neutropenic or immunocompromised patients, it can occasionally affect previously healthy children. The cutaneous findings are characteristic with small indurated papulovesicles progressing rapidly to necrotic ulcers with surrounding erythema and a central black eschar. While lesions can occur at any site, most are commonly found over the buttocks, perineum, limbs, and axillae. We describe A case of EG in paediatric patient who responded to appropriate antibiotic treatment for *Pseudomonas* bacteremia. For patients with possible EG, it is very important to establish the diagnosis early so that appropriate systemic antibiotic therapy can be initiated to reduce morbidity and mortality.

Index Terms- ecthyma gangrenosum,pseudomonas, paediatrics, ceftazidime

I. INTRODUCTION

Ecthyma gangrenosum (EG) is a well-described skin lesion classically associated with *Pseudomonas* septicemia in immunocompromised patients, but may also be caused by other bacterial and fungal organisms [1]. The lesions characteristically appear as small indurated papulovesicles progressing rapidly to necrotic ulcers with surrounding erythema and a central black eschar [2]. Ecthyma gangrenosum is caused by invasion of microorganisms into the media and adventitia of subcutaneous vasculature, precipitating a hemorrhagic occlusive vasculitis [2,3]. Although rare, the presence of EG is indicative of severe

systemic infection with a potentially fatal prognosis. Mortality rates for EG range from 15% to as high as 77% based on reports in the literature [4-11]. Factors that are associated with higher mortality include neutropenia, septic shock, inappropriate or delayed antibiotic therapy, and resistant microorganisms [1,7-12]. we report a case of *Pseudomonas*-associated EG that illustrate the assortment of clinical and histo-pathologic findings in this disease .

II. CASE SUMMARY

One month old female infant born to second degree consanguineous parents presented with fever and refusal of feeds for three days duration. Antenatal history was uneventful. On physical examination, she was febrile (Temperature-101°F) and hemodynamically stable. She had hepatosplenomegaly. On day three of hospital stay she developed a small vesicular lesion over the right thigh which later on after 24 hours rapidly developed into necrotic black eschar with a blister surrounded by an intense red areola over the right thigh(**fig.1**). Peripheral blood smear showed neutrophilic leukocytosis. Blood culture revealed *Pseudomonas aeruginosa* growth, histology of the tissue revealed occlusive vasculopathy with gram negative rods in media and adventitia of vessels. Coagulation profile was normal. On day five of hospital stay the lesion extended to the right gluteal region, skin over the Achilles region, right foot and the external genitalia(**fig.2**)and later after 12 hours it spread to the left side of the thigh and gluteal regions(**fig.3**) even after treatment with ceftazidime.

I. FIGURES
fig 1.



Fig 2.



Fig 3.



III. CONCLUSION

Although EG classically occurs in immunocompromised patients, the same entity would arise in otherwise healthy children. As the appearance of ecthyma gangrenosum can be highly variable, EG should always be considered in the differential diagnosis for septic patients presenting with neutropenia or a new skin lesion.

Suspicion for EG warrants prompt collection of blood and tissue cultures, a skin biopsy, and broad-spectrum empiric antibiotic therapy to include anti-pseudomonal coverage. While a skin biopsy showing occlusive vasculopathy with gram negative rods in venule walls is virtually diagnostic of EG, the histopathologic appearance is affected by many variables, including lesion evolution and antibiotic therapy. Since biopsy findings may be non-specific it is imperative to correlate histopathologic appearance of the lesion with tissue and blood cultures as well as the clinical presentation.

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- [14] Julianna J. Weill1, Cathryn Z. Zhang2, Jessica A. Smith1, Wei Wang3, Jason DuPont2 and Fangru Lian1*

[17]

AUTHORS

First Author – DR.Vikram Ramalingam, Post- Graduate,Department of Paediatrics,Rajah muttiah medical college and research institute,vikramramalingam@yahoo.co.in
Second Author – DR. Samikannu Ramesh M.D,Dc.h , Proffessor and Head of the department , Department of Paediatrics , Rajah muttiah medical college and research institute
Third Author – DR. Ramanathan D.c.h,D N B , Reader in Department of Pediatrics , Rajah muttiah medical college and research institute .

Determinants of Effective Capacity at Tertiary Institutions in Kenya.

Joyce Njuthe* Mwasa Ishmail**

*University of Nairobi

** Jomo Kenyatta University Of Agriculture And Technology

Abstract- The study aimed at identifying the determinants of effective capacity in tertiary education institutions in Kenya and to establish the relative importance of the determinants. The study was a descriptive survey where data was collected using questionnaires with both closed and open ended questions. A total of 60 respondents from 30 tertiary education institutions in Kenya were interviewed and the response rate was 78%.

Findings of the research indicated that there are many determinants of effective capacity in tertiary education institutions in Kenya. The most important were established as operational, facilities and human factors. Other determinants, in order from most to least important were process, external, policy, service, supply chain and other factors.

Index Terms- capacity management, effective capacity, operation management, service management tertiary institutions

I. INTRODUCTION

The services sector is gaining more and more relevance in the international economy; and as a result, research is being attracted in to the management of this field. There are numerous enterprises that currently develop their functions in the services sector. In spite of their particular characteristics of heterogeneity, perishability, intangibility and simultaneity, Hope and Muhlemann (1997) state that services also present similar problems to those of manufacturing. This leads to consideration of the possibility of extrapolating techniques traditionally employed in the manufacturing sector to solve problems of activities belonging to the service sector (Fry et al, 1994).

Capacity decisions are concerned with the ability of an operation to meet customer demand and to respond to changes in that demand over time. As such, they lie at the heart of operations management; since one of the main objectives of operations management is to satisfy customer demand. Not having sufficient capacity to meet customer demand means dissatisfied customers and lost sales opportunities. Having more capacity than required, implies under-utilized resources, which normally means higher costs than necessary and particularly higher unit costs (Dilworth, 1992).

Effective capacity refers to the volume that a workstation or process can produce in a given period under normal operating conditions. It is also defined as the actual maximum load or demand a device or system can carry or meet. Effective capacity can be influenced by the age and condition of the machine, the skills, training, and flexibility of the workforce, and the availability of raw materials. Both these capacity decisions are

short term decisions and relate more to the team and individual resource level rather than to the branch or network which are associated with longer term increases or decreases in capacity such as building a new facility or purchasing additional equipment and recruiting substantially more personnel resource (Barnes, 2008).

Effective Capacity and its Determinants

The concept of capacity requires careful consideration, as it can involve decisions about the size and location of each of an organization's facilities, and the size, type and mix of equipment and the working practices (e.g. working hours and staffing levels) at a single facility. Once made, decisions about facilities and equipment can not be changed easily or cheaply and certainly not in the short term. However, there can often be more flexibility in deciding how to manage those facilities. Additionally, decisions about capacity inevitably affect an organization's ability to serve particular markets from any given location (Barnes, 2008).

Most operations don't normally work at their full capacity, as this tends to put a strain on both resources and people. Instead, they work at a lower level that they can sustain more comfortably over time. Based on this, there are two measures of capacity. The first is a designed capacity, which is the theoretical limit that can be achieved under ideal conditions with no disruptions or problems of any kind. The second is a more realistic effective capacity which is the maximum output that can be sustained over the long term under normal conditions. This allows for set-up times, breakdowns, stoppages, maintenance and so on. Thus, capacity is often not a fixed, absolute value, but it is an agreed quantity that can vary according to circumstances. Effectiveness measures how well an organization sets and achieves its goals (Slack, 2001).

The designed capacity might give a more stable upper limit but the effective capacity is more variable and depends on prevailing conditions. Such conditions are caused by changes in determinants of effective capacity, which are facilities, products and services, human factors, processes, supply chains, operational, policy and external factors. Facilities factors refer to layout, design, location and environment of the facility. Process factors refer to quantity and quality capabilities of the production system. Human factors refer to job content, job design, training and experience, motivation, compensation, learning rates, absenteeism and labour turnover and knowledge. Operational factors include scheduling, materials management, quality assurance and equipment breakdowns. Products or service factors are design and product/service mix. Policy factors refer to management policies of the firm concerning production. Supply

chain factors refer to the capacities of each player in the chain, both upstream and downstream. External factors are product standards, unions, safety regulations, pollution control and environment standards, stability of society and government (vanLooy, 1998)

Due to the high volatility of demand in services, capacity management is a must for every service delivery system if it is to offer high quality output. The education sector falls in the service industry. One of the characteristics of education service is that there is long time contact between the students and the lecturers, leading to loyalty. Capacity has to be well managed for that loyalty to be maintained (Fitzmmons et al, (1994).

Ochieng' (2006) in his study on capacity management strategies concluded that, although capacity management is faced by many challenges, good capacity management strategies are vital to the improvement of service delivery systems. Svetlana and Marc (2005), in their study on decision support system for managing capacity utilization in universities concluded that there is a need for academic workload management.

The above two studies highlighted the need for proper capacity management. To be able to manage capacity properly, the determinants of effective capacity in the specific industry need to be clearly understood. Once understood, the operations managers will then be able to manage each determining factor in the right way, thus leading to overall proper capacity management. It is in view of these observations that the need for carrying out research on determinants of effective capacity in tertiary educational institutions was established. The focus of this study was on Tertiary Educational Institutions in Kenya. The study sought to answer the question:

II. RESEARCH ELABORATIONS

Hayes et al (2005) defines capacity as the level of activity or output that can be achieved (by an operation, facility or organization) in a given period of time under normal working conditions. In a service setting, this might be the number of customers that can be handled between noon and 1pm. In manufacturing, this might be the number of books a printing firm can produce in a day. Capacity is a relative term; in an operations management context, it may be defined as the amount of resource inputs available relative to output requirements over a particular period of time (Klassen et al, 2002).

According to Armistead and Clark (1994), capacity management is the process of planning, analyzing, sizing and optimizing capacity to satisfy demand in a timely manner and at a reasonable cost. They also see capacity management as a process with a broad scope that brings together business, service, and resource capacity needs to ensure optimal use of the resources to achieve the required levels of performance. In this regard, the manner in which capacity is managed is influenced by objectives which determine what must be achieved by an operating system structure, which influences what is feasible. Capacity management, therefore, is the most critical and strategic decision area of operations incorporating decisions on how to balance demand and the capacity of the service delivery system to satisfy the demand. A service firm's success or failure in the process of balancing quality of service and resource management, expressed in terms of resource productivity,

depends on its skill in managing capacity to match demand (Armistead 1991).

Service capacity is related in many similar issues to manufacturing capacity, but there are several important differences. Jacobs et al., (2008) states that service capacity is more time- and location- dependent, it is subject to more volatile demand fluctuations and utilization directly impacts service quality. Services cannot be stored for later use, thus the capacity must be available to produce a service when it is needed. The service capacity must also be located near the customer. The capacity to deliver the service must be first distributed to the customer (either physically or through some communications medium); then the service can be produced (Donald, 2006).

The volatility of demand on a service delivery system is much higher than that on a manufacturing production system for three reasons. First since services cannot be stored, inventory cannot smooth the demand as in manufacturing. Secondly, customers interact directly with the production system and these customers often have different needs, will have different levels of experience with the process, and may require different numbers of transactions. This contributes to greater variability in the minimum capacity needed. The third reason for the greater volatility in service demand is that it is directly affected by consumer behaviour. For example, demand for rooms at a hotel is higher during weekends than on weekdays (Jacobs, 2008). Capacity can be refined into two useful definitions of capacity: Design capacity and effective capacity. Design capacity is the maximum rate of output achieved under ideal conditions. Effective capacity is usually less than design capacity owing to realities of changing product mix, the need for periodic maintenance of equipment, lunch breaks, coffee breaks, problems in scheduling and balancing operations, and other similar circumstances (Angus, 1995).

In general, inadequate planning is a major limiting determinant to effective planning and sees the need to balance a firms operating capacity as one way of solving this problem (Armistead, 1991). Many organizations operate below maximum processing capacity, either because of an insufficient demand to completely fill the capacity, or as a deliberate policy to respond to every new order. Often, organizations have some parts of their operations below capacity while others are at their capacity ceiling. It is the parts at capacity ceiling which are the capacity constraints and are causing bottle necks for the whole operation. These parts would have to be improved to ease bottlenecks that constrain the whole operation (Armistead 1991).

For efficient and satisfactory service delivery to the customer, operational factors such as appropriate scheduling and acceptable level of stock will be maintained to avoid late deliveries, while ensuring satisfactory after service support, inspections and quality control procedures. It is equally important to consider the acceptance level of performance in the face of external forces which include the need to comply with regulatory standards that demand heavy paper work. In summary therefore, the main determinants of effective capacity are facilities, product and service, process, human, policy, operational, supply chain and external factors (Thacker, 2009).

The design, location, layout and environment of the facility where production of goods or delivery of services is done are important components of a business's overall operations, both in

terms of maximizing the effectiveness of the production process and meeting the needs of employees (Jacobs, 2008). Layout decisions entail determining the placement of departments, work groups within the departments, workstations, machines and stock-holding points within a production facility. The objective is to arrange these elements in a way that ensures a smooth workflow (in a factory) or a particular work pattern (in a service organization) and also ease flow of information (Sherali et al, 2003).

A process is a set of logically related tasks or activities performed to achieve a defined business outcome (Hope, 1997). Product designers and manufacturing engineers are particularly interested in process capability and develop process capability studies to help them predict how well a process will meet the required specifications or tolerances and to specify the amount of control necessary as well as the equipment requirements. Process capability is a measure of the uniformity of a process, or in other words, a measure of the ability of the combination of inputs and resources- employees and other people, machines, methods and materials- to consistently produce a product or service within design specifications or tolerances. Inconsistency results in too much scrap rework and lost time; which leads to wasted material and labour time, and thus less capacity (in quality and quantity) (Namahias, 2001).

Flexible processes also account for more effective capacity management. Flexible processes are epitomized by flexible manufacturing systems on one hand and simple, easily set up equipment on the other. Both of these technological approaches permit rapid low-cost switching from one product line to another, enabling economies of scope (Ignacio, 2006).

Human capital is the contribution of people (their skills and knowledge) in the production of goods and services (Scarborough, 2003). Human capital contributes to the success of the firm in attaining its objectives and thus has to be properly managed. Human factors that affect capacity are job content, job design, training and experience, motivation, compensation, learning rates, absenteeism and labour turnover, and knowledge. Job content refers to all the data about an existing job, which activities are performed and what skills are required (Foot, 2008). Job design is the process of identifying tasks that each employee is responsible for completing. It affects job satisfaction and productivity. Jobs may be simplified, so that they involve few tasks, or they may be expanded, so that they involve many tasks (Lussier, 2009).

Employees have to be taught how to perform a new job. Training is the process of teaching employees the necessary skills to perform a job. Development is ongoing education to improve skills for present and future conceptual, and decision-making skills in managerial and professional employees. Training and development constitute a good investment because they benefit individuals, and their organizations, and the economy as a whole. An employee who has done a job for some time has more experience in it and is most likely going to perform better. With time, he masters the processes and reduces the number of mistakes in the production or service delivery

process. This increases his output, thus increasing the capacity of the organization. This also leads to motivation of the employee (Bagley, 2007).

The operations function is the ‘doing’ part of the organization and thus no organization can hope to be successful unless its operations are well managed. The activities of the operations function are central to achieving efficiency and effectiveness. Operations such as scheduling, materials management, quality assurance, maintenance policies and equipment breakdowns largely affect the effective capacity of the firm as it processes inputs into outputs (Dilworth, 2002).

One of the most critical factors in a committed and collaborative relationship between supply chain partners is trust. If trust is present, it can improve the chances of a successful supply chain relationship; if not, transaction costs can rise through poor performance. Effective communication throughout the supply chain helps a company improve the efficiency of its supply and logistics operations. Networked communications enable all members of the chain to share essential market and operational information, improving productivity and reducing time-to-market. Regular marketing communication also builds teamwork by keeping all parties informed on developments that impact their operations. By bringing together all parties through communication, a company can build an extended enterprise that operates as a single, coordinated unit (Hines, 2004).

A descriptive research design of a survey type was used to ascertain the determinants of effective capacity. Survey method of a cross sectional type is often used to study the general behaviour, attitudes, values and characteristics of a population through the collection of quantifiable information from the sample (Mugenda and Mugenda, 2003). Survey research is therefore a type of descriptive research.

A simple random sample of 30 institutions was used. Two employees were selected from each institution, resulting in a sample of 60 respondents. These included the people in charge of operations for each institution. These individuals were selected because they are directly responsible for planning in their institutions. Primary data was used for the study. The data was collected using a structured questionnaire consisting of open- and closed – ended questions. The questionnaires were administered using the drop and pick later method. The respondents of this study were the officers in charge of operations in the selected institutions. The closed ended questions were analyzed quantitatively based on weighted means and standard deviations and presented in tables and charts.

III. RESULTS AND DISCUSSION

Facilities Location, Design and Layout

The location, design and layout of the facility affect the effective capacity of the institution. The study sought to establish the extent to which the various elements of facilities design, location and layout were important to the institutions. The findings of the study were as presented in table 4-3-1.

factor	Descriptive statistics	
	Mean	Std deviation

space utilization	1.40	0.57
Government legislation	1.57	0.76
proximity to customers	1.57	0.79
safety factors	1.68	0.72
ease of communication & support	1.77	0.82
ventilation & lighting	1.79	1.44
fast service delivery	2.13	1.03
minimizing total costs	2.34	1.09
Facility attractiveness	2.51	1.05
Overall mean	1.86	

The results in show that space utilization, government legislation, proximity to customers, ease of communication and support and safety factors; ease of communication and support and ventilation and lighting were considered to be very important determinants of effective capacity (Mean=1). Fast service delivery, minimizing total costs and facility attractiveness were considered important determinants (Mean=2). This shows that facilities are considered very important as determinants of effective capacity in tertiary education institutions. They affirm Jacobs' (2008) proposition that; the design, location, layout and environment of the facility where production of goods or

delivery of services is done are important components of a business's overall operations, both in terms of maximizing the effectiveness of the production process and meeting the needs of employees.

Service Factors

The output rate of a service determines its effective capacity, according to Rhyme (1998). This depends on the service mix, uniformity and design. The study sought to establish the extent to which the various elements of service were important to the institutions.

Factor	Descriptive statistics	
	mean	standard deviation
Service Mix	2.64	0.94
uniformity of service	2.85	1.03
service design	3.04	1.44
Overall mean	2.29	

From the results in table it was found that service mix and uniformity of service were considered important determinants (Mean=2). Service design was considered a neutral determinant with a mean of 3.04. The relatively low overall mean (2.29) is an indication that these institutions fairly consider service factors as a determinant of effective capacity. This is because they customize their services so much to cope with the growing demand. It hence concurs with Rhyme's (1998) observation that customized services lead to less capacity.

Process Factors

The tasks or activities in a process of offering a service determine the outcome of the service offered (Hope, 1997). These activities therefore determine the capacity of the institution. The study sought to establish the extent to which the various elements of process were important to the institutions.

Factor	Descriptive statistics	
	Mean	Std deviation
process capability	1.51	0.54
process flexibility	1.85	0.82
process simplicity	2.79	1.43

Overall mean	2.05	
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From the responses in table it was found that process capability and process flexibility were considered to be very important determinants of effective capacity (Mean=1). Process simplicity was considered a neutral determinant with a mean of 2.79. This infers that process factors are important in effective capacity. This is in line with Namahias' (2001) proposition that process capability and flexibility contribute to more capacity.

Human Factors

Human capital is essential to the operation of any business. According to Scarborough (2003) human capital contributes to the success of the firm in attaining its objectives and greatly affects its effective capacity. The study sought to establish the extent to which the various human factors were important to the institutions.

Factor	Descriptive Statistics	
	Mean	Std deviation
Labour turnover	1.68	0.83
Job content	1.79	0.62
Motivation	1.80	1.66
Absenteeism	1.83	0.68
Training and experience	1.85	1.17
Job design	1.96	0.87
Compensation	2.17	1.04
Learning rates	2.60	1.16
Overall mean	1.96	

From the responses in table, it was found to a very great extent that tertiary education institutions consider labour turnover, job content, motivation, absenteeism, training and experience job design as factors determining their human capital (Mean=1). Compensation and learning rates were considered important determinants (Mean=2). The results show high rating of human factors as determinants of effective capacity in tertiary education institutions. This affirms Foot's (2008) observation that; Knowledge is the firm's sole capability and is important to

sustained capability to compete. She further concluded that organizational performance depends significantly on how the organization manages knowledge.

Policy Factors

Management policies regarding the operations of the business affect its capacity (Barnes, 2008). The study sought to establish the extent to which the various policy factors were important to the institutions.

	Descriptive statistics	
	Mean	standard deviation
no. of working hours per week	1.80	0.84
performance measurement system	2.44	1.07
other capacity cushions	3.09	1.35
excess labour	3.17	1.45
Overall mean	2.63	

From the responses in table, number of working hours per week was considered to be a very important determinant of effective capacity (with a mean of 1.8). Performance measurement system was considered to be an important determinant of effective capacity (with a mean of 2.44). Excess labour and other capacity cushions were considered neutral determinants (Mean=3). The overall mean of 2.63 indicates that policy issues are important to the effective capacity of the institutions. Indeed the mean of 1.8 in number of working hours per week affirms Barnes' (2008) proposition that capacity is

particularly affected by management policies with regard to the number of hours worked each week.

Operational Factors

The activities of the operations function are central to achieving efficiency and effectiveness of its capacity, as observed by Hill (2005). The study sought to establish the extent to which the various operational factors were important to the institutions.

Factor	Descriptive Statistics	
	Mean	Std deviation
scheduling/timetable	1.36	0.69
managing equipment breakdowns	1.96	0.77
materials management	2.06	1.00
quality assurance	2.19	1.01
Overall mean	1.89	

From the results in table it was found that scheduling/timetable and managing equipment breakdowns were considered to be very important determinants of effective capacity (Mean=1). Materials management was considered an important determinant (Mean=2.06). Quality assurance was considered a neutral determinant (Mean=3.81). The very high overall mean of 1.89 shows that this function is very important to the effective capacity of tertiary education institutions. It is in agreement with Dilworth's (2002) observation that; the operations function is the 'doing' part of the organization and thus no organization can hope to be successful unless its

operations are well managed. He also argued that the activities of the operations function are central to achieving efficiency and effectiveness.

Supply Chain Factors

Rahman (1998) in his study on the Theory of Constraints concluded that each of the players in the supply chain has its own capacity limits, and thus affects the effective capacity of the entire system. The study sought to establish the extent to which the various supply chain factors were important to the institutions.

Factor	Descriptive Statistics	
	Mean	Std deviation
matching of supply to demand	2.60	1.12
effective communication	2.62	1.55
trust among partners	2.83	1.29
supply chain visibility	3.34	1.33
performance metrics	3.45	1.39
Overall mean	2.97	

From the results in table, important determinants of effective capacity related to supply chains were found to be matching of supply to demand, effective communication and trust among partners (Mean=2). Supply chain visibility and performance metrics were considered neutral determinants (Mean=3). The results indicate that supply chain factors are considered as determinants of effective capacity in tertiary education institutions. This is in line with Rahman's (1998) proposition

that; a firm's ability to use its own capacity is often directly dependent on capacity up and down the supply chain.

External Factors

Any business operates in an environment where there are definitely forces beyond its control, as indicated by Donald, (2006). The study sought to establish the extent to which the various external factors were important to the institutions.

Factor	Descriptive Statistics	
	Mean	Std deviation
market service standards	1.57	0.71
safety regulations	2.11	0.90
stability of society &government	2.60	1.18
pollution control& environment standards	2.72	0.96

trade/workers unions	3.66	1.56
Overall mean	2.53	

From the results in table, it was found that market service standards was considered to be a very important determinant of effective capacity (with a mean of 1.57). Safety regulations, stability of society and government and pollution control and environment standards were considered important determinants (Mean=2). Trade/workers unions were considered to be a neutral determinant (with a mean of 3). These results show that external factors are important determinants of effective capacity. The high mean of 1.57 for market service standards affirm Klasssen's

(2002) statement that; the market sets the product/service standards, and the firm has to comply with that standard so as to remain competitive in the market.

Other Factors

There are other factors which affect capacity, but do not directly fit in any of the above named groups. The study sought to establish the extent to which other factors were important to the institutions.

Factor	Descriptive statistics	
	Mean	Std deviation
total quality management	2.70	1.48
IT based information system	2.85	1.47
part time employees	3.02	1.52
business process reengineering	3.26	1.61
organizational learning	3.40	1.27
outsourcing	3.57	1.35
Overall mean	3.13	

From the results in table, it was found that total quality management and IT based information systems were considered an important determinants (with a mean of 2). Part-time employees, business process reengineering, organizational learning, and outsourcing and were considered to be neutral determinants (Mean=3). The results show that there is a relatively low extent to which these factors are considered as determinants of effective capacity. However, total quality management and IT based information system stands out in this group with a mean of 2. This affirms how needful it is for education institutions to offer good quality services, with IT as an enabler as proposed by Barnes (2008).

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AUTHORS

First Author – Joyce Njuthe, University of Nairobi
Second Author – Mwasa Ishmail, Jomo Kenyatta University Of Agriculture And Technology

Correlation of Carrying Angle of the Elbow in Full Extension and Hip-Circumference in Adolescents of Nnewi People in Anambra State.

Chinweife K. C, Ejimofor O. C and Ezejindu D.N.

Department of Anatomy, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus. Anambra state, Nigeria.

Abstract- The carrying Angle of the elbow is the measurement of varus-valgus angulation of the arm with the elbow fully supinated. This study was aimed at correlating the relationship between carrying angle, waist circumference and hip circumference and the relationship between that of the males and females carrying angle in adolescent Nnewi people. The carrying angles of 900 Nnewi adolescents were measured, 411 were females and 489 were males. The age range of the subjects was between the ages of 10 to 19 years. The carrying angle was measured on both upper limbs with goniometer. Hip and Waist circumference was measured using butterfly tape in inches. The result of this present study shows that right carrying angle and left carrying angle were significantly higher in females (right 13.82 ± 1.65 and left 12.55 ± 1.76) than that of the males (right 12.30 ± 1.88 , left 10.99 ± 1.87). The carrying angle also increases with age. The waist-hip ratio of the male (0.82 ± 0.06) is significantly higher than that of the females (0.77 ± 0.06) at the level of 0.05. The right and the left carrying angles correlate significantly with the waist circumference in both gender while the right and left carrying angles correlate significantly with hip circumference in the males but do not correlate significantly in the females.

Index Terms- Carrying Angle, hip circumference, waist circumference, correlation, adolescent and Nnewi.

I. INTRODUCTION

T 1.1. BACKGROUND OF STUDY

The carrying angle of the elbow is the measurement of varus-valgus angulation of the arm with the elbow fully supinated (Erhan et al 2005). The intersection of the line along the mid-axis of the upper arm and the line along the mid-axis of the forearm defines this angle. The 'carrying angle' is caused partly by projection of the medial trochlear edge 6 mm beyond its lateral edge and partly by the obliquity of the superior articular surface of the coronoid, which is not orthogonal to the shaft of the ulna. Tilt of the humeral and ulnar articular surfaces is approximately equal; hence the carrying angle disappears in full flexion, the two bones reaching the same plane. When the adducted arm is flexed the little finger meets the clavicle, because of the position of the resting humerus; when the humerus is rotated laterally, the hand reaches the front of the shoulder (Standring et al 2005). Till date, the role of carrying angle in sex determination and its cause of formation is a long debated issue in Anatomy and Anthropology. Knowledge of the carrying angle helps in the management of

pediatric elbow injuries (Balasubramanian et al 2006), for correction of albitus varus deformity occurring after malunited supracondylar fractures of the humerus (Ruparella et al 2010) and for elbow disorders that require reconstruction. Some workers have reported greater carrying angle for the dominant upper limb (Takenmez et al 2004) and established a relationship with the height of an individual and the intertrochanteric distance (Paraskevas et al 2004). While some other workers refute these facts (Balasubramanian et al 2006; Zampagni et al 2008). Khare et al 1999 argued that the carrying angle is not related to the width of the pelvis and is not a secondary sex character as previously believed. Subsequently, other researchers (Mall 1905 and Tukenmez et al 2004) have all shown the mean female carrying angle to be significantly greater than that of the male.

Anthropometric measurements are a set of non-invasive, quantitative techniques which are comparative in nature (Standring et al 2005), coined by the French naturalist George Cuvier (1769-1832) and were used by Physical Anthropologists in their study of human variability among human races and for comparison of Human to other Primates (Roberts 2006). Different Anthropometric measures or ways of taking Anthropometric measurements exist. These include; height, weight, length, head circumference, chest circumference, waist circumference, hip circumference, percentage of body fat etc. Anthropometric measurements are used in a remarkably wide variety of scientific and technical fields ranging from genetics and nutrition to forensics and industrial designs. Over the years engineers, designers, architects etc. have increasingly recognized the need for anthropometric measurements and have also incorporated it into their field of practice.

II. MATERIALS AND METHOD

2.1 Scope of study

This study was delimited to apparently healthy male and female in secondary schools adolescents aged 10 – 19 years in Nnewi with no history or current sign of musculoskeletal injuries in the upper limbs or hip. Cases of cubitus valgus and varus was noted. The parameters measured include; carrying angle, hip circumference and waist circumference.

2.2 Population of Study

The data were collected from Nnewi indigenes, who are males or female Adolescent (10 – 19 year) and whose father is an indigene of Nnewi. The study was carried out in St. Joseph's secondary school, St. Philip's secondary school, Nneoma memorial secondary school, Okongwu memorial secondary

school, Maria Regina secondary school and Nigeria Science and Technical secondary school all in Nnewi north local government area and in Ebenator village in Nnewi south local government area.

Nnewi is the second largest city in Anambra State in south eastern Nigeria. Nnewi as a metropolitan city encompasses two local government areas, Nnewi North and Nnewi South; Nnewi North is commonly referred to as Nnewi central, and comprises four autonomous quarters: Otoho, Uruagu, Umudim, and Nnewichi. Nnewi North also includes Ichi, an autonomous neighbouring town.

As of 2006, Nnewi has an estimated population of 391,227 according to the Nigerian census. The city spans over 1,076.9 square miles (2,789 km²) in Anambra State. Nnewi Metropolitan Area and its satellite towns is a home to nearly 2.5 million residents as of 2005. Dimensionally, Nnewi has an edge over all other units, being recognized by the 1953 figures as the largest inland town of all others in the Eastern states (Nigeria census 2006).

2.3 Sample size

This study was carried out on nine hundred (900) Nnewi adolescents. 489 males and 411 females of between 10 – 19 years of age.

2.4 Inclusion criteria

- Male and female adolescents between the age range 10 -19 year.
- Male and female adolescents who are indigenes of Nnewi and are willing to participate.
- Male and female adolescent without any congenital upper limb deformity or any obvious elbow deformity.
- Male and female participant without any loss of their upper extremities.

2.5 Exclusion criteria

- Participants that have lost one or both of their upper limbs.
- Pregnant, wheelchair bound and unstable participants.
- Participants with left limb dominance.

2.6 Research Instruments

(i) **A flexible tape rule (Butterfly brand, China):** This instrument was used for measuring the participant's waist and hip circumference in inches.

(ii) **A universal goniometer:** This instrument was used for measuring the Participants Carrying angle.

2.7 Procedures for data collection

Before the commencement of this study ethical approval was sought and obtained from the Ethical review committee of the Nnamdi Azikiwe University, Basic Medical Sciences, Nnewi. I then seek the informed consent of the principals of the selected schools as well as the parents or guardians of the participants I met in their homes.

The research procedure was explained to the participants, and all those unwilling to participate were free to decline.

i. **Waist circumference (inches):** This measurement was carried out with the subject standing erect, both feet together and abdomen relaxed. Ensuring that the

participants shirt are not too thick and tight belts around the waist are loosened and He/ She is breathing normally, I then stood behind the participant, in order to locate the narrowest part of their trunk. I then place the measuring tape around the narrowest part of their trunk, in a horizontal plane around the body. I pull the tape measure lightly with the left hand until appropriate tension is achieved and then counter this movement with the right hand. With the tape measure in position between the lowest rib and the superior border of the iliac crest, in the mid axillary line, loose enough to let my finger pass between the rule and the participant's skin. The waist circumference was then read at the end of gentle exhaling and recorded to the nearest 0.1inch.

ii. **Hip circumference (inches):** This was measured over the maximal protrusion of the buttocks. I ensured that the participant was standing relaxed without bending with feet as close together as possible. I measured the hip circumference ensuring that it is horizontal and not too tight so as to compress or pinch the skin and took my reading around the trunk at the greatest protrusion of the buttocks to the nearest 0.1inches.



iii. Measurement of Carrying Angle(degrees)

- I asked the subject to stand up straight, roll his shoulders back and gently rotate his palms to face forward.
- I straightened the goniometer and move the two arms into a straight line so that the readout on the plate shows 0 or 180 degrees.
- I placed the goniometer's measurement plate at the fulcrum of one elbow and line one arm of the goniometer along the middle of the subject's upper arm then swing the goniometer's other arm along until it lines up along the middle of the subject's forearm.
- I recorded the angle from the readout on the measurement plate and subtract the measurement from 180 if your initial readout was 180 degrees. For example, if

the straight goniometer read 180 and it read 170 fitted to the subject's elbow, then the subject's carrying angle is $180 - 170 = 10$ degrees.

- I repeated the process with the other elbow and record the carrying angles for both elbows, recorded from which arm each measurement was taken.



2.8 Method of Data Analysis

The data from this study was summarized with SPSS version 16.0 using descriptive statistics of mean and standard deviation, and analyzed using the Pearson's Correlation. Level of significance shall be set at 0.05.

III. RESULT

TABLE 1: MEAN±STANDARD DEVAITION OF THE MEASURED PARAMETER WITH RESPECT TO AGE.

AGE	No	Carrying Angle		Hip Circ (inches)	Waist Circ (inches)
		Right	Left		
10	17	11.06±1.64	9.76±1.437	28.22±2.73	23.54±0.80
11	31	12.00±2.03	10.71±2.224	31.54±3.70	25.58±2.80
12	67	12.28±2.10	10.91±2.109	31.26±3.18	25.33±1.99
13	132	12.99±1.89	11.58±1.985	31.90±3.52	25.86±2.03
14	140	12.97±1.99	11.76±2.020	33.38±3.28	26.58±2.42
15	108	13.05±1.82	11.82±1.923	33.65±3.38	26.79±2.23
16	149	13.18±1.81	11.81±1.897	34.68±3.43	27.13±2.29
17	121	13.23±1.92	11.84±1.761	34.98±3.09	27.15±2.39
18	94	13.33±1.78	12.18±1.843	35.81±3.26	27.97±2.67
19	41	13.54±1.91	12.39±1.986	36.10±3.55	28.35±3.07
Total	900	12.99±1.93	11.70±1.978	33.68±3.72	26.71±2.51

The table 1 above shows mean±standard deviation of Right and Left Carrying Angle, Hip Circumference, Waist Circumference, Weight and Height with respect to age (in years) and overall mean± standard deviation of each parameter.

For people aged 10 years, the total number measured was 17, their mean ± standard deviation of their (carrying angle was 11.06 ± 1.64 for right and 9.76 ± 1.437 for the left), hip circumference measured in inches was 28.22 ± 2.73 , waist circumference 23.54 ± 0.80 . For people aged 11 years, the total number was 31, their mean ± standard deviation of their (carrying angle was 12.00 ± 2.03 for right and 10.71 ± 2.224 for the left), hip circumference measured in inches was 31.54 ± 3.70 , waist circumference 25.58 ± 2.80 .

For people aged 12 years, the total number was 67, their mean ± standard deviation of their (carrying angle was 12.28 ± 2.10 for right and 10.91 ± 2.109 for the left), hip circumference measured in inches was 31.26 ± 3.18 , waist circumference 25.33 ± 1.99 .

For people aged 13 years, the total number was 132, their mean ± standard deviation of their (carrying angle was 12.99 ± 1.89 for right and 11.58 ± 1.985 for the left), hip circumference measured in inches was 31.90 ± 3.52 , waist circumference 25.86 ± 2.03 .

For people aged 14 years, the total number was 140, their mean ± standard deviation of their (carrying angle was 12.97 ± 1.99 for right and 11.76 ± 2.020 for the left), hip

circumference measured in inches was 33.38 ± 3.28 , waist circumference 26.58 ± 2.42 .

For people aged 15 years, the total number was 108, their mean \pm standard deviation of their (carrying angle was 13.05 ± 1.82 for right and 11.82 ± 1.923 for the left), hip circumference measured in inches was 33.63 ± 3.38 , waist circumference 26.79 ± 2.23 .

For people aged 16 years, the total number was 149, their mean \pm standard deviation of their (carrying angle was 13.18 ± 1.81 for right and 11.81 ± 1.897 for the left), hip circumference measured in inches was 34.68 ± 3.43 , waist circumference 27.13 ± 2.29 .

For people aged 17 years, the total number was 121, their mean \pm standard deviation of their (carrying angle was

13.23 ± 1.92 for right and 11.84 ± 1.761 for the left), hip circumference measured in inches was 34.98 ± 3.09 , waist circumference 27.15 ± 2.39 .

For people aged 18 years, the total number was 94, their mean \pm standard deviation of their (carrying angle was 13.33 ± 1.78 for right and 12.18 ± 1.843 for the left), hip circumference measured in inches was 35.81 ± 3.26 , waist circumference 27.97 ± 2.67 .

For people aged 19 years, the total number was 41, their mean \pm standard deviation of their (carrying angle was 13.54 ± 1.91 for right and 12.39 ± 1.986 for the left), hip circumference measured in inches was 36.10 ± 3.55 , waist circumference 28.35 ± 3.07 .

TABLE 2: CORRELATION BETWEEN THE PARAMETERS

CORRELATION	MALES		FEMALES	
	Coefficient	Sig	Coefficient	Sig
HC vs LCA	0.132*	0.003	0.049	0.319
HC vs RCA	0.097*	0.032	0.019	0.700
HC vs WC	0.691**	0.000	0.698**	0.000
WC vs LCA	0.168**	0.000	0.097*	0.049
WC vs RCA	0.136**	0.003	0.106*	0.032

* correlates significantly at the 0.05 level.

** correlates significantly at the 0.01 level.

The table 2 above and figures below shows the correlations of Carrying Angle (right and left) with other parameters such as; Hip Circumference and Waist Circumference in males and females respectively.

In males, the correlations of Hip Circumference versus Left Carrying Angle and Hip Circumference versus Right Carrying Angle are significantly positive at the 0.05 level. The correlations of Hip Circumference versus Waist circumference, Waist circumference versus left carrying angle, Waist circumference versus right carrying angle is significantly positive at the 0.01 level. The correlation of weight versus right carrying angle is significant.

In females, the correlations of Hip Circumference versus left carrying angle, of Hip Circumference versus right carrying angle is not significantly positive. The correlation of Hip Circumference versus waist circumference and height versus left

carrying angle are significantly positive at 0.01 level. The correlations of waist Circumference versus left carrying angle, Waist Circumference versus right carrying angle is significantly positive at 0.05 level.

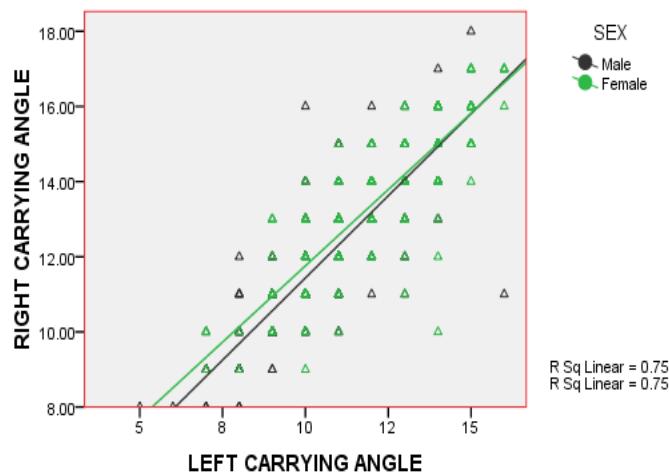


Fig 1: Correlation of right and left carrying angle for both males and females.

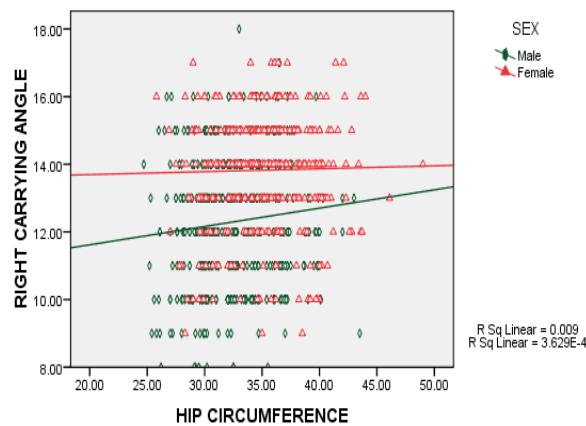


Fig.2: Correlation of right carrying angle hip circumference.

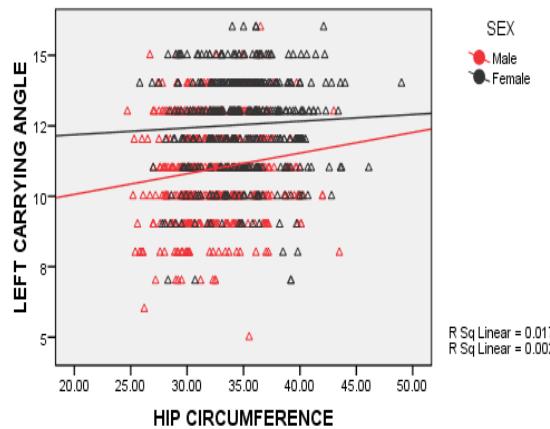


Fig.3: Correlation left carrying angle and hip circumference.

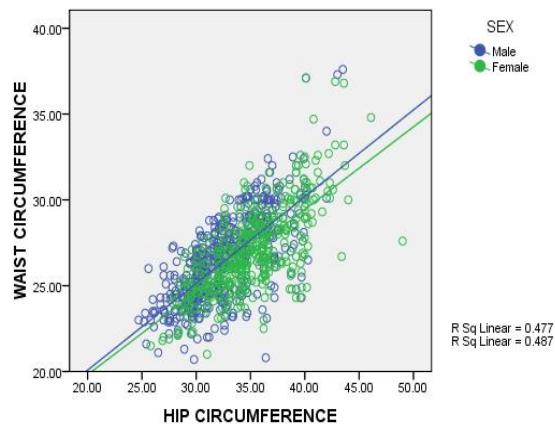


Fig.4: Correlation of waist and hip circumference.

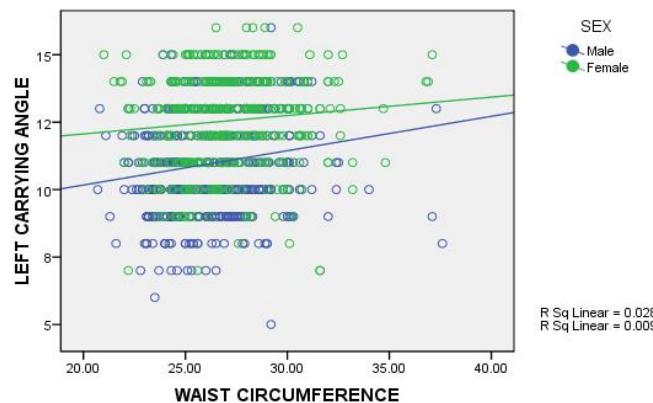


Fig. 5: Correlation of left carrying angle and waist circumference.

TABLE 3: Mean±Standard Deviation Carrying Angles, Hip Circumference, Waist Circumference, Waist-Hip Ratio, Body Mass Index and Age in Males and Females.

Independent Samples Test				
Parameters	Males (N=489)	Females (N=411)	t-value	Sig.
RTCA	$12.30^\circ \pm 1.88^\circ$	$13.82^\circ \pm 1.65^\circ$	-12.830	0.000
LFTCA	$10.99^\circ \pm 1.87^\circ$	$12.55^\circ \pm 1.76^\circ$	-12.803	0.000
HC(inches)	32.53 ± 3.37	35.06 ± 3.64	-10.802	0.000
WC(inches)	26.41 ± 2.47	27.06 ± 2.51	-3.905	0.000
WHR	0.82 ± 0.06	0.77 ± 0.06	10.164	0.000
AGE	14.92 ± 2.22	15.15 ± 2.16	-1.606	0.109

In table 3 above, the Right Carrying Angle (RTCA= $12.30^\circ \pm 1.88^\circ$), Left Carrying Angle (LFTCA= $10.99^\circ \pm 1.87^\circ$), Hip Circumference (HC= 32.53 ± 3.37), Waist Circumference (WC= 26.41 ± 2.47). The waist-hip ratio (WHR= 0.82 ± 0.06) of the males is significantly higher than that of the females.

IV. DISCUSSION

4.1 DISCUSSION

The study of carrying angle and its relation to age, length of fore arm and sex have been carried out by many researchers. Most work done on carrying angle focused on it being a secondary sex determinant.

The present study is set at the statistical significant of ($P \leq 0.05$). My study shows that the males have mean carrying angle of $12.30^\circ \pm 1.88^\circ$ for the right and $10.99^\circ \pm 1.87^\circ$ for the left, while the females have $13.82^\circ \pm 1.65^\circ$ for the right and $12.55^\circ \pm 1.76^\circ$ for the left respectively. These concur with the research done by other researchers which states that the female carrying angle is

greater than that of the males (Udoaka and Oghenonavwe 2009; Kumar et al 2010; Potter 1895; Eliakim et al 2010; Chien Wei et al 2008; Bernardo et al 2011 and Tukemuz et al 2004), especially the work done by Keats et al (1966), which had a more similar result with the mean carrying angle of the males 11.0° and the females 13.0° .

The present study deals with the measurement of the carrying angles and its correlations with the hip circumference, waist circumference and with respect to the sex and age of an individual. Ruparelia et al (2010), reported that the greater value of female carrying angle is because they are shorter than the males but this study revealed that Adolescent males (with 1.5918 ± 0.12 cm) in Nnewi had lower heights than their female (with 1.5919 ± 0.20 cm) counterparts. This agrees with the findings of Rogol et al (2000), who proposed that female adolescents are slightly taller than their male counterparts at pubertal age. Yet the females still maintain a higher value of carrying angle.

Eliakim et al (2011), reported that carrying angles of the Igbos are 17.63 ± 0.25 and 15.05 ± 0.24 for right and left sides respectively in males and 18.67 ± 0.35 and 16.64 ± 0.33 for females. Their values are higher than that of the present study.

In table 2, it was shown that in males, the correlations of Hip Circumference versus Left Carrying Angle, Hip Circumference versus Right Carrying Angle and weight versus left Carrying Angle are significant at the 0.05 level. The correlations of Hip Circumference versus Waist circumference, Waist circumference versus left carrying angle, Waist circumference versus right carrying angle is significant at the 0.01 level. In females, the correlations of Hip Circumference versus left carrying angle, of Hip Circumference versus right carrying angle is not significant. The correlations of waist Circumference versus left carrying angle is significant at 0.05 level.

From the results in table 3, it was also shown that male adolescents in Nnewi also had a significantly lower waist circumference and hip circumference than the females, in concord with findings of Senbanjo et al (2009), which found that males had smaller hip circumference than the females.

Table 1 shows that the carrying angle, hip circumference and waist circumference increase with age in Nnewi adolescent.

4.2 CONCLUSION

According to this study carrying angle, hip circumference and waist circumference are higher in female adolescent of Nnewi than in their male counterpart. The waist and hip circumference directly proportional to the carrying angles and correlates significantly. There was also considerable increase of these parameters with age. Carrying angle and hip circumference may be considered a secondary sex characteristic.

4.3 RECOMMENDATIONS

In view to the result of this study, the following recommendations are made:

Future study should be done using a larger sample size and a large society.

Hip circumference should be correlated with other sex determinants.

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AUTHORS

First Author – Chinweife K. C, Department of Anatomy, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus. Anambra state, Nigeria.

Second Author – Ejimofor O. C, Department of Anatomy, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus. Anambra state, Nigeria.

Third Author – Ezejindu D.N, Department of Anatomy, College of Health Sciences, Nnamdi Azikiwe University, Nnewi Campus. Anambra state, Nigeria.

Correspondence Author – E-mail: chinweifeking@gmail.com.
Telephone: +2348036174954

Home Automation: Access Control for IoT Devices

Rahul Godha*, Sneh Prateek**, Nikhita Kataria

* Cisco Systems, Bangalore, India
** Akamai Technologies, Bangalore, India

Abstract- This paper introduces access control for home automation devices for Internet of Things (IoTs), which offers capabilities to identify and connect many physical sensors into a unified secure system. As a part of IoTs, serious concerns are raised over access of personal and global information pertaining to devices and individual privacy. This research talks about how different devices can be applied different access polices on it.

Index Terms- Access Control, Internet of Things (IoT), Security, Threats.

I. INTRODUCTION

The Internet of Things can be described as connecting everyday objects like mobile phones, smart watches, electronic tablets, sensors and actuators to the Internet where the devices are intelligently linked together enabling various ways to communicate between things and peoples, and between things themselves. With the rapid development of Internet and communications technology, our lives are gradually led into a virtual dimension of augmented reality. People can chat, work, talk and interact via connected objects. However, human beings live in a real world, human activities cannot be fully implemented through the services in the virtual worlds.

Building IoTs has advanced significantly in the last couple of years since it has added a new dimension to the world of communication technologies. According to [2], it is expected that the number of devices connected to the Internet will increase from 100.4 million in 2011 to 2.1 billion by the year 2021, growing at a rate of 36% per year. In the year 2011, 80% machine to machine (M2M) connections were made over mobile networks such as 2G and 3G and it is predicted that by 2021, this ratio will increase to 93% since the cost related with M2M over mobile networks are generally cheaper than fixed networks.

Based on a large number of low-cost sensors and wireless communication, the sensor network technology brings new demands to the communication technology. It can change the way we live, work and play. Apart from benefits of IoTs, there are several security and privacy concerns that needs to be addressed to build a private and secure home.

This journal consists of 6 general sections. These are:

- 1) Abstract
- 2) Introduction
- 3) Security and Privacy Concerns in IoT,
- 4) Authentication Mechanism

- 5) Proposed Solution and Research
- 6) Conclusions

II. SECURITY AND PRIVACY CONCERN IN IoT

The rapid expansion of connected devices, as the Internet of Things, introduces new opportunities for enabling new services and merging new technologies with modern life.

The Smart Home is being rapidly deployed by service providers. Services such as home monitoring (camera), home automation (control over home appliances, home access, etc.), and home security (connected alarm system) enable user control over a wide range of services by means of end-user devices.

Furthermore, home appliances are being connected to the Internet for software updates, malfunction reports, and so forth. These transformations have introduced a wide variety of new risks. The potential for malicious activities ranges from mischief to crime and malicious hacking. Hacking into cameras, violating privacy, and accessing content (pictures and movies) are some of the security threats introduced by the new era of connected homes.

These violations of accessing the content of our home automated devices can lead to many dangerous outcomes. The third party sensor can gather and monitor our private data which can lead to burglary or any other form of troubles. Therefore, these unauthorized access needs to be checked.

In the world of computer networks we have various protocols like 802.1X, PAP, PEAP, EAP and many but these protocols require much high CPU processing capability as well as much memory. So, we need a light weight mechanism that can easily authenticate the microcontrollers or our home automation device sensors.

2.1 HOME AUTOMATION AND CYBERCRIME

Connectivity over the internet or a network; energy conservation; security and various home applications remain driving factors or communication. All these requirement in terms of bandwidth, cost and installation. The development of Internet connected technologies that are implementing IP solutions at home to harness energy while staying away from security threats.

Several standard protocols like IEEE 802.15.4 that can enable cost effective communication between the devices with low latency and cheap installation costs. There are many industrialized based protocols that are also available. Therefore,

with each new protocol represents a new area for possible security flaws.

III. AUTHENTICATION MECHANISM

As of today, IoT faces many challenges to authenticate the devices sensors that join the network. As the hardware ID for the sensors can be forged. Therefore, there are not many ways are to authenticate the device sensors or home automation devices. We have industry adopted standard security protocols like X10, Z-Wave or ZigBee that can provide encryptions mechanisms but proper ways to authentication devices still needs much research.

As referred from the [3] many security mechanisms have been proposed based on private key cryptographic primitives due to fast computation and energy efficiency. Scalability problem and memory requirement to store keys makes it inefficient for heterogeneous devices in IoT. Currently IoT do not address all authentication requirements like mutual authentication, Replay attack resistant, DOS, MITM as well as light weight solutions.

A Simpler Solution for authentication of all the sensors is to maintain a minimal database in the centralized server through which all home sensors are connected. A centralized server can be any sensor or object or a router in our home through which all other home sensors gets Internet or our private network access. This centralized server should be single point of network contact for all the home sensors. A database can be a file or hash of all the connected devices.

IV. PROPOSED SOLUTION

The proposed solution concentrates on controlling the access for the devices or objects that are connecting in home network. Irrespective of the authentication mechanism used, it focus on how much access should a device must get. Some home sensors can have access to a particular Server 1 while other sensor can have access to server 2 but not to server 1 [From Fig 1]. This access control can vary from sensor to sensor. There can also be sensors that cannot get any Internet access.

A. Tagging Mechanism for access control

The devices that are given access to the networks should be assigned a particular tag by the centralized router. The tag determines the access level to the device or sensor into our private network. For example, the devices that are given the highest level of privileges can be granted Read/Write and Publication access while the device with least privilege can only share his data to centralized router or server. It is depicted in the form of table as:

Access Level	Access Code(in bits)	Device Privileges
7	111	Read, write and complete Internet access
6	110	Read, Write and publication to limited server(s) access

5	101	Read, Write & 1 server access
4	100	Read and Write access
3	011	Read access
2	010	No network access (Device can only share its info)
1	001	No access to network
0	000	Not allowed in network

Table 1

*The Read/Write or publication access are with respect to centralized server.

The tags will be kept private within the centralized and it should not be shared with any other devices. The other devices that are connected to the centralized router/server or sensor will be unaware of anything called the tags or the number. It is a mechanism that only centralized authority will know that which connected device should be given what access.

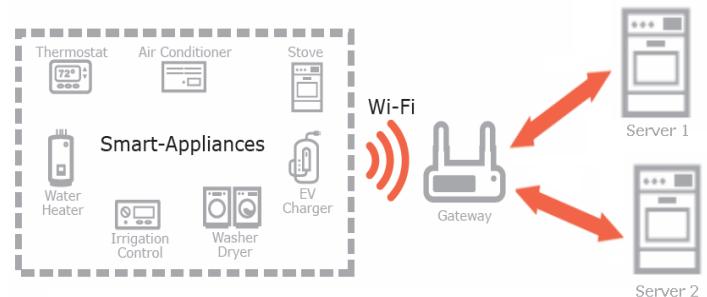


Figure: 1

B. Tag Assignment

As described in Authentication mechanism section that a hash is maintained at the centralized server. The tag will be maintained in the hash. Each connected device in our private home network should be assigned a corresponding TAG. The TAG assignment should be done by an authentication mechanism (if in future any available) or the owner of the home that have access to centralized server. As currently we lack the authentication methods like 802.1X, EAP in IoT world. I have to leverage this task on the centralized server.

If any new sensor or device that tries to connect to our home network will be assigned a default tag value of “2”. Its access code will be “010”, which defines no network access. The centralized server will read the data that it shares but it cannot publish any of its data to the Internet.

C. Selective Publication

This mechanism also provides a selective publication mechanism. There are some sensors that send its data to some remote server that analyzes and present it graphical form. So that sensor can be provided with access to that one particular server. It can also be illustrated as in following figure:

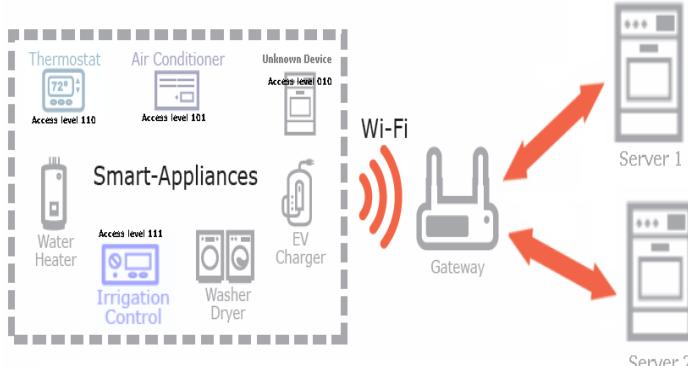


Figure: 2

As shown in the Figure 2 Irrigation Control has been assigned maximum access level 111 by the Gateway. Therefore, it is capable to access complete Internet while Thermostat has been assigned with Access level 110, it can be given access to both Server 1 & 2. The following table describes more on selective Access.

Home Sensor	Access Level	Selective Publication
Irrigation Control	111	Access to R/W and Complete Internet Access
Thermostat	110	Access to R/W and to both Servers 1 & 2.
Air Conditioner	101	Access to R/W and Server 1 only
Unknown Device	010	Gateway can read its data, but it won't be allowed any n/w access.

Table 2

D. Implementation

This intelligence is with Gateway or centralized server that maintains the Access level Codes to each connected sensor. The authorized user that has access to centralized server and mentions which servers a particular sensor can access. A file or database will be maintained in centralized server which will look like the below mentioned table:

Device	Access Level	Access	Accessible IP(s)
Irrigation Control	111	All	
Thermostat	110	-	IPs of Server 1 & 2
Air Conditioner	101	-	IP of Server 1.
Unknown Device	010	-	-

Table 3

List of accessible IPs can be maintained in form of linked lists.

A sample algorithm that can be followed is mentioned as:

Steps in the algorithm:

- 1) Received a request from a particular sensor for destination IP.
 Let say sensor name is SensorX that requests for IP address be IPX.
- 2) Determine its access level by reading from the hash or file.
- 3) Based on the access level, perform the following task:
 - 3.1) If access_level == 7
 return TRUE; // Allow this access.
 - 3.2) if access_level >= 5 and access_level < 7
 For the Device SensorX
 AccessibleIPs = get the list of accessible IPs for SensorX;
 Compare IPX with each AccessibleIPs
 If Match found
 return TRUE; // as allow this access.
 log a message.
 - else
 return FALSE; // Block this access.
 log a failure message.
- 3.3) If access_level == 4
 No Internet/Network Access;
 This device can log some data files in a particular directory in the server.
- 3.4) If access_level == 3
 No Internet/Network access
 This device can read some files in a particular directory in the server and can perform its own action based on that file commands. It cannot modify that file.
- 3.3) If access_level == 2
 No Internet/Network access.
 Gateway can read its shared data.
- 3.4) If access_level == 1
 No access within the network.
- 3.5) If access_level < 1
 Completely Blocked.

- 4) Log the necessary options and messages.
- 5) Process the next request.

This algorithm executes on the centralized server or router. That handles all the sensors request. The Sensors should be unaware of any such access codes or access levels.

V. CONCLUSION (TO BE FILLED AFTER REVIEW)

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

Appendices, if needed, appear before the acknowledgment.

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AUTHORS

First Author – Rahul Godha, Software Developer Engineer,
Cisco Systems, Bangalore, rgodha123@gmail.com
Mobile No.: +91 9901106720

Second Author – Sneh Prateek, Software Developer Engineer,
Akamai Tech, Bangalore, snehsm.007@gmail.com

Co-Author- Nikhita Kataria, Software Developer Engineer, Cisco
Systems, Bangalore.

A Secret Data Hiding and Repairing of Grayscale Document Images with Generation of Authentication Signals

Reddypatil Ashwini G¹, Prof. V.R.Chirchi²

¹PG Student, MBES College of Engineering Ambajogai

²Asst.Professor, PG Department, MBES COEA.

Abstract- With fast advance digital technology image processing is fastest and secure area of research and technology. To hiding a data and repairing with generation of authentication signal are big challenges. To overcome a problem of security a new method is used a secret data hiding and repairing of grayscale document images with generation of authentication signals. An authentication signal is generated for each 2x3 block of input grayscale document image. For generation of authentication signal a grayscale document image content need to binarized. These binarize content transferred into number of share by using Shamir secret sharing scheme. A new plane is used for data hiding called alpha channel plane. This plane adding input grayscale document image to form a Portable Network Graphics (PNG) image which is easy to communication in network. At the time of embedding computed secret values called shares mapped with range of alpha channel plane values. At the receiver side process of image authentication one of the block of image marked as tampered if authentication signal of extracted from alpha channel plane not match with the current block content. Need to repaired tampered block by applied reverse Shamir secret sharing scheme.

Index Terms- Data Hiding, Data repairing, PNG, Alpha Channel, Image authentication, Grayscale document image.

I. INTRODUCTION

Accessing of Internet has become part of many people in day today life. A use of Internet is publically there is no privacy. Transferring a secure data over an Internet is risky. Solving these problems of data security a digital image is used to store secret information. In fast digital technology how to manage security and authentication of a digital image now a challenge. It need to required implement an effective method to solve this type of authentication problem [1]-[2], for a purpose of protection of document images. If part of image is verified and distorted the content illegally, the destructed contents are repaired by using authentication and self repaired capability. An input grayscale document images, which includes legal documents, important certificate, drawings, digital signature, design draft etc. Input image is assumed to be a binary like grayscale document image, which has mainly two gray values. One gray value represent background of image and other represent foreground of image. Grayscale document image divides background and foreground by selecting a threshold value. Above the threshold value

represent binary 1 and below the threshold value represent binary 0.such an image look like gray values but binary in nature. Input grayscale document image adding with alpha channel plane to form a PNG image. Alpha channel plane provide transparency to input image. It also provides large space for hiding shares. Generation of authentication signal to each block and create a number of shares by using Shamir secret sharing (k, n) threshold scheme [7].Mapping of these shares with the range of value alpha channel plane. After mapping input grayscale document image transfer into stego image. At the receiver side process of stego image extraction and verification of authentication signal. If in case image is unauthentic it means there is a tampered block. To repaired these tampered block by applying reverse Shamir secret sharing scheme.

This paper is organized as follows: In section II, Literature Survey of paper. In section III, explained proposed method. In section IV, advantages proposed method. In section V, application and last section VI, conclusion.

II. LITERATURE SURVEY

Number of method for image authentication and hiding have been proposed in past. Some are explain as follows.

[1]Yong and Kot [3], proposed a two layer binary image authentication schema. First layer targeted as overall authentication and second layer is used to find out tampered block location. Input image partitioned into number of block. Authentication achieved by hiding cryptographic signature and localization of tampering achieved by embedding block identifier in each block.

Advantage: -Generation of authentication signal.
-Identify the tampered block location.

Disadvantage: -Distortion in stego image.
-No data repaired capability.

2] Wu and Liu [4], proposed a data hiding in binary image, embedding of data manipulate by using flippability of pixels. Flip black pixel into white and white into black. Proposed method used to find unauthorized use of digital signature. Hide a moderate amount of data in image. Image partition into number blocks and fixed number of bits are embedded in each block by changing some pixel in block.

Advantage: -Finding unauthorized use of digital signature.

- It verifies tampered block location of binary image.

Disadvantage: -Distortion in stego image.
 -No data repaired capability.

3] Later Yong and Kot [5], proposed a pattern based data hiding method for binary image. It aims to preserving the connectivity of pixel. Flippability of pixel is determined and watermark is adaptively embedded in block. It preserves connectivity of neighboring pixel. Data embedding manipulate using pixel flippability.

Advantage: - Embedding data by using cryptographic signature.
 -preserve connectivity of pixel.

Disadvantage: - Distortion in stego image.
 - No tampering block localization capability.
 -No data repaired capability.

4] Tzeng and Tsai method [6], proposed a new approach to authentication of binary image authentication for multimedia communication. It randomly generates an authentication codes. These codes are useful for embed into image blocks. To hold authentication code need of code holder for reduce image distortion. Data embed in image manipulate using pixel replacement. It has high possibility to generate noise pixel.

Advantage: - Capability of tampering blocks localization.
 - Reduce distortion in stego image.

Disadvantage: -No data repaired capability.

III. PROPOSED SYSTEM

In past proposed methods has some problem to remove these problems, in this paper a method for authentication signal generation and also self repaired capability of tampered block is proposed.

Proposed system mainly divides into two phases:

- 1] Embedding phase
- 2] Extraction phase

1] Embedding Phase: Input is a grayscale document image with two major gray values and secret key is used embed remaining shares. Output is a stego image in the PNG format with data embedded and also the authentication signal and data used for repairing .Figure 1, shows the embedding process.

Binarization: By applying moment-preserving thresholding [8], to input image to obtain a two representative gray values. Using these values calculate a threshold to binarize input image, yielding a binary version with represent two binary values 0 and 1.

Input Image Adding with Alpha Channel Plane: An input grayscale document image transfer into a PNG image by adding with alpha channel plane and creating a new image layer with 100% opacity.

Generation of Authentication Signal: Take an input image which is gray values but binary in nature. Take an unprocessed raster scan order 2x3 block of binary image with pixels i.e. six pixels in each 2x3 block. EX-OR first three pixels and later remaining three pixels generate 2-bit authentication signal.

Creation of Shares: Take a generated 2-bit authentication signal as input. Concatenate the authentication signal with the pixels to form an 8-bit string which divides into two 4-bit segments. Apply Shamir secret sharing scheme generate number of partial shares.

Mapping of Shares: Generated partial shares mapped with range of values in alpha channel plane.

Embedding: Next step is to embed the generated shares of each block of grayscale document image into alpha channel plane. Mapping values of generated share with alpha channel plane which is nearly to the transparency range of alpha channel plane. Take a block in alpha channel image corresponding to block of binary image, select the first two pixels in alpha channel image embed with the pixels of binary image. Remaining four pixels embedded using a key. This process continues until end of number of blocks.

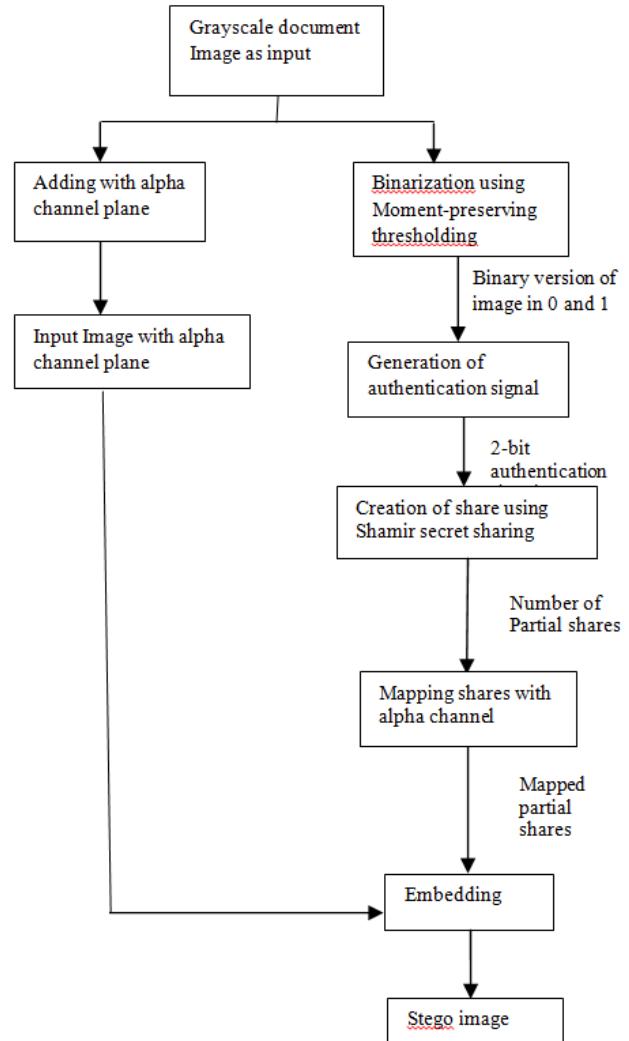


Figure 1: Embedding processes of proposed method

2] Extraction Phase: In this phase receiver side receive stego image and check stego image authentication, including both verification and self-repairing of the original image content. It is reverse procedure of embedding phase. Input as a stego image with two representative gray values and a secret key. Output is marked tampered block and their data repaired if possible. Figure 2, shows extract phase.

Image Authentication and Verification: At the receiver side stego image is received which is grayscale image but binary in nature .Every 2x3 blocks are verified separately. Take a binary block with unprocessed raster scan order with pixel values and corresponding block in alpha channel plane. Extract first two shares from alpha channel plane by apply reverse Shamir secret scheme [7], extract two bit authentication signal in alpha channel plane also compute the authentication signal from binary block of stego image. Compare an extracted authentication signal of alpha channel with computed authentication signal of stego image. If compare values not match then block marked as tampered and if match then stego image is authentic. If marked block has capability to self repaired then sends that block for repairing.

Self-repairing Capability of Tampered Block: If particular block is marked as tampered it implies two shares embedded in the current alpha channel plane is modified or lost. For repairing the six partial share of stego image and choose two shares of input image which is not tampered. Using these shares apply reverse secret sharing scheme repaired tampered blocks.

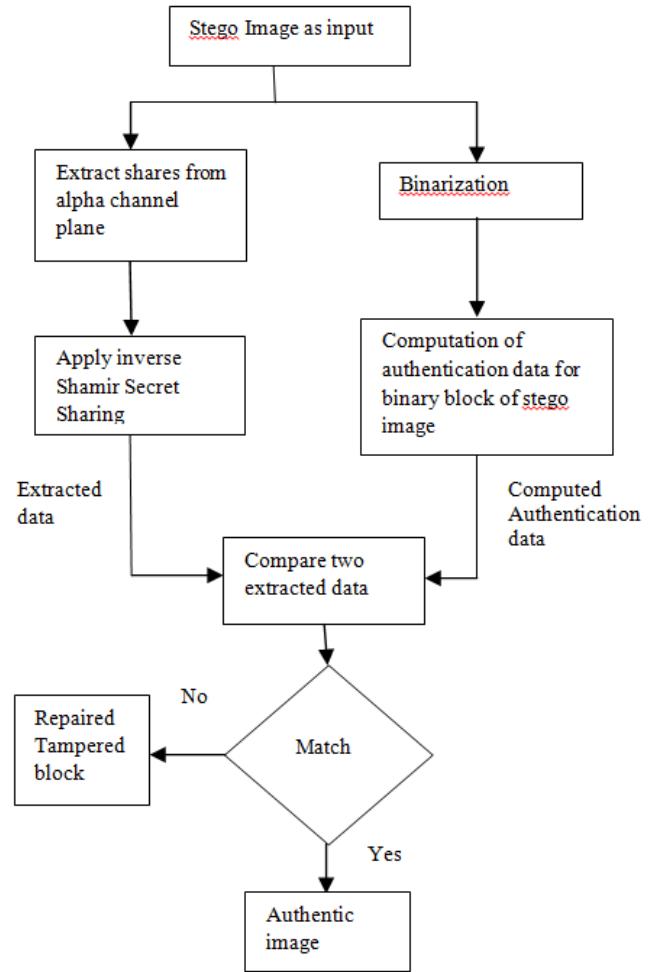


Figure 2: Extraction process of proposed system

IV. ADVANTAGES

The proposed method used to data repairing and generating authentication signal but some other advantages, which are explain as following.

1] No distortion in stego image: In conventional image authentication methods embedding of authentication signal into an input image it is not avoid generation of output stego image distortion. Different from a previous used method a proposed method used an alpha channel for purpose of image authentication and data repairing, leaving the original image untouched so there is no distortion in stego image.

2] Tampered block localization and repaired capability: In past methods only tampered block localization capability but proposed method has tampered block localization and repaired capability. It finds the tampered block location marked block as tampered and repaired a tampered block of image. By using reverse Shamir secret scheme.

3] Use of new type channel for data hiding: Different from common type of images, a PNG image is used. An alpha channel plane is adding with an input image it produce transparency. First time used a carrier as an alpha channel plane with large space for data hiding.

4] Enhancing data security: By using Shamir secret sharing increases data security. Hiding data directly into document image pixel, in proposed system embed data in the form shares these shares mapped with the alpha channel plane of PNG image. Effect of this provides double security. First it divides data into number of shares and generation of authentication signal and second is by the use of alpha channel plane which provide transparency to input image.

5] Less possibility attack: By use of secret sharing scheme and adding authentication signals, and randomly embed the partial shares with adding a key.

V. APPLICATION

A proposed system is used in number of places where security is important. Image content authentication and repaired capabilities are useful for security protection of digital documents in many fields, such as in banking system, multinational companies, CBI.

VI. CONCLUSION

Above explanation and literature review we conclude that a proposed system useful for security of digital documents. It provides a double security by using alpha channel and generating authentication signal to each block. Also data divides into number of shares by using Shamir secret sharing scheme. It distribute authentication signal into entire image part. At the embedding process generated authentication signal and shares mapped with range of value alpha channel plane. After embedding generate a stego image which is in PNG form. At the process of stego image authentication image block marked as tampered it means image content modified. Tampered blocks are repaired by applying reverse Shamir secret sharing.

AUTHORS

First Author – Reddypatil Ashwini G. has completed B.E. degree in computer engineering from Pune University and persuing M.E.in computer networking from BAMU University Aurangabad, reddyashu89@yahoo.com.

Second Author – Prof.Mrs.V.R.Chirchi is working as assistant Professor in PG Department of MBES college of Engineering Ambajogai.

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Use of instructional resources in Senior High School accounting lessons: The tale of teachers and learners

Joseph Tufuor Kwarteng

Department of Arts and Social Sciences Education, University of Cape Coast, Ghana

Abstract- The use of instructional resources makes teaching and learning less arduous. It enhances learners' ability to grasp what is taught with ease. Yet most teachers fail to apply the relevant teaching and learning resources in the instructional intercourse. This study explored the views of Senior High School accounting students and teachers on the use of instructional resources in accounting instructions. In all, 12 accounting teachers, who were selected purposely, and 151 accounting students, who were selected randomly, from four selected Senior High schools in Cape Coast Metropolis responded to a set of questionnaire. Frequency and percentages were used in the data analysis. The study found that accounting teachers hardly used instructional resources to promote understanding in accounting lessons. In most cases, the appropriate instructional resources that could be used were not available. It was further noted that the key barriers to use the appropriate instructional resources in accounting lessons were the high acquisition and maintenance costs coupled with the frequent power outages.

Index Terms- Ghana, school, accounting, teaching and learning resources, teachers, learners

I. INTRODUCTION

State of accounting education

Accounting as a discipline, by its nature, calls for minimum deviation from the rules of thumb that have been established to guide practice. Students must develop the required skills and habit of mastering the required reporting principles, standards as well as conforming to the common conventions that guide practice. This uniformity enhances standardisation in financial reporting which in turn creates a wider market appeal for accounting graduates. To continually uphold this, accounting teachers must ensure strict adherence to the principles, standards and conventions of accounting. This, more or less, implies indoctrination and thus does not give room for creativity. Hence some realist curriculum might be created where students are made to memorize and recite the concepts without having to question what they learn. In this case the accounting instruction might be teacher-centred. The accounting teacher is considered a *know-all* and repository of all knowledge and wisdom so as to instruct students through discipline of the mind to bring students to the knowledge of the onerous *wisdom* that the accounting teacher possesses retrospectively. This has been the traditional accounting curriculum which aimed at nothing but the creation of technical accounting experts.

However, several factors including the diversity of the student body, technological and economic change and external

pressures from employers might not support, if not militate against, the religious impartation of such *virtues* to students. Given this, it is interesting to say that concerns are still raised about the importance of the skills graduates lack and how best to teach and promote such skills. Some argue that if accounting graduates require professional skills they need to develop them while studying at the school and that educators of future professional accountants should be committed to developing the relevant attributes identified as desirable for the professional practice of accounting (American Accounting Association (AAA), 1986; Accounting Education Change Commission (AECC), 1990). Training students this way might lead to the creation of technical accounting experts who may be stereotypically prejudiced.

Use of instructional resources in accounting

Despite the efforts being made by accounting teachers to revamp performance of students, it appears much is still left to be done (Ankomah & Kwarteng, 2010). The missing link is how to fit instruction to appeal to students' understanding to promote instructional success. It appears that accounting instructions are too abstract making them lose practical touch and relevance. The quest of *practicalising* accounting instructions requires the adoption and frequent use of relevant instructional resources in accounting.

The use of instructional resources in teaching and learning plays very important roles in education all over the world. According to Tamakloe, Amedahe and Atta (2005, p. 60), a teaching resource is "a material which a teacher uses to facilitate the learning, understanding and acquisition of knowledge, concepts, principles or skills by his students". Instructional resources in education are the use of equipment and materials that are relevant to motivate, inform, instruct, and present the subject matter to the learner as well as making learning easier than it would have been without it. The use of instructional resources can adapt to the ability and preferences of individual students and increase the amount of personalised instructions students receive. Many students benefit from the immediate responsiveness of the interactions with instructional materials and appreciate self-paced and private learning environment. Moreover, the use of the instructional resources often engages the interest of students, motivating them to learn and increasing their independence and personal responsibility. Although it is difficult to assess the effectiveness of the use of instructional resources, some studies have reported that the use of instructional resources is successful in raising examination scores, improving students' attitude and lowering the amount of the time required to master certain materials (Kurland, 2008). While study results

may vary greatly, there is substantial evidence that the use of the instructional resources can enhance teaching and learning at all educational levels.

Instructional resources cannot be underestimated in the teaching of all subjects among which accounting. This perception may be changed with the use of instructional resources to promote interest in the subject. Some of the relevant instructional resources commonly used in accounting lessons include bank statements, cardboard illustrations, payment vouchers, receipts, invoices, waybills, promissory notes, debit and credit notes, samples of final accounts of organisations. These instructional resources are meant to aid teaching and learning of accounting in the Senior High Schools (SHS). According to Martin and Arendale (1994), in spite of the benefits that go with the use of instructional resources, they are not used much in teaching in schools. Although SHS accounting teachers are aware of the existence of these teaching aids, the institutions seem to be exceptionally slow in adopting the various materials to help teaching of accounting. As such most accounting teachers fall victims of the description of Nacino-Brown, Oke and Brown (1982, p.34) that such accounting "teachers are mostly accused of over verbalization because in the instructional process, they tend to use more words to explain whatever point they want to put across to learners". This opposes the idea of exposing accounting students to the pragmatic use of resources such as accounting software, journals, bank statements, cheque books, vouchers, among others so that they will not alien to work in actual employment. Accordingly, accounting students are robed of the quality instruction expected to make them adapt to the world of work.

II. PURPOSES OF THE STUDY

The purposes of the study were to assess the use of instructional resources in teaching financial accounting in Senior High Schools. Specifically, the study sought to find:

1. The instructional resources available for teaching and learning accounting in SHS and the extent to which the instructional resources are put to use.
2. The challenges teachers face in using instructional resources in teaching accounting in SHS.

III. METHODOLOGY

The target population for this study included accounting teachers and students in four selected Senior High schools in Cape Coast Metropolis. The population was selected for the study because they are directly involved in the use of instructional resources in the teaching and learning of

accounting. The population was also selected on the basis of proximity, cost and time effectiveness. The accessible population included 1100 accounting students and 15 accounting teachers in 4 selected Senior High schools.

In all, the sample consisted of 163 respondents made up of 12 accounting teachers and 151 accounting students from the population. Simple random sampling technique was employed to ensure that each population member had an equal chance of being selected. The possibility of being bias was therefore reduced if not completely avoided. Moreover, it saves a lot of time. However, in the case of selection of teachers who teach accounting, purpose sampling, a type of non-probability sampling was employed as the teachers constitute the experts who have the qualitative information for the proper conduct of the research.

The main instrument that was used for the collection of data is questionnaire. This instrument was used because the respondents could read and write. Two different types of questionnaire were designed; one for teachers and the other for students. The sets of questionnaire were developed based on research questions, which were further derived from the related literature. With regards to the students' questionnaire, 15 items in all were designed for each respondent. The other set of questionnaire meant for the teachers also had 18 items. The sets of questionnaire were divided into three sections. Section A covered the background information of both teachers and students including gender, age, highest academic attainment and form. Section B sought data on the types of instructional resources available and the extent to which they are put to use while Section C collected data on the challenges teachers face in using instructional resources.

The questionnaire for both teachers and students were administered and collected immediately after they had been answered. This ensured 100% retrieval. Few of the teachers and students were contacted to get more information on the use of instructional resources. This supplemented the responses from the questionnaire. The descriptive statistics were mainly used in the data analysis.

IV. RESULTS

Instructional resources in accounting: Students' perspective

From the students' perspective, the availability of the types of instructional resources used in the teaching and learning of financial accounting was sought. The quest was to determine whether these instructional resources were available, available but not adequate, available and adequate or not available at all. The result is displayed in Table 1.

Table 1: Students' View on Types of Instructional Resources Available

Variable	NA	A	ANA	A&A
Audio-visual aids e.g. computers	92(60.9%)	12(7.9%)	44(29.2 %)	3(2%)
Audio aids e.g. tape recorders	136(90%)	6(4%)	6(4%)	3(2%)
Visual aids e.g. overhead projectors	114(75.5%)	17(11.3 %)	15(9.9 %)	5(3.3%)
Community Resources e.g. resource persons	124(82.1%)	13(8.6%)	8(5.3%)	1(0.7%)

Note: NA= Not Available, A= Available, ANA= Available but Not Adequate, A&A= Available and Adequate.

The majority (n=92; % =60.9%) of the students surveyed did not have audio-visual aids in their school. Only an insignificant number of students indicated that such resources were available and sufficient to aid teaching and learning of financial accounting. Further, it was found that most of the students believed that audio aids, visual aids and community resources were not available in the selected Senior High Schools for teaching financial accounting.

Some students 66 (43.7%) asserted that accounting teachers use instructional resources while the majority of them the accounting teachers did not use instructional resources at all. Out of the 66 students who asserted that teachers use instructional resources, 26 of them were of the view that their accounting teachers use audio-visual aids in teaching financial accounting. But the view of the students on the specific type of instructional resource differed markedly.

Accordingly, the type of instructional resources commonly used for accounting instructions was investigated. On this issue, the majority (n=120; 79.5%) of the respondents asserted that audio-visuals aids are not used by accounting teachers in teaching financial accounting while 18.5% admitted that such resources were normally employed in accounting instructions in their schools. Thus, on the basis of the views of the most students one could conclude that accounting teachers do not use audio-visual aids in teaching financial accounting. In another development, the majority (n=146; % = 96.7%) of the students were of the view that audio aids are not used in accounting classes meanwhile four (2.6%) respondents hinted that such resources are rarely used. Furthermore, the students 88.1% were with regards resolute to announce that visual aids such as overheads projectors are not used in accounting instructions to promote understanding.

On the use of community resources such as relevant resource persons to aid accounting instructions, an overwhelming 90.7% of the responding students lamented the apparent unuse of it in their classroom interactions. Only a handful of the students declared some occasional invitation of such resources to deliver some practical skills and knowledge in their financial accounting lessons.

The use of instructional resources in the teaching of financial accounting in the Senior High Schools is not without problems.

The study sought to identify some challenges that teachers faced in using instructional resources for instructional delivery.

As well, the study investigated the problems envisaged or encountered by teachers in the use of instructional resources in accounting. The majority of responding students (82.2%) were unanimous to note the fact that instructional resources were woefully inadequate. Finally, most of the students noted that accounting teachers experience frequent power outages in using audio-visual aids.

Instructional resources in accounting: Teachers' perspective

The accounting teachers were surveyed to complement the views of the students in order to provide a holistic picture of the phenomenon. The availability and adequacy of the instructional resources were feared by the accounting teachers. Only 8.3% of them indicated some availability of the required instructional aids for accounting. On the contrary, a whopping 66.7% of the responding accounting teachers believed that they are available but not adequate. Also, 25% of the respondent asserted that they are not available while none of the teachers thought that they are available and adequate. Hence majority of the teachers believed that availability of audio-visual resources is not a problem but their adequacy.

Again, the results show that 25% of the respondents believed that audio aids for accounting lessons were available while 8.3% thought that they are available but not adequate. 66.7% of the respondents also asserted that audio aids are not available for teaching financial accounting whereas none of the teachers believe that they are available and adequate. Hence most of the respondents believe that audio aids are not available for teaching. In another scenario, 41.7% of the teachers believed that visual aids are not available while 16.6% considered that they are available. While none of the teachers asserted that visual aids are available and adequate, 41.7% believed that they are available but not adequate. With regards to availability of community resources, Table 7 reveals that majority of the teachers believed that they are just available.

In another scenario, a majority of the teachers (n=6; % =50%) indicated that they use visual resources as oppose to 25% who asserted that they do not use any of the instructional resources in teaching. Besides, 8.3% each of the respondents

believed that they use audio-visual, community resources and all of such resources respectively.

According to Farrant (2004, p. 356), "the extent to which instructional resources are put to use helps in maintaining the tempo of motivation and attention in the process of teaching and learning. Instructional resources are designed to assist the learner by helping him to understand what he is learning by seeing it

presented in a simple manner." The quest which was to determine whether instructional resources are rarely used, frequently used, very frequently used or not used at all by financial accounting teachers in teaching and learning is displayed in Table 2. The result shows the perspective of teachers.

Table 2: Teachers' Views on Extent to which the Instructional Resources are put to use

Variable	NU	RU	FU	VFU
Use of Audio-visual aids e.g. computers	2(16.7%)	6(50.0%)	4(33.3%)	0
Use of Audio aids e.g. tape recorders	5(41.7%)	5(41.7%)	2(16.7%)	0
Use of Visual aids e.g. overhead projectors	9(75.0%)	0	3(25.0%)	0
Use of Community Resources e.g. resource persons	3(25.0%)	5(41.7%)	3(25.0%)	1(8.3%)

Note: NU= Not Used, RU= Rarely Used, FU= Frequently Used, VFU= Very Frequently Used.

The results from Table 2 portray that a majority ($n=6$; $\% = 50\%$) of the respondents intimated that they rarely apply audio-visual aids whereas 33.3% also asserted that they often apply them in teaching financial accounting. Also, 16.7% of the responding accounting teachers indicated that they did not use audio-visual aids at all in their lesson delivery. Furthermore, about the use of audio aids, 41.7% of the respondents considered that they did not use audio aids while 16.67% confirmed that they rarely used audio aids. With regards to visual aids, 75% of the respondents considered that such resources are not used in teaching and learning of financial accounting while 25% believed that they are often used. Thus, majority of the teachers indicate that they do not apply visual aids in teaching financial accounting.

Finally, 41.7% of the respondents revealed that they rarely apply community resources such as inviting resources persons in their lessons. Meanwhile, 25% asserted that they did not use community resources in their lessons. Also, whereas 25% believed that they frequently used community resources, 8.3% believed that they use community resources very frequently in their lesson delivery.

The use of instructional resources in the teaching of accounting in the Senior High Schools is not without problems. The study sought to identify some challenges that teachers face in using instructional resources such insufficiency of instructional resources and frequent power outage. The result revealed that 83.3% of the respondents found the available instructional resources to be inadequate accounting instructions in their institution. Yet 16.7% of them believed otherwise. Besides, 91.7% of the respondents agreed that instructional resources were expensive. Finally, while 25% of the teachers decried the frequent power outage in inhibiting their use audio-visual aids in accounting instructions, 75% of them never saw

that problem as a potential factor in discouraging their use of such instructional resources in accounting lessons.

V. DISCUSSION

It was evident that the various types of instructional resources are used but the extent to which they are put to use is not encouraging. The more these instructional resources are put to good use the better the enhancement of teaching processes of the financial accounting teacher during the instructional period. This in no less way impart positively on the confidence as well as the motivation of the teacher. The teacher's ability to combine the various instructional resources and use them effectively and efficiently makes teaching easy and interesting to students.

Although some accounting teachers fail to use instructional resources in their instructional discourse the majority of them use for their classroom interactions with their students. This assertion made by the accounting teachers contradicts the observation by Martin and Arendale (1994), that in spite of the benefits that go with the use of instructional resources, they are not used much in teaching in schools. From a dispassionate viewpoint, the students confirmed this observation as they affirmed that the accounting teachers do not use instructional resources. Interestingly, it was the majority of the students that intimated that the instructional resources were not available. Without prejudicing, it is conclusive to be privy that the accounting teacher's point of view for use of instructional resources might be different from that of the students. For instance the teacher's use of clear and audible voice during instructional period might not be recognised by the students as a best audio aid for instruction. However, some evidence is generated to signal that the extent to which the available instructional resources are put to use is awful. Instructional resources are designed to assist the learner by

helping him or her to understand what he or she is learning by seeing it presented in a simple manner. Thus, teachers' inability to use these instructional resources consistently will reduce the tempo of motivation and attention of learners during classroom instruction which might in turn reduce the quality of instruction (Farrant, 2004). As a result, the effectiveness and professionalism of accounting teachers might be in doubt.

But teachers might not be blamed as they can put some defence in the form of the lack of the appropriate instructional resources for their subsequent deployment. Both the accounting teachers and students surveyed were unanimous to point the unavailability of such instructional aids. Yet Ayinde (1997) opined that an intelligent use of audio-visual aids will save time and stimulate students' interest. Indeed, it is capable of increasing the retention of knowledge and stimulates attitude. It helps students to recognize a problem, provide solution and summarize discussion. More so, they facilitate independent studies, aid communication, create a variety of sensory and make instructions more powerful and immediate. Hence, the insufficiency of such teaching aids will not only limit their use by teachers but it will reduce the quality of instruction.

Therefore, the non-availability of such resources will hamper effective communication between teachers and learners during classroom instructions.

Frequent power outages and the unavailability of the needed materials and/or equipment were cited as the key challenges facing accounting teachers in the use of instructional resources. The entire nation has been experiencing energy crisis. No wonder the incessant fluctuations in the supply of electrical power pose a challenge to the effective use of such instructional resources that require electrical energy to function. The high cost of the needed resources also inhibits teachers' ability to spend their limited resources on the procurement of such instructional resources needed to promote learning in the accounting classroom. Farrant (2004) foresaw this challenge as he advised stakeholders to be forewarned of the high initial cost of electrically operated audio-visual equipment and the difficulty in finding satisfactory suppliers and after sale service. Such is the explanation for the limited introduction and use of instructional resources in accounting instructions. If quality accounting education is desired there is the need for school authorities and other stakeholders to provide the various schools with adequate instructional resources to facilitate teaching and learning.

The availability of community resources is important because, according to Stone and Jacobs (2006), changing educational experience of students by moving beyond the classroom wall can diversify the array of learning opportunities and connect school lessons with daily life and real problems. The apparent failure of teachers in inviting and falling on resource persons to facilitate the practical appreciation, on the part of the learners, of the theories taught in the regular class room will militate against total accomplishment of the accounting principles and concepts and how they are applied to the work place.

VI. CONCLUSION

Most SHS accounting teachers are not sensitive to the evolution of the accounting profession as a result they fail to

define the body of knowledge more suited to the realities of the marketplace, to the needs of the decision makers, and to the future prospects of both. The work of the accounting teacher is professionally deficient as they fail to focus on preparing students to become professional accountants whilst they remain in the classroom (Williams, 1994). This is an argument for establishing a fair support for students whilst in school instead of hoping that they acquire the relevant skills on the job through the use of appropriate instruction resources. If the latter is in the affirmative, what then is the use of the accounting teacher if the students can learn to be professionals on the job? This will then be akin to apprenticeship training that people undergo without any formal classroom instruction. Accordingly, Williams (1994, p. 208) suggests there is the need for changes in the accounting curriculum which "... should focus on the process of learning, not just teaching answers" the content of which "should be taught to identify and solve unstructured problems, learn by doing work in groups, and learn to use technology effectively, such as databases for researching issues". Thus, the new development in the skill requirement of the accounting graduate calls for the need to use real life objects change to aid instruction.

But being somewhat generous with the accounting teachers they may be excused since instructional resources are inadequate and expensive to acquire. Most accounting teachers are limited to the use of the few that are available with intensive pressure being mounted on such resources- with the attending high cost of maintaining them. Thus, it limits the variety that the accounting teacher can add to the accounting instructions to benefit students. This goes a long way to affect teaching and learning of accounting in Senior High Schools since it makes teaching and learning less interesting and ineffective. Furthermore, it might be that the accounting teachers are either not trained or are poorly trained in the use of instructional resources. This makes it difficult for them to use instructional resources in the course of their teaching. Therefore there is the need for school authorities (GES) and other relevant stakeholders to provide the various schools with adequate instructional resources and the needed training on their use to accounting to facilitate teaching and learning.

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AUTHORS

First Author – Joseph Tufuor Kwarteng – BEd (Hons), MBA, MPhil (curriculum Studies), ICA (Ghana), University of Cape Coast, Cape Coast, Ghana, brainsmann@yahoo.com, jtkwarteng@ucc.edu.gh , +233209394916

Comparison of Phytoremediation of Cadmium and Nickel from Contaminated Soil by *Vetiveria Zizanioides L.*

Isha Gunwal*, Lata Singh ** and Payal Mago**

*,** (Department of Botany, Sri Aurobindo College, University of Delhi, Delhi)
** (N.R.E.C College, Khurja, C.C.S University, Meerut)

Abstract- Industrial waste is one of the most important sources of contamination in the surface environment. The impact of heavy metals in soils, plants, animals and humans is due to the unabated expansion of toxic effects. The toxic wastes generated are treated by physicochemical processes in which “Bioremediation” is the microbial clean up approach. Plant based remediation (Phytoremediation) is an emerging biotechnological tool, for cleaning metal polluted or contaminated soil. The present study deals with phytoremediation of metal polluted soil collected from Delhi and surrounding areas utilizing Vetiver grass, which is one of the best “Hyperaccumulators” for the phytoremediation of metal polluted sites. *Vetiveria zizanioides (Linn) Nash* were grown in three types of experimental plots containing sterilized soil with a known quantity of Cd and Ni salts as present in polluted soils (i) Control without any kind of AM spores, (ii) AM inoculum prepared from spores extracted from non Cd and Ni polluted soils,(iii) AM inoculum prepared from spores extracted from Cd and Ni polluted soils. Plants were observed for their growth and harvested after 3 months. The soil and plant samples were analyzed for cadmium (Cd) and nickel (Ni) using Atomic Absorption Spectrophotometry (AAS) at regular intervals i.e. every 15 days till harvesting of experimental plant. The results indicated that roots and shoots taken from plot II showed maximum uptake of Cadmium then Nickel in comparison to roots and shoots taken from plot I and plot III. Pytoremediation is found to be cost effective and highly efficient in remediating the heavy metal polluted sites.

Index Terms- Phytoremediation, Arbuscular Mycorrhizae (AM), Vetiver, Atomic Absorption Spectrophotometry (AAS), Hyperaccumulator, Nickel

I. INTRODUCTION

Industrial waste is one of the most important sources of contamination in the surface environment. Numerous studies of environmental contamination due to industrial wastage activities have been undertaken to further the understanding of the impacts of heavy metals and metalloids in soils, plants, animals and humans. The unabated expansion of chemical industries and technologies indeed left a trail of anxiety and global concern. The toxic metals may be absorbed by plants grown in contaminated soil which then accumulate in animals eating those plants perhaps reaching to chronic toxic levels. Most heavy metals become quite insoluble in soil at pH 6 or more. Cadmium, being highly soluble than other heavy metals, is a frequent contaminant. Other metals such as Ni, Cu, Mo and Zn

are also soluble but to a lesser extent [19]. Soil pollution by heavy metals such as mercury, cadmium, chromium and lead are of great concern to public health [16]. The source of heavy metal in plant is the environment in which they grow and their growth medium (soil) from which heavy metals are then taken up by roots or foliage of plants [22]. Plants growing in polluted environment can accumulate heavy metals at high concentration causing serious risk to human health when consumed [2, 4, 30].

Cadmium is Natural. Cadmium (elemental symbol Cd and CAS registry number 7440-43-9) is a member, along with zinc and mercury, of Group 12 (CAS IIB) of the Periodic Table of the Elements. It is generally characterized as a soft, ductile, silver-white or bluish-white metal, and is listed as 64th in relative abundance amongst the naturally occurring elements. Cadmium is often described as a “heavy metal”, but the term has no meaning in fact since it possesses an average density, atomic number and atomic weight compared to other metals. The density of cadmium is 8.64 g/cm³ at room temperature compared to 1.85 g/cm³ for beryllium, the lightest of the metallic elements, to 19.3 g/cm³ for gold or tungsten, amongst the heaviest of the metallic elements. Nickel is a transition element with atomic number 28 and atomic weight 58.69. In nature, Ni is mostly present in the form of nickelous ion, Ni²⁺. The hydrated form as Ni (H₂O)₆ is the most common form of Ni found in the soil solution. Phytoremediation is the use of certain plants to clean up soil, sediment, water and polyaromatic hydrocarbons (PAHs). Phytoremediation is an aesthetically pleasing mechanism that can reduce remedial costs, restore habitat and clean up contamination in place rather than entombing it in place or transporting the problem to another site. Phytoremediation can be used to clean up contamination in several ways such as Phytovolatilization, Microorganism stimulation, Phytostabilization, Phytoaccumulation or extraction and Phytodegradation by plants[12,15] (Cunningham et al., 1997; Flathman and Lanza, 1998).The primary motivation behind the development of phytoremediative technologies is the potential for low cost remediation [14] (Ensley, 2000). [8] Chaney, (1983) was the first to suggest using these “hyperaccumulators” for the phytoremediation of metalpolluted sites. However, hyperaccumulators were later believed to have limited potential in this area because of their small size and slow growth, which limit the speed of metal removal [10, 11,13] (Cunningham et al., 1995; Comis, 1996; Ebbs et al., 1997). By definition, a hyperaccumulator must accumulate at least 100 mg g⁻¹ (0.01% dry wt [24,31] (Reeves and Baker, 2000; Wantanabe, 1997). Vetiver grass (*Vetiveria zizanioides L. Nash*) has been one among the well documented grasses to have strong resistance to the execrable environment and to be able to survive in high

concentrations of heavy metals [32] (Xia et al., 1999). Although certain plants like *Brassica juncea* (cv. Vardan), *Vetiveria zizanioides*, *Viola sp.* posses a higher potential for removing Cd from moderately contaminated soil and could be used as a hyper accumulator for contaminated soil remediation. Recently vetiver grass, due to its ecofriendly nature, found a new use for phytoremediation of contaminated sites. Vetiver grass is both a xerophyte and a hydrophyte and, once established, is not affected by droughts or floods [17](Greenfield, 1988). It is highly tolerant to droughts and water logging, frost, heat, extreme soil pH, solidity, salinity, Al and Mn toxicity [27](Truong and Claridge, 1996). It is also highly tolerant to a range of trace elements such as As, Cd, Cu, Cr, and Ni [27] (Truong and Claridge, 1996). It is suitable for the stabilization and rehabilitation and reclaiming of acid sulfate and trace metals contaminated soils, i.e. phytoremediation The present study hypothesises that *Vetiver* sp., a plant which shows high mycorrhizal colonization, is a hyper accumulator, with a high biomass, has the potential that mycorrhizal *Vetiver* could enhance Cd and Ni uptake due to more access to soil beyond rhizosphere with the help of mycorrhizal hyphae.

II. MATERIALS AND METHODS

Plants of *Vetiveria zizanioides* were grown under natural conditions in experimental plots in Department of Botany, Sri Aurobindo College, University of Delhi. The soil samples of all the experimental plots were used for analysis of cadmium and Nickel in soil as well as plant parts at regular intervals.

Experimental setup

The experiment was conducted in the Botanical Garden, Sri Aurobindo College, University of Delhi in 3 micro-plots of 10 m² area each. The top soil (up to 30 cm depth) was fumigated twice with 0.1% formaldehyde at an interval of 15 days. Then the soil was allowed to dry and the fumigant was dissipated. Vetiver was grown in three types of experimental plots containing sterilized soil with a known quantity of Cd and Ni salts as present in polluted soils (i) Control without any kind of AM spores, (ii) AM inoculum prepared from spores extracted from non Cd and Ni polluted soils,(iii) AM inoculum prepared from spores extracted from Cd and Ni polluted soils. Clums rate was kept uniform for all treatments and when clumps were 15 days old, thinning was done to maintain spacing of 10 cm between the plants and 20 cm within the rows. The plants were allowed to grow and no fertilizer or pesticide was added to the soil during the course of the experiment. Weeding was done mechanically at regular intervals and plots were irrigated with tap water.

I –Cadmium and Nickel contaminated soil + Vetiver plants without AM fungal spores

II – Cadmium and Nickel contaminated soil + AM fungi spores from non contaminated soil + Vetiver plant

III – Cadmium and Nickel contaminated soil +AM fungi spores from contaminated soil+ Vetiver plant

Description of sampling points

Three different points (A, B and C) 10 km around Delhi were sampled for soil and plant while the fourth sampling point is located in garden of Sri Aurobindo college, Delhi. The samples

from this point served as control and the point was designated as D. Soil was collected from different localities in and around Delhi. These sites are (a) Shastri park area- dumping ground for burnt and half burnt electronic waste and disposal ground for nickel-cadmium batteries, (b) Dump yard of Okhla sewage treatment plant where treated sewage is converted into manure, (c) Sanganer soil from Rajasthan where effluents from dying industries are dumped into the soil, (d) Yamuna soil from the three different regions i. e. near okhla barrage, Wazirabad barrage and ITO barrage. These parts of Yamuna are its flood plains and receive water from Yamuna during rainy season. The water of Yamuna is highly polluted as it receives waste domestic sewage as well industrial effluents of Delhi yet there is large scale cultivation of vegetables and horticulture plants at its bank, (e) Uncontaminated garden soil from Sri Aurobindo college. The soils collected from above sites contain moderate level of Ni so Nickel was supplied in the form of soluble nickel salt dissolved in double distilled water (DDW), was mixed thoroughly in the soil and the soil was homogenized and kept in polythene bags and labeled to avoid a mix-up of the different soil samples and later analyzed for their Ni contamination. Plant samples were collected carefully using hand trowel to dig the soil around the plant and the plants were pulled out carefully, ensuring that no part of the root was lost. The different plant samples were kept in different polythene bags and properly labeled. Soil samples were collected from the same point where the plant samples were uprooted. Clumps of *Vetiveria zizanioides*(Linn.) procured from Central Soil Salinity And Research Institute, Karnal, Haryana and planted in prepared plots (4x4inch) of 15 kg soil capacity containing soil collected from the different locations. Four plots were used for cultivating the plants. The prepared plots were placed in field conditions to expose the growing plants to natural environment. Ten plants per plot were maintained. Plants and soil was analyzed at 15 days interval for investigating the uptake potential, spore density and % root colonization. Every year plants of Vetiver grass uptake Ni from the soil and again the healthy clumps of Vetiver grass were planted in the same soil. The culms of *Vetiveria zizanioides* (Linn.) grass with root (10 cm) and shoot (20 cm) were selected for the study. This experiment was conducted for three consecutive growth period with three treatments to *Vetiveria zizanioides*.

Collection of plant and soil samples

Pilot study has been carried out in the laboratory, Department of Botany, Sri Aurobindo College, University of Delhi, New Delhi-Clumps of Vetiver were procured from Central Soil Salinity And Research Institute, Karnal, Haryana and planted in prepared plots (4x4inch) of 15 kg soil capacity containing sandy soil from the different locations in and around New Delhi, India (28.38N, 77.11E, 228 m altitude) during the winter season. The climate of Delhi is semi-arid and subtropical with the mean annual rainfall of about 650 mm. Three plots for each treatment were used for cultivating the plants. Cadmium and Nickel were supplied in the form of Cadmium nitrate and Nickel nitrate dissolved in double distilled water (DDW), was mixed thoroughly in the soil. The prepared plots were placed in field conditions (in Sri Aurobindo College) to expose the growing plants to natural environment. Ten plants per plot were maintained. Ninety-day-old plants were analyzed at 15 days

interval for investigating the uptake potential. The culms of vetiver grass with root (10 cm) and shoot (20 cm) were selected for the study. This experiment was conducted over a 12-week growth period with three treatments to *Vetiveria zizanioides*.

Estimation of Cadmium and Nickel in soil and plant parts

Soil and plant collection and Preparation-

The soil (loamy sand) used in this study was collected from the experimental plots at regular intervals. The soil was sieved (4 mm) and steam sterilized (100°C for 1 hour for 3 consecutive days) to eliminate naturally occurring AMF propagules. Root samples along with surrounding soil were taken in polythene bags and stored at 4°C until they were processed further. The root samples were preserved in Formalin Alcohol Acetone (FAA) in the ratio of 90:5:5 (v/v/v) before clearing and staining.

Sample preparation:

Each plant sample was separated into leaves, roots, and stems and then dried at 50°C for 8 hours using an oven. The dried plant samples were milled using a laboratory blender and kept for digestion. Unwanted materials such as stones, leaves and debris were removed from the soil samples by handpicking. The soil sample was further broken down into finer particles using a laboratory mortar and pestle. The soil samples were dried for 8 hours at 80°C using an oven.

Sample digestion:

Soil and plant samples were digested before analysis to reduce organic matter interference and allow for the conversion of the metal into a form that can be analyzed by the Atomic Absorption Spectrophotometer (AAS). (Tandon, 1993)

Plant sample digestion:

Plant samples were digested following the Mixed Acid Procedure of Allen *et al* [3]

Reagents-

1. Perchloric Acid, 60%
2. Nitric Acid, concentrated.
3. Sulphuric Acid, concentrated.

Procedure-

1. Weigh 0.20-0.50g of air-dried or oven-dried milled plant sample into a 50 ml Kjeldahl flask using a digital weighing balance.

2. Add 1 ml of 60% Perchloric acid, 5 ml nitric acid and 0.5 ml Sulphuric acid to the weighed milled plant sample.

3. Swirl gently and digest slowly at moderate heat on a laboratory hot plate, increasing the heat later, until the white fume evolving from the Kjeldahl flask turned brown.

4. Digest for 10-15 minutes after the appearance of white fumes.

5. The digest was allowed to cool (the cold digest is usually colourless or occasionally pink).

6. Dilute to about 10 ml and boil for a few minutes and then filtered through a Whatman's filter paper (No. 44 paper) into 50 ml volumetric flask, leaving a whitish residue.

7. The filtrate was then made up to 25 ml using distilled water and kept for further analysis.

8. The residual acid is now about 1% (v/v).

Soil sample digestion:

The same procedure for the digestion of plant sample was used according to the method of Allen *et al.* (1974)

III. RESULT AND OBSERVATION

The results of the chemical analysis of cadmium (Cd) and Nickel in soil and plant samples collected are presented in **Table 1, 2 & Figure 1, 2**. The concentration of cadmium is higher in soil samples obtained from the experimental plot I when compared with those obtained from the experimental plots II & III. The concentrations of the heavy metals in the plant tissue were higher in the experimental plots II & III than the experimental plot I. Irrespective of the concentration of the metals and the presence or absence of AM spores the bioaccumulation of the selected metal was higher in the roots than shoots. It was 140% and 101% respectively in cadmium exposed vetiver plant. These findings suggested that the soil type could cause the difference in cadmium accumulation in vetiver plant. [5] Alloway (1997), Baker and Senft (1997) reported that plant species as well as cultivars differ widely in their uptake ability and accumulation of heavy metals.

The average highest cadmium concentration in shoots of vetiver grass was 5.11ppm. It was lower than the toxic threshold level [28] (Truong, 1999).The average highest Cd concentration in roots of vetiver grass was 11.83 ppm. Comparing the distribution of Cd concentration in the parts of vetiver grass, Cd was found to accumulate more in roots than in shoots (the accumulation rate in shoot/root is from 1.85% to 13.32%). This finding is similar to the results of [28] Truong (1999) and Roongtanakiat *et al.* (2002). They found that a small amount of Cd was translocated to the shoot.

The average highest Nickel concentration in shoots of vetiver grass was 3.99 ppm. It was lower than the toxic threshold level [28] (Truong, 1999).The average highest Ni concentration in roots of vetiver grass was 10.84 ppm. Comparing the distribution of Ni concentration in the parts of vetiver grass, Ni was found to accumulate more in roots than in shoots (the accumulation rate in shoot/root is from 1.05% to 10.32%). This finding is similar to the results of [28] Truong (1999) and Roongtanakiat *et al.* (2002). They found that a small amount of Ni was translocated to the shoot.

Table 1 – Mean Concentration of Cadmium mg/kg or ppm in soil samples and plant tissues of *Vetiveria zizanioides* at regular intervals

Time Interval	Experimental Plot	Cd Concentration (mg/kg or ppm)		
		Soil	Root	Shoot
15 Days	I	30.6	8.4	1.83
	II	29.5	9.3	2.74
	III	28.4	6.74	1.59
30 Days	I	27.3	10.14	2.19
	II	26.2	10.63	3.71
	III	25.1	7.74	1.74
45 Days	I	24.1	11.33	2.79
	II	23.1	11.85	4.71
	III	22.0	9.03	2.44
60 Days	I	20.9	12.13	3.21
	II	19.8	13.12	4.91
	III	18.7	10.04	3.14
75 Days	I	17.6	14.83	4.39
	II	16.5	15.82	5.11
	III	15.4	10.74	3.84
90 Days	I	17.6	14.83	4.39
	II	16.5	15.82	5.11
	III	15.4	10.74	3.9

Table 2 – Mean Concentration of Nickel mg/kg or ppm in soil samples and plant tissues of *Vetiveria zizanioides* at regular intervals

Time Interval	Experimental Plot	Ni Concentration (mg/kg or ppm)		
		Soil	Root	Shoot
15 DAS	I	12.5	1.88	0.83
	II	22.4	9.12	1.63
	III	28.4	6.74	1.59
30 DAS	I	10.3	2.63	1.01
	II	20.2	10.14	1.89
	III	25.1	7.74	1.74
45 DAS	I	9.1	2.85	1.71
	II	18.1	10.33	2.59
	III	22	9.03	2.44
60 DAS	I	7.9	3.12	2.41
	II	17.8	11.13	3.29

	III	18.7	10.04	3.14
75 DAS	I	6.6	3.82	3.11
	II	16.5	11.83	3.99
	III	15.4	10.74	3.84
90 DAS	I	7	3.82	3.11
	II	16.5	11.83	3.99
	III	14.5	10.74	3.84

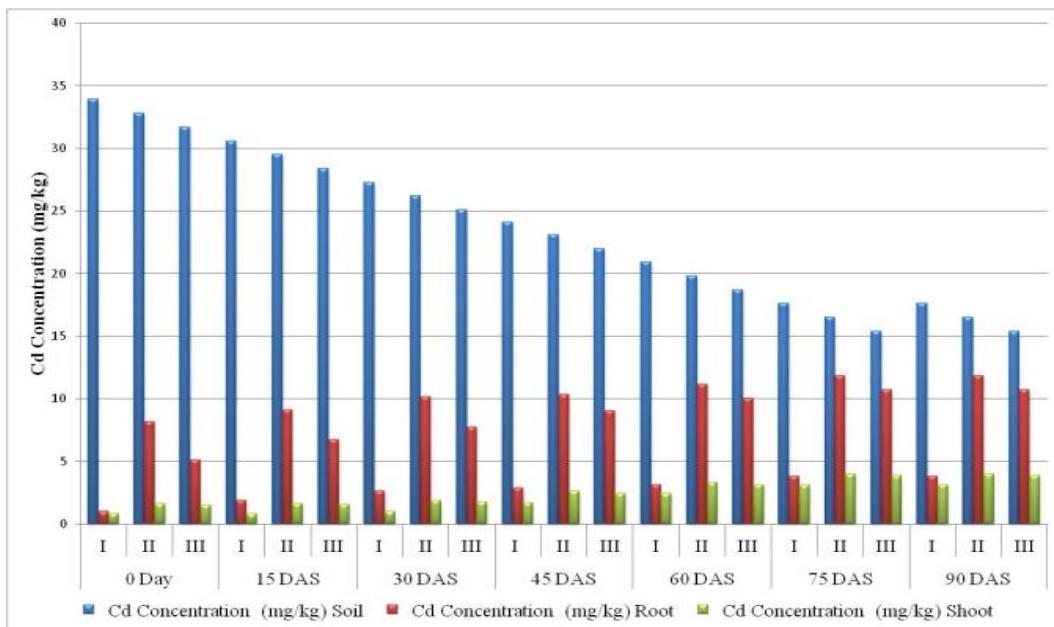


Fig. 1- Mean Concentration of Cadmium mg/kg or ppm in soil samples and plant tissues of *Vetiveria zizanioides* at regular intervals.

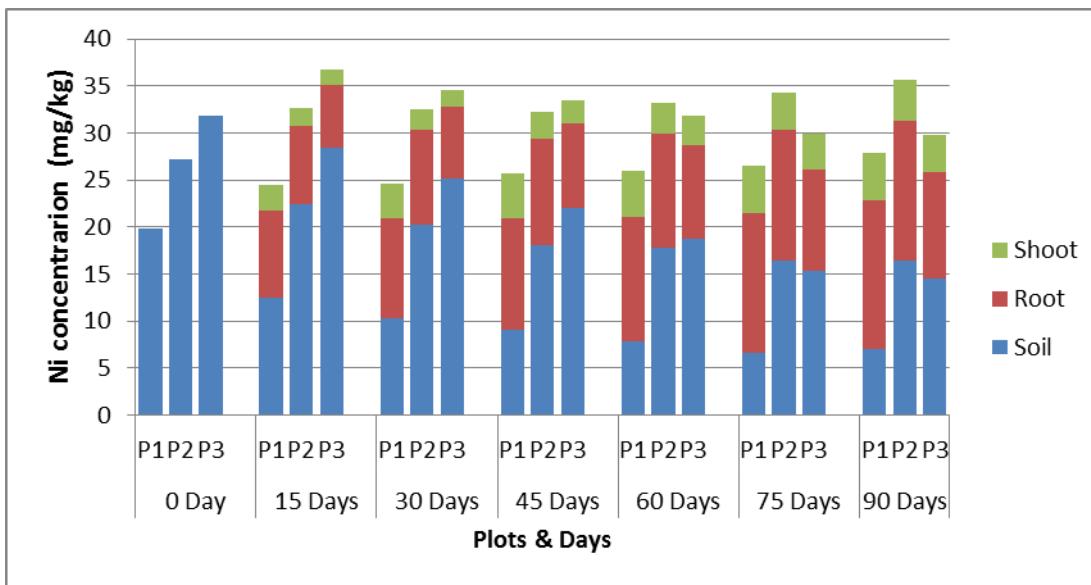


Fig. 2- Mean Concentration of Nickel mg/kg or ppm in soil samples and plant tissues of *Vetiveria zizanioides* at regular intervals.

Plants of *V. zizanioides* were harvested at regular intervals (15 days) from experimental plots. Roots and shoots of vetiver were taken at regular interval (15 days) and analyzed for Cd and Ni uptake every year on 15 DAS (Initial), 45 DAS, 90 DAS (maturity). It was observed that shoot started uptake on 45 DAS and uptake was slow and much less than roots in all the 3 plots studied because shoot showed stunted growth, chlorosis of shoot occurred, no. of fronds decreased and Stability in uptake was observed on 75 DAS and 90 DAS in all the 3 plots studied because the plant attain maturity and started dying.

- At the end of cropping it was observed that there is depletion in cadmium from soil in each plot and roots had accumulated more cadmium in comparison to shoots because of early chlorosis, stunted growth, decrease in no of fronds of shoots were observed due to high concentration of cadmium in soil in each plot. Stability in uptake was observed on 75 DAS and 90 DAS in all the 3 plots studied because the plants attain maturity and started dyeing. (**Table 1 & Fig. 1**)
- At the end of cropping it was observed that there is depletion in Nickel from soil in each plot and roots had accumulated more Nickel in comparison to shoots because of early chlorosis, stunted growth, decrease in no of fronds of shoots were observed due to high concentration of cadmium in soil in each plot. Stability in uptake was observed on 75 DAS and 90 DAS in all the 3 plots studied because the plants attain maturity and started dyeing. (**Table 2 & Fig. 2**)
- It was observed that roots and shoots taken from plot II showed maximum Cadmium uptake in comparison to Nickel uptake in all years in comparison to roots and shoots taken from plot I and plot III.
- From the above result it is concluded that roots have maximum uptake potential than shoots. (**Table 1,2 & Fig. 1, 2**)

IV. DISCUSSION

The concentration of Cd in the soil was higher in soil samples from the industrial site compared with the non-industrial site. There is no doubt that heavy metals are present in soil naturally and non-degradable, and can be accumulated in the plant tissues [3,17] as shown by the concentrations of heavy metals obtained in soils from non-industrial site, but their concentrations can be increased by industrial activities[20]. Vetiver is native to India, its environmental application for soil and water conservation is traditionally practiced for longer time. Systematic efforts to develop the vetiver grass technology for mitigation of soil erosion and water conservation were first initiated in India; however it was not practiced seriously. Several countries on the other hand, taking cues from the Indian initiative extensively implemented environmental applications of this grass [18](*Lavania, 2004*). Currently two main methods for treating contaminated water namely, ‘engineering’ and ‘biological’ are being used. The biological method consists of land irrigation, wetland and hydroponics system [9](*Chomchalow, 2003*).

As vetiver has been found to be highly tolerant to extreme soil condition including heavy metal contamination, the present study was conducted to check the reduction level of Cd contaminants of soil on the plant’s ability to tolerate toxic levels of Cd and on the ability to accumulate these heavy metals in roots and shoots. [29]*Truong and Baker (1998)* have proved the similar results. It might be concluded that heavy metals in soil even at the higher level to plant growth have no negative effect on vetiver root growth but showed negative effect on the shoots and the growth of shoots sustained after some days so as the growth of plant. Our study did not in coordination with the mentioned results. [25](*Roongtanakiat and Chairoj, 2001*).

For successful phytoremediation, the first requisite is high production of plant biomass. Since metal removal is a function of metal concentration in the harvestable biomass, the plant should be able to produce enormous biomass so that it can grow successfully at the contaminated site. Cr uptake is an important parameter in understanding the cellular responses of high HM concentration in plants and is one of the requisites contributing to the success of phytoremediation. The ambient metal concentration in the soil was the major factor influencing the metal-uptake efficiency as the metal uptake was observed to increase with increase in treatment doses (*Ghosh & Rhyne 1999; Begonia et al. 2005*). Considering the definition of hyperaccumulator given by *Foy (1984)*, [6,7,24]*Baker & Brooks (1989)*, *Baker et al. (2000)* and *Reeves & Baker (2000)*, Indian mustard behaves as a potential Cr hyperaccumulator. The present study is not in accordance with the above mentioned results because plant chosen in the present study has a higher biomass of roots as compared to aerial parts. Pods are also used commercially for essential oil extraction (Khus-Khus) which is used in perfumery and beverage industry. Also the roots of the plant are extensively used for making Chiks (a type of curtain sprayed with water occasionally in summer months and keep the area cool and gives sweet fragrance at the same time. Due to higher biomass of its roots the plant is also used for keeping a check on soil erosion. So here due to higher biomass of the roots as compares to shoots the more cadmium accumulation is seen in roots as compared to shoots) On the other hand, Cd accumulation was enhanced in various plant parts with time. In general, when metal concentration was increased, the amount of metal accumulation in plants increased. Similar results were obtained for *Lemna minor* (*Jain et al. 1990*) and water hyacinth [33](*Zhu et al. 1999*). In conclusion, our test plants displayed enhanced tolerance towards a range of Cd concentration besides accumulating high Cd in its various parts, thus serving as a suitable contender for phytoremediation. It is suggested that the remediation potential of Vetiver can be tapped to the utmost by periodically harvesting the plant from the site being remediated, avoiding chances of the plant attaining lethal concentration of metal that could lead to oversaturation and hence the damage. The harvested biomass could then be incinerated and disposed off or the accumulated metal could also be recovered for commercial uses and thus recycled and reused.

The results of the present investigation showed that the cd uptake by roots was more in comparision to the shoot and the concentration of cadmium in soil decreased slowly initially but pick up more later and steadily in three consecutive year of cropping and slightly reached below the permissible level and

continuously present study showed is not in accordance with the following studies.

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AUTHORS

First author- Isha Gunwal, M.sc, M.phil, PhD,
isha_gunwal83@yahoo.co.in

Second author- Lata Singh, M.sc, M.phil, PhD,
drsamindersinghrana@gmail.com

Third author- Payal Mago, Associate Professor, Sri Aurobindo College, University of Delhi, Payal500@hotmail.com

Correspondence author- Isha Gunwal,
isha_gunwal83@yahoo.co.in, contact no- 9560922869

Elder Abuse in Indian families: Problems and Preventive Actions

Yatish Kumar* and Anita Bhargava**

* Yatish Kumar, Doctoral Research Fellow, Centre for the Study of Regional Development, School of Social Sciences, Jawaharlal Nehru University, New Delhi

** Anita Bhargava, Doctoral Research Fellow, Centre for the Study of Regional Development, School of Social Sciences, Jawaharlal Nehru University, New Delhi

Abstract- Elderly are an integral part of a population of any country who owe respect and attention equally like any other section. However, due to changing family structure and modernisation, elderly population is facing inevitable challenges to live their life respectfully. Loneliness, negligence and less importance, illness due to ageing and against lack of treatment are the most of the treacherous conditions which elderly are facing. Sadly, the abusers are their family members, ironically, on whom they depend upon the maximum. The abusive behavior towards elderly is a serious issue which is to be solved; otherwise it will harm the physical, mental and emotional condition of elderly in the Indian families inevitably and irreversibly.

Index Terms- Abuse, neglect, social security, interventions, strategies.

I. INTRODUCTION

One of the striking features of demographic transition in the world has been the substantial increase in the absolute and relative numbers of elderly people. Declining mortality has meant improving life expectancies and an increasing proportion of older people in the population (WHO, 1984). The protruding vertex of population pyramid of India is evincing the significant increase in elderly population over a few decades. As a matter of concern, the country is grappling by the elderly population, a non working and ill health population, is second highest in the world. The competence to delay death through medical advancement and increasing education has resulted into improved life expectancy resulting into protruding vertex.

No doubt, elderly is far more dependent population on working class as compared to cohort of children. Similarly, the needs of elderly are entirely different from population of children. Generally, socio-economic changes might have brought a significant impact like urbanization, modernisation, increase in women's participation in economic activities, mobility of the younger generation and the growth of individualism but, it is also evident that they are leading to the breakdown of the joint family structure, which used to be the primary support for the elderly in India (Knodel et al. 1992; Pandey 2009).

The closely knit family structure of Indian has also been transformed by these socio-economic transformations. As a result, the country is citing numerous problems for the aged population. Before, few decades, elderly were the most respectful members in joint family. However, such values are disappearing

in the families as other family members particularly working family members have very less time to give and provide prompt care to them. The inception of nuclear family, either as a result of migration or property separation/division, elderly of the family has been the sufferer of the change, eventually. Such a transformed family structure is grappling its roots and sliding the elderly towards loneliness and degraded life. If they have more than one child, with whom they will live their remaining life itself becomes a matter of concern at older ages. The elderly are "burden" in families where they lack control or autonomy over family members. In such families, their presence is limited upto taking care of small children especially soon after birth to three years till they start going to school. No proper attention or care and disregard of their importance in the family are the prime forms of negligence towards elderly, ironically which is required utmost and by most of the elderly. It inculcates due to the limited resources and growth of individualism in the modern industrial era. All these aspects have led to greater concern towards the isolation of the elderly from their family and society at large.

Broadly, the problems of elderly are understood as, problems related to impairment of any functional organ and second the mental disturbance caused due to several factors. There are numerous problems classified into these two broad categories, however, the most prominent problem faced by the elderly is the abusive behavior by the family members and people of the society. The growing generation gap, difference in thinking and attitude towards expectations, and living conditions or lifestyle of children have affected the presence and lives of elderly in their own family. In addition, limiting family size, expanded financial burden, aspirations of children for better or elite way of living, somewhere, are sidelining the attention which is required by helpless elderly. Despite improvements, elderly population in India has to overcome collaborated challenges at each level-self, family and society. Generally, elderly abuse is an intentional negligent act by a family member or caretaker or any other person that causes harm or a serious risk of harm to an elderly person (Deswal, 2011). The loss of respect and importance is growing significantly among elderly leading to loneliness and psychologically depressed. Needless to say, the more they grow old the more they need attention and love from the family. As a matter of fact, ageing is an unavoidable phase and is a coalition of various problems. It is compounded when the elderly lacks in physical and mental support by their own family members. Since ageing demands for extra care and attention due to loss of sensory system and weakening of

physical strength, elderly, by no means, have to rely on the help and support of family members.

The Global Response to Elderly Abuse and Neglect; WHO, 2008 report apprehends that the elderly abuse has serious consequences on the health and well-being of older people and can be of various forms: physical, verbal, psychological/emotional, sexual and financial. It can also simply reflect intentional or unintentional neglect. Abuse and neglect are culturally defined phenomena that reflect distinctions between values, standards and unacceptable interpersonal behavior.

II. RESEARCH ELABORATIONS

India accounts for second largest population in the world. The combined impact of high fertility and declining mortality is reflected in the bulk size population. The post independence cohorts owe the largest share in aged population. Largely, they had low literacy levels and non-regularised employment. The decennial census data evidences the gradual influx of aged population in the population pyramid.

Table 1: Percentage Distribution of India's population by age groups, 1961-2011

Census Years	Age-Groups					
	sex	0-14	15-44	45-59	15-59	60+
1961	Male	40.9	43.0	10.6	53.6	5.5

Table 2: Distribution of aged Population in based on Rural and urban residence, SRS Statistical Report, 2011

States	Rural		Urban	
	60-79	80 and above	60-79	80 and above
Andhra Pradesh	8.9	0.7	6.7	0.4
Assam	5.6	0.5	6.1	0.5
Bihar	6.3	0.5	6.7	0.5
Chhattisgarh	6.9	0.4	6.0	0.4
Delhi	4.9	0.5	5.5	0.5
Gujarat	8.0	0.7	7.1	0.7
Haryana	6.5	0.8	6.1	0.6
Himachal Pradesh	9.1	1.4	7.8	0.9
Jammu & Kashmir	7.2	0.9	8.9	0.8
Jharkhand	6.1	0.5	6.4	0.5
Karnataka	8.1	0.7	6.9	0.6
Kerala	11.1	1.5	11.2	1.2
Madhya Pradesh	6.6	0.5	6.4	0.5
Maharashtra	9.4	1.0	7.2	0.6
Odisha	8.7	0.8	7.4	0.7
Punjab	8.7	1.3	8.0	0.8
Rajasthan	6.6	0.7	6.7	0.7
Tamil Nadu	10.0	1.0	9.2	0.9
Uttar Pradesh	6.4	0.6	5.9	0.5
West Bengal	7.0	0.6	9.3	1.0
All-India	7.5	0.7	7.3	0.7

Source of data: Sample Registration System (SRS) Statistical Report 2011, Census of India website (http://www.censusindia.gov.in/vital_statistics/SRS_Report/12SRS%20Statistical%20Report%20Table%20-%202011.pdf), accessed on 7 May 2013).

Inception of Elderly Abuse

The problem of elderly abuse (which was initially called "granny battering") emerged around the world in very short span. For the very first time, the abuse of older people was described in British scientific journals in 1975 (**Baker 1975, Burston 1977**). In Australia, abuse and neglect of older people by family members began to be recognized by the late 1980s (**Kurle, 2003**). Many studies in Australia have been shown that the most frequent form of reported or suspected abuse of elderly people is financial abuse and the adult daughter or son are most likely to be the abusers (**Brill 1999; Cripps 2001; Faye & Sellick 2003; James & Graycar 2000**). It can be inferred from the available information that familial ties dissolved in very early times in western or developed countries, resulting into separation or emergence of nuclear family. **Raju (1996)** indicated that the older individuals suffering from depression, poor health or physical impairments were more at risk of being abused than those of similar age and normal health status. This implies that an elderly with physical or mental impairments may be perceived as a burden by the care-givers. Such stressful and bitterness spills out in form of abuse and negligence of elderly (**Raju and Prakash, 2010**).

Elderly abuse in India has received noteworthy voice in the last two decades abundantly. The study done by **Jamuna (1995)** talked about the conditions of elder abuse in Indian cultural context. A host of factors such as frailty and degree of dependency, lack of space in the house, financial status, temperament and perception of care givers collate in producing abusive behavior from family members. As mentioned earlier elderly are the non working population and hence do not produce and participate in generating or improving monetary conditions, the financial abuse of elderly are seen in most of the present families. In addition, the elderly are dependent on their family members for financial support either to seek medical treatment or day to today expenses. Such demands results in aggressive behavior of family members.

In very recent times, a new trend has been emerged to send elderly at old age homes with a perception that they will have company of people of similar age. In addition, it reduces the burden as well as responsibilities of children. Based on WHO/ International Network for the Prevention of Elderly Abuse older persons (2008), elderly abuse has been classified into three broad categories:

1. Neglect, including isolation, abandonment and social exclusion.
2. Violation of human, legal and medical rights.
3. Deprivation of choices, decision, status, finances and respect.

Concept of Elderly Abuse

The latest available sources addressing elderly abuse have used the definition adopted by the World Health Organisation (WHO) in 2002: *a single or repeated act or lack of appropriate action occurring within any relationship where there is an expectation of trust, which causes harm or distress to an older person (WHO 2002: 3)*. The term 'abuse' comprises various dimensions such as, physical abuse, physical neglect, sexual abuse, verbal assault, material abuse and neglect of the environment and violation of rights. Elderly abuse has been described as intentional actions that cause harm or a risk of harm

or as a caregiver's failure to satisfy the basic needs and safe living conditions of elderly. It includes physical abuse, psychological abuse, negligence, material exploitation, and sexual abuse (**Cohen et al, 2006**). Providing care for the aged has never been a problem in India where a value- based joint family system was dominant. However, joint family including elderly as the most important members was the primate scenario in India families. With a growing trend towards nuclear family set-up, the vulnerability of elderly is considerably increasing (**Sebastian and Sekher, 2011**).

With this backdrop, it is attempted collate the forms of abuses experienced by the elderly in the present study. Except census enumeration, governmental of India lacks in collection information on elderly related factors like prevalence and incidence of elderly abuse and neglect (**Shankardass, 2004**). The present paper provides a concise outline of the worldwide and national literature addressing the experience of abusive behaviour of family members towards their old members. In addition, focus on definitions and understanding abuse, its types, causes, prevalence and effects on mental and physical health of elderly people. Lastly, preventive measures and legal safeguards to elderly people in India have been incorporated to strengthen the theme and focus of the study. The objectives have perpetuated from immense literature discussing the problems of elderly worldwide.

Objectives

The present paper is an attempt to bring out the abusive behaviour towards elderly by their family members in India.

1. To identify the types of abuse prevalent towards the elderly.
2. To study the impact of abusive behavior of family members
3. To examine the adequacy of the social security measures to safeguard the position of the elderly population among family and society.

Study Setting

The present paper emphasizes elderly abuse that has grown as a result of changing family structure in urban areas of the country. Before addressing the issue, it is essential to understand the impact of urbanization on family structure and its values. As documented by researchers, migrants across different parts of the country are the prime source of population in urban areas. As a result of industrialization and modernisation, India has been evincing bulk migration from rural to the major cities. Such a trend led elderly to live in rural areas. Further development added another stream of migration from urban to foreign countries. In recent times, the migration to foreign countries especially developed countries has become wider, as a result of which elderly are left behind to live alone in urban areas. Though they are financially supported by their children to some extent, they have to rely on either their spouse, nearby neighbour and relatives or their care takers for their basic needs. Therefore, it can be said that whether rural or urban, the population and problems of elderly are increasing. However, the elderly in urban areas are more at risk as compared to rural elderly. Elderly in urban areas are the victim of isolation, nuclear family, ill health, social insecurity which all together is termed as "**abuse**". Hence,

to assess the vulnerability in terms of abuse of this population in urban areas is the background theme of the paper.

Data base

In India, information on elderly abuse is not collected in any government based survey and therefore newspapers columns were used as a source of data providing information in the absence of data is the prime limitation of the study.

Table 1: Frequency of Newspapers

News Papers	Frequency	Per cent
Times of India	7	43.75
The Hindu	5	31.25
Nav Bharat Times	2	12.5
The Statesman	1	6.25
Deccan Herald	1	6.25
Total	16	100

Therefore, to meet the objectives of the paper, the data source is the columns of different newspaper which have captured the issue of elderly abuse. These newspapers have published in different years and talk about reports of various surveys carried out by non-governmental organizations which are working on the issues related to ageing in the country. Keeping the necessity in mind, a total of 16 columns were collected and analysed.

Research Methodology

Since the data is collected from newspapers, content analysis has been carried out to investigate the objectives of the paper. Content analysis is a technique which is useful in analysing and understanding the collection of text taken from various means. According to **Abrahamson (1983, P, 286)**, "Content analysis can be employed to examine any type of communication". Content analysis provides freedom to analyse quantitative as well as qualitative data. The textual elements are transformed into counts and thus converting into quantitative data. However, the statements which highlight the issue can be taken as it is in writing. According to **Eric T. Meyer** (<http://microsites.ox.ac.uk/tidsr/kb/54/what-content-analysis>), "These news articles may be about the collection, or they may be

about the type of resource in general. In the context of understanding impact, these news articles can help to understand several things, including:

1. How well efforts to publicize the resource are reflected in the news.
2. From a strictly quantitative perspective, even counts of articles can give you some indication of impact based on frequency of mentions in the media".

III. RESULTS

The second largest populous country in the world is entering into the fourth phase of demographic transition. Gradual decline in total fertility rate and medical improvements are propelling the development large human resource essential for development. **Table 1** indicates the addition of elderly population in every ten years. The 1961 census recorded 24 million elderly which has increased exponentially to 43 million in 1981, 57 million in 1991 and 77 million in 2001. Moreover, the proportion of elderly to total population has increased from 5.63 per cent in 1961 to 6.58 per cent in 1991 and 87.5 per cent in 2001.

The acclaimed newspapers have published articles or news related to elderly abuse time to time. Mostly, they have covered the highlights of survey reports carried out by various organizations in the country like The HelpAge India, Agewell Foundation and WHO.

Table 2: Issue of elderly abuse covered in news papers

News Papers	Frequency	Per cent
Times of India	5	31.25
The Hindu	2	12.5
Nav Bharat Times	2	12.5
The Statesman	1	6.25
Not mentioned	6	37.5
Total	16	100

Out of all the contents, abuse against elderly aimed as the prime focus in the texts of the newspapers. Ten out of 16 newspapers acclaimed that elderly have been experiencing one or another type of abuse across the cities of India.

Under the broad theme of abuse against elder, following sub issues were highlighted in the news papers.

Table 3: Types of Discrimination recorded in newspaper columns

S. No	Type of Abuse/Discrimination	No of Cases	S. No	Type of Abuse/Discrimination	No of Cases
1.	Discrimination of Age	13	9.	Health Care Concern	28
2.	Extreme Abuse	1	10.	Health Care Problem	5
3.	Fall-Health Concern	1	11.	Human Rights	2
4.	Familial Abuse	11	12.	Inhuman Conditions	1
5.	Familial Financial Support	2	13.	Family Type	5
6.	Family Physical Abuse	3	14.	Negativity Regarding Judgment	6
7.	Financial Crisis	4	15.	No Respect	4
8.	Food Problem	3	16.	Verbal Abuse	4

Source: Newspapers

The health care concern is mostly covered in all the newspapers. It covers the concern such as not getting health care facilities, elderly discriminated in not taken to ceremonies due ill health, chronic diseases like Arthritis, Depression, High Blood pressure, Diabetes, Dementia, Impairment of various organs like ears and eyes and knees and so on. They make ageing more vulnerable. According to **The Hindu (08 April, 2012)**, health problems in old age varies from increased susceptibility to infections, inability to cope with physical and psychological stress, degenerative arthritis, atherosclerotic and vascular diseases of heart and brain, cancer of various organs and cognitive impairment due to declining brain size or various types of dementias.

Nowadays, most of the elderly are now living in nuclear family where they do not receive any respect, food and face verbal abuse very often. The familial abuse (11) is very prominent in Madurai (**Times of India**, Publication Date**) followed by Delhi-NCR, Bangalore and other major cities. Nav Bharat Times reported that the elderly have faced familial abuse more than 10 years but do not come up with complaints because of family prestige and fear of losing whatever they have. Verbal and physical abuse leads to elder population to live under depression and a intense feeling of loneliness. Treat their body with a jolt when need help for instance climbing stairs, getting from bed or to go to lavatory are the various forms of physical abuse which elderly suffer on regular basis. "Indian elders are in deprivations of adequate food, clothing and shelter (*The Hindu, 22 September 2010*). Bad words while giving food, financial support or washing of their clothes makes them to feel weak and helpless.

Causes of Abuse

The speedily ageing population in India is witnessing new challenges. The causes of abuse of older people are complex and multifaceted, and may encompass physical, psychological, social, medical, legal and environmental factors and multiple systems (**Bagshaw, Wendt & Zannettino 2009**). Elderly abuse is a complex phenomenon that results from several different causes, and that often has roots in multiple factors (**Sebastian and Sekher, 2011**).

Types of Elderly Abuse:

- **Physical Abuse:** defined as the use of physical force that may result in bodily injury, physical pain, or impairment.
- **Verbal or Psychological Abuse-** defined as infliction of anguish, pain, or distress through verbal or non verbal acts.
- **Financial abuse:** the illegal or improper use of an elderly's funds, property, or assets.
- **Neglect:** can be explained direct neglect, which refers to older people being left alone, isolated, or forgotten and another way of explained indirect which is the withholding of items that are necessary for daily living, such as food and medicine.

Gender and Abuse

Older women are predominantly at risk of financial abuse, physical abuse, and sexual abuse. Though scenario has changed in recent times, it is evident in history of India that by and large women were not encouraged to seek education and become independent. This led to women remain illiterate and could not generate any monetary livelihood for herself. Work participation that would generate income was also not acceptable in Indian society rather they were restricted to perform household chores only. Such implications made women to depend upon their husband for all kinds of needs especially financial support. After death of spouse, she expects the same monetary support from her son. In long run, such financial dependence turns futile and become abusive. The content analysis of the reports available from newspaper clearly indicates the abusive behaviour in relation to financial support.

Second most concern is related to safety of women. Women become victim of rape and physical assault even at older ages. One of the case evident in the data showed an 81 year old woman was raped in the national capital. (**Nav Bharat Times, 9 July, 2014**). Till date, Indian society does not accept remarriage of women completely as compared to widowers. In the absence of source of income such as pensions, women in developing countries experience economic dependency than men. In India, 30 per cent of elderly men have no valuable assets while 60 per cent of women do not possess any assets (**Stephen, 2009**). Similarly in urban China, poverty rates among older women are four times higher than among older men.

Another featuring scenario of elderly abuse is seen in terms of taking advantage of their physical weakness by their caretaker like servants or maids. In the capital of India and many metropolitan cities like Mumbai and Bangalore, many cases have been recorded where they have killed or injured them severely for several reasons. The term "**identity theft**" was coined in 1964, is a stealing of someone's identity which in turn show adverse consequences on the real person. Marlo Solitto, contributor editor of a site known as aging care (www.agingcare.com), have talked about identity theft "occurs when a thief steals the elderly person's social security number, bank account numbers and other financial or personal documents. With this information, he can open a new credit card account for his own use, apply for loans in the victim's name, drain the victim's bank accounts, and illegally obtain professional licenses, driver's licenses and birth certificates." Elderly people are considered as soft targets because they are vulnerable. They are, often, isolated, live alone at home, tend to trust their servants and maid and may be a case of early dementia or memory loss. Such a vulnerable and helpless population cannot resist against theft. Identity thieves steal senior's mail, including bank and credit card statements, checks, tax information and more. And it's not only the mail that gets stolen: Thieves will steal a senior's garbage, rummaging through it for personal and financial information carelessly tossed into the trash. Identity thieves not only take the mail, they also send it to seniors. The mail appears to come from trusted sources, such as the victim's bank, charitable organizations or well-known companies. The scam mail usually contains "official" letterhead, authentic looking logos and registered trademarks (**Marlo Solitto, http://www.agingcare.com/Articles/elderly-identity-theft-**

victims-frauds-scams-cons-139206.htm). Some of the following news published in different cities of the country illuminates the concern regarding safety of elderly population.

- “In a daring daylight murder, a 62-year-old woman was killed by two youths for a gold chain in a busy commercial locality in Salem, Tamil Nadu (Salem, Press Trust of India, 18 April, 2014.”
- “The Cyberabad police arrested a woman and her driver in Hyderabad today, in connection with the murder of a 90-year-old man at Kapra area in the city and decamping with gold and other valuables from his house (Hyderabad, Press Trust of India, 21 March, 2014).”
- “A three-member gang broke into a house near Salem and inflicted head injuries on a 70-year-old woman resulting in her death before decamping with a gold chain, police said today. Police said the woman, who was staying with her 72-year-old brother-in-law, gave the gangsters keys to the bureau and other rooms when they broke in last night but when they did not find anything, they allegedly assaulted her and made off with the chain weighing two sovereigns. (Salem, Press Trust of India, 23 September, 2013).”

The Consequences of Abusive Environment on Elderly Existence

Due to abusive behaviour by the family members, elderly feet upset and sad, health degrades. At times, they lose interest in life which turns detrimental; they attempt suicide or pray to almighty for an early death. In attempt of suicide, they injure themselves physically or mentally which brings serious health complications. In such families feel of burden grows rapidly at both ends. They don't receive expected support from family and children even in the time of extreme need. Today's young will be tomorrow's old, getting old has natural phenomena, so everybody will face the situation. The above mentioned interlinkages led to inevitable intervention of government and non-government organizations to address the issues and propose imperative measures to overcome the problems of elderly population.

Legal Safeguards to Elderly People in India

Government of India is providing various legal safeguards for the elderly people in the country. The year 1999, brought new dimension for elderly when for the first time, National Policy on Older Persons was launched.

The Hindu Adoptions and Maintenance Act (HAMA, 1956)

The Hindu adoption and maintenance act, 1956 in this section 20(3) provides for maintenance of aged or infirm parents. This is re-inforced by the maintenance and social welfare for parents and senior citizens act of 2007 which is more inclusive.

National Social Assistance Programme (NSAP, 1995)

In the year 1995, the Government adopted the National Social Assistance Programme (NSAP), which compounded three programmes running for older people of the country.

- The National Old Age Pension Scheme (NOAPS)
- The National Family Benefit Scheme (NFBS)
- The National Maternity Benefit Scheme (NMBS)

The NOAPS is a centrally-sponsored programme. Under the scheme, criteria for the beneficiary are:

- The age of the beneficiary (male or female) should be 65 years or more.
- An amount of Rs. 75 per month would be given as old age.

The NOAPS is implemented in the States and Union Territories through Panchayats and Municipalities. The National Old Age Pension Scheme has been renamed as Indira Gandhi National Old Age Pension Scheme (IGNOPS) in 2007. **Pension under the Indira Gandhi National Old Age Pension Scheme (IGNOAPS)** has been raised from Rs. 75 to Rs. 200/- per month per beneficiary and the state governments may contribute over and above to this amount. It covered all persons over 65 years and living below the poverty line

Under NFBS an amount of Rs. 10000/- are provided as Central Assistance to the households below the poverty line.

National Old- Age Pension Schemes (NOAPS, 1995)

On August 1995 the Government of India announced the National Old-Age Pension Scheme for the poor. The scheme covers those aged 65+ who are landless, destitute and or have no regular means of subsistence. The assistance was initially Rs.75 month and later on revised to Rs.150. A few of the states have just revised the amount of pension by Rs.275 in Gujarat, Rs.300 in Delhi, Rs.400 in West Bengal and Rs.500 in Goa. In Rajasthan, the amount of pension is Rs.100 for females aged 55+ and males aged 58+, 200 for those age 65+ and Rs.300 for destitute couples. The said scheme is being implemented in states and Union Territories through panchayats and municipalities (**Help-Age India, 2002**).

Annapurna Scheme (1999)

The Government of India introduced a food security scheme for elderly called Annapurna in 1999. This scheme provides food security to the older persons, who though eligible, have remained uncovered under NOAPS. Under the Annapurna scheme 10 kilograms of food grains are provided to the beneficiary every month at no cost. It was implemented by the Ministry of Rural Development with the assistance of the Ministry of Food and Civil Supplies. The Government of India had allotted a sum of Rs 100 crore for the first year of its implementation.

National Council for Older Persons (NCOP, 1999)

National Council for Older Persons was established by the Government of India in May 1999 under section 95, is an extension of the NPOP. The major objectives of the NCOP are (**Nayar, 2003**)

- Provide feedback to government on implementation of NPOP as well as on specific program initiatives for the senior citizens.
- Advocate the best interests of the older persons.
- Lobby for the concession of older persons.

National Policy on Older Persons (NPOP, 1999)

Because of urge of necessity, interventions in old age welfare, Ministry of Social and Empowerment declared ‘National Policy on Older Persons’ on January 1999. The policy provides

broad guideline to the state government for taking action for the welfare of older persons in a protective manner. A number of areas to intervene such as financial security, health care and nutrition, shelter, education, welfare, protection of life and property etc for the well being of elderly person in the country were identified. In addition, the role of the non-government organisations which provide user-friendly and affordable services to complement the endeavours, were also encouraged in the policy. Broadly the objectives framed in the policy are:

1. Protection against abuse and exploitation of elderly.
2. Services to improve quality of care for elderly.
3. To provide care and protection to the vulnerable elderly people.
4. To encourage families to take care of their older family members.
5. To provide adequate health care facility to the elderly.

The Policy also appreciates the special needs of older persons and therefore lays emphasis on empowerment of community as well as individuals to meet the challenges of the process of ageing adequately.

Maintenance and Welfare of Parents and Senior Citizens Act (MWPSC, 2007)

The Maintenance and Welfare of Parents and Senior Citizens Act, 2007 was enacted in December 2007 to ensure need based maintenance for parents and senior citizens of country. Making the Old Age Homes for aged and provides adequate medical facilities and economic security for older. The act notified only 22 states of the country. The principle promotes the basic right to older based on self- fulfillment and dignity.

Old age homes and day care centres:

The importance of the institutional care is realised especially for the poor and destitute aged. Most of the institutional care in the form of **Old Age Homes (OAH)** is provided by voluntary organisation. Voluntary organisations are also running Day Care Centres (DCC) to fulfill the psychological need for the aged, These Day Care Centres (DCC) are very useful but limited in numbers (**Joshi, 2006**).

Pandey and Jha (2012) have reported that **Integrated Program for Older Persons (IPOP)** was launched by the Government of India in **2008** with the objectives of improving the quality of life of older persons by providing basic amenities such as shelter, food, medical care and entertainment opportunities and by encouraging productive and active ageing through providing support for capacity building of Government/Non- Governmental Organizations/Panchayati Raj Institutions/local bodies and the Community at large. However, access to this scheme is limited (**Rajan, 2010**).

National Council for Senior Citizens:

National Council for Senior Citizens, headed by the Minister for Social Justice and Empowerment will be constituted by the Ministry. With tenure of five years, the Council will monitor the implementation of the policy and advise the government on concerns of elderly population. These policies stipulate the extension of government support for financial

security, health care, shelter, welfare and other needs of senior citizens.

The **Ministry of Health and Family Welfare** provides the following facilities for senior citizens:

1. Separate queues for older persons in government hospitals.
2. Geriatric clinics in several government hospitals.

Some other ministries are also provided basic support for implementation of various programme and policies working for strengthen of elderly. The Ministries of Home Affairs, Rural Development, Urban Development, Youth Affairs & Sports, Railways, Science & Technology, Statistics & Programme Implementation, Labour, Panchayati Raj and Departments of Elementary Education & Literacy, Secondary & Higher Education, Road Transport & Highways, Public Enterprises, Revenue, Women & Child Development, Information Technology and Personnel & Training will setup necessary mechanism for implementation of the policy.

Support from Non Governmental Organisations (NGOs)

Since, government policies and programmes suffer from loopholes and untamed period of implementation; many non-governmental organisations have been dispensing their commendable services to resolve/reduce the burden of ageing population in the country. These nongovernmental organisations are playing their role in addressing the vibrant issues as well as giving financial and emotional support to elderly.

Help Age India is one of such charity serving the disadvantaged elderly for the past three decades. The organisation set up in 1978 is expanding its wings and presently deals in various issues of elderly such as providing health care, old age homes, camps, financial grant, cataract surgeries, active ageing centres, cancer care, livelihood support and so on. They also deal with the population of elderly who are the sufferer of abuse and loneliness. The most recent survey report titled "Beaten in Mind, Body and Spirit" itself reflects the vulnerable conditions of elderly in the country. According to the report, 50 percent of the elderly are facing abuse and women seemed to have more vulnerable (52 per cent against 48 percent of men). Bengaluru followed by Nagpur and Delhi shows highest abusers against elderly. Verbal Abuse (41%), Disrespect (33%) and Neglect (29%) are three most serious forms of abuse which are making elderly a burdensome population. The statements like "*I am given two chappatis in a whole day to eat*", "*my own nephew beats me so much that I can't get up from bed for 7 days*" and "*financial dependency on daughter in law and son made us servant*" provides shocking and brutal behaviour of their own trusted source of family members.

Similarly, **Agewell foundation** has been working for the welfare of aged population since 1999. They have produced more than 100 surveys and reported which reflect the problems of ageing in the country. Their vision is to deal with the detrimental conditions of elderly and provide appropriate support which can lead them to live a better life. The services arranged for the elderly range from legal assistance, financial advice, ambulance service, help with pension problems, property tax notice, wealth income tax assessment orders, and so on. However, the most recent report on "Human Rights of Older People in India: A Reality Check" revealed that every third elder in the interview

reported that they have experiences one or another form of abuse. Misbehave/mistreatment restriction to social life, mental torture, denial of basic needs, and physical harassment/assault are some of the major abuses which are experienced by elderly daily. 26 per cent of the elderly in the survey reported that they are not getting proper food. In 1981, age care organizing free geriatric health check up camps in Delhi for the urban poor. It provides service for low income groups around the metropolis. By mid 1999, these comps covered 56000 aged people above 50 years of age. Another non-governmental organizing is Indian association of retired persons, having its headquarters in Bombay (Mumbai). It undertakes a multiplicity of programme for the welfare of retired persons. It provides socio-medical and financial help to its members (**Shankardass, 2000**). The work done by both the non-governmental organisations clearly knits the elder abuse in the country and specifically in urban areas.

IV. CONCLUSIONS

This study investigated the degree and nature of abuse experienced by the elderly in family. The abundant research synthesizes the issue of elderly abuse is on alarm rise in the country. Since, India soon will be in the category of “graying nations”, these issues are need to be addressed. The study has the limitation of data and hence had to rely on the available reports and texts of newspapers. Secondly, the research paper has focused on problems of elderly in urban areas but there might be problems (different in forms) in rural parts as well. Nevertheless, the study is a working attempt to cite the poor and vulnerable conditions of the elderly in urban areas. The abusive behaviour towards elderly by their own family members found very common which insights the depletion of human values among modern and new generations. Timely intervention of policies and imperatives measures are utmost important to overcome the concern else there would a great loss of human resource.

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AUTHORS

First Author – Yatish Kumar, Yatish Kumar, Doctoral Research Fellow, Centre for the Study of Regional Development, School of Social Sciences, Jawaharlal Nehru University, New Delhi (yatish.86@gmail.com)

Second Author – Anita Bhargava, Anita Bhargava, Doctoral Research Fellow, Centre for the Study of Regional Development, School of Social Sciences, Jawaharlal Nehru University, New Delhi (annubbps@gmail.com)

Effect of retinal laser photocoagulation on contrast sensitivity and visual acuity in patients of diabetic retinopathy

Dr. Suchi V. Shah, Dr. Harsha C. Jani, Dr. Devendra A. Saxena

Department of Ophthalmology, Pramukhswami Medical College, Karamsad, Gujarat – 388 325

Abstract- Objective: To measure the effect of retinal laser on contrast sensitivity (CS), visual acuity and self reported visual disability in patients of diabetic retinopathy (DR).

Methods: A prospective and analytical study in 53 eyes undergoing frequency doubled Nd-YAG retinal laser photocoagulation for DR was conducted over a period of 1 year at a tertiary care center. Best corrected visual acuity (BCVA) and CS were measured before each laser sitting and on subsequent follow-ups. The pre-laser measurements were compared with those of 3 month follow-up. On the final visit a self reported visual disability questionnaire was administered.

Results: The mean improvement in BCVA and CS was 0.07 logMAR and 0.11 logCS units respectively. Improvement in CS is maximum following focal laser. A statistically significant difference is found between the pre and post laser BCVA ($P = 0.014$) and CS ($P = 0.001$). A good statistical correlation is established between CS and self reported visual disability (correlation coefficient = 0.75) while the latter has a weaker correlation with BCVA.

Conclusions: Laser photocoagulation has a definitive role in stabilizing visual function in patients with DR. CS is better correlated with self reported visual disability and thus measures functional visual improvement better than the conventional high-contrast visual acuity.

Index Terms- Contrast sensitivity, diabetic retinopathy, diabetic macular edema, laser photocoagulation,

I. INTRODUCTION

The prevalence of adult diabetes worldwide is anticipated to rise from 4.0% in 1995 to 5.4% by 2025.¹ Given this rising prevalence, it is expected that diabetic retinopathy and diabetic macular edema (DME) will continue to be common and will be important causes of visual impairment. As per the World Health Organisation (WHO) estimates, India has 31.7 million diabetic subjects.² The prevalence of diabetic retinopathy (DR) in type-2 DM was found to be 35-39% in the United Kingdom Prospective Diabetes Study (UKPDS).³ DR is the leading cause of legal and functional blindness for people in their working years.⁴

Visual acuity has been used conventionally as the sole measure of visual function in patients coming to the eye clinic for various ocular conditions. The most commonly used Snellen's vision chart for distant vision, uses a high contrast of black letters in

white illuminated background for measurement of visual acuity. This high contrast is not present in our day to day life and surroundings and thus patients giving a good visual acuity on Snellen's chart may not actually be experiencing the same visual sharpness and clarity in their routine life.

A study of health related quality of life (HRQoL) appraises contrast sensitivity (CS) as a newer measure of visual function and its value in determining HRQoL and health utility in comparison to the most standard measure, visual acuity. It shows that CS has significant and independent properties to visual acuity.⁵ Visual function at low contrast is an essential part of visual capability which may change independently of visual function at high contrast and thus both the areas of function should be investigated. Neither visual acuity nor CS losses are specific findings; they rather depict loss of certain kind of visual information somewhere in its long optical and neural processing path.⁶

Patients undergoing argon laser panretinal photocoagulation (PRP) for proliferative diabetic retinopathy (PDR) developed temporary losses in high spatial frequency CS during the closely spaced PRP treatments. Since Snellen's visual acuity remained stable at the pre-laser level, these results indicate the need for more sensitive measures of visual resolution to monitor foveal integrity in patients undergoing PRP.⁷ Hellstedt et al.⁸ suggested that contrast sensitivity is a sensitive indicator of changes in diabetic retinopathy and macular edema, especially at low- to mid- range spatial frequencies. Isolated losses of CS exist in certain diseases, and in many others, loss of contrast sensitivity is more prominent and disturbing to the patient than the loss of visual acuity.⁹

Contrast acuity tests may provide clinically relevant information about the functional visual performance and may be included in the clinical evaluation of patients when we want to evaluate functionally relevant visual impairment in the absence of high-contrast visual acuity loss. Vision under reduced light or contrast conditions should be considered for estimating real-life visual performance.¹⁰ Keeping in mind the importance of CS in day to day activities, this study has been conducted to measure the change in CS and visual acuity after retinal laser in DR patients.

II. MATERIALS AND METHODS

A prospective and analytical study was conducted over a period of one year at the ophthalmology out patient department of a tertiary care center. Thirty three patients with various stages of diabetic retinopathy undergoing frequency doubled NdYag retinal laser photocoagulation and fitting into the eligibility criteria were consecutively recruited out of which three patients were excluded from statistical analysis due to lack of follow up. The exclusion criteria consisted of best corrected visual acuity (BCVA) less than 3/60, patients with ocular co-morbidities like retinal disorders (except diabetic retinopathy), optic nerve diseases, corneal dystrophies and those who have previously received retinal laser.

BCVA and CS were taken before laser photocoagulation (pre-dilatation). On the consecutive follow up BCVA and CS were measured and recorded till 3 months after the first laser sitting.

Visual acuity was assessed by self-illuminated Snellen acuity charts placed at a distance of 6 m (20 ft) from the patient with an illumination of 100 lux. Pinhole vision was taken and BCVA taken after giving appropriate spherical and cylindrical correction. Snellen's BCVA measurements were converted into logMAR units for statistical analysis using the table originally given by Ferris et al.¹¹

The Pelli-Robson Chart (Clement Clarke International Ltd.; Columbus, OH.) was used to measure CS which is a wall chart displaying letters of constant size with 16 letter triplets. Three letters form a triplet of equal contrast and contrast decreases from row to row by a factor of 2 (i.e., 0.15 logCS units per triplet). The test chart was illuminated by room light providing a background luminance of 100 cd/m² (minimum 91 cd/m²; maximum 102 cd/m²). Testing was carried out at 1 m (LogMAR equivalent 1.3) before dilating the pupils with the patient wearing his best spectacle correction.¹² Testing was carried out by a single trained observer.

A detailed ocular examination was carried out prior to laser photocoagulation. Direct, indirect ophthalmoscopy and slit lamp biomicroscopy of posterior segment using a 90D (Volk Optical Inc.) lens were carried out. A thorough slit lamp evaluation of anterior segment and central corneal thickness corrected goldman applanation tonometry (GAT) was performed ruling out other existing ocular co-morbidities. Fundus fluorescein angiography (FFA) was performed to access macular ischemia, macular edema, capillary non-perfusion areas and neovascularisation prior to laser photocoagulation. The procedure was carried out by adhering to the protocols and with emergency resuscitation drugs.

A written and informed consent was taken prior to laser photocoagulation which was performed by a single vitreo-retinal surgeon. Panretinal photocoagulation (PRP) was done for patients with PDR (proliferative diabetic retinopathy) or severe NPDR (non-proliferative diabetic retinopathy). The number of sittings of PRP were decided in terms of the amount of regression of neovascular disease and achievement of fibrous avascular tissue. In focal photocoagulation light, small-sized

burns to leaking microaneurysms in the macula outside the foveal avascular zone were given.

Three months after the last laser session participants were administered a structured questionnaire in the vernacular language regarding their visual disabilities before and after laser treatment. The questionnaire was administered by a single trained interviewer who was blind folded regarding the BCVA and CS of the participants. Questions mentioned in the questionnaire were adapted from NEI VFQ-25 (National Eye Institute, Visual Function Questionnaire (25 Item)) and VDQ (visual disability questionnaire). VFQ-25 was selected because of the scale being able to compare the relative burden of visual disorders on the same scale which is designed to capture the impact of visual problems on physical functioning, emotional wellbeing and social functioning. The rigorous multi-condition evaluation of the scale proved it to be reliable and valid.¹³ VDQ has been designed in India by Marella et al.¹⁴ keeping in mind the Indian population and the difficulties they face in their daily activities. Activities like self grooming which was given maximum importance by the participants with visual disabilities have been incorporated in our questionnaire. The response from participants was recorded as worsening, improvement or no change as compared to the discomfort in these activities prior to laser treatment.

III. RESULTS

Out of a total of 53 eyes (30 participants), 20 were males and 10 were females. The age of patients ranged from 43 to 75 years. Following is the age-wise distribution of DR. (Table 1)

Table 1: Age-wise distribution of diabetic retinopathy

Age group (Years)	Percent % n=53	NPDR without CSME % n=2	NPDR with CSME % n=30	PDR without CSME % n=6	PDR with CSME/MI*/HRC† % n=15
41-50	15.1	12.5	25.0	25.0	37.5
51-60	41.5	0.0	68.2	4.5	27.3
61-70	37.7	0.0	55.0	15.0	30.0
71-80	5.7	33.3	66.7	0.0	0.0
Total	100.0	3.8	56.6	11.3	28.3

* Macular ischemia

† High risk characteristics

Out of 53 eyes, 41.5% received focal laser, 30.2% received focal laser followed by PRP while the remaining eyes received PRP.

Overall, the mean pre-treatment BCVA (Best corrected visual acuity) was 0.42 logMAR units and that on an average after 3 months of laser photocoagulation was 0.35 logMAR units. This shows a net improvement of 0.07 logMAR units. The mean pre-treatment CS was 1.86 logCS units and that after 3 months of

laser photocoagulation was 1.97 logCS units. This shows a net improvement in the CS of 0.11 logCS units.

There is an improvement in mean BCVA with all the three types of laser used in the study. The mean improvement in CS is maximum in patients who had taken focal laser that is 0.14 units. Table shows the mean change in BCVA and CS following laser. (Table 2)

Table 2: Mean change in BCVA and CS according to the type of laser photocoagulation

Type of Laser	Frequency	Mean Change in BCVA	Mean Change in CS
PRP	15	-0.033	0.040
Focal laser	22	-0.079	0.143
Focal laser followed by PRP	16	-0.096	0.131
Total	53	-0.071	0.110

Overall, a statistically significant difference is found between the pre and post laser BCVA ($p=0.014$) and CS ($p=0.001$). This difference in CS is the maximum in patients undergoing focal laser photocoagulation for CSME ($p=0.004$). Results of t-test for pre laser and post laser BCVA and CS is shown. (Table 3)

Table 3: Results of paired t-test for pre laser and post laser BCVA and CS

Pair	Mean difference after laser	Std. Deviation	95% confidence interval		P value
Pre and post laser BCVA	-0.071	0.203	-0.127	-0.015	0.014
Pre and post laser CS	0.110	0.232	0.046	0.174	0.001

Table 4: Change in CS, BCVA and self reported visual acuity according to type of laser given and type of DR

Change in parameters compared to baseline		Status of Diabetic Retinopathy				Type of Laser		
		NPDR without CSME % n=2	NPDR with CSME % n=30	PDR without CSME % n=6	PDR with CSME/ MI*/HRC† % n=15	PRP % n=15	Focal laser % n=22	Focal laser followed by PRP % n=16
Contrast Sensitivity	<i>No change</i>	0	33.3	66.7	40	53.3	18.2	50
	<i>Worsening</i>	50	13.3	0	13.3	20	9.1	12.5
	<i>Improvement</i>	50	53.3	33.3	46.7	26.7	72.7	37.5
Best Corrected Visual Acuity	<i>No change</i>	0.0	36.7	50.0	46.7	40.0	36.4	43.8
	<i>Improvement</i>	50.0	36.7	16.7	46.7	26.7	40.9	43.8
	<i>Worsening</i>	50.0	26.7	33.3	6.7	33.3	22.7	12.5
Self Reported Visual Disability	<i>No change</i>	50.0	60.0	83.3	53.3	73.3	40.9	75.0
	<i>Worsening</i>	0.0	6.7	0.0	0.0	0.0	9.1	0.0
	<i>Improvement</i>	50.0	33.3	16.7	46.7	26.7	50.0	25.0

* Macular ischemia

† High risk characteristics

Chart shows the change in BCVA and CS from baseline on the final follow up (3 months) after laser photocoagulation. (Chart 1)

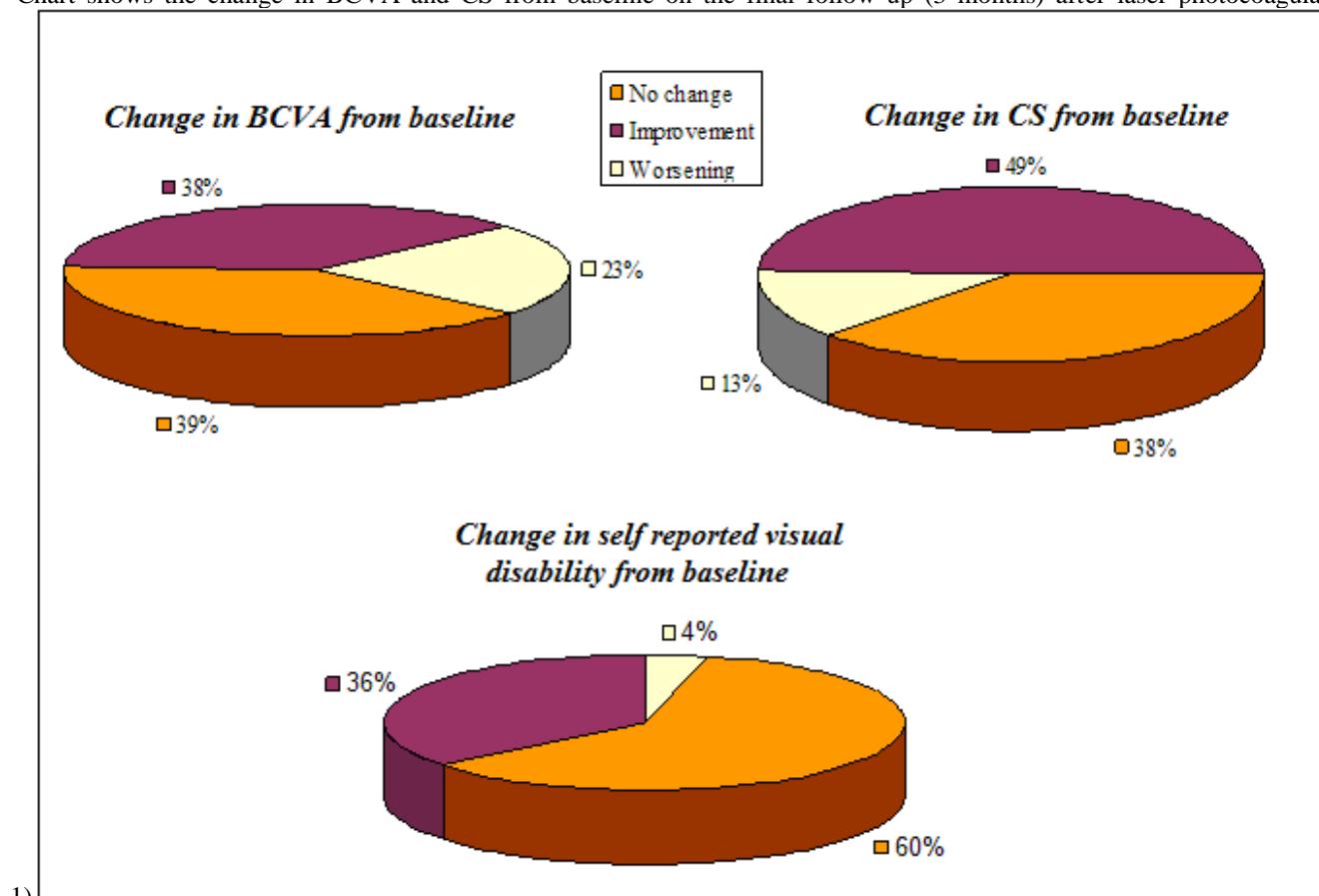


Chart 1: Change in BCVA and CS from baseline on the final follow up (3 months) after laser photocoagulation.

IV. DISCUSSION

In the study we found that around 38% of the eyes treated with laser photocoagulation had an improvement in BCVA compared to the baseline, while 40% maintained a stable vision. Remaining 23% had a drop in the post laser BCVA in the final follow up. CS improved from the baseline in 49.1% (26 eyes) of the eyes out of which 61.5% (16 eyes) had undergone focal laser for DME. A decrease in CS compared to baseline was observed in 20% of the eyes undergoing PRP which is more as compared to that with focal laser (9%). Lövestam-Adrian et al.¹⁵ in their study in 20 eyes treated with PRP for proliferative diabetic retinopathy too noted a loss in CS following PRP compared to the untreated eyes. Despite of the fact that focal laser has its maximum effect on the cones at macula, CS improves the most after focal laser due to the resolution of macular edema following treatment.

Olk in a randomized clinical trial involving 92 patients with diffuse diabetic maculopathy, reported an improvement in the BCVA in 45% of the eyes and a stable vision in another 45% of eyes, showing a positive effect of laser photocoagulation in patients with DME.¹⁶

A questionnaire for self reported visual disability was administered to the participants 3 months after laser photocoagulation. The questionnaire consisted of activities of daily living like recognizing faces, picking out things from crowded shelf, self grooming and doing activities in dim light. The response was recorded as worsening, improvement or no change as compared to the discomfort in these activities prior to laser treatment. Here too, an improvement of visual function was noted in 50% of the eyes undergoing focal laser. Overall, 60% of the participants experienced no change in their daily visual activities while 36% had an improvement in the same. This clearly depicts that laser photocoagulation has a definitive role in stabilizing subjective visual function.

Aiello et al. in a multicenter randomized clinical trial studied the factors associated with the visual acuity outcome after focal/grid photocoagulation for DME in 393 eyes found that worse baseline visual acuity was only associated with frequent visual acuity improvement. They concluded that focal/grid laser photocoagulation remains the standard management for DME. Visual acuity improved from baseline in 32% of eyes and worsened in 19% of eyes.¹⁷ It has previously been shown by Striph et al. that diabetic macular oedema produces a

generalized loss of threshold sensitivity across the central 10° of the visual field following modified grid treatment.¹⁸

Despite of the advent of anti-VEGFs in treatment of DR, laser photocoagulation still plays a vital role in management of DR and will continue to be a pivotal component for the next several years.¹⁹ In the multicentre randomized clinical trial by the DRCR network it had been shown that over a two year period, focal/grid photocoagulation was more effective and had fewer side effects than 1-mg or 4-mg doses of preservative-free intravitreal triamcinolone for most patients with DME. The study supported the fact of focal/grid laser photocoagulation being effective in the treatment of DME.²⁰ The results of the RESTORE study by Mitchell et al.²¹ advocate a combined modality of treatment for DME in the form of ranibizumab with laser photocoagulation. Excellent to good eyesight was reported by 50% of the patients who had taken a combined treatment (determined by the individual NEI VFQ-25 question pertaining to patient's perception of eyesight post-treatment). The present study shows that laser photocoagulation has a distinct role in maintaining a stable visual acuity in patients with DR. Improvement in CS is the maximum after focal laser in CSME due to the subsidence of macular edema. Majority of the patients demonstrate no change in the self reported visual disability after laser treatment (60.4%) while only a few patients experienced a worsening (3.8%).

CS is thus a very useful tool in conjunction with visual acuity in patients with DR as it correlates with the subjective visual disability better than high contrast visual acuity in Snellen's charts. We thus recommend measurement of CS in all patients of DR. The laser parameters used for retinal laser like power, duration and number of shots are individualised from patient to patient depending on the type of DR. These parameters thus cannot be accurately compared or correlated with the change in visual function. Further studies with much larger sample size need to conducted to quantify the laser parameters that are associated with a change in visual function.

V. CONCLUSION

Laser photocoagulation has a definitive role in stabilizing visual function in patients with DR. CS is better correlated with self reported visual disability and thus measures functional visual improvement better than the conventional high-contrast visual acuity.

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AUTHORS

First Author – Dr. Suchi V. Shah, MS Ophthalmology
Senior Resident, Bangalore Medical College & Research
Institute, Fort Road – 560002
[Ex- Resident in Dept of Ophthalmology, Pramukhswami
Medical College, Karamsad, Gujarat – 388325]
suchi.shah.87@gmail.com

Second Author – Dr. Harsha C. Jani, MS Ophthalmology,
Professor & Head, Dept of Ophthalmology, Pramukhswami
Medical College, Karamsad, Gujarat – 388325
harshacj@charutarhealth.org

Third Author – Dr. Devendra A. Saxena,
MS Ophthalmology, Vitreo-retinal surgeon, Associate
Professor, Dept of Ophthalmology, Pramukhswami Medical
College, Karamsad, Gujarat – 388325
deekaysaxena@yahoo.com

Correspondence Author –

Dr. Suchi V. Shah, MBBS, MS (Ophthalmology)
Senior Resident, Bangalore Medical College & Research
Institute, Fort Road – 560002
[Ex- Resident in Dept of Ophthalmology, Pramukhswami
Medical College, Karamsad, Gujarat – 388325]
suchi.shah.87@gmail.com

PHONE - +91 9686557587

Communication of Gender through Personal Grooming and adornment in Different Cultures and different Times

Chang'orok Joel and Clariss Kasamba

Abstract- In the Concise Oxford Dictionary, image is described as "the character or reputation of a person or thing as generally perceived". A first impression based on non-verbal communication goes a long way in influencing this perception and within seconds of meeting someone for the first time, your appearance, body language and non-verbal communication will create a lasting first impression, and that person will assume to know everything about you. Like it or not, it's true and the work world demands making a great first impression and keeping it. This paper looks at how communication of gender is manifested through personal grooming and adornment in different cultures and in fact different times in the world. It goes further to delve on whether really women -at times "dress to kill" as well as youth and the popular culture today. All this in an effort to check on whether - indeed people dress to communicate, entertain or just cover their nakedness. Specifically, the people looks at how a person's gender determines how they dress as well as how cultures determine the way we dress.

Index Terms- dressing for communication, culture and dressing, communicating through personal grooming.

I. INTRODUCTION

Image vs. Perception; Well, as they "light travels faster than sound" thus you are seen before you are heard ad before even uttering a word your visual image will say a multitude about you as an individual. Michener (2003) posed that your perceived level of intelligence, competence, affability, self-esteem, confidence, power, beliefs and success and in respect about the organization you represent (its philosophy, culture, and standard of service). We constantly send out *silent messages* providing clues to both existing and potential clients and colleagues. Based on these; the paper critically looks at how persons, organizations or groups and even a community take these *clues or cues* to . consider you for a job or promotion (in the case of an interview), consider buying your organization's products and services, formation of attitudes about you, how to think and treat you as you interact in a communication or social situation in your day-in day-out interaction. The paper highlights how people, groups, organizations or communities are affected by your appearance, whether or not they realize it, and whether or not they think appearance is important. In short, your visual presentation has consequences.

Haloo Effect Theory

Edward Thorndike, (1920) known for his contributions to educational psychology, coined the phrase "halo effect" in his 1920 article "The Constant Error in Psychological Ratings". He

had noted in a previous study made in 1915 that estimates of traits in the same person were very highly and evenly correlated. The psychological concept 'halo effect' has stood the test of time; it states that if we know certain positive things about a person, we tend to have a generally positive impression of that person, sometimes even in spite of evidence to the contrary i.e. in the Kenyan case of Waititu beating up a Masai man and inciting his people against. Whether the young man had stolen or not, people sympathized with him simply because the community has been known for being polite and probably Kenyan trademark.

The halo effect also extends to a person's dressing and appearance that is why a positive first visual impression is so important. If someone is nicely dressed and looks well put-together, we have greater confidence in his or her abilities even before he or she has said a word. In Kenya for example, the pastors have to dress and dress and behave in a way to create an impression they have been inspired by Holy Spirit.

On the contrary, the devil effect, also known as the reverse halo effect, is when people allow an undesirable trait to influence their evaluation of other traits. The Guardian wrote of the devil effect in relation to Hugo Chavez: "Some leaders can become so demonized that it's impossible to assess their ach achievements and failures in a balanced way

Gender differences and the Haloo Effect

Kaplan's (1978) study yielded much of the same results as are seen in other studies focusing on the halo effect—attractive individuals were rated high in qualities such as creativity, intelligence, and sensitivity than unattractive individuals. However, in addition to these results Kaplan found that women were influenced by the halo effect on attractiveness only when presented with members of the opposite sex. When presented with an attractive member of the same sex, women actually tended to rate the individual lower on socially desirable qualities. Dermer and Thiel (1975) continue this line of research, going on to demonstrate that jealousy of an attractive individual could be a major factor in evaluation of that person. Their work shows this to be more prevalent among females than males, with females describing physically attractive women as having socially undesirable traits like in the case of Lupita Nyongo where women posted more negative comments than men.

Appearance and Interview Success

During interviews, most employers are severely irritated by inappropriate dress, mumbling and even poor handshakes by job applicants during interviews. However, Myer D (2003) in their book *Social Psychology*, Dressing in a professional yet stylish manner can give you a tremendous feeling of confidence that is exhibited to others through your attitude and actions." Recent studies conducted on interview habits they found that over a

quarter were upset by unsuitable clothing or appearance. It is therefore clear that how you dress matters.

Looking at the following excerpt: Pamela Monticelli, a senior recruiter for Sovereign Bank in Tom's River, New Jersey, believes, "Especially in the financial industry, which tends to be a more conservative environment, what a lot of the younger people don't understand is that we are looking for someone to represent the company. So your appearance is not just representative of you; you will also be representing the company the way we want it to be represented." She adds, "I have raised four teenagers and every one of them has, at some point, gotten a piercing or tattoo and has said that 'if I am going to work for XYZ Company they need to accept me for who I am.' My children need to understand that at some point they might have to modify their appearance to fit into a professional environment. While companies believe in a diverse environment, you also don't want to offend your customers."

Dressing code

Dress codes are written and, more often, unwritten rules with regard to clothing. Clothing like other aspects of human physical appearance has a social significance, with different rules and expectations being valid depending on circumstance and occasion. Even within a single day an individual may need to navigate between two or more dress codes, at a minimum these are those that apply at their place of work and those at home, usually this ability is a result of cultural acclimatization. Different societies and cultures will have different dress norms although Western styles are commonly accepted as valid most cases.

The dress code has built in rules or signals indicating the message being given by a person's clothing and how it is worn. This message may include indications of the person's gender, income, occupation and social class, political, ethnic and religious affiliation, attitude and attitude towards comfort, fashion, traditions, gender expression, marital status, sexual availability, and sexual orientation, etc. Clothes convey other social messages including the stating or claiming personal or cultural identity, the establishing, maintaining, or defying social group norms, and appreciating comfort and functionality. For example, wearing expensive clothes can communicate wealth, the image of wealth, or cheaper access to quality clothing. All factors apply inversely to the wearing of inexpensive clothing and similar goods. The observer sees the resultant, expensive clothes, but may incorrectly perceive the extent to which these factors apply to the person observed. Clothing can convey a social message, even if none is intended.

If the receiver's code of interpretation differs from the sender's code of communication, misinterpretation follows. In every culture, current fashion governs the manner of consciously constructing, assembling, and wearing clothing to convey a social message. The rate of change of fashion varies, and so modifies the style in wearing clothes and its accessories within months or days, especially in small social groups or in communications media-influenced modern societies. More extensive changes, requiring more time, money, and effort to effect, may span generations. When fashion changes, the messages communicated by clothing change.

Fashion

Not only can particular styles of clothes define a person as an individual, but also as a part of a group. According to Thomas (2007) "Fashion is a language of signs, symbols and iconography that non-verbally communicate meanings about individuals and groups." Depending on the context clothes and other defining objects can mean very different things, Fred (1994) discusses the way that clothes and fashion can represent identity through the semiotic notion of code.

Davis (1994). Adds, although you can give meaning to semiotics signs can change and this applies to trends as well. Fashion design and symbolic adornments can have very definitive symbols, but depending on the time and place those symbols can be constantly shifting and changing. Even though they may change they are still held to their symbolic meaning by the collective culture.

Gender and Dressing code

In some traditions, certain types of clothing are worn exclusively or predominantly by either men or women. For example, the wearing of a skirt tends to be associated with female dress, while trousers are associated with male dress. Hairdressing in some societies may also conform to a dress code, such as long hair for women and short hair for men. Some headgear are usually geared towards women, such as hair-clips, hairpins, and barrettes.

Personal Grooming and Social status

In many societies, particular clothing may indicate social status, reserved or affordable to people of high rank. For example, in Ancient Rome only senators were permitted to wear garments dyed with *Tyrian purple*; and, in traditional Hawaiian society, only high-ranking chiefs could wear feather cloaks and *palaoa* or carved whale teeth. In China before the establishment of the republic, only the emperor could wear yellow. Just like in Nigerian where dressing distinguishes the social and gender roles. In Kenya Masai's are famous for the red *shukas* etc.

The school uniform came about because of bullying that become a major problem in school systems amongst all ages. It led to social issues, self-doubt, depression and even suicide attempts amongst students. In 1996, former President Bill Clinton announced his support for the idea of school uniforms stated, "School uniforms are one step that may help break the cycle of violence, truancy and disorder by helping young students understand what really counts is what kind of people they are." It did not take much more than this presidential approval to get many school districts across the country on board. By requiring students to wear a school uniform they are less likely to have something to make fun of other students for. This would cause the students to get to know one another by their personality and who they really are rather than the clothes they wear.

Occupation and Dressing

Military, police, and firefighters usually wear uniforms, as do workers in many industries. School children often wear school uniforms, while college and university students sometimes wear particular kind of dress i.e. during special occasions members of religious orders may also wear uniforms or sometimes a single

item of clothing or a single accessory can declare one's occupation or rank within a profession.

Ethnic and political affiliation

In many regions of the world, national costumes and styles in clothing and ornament declare membership in a certain village, caste, religion, etc. A Scotsman declares his clan with his tartan. A French peasant woman identified her village with her cap or coif. A Palestinian woman identifies her village with the pattern of embroidery on her dress, coastal women have a particular way of dressing and so are the pastoralist and other groups.

Clothes can also proclaim dissent from cultural norms and mainstream beliefs, as well as political affiliation. As you may have witnessed of late in Kenya, every party has its colour resonating their various political manifestos like the orange colour for ODM and Red for Jubilee etc.

Religious affiliation

A Sikh or Muslim man may display his religious affiliation by wearing a turban and other traditional clothing. Many Muslim women wear head or body coverings hijab, that proclaim their status as respectable women and cover the so-called intimate parts. A Jewish man may indicate his observance of Judaism by wearing a yarmulke. In Kenya, Different denominations can be distinguished by their unique outfits i.e. Catholics-cross, veils and rosary etc.

Marital status

Visual markers of marital status- Traditionally, Hindu women wear **sindoor**, a red powder, in the parting of their hair to indicate their married status; if widowed, they abandon sindoor and jewelry and wear simple white clothing. However, this is not true of all Hindu women; in the modern world this is not a norm and women without sindoor may not necessarily be unmarried. In many Orthodox Jewish circles, married women wear head coverings such as a hat, snood, or wig. Additionally, after their marriage, Jewish men of Ashkenazi descent begin to wear a Tallit during prayer. Men and women of the Western world may wear wedding rings to indicate their married status, and women may also wear engagement rings when they are engaged.

Besides communicating about a person's beliefs and nationality, clothing can be used as a non-verbal outlet to attract others. Men and women might adorn themselves with accessories and keep up with the latest fashion trends to attract partners they are interested in. In this case, clothing becomes a means of self-expression, and people can sense power, wealth, sex appeal, personality, or creativity just by looking at what a person is wearing.

Most recently at the New York Fashion Week that took place last month in New York City, we saw that clothing can even reflect a society's state of economy. Since our economy is still on the road to recovery, designers focused on less expensive fabrics and more wearable, practical designs when creating clothing for this season.

II. SUMMARY

Personal grooming and dressing modes are determined by a number of factors ranging from social, political economic

factors. The variation and discrepancies in dressing and grooming are further influenced by other social cultural issues like religion, race, tribe, values etc. However, cross-cutting issues like climatic variations influence the outfits one puts on, a good example seen in those traveling abroad (Kenyans attending ICC cases) are seen heavy woolen outfits immediately they land in the Hague and other places and vice-versa when tourists are at the coast, they dress "scantly" probably to adapt to the hot weather. Therefore, for one to appreciate how people dress, one has to look at a number of issues though gender still remains the most universal determinant of how people dress.

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AUTHORS

First Author – Chang'orok Joel email: akopajj@yahoo.com

Second Author – Clariss Kasamba

DNA and metabolite based profiling in *Crocus sativus* L.

Syed Imran Bukhari, Sanjana kaul, Manoj Kumar Dhar

School of Biotechnology, University of Jammu

Abstract- Saffron derived from *Crocus sativus* is the most expensive, flavored and colorful spice with worldwide importance and utilities in many disease conditions. Many efforts have been made to detect variability in this plant. We used sequence specific amplified polymorphism (SSAP) and retrotransposon microsatellite amplified polymorphism (REMAP) markers for analyzing the genetic diversity among thirty accessions of *Crocus sativus*. Besides, we also attempted metabolite profiling in these accessions. This work aimed at assessing the molecular and biochemical variability in saffron since it has been reported to be highly stable in other parts of the world. Various primer combinations were used in SSAP and REMAP for PCR amplification and the primers giving the best pattern were used for further analysis. The retrotransposon based molecular marker failed to find any variation at molecular level inferring the inability of retrotransposon mobility to cause polymorphism in geographically different cultivars of *Crocus sativus*. However, the HPLC profiling of samples collected from 17 selected locations among the thirty samples, revealed variations in metabolite concentrations of crocin and safranal. The results obtained in this study supported the monomorphic nature of Kashmir saffron at genetic level.

Index Terms- Crocin, High Performance Liquid Chromatography, , REMAP, Safranal, SSAP

I. INTRODUCTION

Saffron, *Crocus sativus* is a triploid ($3n=24$) sterile plant belonging to the family Iridaceae. Saffron is considered to be the most expensive spice of the world. The major saffron producing countries are Iran, Greece, Spain, Turkey, India, and Morocco. Recently, Europe has also started cultivating saffron successfully in various areas (Caballero & Miranda, 2007). In India, saffron is cultivated in Kashmir valley and Kishtwar region of Jammu and Kashmir State. Although, saffron has remained under cultivation various stress conditions resulting in mutations, but the sterility and vegetative propagation of the plant has limited these mutations from being redistributed in the plant (Ahmad, Zaffar, Mir, Razvi, Rather & Mir, 2011).

During the past few years, molecular markers such as RAPD (Random Amplified Polymorphic DNA) (Caiola, Caputo & Zanier, 2004), ISSR inter-simple sequence repeats (Tanyolac, 2004), AFLP (Amplified Fragment Length Polymorphism) (Ozkan , Kafkas, Ozer & Brondolini , 2005 and IRAP (Inter Retrotransposon Amplified Polymorphism) (Alavi , Mohammadi, Aharizad & Moghaddam, 2008) have been used extensively for detection of genetic variation among various accessions of *C. sativus* but failed to find polymorphism in *C. sativus*. However, molecular markers based on transposable

elements i.e., retrotransposons (REMAP and SSAP) that have proved to be promising for elucidating genetic diversity in other plants have not been used in saffron. Because of the irreversible nature of retrotransposon insertions, they are considered particularly useful in phylogenetic studies. Present work is the first report on the application of SSAP and REMAP on *C. sativus*, especially of Indian accessions.

Saffron owes its importance to the presence of apocarotenoid that are characterized by a bitter taste, yellow orange colour and hay like fragrance because of apocarotenoids crocin, picrocrocin and safranal (Negbi, 1999). Metabolite profiling of saffron may help in identifying the clones with high quantity of apocarotenoids. Application of molecular markers and metabolite profiling may help in establishing a relationship between genetic and metabolic variation, if any. Moreover, the variations in the contents of bioactive active components greatly influence the quality and beneficial health effects of this herb. Therefore, the simultaneous quantification of bioactive compounds can play an important role in the effective quality evaluation for *C. sativus*.

II. MATERIALS AND METHODS

Plant material

For studies on molecular markers leaves were collected from saffron plants growing at 30 locations in Jammu and Kashmir. However, among these 17 locations (having significant difference in altitude) were selected for metabolite study (Table 1). Plant tissues were independently harvested, frozen in liquid nitrogen and stored at -80°C until required.

DNA extraction

DNA was extracted from 400 mg of leaf material using the protocol given by Doyle and Doyle with some modifications (Doyle and Doyle, 1991). The extracted DNA was quantified spectrophotometrically and stored at -20°C till further analyses.

REMAP analysis

For REMAP analysis, LTR based primers MKD-4, MKD-5, MKD-9, MDK-11 were used in combination with B1, B2, B3, B4, B5, B6, B7 and B8 ISSR based primers (Table 2). Several combinations of primers were used and the combinations resulting in large number of bands were selected for further analysis. The reactions were performed in 25 μ l reaction volume containing 0.25 mM dNTPs, 1X buffer, 1.5 mM MgCl₂, 0.5 U Taq DNA polymerase and 5 pmol primers. PCR thermal cycler conditions consisted of initial denaturation for 3 min at 94°C, followed by 35 cycles of denaturation for 30 S at 94°C, annealing at 46°C for 30 S, extension for 2 min at 72°C, and the final extension of 10 min. The PCR-amplified fragments were

electrophoresed on a 4% agarose gel in TAE and were visualized by ethidium bromide staining.

SSAP Analysis

For SSAP analysis, the protocol of Kour *et al.* (Kour , Kour and Dhar, 2009) was followed with slight modifications. The purified DNA was digested with *MseI* restriction enzyme in 100 μ l reaction volume. This was followed by ligation with 2pmol of *MseI* adaptors (ASW1 and ASW2) using 0.2 U of T4 DNA ligase. The samples were incubated at 37°C for 3 h and the PCR reaction was performed using primers against LTR region and RNaseH motif. The primers selected for the SSAP analysis enlisted in table 3 with their sequences, were MKD-4, MKD-5, MKD-9, MDK-11, ASW1, ASW2, ASW-8, ASW-9 and ASW-10. The reactions were performed in 25 μ l reaction volume containing 0.2 mM dNTPs, 1x buffer, 0.25 mM MgCl₂, 0.5 U *Taq* DNA polymerase and 5 pmol primers. PCR thermal cycler conditions consisted of initial denaturation for 2 min at 94°C, followed by 35 cycles of denaturation for 30 S at 94°C, annealing at 46°C for 30 s, extension for 2 min at 72°C, and the final extension of 10 min. The PCR amplified fragments were electrophoresed on a 4% agarose gel and visualized by ethidium bromide staining.

HPLC Analysis

Saffron stigmas collected from plants cultivated at 17 locations were selected for HPLC analysis. Extraction of saffron stigmas was performed according to Lozano *et al.* (Lozano ,Castellar , Simancas & Iborran, 1999) with some modifications. For the estimation of crocins and safranal, 50 mg of saffron stigmas were suspended in 10 ml methanol-water (50:50, v/v) and stirred for 24 h at 4 °C in the dark. After extraction, samples were centrifuged at 20,000g for 45 min to eliminate plant residues and the supernatant was collected and filtered through a 0.45 μ m nylon membrane (Millipore, USA). The samples were stored in dark till analyzed. HPLC analysis was performed with a Waters (USA) HPLC system equipped with 515 quaternary gradient pump, 717 Rheodyne injector, 2996 PDA detector and Empower software (version 3.0). The column used for separation was RP-18 (4.6×250 mm, 5 μ m) (Merck) column. The mobile phase consisted of methanol–water (50:50) (v/v) delivered at a flow rate of 0.8 mL/min. The accessions of thirty samples and their geographic origin are listed in Table 1. Standards, safranal 88% and crocins were purchased from Sigma-Aldrich, USA.

III. RESULTS AND DISCUSSION

REMAP and SSAP are retrotransposon based markers and are relatively new and efficient techniques which have been used for analyzing the variability in plants. We used twenty different primer combinations for SSAP analysis in saffron. Among these primer MKD9 and ASW8 (figure 1) combination gave a good number of scorable bands. In case of REMAP thirty two different primer combinations were used, primer B5 and MKD9 (figure 2) gave the maximum number of bands but unfortunately were not successful to reveal any polymorphic bands. A total of nine primers, making twenty different combinations were used for SSAP analysis. SSAP and REMAP selected primer combinations were able to give scorable number of bands but were not

successful to give any polymorphic band. IRAP, RAPD and ISSR (Ozkan , Kafkas, Ozer & Brondolini , 2005; Moraga, Castillo Lopez, Gomez-Gomez & Ahrazem, 2009) analysis of *Crocus* has been already conducted and all these genetic markers have shown no polymorphism in *C. Sativus* which corroborated well with the present study of ours.

Major components of saffron are crocin and safranal along with picrocrocin and crocetin. Identification and content analysis of these components could be a discriminative key for the characterization of *crocus sativus* of different geographical locations. Chemoprofiling of saffron is gaining attention because of the promising therapeutic roles shown by this spice in number of clinical conditions and disease. Higher the content of saffron components better is the quality of the spice. Chemoprofiling of saffron from different parts of the world have shown that concentration of crocin in saffron varies in the range of 0.85% to 32.4% dry weight of saffron from different countries (Alonso, Salinas, Garijo, Sanchez-Fernandez, 2001). The variation in the components was further supported by the findings of other workers (Li , Lin & Kwan Min 1999; Caballero & Pereda-Miranda 2007). In case of Indian sample concentration of crocin was found to be 67.3 mg/g and of safranal 8mg/g (Sujata, Ravishankar & Venkataraman, 1992). In our HPLC profile study of the samples collected from different geographical areas the concentration of crocins and safranal was found to be variable. The crocin content ranged between 30.74 ± 0.19 mg/g to 79.84 ± 0.29 mg/g (Table 4). Accession CR16 showed highest crocin content (79.38 ± 0.29 mg/g) followed by accession CR19 (78.53 ± 0.39 mg/g) (Table 4). The KP accession in Kashmir showed the lowest crocin content. Quantification of safranal has shown a significant variation was with accession KWP from of Kishtwar area having lowest safranal content (0.13 ± 0.016 mg/g) and sample from Samboora area of Kashmir showing highest (0.92 ± 0.051) (Table 4). The concentration of crocin and safranal for the standard sample (Sigma Aldrich, USA) was observed to be $12.5\text{mg}/\pm 0.08$ and $0.13\text{mg}/\pm 0.016$ respectively (Table 4).). In our study the crocin content was found higher in the samples collected from fields of Kishtwar (Table 4). The representative chromatograms of crocin and safranal are shown in figure 3 and 4 respectively.

Although the biochemical analysis of saffron collected from 17 geographical locations of Jammu and Kashmir (India) showed variations in the content of crocin and safranal and also reveals that overall quality of Indian saffron (in terms of content composition) is better than the saffron of the other parts of the world. However, PCR-based approaches i.e. SSAP and REMAP (first of its nature to be used in *C. sativus*) did not reveal any variation at molecular level in samples collected from 30 geographically different locations. This study reinforced the results of monomorphic nature of this plant that has earlier been documented in other parts of the world. Also it is revealed that insertional polymorphism via retrotransposon movements that has been considered one of the major causes of variability in other plants is possibly lacking in *C. sativus*. However, the exploration of advanced markers is required and suggested to detect molecular variation in *C. Sativus* if any.

IV. CONCLUSION

This study concludes that retrotransposon mobility has not been able to insert any variation in saffron at molecular level and reveals it to be monomorphic at genetic level. However, chemoprofilng reveals significant variation in the content of bioactive components of saffron in addition to better quality of Indian saffron that could be an important aspect for considering saffron to be used as a functional food because of the diverse therapeutic applications of saffron components.

CONFLICT OF INTEREST

The author (s) have not declared any conflict of interests

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AUTHORS

First Author – Syed Imran Bukhari, School of Biotechnology, University of Jammu, Email: syedconscious@gmail.com

Second Author – Sanjana kaul, School of Biotechnology, University of Jammu, Email: Sanrozie@rediffmail.com

Third Author – Manoj Kumar Dhar, School of Biotechnology, University of Jammu, Email: manojkdhar@rediffmail.com

Correspondence Author – Prof. Manoj K. Dhar, Director, School of Biotechnology, University of Jammu, Jammu -180006, India, tel/fax : +91-191-2456534, manojkdhar@rediffmail.com syedconscious@gmail.com,

Table Legends:

Table 1: Geographical locations of sample collection.

Table 2: List of primers used for REMAP analysis.

Table 3: List of primers used for SSAP analysis.

Table 4: Metabolite (Crocin & Safranal) concentration of different accessions.

Figure Legends:

Figure 1: SSAP analysis of *Crocus sativus* germplasm collected different areas of Jammu and Kashmir using primer pairs MKD-9 and ASW-8.

Figure 2: REMAP analysis of *Crocus sativus* germplasm collected different areas of Jammu and Kashmir using primer pairs B5 and MKD9.

Figure 3: HPLC chromatogram of crocin, (a) standard, (b) accession KP lowest crocin content , (c) accession CR16 highest crocin concentration & (d) accession R19, highest crocin content from Kashmir division.

Figure 4: HPLC chromatogram of safranal, (a) standard s and (b) accession KWP with lowest concentration of safranal

Table 1: Geographical locations of sample collection.

Accession code	Geographical areas	Accession code	Geographical areas
CR1	Khunmoh A	CR16	Puchhal kishtwar
CR2	Khunmoh B	CR17	Chrar A
CR3	Wuyan A	CR18	chadora
CR4	Samboora pampore	CR19	Khrew A
CR5	Namalbal pampore	CR20	Khrew B
CR6	Tulbagh pampore	CR21	Beerwar kishtwar
CR7	Chandhara near batmill	CR22	Hudri Kishtwar
CR8	Patalbagh pampore	CR23	Galander
CR9	Chandhara B	CR24	Zevan
CR10	Konibal A	CR25	Hadyal
CR11	Konibal B	CR26	Androosa A
CR12	Lathipora A	CR27	Androosa B
CR13	Lathipora B	CR28	Dushnar
CR14	Lathipora C	CR29	Nagam A
CR15	Dusu	CR30	Nagam B

Table 2: Primers used for REMAP analysis.

S. No.	Primer code	Primer sequence
1	B1	5'GCCTTGAAACTTCTCTGTATC3'
2	B2	5'CCCTTCCAGTTAAATCAGTCG3'
3	B3	5'GAGTGCAGAAGCGAGTAGAG3'
4	B4	5'TCCGTGTCCTCTGTCTGTG3'
5	B5	5'GGGAATGAACAGAGGAAA3'
6	B6	5'ATGTTGGAACTTTAGTGTG3'
7	B7	5'ACCACTGCAATCCTCATCTTG3'
8	B8	5'CCCTCATCCTCCATTCTTATCG 3'
9	MKD4	5'ACTGCCTTTACATGG 3'
10	MKD5	5-AACATATCATCACATA-3'
11	MKD9	5-CTAAGAGGCTACCACCAAAT-3'
12	MKD11	5-ACACTTAGAGAACCTGGCA-3'

Table 3: Primers used for SSAP analysis .

S. No	Primer code	Primer sequence
1	MKD4	5-ACTGCCTTTACATGG-3'
2	MKD5	5-AACATATCATCACATA-3'
3	MKD9	5-CTAAGAGGCTACCACCAAAT-3'
4	MKD11	5-ACACTTAGAGAACCTGGCA-3'
5	ASW1	5'-GACGATGGATCCTGAG-3'

6	ASW2	5'-TACTCAGGATCCAT-3'
7	ASW8	5'-GATGGATCCTGAGTAAC-3'
8	ASW9	5'-GATGGATCCTGAGTAAAC-3'
9	ASW10	5'-GATGGATCCTGAGTAAACA-3'

Table 4: Showing metabolite (crocin & safranal) concentration of different accessions.

Accession	Location	Total crocin	Safranal
CR 3	Wuyun, Kashmir	55.58±0.42	0.23±0.032
CR 4	Samboor, Kashmir	54.73±0.33	0.92±0.051
CR 7	Pampore, Kashmir	77.46±0.31	0.5±0.067
CR 10	Konibal, Kashmir	47.06±0.22	0.17± 0.011
CR 12	Lathipor A, Kashmir	42.5±0.37	0.22±0.033
CR 16	Puchhal, Kishtwar	79.38±0.29	0.16±0.032
CR 17	Chrar A, Kashmir	40.66±0.35	0.62±0.021
CR 18	Chadora, Kashmir	53.4±0.43	0.4±0.071
CR 19	Khrew A, Kashmir	78.53±0.39	0.19±0.021
CR 22	Hudri, Kishtawar	63.26±0.29	0.26±0.042
CR 24	Zevan, Kashmir	39.6±0.28	0.22±0.063
CR 25	Hadyal, Kishtawar	69.7±0.34	0.26±0.033
CR 26	Androosa	46.9±0.28	0.17±0.019
CR 28	Dushnar, Kishtwar	64.4±0.36	0.15±0.017
KP	Kashmir, Market	30.74±0.19	0.18±0.023
Sigma	Sigma	12.5±0.08	0.15±0.037
KWP	Kishtwar Market	36.5±0.18	0.13±0.016

Values are represented as mean ±S.D

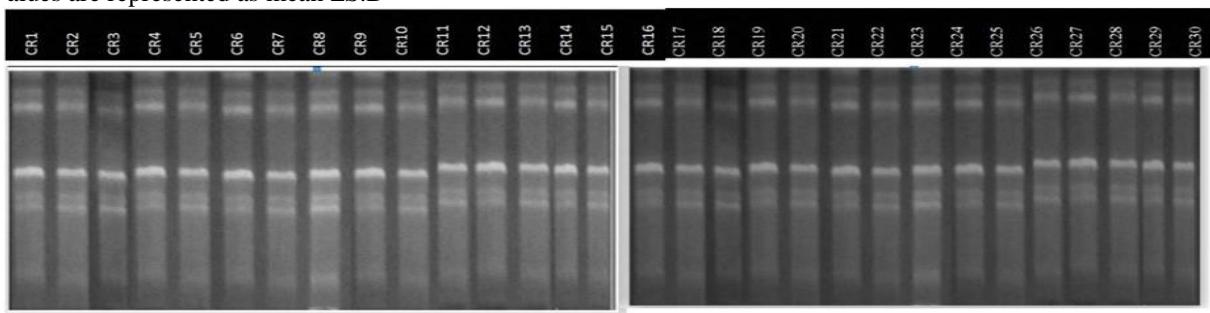


Figure 1: SSAP analysis of *Crocus sativus* germplasm collected different areas of Jammu and Kashmir using primer pairs MKD-9 and ASW-8

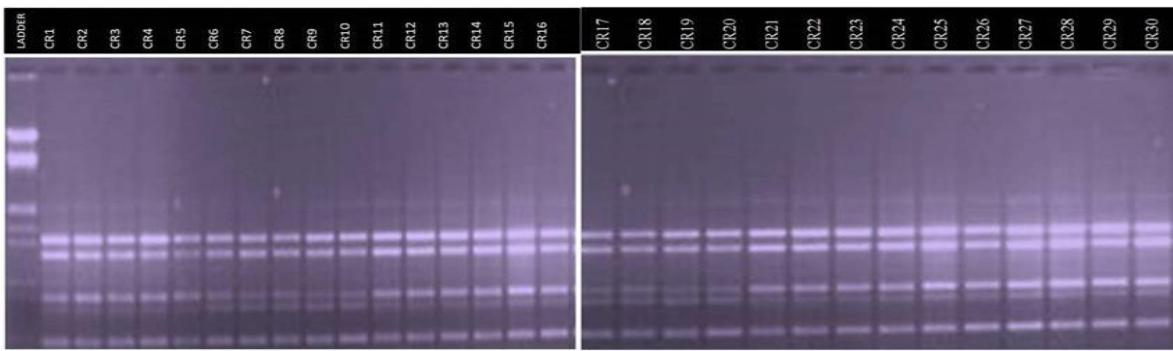


Figure 2: REMAP analysis of *Crocus sativus* germplasm collected different areas of Jammu and Kashmir using primer pairs B5 and MKD9.

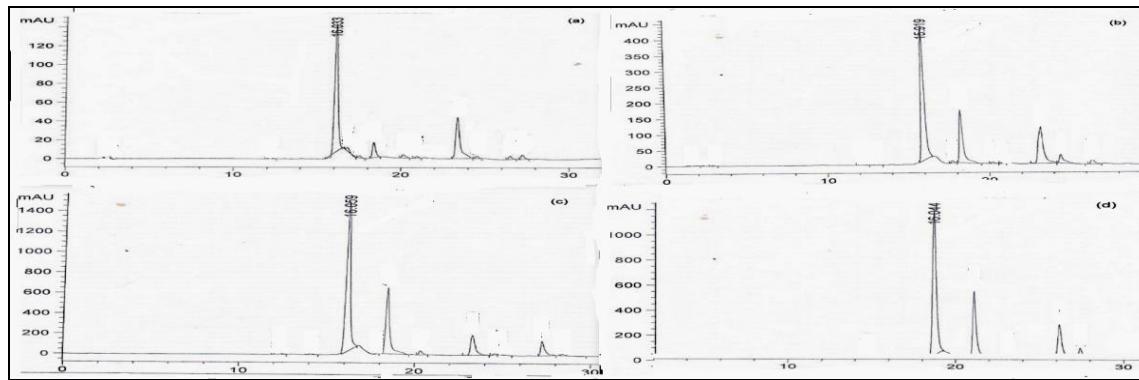


Figure 3: HPLC chromatogram of crocin, (a) standard, (b) accession KP lowest crocin content , (c) accession CR16 highest crocin concentration& (d) accession R19, highest crocin content from Kashmir division.

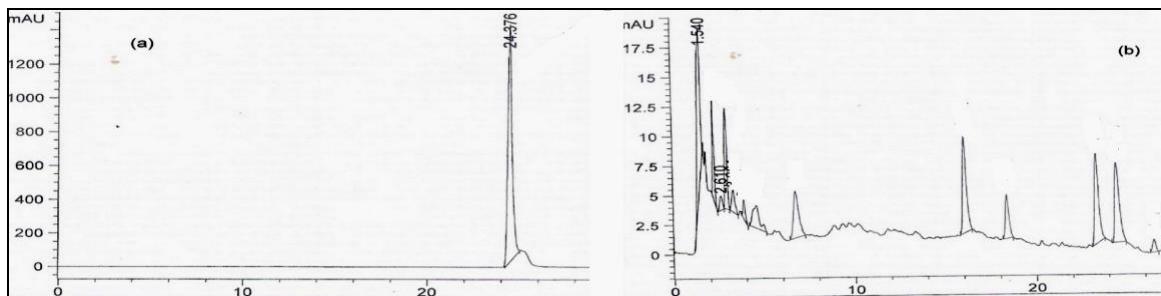


Figure 4: HPLC chromatogram of safranal, (a) standard s and (b) accession KWP with lowest concentration of safranal

Intelligent HTML Code Analyzer and Builder from PSD Layers

Josekutty Abraham*, Prof. Manoj T Joy **

* M.Tech Student Computer Science, Amal Jyothi College of Engineering, Kanjirapally, Kottayam, Kerala, India.

** Professor – Computer Science, Amal Jyothi College of Engineering, Kanjirapally, Kottayam, Kerala, India.

Abstract- Intelligent HTML (HyperText Markup Language) Code Analyzer And Builder From PSD (PhotoShop Document) Layers' generates the HTML code from PSD designs automatically. This system mainly focuses on developers. It reduces the time which is utilized for making HTML codes from PSD designs. It produces Image Cropping, HTML Coding, and CSS (Cascading Style Sheets) coding and Final Compression within in short time. This system generates HTML, CSS files with corresponding codes and arranged in a web standard. Each and every layers of PSD are processed through several passing methods and analyzing the relations of parent and children of layers. This relation gives the hierarchical coding pattern.

Index Terms- Auto Coding, HTML Converter, PSD to HTML, Code Generator.

I. INTRODUCTION

The PSD file is Photoshop format contained with several image layers. HTML is a coding language that is used to display web pages. Generally, the primary designs are made with Photoshop in PSD format and then converting into HTML Code Manually. An HTML file is connected by different referencing image files, script files and CSS file. CSS can be written inside or outside of an HTML file.

'Intelligent HTML Code Analyzer and Builder From PSD Layers' will process the conversion of HTML Code from PSD designs automatically [1]. There is no direct relation between PSD and HTML. PSD is a pure image related format whereas HTML is a pure scripting format. Here it analyses the PSD layer positions and analyzing the relations between them. This relation is used to make HTML codes. The coding can be done in two ways. The first way is to relate one layer with previous layer. Another method is to connect the layers in a hierarchical structure. First one is friendly with jQuery and used to make HTML animations whereas the second one is used in dynamic or static pages.

The Journal consists following parts,

- 1) Abstract
- 2) Introduction
- 3) Existing System Study
- 4) Literature Survey
- 5) System Design
- 6) Implementation and Results

II. EXISTING SYSTEM STUDY

Manual coding is done by a human being. There is no automatic methods are used. The PSD file is manually cropped and scaled. After analyzing the design, coder will make a plan and start coding. Manual coding is trustier but time and cost consuming. Following are some existing tools that are used to convert PSD to HTML.

- 1) Traditional Photoshop Slicer.
- 2) psd2htmlconverter.com Online Converter
- 3) psdtoweb.de Online Converter

The Slice tool allows you to divide an image into smaller sections which fit together like a jigsaw (but with straight edges). The slicing lines are drawn manually.

psd2htmlconverter.com Online Converter is based on the instructions that we are given in the PSD layers. Most of processes are based on the naming of layers. Before proceeding, we have to select several options to build a code. Each Photoshop Layer group is converted into a div block in the resulting CSS HTML layout. Unite logical groups of elements (like header, content, footer, columns, etc) into Photoshop Layer Groups. It will help us to correctly unite CSS elements into HTML scalable div blocks (so if someone adds more text than it will still look fine). All elements of such markup will be grouped into rows and columns of HTML/CSS elements and

they will be aligned relative to each other through such CSS properties as 'margin', 'padding' and 'float'. Perfect output code is depends upon grouping of layers. The hierarchy is building after analyzing the group structure in the layer group of PSD.

psdtoweb.de online converter do the html conversion from PSD file based on Position of layers. The x and y axis are analyzed and written in CSS file as a line by line format. Hierarchical result can't be produced by it. Line by line type coding is too confusing for the developers. The converter is receiving the PSD file, converting to position based code alone. The output HTML div's are arranged line by line. It can be used only for the jQuery type coding. It won't show properly in Dreamweaver type editing software.

III. LITERATURE SURVEY

HTML or HyperText Markup Language [2] is the main markup language for creating web pages and other information that can be displayed in a web browser. The purpose of a web browser is to read HTML documents [3] and compose them into visible or audible web pages. The browser does not display the HTML tags, but uses the tags to interpret the content of the page. HTML elements form the building blocks of all websites. HTML allows images and objects to be embedded and can be used to create interactive forms. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. It can embed scripts written in languages such as JavaScript which affect the behavior of HTML web pages. CSS styles are used to control the properties of HTML elements.

A. General Structure of HTML Page

The first item to appear in the source code of a web page is the doctype declaration. This provides the web browser (or other user agent) within formation about the type of markup language in which the page is written, which may or may not affect the way the browser renders the content. It may look a little scary at first glance, but the good news is that most WYSIWYG web editors will create the doctype for you automatically after you've selected from a dialog the type of document you're creating. If you aren't using a WYSIWYG web editing package, you can refer to the list of doctypes contained in this reference and copy the one you want to use.

B. Cascading Style Sheet Rules

Cascading Style Sheets (CSS) [4] is a style sheet language used for describing the look and formatting of a document written in a markup language. While most often used to style web pages and interfaces written in HTML and XHTML, the language can be applied to any kind of XML document, including plain XML, SVG and XUL. CSS [5] is a cornerstone specification of the web and almost all web pages use CSS style sheets to describe their presentation.

C. Position Based Coding Rule

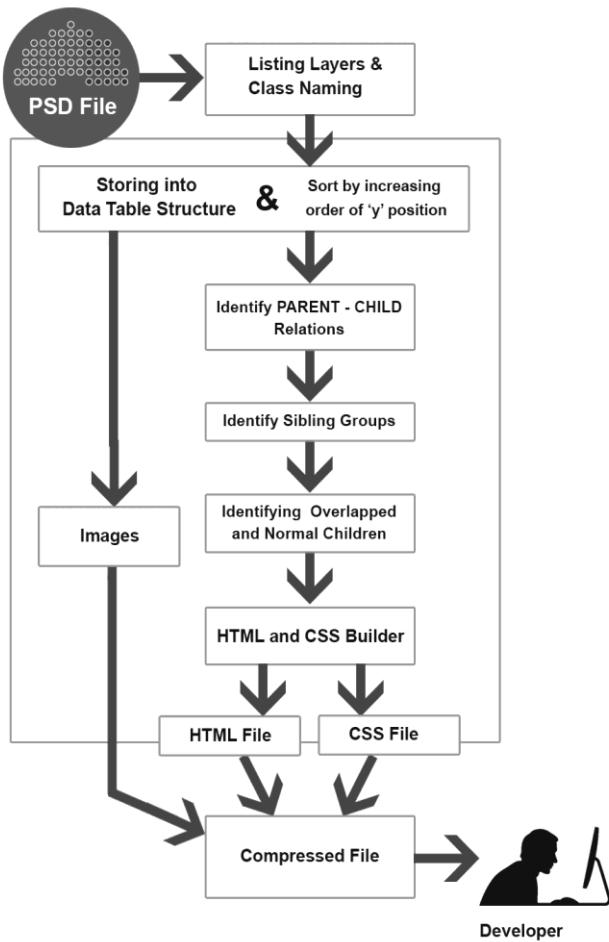
When the element is given a relative position, one can then shift the element horizontally or vertically with the top, bottom, left, right properties. Everything else in the page stays exactly where it was and acts like the element was never moved.

D. Overlapping DIVs

In normal HTML coding, DIVs are not overlapped. If one div is used, another one can be used right to it, left to it or under to it. But if we need to overlap to divs, we use position styles sheet property. The position has relatively connecting property value called 'relative'. The element is positioned relative to its normal position, so "left:20" adds 20 pixels to the element's LEFT position.

IV. SYSTEM DESIGN

PSD layer parsing is the first phase of the Hierarchical Method. After Parsing, layer list are analyzed and a unique name is given for each layer. The unique name is a combination of date and time with layer name. Unwanted characters are avoided from layer naming. The extracted layer is converted to PNG image and giving the same unique name as file name. This same name is given for the CSS class name for identification. Default Data Table Structure is used to store the layer information. Then the list is sorted in the increasing order of top position. Another main function is to find the parent and child relations. After this analysis, we will get some uncategorized layers. These can be sibling or confused layers. The sibling layers are grouped and attached to a new parent layer. The very next stage is to generate HTML and CSS codes. Finally the HTML and CSS files are compressed to a zip file.



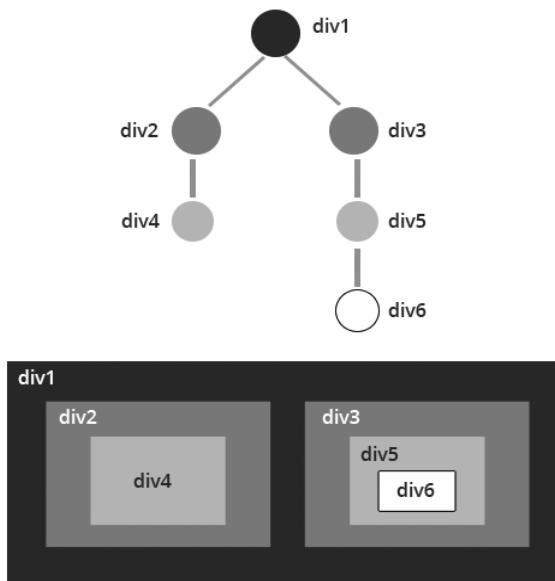
[Figure IV-1, Work Flow]

A. Hierarchical Structure - Design Considerations

In the Hierarchical Method, DIVs has relation with each other. If one DIV is inside of another, first one is called as parent and the second one is the child. This can be spread like in iterative manner.

The following are the basic design considerations in hierarchical rule.

- 1) One parent can hold more than one child. If this rule is not followed, the browser will show a wrong structure of web page.
- 2) If one DIV have more than one child, each one should follow same CSS float property.
- 3) In the case of overlapped layers, the position relative method can be used.



[Figure IV-2, Normal Hierarchy of DIVs]

B. General Symbol Table Design

The following is the base symbol table structure. The parser is parsing the PSD file and the layer information is analyzed. The name of layer is hashed with micro time for avoiding duplication.

Symbol Name	Usage
SaveName	Save name is the hashed name of layer
xposition	Value of x position
Yposition	Value of y position
LayerHeight	Height of the layer
LayerWidth	Width of the layer
xposition-xtended	Value of x position plus width
yposition-xtended	Value of y position plus height
Zindex	z axis value (order of layer)
Parent	Parent of this layer

[Table IV-1, General Symbol Table View]

The SaveName is hashed name of layer. xposition, yxposition, LayerHeight, LayerWidth are saved from the PSD information list. xposition-xtended is the summation of xposition and LaterWidth. The layer is a rectangle structure. So, xposition-xtended is the last x position of the layer. Same way, yposition-xtended is based on the y position and the height of the layer. zindex is a digital value. It represents the order of layer. No two layer have same value. The parsing is actually starting from zero to last value. Parent field is used for finding the relation between Parent and Child divs.

V. IMPLEMENTATION AND RESULTS

The implementation consists of different steps. The code is delivering in hierarchical structure.

- A) PSD Parsing and Image Cropping.
- B) Storing Layer Information and Position Based Sort.
- C) Parent-Child Relation Analyzing.

- D) Sibling Group Analyzing.
- E) Identifying Overlapped and Normal Children.
- F) HTML Code and CSS Code Generation.
- G) Compression

A. PSD Parsing and Image Cropping.

Program reads the PSD file format and analyzing the layer information. This process is called as PSD parsing. The parsing is done in bottom to top manner. The designer starts with background and the contents are added one over another. The very next process is to crop each of these layers with background transparency support. The layer information contains the pixel data and the properties of layer image. The system uses PNG-24 to save the image files with transparency.

B. Storing Layer Information and Position Based Sort.

For finding the relations between the layers, we need to store the whole information of layers. Generally, a PSD file parsing is giving very few information such as x and y position from the document, height, width details and order of layer. So these are stored into a Symbol Table structure. Symbol Table is limited but very easy to access compared to other data structures.

The actual layer order is the order that we extracted from PSD file. But we need to change the order of arrangement for the hierarchical structure. So the order is changed as in increasing order of y position. This will give a vertically increasing structure as we needed.

The parsing was done from bottom to top order and now we have changed the order from top to bottom manner. Why we do the bottom to top in the parsing is to get the order of overlapping layers. Overlapped layer is noted and avoiding the completely masked layers.

C. Parent-Child Relation Analyzing Algorithm.

For designing the Parent-Child Relation Algorithm, I have used 4 set of conditions.

DT1 and DT2 are Data Table 1 and Data Table 2.

i. Set 1

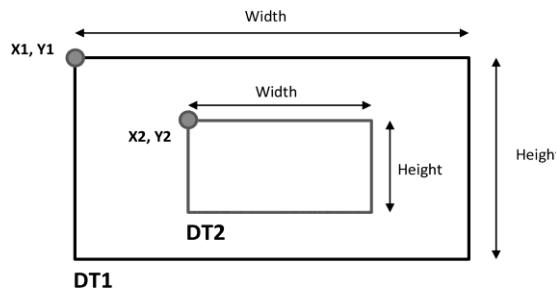
CONDITION 1:

$(DT2.X2 < DT1.(X1+width)) \&\& (DT2.X2 > DT1.X1)$

CONDITION 2:

$(DT2.Y2 < DT1.(Y1+height)) \&\& (DT2.Y2 > DT1.Y1)$

As per condition 1 and condition 2, Child is situated inside of Parent's area. Sometimes, Parent may be overlapped completely over the child. In this case, the child is discarded.



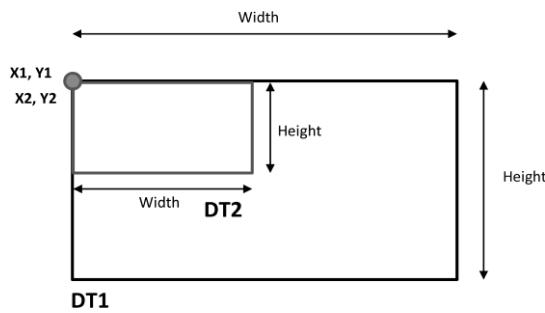
[Figure V-1, Set 1 - Condition1 and Condition2]

ii. Set 2

CONDITION 3:

$(DT1.X1 == DT2.X1) \&\& (DT1.Y1 == DT2.Y2)$

In condition 3, the x,y position of both are same. In this situation, if the order of DT2 is greater than DT1, DT2 can be considered as a child of DT1.

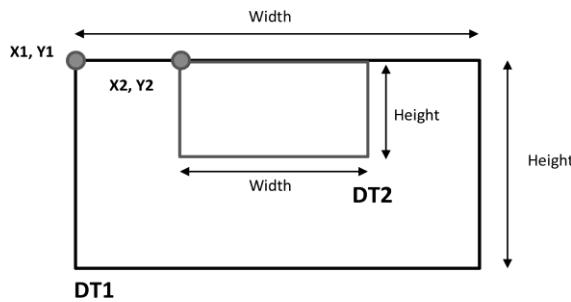


[Figure V-2, Set 2 – Condition3]

iii. Set 3

CONDITION 4:
 $(DT1.X2 > DT1.X1) \&\& (DT2.Y2 == DT1.Y1)$

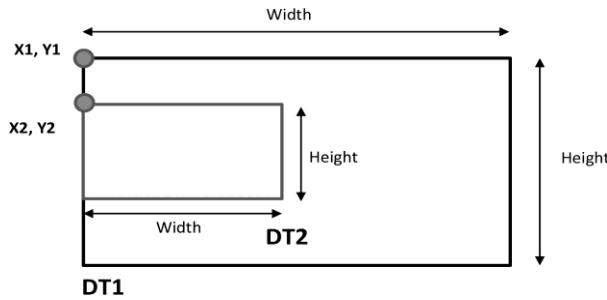
The condition 4 is denoting that the child is attached to the top of parent. In this case also we have to consider the order of layer. Higher order one become as child. The lower order one means that the second layer will be under the parent layer. That means the child layer will be hidden because of the parent is covering completely.



[Figure V-3, Set 3 – Condition4]

iv. Set 4

CONDITION 5:
 $(DT1.X2 == DT1.X1) \&\& (DT2.Y2 > DT1.Y1)$



[Figure V-4, Set 4 – Condition5]

The condition 5 is denoting that the child is attached to the left of parent. In this case also we have to consider the order of layer. Higher order one become as child.

Parent-Child Identification Algorithm

1. Data Table DT1
2. Data Table DT2 = DT1

3. FOR each element in DT1 compared with DT2 excluding the same element
4. IF CONDITION 1 AND CONDITION 2 are TRUE
5. DT1.element is the parent of DT2.element
6. DT2.element.parent = DT1.element
7. IF CONDITION 3 is TRUE AND order of DT2 is greater
8. DT1.element is the parent
9. IF CONDITION 4 is TRUE AND order of DT2 is greater
10. DT1.element is the parent
11. IF CONDITION 5 is TRUE AND order of DT2 is greater
12. DT1.element is the parent
13. END
14. SymbolTable = DT2

D. Sibling Group Analyzing.

The SymbolTable is used to analyze the Sibling Group. Parent and Multiple child details are analyzed and store to a new Data Table Structure called ChildTable. This table details will help to do the HTML and CSS coding.

Sibling Grouping Algorithm

1. Data Table SymbolTable
2. Data Table SymbolTable_copy = SymbolTable
3. FOR each element in SymbolTable compared with SymbolTable_copy
4. Skip the same element
5. SymbolTable.element of multiple children are identified
6. Storing both Parent and Child details to ChildTable
7. END

E. Identifying Overlapped Children Algorithm

The ChildTable is the input for finding the Overlapped and Normal Children. A flag is set in each row to know whether the element is Overlapped or Not.

CONDITION 6:

ChildTable_copy.(Y2+height) < ChildTable.(Y1+height)

CONDITION 7:

ChildTable_copy.(X2+width) < ChildTable.(X1+width)

Overlapped Children Algorithm

1. Data Table ChildTable
2. Data Table ChildTable_copy = ChildTable
3. FOR each element in ChildTable compared with ChildTable_copy
4. Skip the same element
5. IF CONDITION 6 AND CONDITION 7 are TRUE
6. ChildTable.element.child is a Normal Child
7. ELSE
8. ChildTable.element.child is an Overlapped Child
9. END

F. HTML Code and CSS Code Generation

The HTML Code and CSS Code Generation are almost same to as the Position Based Method but the logic is different. HTML Code and CSS Code Generation are done parallel. In Logic, no need of multiple passes. When the HTML code is generated, corresponding class and properties are also written. Parent-Child Relation table is studying and the Parent of children is collected from ChildTable.

General Algorithm

1. HierarchyCoderBuilder(InitialNode)
2. Writing HTML, CSS Codes to index and style file
3. FOR each element in ChildTable
4. Parent = ChildTable.element

```
5.      IF Parent==InitialNode
6.          Children List collected
7.          HierarchyCoderBuilder(Children)
8. END
```

HTML and CSS Code Generations are done in parallel. In Logic, there is no need of multiple pass. When the HTML code is generated, corresponding class and properties are also written.

Parent-Child Relation table is analyzing and relations are collected from Symbol Table. Corresponding HTML and CSS codes are written into index.html and styles.css files respectively. Finally compression process is there. CSS file, index HTML file and image folder is compressed and archived into a zip file. The default compression function is used to make the zip option. The file name of compressed file is hashed with date, time and folder name for avoiding duplication. This URL is given in the final page for downloading. The ZIP format may be suitable for the developer to get all together.

VI. CONCLUSION

THIS SYSTEM REDUCES THE TIME WHICH IS UTILIZED FOR MAKING HTML CODES FROM PSD DESIGNS. THIS PROGRAM CAN BE EXECUTED VERY QUICKLY. IT CAN DO 4 HUGE PROCESSES SUCH AS IMAGE CROPPING, HTML CODING, CSS CODING AND FINAL COMPRESSION WITHIN IN A SHORT TIME. THE HIERARCHICAL CODING IS OBEDIENCE SEO RULES AND CAN BE USED FOR STATIC AND DYNAMIC WEB PAGES. POSITION BASED CODING IS MAINLY USED FOR JQUERY SUPPORTED ANIMATION PAGES.

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AUTHORS

Josekutty Abraham – M.Tech Student – Computer Science, Amal Jyothi College of Engineering, Kanjirapally, Kottayam, Kerala, India. Email: vjosekutty@gmail.com

Prof. Manoj T Joy – Professor – Computer Science, Amal Jyothi College of Engineering, Kanjirapally, Kottayam, Kerala, India.
Email:

Design and Evaluation of Extended release tablet of Venlafaxine Hydrochloride using Compression coating method

K. V. Krishna, K. Satyavathi, M. Venu

Department of Pharmaceutical Technology, Koringa College of Pharmacy (Andhra Pradesh)

Abstract- Venlafaxine Hcl is an anti-depressant drug which is used in depression. The aim of present investigation was to prepare an ER tablet of Venlafaxine Hcl with similar dissolution profile matching to Effexor ER. An immediate release core tablet of 100mg was prepared and it was compression coated using HPMC matrix system. HPMC of three viscosity grades i.e., K4M, K15M, K100M and different concentrations of 15% polymer, 25% polymer, 35% polymer & 45% polymer were taken. With the above polymers by using wet granulation and direct compression process 24 formulations were prepared. The data obtained from in vitro drug release was used to determine the similarity factor between marketed and optimized product. Out of all F7 formulation (K15M 35% polymer) is optimized and is matching with the marketed product.

Index Terms- Venlafaxine Hcl, Extended release tablet, Compression coating method

I. INTRODUCTION

Venlafaxine HCl is a structurally novel antidepressant drug, and is usually categorized as serotonin-norepinephrine reuptake inhibitor (SNRI), but it is referred as serotonin-norepinephrine-dopamine reuptake inhibitor (SNDRI). Its active metabolite, O-desmethylvenlafaxine (ODV), are potent inhibitors of neuronal serotonin and norepinephrine reuptake and weak inhibitors of dopamine reuptake. Venlafaxine and ODV have no significant affinity for muscarinic, histaminergic, or α -1 adrenergic receptors in vitro. Pharmacologic activity at these receptors is hypothesized to be associated with the various anticholinergic, sedative, and cardiovascular effects seen with other psychotropic drugs. Venlafaxine and ODV do not possess monoamine oxidase (MAO) inhibitory activity. Venlafaxine is well absorbed and extensively metabolized in the liver. The half-life of Venlafaxine was 5 to 7 hours so must be given two or three times to maintain adequate plasma concentration. The present work was carried out to develop extended release venlafaxine tablet to be given once daily. The main objective of the present work was to develop a swelling matrix type drug delivery platform system for Venlafaxine HCl which will have dissolution profile similar to Effexor XR capsules. To develop a platform technology for Venlafaxine sustained release tablets using compression coating as technique for controlling drug release. Drug loaded pellets of Venlafaxine HCl were enrobed in a HPMC matrix by the compression coating technique. The cup:

cap technology was used for the compression coating due to its novelty, easy of fabrication and excellent reproducibility.

Design and Development: Venlafaxine IR Formulation:

The experimental work was performed in the following sequence:

1. Dissolution profile of the innovator product (Effexor XR) was performed to determine the target.
2. Drug loading of Venlafaxine HCl on to sugar pellets as per standardized method.
3. Preparation of coating material formulations using different viscosity grade polymers each at 15%, 25%, 35% and 45% concentration for compression coating by the wet granulation method. Characterization of the granules.
4. Compression coating of drug loaded pellets (2) with coating formulations(3)
5. Preparation of coating material formulations using different viscosity grade polymers each at 15%, 25%, 35% and 45% concentration for compression coating by the direct compression method.
6. Compression coating of drug loaded pellets (2) with coating formulations (5).
7. Dissolution profiles for compression coated tablets (4) and (6) in 0.1N HCl as per the USP method.

II. DISSOLUTION PROFILE OF EFFEXOR XR CAPSULES

The dissolution profile of Effexor XR 37.5 mg capsules was carried out on 6 units as per the following conditions:

Apparatus	: USP Type II
Media	: 900 ml 0.1N HCl
Temperature	: $37.5 \pm 0.2^\circ\text{C}$
r.p.m	: 50 rpm
Sampling time points (hours)	: 1, 2, 4, 8, 12 and 20
Analytical Method	: UV spectroscopy at 274 nm.

III. LOADING OF DRUG VENLAFAXINE HCl ON TO NON-PERIL SUGAR BEADS

The Wooster column fitted to the Niro STREA fluidized bed coating system was used to load Venlafaxine HCl on to sugar beads. The formula and process is as given below:

Table: 1 Unit Composition formula for Venlafaxine HCl Loading

S.No.	Ingredient	CF1	CF2	CF3	CF4
1	Sugar Spheres (20/25)	43.571	43.571	43.571	43.571
2	Venlafaxine HCl	42.429	42.429	42.429	42.429
3	HPMC 6 cps	2.000	3.000	4.000	5.000
4	Talc	12.500	11.500	10.500	9.500
5	Purified Water	q.s	q.s	q.s	q.s
	Total Drug Loaded Pellets	100.500	100.500	100.500	100.500

Procedure:

- 1) Venlafaxine HCl was added to 60% of the total water in a beaker and stirred till completely dissolved
- 2) To 40% of the balance water, HPMC 6 cps was added slowly with constant stirring at medium speed taking care to avoid foaming and lump formation. After the powder has been completely added, the stirring was continued at slow speed for 30 minutes to completely disperse the HPMC
- 3) Solution (2) was added to (1) under continuous stirring
- 4) Talc was added to solution (3) and stirring was continued for 60 minutes.
- 5) The dispersion was filtered thru # 200 bolting cloth to remove any lumps or extraneous matter.
- 6) The 20/25 fraction of sugar spheres were loaded into the STREA and preheated to 37 °C.

- 7) The drug dispersion (5) was sprayed at an optimum rate of 1 to 3 ml/min through 1.0 mm spray nozzle, 50°C inlet temperature and 40°C exhaust temperature. The atomizing air pressure was adjusted to 2.5 psi.
- 8) At the end of the spraying, the pellets were allowed to dry in the STREA at 55° C inlet temperature for 30 minutes.
- 9) The drug loaded pellets were analyzed for drug content and dissolution profile.

IV. FORMULATION OF COATING MATERIAL BY WET GRANULATION PROCESS

A series of granules (Table 2) with 4 levels of each of HPMC K4M, K15M and K100M were prepared by the wet granulation technique.

Table: 2 Unit Composition Formula for Coating Layer (Wet Granulation Process)

Ingredients		15% Polymer			25% Polymer			35% Polymer			45% Polymer		
		F1 (mg)	F2 (mg)	F3 (mg)	F4 (mg)	F5 (mg)	F6 (mg)	F7 (mg)	F8 (mg)	F9 (mg)	F10 (mg)	F11 (mg)	F12 (mg)
HPMC	K4M	120			200			280			360		
HPMC	K15M		120			200			280			360	
HPMC	K100M			120			200			280			360
PVP	K30	20	20	20	20	20	20	20	20	20	20	20	20

Lactose	Mono-hydrate	300	300	300	300	300	300	300	300	300	300	300	300
Avicel	PH101	348	348	348	268	268	268	188	188	188	108	108	108
Mag.	Stearate	8	8	8	8	8	8	8	8	8	8	8	8
Aerosil	200 P	4	4	4	4	4	4	4	4	4	4	4	4
Total		800	800	800	800	800	800	800	800	800	800	800	800

Wet Granulation Process:

➤ Sifting:

HPMC, Lactose and Avicel were sifted through #20mesh and Magnesium stearate was shifted #40 mesh sieve and are collected separately.

➤ Dry mixing:

Mixing of HPMC, Lactose and Avicel 101 was done in RMG (10L Capacity) for 10 min with impeller slow speed and chopper off.

➤ Binder preparation:

Povidone (PVP K30) dissolved in purified water to form binder solution.(25% w/v solution)

➤ Granulation:

Binder solution added slowly for 90 sec with chopper off. Then kneading carried out for 120 sec with chopper slow and impeller fast.

Table: 3 Granulation Sequence

Condition	Time	Impeller Speed	Chopper
Dry Mixing	1200 sec	100 rpm	0
Binder Addition	90 sec	150 rpm	0
Mixing time	60 sec	150 rpm	0
Mixing time	60 sec	150 rpm	0
Kneading Time	120 sec	150 rpm	1000 rpm
Removal	60 sec	100 rpm	0

➤ Drying:

1.Wet mass was dried in fluid bed dryer at 60°C until the loss on drying was not more than 1.2 % w/ w.
 (Determined by Moisture analyzer at 85°C)
 2.Pooled sample from different locations of Fluid Bed Dryer bowl were taken and Loss on Drying (LOD) was studied at 60°C on Moisture Balance the LOD after drying was - below 0.95% .

➤ Milling & sifting:

Dried granules were sifted through # 20 and the retentions were milled through 1.0 mm screen, medium speed with knives forward direction in comminuting mill. The milled material was sifted through # 20mesh. Process continued till all the dried granules pass through # 20 mesh

➤ Blending:

The dried granules were loaded in an Octagonal Blender, Magnesium stearate and Aerosil were added and blended for 5 minutes at 8 rpm.

The dried granules were characterized by following methods:

1. Angle of repose
2. Bulk density
3. Tapped density
4. Compressibility index
5. Hausner's ratio

Formulation of Coating material by Direct Compression Technique

A series of granules (Table: 4) with 4 levels of each of HPMC K4M, K15M and K100M were prepared by the direct compression technique.

Table: 4 Unit Composition Formula for Coating Layer (Direct Compression Technique)

Ingredients		15% Polymer			25% Polymer			35% Polymer			45% Polymer		
		F13 (mg)	F14 (mg)	F15 (mg)	F16 (mg)	F17 (mg)	F18 (mg)	F19 (mg)	F20 (mg)	F21 (mg)	F22 (mg)	F23 (mg)	F24 (mg)
HPMC	K4M	120			200			280			360		
HPMC	K15M		120			200			280			360	
HPMC	K100M			120			200			280			360
PVP	K30	20	20	20	20	20	20	20	20	20	20	20	20
Lactose	Anhydrous	300	300	300	300	300	300	300	300	300	300	300	300
Avicel	PH102	348	348	348	268	268	268	188	188	188	108	108	108
Mag.	Stearate	8	8	8	8	8	8	8	8	8	8	8	8
Aerosil	200 P	4	4	4	4	4	4	4	4	4	4	4	4
Total		800	800	800	800	800	800	800	800	800	800	800	800

Blend Preparation for the Direct Compression Technique:

➤ Sifting:

HPMC, Lactose and Avicel were sifted through #20mesh and Magnesium stearate was shifted #40 mesh sieve and are collected separately.

➤ Blending Sequence:

- (1) HPMC and PVP are loaded in the blender and mixed for 5 minutes.
- (2) The blend is unloaded and co sifted with Lactose Anhydrous.
- (3) The co sifted material is then loaded into the blender and blended for 5 minutes.
- (4) The blend is unloaded and co sifted with Avicel PH 102.
- (5) The co sifted mixture is again loaded into the blender and blended for 15 minutes.
- (6) To this, Aerosil and Magnesium stearate are added and blended for 5 minutes

V. COMPRESSION COATING (FOR BOTH PROCESSES)

Compression coating was carried out using 12.5 mm circular die punch set using the following sequence of compression

(1) 400 mg of the coating formulation was placed in the die cavity

(2) This was compressed to give a soft compact

(3) In this compact a 6 mm cavity was created.

(4) In this cavity, 100 mg of Venlafaxin HCl pellets were carefully placed (equivalent to 37.5 mg of Venlafaxine HCl)

(5) Then 400 mg of the coating material was overlaid and the final compression was carried out.

(6) The compressed tablets were evaluated for Weight, thickness, hardness, friability, Assay and dissolution profile in 0.1N HCl.

Tooling:

12.5mm hollow punch with a 6.5 mm bit

Evaluation of tablets:

Thickness:

Twenty tablets from representative sample are randomly taken and individual thickness of tablet was measured by using a digital vernier calipers. Average thickness and standard deviation values are calculated.

Hardness

Tablet hardness was measured by using the Monsanto hardness tester. From each batch six tablets were measured for hardness and the average of six values was noted along with the standard deviations.

Friability Test:

From each batch, 10 tablets were accurately weighed and then placed in the friability test apparatus (Roche friabilator). Apparatus was operated at 25 rpm for 4 minutes and tablets were observed while rotating. The tablets were then taken after 100 rotations, dedusted and reweighed. The friability was calculated as percentage weight loss.

Note: No tablet should stick to the walls of apparatus. If so, brush the walls with talcum powder. There should be no capping also.

% Friability was calculated as follows

$$\% \text{ Friability} = (W_1 - W_2)/W_1 \times 100$$

where W_1 = Initial weight of the 20 tablets.

W_2 = Final weight of the 20 tablets after testing.

Friability values below 1 % are generally acceptable.

Weight Variation Test:

To study the weight variation, individual weights (W_I) of 20 tablets from each of formulation were noted using electronic balance. Their average weight (W_A) was calculated. Percent weight variation was calculated as follows. Average weights of the tablets along with standard deviation values were calculated.

$$\% \text{ weight variation} = (W_A - W_I)/W_A \times 100$$

As the total tablet weight was 800 mg, according to USP 1996, out of twenty tablets $\pm 5\%$, variation can be allowed for not more than two tablets.

VI. IN VITRO DRUG RELEASE STUDIES

The in vitro drug release study was performed for the single- & multiple-unit tablets using USP Type II dissolution apparatus under the following conditions.

Dissolution test parameters

Medium	:	900ml of 01.N HCl
Rotation speed	:	50 rpm
Temperature	:	37±0.5°C
Sampling Volume	:	5ml

At predetermined time intervals samples (5 ml) were collected and replenished with same volume of fresh media. The drug content in the samples was estimated using UV-spectrophotometer at 271 nm.

Release kinetics:

To analyze the *in vitro* release data, various kinetic models were used to describe the release kinetics. The drug release profile obtained in dissolution test was plotted in different models.

1. Zero order rate kinetics
2. First order rate kinetics
3. Higuchi square root kinetics
4. Korsmeyer-peppas model
5. Hixson Crowell plot

Results and Discussions:

The dissolution profile for the Effexor XR 37.5 mg capsules is recorded in Table 5 and shown in Fig 1

Based on this profile the target product profile is defined as shown in Table: 5

Table: 5 Dissolution profile for Effexor XR

S.No	Time (hours)	% Drug release
1	0	0
2	1	8.3
3	2	11.5
4	4	23.35
5	8	49.4
6	12	86.85
7	20	99.15

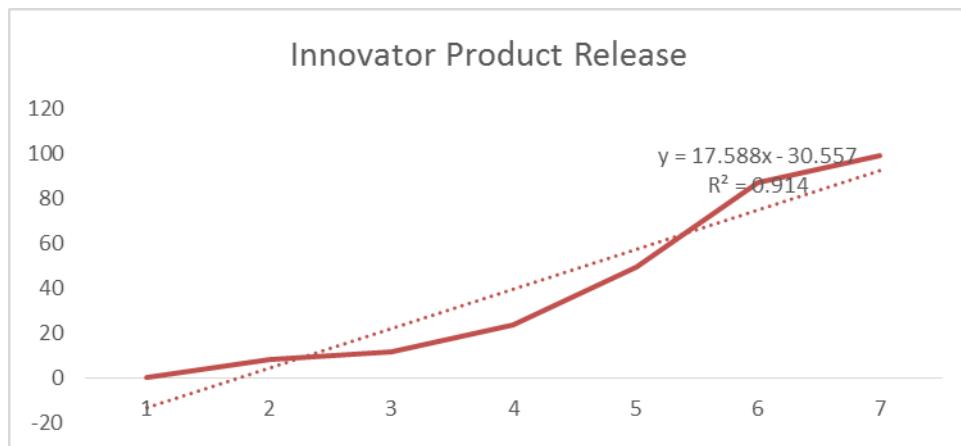


Fig: 1 Dissolution profile of Effexor ER

Assay and Dissolution profile for Drug Loaded Pellets of Venlafaxine HCl:

The assay for the drug loaded pellets was conducted by taking 100 mg of pellets (equivalent to 37.5 mg of Venlafaxin HCl) in 100 ml volumetric flask. 0.1N HCl was added and

sonicated for 30 minutes. The volume was made up to 100 ml. The sample was filtered and suitably diluted. The absorbance was measured at 274 nm and % drug content was calculated. This procedure was carried out in triplicate. The mean % drug content was 99.7%

Table: 6 Assay for Venlafacine Hcl

S.No	Time (minutes)	Mean % Drug dissolved
0	0	0
1	10	65
2	15	85
3	30	93
4	45	98
5	60	99.7

Assay for Venlafaxine HCl Pellets

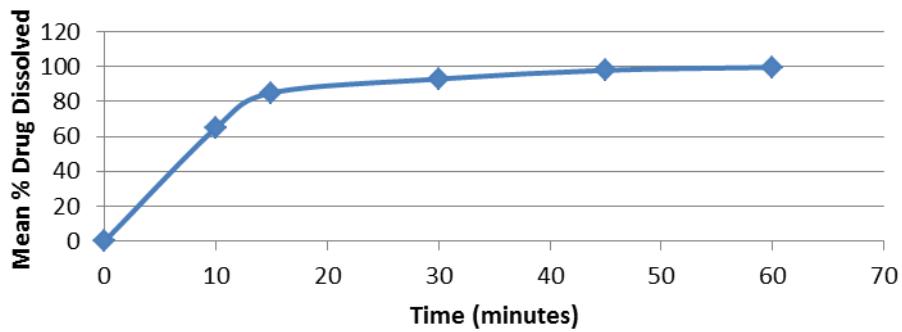


Fig: 2 Assay for Venlafaxine Hcl pellets

The dissolution profile for pellets was carried out in 0.1N HCl by directly putting 100 mg pellets in each of the dissolution vessel and sampling at 5, 10, 15, 30, 45 and 60 minutes time

points. The mean % drug dissolved was calculated and recorded in Table 7:

Table: 7 Dissolution profile of Venlafaxine Hcl pellets

Time (mins)	Mean % Drug Released				
	CF1	CF2	CF3	CF4	TPP
0	0	0	0	0	0
5	4.77	24.28	34.78	40.05	20-30%
10	11.46	58.17	58.75	62.23	55-65%
15	20.66	74.13	82.72	84.15	70-80%
30	43.78	87.82	96.69	99.19	85-95%
45	57.02	94.92	-	-	90-100%
60	63.79	100.00	-	-	-

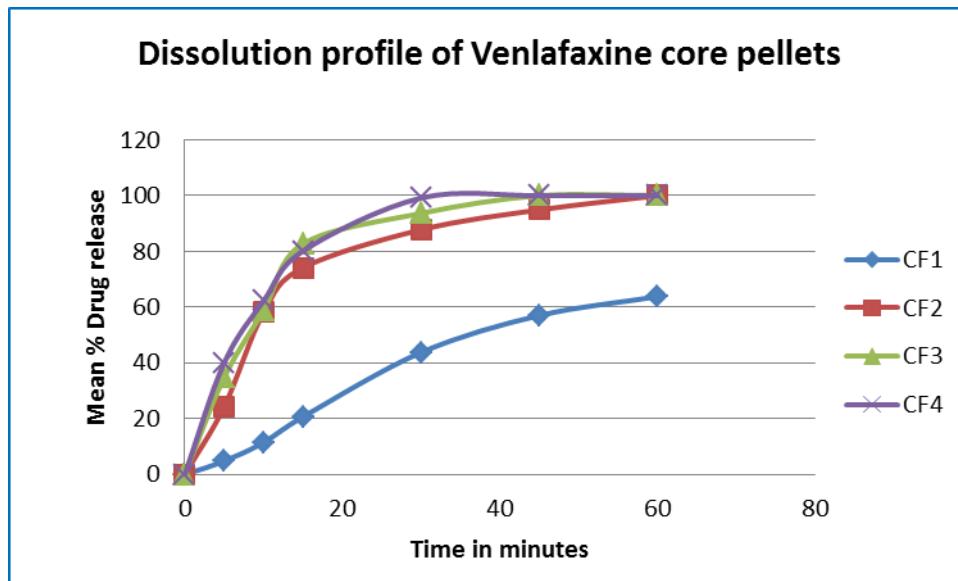


Fig: 3 Dissolution profiles of Venlafaxine core pellets at 274nm

From the dissolution profiles, CF2 follows the TPP and hence the CF2 formulation is finalized and is used further in all the following formulations for preparation of core tablets.

Formulations Prepared by Wet Granulation Technique

Table: 8 Granules characteristics for Coating Material granules

FORMULATIO N CODE:	BULK BENSITY (gm/ml)	TAPPED DENSITY(gm/ml)	COMPRESIBILIT Y (%)	HAUSNER RATIO	ANGLE OF REPOSE
F1	0.555	0.617	10.0	1.11	28
F2	0.5	0.625	20.0	1.25	39
F3	0.531	0.632	15.9	1.19	35
F4	0.555	0.632	12.2	1.13	33
F5	0.588	0.714	17.6	1.21	37
F6	0.534	0.632	15.5	1.18	34
F7	0.526	0.606	13.1	1.15	32
F8	0.5	0.613	18.5	1.22	38
F9	0.568	0.666	14.7	1.17	35
F10	0.561	0.675	16.8	1.20	36
F11	0.512	0.595	13.8	1.16	34
F12	0.502	0.519	15.0	1.03	36

Table: 9 The physical properties of tablets are recorded

FORMULATIO N CODE	Average weight range (mg)	HARDNESS†(Kg/cm ²)	THICKNESS † (mm)	FRIABILITY† (%) w/w	ASSAY* (%)
F1	922.1±2.13	6.3±0.36	6.53±0.06	0.85	99.54
F2	920.6±4.13	5.1±0.58	6.46±0.04	0.83	99.84
F3	919.5±3.13	4.5±0.63	6.54±0.07	0.99	97.44
F4	920.9±5.83	6.1±0.12	6.80±0.09	0.76	99.34
F5	924.8±6.84	5.8±0.22	6.11±0.06	1.38	97.84
F6	917.7±3.46	6.2±0.54	6.39±0.06	0.84	99.44
F7	918.3±6.22	6.6±0.83	6.86±0.05	0.88	98.24
F8	916.9±5.88	5.2±0.28	6.45±0.03	0.92	97.23
F9	922.2±3.44	6.8±0.62	6.29±0.09	0.99	97.55
F10	919.6±3.99	4.3±0.84	6.73±0.07	1.25	98.67
F11	917.8±4.44	6.6±0.32	6.59±0.01	0.99	98.36
F12	923.2±3.67	5.9±0.21	6.86±0.09	1.49	99.23

*All values are expressed as M ±SE, n=20, † All values are expressed as M±SE, n=10.

The tablets prepared by wet granulation technique showed hardness in the range of only 4 to 6 kg and friability was above 0.8% w/w.
 All the batches passed the test for assay.

Table: 10 Dissolution Profile for Venlafaxine HCl ER tablets prepared by Wet Granulation Method

Time	Effexor XR	k4M %				k15M %				k100 M %			
		15%	25%	35%	45%	15%	25%	35%	45%	15%	25%	35%	45%
	TPP	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	8.3	38.56	28.56	25.78	20.54	23.2	13.2	9.7	6.5	25.67	14.97	2.94	0
2	11.5	76.89	56.89	47.57	36.4	37.89	27.89	15.68	9.7	43.5	20.96	4.44	3.8
4	23.35	95.8	89.8	80.98	49.8	60.98	50.98	25.47	17.68	65.45	32.89	17.2	7.26
8	49.4	98.1	91.1	97.46	81.57	82.38	80.99	54.98	45.24	78.27	44.56	34.5	18.57
12	86.85	99.57	95.57	98.89	90.57	93.86	88.86	92.77	80.57	82.19	70.57	67.8	35.68

20	99.15	100	100	99.54	98.54	98.04	95.54	98.97	87.67	83.46	78.89	70.89	55.79
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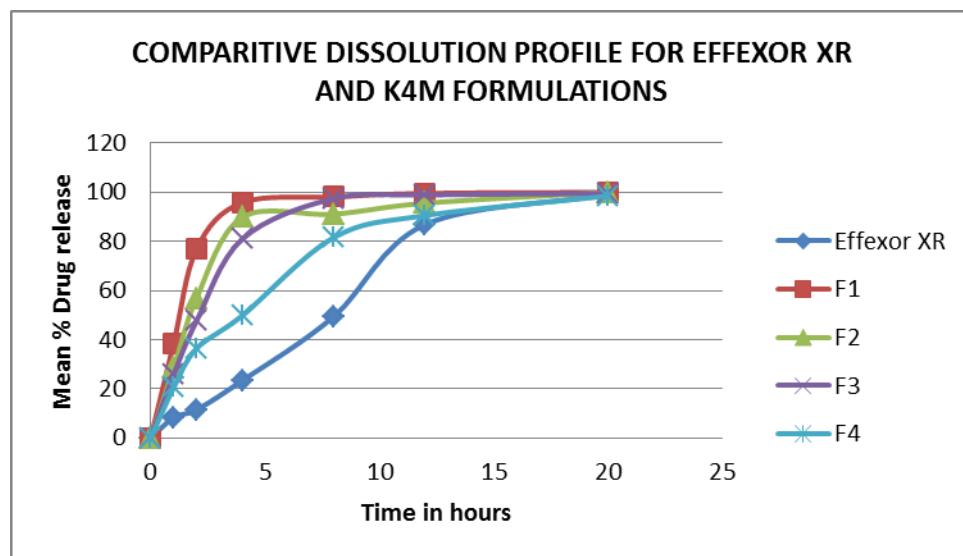


Fig: 4 Comparative Dissolution Profile of Effexor and K4M wet granulation formulations

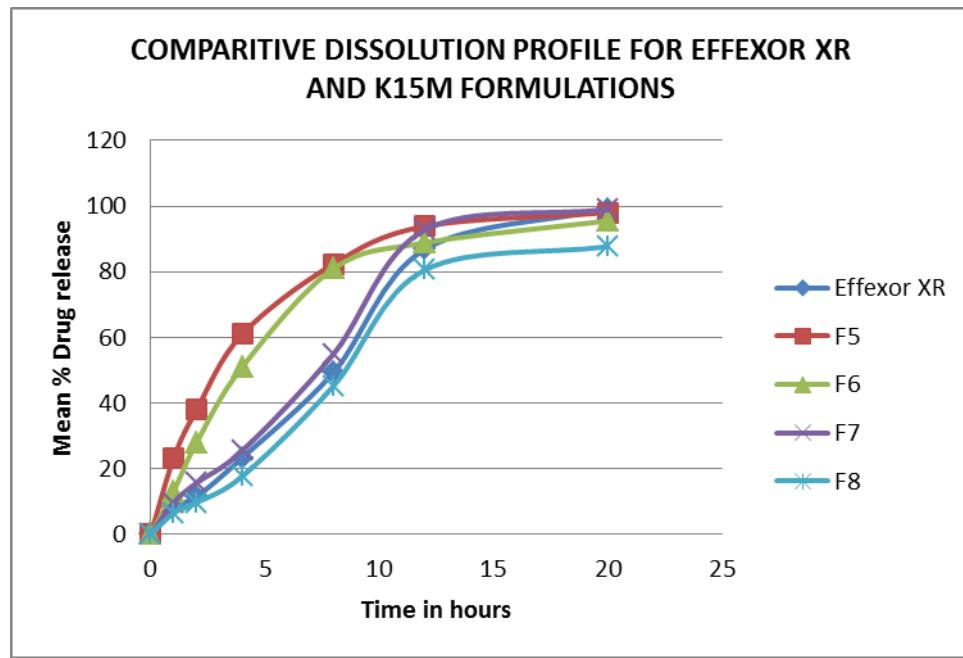


Fig: 5 Comparative Dissolution Profile of Effexor and K15M wet granulation formulations

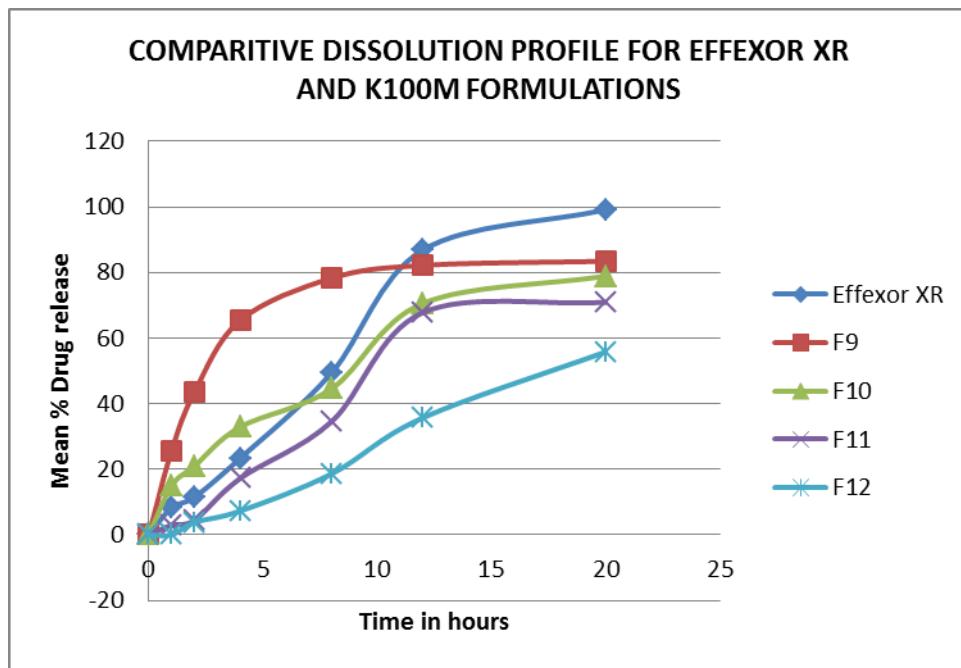


Fig: 6 Comparative Dissolution Profile of Effexor and K100M wet granulation formulations

Formulations Prepared by Dry Granulation Technique

The physical properties of the tablets prepared by direct compression are recorded

Table: 11 Physical properties

FORMULATION CODE	Average weight range (mg)	HARDNESS†(Kg/cm ²)	THICKNESS † (mm)	FRIABILITY‡ (%) w/w	ASSAY* (%)
F13	902.1±2.13	10.3±0.36	6.53±0.06	0.23	98.04
F14	910.6±4.13	7.1±0.58	6.46±0.04	0.28	97.64
F15	909.5±3.13	8.5±0.63	6.54±0.07	0.32	99.48
F16	908.9±5.83	8.1±0.12	6.80±0.09	0.36	96.00
F17	914.8±6.84	9.8±0.22	6.11±0.06	0.18	98.09
F18	927.7±3.46	8.2±0.54	6.39±0.06	0.29	97.76
F19	914.3±6.22	7.6±0.83	6.86±0.05	0.27	99.84
F20	906.9±5.88	8.2±0.28	6.45±0.03	0.38	96.21
F21	942.2±3.44	7.8±0.62	6.29±0.09	0.27	95.58
F22	913.6±3.99	8.3±0.84	6.73±0.07	0.33	99.87
F23	919.8±4.44	9.6±0.32	6.59±0.01	0.36	97.46
F24	903.2±3.67	7.9±0.21	6.86±0.09	0.27	98.29

*All values are expressed as M ±SE, n=20, † All values are expressed as M±SE, n=10.

The tablets prepared by Dry granulation technique showed hardness in the range of 7 to 10 kg and friability was below 0.3% w/w. All the batches passed the test for assay.

Table: 12 Dissolution Profile for Venlafaxine HCl ER tablets prepared by Direct Compression Method

Time	Effexor XR	k4M %				k15M %				k100 M %			
		15%	25%	35%	45%	15%	25%	35%	45%	15%	25%	35%	45%
TPP	F13	F14	F15	F16	F17	F18	F19	F20	F21	F22	F23	F24	

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	8.3	35.68	24.56	19.78	15.44	20.21	10.34	7.73	4.55	25.67	9.81	1.84	0	
2	11.5	66.89	47.89	35.57	25.43	30.89	17.89	9.68	7.81	46.13	18.59	5.19	2.17	
4	23.35	85.8	69.56	60.98	37.81	55.98	47.39	20.41	12.67	64.71	28.47	19.71	11.35	
8	49.4	90.1	81.78	87.46	78.63	78.38	70.27	44.97	40.24	78.29	34.59	30.54	19.27	
12	86.85	95.57	90.57	98.89	87.57	83.86	80.86	80.16	78.51	82.19	69.16	61.83	31.45	
20	99.15	99.47	98.68	99.54	98.54	99.04	97.54	98.97	93.19	87.67	79.37	71.48	63.28	

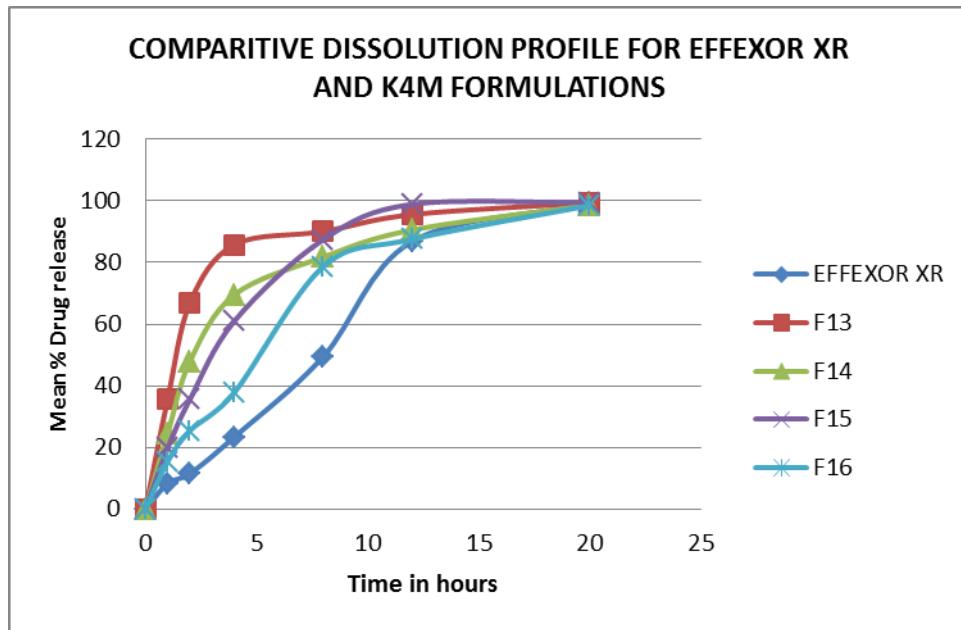


Fig: 7 Comparative Dissolution Profile of Effexor and K4M Direct compressed formulations

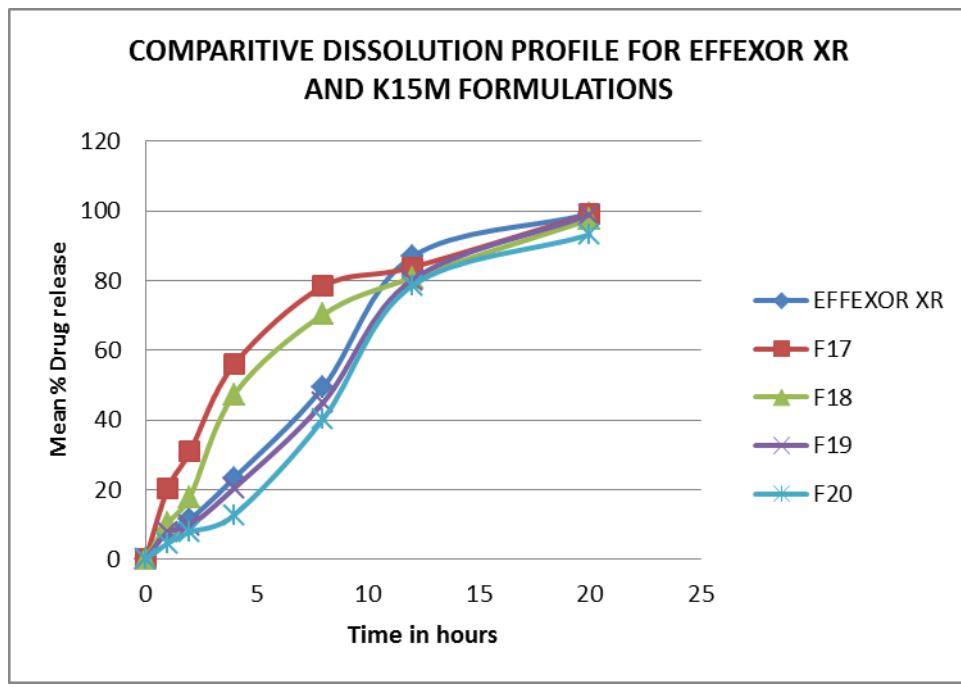


Fig: 8 Comparative Dissolution Profile of Effexor and K15M Direct compressed formulations

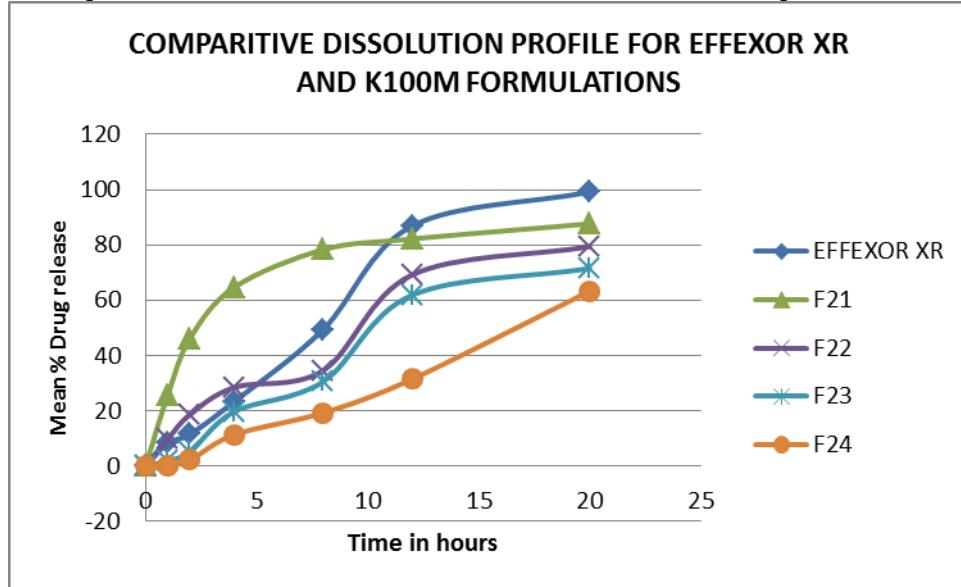


Fig: 9 Comparative Dissolution Profile of Effexor and K100M Direct compressed formulations

From the Dissolution profiles of the 24 formulations, F7 formulation containing K15M 35% prepared by Wet granulation showed better release values to the Targeted product EFFEXOR XR 35mg.

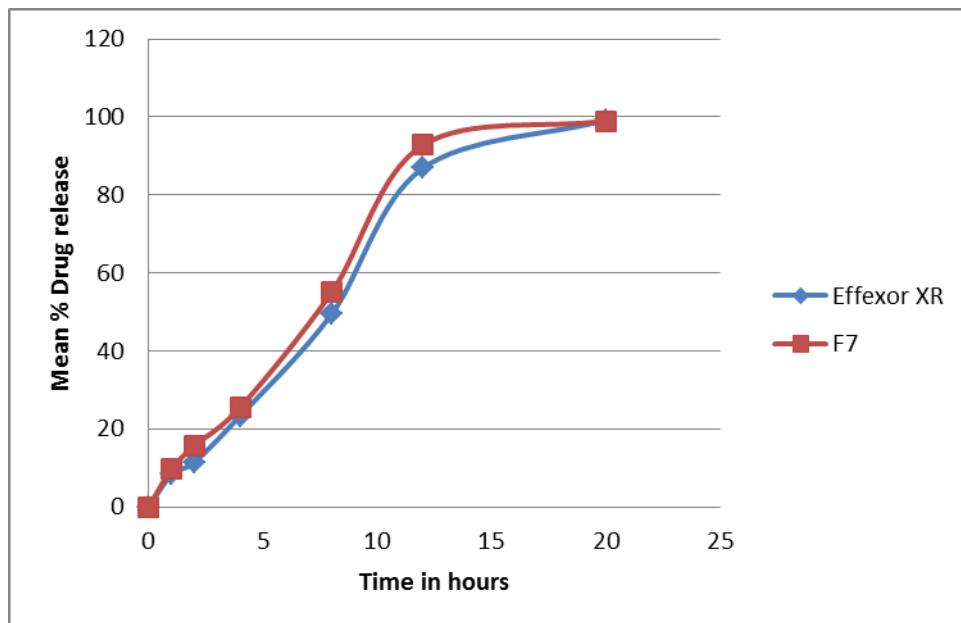


Fig: 10 Comparative Dissolution Profile of F7 with Effexor XR

RELEASE KINETICS OF EFFEXOR XR AND F7 FORMULATION:

Release kinetics of EFFEXOR XR:

Table: Release kinetics of Effexor XR

RELEASE KINETICS					
	ZERO	HIGUCHI	PEPPAS	FIRST	Hixson Crowell
	1	2	3	4	5
	R(CvT)	R(CvRoot(T))	Log T vs Log C	TIME vs LOG % REMAINING	TIME Vs (Q1/3-Qt1/3)
Slope	5.344	24.936	0.959	-0.017	0.190
Correlation	0.9718	0.9614	0.9879	-0.9640	0.9880
R 2	0.9444	0.9243	0.9759	0.9293	0.9761

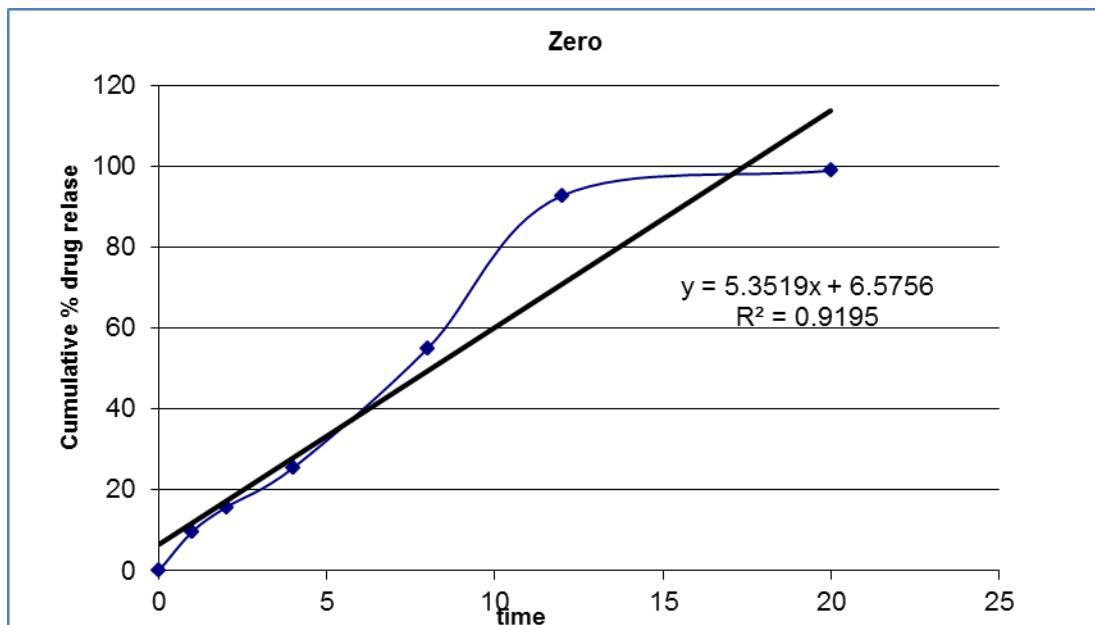


Fig: 11 Zero order plot for Effexor XR

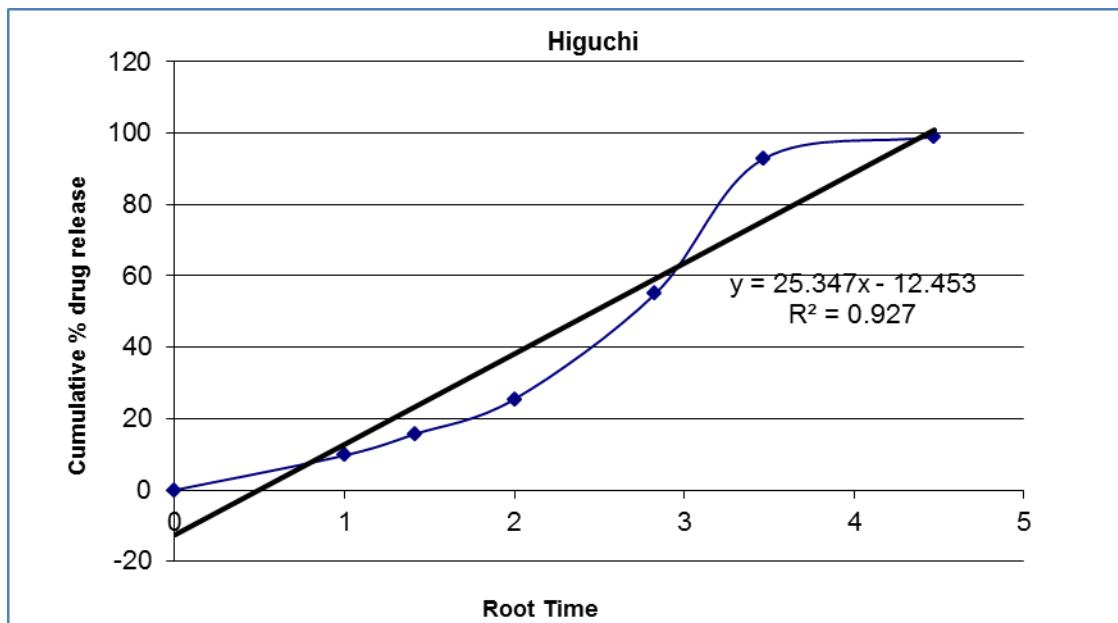


Fig: 12 Higuchi plot for Effexor XR

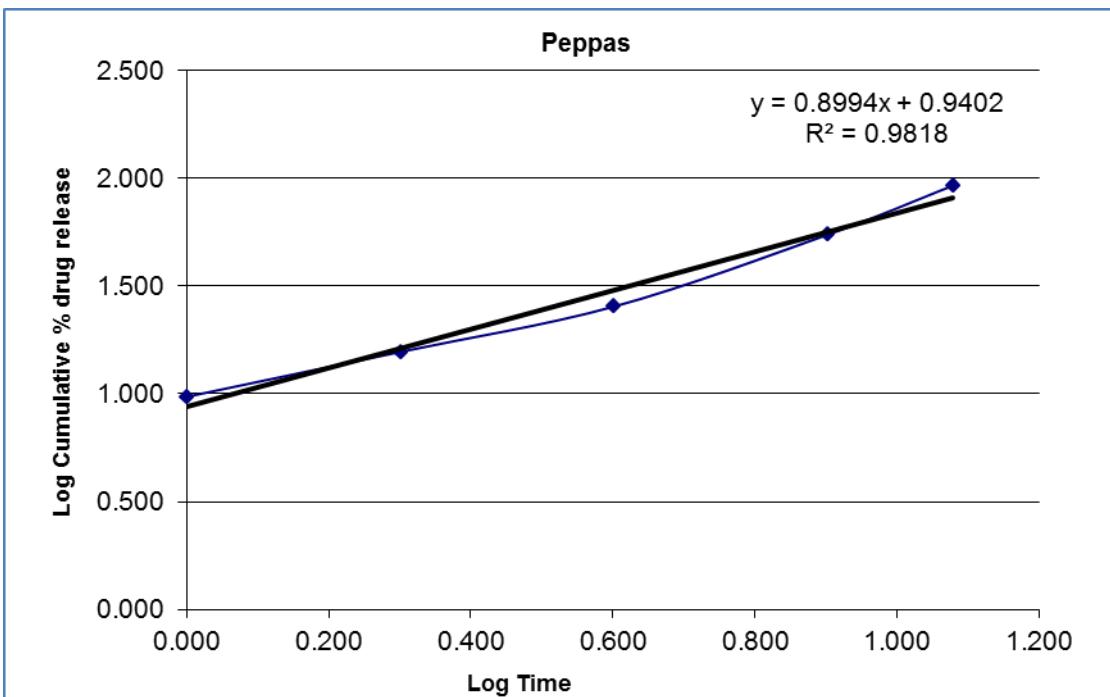


Fig: 13 Peppas plot for Effexor XR

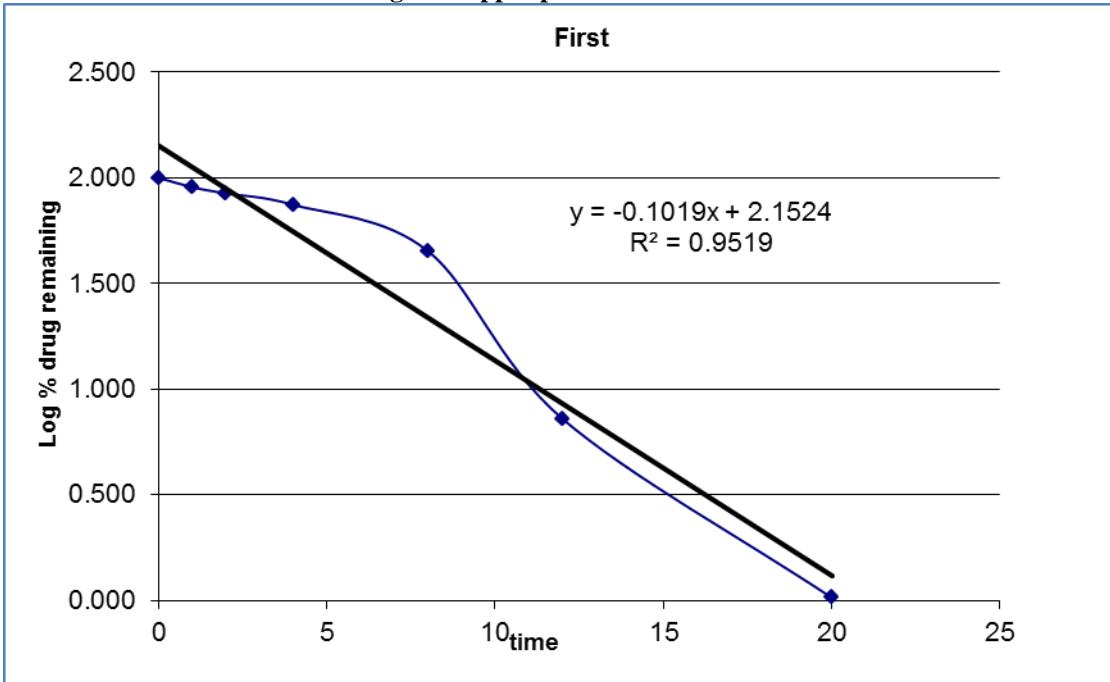


Fig: 14 First order plot for Effexor XR

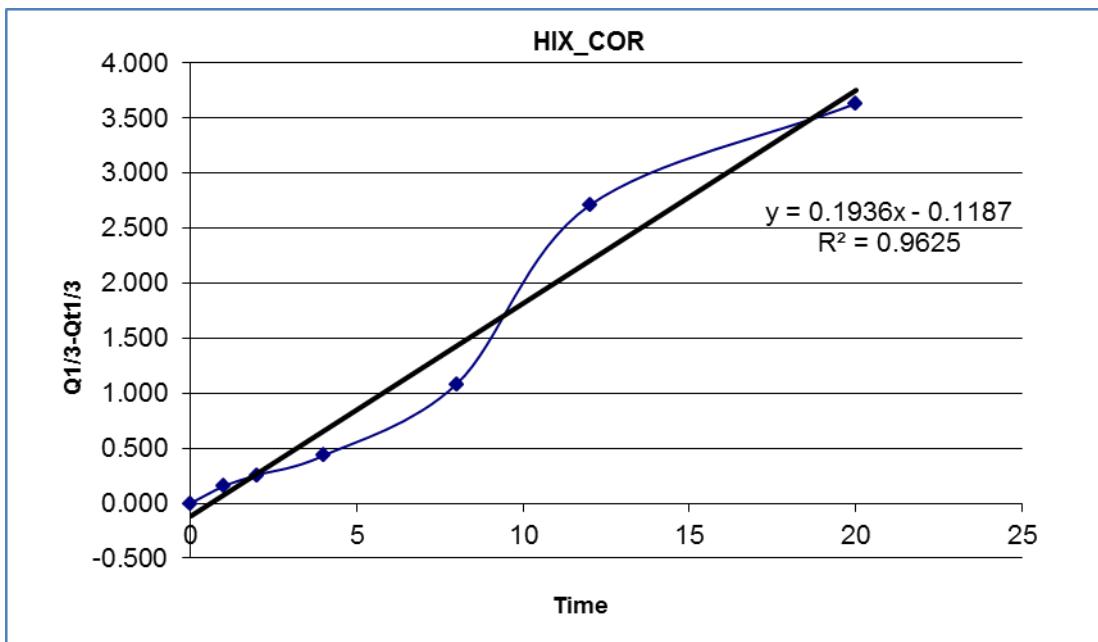


Fig: 15 Hixson Crowell plot for Effexor XR

Release kinetics of F7 formulation:

Table: Release kinetics of F7 formulation

RELEASE KINETICS					
	ZERO	HIGUCHI	PEPPAS	FIRST	Hixson Crowell
1	2	3	4	5	
R(CvT)	R(CvRoot(T))	Log T vs Log C	TIME vs LOG % REMAINING	TIME Vs (Q1/3-Qt1/3)	
Slope	5.352	25.347	0.899	-0.017	0.194
Correlation	0.9589	0.9628	0.9909	-0.9757	0.9811
R²	0.9591	0.9270	0.9818	0.9319	0.9625

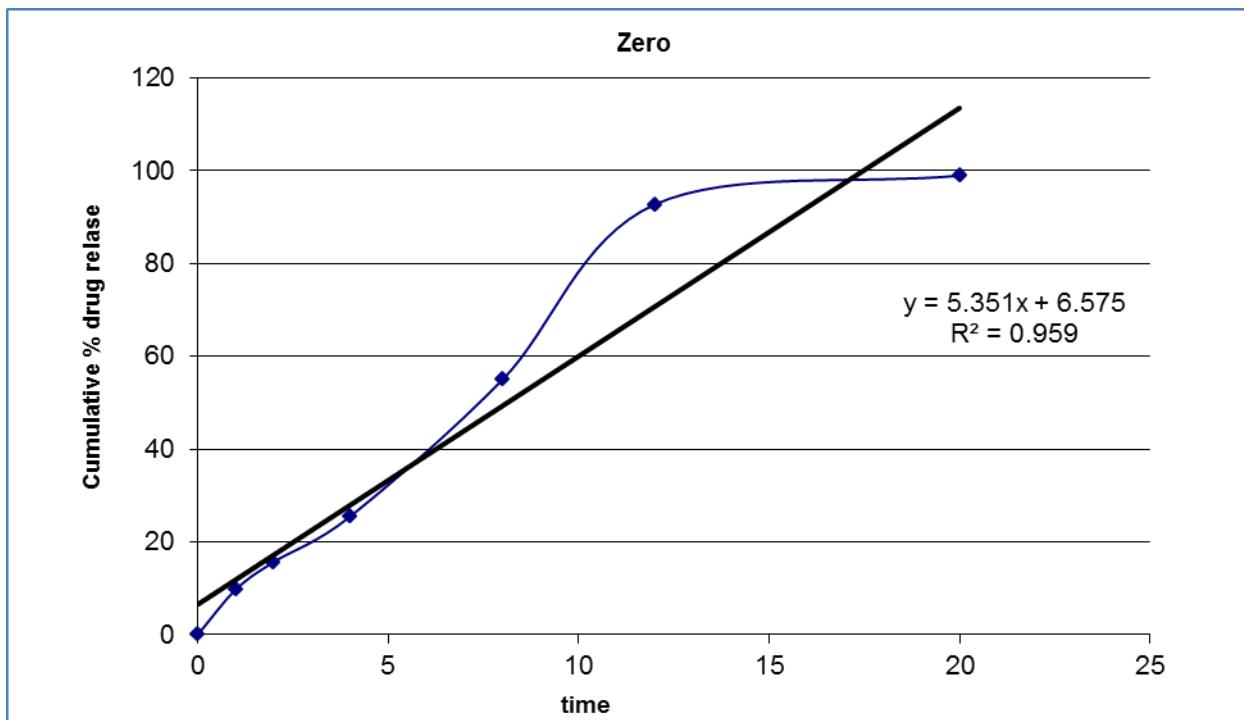


Fig: 16 Zero order plot for F7 formulation

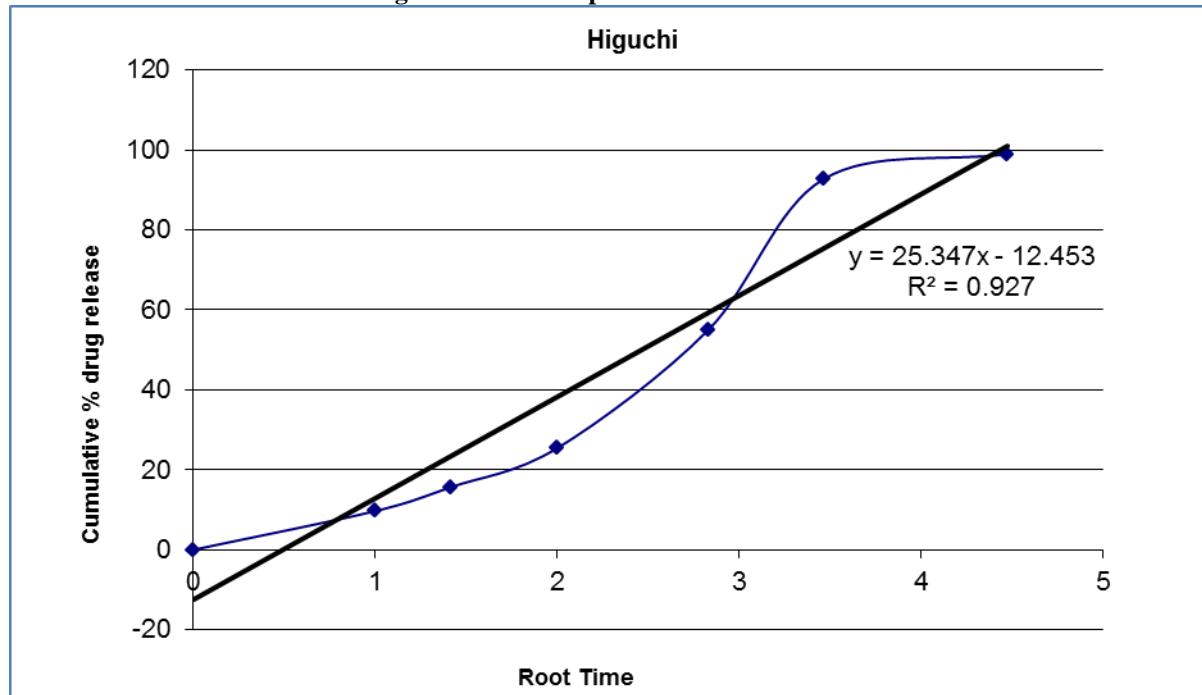


Fig: 17 Higuchi plot for F7 formulation

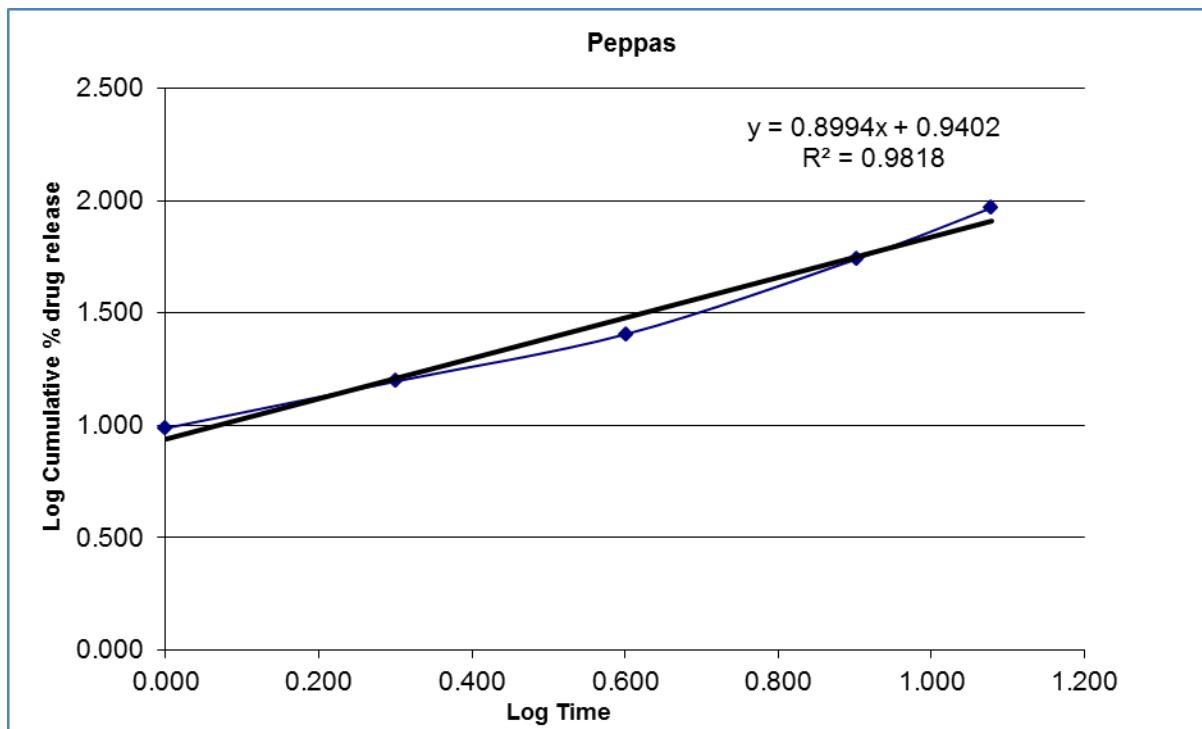


Fig: 18 Peppas plot for F7 formulation

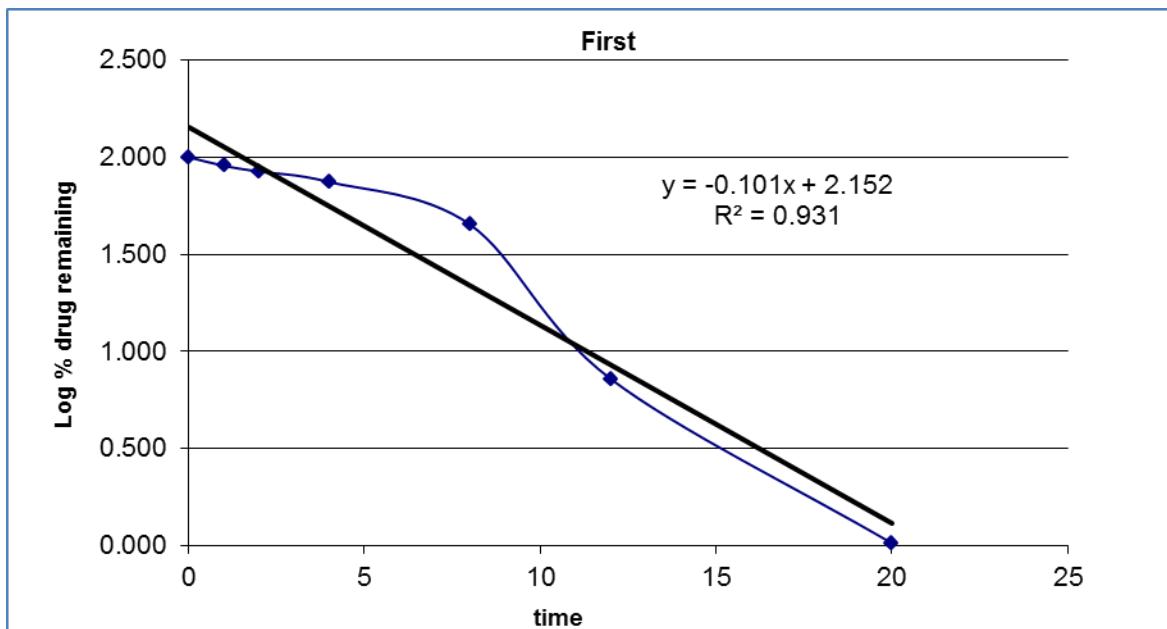


Fig: 19 First order plot for F7 formulation

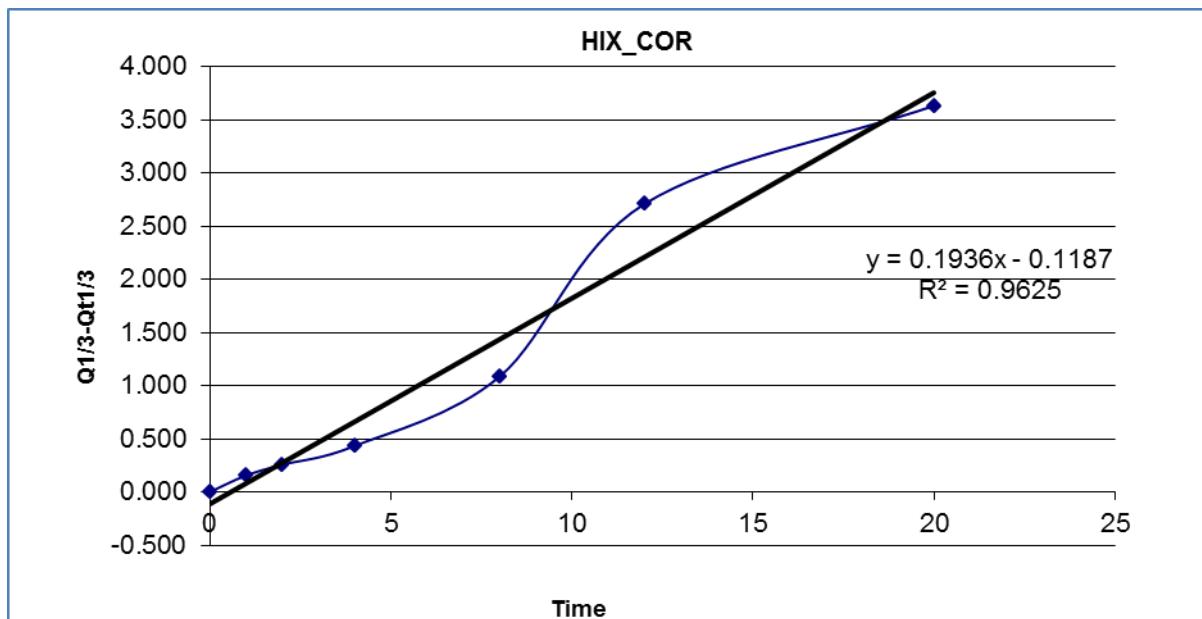


Fig: 20 Hixson Crowell plot for F7 formulation

Comparison of Release kinetics of F7 with EFFEXOR XR:

FORMULATION CODE	ZERO ORDER		FIRST ORDER		HIGUCHI		KORSEMAYER -PEPPAS		
	R ²	K	R ²	k	R ²	k	R ²	k	n
EFFEXOR	0.944	5.344	0.929	0.017	0.924	24.93	0.975	0.959	0.987
F7	0.959	5.351	0.931	0.227	0.927	25.34	0.981	0.899	0.940

Kinetic analysis of release data

To understand the rate and mechanism of drug release from optimized tablet formulation, dissolution data was fitted into different release kinetic models. Both the formulations follow Zero order kinetics. The model that best fitted the release data was selected based on the correlation coefficient value (R^2) obtained from various kinetic models. *In vitro* drug release profile from the formulations could be best expressed by Korsmeyer-Peppas equation as plot showed linearity with R^2 value 0.975-0.981. In Korsmeyer-Peppas equation, linear plot was obtained for optimized formulation with more correlation coefficient (R^2) value 0.981 than marketed product. It was concluded that the optimized formulation followed mixed mechanism of diffusion and erosion so called anomalous diffusion mechanism for drug release.

F7 formulation showed better release kinetics than EFFEXOR XR.

VII. CONCLUSION

The results showed significant effect on the release of drug from the tablets. Formulation F7 was selected as promising formulation and was found that formulation released the drug

90% in 12 hour. From drug release kinetic study we can conclude that optimize batch K15 (35%) is matching the innovator product. This was further concluded from the similarity factor (f2), which was found to be 68.25

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AUTHORS

First Author – K. V. Krishna, Department of Pharmaceutical Technology, Koringa College of Pharmacy (Andhra Pradesh)

Second Author – K. Satyavathi, Department of Pharmaceutical Technology, Koringa College of Pharmacy (Andhra Pradesh)

Third Author – M. Venu, Department of Pharmaceutical Technology, Koringa College of Pharmacy (Andhra Pradesh)

Biokinetic Study on Chromium Removal from Textile Wastewater Using Azadirachta Indica as a Low Cost Adsorbent

*Gnanambal.V **Asha.B ***Bhuvaneswari.A

* PG Student, Department of Civil Engineering, Annamalai University, Annamalai Nagar.
** Assistant Professor, Department of Civil Engineering, Annamalai University, Annamalai Nagar.
*** Assistant Professor, Department of Civil Engineering, Annamalai University, Annamalai Nagar.

Abstract- The Contamination of water by toxic heavy metals through the discharge of Industrial wastewater has been causing worldwide concern in the last few decades. Metals that is significantly toxic to human beings and ecological environments. The concentrations of toxic metals in wastewater effluent are higher than permissible discharge levels. Because of all these reasons and some definite regulations measures of precaution, it becomes necessary to remove the heavy metals from wastewater by an appropriate treatment before releasing them into the environment. Azadirachta Indica is used as an adsorbent for the removal of heavy metals from the textile wastewater. The adsorbent exhibits very high adsorption potential for removal of chromium which was achieved maximum at 90% in pH of range 1 to 10. The equilibrium data were fitted well by the Freundlich and Langmuir isotherm models.

Index Terms- Adsorption, pH, Chromium, Azadirachta Indica, isotherm, Biosorbent

I. INTRODUCTION

The industrial wastewater discharged to the ground water after various chemical treatment processes are found to have more toxic effect due to the presence of chemicals. Biosorption is one of the established unit operations used for the treatment of contaminated water such as raw water and wastewater. Adsorption studies are usually conducted over batch studies and column studies. Even though the most promising adsorbent for adsorption is activated carbon, which has a high surface area and a high adsorption capacity, it is very expensive, has high operation costs and there is a need for regeneration after each adsorption cycle (H.Marsh and F.Rodriguez-Reinoso, 2006) and (I.Ali and V.K. Gupta, 2007). Activated carbon is the most used adsorbent. Due to its high cost and considering the enormous quantity of effluent produced by textile industries, researchers are turning toward the use of alternative adsorbents also called non-conventional low-cost adsorbents.

Different methods of treating wastewater containing heavy metal ions have been developed over years which include coagulation, ion-exchange, membrane separation, electro flotation, etc (C. Namasivayam and K. Ranganathan, 1995). However, most of these techniques have some disadvantages such as complicated treatment process, high cost, and energy use. Among these methods, adsorption is a much preferable technique

for the removal of heavy metals from polluted water compared to others due to ease of operation and cost-effective process (S. Saxena and S.F.D, Souza, 2006). The removal and recovery of heavy metals from wastewater is significant in the protection of the environment and human health. (Kaewasarn,2002). The inadequate disposal of wastewater contaminated with heavy metals presents a very serious environmental problem, being a risk to the aquatic ecosystems and to human health. (Amarasinghe and Williams, 2007). The present study tends to investigate Neem (Azadirachta Indica) leaves as a low cost adsorbent for the removal of chromium from textile wastewater.

II. MATERIAL AND METHODS

Fresh Azadirachta Indica Leaf

The Neem tree of family Meliaceae is native to the Indian sub-continent, and its leaves and seeds have been used traditionally to treat a number of human ailments and also as a household pesticide. The tree is known as an air purifier and different parts of the tree such as leaves, bark and seeds have been reported to possess a variety of medicinal and germicidal properties.

The Mature Azadirachta indica leaves were collected from a number of tall trees in Veerananallur, Cuddalore Dt.

The raw Azadirachta indica leaves contain the following characteristics:

22.9%	Moisture content -	59.4%
	Carbohydrates	-
6.2%	Proteins	7.1%
	Fibre	-
1.0%	Minerals	3.4%
	Fats	-

Preparation of Biosorbent

The mature Azadirachta indica leaves were thoroughly washed with distilled water three to four times to remove dust and other impurities and were allowed to dry first at room temperature in a shade and then in an oven at 60°C till the leaves became crisp that could be crushed into a fine powder in a mechanical grinder and then screened. Dried Azadirachta indica leaves powder is keeping in plastic containers stored in

humidifier for further use. This fine powders were used as an biosorbent. In the present study the powdered materials in the range of 300 microns of average particle size were then directly used as biosorbent without any pretreatment.

Biosorption Study

A known quantity of biomass is taken and added with the industrial wastewater and the mixture is placed over the mechanical shaker. The samples were taken out at a specific duration of time and centrifuged at 1000 rpm for 15min. The supernatant liquid was separated low residual Chromium ions is analyzed by Atomic Adsorption Spectrophotometer.

Sampling Data

The textile dye waste samples were collected from the Loyal Superfabrics Private Limited, Cuddalore District. The analysis of parameter was carried out in accordance with Standard Methods, APHA (2000).

The adsorption capacity of the biosorbent at equilibrium was calculated using the equation.

$$q_e = \frac{(C_0 - C_e)V}{m}$$

where

q_e = Adsorption capacity of the biosorbents at equilibrium (mg/g)

C_0 = The initial concentration of the adsorbate in solution (mg/l)

C_e = The equilibrium concentration of the adsorbate in solution (mg/l)

V = The volume of the solution (l)

m = The Mass of the biosorbent used (g)

III. RESULTS AND DISCUSSION

Effect of Adsorbent

The percentage adsorption of the dye, on Neem Leaf Powder for removal of Chromium at pH 7 was (0.5gm, 1gm, 1.5gm and 2gm) depicted in Fig. 1. Neem Leaf Powder dose of 0.5gm showed 68.57% removal at 30 minutes contact time but the adsorption increased to 88.5% for 150 minutes. On the other hand, if the Neem Leaf Powder dose was increased to 2.0gm, the adsorption % was achieved from 85.24 to 90% at 150 minutes.

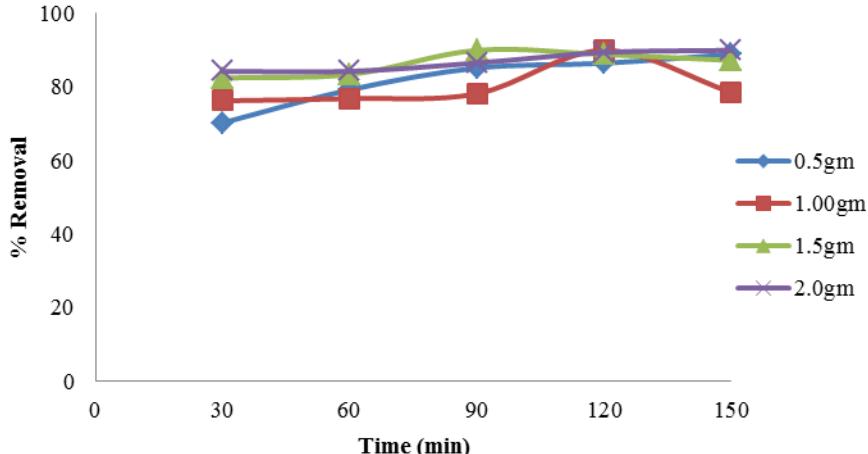


Fig.1 Characteristics curves on Time Vs % removal effect of Cr for Neem Leaf powder (NLP)

Influence of pH

The solution pH is one of the parameter having considerable influence on the biosorption of metal ions, because the surfaces changes density of the adsorbent and the charge of the metallic specimen present on the pH. In the present work, the extend of Chromium biosorption was investigated in pH range 1 to 10 with a constant amount of Neem leaf powder for 0.5gm/100ml. A

maximum chromium of 86.6% (10mg/g) was reported at pH=3 onto treated sawdust (Volesky et al., 1995) as pH was varied from 2 to 10. The results are shown in Fig. 2. The percentage removal of the metal was increased from 70.30 to 88.95% for 0.5gm/100ml and percentage. Biosorption was increased steeply from 84.28 to 90.00% (2gm/100ml) as pH increase from 1 to 7.

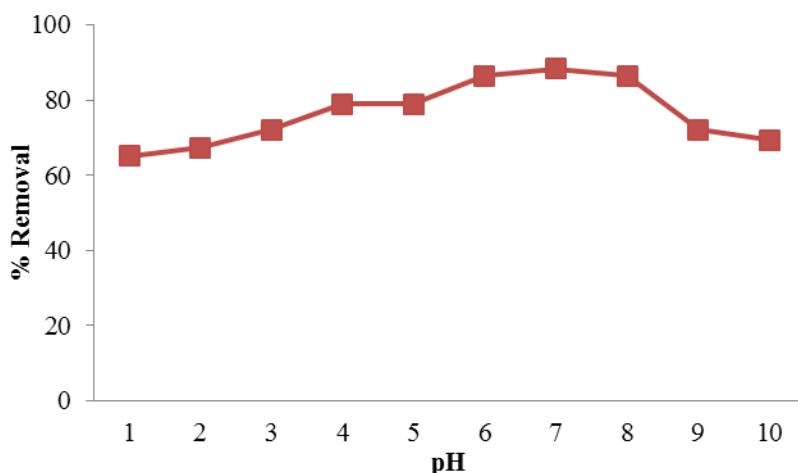


Fig. 2 Characteristics curves on pH Vs % removal of Cr for Neem Leaf Powder

Effect of Adsorbent Dosage

The % removal of chromium was increased with the increase in adsorbent dosage. In case of Neem, the % removal was

increased from 70.30% to 90% as the amount of Neem powder increased from 0.25 gm/L to 2 gm/L as shown Fig.3.

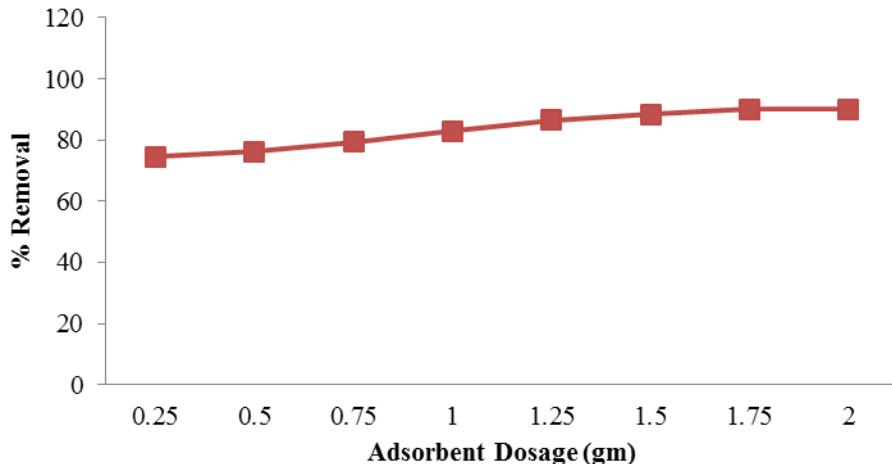


Fig.3 Characteristics curves on effect of dosage Vs % removal of Cr for Neem Leaf Powder Kinetics of biosorption

Freundlich isotherm

The Freundlich equation predicts that the concentrations of metal ion on the adsorbent will increase as long as there is an increase in the metal ion concentration in liquid, as represented by Eq.(1).

where x/m is the mass of adsorbate adsorbed per unit mass of adsorbent, K_F is Freundlich capacity factor, C_e is equilibrium concentration of adsorbate in solution after adsorption and $1/n$ represents Freundlich intensity parameter. The constants in Freundlich isotherm can be determined by plotting $\log (x/m)$ versus $\log C_e$ from the best-fit straight line.

Langmuir isotherm

The Langmuir adsorption isotherm assumes that the adsorbed layer is one molecule in thickness and that all sites are equal, resulting in equal energies and enthalpies of adsorption. The sorption data were analyzed according to the linear form of the Langmuir isotherm, as represented in Eq (2).

where x/m is the mass of adsorbate adsorbed per unit mass of adsorbent, C_e is equilibrium concentration of adsorbate in solution after adsorption, a is a Langmuir constant which is a measure of adsorption capacity expressed in mg/g and b is also a Langmuir constant which is a measure of energy of adsorption expressed in 1/mg.

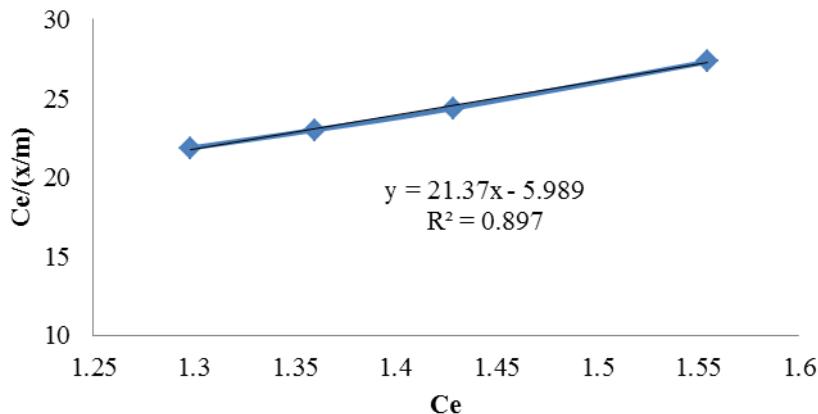


Fig.4 Linearised Langmuir isotherm plot for the adsorption of Cr by Neem Leaf powder

$$\text{Intercept } a = -2.817$$

$$\text{Slope } b = 19.128$$

$$Ce(x/m) = -0.0185 + 0.052Ce$$

Langmuir Isotherm characteristics

SYSTEM	a in (l/mg)	b in (mg /g)	Ce (x/m) = 1/(ab) + (1/b) Ce	R ²
Neem leaf powder	14.538	0.1054	Ce(x/m) = -0.0185 + 0.052Ce	0.897

$$\text{Log}(x/m) = \log k + (1/n) \log Ce$$

The intercept 1/n is the estimation of the sorption capacity and K is an estimate of sorption intensity.

Freundlich adsorption isotherm

The experimental results are shown in Fig.5 and fitted in Freundlich model.

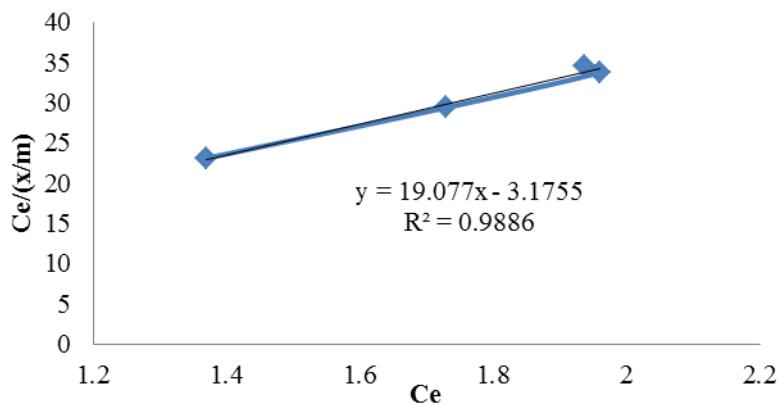


Fig. 5 Linearized Freundlich Isotherm plot for the adsorption Cr by Neem leaf powder

$$\text{Intercept } k = -3.175$$

$$\text{Slope } 1/n = 19.07$$

$$\log(x/m) = \log k + (1/n) \log Ce$$

$$\log(x/m) = 0.50 + 19.07 \log Ce$$

Freundlich Isotherm characteristics

SYSTEM	K	1/n	R ²
Neem leaf powder	-3.175	19.07	0.9886

Neem leaf powder	-3.175	19.07	0.988
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Comparison of Isotherm characteristic for heavy metal

Adsorbent	Heavy metal	Langmuir Isotherm	Freundlich Isotherm	R ² Langmuir Isotherm	R ² Freundlich Isotherm
Neem leaf powder	Chromium	Ce(x/m)= 0.0185+0.052Ce	- Log (x/m) =0.50+19.07 log Ce	0.897	0.988

IV. CONCLUSION

In the present study, Bisoprtion experiments for the removal Cr ions from aqueous solutions have been carried out using dried neem leaf as low cost and natural available adsorbents. It was found that the biosoprtion was rapid and increased by the decrease in biosorbent average particle size. The adsorption isotherm data was satisfactory explained by Langmuir and Freundlich isotherm models. The frendlich isotherm had been well fitted the bisorption of Cr with chemically modified neem leaf powder. Among the various desorbing agents tested, 90.0% Cr recovery was achieved with 2 gm for Neem Leaf Powder. The overall results indicated that Neem Leaf Powder is an effective low cost biosorption for the removal of chromium from the textile wastewater. The equilibrium data was anlaysed used Langmuir, Freundlich equation. Their results shows that the experimental data are best correlated by Freundlich isotherm.

AUTHORS

First Author – Gnanambal.V, PG Student, Department of Civil Engineering, Annamalai University, Annamalai Nagar.
Second Author – Asha.B, Assistant Professor, Department of Civil Engineering, Annamalai University, Annamalai Nagar.
Third Author – Bhuvaneswari.A, Assistant Professor, Department of Civil Engineering, Annamalai University, Annamalai Nagar.

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Dalit Reservation and the Issue of Social Upliftment: An Overview

Anindita Mondal

I. INTRODUCTION

“**D**alit” is the name which the people to those castes at the very bottom of India’s caste hierarchy have given themselves. Formerly they were known as untouchables, because their presence was considered to be so polluting that contact with them was to be avoided at all costs. The official label for them has been Scheduled Castes, because if their caste is listed on the government schedule, caste members become eligible for a number of affirmative action benefits and protections.

The SCs and STs are the only two social groups that are eligible for reservations in legislatures, both at the Central and State levels. Based on the percentage of their population in each state, the Constitution explicitly permits reservations for SCs and STs in Parliament and State assemblies, as also in public employment and educational institutions funded by the State; it also provides for the creation of the body to monitor all these safeguards.

The present study focuses attempts to examine if these privileges, “protective discrimination” as this is called, could change the social status of ‘Dalits’ and facilitate their social upliftment. The first section deals with the meaning of ‘Dalit’. Identity formation of Dalits in different times and by different reformers is the substance of the second section. And the issue of reservation and its impact on Dalits are the essence of the third section.

Dalit: Meaning

The underprivileged sections, especially the “bahujans” and the “dalits” have had a history of struggle in challenging “given” identities and furthermore constructing their own alternative identities and political concepts to fulfil the requirements of contemporary times. In this discourse “dignity of the self” became the outcry for targeting the nature of the existing social control. Dalits, differing from the mainstream political discourse, are demonstrating a new path for social and political transformation. Both the modern Buddhists and the new aggressive dalit political elites reject all “the given” liberal identifications and “cultured” nomenclatures, eventually constructing a social robust political identity in the public domain (Wankhede, 2008).

The word “Dalit” comes from the Marathi language, and means “ground”, “suppressed”, “crushed”, or “broken to pieces”. The term expresses their “weakness, poverty and humiliation at the hands of the upper castes in the Indian society” (Geetanjali, 2011). Gandhi coined the term “Harijan”—“Children of God” for them. The harijan nomenclature is considered pejorative by some leaders of the castes. They prefer to be called dalit. Occupying the lowest rank in the Hindu caste system, they are called Avarna, those whose place is outside the chaturvarna system.

They are also known as perial, Panchama, atisudra, Antyaja or Namashudra in different parts of the country. Their touch, and sometimes their shadows and even their voices are believed to pollute caste-Hindus (Shah, 2004: 118). The term “Scheduled Caste” is the official term used in Indian government documents to identify former “untouchables”. However, in 2008 the National Commission for Scheduled Castes, noticing that “Dalit” was used interchangeably with the official term “scheduled castes”, called the term “unconstitutional” and asked state governments to end its use (Geetanjali, 2011: 1-2). The SCs constitute 16 percent of India’s population.

In the context of traditional Hindu society, Dalit status has often been historically associated with occupation regarded as ritually impure, such as any involving leather work, butchering, or removal of rubbish, animal carcasses, and wastes. Dalits work as manual labourers cleaning streets, latrines and sewers. Engaging in these activities was considered to be polluting to the individual and this pollution was considered contagious. As a result, Dalits were commonly segregated, and banned from full participation in Hindu social life (Geetanjali, 2011). For example, they could not enter a temple. Elaborate precautions were sometimes observed to prevent inadvertent contact between Dalits and other castes. These included obliging them to live in separate hamlets, use separate wells to draw water, imposing prohibition on the wearing of certain items of clothing or ornament which were deemed to convey dignity or status. In some areas, low caste women were forbidden to wear blouse under their Sarees. Similarly, in many areas, untouchable children have found it difficult to attend school because the high castes do not take it positively. The precise degree of social distance between the high castes and these excluded groups varies locally (Sharma, 2002: 48).

Though the visible practice of untouchability has declined—certainly in public spheres—incidents of atrocities against Dalits have not shown a similar downturn and continue unabated in post-independent India in various forms—murder, grievous hurt, arson and rape. Caste prejudice often contribute, but are not solely responsible for the atrocities against Dalits. Conflicts over material interests and political power contribute a great deal to such incidents (Shah, 2001: 20).

Social reformers differ in their view regarding ‘untouchables’. They have always stood against this evil practice. They have tried to make understand people about the irrationality of this custom. Besides, they have given different alternative identities to untouchables. The next section will deal with the different identities ascribed to them (untouchables).

II. IDENTITY FORMATION

Mahatma Gandhi, an ardent champion of removing untouchability within the Hindu Chaturvarna framework, called the untouchable, '*Harijan*'—man of God. Gandhi borrowed the name from a Bhakti Saint of the seventeenth century, Narsinh Mehta (Shah, 2001). He primarily appealed to caste Hindus to use the term *Harijan* instead of *Antyaja*. He explained:

The 'untouchable', to me is, as compared to us (caste-Hindus); really a '*Harijan*'—a man of God—and we are '*Durjana*' (men of evil). For whilst the untouchable has toiled and moiled and dirtied his hands so that we may live in comfort and cleanliness, we have delighted in suppressing him. We are solely responsible for all the short coming and faults that we may lay at the door of these untouchables. It is still open to us to be *Harijan* ourselves, but we can only do so by heartily repenting of our sin against them.

(Gandhi, 1971: 244)

The term *Harijan* has been widely used by caste Hindus as a substitute for *achchuta*, that is, untouchable. Many SCs also began to call themselves so hoping that the caste Hindus would change their behaviour towards them. But it did not provide a new worldview, symbol or path to attain equal status, which was their demand. In fact, for Gandhi, the new category aimed at persuading caste Hindus to express repentance. By doing so, they were expected to change their heart and behaviour towards untouchables. Dr. Ambedkar and his followers did not find any difference whether they were called *achchuta* or *Harijan*, as the nomenclature did not change their status in the social order (Shah, 2001: 21).

According to Ambedkar, saints (like Narsinh Mehta) never carried on a campaign against caste and untouchability. The saints of the Bhakti sect 'were not concerned with the struggle between man and man. They were concerned with the relation between man and God' (Kumber, 1979). Later, a section of the SC leaders rejected the term *Harijan*, considering it an insult rather than an hour. Though Dr. Ambedkar did not popularise the word 'Dalit' for untouchables, his philosophy has remained a key source in its emergence and popularity. 'Dalit' means 'ground down', or 'broken to pieces', in both Marathi and Hindi. B.R. Ambedkar first used the term in 1928 or so, in his newspaper *Bahishkrit Bharat*, but the term gained new potency in Maharashtra during the 1970s, a period of literacy and cultural efflorescence that saw the birth of Dalit Sahitya (literature). Today, the widespread currency of the term is also belated recognition of the Dalit's militant claims upon a history of humiliation and suffering (Rao, 2008). Dalit Panthers used the term to assert their identity for rights and self-respect. It includes all the oppressed and exploited sections of society. It does not confine itself nearly to economic exploitation in terms of appropriation of surplus. It also relates to suppression of culture—way of life and value system—and, more importantly, the denial of dignity (Shah, 2001). It has essentially emerged as a political category. According to Gangadhar Patawane: 'Dalit is not a caste. Dalit is a symbol of change and revolution. The Dalit believes in humanism. He rejects existence of God, rebirth, soul, sacred books that teach discrimination, faith and heaven because these have made him a slave. He represents the exploited man in his country' (Cited in Das and Massey, 1995: iv).

Interestingly, in the academic realm, various terms have been used in understanding of the Dalit category by the scholars, working on Dalit politics. For example, Harrold Issac has used the category of ex-untouchables in his study (Issac, 1965); some other scholars use the term 'untouchables' (Mendelsohn and Vicziana, 2000). Barbara Joshi and Lelah Dushvin use the categories of ex-untouchables and SCs quite interchangeably (Joshi, 1982). In administrative parlance, Dalits are known by various legally constituted terms—SCs, STs or Depressed Classes—originally used by the imperial state.

The category of Dalit was defined by Ambedkar in a most comprehensive way. He says, '.....dalithood is a kind of life conditions which characterise the exploitation, suppression and marginalization of Dalits by the social, economic, cultural and political domination of the upper castes Brahminical ideology' (Omvedt, 1994). Ambedkar, however, did not use this category very often in his writing. In fact, he used a number of categories depending upon the context. For example, when he was dealing with the imperial state, he would use the category of Depressed Classes. If he was addressing high caste Hindu adversaries, he would use the term 'Bahiskrit', that means, one who is an outcaste. In the arena of competitive politics, he would use the term 'Scheduled Caste'. This was evident the establishment of Scheduled Caste Federation by him in 1942. Finally, when addressing his own social constituency, he preferred to use the term 'Pad Dalit', meaning those who are crushed under the feet of the Hindu system (Guru, 2001).

In recent years, some politicians in the country have also discarded the Dalit category as a socially reactionary, negative one and sought to replace it with the 'Bahujan' category. But this rejection by leading Bahujan political leaders is basically followed by empty emotionalism and can never be progressively integrated into the theoretical consciousness of Dalits. The language of the Bahujan political discourse does not accord to the category of Harijan a radical material status and hence this category will continue to differ radically from the Dalit category (ibid.).

Guru has concluded that the category of Dalit cannot be accommodated within the majority-minority divide or the Bahujan-Mahajan dichotomy. It does not perceive people as numerical entities to be manipulated by the Dalit-Bahujan power brokers or poll pundits. Because this category does not exist ready-made, either for statistical jugglery or for electoral arithmetic, it has to be discursively constituted and negotiated with other vibrant and sensitive categories across social and ideological spaces. Thus, the deployment of the Dalit category has the logical insight which contains an element of negation and also the conjunction of categories from the same logical class. The Dalit category is historically arrived at, sociologically presented and discursively constituted (2001: 105-107).

So, from the above discussion it is evident that though many have used different categories to describe 'untouchable', 'Dalit' seems to be the acceptable and mostly used term. Now the next section will deal with the reservation policy and its impact on their social upliftment as it demands serious attention and any discussion on the status of Dalits in general remains incomplete without it.

III. RESERVATION AND THE REALITY OF SOCIAL UPLIFTMENT

India is one of the few countries in the post-colonial world that took up the challenge of building an inclusive democracy in a highly diverse, multicultural, multilingual and multi religious society. The establishment of democracy and universal adult suffrage in a hierarchical society characterized by unprecedented social inequality, deprivation, and oppression was undoubtedly a revolutionary principle, a bold experiment in political affairs, perhaps the most significant in any country (Jayal, 2001). Nearly sixty seven years after independence, India remains a major success story in respect of democracy and social inclusion. This is largely due to the primacy given to equality and social justice as the cardinal principles of contemporary political life. The policy of providing benefits to historically 'disadvantaged' peoples, which was established through special provisions in the Constitution, played an important role in it. For the sake of brevity the term 'disadvantaged' refers collectively to all three groups officially designated as backward: the SCs, the STs and the OBCs. These three groups were targeted for special advantages and protection under Article 46 and the Directive Principles of State Policy (Hasan, 2009). These programmes permits departure from formal equality for the purpose of eliminating social discrimination (Galanter, 1984: 379-80).

The Constitution did not provide for reservation for the SCs and STs because they are poor or economically disadvantaged; it did so because they faced an explicit, structured and systematic exclusion from public life for centuries on grounds of descent. But these measures were also defended for their potential contribution in improving their socio-economic conditions of the disadvantaged. For Ambedkar, 'severe social separation' was the definition of discrimination (Hasan, 2009: 37).

The policy of preferential treatment has a long history. The British put the system of reservations in place over the objections of the Congress and most other political representatives. The early initiatives were deeply influenced by the overall colonial understanding of Indian Society. According to the British, the Indians represented societies of communities, not individuals, and so India was unsuitable for modern political institutions. The reservations of seats in legislatures and other similar political privileges were part of colonial structures since the early decades of twentieth century (Hasan, 2009: 19-20). The postcolonial nation state took the British legacy.

The major credit for the policy of preference put in place by the Constitution makers must go to Ambedkar, who was appointed as Law Minister in the first independent government formed in 1947. As Oliver Mendelsohn and Vicziani suggest that it is difficult to underestimate the significance of Ambedkar's appointment as Law minister, and the fact that he was chosen as the Chairman of the Drafting Committee for the Constitution, in terms of the ultimate decision on reservations for the SCs (Mendelsohn & Vicziani, 2000: 37). He strenuously fought for preferential treatment in their favour in education and government employment. Thus, he built a new political culture for articulating the socio-political rights of SCs, which culminated in the constitutional provisions for substantive equality for the historically disadvantaged groups, in particular the SCs (Zelliot, 1992).

For Ambedkar societal reforms vis-a-vis the Constitution became the prime task and therefore his new political party RPI (Republican Party of India) never constructed any hyperactive political ideology, but revolved round the same principles of social change. Being a spiritual person, he aspired to bring social change through the most non-violent, human and collective mode of cultural resistance. He imagined the Dalits as a modern citizen endowed with basic human rights, dignity and a glorified cultural past with which he/she would be capable of entering the domain of politics.

The social disadvantage suffered by the Dalits in India was taken note of in the Constitution of India, which was drafted under the Chairmanship of Dr. Ambedkar—a person who had spearheaded the most momentous anti-caste movement of the depressed classes. It provided the Dalits with many safeguards, viz.,

- Social, educational, cultural and religious safeguards;
- Economic safeguards;
- Political safeguards;
- Safeguards for employment.

Reservation in the educational institutions and the financial assistance in the form of scholarships and freehips constitute perhaps the most important factor in the development scheme for Dalits. For it is primarily responsible to make the basic input of education available and affordable to them. Without education, all the constitutional safeguards including the reservations in services would be infructuous (Geetanjali, 2011: 230-31).

But over the six decades of the implementations of the reservation policy it refuses to reach even the prescribed levels confirming the casteist notion still prevalent in society that the Dalits are intrinsically an inferior specie. Despite this vile attitude of the establishment the reservations by far has been the sole contributor to advancement of the Dalits. The benefits of the reservation policy to the Dalit community have been more indirect than direct. Directly, it benefited a few but indirectly it has created hope for advancement in the entire Dalit population. Though there is a massive protest against this policy across the country. The opponents of the issue argue:

- Allocating quotas on the basis of caste is a form of racial discrimination, and contrary to the right to equality.
- Most often, only economically sound people from the so-called lower castes will make use of reserved seats, thus counteracting the spirit of reservations. Political parties know reservations are no way to improve the lot of the poor and the backward. They support them because of self-interest of the "creamy layer", who use the reservation to further their own family interests and as a political flag of 'achievement' during election campaigns.
- The qualities of the elite institute may go down, because merit is severely being compromised by the reserving seats for certain caste-based communities.

- The caste system is kept alive through these measures.
- Not everyone from the so-called upper classes are rich, and not all from so-called lower classes are poor.
- Providing quotas on the basis of caste and not on the basis of merit will deter the determination of many educated and deserving students of India.

IV. CONCLUSION

There is a growing disquiet that reservations have become excessive under political pressure and that the pursuit of quality has been hijacked by politics to become the pursuit of votes. Rajeev Dhavan argues that 'India's reservation policy was designed to make "unequals" equal—not to open the door to every demand for preference by all or any community.....Today's politics of reservation follows a quest for electoral victory, nor social justice' (Dhavan, 2003). These numerous controversies suggest that the social consensus underlying these policies is not as watertight as it may seem. But most political parties do not oppose reservations, which testifies to the clout of the lower castes in the polity.

When reservations were introduced by the new state, the idea was to tear down the barriers to social exclusion and promote the participation of historically excluded and disadvantaged groups. Policies of affirmative action were viewed as instruments through which to offset the advantage enjoyed by some and to equalize opportunities for others. The Constituent Assembly debates indicate that these were meant only as a temporary measure and that the backwardness contemplated was extreme backwardness and not the one contemplated now. Moreover, they were seen as complementary to the commitment to an active welfare state that would ameliorate the conditions of the masses by providing an additional boost to the hitherto excluded and poor (Hasan, 2009).

There is doubt that reservation policy has benefited its intended beneficiaries. A sizeable section of India's middle classes consist of OBCs, SCs and STs. Reservation policy had created a small but significant middle class among the lower-caste groups, which have acquired modern education and entered the bureaucracy and other non-traditional occupation. Even with these gains we have not achieved a level of progress where we can afford to jettison affirmative actions as an instrument of integration and inclusion. It is now time to think about how to use different and new means to bridge disparities and deepen social equalities so that the pursuit of equality and justice does not remain anchored in caste and caste alone.

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AUTHORS

First Author – Anindita Mondal

Solar Energy Fundamentals and Challenges in Indian restructured power sector

Ashok Upadhyay ^{*}, Arnab Chowdhury ^{**}

^{*} Deputy Director (Generation), M.P. Electricity Regulatory Commission, Bhopal, Madhya Pradesh
^{**} Pursuing MBA (Power Mgmt.), University of Petroleum and Energy Studies., Dehradun, Uttarkhand

Abstract- In recent years the solar energy technologies has experienced phenomenal growth. The realization of technological improvements, growing public awareness of environmental issues, the economic climate and number of policy instruments have facilitated and sustained this strong interest in these technologies. Since the cost of electricity generated from solar is still expensive and also the power from renewable resources including solar is infirm power, large scale development of renewable resources did not take place and distribution utilities are also least interested to purchase power from renewable sources. This paper provides an overview of technical, economic and policy aspects of solar energy development. It reviews the status of solar energy in terms of resource potential, existing capacity, along with historical trends and future growth prospects of solar energy. The paper also focuses on the technical, economical, and institutional barriers to the development and utilization of solar energy technologies. The paper reviews existing fiscal and regulatory policy instruments to support solar energy development, indicating how successful these policy apparatus are in achieving their goals. And finally a review based on existing studies of the future prospects of solar energy supply under various scenarios in Indian restructured power sector is provided.

Index Terms- Environmental issues, economic climate, policy instruments

I. INTRODUCTION

The Indian power sector is predominantly based on fossil fuels, with about three-fifths of the country's power generation capacity being dependent on vast indigenous reserves of coal. But in few last decades Indian government has taken several steps to reduce the use of fossil fuels-based energy while promoting renewable generation. Solar energy constitutes the most abundant renewable energy resource available and in most regions of the world even its technically available potential is far in excess of the current total primary energy supply. As such solar energy technologies are a key tool to lower worldwide carbon emissions. The wide range of technologies available today, to harness the sun's energy, is classified into passive and active technologies. The active technologies, which formed the content of this paper, are broadly divided into photovoltaic and solar thermal, where solar thermal can be further classified into solar-thermal electric and non-electric applications. The market for many of the solar energy technologies has seen dramatic expansion over the past decade in particular the expansion of the

market for grid-connected PV systems and solar hot water systems have been remarkable. At present India is fifth largest country in the world of electricity generation, having presently installed capacity of 243 GWs out of which 69.5 % is from thermal, 16.5 % from hydro, 2% from nuclear and rest about 12% from renewable energy sources. Although Indian power sector has experienced a seven times increased in its installed capacity a jump from 30,000 MW in 1981 to over 243028 MW by March, 2014 but still there is a huge gap in generation and demand in India hence need to be established more generation plants preferable to be come from renewable sources by governmental as well as various private participation. As per the load generation balance report for FY2013-14 issued by CEA, the anticipated peak shortage in the country during FY2013-14 works out to 6.2% based on the anticipated demand and availability of power. Solar energy has emerged as a viable, cost-effective and commercial option for grid connected power generation. During the past few years, a significant trust has been given to the development and induction of solar energy technology for use in different sectors. India is the only country in the world with an exclusive Ministry to promote the renewable energy sources. Presently the installed capacity of solar energy projects in India is approximately 3000 MW. India plan to produce 20 GW of solar power by 2020. While the cost of energy from many solar energy technologies remains high compared to conventional energy technologies, the cost trend of solar energy technologies demonstrates rapid declines in the recent past and the potential for significant declines in the near future. In addition to cost, it is found that a number of barriers that appear to limit the rapid growth of such technologies. These include technical barriers such as low-efficiencies, challenges with energy storage, reliability of balance of system components; and institutional barriers such as lack of information, outreach and regulatory structure. In response, a number of highly effective policy instruments have come together in some of the most successful markets for solar energy. These include fiscal and market based financial incentives (e.g. feed-in-tariff, rebates, tax credits), regulations (e.g. renewable portfolio standards, solar energy mandates) as well as a number of pilot demonstration projects. While the continued operation of such initiatives is imperative for the future growth of these markets it is also becoming apparent that innovative ways to reduce the fiscal burden of policy incentives are needed. As such, there is presently growing interest in market-based mechanisms to complement existing fiscal policy incentives.

Solar energy has experienced phenomenal growth in recent years due to both technological Improvements resulting in cost reductions and government policies supportive of renewable

energy development and utilization. This paper analyzes the technical, economic and policy aspects of solar energy development and deployment. While the cost of solar energy has declined rapidly in the recent past, it still remains much higher than the cost of conventional energy technologies. Like other renewable energy technologies, solar energy benefits from fiscal and regulatory incentives and mandates, including tax credits and exemptions, feed-in-tariff, preferential interest rates, renewable portfolio standards and voluntary green power programs in many countries. Potential expansion of carbon credit markets also would provide additional incentives to solar energy deployment; however, the scale of incentives provided by the existing carbon market instruments, such as the Clean Development Mechanism of the Kyoto Protocol, is limited. Despite the huge technical potential, development and large-scale, market-driven deployment of solar energy technologies world-wide still has to overcome a number of technical and financial barriers. Unless these barriers are overcome, maintaining and increasing electricity supplies from solar energy will require continuation of potentially costly policy supports. Drives moving in the direction of reduction of capital cost of solar energy through technological development and increase in Plant Utilization Factor with overall improvement in efficiency. Drives are also moving in the direction of developing storage facilities for energy from solar to make them firm and useful form of energy.

Restructuring of power sector has changed the traditional mission and mandates of utilities in complex way, and had large impact on environmental, social and political conditions for any particular country. At the same time, new regulatory approaches are being found for reducing environmental impacts in restructured power sector. Enactment of the Electricity Act 2003 (the Act) has provided further support to renewable energy by stipulating purchase of a percentage of the power procurement by distribution utilities from renewable energy sources. The renewable purchase obligation as well as preferential tariff for procurement of such power has been specified by various State Electricity Regulatory Commissions (SERCs). Despite all strategic policies in place, purchase of Renewable Energy Certificate (REC) has not been very encouraging and sale of now solar REC is at a very low price. SERCs must prevail upon Discoms to meet them RPO obligation. Cost of energy generated from solar can also be reduced by promoting competition within such projects. At the same time, adequate promotional measures would also have to be taken for development of technologies.

While the Electricity Act, 2003, the policies framed under the Act, and also the National Action Plan for Climate Change (NAPCC) provide for a roadmap for increasing the share of renewable in the total generation capacity in the country, there are constraints in terms of availability of RE sources evenly across different parts of the country. This inhibits the State Commissions, especially in those states where the potential of RE sources is not that significant, from specifying higher renewable purchase obligation. This paper discusses the latest technological development in the field of solar energy and its storage facilities. This would help to minimize cost of power procurement, and lead to efficient resource utilization across the country and provide incentive for investment in appropriate technologies. The paper also highlights salient features,

technological development, potential and achievement, advantages and key barriers in development of solar energy projects in India. This paper also highlighted the implementation and operational or grid related issues in solar power projects.

Finally, the paper finds that the future projections for solar energy technologies are broadly optimistic. According to the projections considered here, the market for solar energy technology is expected to grow significantly in the long-term as well as short-term. Further, despite its technical and economic limitations at present, it is expected that solar energy will play an important role in the future.

II. LEGAL FRAMEWORK

Government of India has come out with Acts, Policies and Regulations to support renewable Energy. The major contributors are as under.

1.1 Electricity Act, 2003

The Electricity Act 2003 has promotes electricity generation from co-generation and renewable energy sources. The Act accelerated the process of renewable energy development in the country (2).

- ❖ Section 3(1) of the Act provides that the National Electricity Policy (NEP) to be formulated by the central government, in consultation with the state governments for development of the power system based on optimal utilization of resources including renewable sources of energy
- ❖ Section 4 of the Act provides that the Central Government to prepare a national policy, in consultation with the state governments, permitting stand alone systems (including those based on renewable sources of energy and other non-conventional sources of energy) for rural areas.
- ❖ Section 61 (h) stipulated that the terms and conditions for the determination of tariff to be prescribed by the SERCs to promote co-generation and generation of electricity renewable sources of energy.
- ❖ Section 86(1) (e) empower the SERC's to specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of distribution licensee. The aforesaid section of the Act also empowers the SERCs to promote co-generation and generation of electricity through renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any persons.
- ❖ SERCs have specified a Renewable Purchase Obligation (RPO) and have specified feed-in tariff and other terms and conditions to promote co-generation and generation of electricity from renewable energy sources.

1.2 National Electricity Policy 2005

The National Electricity Policy 2005 stipulates that progressively the share of electricity from non-conventional sources would need to be increased; such purchase by distribution companies shall be through competitive bidding process; considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the commission may determine an appropriate differential in prices to promote these technologies.

1.3 Tariff Policy 2006

The Tariff Policy has stated that, in Pursuant to provisions of section 86 (1) (e) of the Act, the Appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentages for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April, 2006.

1.4 National Action Plan of Climate Change

The National Action Plan of Climate Change has set the target of 5% renewable energy purchase for FY 2009-10 which will increase by 1% for next 10 years. The NAPCC further recommends strong regulatory measures to fulfil these targets. NAPCC have set the target to achieve 15% of total energy requirement of the country from renewable by 2020.

III. FUNDAMENTALS AND BASIC CONCEPT OF SOLAR ENERGY

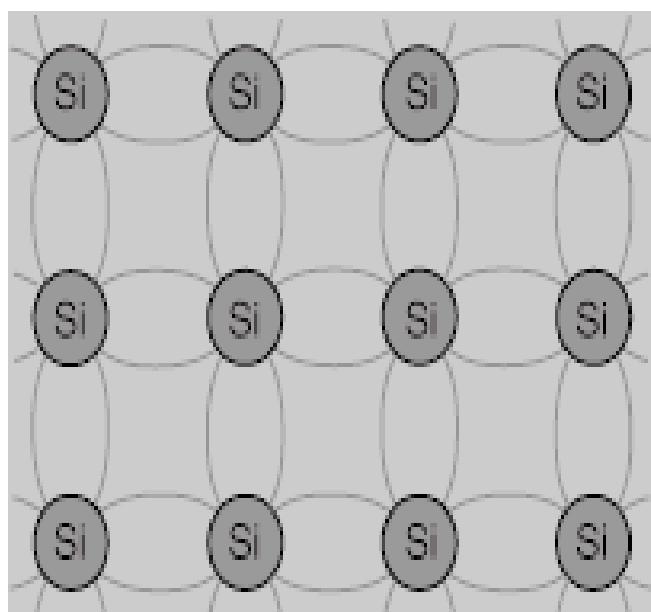
Solar energy can be produced by two methods. One is Solar PV i.e. through photovoltaic cells and other is Solar Thermal i.e. through concentrated solar power.

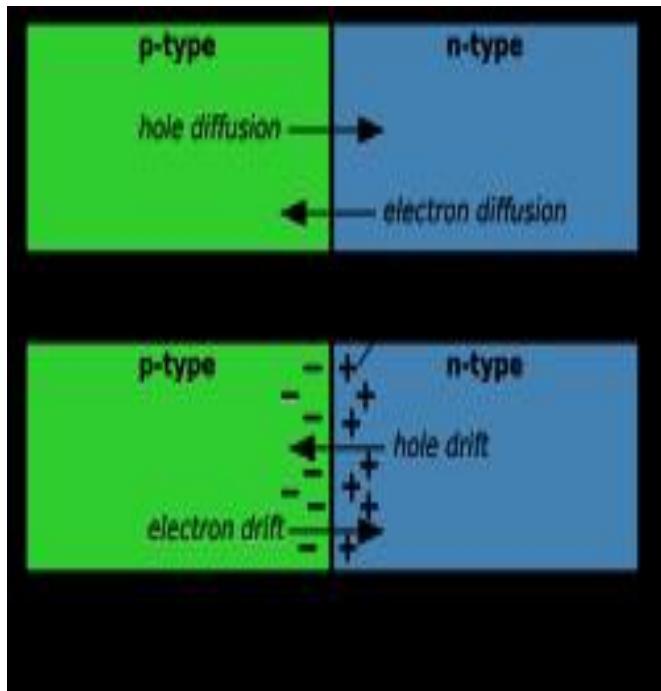
1.1 Solar Photovoltaic (PV):

Historical development: Solar Photo-voltaic (PV) is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels composed of a number of solar cells containing a photovoltaic material. It is a device that directly converts solar energy into electricity by photovoltaic effect. Photoelectric effect was first time recognized in 1839 by F.C. Becquerel. In this Phenomenon the electrons are emitted from matter after absorption of energy from radiation. In 1883 – First solar cell was built by coating Selenium with extremely thin layer of gold. In 1958 – Bell laboratories found that Silicon (Si) doped with certain impurities was very sensitive to light. This finding resulted in the production of first practical solar cell with sunlight conversion efficiency ~6% made from materials that emit electrons when exposed to EM radiation. Mainstream materials presently used for photovoltaic include monocrystalline silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium gallium selenide/sulfide. Due to the increased demand for renewable energy sources, the manufacturing of solar cells and photovoltaic arrays has advanced considerably in recent years. The amount of power available from a solar cell depends on

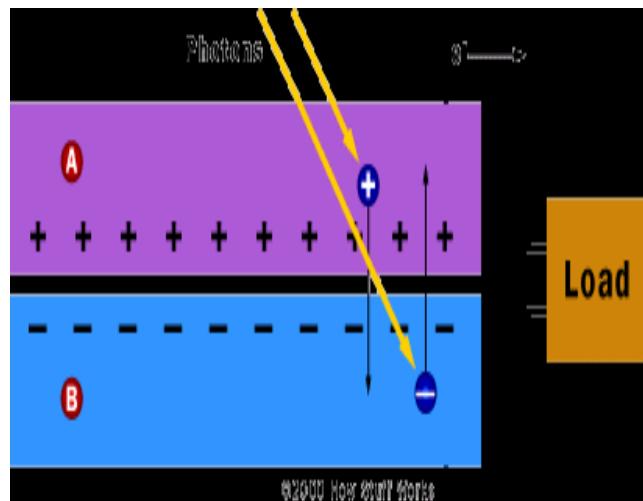
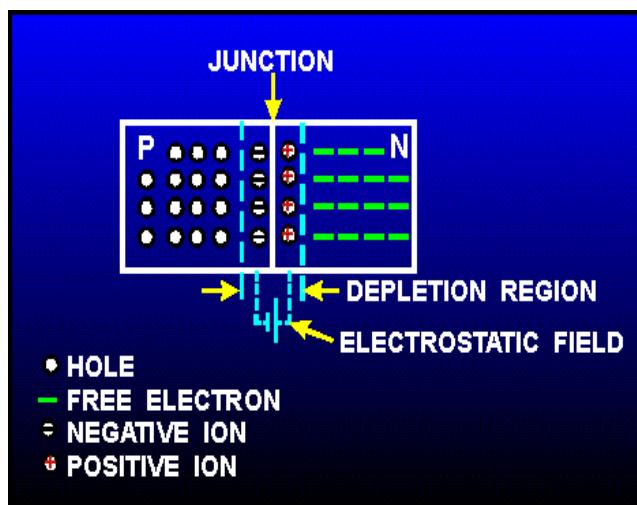
- Type and area of material
- Intensity of sunlight
- Wavelength of sunlight

Working principle: Sunlight is made out of tiny energy pockets called photons and that each individual solar cell is designed with a positive and negative layer thus being able to create an electric field (similar to the one in batteries). As photons are absorbed in the cell their energy causes electrons to get free, and they move to the bottom of the cell, and exit through the connecting wire which creates flow of electrons thus generate electricity. The bigger amount of the available sunlight the greater the flow of electrons and the more electricity gets produced in the process. It is a form of photoelectric cell (in that its electrical characteristics e.g. current, voltage, or resistance vary when light is incident upon it) which, when exposed to light, can generate and support an electric current without being attached to any external voltage source, but do require an external load for power consumption. Pure Si is a poor conductor of electricity. Doping – introducing impurities into an intrinsic (pure) semiconductor to change its electrical properties. Examples of n-type dopants – Phosphorus (Ph), Arsenic (As), Antimony (Sb). Examples of p-type dopants – Boron (B), Aluminium (Al). Doping provides with charge carriers (holes and electrons) that can carry electrical current. Electric field to force electrons to flow in a certain direction. This electric field is achieved by bringing together p-type and n-type semiconductors together to make a diode. Holes and electrons from p-region and n-region respectively recombine, creating a depletion region and an electric field. The movement of holes and electrons are represented below. Depletion region continues to grow till the electric field becomes large enough to prevent the flow of charge carriers from one side to the other. Now, if the diode is exposed to light, it frees the electrons in n-region and these electrons, repelled by the electric field, flow through the load to p-region. These electrons constitute current. The flow of electrons and hole can be represented as follows:





The movement of hole and electrons resulting flow of electricity across the cell represented as given below:



Several solar cells are connected together, encapsulated in a glass covered frame to form a module. A solar cell made from a mono-crystalline silicon wafer with its contact grid made from bus bars (the larger strips) and fingers (the smaller ones)

As light hits the solar panels, the solar radiation is converted into direct current electricity (DC). The direct current flows from the panels and is converted into alternating current (AC) used by local electric utilities. Finally, the electricity travels through transformers, and the voltage is boosted for delivery onto the transmission lines so local electric utilities can distribute the electricity to homes and businesses.

The operation of a photovoltaic (PV) cell requires 3 basic attributes:

- Photons in sunlight hit the solar panel and are absorbed by semiconducting materials, such as silicon.
- Electrons (negatively charged) are excited from their current molecular/atomic orbital. Once excited the electron can either dissipate the energy, and return to its orbital or travel through the cell until it reaches an electrode. Current starts flowing through the material to cancel the potential and this electricity is captured. Due to the special composition of solar cells, the electrons are only allowed to move in a single direction.
- An array of solar cells converts solar energy into a usable amount of direct current (DC) electricity.

Essential requirements for solar energy generation are as follows:

1. High solar radiation at that particular site.
2. Adequate land availability.
3. Suitable terrain and good soil condition.
4. Proper approach to site.
5. Suitable power grid nearby.
6. Techno-economic selection of solar panels.
7. Scientifically prepared layout.

Main Components of Solar PV:

Solar cell: In order to make a Monocrystalline solar cell, a silicon ingot, also known as a silicon boule (crystal), must first be produced. Once a silicon ingot has been made, it is thinly sliced and semiconductors are imbedded in the disk. The silicon

disk will have positive and negative leads, which serve as connection points to tie multiple cells in series. Once multiple cells are connected in series, the formation of a photovoltaic module begins..

Photovoltaic modules: Due to the low voltage of an individual solar cell, several cells are wired in series in the manufacture of a "laminate". The laminate is assembled into a protective weatherproof enclosure, thus making a photovoltaic module or solar panel. Modules may then be strung together into a photovoltaic array.

Photovoltaic arrays: A photovoltaic array (or solar array) is a linked collection of solar panels. The power that one module can produce is seldom enough to meet requirements of a home or a business, so the modules are linked together to form an array. Most PV arrays use an inverter to convert the DC power produced by the modules into alternating current that can power lights, motors, and other loads. The modules in a PV array are usually first connected in series to obtain the desired voltage; the individual strings are then connected in parallel to allow the system to produce more current. The array rating consists of a summation of the panel ratings, in watts, kilowatts, or megawatts.

Mounting systems: Modules are assembled into arrays on some kind of mounting system, which may be classified as ground mount, roof mount or pole mount. For solar parks a large rack is mounted on the ground, and the modules mounted on the rack. For buildings, many different racks have been devised for pitched roofs. For flat roofs, racks, bins and building integrated solutions are used. Solar panel racks mounted on top of poles can be stationary or moving. Side-of-pole mounts are suitable for situations where a pole has something else mounted at its top, such as a light fixture or an antenna. Pole mounting raises what would otherwise be a ground mounted array above weed shadows and livestock, and may satisfy electrical code requirements regarding inaccessibility of exposed wiring. Pole mounted panels are open to more cooling air on their underside, which increases performance. A multiplicity of pole top racks can be formed into a parking carport or other shade structure. A rack which does not follow the sun from left to right may allow seasonal adjustment up or down.

Tracker: A solar tracker tilts a solar panel throughout the day. Depending on the type of tracking system, the panel is either aimed directly at the sun or the brightest area of a partly clouded sky. Trackers greatly enhance early morning and late afternoon performance, increasing the total amount of power produced by a system by about 20–25% for a single axis tracker and about 30% or more for a dual axis tracker, depending on latitude. Trackers are effective in regions that receive a large portion of sunlight directly. In diffuse light (i.e. under cloud or fog), tracking has little or no value. Because most concentrated photovoltaic

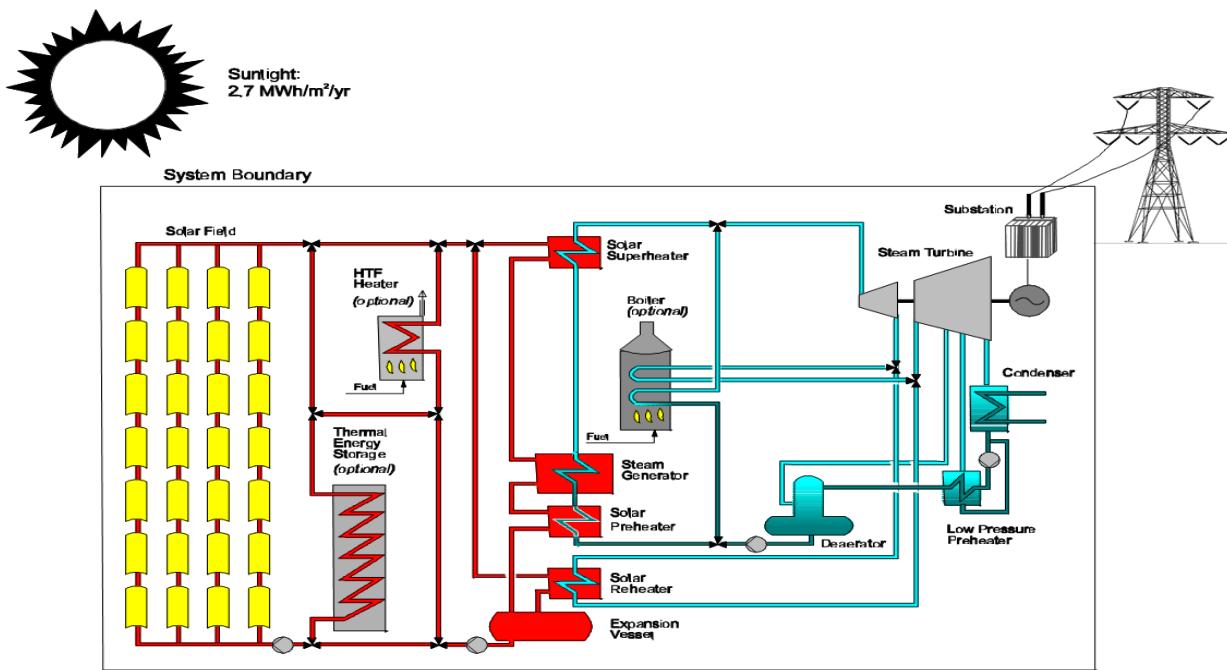
systems are very sensitive to the sunlight's angle, tracking systems allow them to produce useful power for more than a brief period each day. Tracking systems improve performance for two main reasons. First, when a solar panel is perpendicular to the sunlight, it receives more light on its surface than if it were angled. Second, direct light is used more efficiently than angled light. Special Anti-reflective coatings can improve solar panel efficiency for direct and angled light, somewhat reducing the benefit of tracking.

Inverters: Systems designed to deliver alternating current (AC), such as grid-connected applications need an inverter to convert the direct current (DC) from the solar modules to AC. Grid connected inverters must supply AC electricity in sinusoidal form, synchronized to the grid frequency, limit feed in voltage to no higher than the grid voltage and disconnect from the grid if the grid voltage is turned off. Islanding inverters need only produce regulated voltages and frequencies in a sinusoidal wave shape as no synchronization or co-ordination with grid supplies is required. A solar inverter may connect to a string of solar panels. In some installations a solar micro-inverter is connected at each solar panel. For safety reasons a circuit breaker is provided both on the AC and DC side to enable maintenance. AC output may be connected through an electricity meter into the public grid.

1.1 SOLAR THERMAL:

Concentrated solar power : This systems use mirrors or lenses to concentrate a large area of sunlight, or solar thermal energy, onto a small area. Electrical power is produced when the concentrated light is converted to heat, which drives a heat engine (usually a steam turbine) connected to an electrical power generator or powers a thermo chemical reaction. Solar thermal power technologies are of three types namely Parabolic trough, Dish engine and Power tower.

Parabolic trough technology is the Most proven and mature technology. It consists of a field of single axis tracking parabolic trough solar collectors. Linear receiver located at the focus of parabola. The Heat transfer fluid (HTF) circulates through the receiver and returns to a series of heat exchangers. High-pressure superheated steam generated is fed to turbine. It designed to use solar energy as primary energy source. Fossil fuel based capability can also be used to supplement the solar output during periods of low solar radiation. Modularity, Heat transfer fluid – molten salt, synthetic oil etc. It Operate at temperatures ranging between 1000C-4000C. This technology Used to design power generation systems in the range of 30MW – 150MW. The water requirement is 17,500 cubic metre/MW-yr. Schematic of solar parabolic trough system is as follows:



Working principle: The common basic principle of solar thermal power plants is the use of concentrating parabolic dish systems in large-scale solar fields that concentrate the solar radiation onto a receiver. All systems must track the sun in order to be able to concentrate the direct radiation. This radiation is first converted into thermal energy at temperatures in the range of about 200 to over 1,000 °C (depending on the system). The thermal energy can then be converted to power, as in a conventional power plant, using steam or gas turbines; if needed, it can also be used in other industrial processes, for example, water desalination, cooling or – in the near future – for hydrogen production. Power plants based on concentrated solar power use the sun's energy to generate electricity on an industrial scale. Solar radiation is optically concentrated, thus generating very high temperatures for the power plant process. This high-temperature heat can be stored, thus allowing electricity to be generated on demand an important advantage of this technology.

Components of Solar Thermal:

High-temperature collectors: During the day the sun has different positions. For low concentration systems (and low temperatures) tracking can be avoided (or limited to a few positions per year) if non-imaging optics are used. For higher concentrations, however, if the mirrors or lenses do not move, then the focus of the mirrors or lenses changes (but also in these cases non-imaging optics provides the widest acceptance angles for a given concentration). Therefore it seems unavoidable that there needs to be a tracking system that follows the position of the sun (for solar photovoltaic a solar tracker is only optional). The tracking system increases the cost and complexity. With this in mind, different designs can be distinguished in how they concentrate the light and track the position of the sun.

Parabolic trough designs: Parabolic trough power plants use a curved, mirrored trough which reflects the direct solar radiation onto a glass tube containing a fluid (also called a receiver, absorber or collector) running the length of the trough,

positioned at the focal point of the reflectors. The trough is parabolic along one axis and linear in the orthogonal axis. For change of the daily position of the sun perpendicular to the receiver, the trough tilts east to west so that the direct radiation remains focused on the receiver. However, seasonal changes in the angle of sunlight parallel to the trough does not require adjustment of the mirrors, since the light is simply concentrated elsewhere on the receiver. Thus the trough design does not require tracking on a second axis. The receiver may be enclosed in a glass vacuum chamber. The vacuum significantly reduces convective heat loss. A fluid (also called heat transfer fluid) passes through the receiver and becomes very hot. Common fluids are synthetic oil, molten salt and pressurized steam. The fluid containing the heat is transported to a heat engine where the heat is converted to electricity.

Power tower designs: Power towers (also known as 'central tower' power plants or 'heliostat' power plants) capture and focus the sun's thermal energy with thousands of tracking mirrors (called heliostats) in roughly a two square mile field. A tower resides in the center of the heliostat field. The heliostats focus concentrated sunlight on a receiver which sits on top of the tower. Within the receiver the concentrated sunlight heats molten salt to over 1,000 °F (538 °C). The heated molten salt then flows into a thermal storage tank where it is stored, maintaining 98% thermal efficiency, and eventually pumped to a steam generator. The steam drives a standard turbine to generate electricity. This process, also known as the "Rankine cycle" is similar to a standard coal-fired power plant, except it is fueled by clean and free solar energy. The advantage of this design above the parabolic trough design is the higher temperature. Thermal energy at higher temperatures can be converted to electricity more efficiently and can be more cheaply stored for later use. Furthermore, there is less need to flatten the ground area. In principle a power tower can be built on the side of a hill. Mirrors can be flat and plumbing is concentrated in the tower. The disadvantage of this system is that each mirror must have its own

dual-axis control, while in the parabolic trough design single axis tracking can be shared for a large array of mirrors.

Dish designs: A parabolic solar dish concentrates the sun's rays on the heating element of a Stirling engine. The entire unit acts as a solar tracker. This CSP-Stirling is known to have the highest efficiency of all solar technologies around 30% compared to solar PV approximately 15%, and is predicted to be able to produce the cheapest energy among all renewable energy sources in high scale production and hot areas, semi deserts etc. A dish Stirling system uses a large, reflective, parabolic dish (similar in shape to satellite television dish). It focuses all the sunlight that strikes the dish onto a single point above the dish, where a receiver captures the heat and transforms it into a useful form. Typically the dish is coupled with a Stirling engine in a Dish-Stirling System, but also sometimes a steam engine is used. These create rotational kinetic energy that can be converted to electricity using an electric generator. Dish systems convert thermal energy in solar radiation to mechanical energy and then to electrical energy. These dishes track sun in two axes. Use mirror array to reflect and concentrate incoming solar radiation on to a receiver. The concentrated radiation is then transferred to an engine. The engine transfers the heat energy into mechanical energy. An alternator converts mechanical energy into electrical energy. This system has high efficiency, modularity and autonomous operation. It also has Inherent ability to operate on fossil fuels and have a wide range of potential applications. Land requirement for this system is – 3 to 4 acres per MW.

Fresnel reflector: A linear Fresnel reflector power plant uses a series of long, narrow, shallow-curvature (or even flat) mirrors to focus light onto one or more linear receivers positioned above the mirrors. On top of the receiver a small parabolic mirror can be attached for further focusing the light. These systems aim to offer lower overall costs by sharing a receiver between several mirrors (as compared with trough and dish concepts), while still using the simple line-focus geometry with one axis for tracking. This is similar to the trough design (and different from central towers and dishes with dual-axis). The receiver is stationary and so fluid couplings are not required (as in troughs and dishes). The mirrors also do not need to support the receiver, so they are structurally simpler. When suitable aiming strategies are used (mirrors aimed at different receivers at different times of day), this can allow a denser packing of mirrors on available land area. Rival single axis tracking technologies include the relatively new linear Fresnel reflector (LFR) and compact-LFR (CLFR) technologies. The LFR differs from that of the parabolic trough in that the absorber is fixed in space above the mirror field. Also, the reflector is composed of many low row segments, which focus collectively on an elevated long tower receiver running parallel to the reflector rotational axis. Prototypes of Fresnel lens concentrators have been produced for the collection of thermal energy by International Automated Systems. No full-scale thermal systems using Fresnel lenses are known to be in operation, although products incorporating Fresnel lenses in conjunction with photovoltaic cells are already available.

Enclosed parabolic trough: The enclosed parabolic trough solar thermal system encapsulates the components within a greenhouse-like glasshouse. The glasshouse protects the components from the elements that can negatively impact system

reliability and efficiency. Lightweight curved solar-reflecting mirrors are suspended from the ceiling of the glasshouse by wires. A single-axis tracking system positions the mirrors to retrieve the optimal amount of sunlight. The mirrors concentrate the sunlight and focus it on a network of stationary steel pipes, also suspended from the glasshouse structure. Water is pumped through the pipes and boiled to generate steam when intense sun radiation is applied. The steam is available for process heat. Sheltering the mirrors from the wind allows them to achieve higher temperature rates and prevents dust from building up on the mirrors as a result from exposure to humidity.

Working of Solar Thermal: A solar thermal power plant in principle works no differently than a conventional Steam power plant. However, there is one important difference. No harm is done to the environment by burning coal, oil, natural gas or by splitting uranium to produce steam. It is produced solely by the energy that comes from the sun. In order to achieve the high temperatures required, solar radiation must be concentrated. Parabolic trough collectors represent the most advanced technology for use in doing this. These troughs are more than 1,300 feet (400 meters) in length and are made up of parabolically shaped mirror segments. The troughs track the sun over the course of the day and focus the resulting radiation along the caustic line of the mirrors onto specially coated, evacuated absorber tube receivers. Solar radiation heats up the thermo-oil that flows through the receiver to a temperature of 400° Celsius so that a downstream heat exchanger is able to generate steam. As in a conventional power plant, the steam is pressurized inside the turbine that drives the generator. Heat storage systems can allow electricity output even if the sun isn't shining.

IV. TECHNOLOGICAL DEVELOPMENT

Nanopillars: A material with a novel nanostructure developed at the University of California, Berkeley could lead to lower-cost solar cells and light detectors. It absorbs light just as well as commercial thin-film solar cells but uses much less semiconductor material. The new material consists of an array of nanopillars that are narrow at the top and thicker at the bottom. The narrow tops allow light to penetrate the array without reflecting off. The thicker bottom absorbs light so that it can be converted into electricity. The design absorbs 99 percent of visible light, compared to the 85 percent absorbed by an earlier design in which the nanopillars were the same thickness along their entire length. An ordinary flat film of the material would absorb only 15 percent of the light. Structures such as nanowires, microwires, and nanopillars are excellent at trapping light, reducing the amount of semiconductor material needed. Nanowires and nanopillars use half to a third as much of the semiconductor material required by thin-film solar cells made of materials such as cadmium telluride, and as little as 1 percent of the material used in crystalline silicon cells. Overall, these improvements could make solar cheaper. "Reducing material costs while achieving the same amount of light absorption and hence efficiency is very important for solar cells."

Nanonets: One problem with solar cells is that they only produce electricity during the day. A promising way to use the sun's energy more efficiently is to enlist it to split water into hydrogen gas that can be stored and then employed at any time,

day or night. A cheap new nanostructured material could prove an efficient catalyst for performing this reaction. Called a nanonet because of its two-dimensional branching structure, the material is made up of a compound that has been demonstrated to enable the water-splitting reaction. Because of its high surface area, the nanonet enhances this reaction. The nanonet consists of, structures made up of branching wires of titanium and silicon. Recently the researchers in Germany, showed that titanium disilicide, which absorbs a broad spectrum of visible light, splits water into hydrogen and oxygen—and can store the hydrogen, which it absorbs or releases depending on the temperature. Other semiconducting materials have been tested as water-splitting catalysts but have proved unstable. The nanonets, made up of flexible wires about 15 nanometres thick, grow spontaneously from titanium and silicon flowing through a reaction chamber at high temperatures. The material is 10 times more electrically conductive than its bulk form. Conductivity is an important property for water-splitting catalysts. In preliminary tests, the nanostructured version of the material performs about 100 times better than bulk titanium disilicide.

Powerful solar cells: A new solar cell is 27 percent more efficient without being more expensive to make. Technologies the company which created this technology, claims that it improves the efficiency—a measure of the electricity generated from a given amount of light—of multicrystalline silicon solar cells by 27 percent compared with conventional ones. Such improvement will bring multicrystalline cells to efficiencies about the same as single-crystal cells—around 19.5 percent—at the lower costs. There are 3 methods which improves the efficiency. The first is a method for adding texture to the surface of the cells that allows the silicon to absorb more light, a trick that's been used before with single-crystalline devices but has been difficult to implement with multicrystalline silicon. The rough surface causes light to bend as it enters the cell so that when it encounters the back of the cell, it doesn't reflect right back out; rather, it bounces off at a low angle and remains inside the slab of silicon. The longer the light remains within the silicon, the greater the chance that it will be absorbed and converted into electricity.

Flexible solar cells: A new method for making flexible arrays of tiny silicon solar cells could produce devices that don't suffer this trade-offs. Arrays of these microcells are as efficient as conventional solar panels and may be cheaper to manufacture because they use significantly less silicon. They use a stamp made of a soft polymer to pick up the microbars and place them on a substrate, which may be glass or a flexible plastic, and then fabricate interconnects. A cell thickness of 15 to 20 micrometers struck a good balance: thin enough to be flexible, but thick enough to be mechanically stable and efficient. Arrays of the flexible cells have about 12 percent efficiency.

Solar collectors: Looking to make solar panels cheaper, the glass coated sheets with advanced organic dyes that more efficiently concentrate sunlight have used. The glass sheets can reduce the amount of expensive semiconducting material needed in solar panels and provide a cheap way to extract more energy from high-energy photons, such as those at the blue end of the spectrum. The simple, flat sheets of glass have a number of advantages over previous solar concentrators, devices that gather sunlight over a large area and focus it onto a small solar cell that

converts the light into electricity. Solar concentrators in use now employ mirrors or lenses to focus the light. Because the new glass sheets are lighter and flat, they can easily be incorporated into solar panels on roofs or building facades. They could also be used as windows, which, connected to solar cells, could generate electricity. What's more, mirrors and lenses require mechanical systems for tracking the sun to keep the light focused on a small solar cell. These tracking systems add cost and can break down over the decades that solar panels are made to be in service. The flat glass concentrators don't require a tracking system. Instead of using optics, the glass sheets concentrate light using combinations of organic dyes. Light is absorbed by the organic dyes coating one side of the glass sheet. The dyes then emit the light into the glass. The glass channels the light emitted by the dye to the edges of the glass, in the same way that fibre-optic cables channel light over long distances. Narrow solar cells laminated to the edges of the glass collect the light and convert it into electricity. The amount of light concentration depends on the size of the sheet—specifically, the ratio between the size of the surface of the glass and the edges. To a point, the greater the concentration, the less semiconductor material is needed, and the cheaper the solar power.

Nanowire solar cells: They have grown light-absorbing nanowires made of high-performance photovoltaic materials on thin but highly durable carbon-nanotube fabric. They've also harvested similar nanowires from reusable substrates and embedded the tiny particles in flexible polyester film. Both approaches, they argue, could lead to solar cells that are both flexible and cheaper than today's photovoltaics. It is possible to achieve 40 percent efficiency, given the superior ability of such materials to absorb energy from sunlight and the light-trapping nature of nanowire structures. By comparison, current thin-film technologies offer efficiencies of between 6 to 9 percent. The technology relies on nanowires containing multiple layers of exotic Group III-V materials, such as gallium arsenide, indium gallium phosphide, aluminium gallium arsenide, and gallium arsenide phosphide. "It creates tandem or multi-junction solar cells that can absorb a greater range of the [light] spectrum, compared to what you could achieve with silicon. Each nanowire is 10 to 100 nanometres wide and up to five microns long. Their length maximizes absorption, but their nanoscale width permits a much freer movement and collection of electrons.

V. BENEFITS OF SOLAR POWER

- i. Solar energy is a clean, renewable resource that is continuously supplied to the earth by the sun.
- ii. Solar resources are available everywhere in the world. It gives out no emissions i.e. environmentally safe.
- iii. Energy security to the country. No dependency on foreign resources for electricity generation.
- iv. Can be permitted and installed faster than other traditional or renewable power plants.
- v. Produces local, on-site energy, which reduces the need for extensive high-voltage transmission lines or a complex infrastructure.
- vi. Reliable over the long term. With no moving parts, fixed photovoltaic systems last longer than other energy sources.

- vii. Clean, quiet and visually unobtrusive in nature. Solar energy plants do not have any polluting emissions, do not make any sound, and are not considered to be an "eyesore."
- viii. Uses little to no water in the production of zero-emission electricity.
- ix. Has a predictable energy curve and is most efficient when utility rates are at their highest.
- x. Can be placed in virtually every geographical region because the sun is available everywhere.
- xi. Offsets the need for polluting, expensive and inefficient power plants designed exclusively to meet peak demand.
- xii. Creates clean, renewable energy that will sustain and support the health of future generations.
- xiii. Is a distributed generation ("DG") energy source that can mitigate national security concerns about energy disruption.
- xiv. Supports national energy independence because solar electricity is used where it is generated.
- xv. Creates good, local jobs for the new energy economy. In fact, solar energy creates more jobs per megawatt hour than any other energy type.

VI. BOTTLENECKS OF SOLAR POWER PROJECTS:

- i. The major disadvantage of solar or any renewable energy is availability. The weather conditions on which the availability is dependent is a major factor. So, we can't say if in a particular time the energy from solar will be available to us or not.
- ii. The high capital cost is another factor. Though the cost of setting up of a PV plant has come down considerably, but in comparison to fossil fuel power generation it's still high.
- iii. Large land area requirement, which sometimes is not feasible.
- iv. Solar thermal needs a considerable amount of water, so, basically to be located near a large water source.
- v. Storage problem, suppose the demand of power is not so high, now the electricity produced by the solar plant will have to be stored somewhere to supply it at the time of demand. This increases the cost of the project.

VII. INCENTIVES AND PROMOTIONAL POLICIES:

- **Incentive mechanisms:** Because the point of grid parity has not yet been reached in many parts of the country, solar generating stations need some form of financial incentive to compete for the supply of electricity. Many states have introduced such incentives to support the deployment of solar power stations.
- **Feed-in tariffs:** Feed in tariffs are designated prices which must be paid by utility companies for each kilowatt hour of renewable electricity produced by qualifying generators and fed into the grid. These tariffs normally represent a premium on wholesale electricity

prices and offer a guaranteed revenue stream to help the power producer finance the project.

- **Renewable portfolio standards and supplier obligations:** These standards are obligations on utility companies to source a proportion of their electricity from renewable generators. In most cases, they do not prescribe which technology should be used and the utility is free to select the most appropriate renewable sources.
- **Renewable Energy Certificate Mechanism:** The concept of Renewable Energy Certificate (REC) concept seeks to address the mismatch between availability of RE sources and the requirement of the obligated entities to meet their renewable purchase obligation. Renewable Energy Certificate (REC) mechanism is a market based instrument to promote renewable energy and facilitate renewable purchase obligations (RPO). Cost of electricity generation from renewable energy sources is classified as cost of electricity generation equivalent to conventional energy sources and the cost for environmental attributes.
- **Loan guarantees and other capital incentives:** Some government financial institutions offered less targeted financial incentives, available for a wide range of infrastructure investment, such as loan guarantee scheme, which stimulated a number of investments in the solar power plant.
- **Tax credits and other fiscal incentives:** Another form of indirect incentive which has been used to stimulate investment in solar power plant was tax credits available to investors. In some cases the credits were linked to the energy produced by the installations, such as the Production Tax Credits. In other cases the credits were related to the capital investment such as the Investment Tax Credits.

VIII. SOLAR ENERGY STORAGE

Energy storage can be defined as "Storing of energy in a viable form for use later in production of electricity or any other purposes deemed necessary." Energy storage is accomplished by devices or physical media that store energy to perform useful processes at a later time. A device that stores energy is sometimes called an accumulator. Many renewable energy sources (most notably solar and wind) produce infirm or intermittent power. Wherever intermittent power sources reach high levels of grid penetration, energy storage becomes one option to provide firm and reliable energy supplies. Individual energy storage projects augment electrical grids by capturing excess electrical energy during periods of low demand and storing it in other forms until needed on an electrical grid. The energy is later converted back to its electrical form and returned to the grid as needed. (10). Common forms of renewable energy storage include pumped-storage hydroelectricity, which has long maintained the largest total capacity of stored energy worldwide, as well as rechargeable battery systems, thermal energy storage including molten salts which can efficiently store and release very large quantities of heat energy, and compressed air energy

storage. Less common, specialized forms of storage include flywheel energy storage systems, the use of cryogenic stored energy, and even superconducting magnetic coils. Solar energy can be stored at high temperatures using molten salts. Salts are an effective storage medium because they are low-cost, have a high specific heat capacity and can deliver heat at temperatures compatible with conventional power systems. The Solar PV used this method of energy storage, allowing it to store 1.44 TJ in its 68 m³ storage tank with an annual storage efficiency of about 99%. Off-grid PV systems have traditionally used rechargeable batteries to store excess electricity. With grid-tied systems, excess electricity can be sent to the transmission grid, while standard grid electricity can be used to meet shortfalls. Net metering programs give household systems a credit for any electricity they deliver to the grid. The storage of solar energy can be classified in following forms:

Mechanical:

- [Compressed air energy storage](#)
- [Flywheel energy storage](#)
- [Gravitational potential energy storage](#)
- Pumped hydroelectric storage (PHS),

Thermal:

- Cool water, hot water or ice thermal storage.
- Liquid air or liquid nitrogen energy storage or [Cryogenic energy storage](#).
- [Molten salt storage](#).

Chemical:

- Battery, Battery Energy Storage System (BESS), flow battery, secondary battery.
- [Hydrogen storage](#).
- [Power to gas](#).

Electromagnetic:

Storage coil, superconducting storage coil or [Superconducting magnetic energy storage](#)

Some types of Solar Energy Storage facilities:

- a) **Cryogenic energy storage (CES)** is the use of low temperature ([cryogenic](#)) liquids such as [liquid air](#) or [liquid nitrogen](#) as [energy storage](#). When it is cheaper (usually at night), electricity is used to cool air from the atmosphere to -195 °C using the [Claude Cycle](#) to the point where it [liquefies](#). The [liquid air](#), which takes up one-thousandth of the volume of the gas, can be kept for a long time in a large [vacuum flask](#) at [atmospheric pressure](#). At times of [high demand for electricity](#), the liquid air is pumped at [high pressure](#) into a [heat exchanger](#), which acts as a [boiler](#). Air from the atmosphere at ambient temperature, or hot water from an industrial heat source, is used to heat the liquid and turn it back into a gas. The massive increase in volume and pressure from this is used to drive a [turbine](#) to generate electricity.

b) **Molten salt storage** can be employed as a thermal energy storage method to retain thermal energy collected by a [solar tower](#) or [solar trough](#) so that it can be used to generate electricity in bad weather or at night. It was demonstrated in the [Solar Two](#) project from 1995-1999. The system is predicted to have an annual efficiency of 99%, a reference to the energy retained by storing heat before turning it into electricity, versus converting heat directly into electricity. The molten salt mixtures vary. The most extended mixture contains [sodium nitrate](#), [potassium nitrate](#) and [calcium nitrate](#). It is non-flammable and non-toxic, and has already been used in the chemical and metals industries as a heat-transport fluid, so experience with such systems exists in non-solar applications. The salt melts at 131 °C. It is kept liquid at 288 °C in an insulated "cold" storage tank. The liquid salt is pumped through panels in a solar collector where the focused sun heats it to 566 °C. It is then sent to a hot storage tank. This is so well insulated that the thermal energy can be usefully stored for up to a week. When electricity is needed, the hot salt is pumped to a conventional steam-generator to produce [superheated steam](#) for a turbine/generator as used in any conventional coal, oil or nuclear power plant. A 100-megawatt turbine would need a tank of about 9.1 metres tall and 24 metres in diameter to drive it for four hours by this design.

- c) **Battery System:** Without batteries to store energy we would only have power when the sun was shining or the generator was running.

Marine type deep cycle batteries are basically for boats & campers and are suitable for only very small systems. They can be used but do not really have the capacity for continuous service with many charge/discharge cycles for many years. Regular or Car type batteries should not be used at all because they cannot be discharged very much without internal damage. A very popular battery for small systems is the Golf Cart battery. They are somewhat more expensive than deep cycle recreational batteries but are probably the least expensive choice for a small system on a budget.

Flooded type These are Lead acid batteries that have caps to add water. Many manufacturers make these types for Solar Energy use. They are reasonably priced and work well for many years. All flooded batteries release gas when charged and should not be used indoors. If installed in an enclosure, a venting system should be used to vent out the gases which can be explosive.

Gel type Not to be confused with maintenance free batteries, sealed gel batteries have no vents and will not release gas during the charging process like flooded batteries do. Venting is therefore not required and they can be used indoors. This is a big advantage because it allows the batteries to maintain a more constant temperature and perform better.

Absorbed Glass Mat batteries are the best available for Solar Power use. A woven glass mat is used between the plates to hold the electrolyte. They are leak/spill proof, do not out gas

when charging, and have superior performance. They have all the advantages of the sealed gel types and are higher quality, maintain voltage better, self discharge slower, and last longer. The Sun Xtender series by Concorde Battery is an excellent example of AGM batteries. They are more expensive, but usually get what pay for it. This type of battery used in airplanes, hospitals, and remote telephone/cell tower installations.

Steam accumulators: A Steam accumulator is an insulated steel pressure tank containing hot water and steam under pressure. It is a type of energy storage device. It can be used to smooth out peaks and troughs in demand for steam. Steam accumulators may take on significance for energy storage in solar thermal energy projects. A solar power tower stores heat in tanks as pressurized steam at 50 bar and 285 °C. The steam condenses and flashes back to steam, when pressure is lowered. Storage is for one hour. The longer storage is possible, but that has not been proven yet in an existing power plant.

Phase change material: A phase-change material (PCM) is a substance with a high heat of fusion which, melting and solidifying at a certain temperature, is capable of storing and releasing large amounts of energy. Heat is absorbed or released when the material changes from solid to liquid and vice versa; thus, PCMs are classified as latent heat storage (LHS) units. Phase Change Material (PCMs) offers an alternative solution in energy storage. Using a similar heat transfer infrastructure, PCMs have the potential of providing a more efficient means of storage. PCMs can be either organic or inorganic materials. Advantages of organic PCMs include no corrosives, low or no under cooling, and chemical and thermal stability. Disadvantages include low phase-change enthalpy, low thermal conductivity, and flammability. Inorganics are advantageous with greater phase-change enthalpy, but exhibit disadvantages with under cooling, corrosion, phase separation, and lack of thermal stability. The greater phase-change enthalpy in inorganic PCMs make hydrate salts a strong candidate in the solar energy storage field.

Solar pond: A solar pond is a pool of saltwater which acts as a large-scale solar thermal energy collector with integral heat storage for supplying thermal energy. A solar pond can be used for various applications, such as process heating, desalination, refrigeration, drying and solar power generation. A solar pond is simply a pool of saltwater which collects and stores solar thermal energy. The saltwater naturally forms a vertical salinity gradient also known as a "halocline", in which low-salinity water floats on top of high-salinity water. The layers of salt solutions increase in concentration (and therefore density) with depth. Below a certain depth, the solution has a uniformly high salt concentration. When solar energy is absorbed in the water, its temperature increases, causing thermal expansion and reduced density. If the water were fresh, the low-density warm water would float to the surface, causing convection current. The temperature gradient alone causes a density gradient that *decreases* with depth. However the salinity gradient forms a density gradient that *increases* with depth, and this counteracts the temperature gradient, thus preventing heat in the lower layers from moving upwards by convection and leaving the pond. This means that the temperature at the bottom of the pond will rise to over 90 °C while the temperature at the top of the pond is usually

around 30 °C. The main features of solar pond energy storage system are as follows:

- The approach is particularly attractive for rural areas in developing countries. Very large area collectors can be set up for just the cost of the clay or plastic pond liner.
- The evaporated surface water needs to be constantly replenished.
- The accumulating salt crystals have to be removed and can be both a valuable by-product and a maintenance expense.
- No need of a separate collector for this thermal storage system
- The power can be used when it needed.

IX. BENEFITS OF STORAGE SYSTEMS:

- **Security:** A more efficient grid that is more resistant to disruptions.
- **Environment:** Decreased carbon dioxide emissions from a greater use of clean electricity.
- **Economy:** Increase in the economic value of solar power and strengthened competitiveness in the clean energy race.
- **Jobs:** New income sources for rural landowners and tax revenues for solar development areas. More jobs in supporting sectors such as manufacturing, engineering, construction, transportation and finance.
- Peak Demand Reductions.
- Improved asset utilization.
- Air emission reductions.
- Improved reliability.

X. BARRIERS TO THE DEVELOPMENT AND UTILIZATION OF SOLAR ENERGY TECHNOLOGIES

There are so called barriers that tend to weaken the adoption of solar energy technologies for electricity generation and thermal utilization purposes. These barriers are classified broadly as technical, economic, and institutional.

Technical Barriers

Solar PV

- i. The efficiency constraint is one of the main barriers to widespread use. The thin-film and crystalline-silicon modules have efficiency ranges of 7% to 10% and 12% to 18% respectively. Even as PV technologies with significantly higher efficiencies are under development, the present efficiency ranges constitute a barrier.
- ii. Strong demand for PV outpaced the supply and partly stalled the growth of solar sector. However, the resulting surge in production combined with the present financial crisis has created an industry wide.
- iii. The performance limitations of balance of system components, of solar PV system such as batteries, inverters and other power-conditioning equipment are another area with considerable room for improvement.

- iv. Lack of clarity regarding technical limits of exporting power to the grid and network grid protection requirements for PV systems to safely export power.
- v. In the case of stand-alone PV systems, storage is an important concern as is the shorter battery life compared to that of the module. Further, safe disposal of batteries becomes difficult in the absence of a structured disposal/recycling process.
- vi. Lack of proper information about the utilization of solar electric systems, especially PV. For instance, incorrect charging techniques such as polarity reversal were seen as frequent problems that damaged the junction boxes of the PV panel. It was observed that cracks in the glass of the PV module, water intrusion during rainy season, dust and algal growth accumulating along the lower section of the panels also constituted some of the major problems of PV systems.
- vii. When the PV systems are promoted, especially from government sponsored programs, very little care is given to the potential load of the prospective user's household. People have been found to install more bulbs than the specified number. In addition, in many cases it was found that the replacement for a fused CFL bulb was a cheaper incandescent one. This resulted in faster drainage of the battery. It has also been observed that in an effort to overcharge¹ the battery, the charge controller is bypassed. Such practices reduce the battery life and require investment in a new battery.

Solar thermal

- i. In the case of solar thermal parabolic trough systems, one of the most proven solar power technology, the upper process temperature is limited by the heat carrying capacity of the thermal oil used for heat transfer. Thermal loss from heat storage in such system remains an important technical challenge in solar thermal technologies.
- ii. In case of central receiver systems of solar thermal the technologies such as the molten salt-in-tube receiver technology and the volumetric air receiver technology, both with energy storage system needs more experience to be put for large-scale application.
- iii. With regard to solar thermal application for space and water heating, thermal losses from heat storage is an important challenge. It was observed that the losses were up to five times greater than originally expected. In addition many of solar thermal designs are put to market without assessing appropriateness of people's needs and without proper education related to its efficient use. Lack of trained manpower to install and maintain such systems has also been a persistent concern.
- iv. Another barrier to solar air and water heating applications especially in industrialized countries is the lack of integration with household appliances.

Economic Barriers

Solar PV

- i. While solar PV has zero fuel cost, low O&M costs and is competitive on a life-cycle cost basis, the high initial upfront cost and unavailability of easy and consistent financing options forms a prime barrier.
- ii. Cost comparisons are often made against established conventional technologies that benefit from direct and indirect subsidies, accumulated industry experience, economies of scale and uncounted externality costs.
- iii. Unusually high risks are assessed in determinations by finance institutions because of their lack of experience with PV projects.
- iv. Bias against distributed technology platforms among conventional energy agencies and utilities. Thus, in less wealthy countries, limited sources of investment finance are directed towards conventional energy technologies.
- v. The cost of the module may decline but may not be matched by a proportional decline in Balance of System costs.
- vi. Power tariffs are subsidized for certain sectors of the economy (e.g. agriculture) and/or certain income groups. As such the use of PV to serve these market segments is at a disadvantage.

Solar Thermal

- i. High upfront and maintenance costs constitute significant barriers. This is particularly relevant for poorer potential customers.
- ii. The lengthy payback periods and small revenue stream also raises creditworthiness risks of such systems.
- iii. The bias against distributed energy technology platforms among conventional energy agencies and utilities
- iv. In the case of solar thermal applications, diffusion can be hindered by gaps in technical and financial data needed for accurate planning and implementation of projects.

XI. RECOMMENDATIONS

The capital cost of the solar power system is higher than the conventional source of energy. Efforts are required to be made for reduction of capital cost of solar power projects to make it comparable with conventional source of energy. Most of the State Electricity Regulatory Commissions issued the tariff order for purchase of power from solar power projects. The other States, those having potential of solar energy also required to issue solar energy tariff to accelerate and attract the investment in this field. It may also be concluded that solar energy development is of great importance from the point of view of long term energy supply security, decentralization of energy supply particularly for the benefit of the rural population, environmental benefits and sustainability. For faster development of solar energy, following recommendations are necessary to implement

- A strong need to improve reliability of technologies and introduce consumer-desired features (in terms of services and financial commitments) in the design and sales package.

- Although solar energy is comparatively more expensive than conventional fuels, but it can be used in distributed generation and local distribution networks to counterbalance the transmission & distribution (T&D) losses incurred by states depend on government support for development.
- Incorporation of solar energy strategy into development programmers will promote its decentralized applications.
- The government policies should encourage more private participation and industry collaboration in R&D for rapid commercialization of solar energy and in market infrastructure development.
- Public-private role in solar energy development needs to be redefined. Solar energy deployment could also be enhanced from energy services delivery perspective.

XII. CONCLUSION

Solar power is infirm power and efforts are required to be made it firm power by developing appropriate storage facilities. The solar power can also make a viable source of energy by announcing the suitable policies incentives. Re-powering has to be a part of any strategy to scale-up solar power capacity as it is vital to optimally utilize high solar radiation sites that remain unused due to less effort by the government and investing companies and to retrofit or replace the old panels with modern, large and higher, more efficient ones. This will have to go along side efforts to develop and facilitate introduction of a new generation of solar panels that can harness the potential from sustained low to medium solar radiation regimes available in abundant measure in large parts of the country. Such efforts may require revisiting role and mandate of Jawahar Lal Nehru Solar Mission (JNNSM) and to position an institution that can lead new initiatives in solar resources assessment and technology development

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- [10] New and Renewable Energy Department, M.P.
- [11] M.P Electricity Regulatory Commission's Web-site.
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AUTHORS

First Author – Ashok Upadhyay has Graduation degree in Electrical Engineering, degree of Master in Engineering in Industrial Engineering and having degree of M. Phil in Renewable Energy. The main author is certified Energy Manager accredited by BEE, Govt. of India. The Author is working as Dy. Director (Generation) in M.P. Electricity Regulatory Commission, Bhopal. The main author is currently pursuing PHD program in electrical engineering from MANIT, Bhopal, Madhya Pradesh, India, PH-09893324160.
E-mail:ashok.upadhyay06@gmail.com

Second Author – Arnab Chowdhury Pursuing MBA (Power Mgmt.), University of Petroleum and Energy Studies., Dehradun, Uttarkhand, chowdhury6698@gmail.com

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The Economic Analysis of the Smallholders Grape Production and Marketing in Dodoma Municipal: A case study of Hombolo Ward

Natalia Kalimang`asi*, Robert Majula* and Nathaniel Naftali Kalimang`asi**

*Department of Research, Short Course and Consultancy, Local Government Training Institute, Dodoma- Tanzania.

**Directorate of Academic, Research and Consultancy, Tarime Institute of Business School, Mara- Tanzania.

Abstract- The study is aimed at evaluating production, marketing and income of small holder grape producers in Dodoma. The study used both primary and secondary data. A sample of 35 smallholders grape producers was randomly selected. Data were collected by using semi -structured questionnaires and analyzed by SPSS and Ms- Excel. Descriptive statistics was used to determine the frequencies and percentages whereby mean of Kgs/acre and mean income/acre were calculated to determine performance of the farmers.

Results indicate that female small holder farmers were more efficient as they produced 2000Kg/1.60 acre than males who produced 1480Kg/1.72Acre. Further analysis indicates that unmarried smallholders were more efficient (2000kg/1.00acre) compared to married ones who produced 1590 kg/1.75acre. Also, findings indicate that the youngest producers had the largest grape output (mean 2170kg/1.33 acre) compared to elders (1540 kg/1.75 acre). The results show that grape production was mostly practiced by people with low education level and each smallholder grape producers sold an average 1530kg per year which account for 91.4% of market share. However, majority of respondent (57.1%) replied that they sold their produces on credit basis and it takes more than 6 months to be paid. Major challenges faced by smallholder grape producers were decline of the quality of grape due to delayed payment, diseases and unreliable market whereby major strategies were to increase number of extension officers, increase the numbers of processing firms, enforcement of written contracts and establishment of grape board and cooperative union in order to organise farmers to form strong farming entity.

Index Terms- Smallholder, Grape Producers, Production, Marketing

I. INTRODUCTION

Grape is a non -climatic fruits, specifically a berry and from the deciduous woody vines of the genus *Vitis*. In Tanzania, grape is produced in Dodoma, as one of the biggest cash crops in the region. Grape production is the main stay for many farmers in Dodoma Municipal and the nearby districts of Chamwino and Kongwa. The urban Dodoma produces 70% of the grapes and rural Dodoma produces 30% (SNV Tanzania a report on fresh fruits, 2005). This crop has multi-usage such that it can be eaten raw or can be used for making jam, juice, jelly, wine, grape seed-extracts, raisins, vinegar and grape -seed oil. This crop is

considered as a symbol crop for Dodoma region. Grapes were introduced to Dodoma by the missionaries 1960. The first small wineries were started in Bihawana and Hombolo missions. These wineries produced communal wine for church purposes only. Historically, grape production in Dodoma can be traced back to 1963 when the Isanga prison, the oldest prison started growing grapevine. In this year the Isanga prison started with only four acres and three years later the crop was gradually introduced to the five villages namely Mpunguzi, Msalato, Nala, Nkulabi and Mundemu. Subsequently, the National Service Camp at Makutupora - Dodoma accepted the idea thus increasing the acreage and the yields rising high from the grapes to be consumed fresh as table grapes to wine production. The first government institution to invest much in wine production was Isanga prison which prompted the construction of a winery plant in 1969. This company was very famous in Africa and later became the sole buyer of grapes from farmers for wine processing. The establishments of a Makutupora research centre to determine appropriate types of grapes of wines and encouraged more and more farmers to come forward and open grape farms (<http://www.google.com> 25th march, 2014).

Grape is one of the world's largest fruits crops with approximately 67.5 million tones produced each year. Grape grows best in the Mediterranean type of climate with long relatively dry summers and mild winters. Worldwide, Grape is mainly meant for wine production however, a certain portion is dried into raisins and a major part is marketed yearly as fresh fruit, making table grapes one of the world's prominent fresh fruits crops (Khoshroo A. et al., 2013). In US the consumption of fresh grapes has increased from 2.9 pounds per person in 1970 to 7.9 pounds in 2009 (Economic Research Service (ESR), 2009). Moreover, grape is the most important and economical garden fruit crop in the world (Shahraki, Dahmardeh and Karbasi, 2012). In the year 2012, the US and Canadian market, price for fresh grapes jumped to \$1,340 per tons compared to those prices last peaked at \$986 per tons in 2006 (National Agricultural Statistic Services (NASS), 2013).

Regardless of potentiality of grapes, small holder grape growers in Tanzania are facing production, processing and marketing problems such as inadequate product quality, few processing plants or winery industry, low price, low incentives, low output, unreliable rainfall, insufficient agricultural extension services, shortage of buying posts, late payment, low labour productivity, poor infrastructure and poor-harvest management. Sometimes, some market actors violate set standard units of

weights and product grades (MITM, 2008; and MAFC, 2006). As a result farmers ending up having unreliable markets and receive low price for grapes produced. Lack of common price hinder the development of this crop in Tanzania, as most of the business people tend to provide the buying price (Price Maker) for themselves in such a way that the grape growers (Price Taker) continue to be enslaved and being poor. Glover and Kusterer (1990) argued that the market practices out of contract farming, buyer of crops can hold a monopoly position and exploit small-growers. Furthermore, investors especially wine processing industries purchase grapes from smallholder farmers on credit basis, hence money value of their produces keep on depreciating from period of harvesting to the time farmers receive money. The Ministry of Agriculture, Food Security and Cooperative (MAFC, 2006) pointed out agricultural problems like lack of skills in crop husbandry, low chemical fertilizers, delayed payments violated by crop buyers, the good example from Mtibwa Sugar Estates. Due to that, most of the grape farmers are living in very poor life. In this case smallholder farmers produce grapes without being certain of the market. During the grapes season, it is a common to see women carrying the dishes, boxes and plastic basins moving around in the Municipal streets selling their grapes. Such kind of business practices will not provide much profit to grape growers in order to reduce poverty for these farmers. These practices will not make grape farmers move forward or change their life standards, instead having only survival needs of life. Emana and Gebremedhin (2007) argued that poor production handling and packing, imperfect pricing systems, and lack of transparency in market information are also among the impediments in the agricultural production and marketing. The Ministry of Industry, Trade and Marketing (MITM, 2008) argues that market constraints of smallholder farming were weak legal and regulatory framework on agricultural marketing; weak institutional set-up dealing with agricultural marketing; inadequate marketing research; inadequate marketing linkage; and inadequate capacities to utilize opportunities emerging in the domestic, regional and international markets and including preferential markets.

II. MATERIALS AND METHODS

Study Area

This study was carried out in Hombolo Ward in Dodoma region. The study targeted the smallholder grape producers found in this Ward. The choice of this study area was due to the fact that these Wards are among the areas which produce grapevine since 1960s. Demographically Hombolo Ward has 22,457 total number of population (National Census, 2012). The economic activities of this area are agriculture, business, office works, animal husbandry and hunting.

Research Design and Data Collection

The study used a cross sectional research design which involved collecting data at one point in time (Kothari, 2007). Both primary and secondary data collection techniques were used to accomplish this work. Primary data were collected through self administered structured questionnaires while secondary data were collected from journal, books, websites, reports and speeches. The questionnaires were structured with closed and

opened ended questions with two sections. The first section of the questions included respondents profile and the second section was about respondent's marketing channel, small holders' income, size of the farm, amount of grapes (Kg) per acre per annum and price of grapes per kg per years.

Sample Size and Sampling Techniques

Hombolo ward was purposively selected for this study because this ward was among the ward which produce a large quantity of grapes in Dodoma Municipal. Thereafter, simple random sampling was used to get respondents from smallholders grape producers. The probability sampling techniques was used because every grape producer had an equal chance of inclusion in the sample. A sample of 35 respondents of smallholders grape producers was randomly drawn from a sample frame list of 200 small holder grape producers. Moreover, the sample size of the study was based on the theory of central limit which assumes that any sample size greater than thirty (30) is a good representative of the population at 5 percent level.

Data Analysis

Data from field were coded and summarised using SPSS and Excel statistical computer programs. Both descriptive and quantitative data were analysed using Statistical Package for Social Science (SPSS) and Excel statistical computer programs. Descriptive statistics was used to determine the frequency of occurrences and percentages. Results of the analysis were presented descriptively in a tabular form followed by narrative description of the results.

III. RESULTS

Sex of smallholder farmers and mean output of grape produces

Descriptive statistics of sex of smallholder farmers was measured against the output per kilogram per acre per year as shown in Table 1. Logically, in production males produce more than females do. The mean for male smallholder farmers was 1480 kilograms of grapes per acre per year cultivated under mean of 1.72 acres. The female small holder farmers obtained a mean of 2000 kilogram of grape produce acre per year cultivated under mean of 1.60 acre. However, total mean of kilogram for the sample was 1630 cultivated under the mean acre of 1.69. These results indicate that female small holder farmers were leading in the grapes production. This was because females are more effective and efficient in doing things compared to the males. In this case the production of grapes accepts the theory of the influence of sex in production.

Table 1: Mean of Kilogram/Acre owned by Males and Females

Variables	Frequency	Percentage	Mean of Kgs	Mean acre
Male	25	71.4	1480	1.72
female	10	28.6	2000	1.60
Total	35	100	1630	1.69

Source: Field Data June, 2014

Marital status of smallholder farmers and mean of Kilogram/Acres

Descriptive statistics of marital status of smallholder farmers was measured against the output per kilogram per acre per year as shown in Table 2. Theoretically, married producers would have more output than single family this is because the married would have more labour force than single family and divorced small holder farmers. The findings showed that the unmarried smallholder farmers obtained the mean of 2000 kilograms of grapes, produced under a mean 1.00 acre. Furthermore, married small holder farmers obtained a mean of 1590 kilograms of grapes under a mean acre of 1.75 per year. Indeed, the results show that unmarried smallholder farmers were leading by obtaining a higher mean of grape produces in kilograms per acre per year (because they obtained the mean kilogram above the mean of total sample which is 1630 kilogram cultivated under mean acre of 1.69) compared to married smallholder farmers. This implies that unmarried producers devote most of their time in grape production compared to married ones.

Table 2: Mean of Kilograms/Acre per Marital Status

Variables	Frequency	Percentage	Mean of Kgs	Mean acre
Single	2	5.7	2000	1.00
Married	32	91.4	1590	1.75
Widow	1	2.9	2000	1.00
Total	35	100	1630	1.69

Source: Field Data June, 2014

Age of Smallholder Farmers and Mean of Kilograms per Acre

Principally, it is thought that young populations are more productive than old population. Table 3 shows the age of smallholders grape producers, the youngest age of smallholder farmers were aged between 18-34 years, elders aged between 35-64 and the oldest were aged above 64 indicating the variation of output in grape production. The young aged small holder farmers obtained the mean 2170 kilograms of grape produces per year under the mean acre of 1.33. The eldest grape producers obtained a mean 1540 kilograms of grapes per year under a mean of acre of 1.75. Similarly, the eldest grape producers obtained a mean of 1000 kilogram per year cultivated under mean acre of 2.00. The findings indicate that the youngest producers had the largest grape output per acre per year in the study areas compared to elders who obtained the grape output below the average of the total sample (1630 kg/1.69 acre). This indicates that youngest small holder farmers engaged more and very efficient in grape production compared to the oldest small holder farmers.

Table 3: Age of Smallholders Farmers and Mean of Kilograms/Acre

Variables	Frequency	Percentage	Mean of Kgs	Mean acre
Age between 18-34	6	17	2170	1.33

Age between 35-64	28	80	1540	1.75
Age above 64	1	3	1000	2.00
Total	35	100	1630	1.69

Source: Field Data June, 2014 ***Significance at 95% of Confidence Interval

Level of education of smallholder farmers and mean of kilogram/Acre

Logically educated farmers are expected to produce more compared to uneducated farmers. This is due to the fact that educated farmers can easily adopt new technology and techniques of production. Table 4 shows that smallholder farmers with primary level of education had their mean kilogram of grape produce at 1530, produced under mean of acres 1.95. The smallholder farmers with secondary level of education had the mean output of 2400 kilograms per acre per year, produced under a mean of acres 1.40. Furthermore, the smallholder farmers with higher level of education had mean output 1400 kilograms of grapes per year produced under a mean of acres 1.40. The results show that grape production was mostly practiced by people with low education and people with higher education were not effectively engaged in grape production (table 4). Thus, the higher the education the lower was the involvement in the agricultural sector.

Table 4: Level of education of smallholder farmers and mean of kilogram/Acre

Variables	Frequency	Percentage	Mean of Kgs	Mean acre
Informal Education	2	5.7	1000	2.00
Primary Education	19	54.3	1530	1.95
Secondary Education	5	14.3	2400	1.40
NACTE Education	4	11.4	1750	1.00
University Education	5	14.3	1400	1.40
Total	35	100	1630	1.69

Source: Field Data June, 2014 ***Significance at 95% of Confidence Interval

The Grapes Production Analysis in Dodoma Municipal

Dodoma Region is found in Central Plateau zone which is famous for production of fruits such as Grapes, Mango, Papaya, guava, baobab, tamarind and dates (Ministry of Agriculture and Food Security- Horticulture Unit, 2005). Grape is one of cash crops in Dodoma Municipal and a region at large. The urban Dodoma produces 70% of the grapes and rural 30% (SNV Tanzania Report on fresh fruits, 2005). Majority (100%) of smallholders grape producers in Dodoma produce grapes in their own land, contrary grapes is cash crops in Dodoma, production of grape is dominated by small holders farmers (table 5). The

majority of smallholders grape producers (62.9%) surveyed had a land size ranging between 2 and 5 acres. On average each smallholder producers produce 1630 kilogram per annum on average of 1.69 acre, however the result revealed that the longer year of growing grapes (2 years and above), the higher the grape

production (table 5 below). This implies that the experienced grape producers are better off in terms of production than the new ones.

Table 5: The Production Analysis of Grapes

Variables	Responses			Total
Do you own land for grape production?	Yes	No		35
	(35)100%	0		
How many acres (land size) do you use in grape production?	Less than 2 acres	Between 2 and 5 acres	Above 5 acres	35
	12(34.3%)	22(62.9%)	1(2.9%)	
Average kilogram per Acre/year per households for each categories	Less than 2 acres	Between 2 and 5 acres	Above 5 acres	35
	12(1,920)	22(1,410)	1(3,000)	
Year of growing grapes	Less than 2 years	Between 2 and 5 years	Between 5 and 10 years	35
	3(8.6%)	17(48.6%)	15(42.9%)	

Source: Field Data June, 2014

The Marketing of Grapes in Dodoma Municipal

Table 6 indicates the nature of sale transaction of grape produced in Dodoma region. The results showed that most grapes produced in Dodoma Municipal are moving through Producers---Retailer (Street Vendors) --- Market. During the survey, on average each smallholder grape producers sold over 2500 kilogram of their grapes direct to the market (Producers -----Spot market). This is equal to 5.7% of total grape sold per year. Furthermore, on average grapes each smallholder grape producers sold 3000 kilogram of grape per year through the marketing channel of Producers – Retailer (Street Vendors) –

Market, which is equal to 62.9% and on average each smallholder grape producers sold 1530 kilogram per year through Producers—Agents---processing firms, which account for 91.4% of marketed share. Although, most of grapes are sold through the Producers – Retailer (Street Vendors) – Market, still there is a big share of grapes which is sold to grape processing industry (winery). The data from Hombolo ward shows that marketing actors go to buy grapes at farm gate (table 6). Grape processing firms purchase more grapes than any other types of buyer (62.9%).

Table 6: Marketing of Grapes in Dodoma Municipal

Variables	Responses			Total no. of respondents
Where do you sale your grape produces?	Wholesalers	Processing firms	wholesalers and processing firm	35
	3 (8.6%)	22(62.9%)	10(28.6%)	
What is marketing channel of your grape produces?	producers-spot market	producers-Retailer - market	producers-agents-processing firms	35
	2(5.7%)	1(2.9%)	32(91.4%)	
Average kilograms sold per each marketing channel	2500	3000	1530	35

Source: Field Data June, 2014

Cost of Labour Used in Grape Production per Acre per Year

Table 7 indicates household labour cost used in grape production per acre/year. Smallholder grape producers incur different costs during production process. Majority of smallholder's producer incur cost of land clearing which is above Tsh. 100,000. Similarly, more than a half (60%) of respondents incurs the cost of cultivation which is above Tsh. 250,000 and cost of planting which is above Tsh. 201,000. Moreover, the cost

of putting fertilizers, majority of respondents incurred the cost above Tsh.150,000 per acre and in case of pruning, majority incur the cost below tsh. 60,000. However, above two third of respondents indicate that pest control activity had the cost above Tsh. 151,000 and majority possess costs less than Tsh. 61,000 in harvesting, packaging and transporting (table 7).

Table 7: households Labour Cost (Tanzanian shilling) used in Grape Production per Acre per year

Variable	Responses				Total no. of respondents
	T. shilling	T. shilling	T. shilling	T. shilling	
Land Clearing	0-100000	101, 000-200,000	201,000-500,000	Above 500,000	35
	10(28.6%)	14(40.0%)	9(25.7%)	2(5.7%)	
Cultivation	0-250,000	251,000-500,000	501,000-750,000	above 750,000	35
	4(11.4%)	21 (60%)	3(8.6%)	7(20.0%)	
Planting	0-200,000	201,000-400,000	401,000 - 800,000	above 800,000	35
	12(34.3%)	2(5.7%)	16(45.7%)	5(14.3%)	
Fertilizer	0-75,000	76,000-150,000	151,000-225,000	above 225,000	35
	3(8.6%)	5(14.3%)	8(22.9%)	19(54.2%)	
Pruning	0-20,000	21,000-40,000	41,000-60,000	Above 60,000	35
	6(17.1%)	7(20.0%)	7(20.0%)	15(42.9%)	
Pest Control	0-150,000	151,001-300,000	301,000-600,000		35
	5(14.2%)	12(34.3%)	18(51.5%)		
Harvesting	0-60,000	61,000-120,000	121,000-180,000		35
	22(62.9%)	8(22.9%)	5(14.3%)		
Packaging	0-30,000	31,000-60,000	above 90,000		35
	20(57.1%)	10(28.6%)	5(14.3%)		
Transporting	0-50,000	51,000-100,000	above 100,000	Nil	35
	7(20.0%)	6(17.1%)	2(5.7%)	20(57.1%)	

Source: Field Data June, 2014

Nature of Sale Transaction of Grapes in Dodoma

Table 8 below shows results of nature of sale transaction of grape produces. More than a half (57.1%) of respondents replied that they sale their produces on credit basis whereby majority (62.9%) of respondent said it takes more than 6 months to be paid. Majority (77.1%) of respondents replied to have a form of

agreement with buyers, even though it is not a written contract that could help them to hold the buyers accountable. Furthermore, producers replied that they do not get any assistance from buyers except the extension services from public extension officers.

Table 8 Nature of transaction of grapes

Variables	Responses			Total No. of Respondents
Mode of payment of grape produces	cash basis	credit basis	cash and credit	35
	8(22.9%)	20(57.1%)	7(20%)	
How long does it take to get cash since the point of sale?	less than 3 months	Between 3 and 6 months	more than 6 months	35
	4(11.4%)	9(25.7%)	22(62.9%)	
Do you have a written or oral form of agreement with the buyers?	Yes	No		35
	27(77.1%)	8(22.9%)		
What type of assistance do you get from buyers?	Training and technology	Extension Services	No assistance	35
	5(14.3%)	17(48.6%)	13(37.1%)	

Source: Field Data June, 2014

Income of Grape Producers per Acre per Annum

Table 9 below indicates respondents' level of income earned per year per acre. Thirty four percent (34.3%) of the respondents earn income less than Tsh. 5 million per year per acre and the rest earned income above Tsh.5 million per year per acre. More than a half (57.1%) of respondents said that grape production did no assist them to acquire wealth such as house or buy a car. However, for those who replied that grape production assisted to acquire wealth, their responses were as follows;- 40% said were able to build a house, 20% were able to buy a car, 14.3% mentioned that were able to own a car and build houses and

25.7% said were able to own house and send their children to school. On average the smallholder grape producer who owns the farm less than 2 acres was able to get an average 1,920 kilogram of grape outputs per acre per year and earn an average of Tsh. 2.42 million per year. Similarly, smallholder grape producers who own the farm between 2 and 5 acres were able to get an average of 1,410 kilogram of grape outputs per acre per year and were able to earn Tsh. 2.09 million per year. This result revealed that smallholder grape producers who own farms less than 2 acres were more efficiency than those who own above than 2 acres.

Table 9: Income of Grape Producers per Acre per Annum

Variables	Responses				Total No. of Respondents
Income earned/year/acre	less than 5million	between 5mil and 10mil	between 10mil and 15million	above 15million	35
	12(34.3%)	8(22.9%)	11(31.4%)	4(11.4%)	
Average income/acre/year	less than 2 acres	between 2 and 5 acres	above 5 acres		35
	12(2.42Mil)	22(2.09mil)	1(2mil)		
Average kg/Acre/year per households for each categories	Less than 2 acres	Between 2 and 5 acres	Above 5 acres		35
	12(1,920)	22(1,410)	1(3,000)		
Grape production assists to acquire wealth	Yes	No			35
	15(42.9%)	20(57.1%)			
Asset(s) acquired as result of grape production	houses	car	car and house	Own house and send children to school	35
	14(40%)	7(20.0%)	5(14.3%)	9(25.7%)	

Source: Field Data June, 2014

Trend of Price of Grapes per Kg

Table 10 below indicates the trend of price of grapes in Dodoma. The price of grapes in Dodoma Municipal tends to vary between Tsh.500 and tsh. 1000. The result indicates that more than a half (54.3%) of respondents replied that they sell their

grape on price ranging between Tsh. 501-800 with average kilogram of 1470 sold. The price of grape has been fluctuating from season to season depending on harvest and availability of buyers. However, in most cases they sell at price of Tsh.500 shilling.

Table: 10 Trend of Price of Grapes per Kilogram

Variables	Frequency	Percentage	Mean of Kilogram
Average range 501-800	19	54.3	1470
801-1,000	16	45.7	1810
Total	35	100	1630

Source: Field Data June, 2014

Production and Marketing Challenges

Table 11 show results of challenges facing smallholder grape producers in production and marketing of grapes. Majority of respondents (51.4%) explained that decline of the quality of grape due to delayed of payment was the major challenges faced by grape producers during production. Others (31.4%) explained that another challenge of grape production was diseases attack

such as fungus and the rest explained that grape production incurs high input prices such as insecticides. Furthermore, majority of respondents (42.9%) replied that processing firms delayed payment and 37.1% said that there is unreliable market for grape. The study findings, agreed by Mwakalinga and Massawe (2007) who argue that agricultural sector in Tanzania

faces a lot of problems like low price, low output and unreliable market, poor infrastructure and poor quality.

Table 11: Production and Marketing challenges

Variables	Responses			Total no. of respondent
Production challenges of grapes	Diseases attack eg. fungus	High price of Inputs such as insecticides	Decline quality of grapes due to delayed payment	
	11(31.4%)	6(17.2%)	18(51.4%)	
Marketing challenges of grapes	Unreliable markets	Low prices	Delayed payment by processing firms	
	13(37.1%)	7(20.0%)	15(42.9%)	

Source: Field Data June, 2014

Production and Marketing strategies to overcome challenges

Table 12 presents result on production and marketing strategies to overcome challenges faced by smallholder grape producers. Majority of respondents (45.6%) argued that government should employ more extension officers in order to help them to overcome production challenges. Others (31.4%) explained that there should be written contract between producers and the buyers (Processing Firms) and the rest showed the need of establishing grape Board and provision of credit to grape farmers (table 12). On the marketing side, majority of respondents (42.9%) explained that government should invest in processing industries in order to increase market for this crop and

(31.4%) argued that there is a need of having a written contract between buyer and seller of the crop. Twenty percent of respondents emphasized the on establishment of grape cooperative union like in other perennial crops such as cashew nuts and cotton. Liberio (2009) clarified that some of the factors for low agricultural growth are inadequate agro-processing facilities to add value and shelf life to farm produce, weak cooperative unions which fail to organise farmers to form strong farming entity, absence of rural financial institutions to address farmers' credit needs on loan terms and weak research – extension – farmer linkage which reduces spread of new agricultural technologies and information/knowledge from research experts to farmers.

Table 12: Production and Marketing strategies to overcome challenges

Variables	Responses				Total no. of respondent
Production strategies	Government should establish grape board	Government should employ extension officers in order to help them	There should be written Contract between producers and Buyers (processing firm)	Government should provide credit to farmers	35
	4(11.4%)	16(45.8%)	11(31.4%)	4(11.4%)	
Marketing strategies	There should be a contract between buyer and sellers	Government should invest in processing industry in order to increase market for this crop	Department of cooperatives and marketing should assist the producers to establish cooperative union	There should be reliable market	35
	11(31.4%)	15(42.9%)	7(20.0%)	2(5.7%)	

Source: Field Data June, 2014

IV. CONCLUSION

Results from the study revealed that female small holder farmers were more efficient than male grape producers and unmarried smallholders grape producers were more efficient compared to married ones. Also, the youngest producers had the largest grape output compared to elders. Furthermore, results showed that grape production was mostly practiced by people with low education and people with higher education were not

effectively engaged in grape production. On average each smallholder grape producers sold through marketing channel of Producers—Agents---processing firms which account for 91.4% of marketed share. Moreover, majority of respondents replied that they sale their produces on credit basis and it takes more than 6 months to be paid. Major challenges faced in the production and marketing of grape were decline of the quality of grape due to delayed payment, diseases and unreliable market whereby the major production and marketing strategies were to

employ more extension officers, increase the numbers of processing firms, there should be written contracts between buyers and sellers and the government should establish grape cooperative unions.

V. POLICY RECOMMENDATIONS

- i. Government should enforce written contract between buyer and seller of grape in order to reduce some thought of exploitation of sellers and also to ensure market reliability for grapes;
- ii. Government should establish grape board and cooperative union in order to organise farmers to form strong farming entity;
- iii. More research should be conducted to address and solve challenges faced by small grape producers in Dodoma Municipal.

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AUTHORS

First Author: Natalia Kalimang`asi – Master of Business Administration (Finance), Bachelor of Science in Agricultural Economics and Agribusiness Email: mwaseu@yahoo.com

Second Author: Robert Majula – Master of Administration (Marketing), Bachelor of Arts in Commerce (Marketing)

Third Author: Nathaniel Naftali Kalimang`asi: Master of Science in Economics, Bachelor of Arts in Economic Development, Email: nathan54@yahoo.com

Correspondence Author: Natalia Kalimang`asi – Email: mwaseu@yahoo.com; mwaseukalima@yahoo.com, +255 787 577 082

Contribution of Contract Cocoa Production on Improving Livelihood of Smallholder Farmers

Nathaniel Naftali Kalimang`asi*, Agrey Kihombo (PhD) ** and Natalia Kalimang`asi ***

*Student of MSc in Economic -Mzumbe University - Tanzania

**Department of Economics, Mzumbe University – Morogoro-Tanzania

*** Department of Research and Consultancy, Local Government Training Institute, Dodoma- Tanzania

Abstract- This study examined the technical efficiency of cocoa productivity through contract farming in Tanzania for improving livelihoods of smallholder farmers. Probability sampling was used to select 271 respondents (131 respondents from Kilombero and 140 from Kyela Districts). A cross-sectional data were collected using structured questionnaire from cocoa smallholder farmers. The data was analyzed by using NLOGIT software version 5. The results show that the mean technical efficiency was 79.7% and 61.6% from Kilombero and Kyela Districts respectively. Smallholder farmers from Kilombero District were more efficient than Kyela District within contractual arrangement. These smallholder farmers were technically efficient in terms of number of hours spent in farms, labour training, experience, distance and Size of labourer. Moreover, results show that smallholder farmers agreed that being in contract had increased access of training (89.3% (n=242)), credits (80.8% (n=219)), production quantity (73.1% (n=198)), production acreage (71.7% (n=194)), timely purchase (92.9% (n=252)) and timely payment (95.2% (n=258)). However, results show that 67.47% of respondents disagreed that contract farming did not provide timely inputs and 74.9% of respondents disagreed that contract farming helped to introduce new technology. Therefore, findings suggest that contract farming contributed a lot on improving smallholder farmers' livelihood within contract farming.

Index Terms- Technical Efficiency, Contract Farming, Livelihoods

I. INTRODUCTION

Agricultural sector is the leading sector of the economy of Tanzania and accounts for over half of the GDP and export earnings; and over 80% of the poor are in rural areas and their livelihood depends on agriculture (United Republic of Tanzania (URT), 2001). Apart from providing food, Agriculture sector remains to be the country's main source of income for the rural population, which forms 80 percent of the total population and employs 70 percent of the active labour forces (Ministry of Agriculture and Food Supply (MAFS), 2005). However, most smallholders farmers in Tanzania use hand hoes in farming ranging from 1 to 3 acres, and this is the main type of farming characterizing the agricultural economy in Tanzania. Tanzania has conducive environment for development of agriculture sectors despite its people using poor technology. The agricultural sector in Tanzania is facing a lot of problems like low price, low

incentives, low output and unreliable market, poor infrastructure, poor quality, low productivity, poor coordination, inadequate private sectors (Mwakalinga and Massawe, 2007; Delgado, 1995; and URT, 2001). As the result of such problems the agricultural sector has been growing slowly and therefore increasing poverty to smallholder farmers in particular and the nation in general. This is so because most of smallholder farmers in Tanzania do practice independently and lack supports in their production. Smallholder farmers in Tanzania are facing production problems such as inadequate product quality, low labour productivity, insufficient extension, poor market, low price, poor-harvest management, shortage buying posts, late payment, where some market actors violate set standard units of weights and product grades. The Ministry of Industry, Trade and Marketing (MITM, 2008) argues that market constraints of smallholder farming were weak legal and regulatory framework on agricultural marketing; weak institutional set-up dealing with agricultural marketing; inadequate marketing research; inadequate marketing linkage; and inadequate capacities to utilize opportunities emerging in the domestic, regional and international markets and including preferential markets.

Due to these agricultural constraints one would say that contract farming arrangements is a measure of some of these problems in production. The Food and Agricultural Organization (FAO₂) (cited by Ministry of Agriculture Food and Cooperatives (MAFC), 2006) defined contract farming as "an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices. The centralized model of contract farming links the term "Contract Farming" as a vertically coordinated model where the sponsor purchases the crop from farmers and processes or packages and markets the product (Eaton and Shepherd, 2001). Contract farming could be an institutional arrangement that enables farmers to access markets, introduction of higher-value seeds, information, technology, reduction of production risk for farmers, monitoring and labour incentives, timely inputs and production markets, credit and financial intermediation, reduction in the risk of price fluctuations, and increased incomes (Eaton and Shepherd, 2001; Glover and Kusterer, 1990; Key and Runsten, 1999; Holloway et al. 2000; Warning and Key, 2002; Patrick 2004; Birthal et al. 2005a; and Ramaswami et al. 2006).

Contract farming act as value chain between smallholder farmers and the company, Hellin and Meijer (2006) argues that chain actors who actually transact a particular product as it moves through the value chain include input (e.g. seed suppliers), farmers, traders, processors, transporters, wholesalers, retailers

and final consumers. For the success of the organization there must be dependent to each other. The organization provides services to the people and people provide raw materials (sell products) to the organization, this act as a value chain between the two sectors. Contract farming looks as the chain linking the buyer and out-grower because they are supporting each other in the production. The study aimed at assessing contribution of contract cocoa production on improving livelihood of smallholder farmers in Tanzania.

1.1 Conceptual framework

Technical efficiency measures the performance of production in a given available resources. Producers always aimed at maximizing profit and minimizing cost of production in order to produce at efficiency level. Battese and Coelli (1988) define technical efficiency of a firm as the ratio of its mean production (in original units), given the level of inefficiency, to the corresponding mean production if the inefficiency level were zero. But, inefficiency can arise due to other factors which are out of the control of the producers like bad weather (drought, flood, volcanoes), diseases, wild animals, which can lead to the production below the frontier (Aigner et al. 1977; and Meeusen and Broeck, 1977). Efficiency analysis is a common way of evaluating the performance of agricultural production, whereby highly efficient farms are considered to have higher likelihood of survival (Manevska-Tasevska, 2012). However, livelihood is the way smallholder farmers earn income in order to support life. According to Department of International Development, (1999) term *livelihood* comprises the capability, assets and activities requisite for a means of living. The asset is referred to tangible or intangible; tangible assets are such as food store and cash saving, trees, land, livestock and tools and intangible assets are such that access to materials, information, education, health services and employment opportunities. The livelihoods outcomes are seen in human asset, social assets, natural assets, physical assets and financial assets acquired by undertaking a certain activity. Therefore, the livelihood of smallholder farmers within contract farming in cocoa production could be evaluated through assessing some of aforementioned outcomes.

II. METHODOLOGY

2.1 Study Area

The study was conducted in Kilombero and Kyela Districts which are among the areas that produce cocoa beans in Tanzania. The primary data for this study were collected on March - April, 2013. The sampling unit of the study was limited only to the areas producing cocoa, predominantly those within contract farming. Smallholder farmers was obtained from two districts (Kilombero and Kyela), four wards and ten villages involved in the study. Probability sampling method was employed to obtain respondents from smallholder farmers producing cocoa. Cross-sectional data was collected using structured questionnaire; the sample size was 140 respondents from Kyela District and 131 respondents from Kilombero District.

3.1 Analytical Model

The Cobb-Douglas production function has been widely used in agricultural studies because of its simplicity and ease of

estimation from agricultural data (Derbetin, 1992). The Cobb-Douglas production function, in its stochastic form, was presented in equation 1.

$$Y_i = \beta_0 X_{2i}^{\beta_2} X_{3i}^{\beta_3} X_{4i}^{\beta_4} X_{5i}^{\beta_5} e^{u_i} \dots \dots \dots \text{Equation (1)}$$

Where Y_i = output per acre/year/household, X_2 =labour input, X_3 = land input, X_4 =technology used, X_5 =cocoa plants per acre, u_i =stochastic disturbance term, and e = base of natural logarithm. From Equation 1 it is clear that the relationship between output and the four inputs is nonlinear. In transformation this model will be as follows:

$$\ln Y_i = \beta_0 + \beta_2 \ln X_{2i} + \ln \beta_3 X_{3i} + \beta_4 \ln X_{4i} + \beta_5 \ln X_{5i} + \varepsilon_i \dots \dots \dots \text{Equation (2)}$$

Where; β_0 = constant term, \ln = natural logarithm, $\beta_2, \beta_3, \beta_4$, and β_5 is coefficients and other parameter is previous explained.

The error term (ε_i) has two components u_i and v_i which form equation 3

$$\varepsilon_i = v_i - u_i \dots \dots \dots \text{Equation (3)}$$

Where; v_i = is a random error associated with random factors which are out of the control of the producers (Aigner et al. 1977; and Meeusen and Broeck, 1977) such as bad weather (drought, flood, volcanoes), diseases, wild animals, which can lead to the production below the frontier. It has a zero mean and variance equal to δ_v^2 such that its distribution is given as $N(0, \delta_v^2)$.

u_i = is a non-negative truncated half normal random variable (at zero) with a distribution given as $N(0, \delta_u^2)$. However, u_i can also have other distributions such as gamma and exponential. It is associated with farm-specific factors. The mean values of u_i are determined by equation 4.

$$u_i = \omega_i p_i \dots \dots \dots \text{Equation (4)}$$

Where; p_i = Represents inefficiency variable for; $i=1,2,3, \dots, n$; ω_i = Parameter estimates; for $i=1,2,3, \dots, n$; δ_v^2 and δ_u^2 are the variances of v_i and u_i respectively. The inefficiency variable is represented by farm characteristics such as family labour, hired labour, training, distances, access to credit, time (manday hours) and experience.

The maximum likelihood estimation of equation 2 yields parameter estimates; β_i and λ . Given the production frontier and inefficiency effect models represented in equation 5, technical efficiency can be obtained from the conditional expectation of u_i given ε_i as shown in equation 5 (Zaibet and Dharmapala, 1999).

$$E[-u_i | \varepsilon_i] = \frac{\delta_u \delta_v}{\delta} \left[\frac{f^*(\lambda \varepsilon_i / \delta)}{1 - F^*(\lambda \varepsilon_i / \delta)} - \frac{\varepsilon_i \lambda}{\delta} \right]$$

.....Equation (5)

Where; $E[-u_i | \varepsilon_i]$ = A conditional mean of u_i given ε_i ; δ_v^2 = is the variance of v_i ; δ_u^2 = Is the variance of u_i ; $\delta^2 = \delta_u^2 + \delta_v^2$ sample variance; $\lambda = \delta_u / \delta_v$ ratio of variance; f^* = value of a standard normal distribution function; and F^* = value of distribution function. Both functions are being evaluated at $\frac{\lambda \varepsilon_i}{\delta}$. Since technical efficiency of a production can be estimated under conditional expectation of u_i given ε_i .

The individual farmer's level of technical inefficiency was calculated from the expected value of equation 4 as re-written in equation 5 and later TE was compared with the return of cocoa output per kilograms per acre per year per household as showed in equation 6.

$$TE_i = \exp(E[-u_i | \varepsilon_i])$$

.....Equation (6)

Such that $0 \leq TE \leq 1$. Otherwise $TE_i < 1$ provides a measure of short fall of observed output from maximum feasible output that characterized by a stochastic elements that varies across producers (Kumbhakar and Lovell, 2000).

3.2 The Empirical Model

The model in equation 7 representing stochastic frontier was estimated in two step process. First step; cocoa production through contract farming over one year output (Y) was regressed against the independent variables, including area under production (acres/land), labour (family labour plus hired labour), cocoa plants per acre and cost of technology used in production. The log linear production function is represented by equation 7.

$$\ln Y = \ln \beta_0 + \beta_1 \ln X_{1ij} + \beta_2 \ln X_{2ij} + \beta_3 \ln X_{3ij} + \beta_4 \ln X_{4ij} + v_{ij} - u_{ij} \dots \text{Equation.(7)}$$

Where; $\ln Y$ = Output of cocoa products per kgs/acre/years/household; X_1 = Area under cocoa production (land); X_2 = number of cocoa plants per acre; X_3 = Labour (man day/acre including family labour plus hired labour); X_4 = Cost of technology used in production; v_i = Random errors; u_i = Technical inefficiency effects; and \ln = natural logarithms.

Then in the second step; the error term (u_i) was regressed against selected socio-economic characteristics of the farm as shown in equation 8.

$$u_i = \omega_0 + \omega_1 p_1 + \omega_2 p_2 + \omega_3 p_3 + \omega_4 p_4 + \omega_5 p_5 + \omega_6 p_6 + \omega_7 p_7$$

.....Equation (8)

Where; $\omega_0, \omega_1, \omega_2, \dots, \omega_7$ = parameter estimates; p_1 = Distance from home to the field, p_2 = Training, p_3 = Experience in cocoa production; p_4 = Credit; p_5 = Family labour, p_6 = Hired labour; and p_7 = Time used in production (man hours per day).

III. RESULT AND DISCUSSION

4.1 Individual Attributes and Cocoa Output per Acre

Table 1 shows individual attributes and cocoa output per acre per years per household at Kilombero and Kyela Districts. Male producers from Kilombero District obtained 512.79 mean output of cocoa in kilogram under mean acre 1.47 of cultivated land and in Kyela District; male producers obtained 432.60 mean output of cocoa in kilogram under mean acre 1.38 of cultivated land. Female producers in Kilombero District obtained 502.37 mean output of cocoa in kilogram which produced under mean acre 1.37 of cultivated land; and Kyela District female obtained 219.71 mean output of cocoa produced under mean acre 0.73 of cultivated land. Based on the sex of smallholder farmer's data shows that Kilombero District is more productive compared to Kyela District. The group shows that males were very efficient in the production of cocoa than females in both Districts. Logically; males are more productive than females; the results from field support this logic because males were leading in the production of cocoa. There is a need to encourage females to participate fully in the production of cocoa.

Unmarried producers from Kilombero District obtained 174.76 mean output of cocoa in kilogram produced under mean acre of 0.47 of cultivated land; and in Kyela District, unmarried producers 93.01 obtained mean output in kilogram under mean acre 0.31 of cultivated land. The mean of cocoa output in kilogram obtained by married producers from Kilombero District was 779.94 produced under mean acre 2.19; and married producers from Kyela District obtained mean output 502.42 in kilogram per year under mean acre 1.68 of cultivated land. The mean 67.31 in kilogram of cocoa output obtained by divorced producers from Kilombero District which produced under mean acre of 0.21; and Kyela District divorced producers obtain a mean 56.89 of cocoa output in kilogram per year under mean acre 0.12 cultivated. In both districts married producers are leading in cocoa production, Kilombero District being leading in cocoa output produced per acre. Principally; married producers are more productive compared to single producers and divorced producers. The findings showed that married producers were leading in the production of cocoa as principle suggests because married producers had large labour force used in the production. The mean of cocoa output in kilogram produced by young producer's aged below 45 years from Kilombero District was 523.34 which cultivated under mean acre 1.55; and mean of cocoa output produced by young producers from Kyela District was 148.07 which produced under mean acre 0.53. On the other hand old producers aged 45 years and above from Kilombero District obtained mean 491.82 of cocoa output in kilogram which cultivated on mean acre 1.29; and Kyela District, old producers obtained mean 504.24 of cocoa output produced under mean acre 1.58. Table 1 shows that in Kilombero District the number of young producers were smaller than old producers but young producers are leading in cocoa output; but in Kyela the old producers are leading in the cocoa output than young producers. Logically, young producers are more efficient than old producers in agricultural sector. The young producers in Kilombero District are in line with this logic while in Kyela District the results are inversely to this logic, aged farmers obtained more kilograms of

cocoa output per acre compared to the young who are strong in the production.

The smallholder producers having primary education obtained mean 482.00 of cocoa output which produced under mean acre 1.20 from Kilombero District; and Kyela District obtained 338.34 mean of cocoa output produced under mean acre 1.14. The mean of cocoa output per kilograms obtained by smallholder farmers having secondary education was 318.53 under mean acre 1.00 from Kilombero District; and Kyela District, producers with secondary education obtained 288.34 mean of cocoa output produced under mean acre 0.87. The mean of cocoa output in kilograms per year produced by farmers with

higher education from Kilombero District was 214.62 which produced under mean acre 0.64; and from Kyela District, farmers obtained 25.13 mean of cocoa output which produced under mean acre of 0.09. Logically, educated producers are the ones who can produce more compared to uneducated producers. Contrary to this notion, this study showed that smallholder farmers with lower level of education produced more output compared to those with higher levels of education. Thus, there is a need to encourage educated farmers to participate fully in production because they can easily adapt to the change of technology.

Table 1 Individual Attributes and Cocoa Output per Acre per Year

Variables	Kilombero	District		Kyela	District	
	Freq (%)	Mean Kgs	of Acres	Freq (%)	Mean Kgs	of Acres
Sex						
Male	68 (51.9%)	512.79	1.47	89 (63.6%)	432.60	1.38
Females	63 (48.2%)	502.37	1.37	51(36.4%)	219.71	0.73
Marital Status						
Not married	20(15.3%)	174.76	0.47	19(13.6%)	93.01	0.31
Married	101(77.1%)	779.94	2.19	112(80.0%)	502.42	1.68
Divorced	10(7.6%)	67.31	0.21	9(6.4%)	56.89	0.12
Age						
Young <45yrs	64(48.9%)	523.34	1.55	31(22.1%)	148.07	0.53
Old ≥ 45	67(51.1%)	491.82	1.29	109(77.9%)	504.24	1.58
Level of education						
Primary level	63(48.1%)	482.00	1.20	74(52.9%)	338.34	1.14
Secondary level	38(29.0%)	318.53	1.00	60(42.9%)	288.34	0.87
University level	30(22.9)	214.62	0.64	6(4.3%)	25.13	0.09

Source: Field Data Survey, 2013

4.2 Estimation Model

Table 2 presents results of the stochastic frontier production function results estimated using maximum-likelihood method. As it can be seen from the Table 2, the coefficient of amount of plants in Kilombero District and land in Kyela District was positive but not statistically significant. The coefficient of land was 0.08136 in Kilombero District was statistically significant at 1% implies that a unit increases in land could lead to an output rise by 8%. The coefficients of labour (family labour and hired labour) were -0.03180 and 0.14409 from Kilombero and Kyela districts respectively. Where Kilombero District is statistically significant at 1% level and Kyela District is statistically significant at 10% level. The unit increase in labour in

production will lead to increase the output by 3% in Kilombero District and 14% in Kyela District ceteris paribus. The coefficient of number of plants per acre was 0.11442 in Kyela which is statistically significant at 5% level. This implies that the unit increases of cocoa plant per acre, the output will increase by 11% after the three to four years as the length of cocoa plant from planting to harvesting.

The coefficients of tools used in production were 0.00122 and 0.02430 from Kilombero and Kyela districts respectively. Where Kilombero District is statistically significant at 1% level and Kyela District is statistically significant at 5% level. The unit increase in tools of production will lead to increase the output by 0.1% in Kilombero District and 2% in Kyela District ceteris paribus.

Table 2 Production function

District	Kilombero District					Kyela		
	Parameter	Proxy variable	Coeff	Std.Error	p-Value	Coeff	Std.error	p-Value

Constant	β_0	7.53608***	.00672	.0000	5.76388***	.31395	.31395
lnLand	β_1	.08136***	.00087	.0000	.04142	.03659	.2576
lnLabour	β_2	-.03180***	.00150	.0000	.14409*	.08255	.0809
LnPlants	β_3	.00064	.00158	.6841	.11442**	.05675	.0438
InTools (hand hoe)	β_4	.00122***	.00012	.0000	.02430**	.03659	.0302

Source: Field Data Survey, 2013 Note ***,**,* ==>Significance at 1%,5%,10% level

4.3 Input Elasticity from Model Estimation

The elasticity's of output factors of production are return to scale of the Cobb-Douglas stochastic frontier model. Determination of elasticity's is necessary for the estimation of responsiveness of output to factor inputs of production. Most of the inputs on the stochastic frontier were statistically significant at different levels. Summation of all the partial elasticity of production with respect to every input was 0.111 and 0.27 of Kilombero and Kyela districts respectively. For Cobb-Douglas

model this figure represents the returns-to-scale coefficient, also called the function coefficient or total output elasticity. When all factors were varied by the same proportion, the function coefficient indicated the percentage by which output increased. In this case, it means if all variables were to be increased by 1%, output would increase by 11% and 27% in Kilombero District and Kyela District respectively which represent increasing return to scale.

Table 3 Input Elasticity

District	Kilombero	Kyela
Variable inputs	Elasticity	Elasticity
Land	0.08	
Labour	0.03	0.14
Plants		0.11
Tools used (Hand hoes)	0.001	0.02

Source: Field Data Survey, 2013

4.4 Marginal Value Product and Factor Inputs

In order to assess the condition of a producer's profit level between Kilombero and Kyela districts a number of variable such as Marginal Physical Product (MPP)⁶, Marginal value Product (MVP)⁷ and input prices were also estimated.

⁶ MPP= APP*input elasticity

⁷ MVP=MPP*output price

Table 4 Marginal Value Product and Factor inputs

Variable	APP	Elasticity	MPP	MVP Tshs	Unit Price Tshs
Kilombero district					
Land	357.45	0.08	17.87	1,608,300	90,000
Labour	185.59	0.03	5.56	222,400	40,000
Tools used	0.212	0.001	0.0002	1.4	7,000
Kyela district					
Labour	146.26	0.14	20.48	819,200	40,000
Plants	2.853	0.11	0.313	633.74	2024.72
Tools used	0.077	0.02	0.0015	10.5	7000

Source: Field Data Survey, 2013

The condition requirement for profit maximization is that the Marginal Variable Product (MVP) must be equal to the average unit price of inputs. When the unit use of labour and land in production per acre is greater than the average unit of price this implies that the unit increase in the variables cocoa farm will lead to negative return in production. Therefore, the MVP of tools of production (technology used/ hand hoes) was lower than the average unit price in both districts. From this result the smallholder farmers would benefit by increasing the tools of production especially hand hoes in the production of cocoa rather than increasing labour and land. Furthermore, Kyela had opportunity of increasing the cocoa plants in the available plots in order to increase production.

4.5 Distribution of Technical Efficiency

Table 5 shows the range of technical efficiency. About 11.45% (n=15) and 28.57% (n=40) from Kilombero and Kyela respectively of smallholder farmers had a mean below 50% smallholder farmers who were technically inefficient in the production of cocoa. Furthermore, 88.55% (n=116) and 71.43% (n=100) from Kilombero and Kyela respectively of smallholder farmers within contract farming were technically efficient above 50%. The mean technical efficiency was 79.7% and 61.6% from Kilombero and Kyela respectively.

Table 5 Percentage Technical Efficiency

District	Kilombero		Kyela	
Efficiency scores	Sample	%	Sample	%
<30	5	3.82	11	7.85
30-39	6	4.58	9	6.43
40-49	4	3.05	20	14.29
50-59	9	6.87	21	15.00
60-69	18	13.74	30	21.43
70-79	17	12.98	27	19.29
80-89	21	16.03	19	13.57
□□-99	51	38.93	3	2.14
Total	131	100	140	100

Source: Field Data Survey, 2013

Table 6 shows the results of socio-economic factors that influenced technical efficiency or inefficiency. Negative sign on a variable efficiency means that the variable increases technical efficiency, while a positive sign reduces technical efficiency. The coefficients parameters on technical efficiency should not be directly interpreted (Battese and Coelli, 1992).

Smallholder farmers within contract farming had access of training which can facilitate the increase of cocoa output. The coefficient of training was 0.08015 ($p=0.0000$) and 0.00114 ($p=0.0220$) from Kilombero District and Kyela District

respectively. The parameter was statistically significant at 1% and 5% from Kilombero District and Kyela District respectively. Smallholder farmers who underwent training are in good position of increasing production than non trainee's producers. The results agree with Kibirige's (2008) who found that farmers who received training increased their productivity. Equally, Galawat and Yabe (2011) found that farmers who attended training were profit efficient, while farmers who did not have any training were inefficient and had low profit efficiency. Also, the result is consistent with finding of Nikaido (2004) who found that the

participation of the small scale producers in trainings increased efficiency for small scale industry in India. Different finding in world shows that farmers who had access of training are technically efficient in their production.

Smallholder farmers who are close to their farm are expected to be efficient in the production than those who are far away from the field. The coefficient of distance 0.0021(p=0.0126) in Kilombero which is statistically significant at 5% level. The findings conclude that the smallholder farmers who are close to their farm are in position of increasing production. This finding is related with the findings of Kebede (2001) who found that the closer the farm the less the distance used and the greater the efficiency.

Technical efficiency in the production is also associated with hours used in the production; the standard hours used in agriculture is six hours per day. Table 6 shows the coefficient of man hours per day (time) was 0.20898 (p=0.0000) which is statistically significant at 1% level and 0.17512 (p=0.0471) statistically significant at 5% level from Kilombero District and Kyela District respectively. Smallholder farmers within contract farming will increase productivity if they use standard hours in production.

The results on Table 6 show Kilombero District and Kyela District on utilization of family labour are statistically significant at 1% level. The smallholder farmers who use family labour are technically efficiency in the study areas. The results is in line with Kibirige (2008) who reported that increasing number of labour in maize made farmers become technically efficient. Also Kebede (2001) found that the increase of labour in production the output of rice was increased too. In addition, the findings of Kibaara (2005) suggested that the increase of labour possibly led to increase of maize yield.

Regarding to the use of hired labour in the production of cocoa it is technically efficiency at Kilombero District than in Kyela District. The coefficient hired labour was 0.0002 (p=0.0000) which is statistically significant at 1% level. Smallholder farmers in Kilombero District are in good position of using hired labour in the production of cocoa within contract farming.

The smallholder farmers in Kyela District are more experienced in the production of cocoa, the coefficient of experience was 0.00114 (p=0.0221) which is statistically significant at 5% level. The experienced producers are expected to be technically efficiency than newer producers. The result was consistent with the findings of Oleke (2008) who found that the experienced egg producers were the one who where technically efficient. Furthermore, Sesabo (2007) showed that fishermen who had many years of experience in fishing increased their productivity.

The coefficient for credit was -0.00013 (p=0.0000) which signify that the unit increase in credit leads to slight change in cocoa output at Kilombero District. This factor is statistically significant at 1% level. The access of credit within contract farming in production of cocoa in Kilombero District facilitated farmers to increase the output. The result agrees with Onoja (2009) who found that the farmers used credit their yield increased by 7.3%. Likewise, Kibaara (2005) found that alleviating credit constraints enables producers to buy hybrid seeds, and thus reduce technical inefficiency.

Table 6 Determinant of Technical Efficiency

District	Kilombero				Kyela		
Parameter	Proxy variable	Coeff	Std.Error	p-Value	Coeff	std.Error	p-Value
Constant	ω_0	6.91957***	.00498	.0000	6.29639***	.21018	.0000
Training (# days per year)	P_1	.08015***	.00200	.0000	.00114**	.00050	.0220
Distance (home to field)	P_2	.00021**	.8295	.0126	.00347	.01121	.7568
Time (man hour per day)	P_3	.20898***	.00076	.0000	.17512**	.08819	.0471
Family labour (man days)	P_4	.07092***	.00111	.0000	.29507***	.09638	.0022
Hired labour (man days)	P_5	.00021***	.5229	.0000	.00277	.09011	.9755
Experience (in cocoa prod)	P_6	.59692	.00014	.6688	.00114**	.00050	.0221
Credit	P_7	-.00013***	.7309	.0000	-.00253	.00919	.7833
Log likelihood function		-185.23011			-106.85501		
Wald Chi-square		73.650	N=131		1.647	N=140	
Mean technical efficiency		79.7%			61.6%		

Source: Field Data Survey, 2013 Note***, **, * ==>Significance at 1%,5%,10% level

4.6 Contribution of Contract Farming on Improving Smallholder Farmers livelihoods

The investigation of production quantity among the smallholder farmers within contract farming shows that 73.1% (n=198) of respondents agreed that contract farming led to increased productivity and others denied. Also result shows that 95.2% (n=258) of smallholder producers on contract farming said that contract helped them to sell their products on time while others disagreed. Findings showed that 92.9% (n=252) of smallholder farmers agreed that contract farming enabled timely purchase of their produces. Furthermore, result shows that 89.3% (n=242) agreed that contract farming provides access of training to smallholder farmers. Moreover, the results of production acreage shows that 71.7% (n=194) of smallholder farmers

increased the area of production being in contract farming and others disagreed. Eighty one percent (80.8% (n=219)) agreed that contract farming had made them access of obtaining credits. Whereas result indicates that 67.47% of respondents disagree that contract farming helped in obtaining input on time and 74.9% of respondents said contract farming did not increase access of using new technology within contractual arrangement (See table 7). These results prove that smallholder farmers being in contract had improved their livelihoods considering livelihoods outcomes such that Skills and knowledge acquired in contract production, timely purchases, timely payment, increased output and acreage of production, formalised group and relation, increased access to credit and increased employment opportunities.

Table 7 Opportunities within Contract Farming

Variable	% of Agree	% of Disagree
Production quantity	73.1 (n=198)	26.9% (n=73)
Timely purchase	95.2% (n=258)	4.8% (n=13)
Timely payment	92.9 (n=252)	7.1% (N=19)
Timely inputs	32.53% (n=88)	67.47% (n=183)
Access of training	89.3% (n=242)	10.7% (n=29)
Production acreage	71.7% (n=194)	28.3% (n=77)
Availability of technology	25.1% (n=68)	74.9% (n=203)
Access of credit	80.8% (n=219)	19.2% (n=52)

Source: Field Data Survey, 2013

4.7 Discussion of Opportunities Available within Contract Farming

Essentially, contract farming stipulates that within contract, smallholder farmers had access of training, credits, increased production quantity, increased production acreage, timely purchase, timely payment, timely inputs, better price and introduction of appropriate technology. This study found that many smallholder farmers benefited from contract farming although there were few challenges encountered on timely inputs, new technology and price fluctuation, within contractual arrangement. Other challenges encountered by smallholder farmers out of contractual arrangement include occurrence of diseases, attack of crops by wild animals, climatic change (drought) and theft cases. It is essential that contract farming provide inputs to smallholder farmers so as they can prevent pests which frequently attack crops in the study areas.

IV. CONCLUSION AND POLICY IMPLICATION

Contract farming contributes much to the improvement of livelihood of smallholder farmers within contractual arrangement especially on access of credits, timely purchase of their products, timely payment, and increase in production quantity, and labour training. The result shows that smallholder farmers from Kilombero District are technically efficiency than smallholder farmers from Kyela District. This calls for smallholder farmers

from Kyela to increase effort in the production and introduce new cocoa plants like farmers from Kilombero Districts.
Rambling

The low performance of cocoa production in Kilombero and Kyela Districts are resulted from factors which are out of control of smallholder farmers such as drought and wild animal (like monkey) who consume fruits. There is a need for the contract companies to introduce irrigation system within contract farming which will facilitate the harvesting of cocoa beans throughout the year. Furthermore, the government of Tanzania through its ministry of natural resource and tourism should take measures on how wild animals can be controlled in cocoa farms.

Furthermore, smallholder farmers in the production of cocoa are faced with various diseases which attack cocoa plants and fruits in general which lead to reduction on output. Also, cocoa plants faced various diseases yet smallholder farmer said there is no pesticides to control diseases, hence they are not allowed to use industrial chemical for fumigation in steady they use locally made pesticides to control pests in cocoa farms. This call for government and contract companies to find solution on how smallholder farmers can control diseases and fortunately the productivity will be increase.

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AUTHORS

- First Author:** Nathaniel Naftali Kalimang`asi: Master of Science in Economics, Bachelor of Arts in Economic Development, Email: nathan54@yahoo.com,
Second Author: Aggrey Kihombo (PhD in Economics), Master of Science in Economics Mzumbe University; email: akihomblo@yahoo.com

Third Author: Natalia Kalimang`asi – Master of Business Administration (Finance), Bachelor of Science in Agricultural Economics and Agribusiness Email: mwaseu@yahoo.com

Correspondence Author: Nathaniel Naftali Kalimang`asi,
email: nathan54@yahoo.com, alternatively,
nkalimangasi@gmail.com+255 787 209 925

Technical Efficiency of Cocoa Production through Contract Farming: Empirical Evidence from Kilombero and Kyela Districts

Nathaniel Naftali Kalimang`asi*, Agrey Kihombo (PhD)** and Natalia Kalimang`asi***

*Student of MSc in Economic -Mzumbe University - Tanzania

****Department of Economics, Mzumbe University – Morogoro-Tanzania**

*** Department of Research and Consultancy, Local Government Training Institute, Dodoma- Tanzania

Abstract- This study centred on assessing the effect of key determinants of technical efficiency in cocoa production through contract farming drawing experience of Kilombero and Kyela districts. Primary data were collected using structured questionnaires. Probability sampling design was used to obtain respondents from smallholder farmers. Whereby cross-sectional data were collected using structured questionnaire from the sample size of 271 respondents in Kyela and Kilombero Districts. The stochastic production frontier function was estimated by using maximum likelihood estimation (MLE), data was analysed by using NLOGIT software version 5. Overall results show that 41 percent ($n=111$) of smallholder farmers had a mean technical efficiency below 50 percent and thus are considered to be technically inefficient while 59 percent ($n=160$) of them were technically efficient by more than 50 percent. These smallholder farmers were technically efficient in terms of number of hours spent in farms, labour training, experience, distance and size of labourer. Moreover, results show that smallholder farmers agreed that being in contract had increased access of training (89.3% ($n=242$)), credits (80.8% ($n=219$)), production quantity (73.1% ($n=198$)), production acreage (71.7% ($n=194$)), timely purchase (92.9% ($n=252$)) and timely payment (95.2% ($n=258$))). Whereas, the results show that 67.47% ($n=183$) of respondents said, contract farming had no impact on timely inputs and 74.9% ($n=203$) of respondent disagreed that contract farming helped to introduce new technology. Thus, the study concluded that there is great possibility for technical efficiency to increase agricultural productivity in contract farming.

Index Terms- Contract Farming, Technical Efficiency, Smallholders

I. BACKGROUND INFORMATION

Tanzania is endowed with high potential base for agriculture development, yet it is among the poorest in developing countries (one of the last 20 in the rank) (United Nation Development Programme (UNDP), 2004). Agriculture (including crop production, livestock and natural resources) is one of the leading sectors of the economy. Apart from providing food, it remains to be the country's main source of income for the rural population, which forms 80 percent of the total population and employs 70 percent of the active labour forces (Ministry of Agriculture and Food Supply (MAFS), 2005). The agricultural

sector in Tanzania is facing a lot of problems like low price, low incentives, low output, unreliable market lack of skills in crop husbandry, low chemical fertilizers, delay payments violated by crop buyers (Ministry of Agriculture, Food and Cooperative (MAFC), 2006). Because of those problems stakeholders and non-government organization started to make arrangement with smallholder farmers through contract farming in order to provide services in production and marketing of the products. Contract farming refers to contractual arrangements between farmers and other firms, whether oral or written, in which non-transferable contracts specify one or more conditions of marketing and production (Glover and Kusterer, 1990).

Literatures suggests that, through contract farming smallholder farmers get various assistances such as introduction of higher-value seeds, information, technology, reduction of production risk for farmers, monitoring and labour incentives, timely inputs and production markets, credit and financial intermediation, reduction in the risk of price fluctuations, increased incomes and market access (Eaton and Shepherd, 2001; Glover and Kusterer, 1990; Key and Runsten, 1999; Holloway et al. 2000; Warning and Key, 2002; Patrick 2004; Birthal et al. 2005a; and Ramaswami et al. 2006). In Tanzania, cocoa is among the crop which is produced under contract farming. Other crops which are under contract farming include sugar cane, tobacco, tea, pyrethrum, cotton, cashew nut, coffee, citrus fruits, and sisal (MAFC, 2006). The study aimed at assessing the effect of key determinants of technical efficiency (i.e., accessibility of new technology, timely purchase, timely inputs, timely payment, better price, access to credit and labour training) within contract farming in Cocoa production.

II THEORETICAL FRAMEWORK

Different forms of functions can be used to estimate the general production function, among them, most commonly used are the Cobb-Douglas and the translog production functions. The Cobb-Douglas production function has been widely used in agricultural studies because of its simplicity and ease of estimation from agricultural data (Derbetin, 1992). The Cobb-Douglas production function, in its stochastic form, was presented in equation 1.

Where; y_i = Output for $i=1, 2, 3, \dots, n$; β_0 = Constant; Π = A steady multiplicative symbol; x_{ij} = i^{th} input, for the j^{th} respondent for $i=1,2,3,\dots,n$ and $j=1,2,3,\dots,n$, e = Natural logarithm; β_i = A vector of parameter; for $i = 0, 1, 2, 3, \dots N$; and ε_i = The error term

The loglinear transformation of equation 1 expression gives equation 2 which can be used for parameter estimation using regression analysis (Kumbhakar et al.1991).

$$\ln Y_i = \ln \beta_0 + \sum_{j=1}^k \ln \beta_i \ln X_{ij} + \varepsilon_i \quad \dots \dots \dots \text{Equation (2)}$$

The error term (ε_i) has two components u_i and v_i which form equation 3

$$\varepsilon_i = v_i - u_i \quad \dots \dots \dots \text{Equation (3)}$$

Where; v_i = is a random error associated with random factors which are out of the control of the producers (Aigner et al. 1977; and Meeusen and Broeck, 1977) such as bad weather (drought, flood, volcanoes), diseases, wild animals, which can lead to the production below the frontier.

It has a zero mean and variance equal to δ_v^2 such that its distribution is given as $N(0, \delta_v^2)$.

u_i = is a non-negative truncated half normal random variable (at zero) with a distribution given as, $N(0, \delta_u^2)$. However, u_i can also have other distributions such as gamma and exponential. It is associated with farm-specific factors. The mean values of u_i are determined by equation 4.

$$u_i = \omega_i \pi_i \quad \dots \dots \dots \text{Equation (4)}$$

Where; π_i = Represents inefficiency variable for; $i=1,2,3, \dots, n$; ω_i = Parameter estimates; for $i=1,2,3, \dots, n$; δ_v^2 and δ_u^2 are the variances of v_i and u_i respectively. The inefficiency variable is represented by farm characteristics such as age of smallholder farmers, level of education of smallholder farmers, family labour, hired labour, training, distances, access to credit, time (man day hours) and experience in cocoa production.

The maximum likelihood estimation of equation 2 yields parameter estimates; β_i and λ . Given the production frontier and inefficiency effect models represented in equation 5, technical efficiency can be obtained from the conditional expectation of u_i given ε_i as shown in equation 5 (Zaibet and Dharmapala, 1999).

$$E[-u_i|\varepsilon_i] = \frac{\delta_u \delta_v}{\delta} \left[\frac{f^*(\lambda \varepsilon_i / \delta)}{1 - F^*(\lambda \varepsilon_i / \delta)} - \frac{\varepsilon_i \lambda}{\delta} \right] \quad \dots \dots \dots \text{Equation (5)}$$

Where; $E[-u_i|\varepsilon_i]$ = A conditional mean of u_i given ε_i ; δ_v^2 = is the variance of v_i ; δ_u^2 = Is the variance of u_i ; $\delta^2 = \delta_u^2 + \delta_v^2$ sample variance; $\lambda = \delta_u / \delta_v$ ratio of variance; f^* = value of a standard normal distribution function; and F^* = value of distribution function. Both functions are being evaluated at δ . Since technical efficiency of a production can be estimated under conditional expectation of u_i given ε_i .

The individual farmer's level of technical inefficiency was calculated from the expected value of equation 4 as re-written in equation 5 and later TE was compared with the return of cocoa output per kilograms per acre per year per household as showed in equation 6.

$$TE_i = \exp(E[-u_i | \varepsilon_i]) \quad \dots \dots \dots \text{Equation (6)}$$

Such that $0 \leq TE \leq 1$. Otherwise $TE_i < 1$ provides a measure of short fall of observed output from maximum feasible output that characterized by a stochastic elements that varies across producers (Kumbhakar and Lovell, 2000).

2.2 Empirical Model

The model in equation 7 representing stochastic frontier was estimated in two step process. First step; cocoa production through contract farming over one year output (Y) was regressed against the independent variables, including area under production (acres/land), labour (family labour plus hired labour), cocoa plants per acre and cost of technology used in production. The log linear production function is represented by equation 7.

$$\ln Y = \ln \beta_0 + \beta_1 \ln X_{1ij} + \beta_2 \ln X_{2ij} + \beta_3 \ln X_{3ij} + \beta_4 \ln X_{4ij} + v_{ij} - u_{ij} \quad \dots \dots \dots \text{Equation (7)}$$

Where; $\ln Y$ = Output of cocoa products per kgs/acre/years/household; X_1 = Area under cocoa production (land); X_2 = number of cocoa plants per acre; X_3 = Labour (man day/acre including family labour plus hired labour); X_4 = Cost of technology used in production; v_i = Random errors; u_i = Technical inefficiency effects; and \ln = natural logarithms. Then in the second step; the error term (u_i) was regressed against selected socio-economic characteristics of the farm as shown in equation 8.

$$u_i = \omega_0 + \omega_1 \pi_1 + \omega_2 \pi_2 + \omega_3 \pi_3 + \omega_4 \pi_4 + \omega_5 \pi_5 + \omega_6 \pi_6 + \omega_7 \pi_7 + \omega_8 \pi_8 + \omega_9 \pi_9 \quad \dots \dots \dots \text{Eqn(8)}$$

Where; $\omega_0, \omega_1, \omega_2, \dots, \omega_9$ = parameter estimates; π_1 = age of smallholder farmers (years); π_2 = Level of education of smallholder farmers; π_3 = Distance from home to the field, π_4 = Training, π_5 = Experience in cocoa production; π_6 = Credit; π_7 = Family labour, π_8 = Hired labour; and π_9 = Time used in production (man hours per day).

III. METHODOLOGY

This study was conducted in Kilombero and Kyela Districts which are among the area producing cocoa beans in Tanzania, Kyela being the leading district in the production of cocoa beans. The primary data for this study were collected on March-April 2013. The sampling unit of the study was limited only to the areas producing cocoa, predominantly those within contract farming. In this study purposive sampling was employed to obtain wards and villages which produced cocoa beans. The sample of smallholder farmers was obtained from four wards and ten villages in both districts. Probability sampling method was employed to obtain 271 respondents from smallholder farmers producing cocoa. Cross-sectional data was collected using structured questionnaire from each district.

IV. RESULT AND DISCUSSION

4.2 Descriptive Statistics

Table 1 shows that majority of the male cocoa producers obtained mean output in kilogram 486.55 (55.8%) under mean acre cultivated was 1.33 (56.6%), mean of family labour used 1.99 (58.4%) and mean of hired labour used 0.86 (52.2%). The mean output of kilogram of cocoa obtained by female 385.18 (44.2%), under mean acre 1.02 (43.6%) cultivated; mean of family labour used 1.44 (41.6%); and mean of hired labour used 0.67 (47.8%). Based on the background variables data shows that males were very efficient in the production of cocoa than females; as theory suggests that males are more productive than females; the results from field support this theory because males were leading in the production of cocoa. There is a need to encourage females to participate fully in the production of cocoa.

Unmarried producers obtained the mean of cocoa output per kilogram per acre per year was 107.50 (12.3%); mean of acre cultivated was 0.29 (12.2%); the mean of family labour used was 0.43 (12.4%); and mean of hired labour used was 0.12 (8.1%). Married cocoa producers obtained the mean of cocoa output per kilogram per acre per year was 674.62 (77.4%); mean of acres cultivated was 1.84 (77.3%); the mean of family labour used was 2.72 (78.6%); and the mean of hired labour used was 1.20 (81.1%). Divorced cocoa producers obtained the mean of cocoa output per kilograms per acre per year was 89.61 (10.3%); the mean of acres cultivated 0.25 (10.5%); the family labour used 0.31 (8.9%); and the mean of hired labour used 0.16 (10.8%).

Principally, married producers are more productive compared to single producers and divorced producers. The findings showed that married were leading in the production of cocoa because married producers had large labour force used in the production.

The mean output of cocoa in kilograms per acre/year produced by young groups aged below 40 years was 238.94 (27.4%); mean of acre cultivated was 0.70 (30.3%); mean of family labour used was 0.97 (28.4%); and the mean of hired labour used was 0.57 (37.3%). The mean output of cocoa in kilogram per acre/year obtained by old producer aged 40 years and above was 632.78 (72.6%); the mean of acre cultivated was 1.61 (69.7%); the mean of family labour used was 2.44 (71.6%); and mean of hired labour used was 0.96 (62.7%). In principle young producers are more efficiency than old producers in agricultural sector. In the study area the results are inversely to this notion and show that aged farmers obtained more kilograms of cocoa output compared to the young farmers who are strong in the production. This caused by the nature of the cocoa crop itself which discouraged the youth to engage in its production. The cocoa plant takes 3 to 4 years from planting to harvesting hence the young people may not be tolerant to invest in production and wait for 4 years in anticipation of harvesting as the findings this study indicated.

The mean of cocoa output per kilograms/acre/year obtained by smallholder farmers having primary level of education was 362.59 (41.6%); mean acre cultivated was 0.98 (40.3%); the mean of family labour used was 1.44 (47.8%); and mean of hired labour used was 0.64 (41.0%). The mean of cocoa output per kilograms obtained by smallholder farmers having secondary level of education was 297.74 (34.1%); the mean of acres cultivated was 0.78 (32.1%); the mean of family labour used was 0.76 (25.2%); and the mean of hired labour used was 0.51 (32.7%). The mean of cocoa output in kilograms per year produced by farmers having university level was 211.73 (24.3%); the mean acres cultivated were 0.67 (27.6%); the mean of family labour was 0.81 (26.9%); and the mean of hired labour used was 0.41 (26.3%). Logically, educated producers are the ones who can produce more compared to uneducated producers. Contrary to this notion, this study showed that smallholder farmers with lower level of education produced more efficient compared to those with higher levels of education. Thus, there is a need to encourage educated farmers to participate fully in production because educated people can easily adapt to the change of technology.

Table 1 Background Variables and Mean of (Kilograms, Acres, f/Labour, and h/Labour)

Variables	Freq	%	Mean Kgs	of acre	Mean of family labour	of labour	Mean of hired labour
Sex							
Male	155	57.2	486.55	1.33	1.99	0.86	
Females	116	42.8	385.18	1.02	1.42	0.67	
Marital status							
Not married	33	12.2	107.50	0.29	0.43	0.12	
Married	212	78.2	674.62	1.84	2.72	1.20	
Divorced	26	9.6	89.61	0.25	0.31	0.16	
Age							
Young <40yrs	71	26.8	238.94	0.70	0.97	0.57	
Old ≥ 40	200	73.2	632.78	1.61	2.44	0.96	

Level of education

Primary level	117	43.9	362.59	0.98	1.44	0.64
Secondary level	94	34.7	297.74	0.78	0.76	0.51
University level	59	21.8	211.73	0.67	0.81	0.41

Source: Field Data Survey, 2013.

4.3 Contribution of contract farming on cocoa production

Table 2 below indicates contribution of contract farming on cocoa production. The investigation of production quantity among the smallholder farmers within contract farming shows that 73.1% (n=198) of respondents agreed that contract farming led to increased productivity and others denied. Also result shows that 95.2% (n=258) of smallholder producers on contract farming said that contract helped them to sell their products on time while others disagreed. Findings showed that 92.9% (n=252) of smallholder farmers agreed that contract farming enabled timely purchase of their produces. Furthermore, result shows that majority (89.3% (n=242)) of respondents agreed that contract farming provides access of training to smallholder farmers. Moreover, result of production acreage shows that more

than two third (71.7% (n=194)) of smallholder farmers increased the area of production being in contract farming and others disagreed. Eighty one percent (80.8% (n=219)) of respondents agreed that contract farming had made them access of obtaining credits. Whereas result indicates that majority of respondents 67.47% (n=183) disagreed that contract farming helped to obtaining input on time and 74.9% (n=203) of respondents disagreed that contract farming increased access of using new technology.

These results show that contract farming on cocoa production contributed a lot to smallholder farmers in terms of access of training, credits, increased production quantity, increased production acreage, timely purchase, and timely payment as Table 2 indicates.

Table 2 Opportunities within Contract Farming

Variable	% of Agree	% of Disagree
Production quantity	73.1 (n=198)	26.9% (n=73)
Timely purchase	95.2% (n=258)	4.8% (n=13)
Timely payment	92.9 (n=252)	7.1% (N=19)
Timely inputs	32.53% (n=88)	67.47% (n=183)
Access of training	89.3% (n=242)	10.7% (n=29)
Production acreage	71.7% (n=194)	28.3% (n=77)
Availability of technology	25.1% (n=68)	74.9% (n=203)
Access of credit	80.8% (n=219)	19.2% (n=52)

Source: Field Data Survey, 2013

4.4 Trend of Price of Cocoa

Contract farming has constructive elements towards smallholder farmers; price stability is among the element within contractual arrangement. It is asserted that the situation is inversely proportional to the expectation of smallholder farmers of cocoa production. Table 3 shows the trend of price of cocoa products being fluctuating from 2010 to 2013, the mean price of cocoa in kilogram from 2010/2011, 2011/2012 and 2012/2013

was 2425.09, 2463.84 and 2024.72 respectively. The result shows the mean price of cocoa in 2010/2011 was low, in 2011/2012 increased and 2012/2013 the mean price decreased compared to the previous years. The price of cocoa has been fluctuating yearly thus discouraging the smallholder farmers to engage in production of cocoa. In turn, some of the farmers in Mbingu ward started to withdraw in cocoa production and burnt their cocoa farms.

Table 3 Trend of Price of Cocoa

	N	Min	Max	Mean	Std. Error	Std. De
Price 2010/11	271	1500	4000	2425.09	35.058	577.124
Price 2011/12	271	1500	3000	2463.84	16.235	267.261
Price 2012/13	271	1400	3000	2024.72	11.081	182.415

Source: Field Data Survey, 2013

4.5 Estimation Model

Table 4 presents results of the stochastic frontier production function; results estimated using maximum-likelihood method. As it can be seen from the table 4, the coefficient of amount of cocoa plants per acre was positive but not statistically significant. The expected signs for variables such as cost of technology used in production and labour were negatives while the coefficients of land were positive and statistically significant.

The coefficient of land 0.07376 (p-value 0.0577) under cocoa production was statistically significant at 10% level. This indicates when smallholder farmers increase area of production the output increases by 7% after three to four years. Labour

(family labour plus hired labour) is a parameter used in production of cocoa its coefficient 0.04831 (p-value 0.0862) implies that a unit increase in labour could lead to an output rise by 4% statistically significant at 10% level. This result fall in line with findings of Kebede (2001) who suggested that hand hoes (technology used) were inputs in the production. Technology used in production was tested to find their effect in the cocoa production. The result showed that the coefficient of technology used was 0.01804 (p-value 0.0000), the variable being positive and statistically significant at 1% level. Smallholder farmers who applied new technology in their production increased their output by 1% in the next season ceteris paribus.

Table 4 Maximum-likelihood Estimates for Parameters of the Stochastic Frontier Production

Parameter	Proxy variable	Coefficient	Std.Error	p-Value
Stochastic Frontier				
Constant	β_0	11.5779***	.77339	0.0000
lnLand	β_1	0.07376*	.03886	0.0577
lnLabour	β_2	-0.04831*	.02816	0.0862
LnPlants	β_3	0.02310	.02732	0.3977
lnTools (hand hoe)	β_4	-0.01804***	.00147	0.0000

Source: Field Data Survey, 2013

Note: ***, **, * ==>Significance at 1%, 5%, 10% level

4.5 Input Elasticity from Model Estimation

The elasticity's of output for land, labour, and technology used in production are return to scale of the Cobb-Douglas stochastic frontier model as shown on Table 5. Determination of elasticity's is necessary for the estimation of responsiveness of output to factor inputs of production. Most of the inputs on the stochastic frontier were statistically significant at different levels. Summation of all the partial elasticity of production with respect

to every input was 0.14. For Cobb-Douglas model this figure represents the returns-to-scale coefficient, also called the function coefficient or total output elasticity. When all factors were varied by the same proportion, the function coefficient indicated the percentage by which output increased. In this case, it means if all of the variables were to be increased by 1%, output would increase by 14% representing increasing return to scale.

Table 5 Input Elasticity

Variable inputs	Elasticity
Labour	0.05
Land	0.07
Technology used (Hand hoes)	0.02

Source: Field Data Survey, 2013

Table 5 shows that land and labour had high responsiveness in the production of cocoa, followed by technology used in production such as hand hoes. This implies that hand hoes had little response in the production of cocoa.

marginal value product (MVP)⁹ and input prices were also estimated.

4.6 Marginal Value Product and Factor Inputs

In order to assess the condition of a producer's profit level a number of variable such as marginal physical product (MPP)⁸,

⁸ MPP= APP*input elasticity

⁹ MVP=MPP*output price

Table 6 Marginal Value Product and Factor Inputs

Variable	APP kgs per Acre	Elasticity	MPP kgs per Acre	MVP Tshs	Average Price Tshs	Unit
Land	370.95	0.07	25.97	2,337,300	90,000	
Labour	157.35	0.05	7.87	314,800	40,000	
Technology used	0.12	0.02	0.0024	16.8	7,000	

Source: Field Data Survey, 2013

Table 6 shows the condition requirement for profit maximization is that the Marginal Variable Product (MVP) must be equal to the average unit price of inputs. When the unit use of labour and land in production per acre is greater than the average unit of price this implies that the unit increase in the variables cocoa farm will lead to negative return in production. Therefore, the marginal value product of tools of production (technology used/ hand hoes) was lower than the average unit price. From this result the smallholder farmers would benefit by increasing the tools of production especially hand hoes in the production of cocoa rather than increasing labour and land.

4.7 Range of Frequency Distribution of Technical Efficiency

Table 7 shows the range of technical efficiency. About 41% of smallholder farmers had a mean below 50%, this represent the total number (n=111) smallholder farmers who were technically inefficient in the production of cocoa. Furthermore, 59% (n=160) of smallholder farmers within contract farming were technically efficient in the production of cocoa had a mean Technical Efficiency above 50%.

Table 7 Percentage Technical Efficiency

Efficiency scores	Sample (N)	%
<40	1	0.4%
40-49	110	40.6%
50-59	94	34.7%
60-69	45	16.6%
≥70	21	7.7%
Total	271	100%

Source: Field Data Survey, 2013

Table 8 shows the results of socio-economic factors that influenced technical efficiency or inefficiency. A negative sign on a parameter efficiency means that the variable increases technical efficiency, while a positive sign reduces technical efficiency. It is important to note that these coefficients should not be directly interpreted (Battese and Coelli, 1993). Table 8 shows that age, education level, hired labour and credits were statistically insignificant. This indicates that they cannot explain any anything in the production of cocoa. Although prior, it was expected that availability of credit and hired labour in the production could increase output per kilograms per acre per household.

Training is a parameter which was used to capture the effect of training on technical efficiency of production of cocoa. The smallholder farmers who attained training in the production of cocoa had access to produce at high efficiency than non-trained farmers. The expectation was that smallholder farmers within contract farming had access to get training which enabled them to produce many products at high quality and increase their technical efficiency. The coefficient obtained was 0.12518 and p-value 0.0000 was statistically significant at 1% level. This indicates that the smallholder farmers who underwent training increased their products of cocoa beans. The results agree with Kibirige's (2008) who found that farmers who received training

increased their maize productivity. Similarly, Sentumbwe (2007) found that farmers who got training in better agronomic practices were technically more efficient than farmers who lacked such training. Likewise Galawat and Yabe (2011) found that farmers who attended training were profit efficient, while farmers who did not have any training were inefficient and had low profit efficiency. Equally, Nikaido (2004) found that the participation of the small scale producers in trainings increased efficiency for small scale industry. This explains that smallholder farmers who undergo training become technically efficient in the production of cocoa. Inefficient farmers can be in technical efficiency if and only if they undergo training frequently in the production of cocoa.

Distance is a variable that is aimed to measure the effect of distance on technical efficiency. It was expected that smallholder farmers who were close to the farm increase technical efficiency compared to smallholder farmers who are far away from the field. The coefficient of distance was negative -0.01379 with the p-value 0.0658 as shown in Table 8. In accordance with this expectation the coefficient is negative and statistically significant at 5% level. The smallholder farmers who stayed far away from the field their output will decrease while those close to their farms increased their outputs. This suggests that the smallholder farmers who were close to their plot had access to increased

production of cocoa within contract because of using less kilometre/metre in field. This finding is related with the findings of Kebede (2001) who found that the closer the farm the less the distance used and the greater the rice production technical efficiency.

Time is input which measured in man hours working in the cocoa farm. The standard hour for man days is six hours per day. The coefficient of man hours per day is -0.01379 and p-value 0.0128 which is statistically significant at 5% level. This indicates that smallholder farmers who used standard hours in the cocoa production their output are expected to increase while those who use less hour per day their output will decrease.

Family size is a variable which was measured to capture the effect of family labour on technical efficiency of smallholder farmers. Prior expectation was that family with large number of workers in production of cocoa is expected to be technically efficiency compared to smallholder farmers' with few members. The coefficient found was 0.10818 and p-value 0.0193 was statistically significant at 5% level. This indicates that family which had many labourers in the production of cocoa per day per acre were technically efficient. This result is similar to findings of Kibirige (2008) who reported that increasing number of labour in maize made farmers become technically efficient. Moreover, Kebede (2001) found that the increase of labour in production the

output of rice was increased too. Also findings of Kibaara (2005) suggested that the increase of labour probably led to increase of maize yield.

The coefficient of experience of smallholder farmers in cocoa growing was negative 0.08899 with the p-value 0.0001 which was significant at 1% level, indicating that more experienced farmers tended to be more efficient in cocoa production. The experienced farmers were expected to be positively correlated for adoption of new technology and techniques of production. Smallholder farmers who had experience in production of cocoa their output per acre per year increase. The result was consistent with the findings of Oleke (2008) who found that experienced egg producers were the one who were technically efficient. Furthermore, Sesabo (2007) showed that fishermen who had many years of experience in fishing increased their productivity. Also, Kebede (2001) found that farming experience and education were both significant for improving technical efficiency. As well, Kibirige (2008) found that the maize producers who had many years in production increased their output. This suggests that the farmers who had experience in production of cocoa had technical efficiency because it enabled them to adopt new technology in production. New producers can be technically inefficient in a short run and technically efficient in the long run of production of cocoa.

Table 8 Determinants of Technical Inefficiency

Parameter	Proxy variable	Coefficient	Std.Error	p-Value
Inefficiency Model				
Constant	ω_0	6.80692***	0.35352	0.0000
Age of farmers (years)	π_1	0.01495	0.08556	0.8613
Level of education	π_2	0.02230	0.03875	0.5651
Training	π_3	0.12518***	0.02783	0.0000
Distance (home to field)	π_4	-0.01379*	0.00750	0.0658
Time (hour per day)	π_5	-0.01379**	0.05129	0.0128
Family labour (man days)	π_6	0.10818**	0.04623	0.0193
Hired labour (man days)	π_7	-0.00281	0.04076	0.9450
Experience (in cocoa prod)	π_8	-0.08899***	0.02308	0.0001
Credit	π_9	-0.02734	0.06353	0.6670
Variance Parameters for Compound Error				
Lambda (σ_u/σ_v)	λ	2.97549***	0.44977	0.0000
Sigma	σ	0.67748***	0.00197	0.0000
Sigma-squared (u)	σ_u^2	0.41240		
Sigma-squared (v)	σ_v^2	0.04658		
Gamma $\delta_u^2/(\delta_u^2 + \delta_v^2)$	γ	0.89851		
Log likelihood function		-152.57567		
Mean technical efficiency		59%		

Source: Field data, 2013. **Note*****, **, * ==>Significance at 1%, 5%, 10% levels

V. CONCLUSION

Basing on the findings, it can be concluded that contract farming contributes much to smallholder farmers especially in terms of timely purchase of their products, timely payment, increased productivity, labour training and access to credit. On

the other hand timely input and new technology are areas which contract farming seems to have no impact as the findings indicated in descriptive statistics. In the estimation models smallholder farmers within contract farming are technically efficient in the production of cocoa beans, although there are few smallholder farmers who are technically inefficient. Positive

outcome obtained by smallholder farmers being in contract farming indicate that contract farming is good for supporting the smallholder farmers in the agricultural production. This calls for the government of Tanzania and NGOs to encourage contract farming in different crops in agriculture sector. The incentives available within contract farming enable smallholder farmers to increase production.

5.1 Policy Implication

The potential policy implication is transparency within contract, the institution making contract farming should be clear in case of crop fails and what happens if the contractors do not provide input on time. The contract is said to be silent in case of years when smallholder farmers failed to harvest crops. Also measures to be taken when the contractors do provide inputs timely to smallholder farmers should be stated. The contract must be transparent and both sides must agree on it.

Government intervention; The government must be involved in contract farming in order for the two parties to be efficient. The government institution must be involved when two parties sign the contract. The involvement of the government on contract farming will help to arrange price floor and legal enforcement on contract farming.

At the moment, smallholder farmers are faced with price instability of cocoa beans. This calls for international investors to come and build manufacturing industry in order to produce the final products of cocoa beans here in Tanzania, because the market of final products of cocoa beans is large rather than exporting raw products to the World market.

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AUTHORS

First Author: Nathaniel Naftali Kalimang`asi: Master of Science in Economics, Bachelor of Arts in Economic Development, Email: nathan54@yahoo.com,

Second Author: Aggrey Kihombo (PhD in Economics), Master of Science in Economics Mzumbe University; email: akihombo@yahoo.com

Third Author: Natalia Kalimang`asi – Master of Business Administration (Finance), Bachelor of Science in Agricultural Economics and Agribusiness Email: mwaseu@yahoo.com

Correspondence Author: Nathaniel Naftali Kalimang`asi, email: nathan54@yahoo.com, alternatively, nkalmangasi@gmail.com+255 787 209 925

The Roles of Civics and Ethical Education in Shaping Attitude of the Students in Higher Education: The Case of Mekelle University

Gosa Setu Tafese * and Desta Tamrat Desta **

*Department of Civics and Ethics, College of Law and Governance, Mekelle University, Ethiopia

**Department of Civics and Ethics, College of Law and Governance, Mekelle University, Ethiopia

Abstract- Civics and Ethical Education aimed to produce effective and active citizen, who can recognize problem of their countries, their own citizenship responsibility and desirable code of conduct. As a result, it has been apparently introduced to Ethiopian universities, but yet its role has not been well studied. This article, therefore, employed qualitative research approach to assess the roles of Civics and Ethical Education in shaping the attitude of students in Mekelle University. Civics and Ethical Education is developing and promoting civic skills, knowledge and disposition in Mekelle University to affirm both changes in behavior and attitude of the learners. It also create conducive environment to the learners to co-exist with other socio-cultural groups and have a culture of respect for one another's view. It is also preparing students of Mekelle University to take part in the ethical and legal governance of public goods such as classroom, dormitory and university's property.

Index Terms- Civics; Ethical Education; Attitude; Mekelle University

I. INTRODUCTION

Education is increasingly acknowledged as a means for combating diverse societal problems. It is also widely accredited as pre eminent in fostering attitudes, knowledge and skills of citizens (Birhanu, 2012). The education system has a societal responsibility to produce good and responsible citizens, who understand, respect the constitution, democratic values and human rights; develop attitudes for research and community services; develop a sense of citizenship to participate in and contribute to the development of the community and the country (BHRT, 2001). To achieve this objective, a curriculum for the delivery of Civics and Ethical Education was developed and harmonized at national level. As a result, Civics and Ethical Education has started to be taught at the primary, secondary and higher education levels.

Civics and Ethical education has a great role in attitude change of the students in Ethiopia and many other countries like the United states of America , China , African and middle east countries, and it also serve as a way of cultivating good citizens(Ibid).

In Ethiopia, it is playing a great role in producing good citizens, who understand properly the problem of their country, understand the citizenry obligation to make personal contribution

equipped with good ethical and democratic culture. In shaping citizens to the best of this purpose, it is the obligation of any government to acquaint his citizens with good civic and ethical values, knowledge and skills (Seyoum, 1996).

To promote the effectiveness of Civics and Ethical Education, the FDRE Ministry of Education has taken different measures so far. Of these measures, one is measure regarding curriculum change. There were three major periods of curricular change. The first period was, of course, when the subject was introduced. According to the first curriculum, the mission of Civics and Ethical Education is to help students into competent Ethiopian citizens endowed with a global and human outlook, strong and democratic national feelings and sense of patriotism; to develop democratic values and the culture of respect for human rights; to stand for truth and the well-being of the peoples of Ethiopia as well as for equality, justice, and peace; to understand, apply, and uphold the Constitution (Yamada, 2011). The role of higher education in shaping the moral and civic lives of students is critical. It is believe that higher education has a critical role to play in shaping character and enhancing a sense of social responsibility (Ruben, 2007). It is also potential to be a powerful influence in reinvigorating the democratic spirit in a given state. In Ethiopia, many thousands of students are now enrolling in higher education. These students are expecting to involve in democratic and development processes at both local and national levels and thereby higher education has the highest lion share in producing active citizens in a democratic society, personal development, and the development and maintenance of a broad, advanced knowledge base (McIlrath, Lyons, and Munck, 2012).

Higher Education Proclamation no. 650/2009 states that the objectives of higher education are:

to prepare knowledgeable, skilled, and attitudinally mature graduates in numbers with demand-based proportional balance of fields and disciplines so that the country shall become internationally competitive; promote and uphold justice, fairness, and rule of law in institutional life; promote democratic culture and uphold multicultural community life; ensure fairness in the distribution of public institutions and expand access on the basis of need and equity (HEP, 2009).

Students enrolled at universities have the opportunity to transform their social interests into advocacy through personal connections with the community. Historically, higher education

has been viewed as a vehicle to promote holistic student development (Shankar, 2009).

II. STATEMENT OF THE PROBLEM

In view of building democracy, the Ethiopian government has introduced the new Educational and Training Policy with a goal to ensuring democratic values such as equality, liberty, justice truth and respect for human rights (Seyoum, 1996). In order to realize the intended educational goals, FDRE Ministry of Education has developed Civics and Ethical education as common course to all departments in the Mekelle University like other universities in the country so as to build democracy and enhance prosperity (MOE, 2005). Civics and Ethical Education aimed to produce effective and active citizen, who can recognize problem of their countries, their own citizenship responsibility and desirable code of conduct. As a result, it has been apparently introduced to Ethiopian universities, but yet its role has not been well studied. This study, therefore, intended to investigate the roles of Civics and Ethical education in cultivating attitudes of students in Mekelle University.

III. OBJECTIVES OF THE STUDY

The overall objective of this study is to assess the roles of Civics and Ethical education in shaping the attitude of students in Mekelle University. Specifically, this study has the following objectives.

- ✓ To assess the roles of Civics and Ethical Education in cultivation of moral and ethical values of the students
- ✓ To examine the efforts of Civics and Ethical Education in development of democratic outlook and strengthening democratic values
- ✓ To examine the roles of Civics and Ethical Education in creating peaceful citizen

IV. METHODOLOGY AND METHOD OF DATA COLLECTION

This study was employed qualitative research approach. The reason for the selection of qualitative approach is that it helps the researcher to investigate the roles of Civics and Ethical Education in shaping the attitude of the students in higher education, specifically in Mekelle University. It also focused on the depth of information rather than generalization of the whole population (Patton, 1990). In terms of tools of data collection, the researcher used both primary and secondary sources. Regarding primary sources, observation of the researcher was used as tools of data collection due to the fact that the researcher has been teaching Civics and Ethical Education course for more than five years in regular, extension and summer in-service programs in various colleges in the University. The researcher has been made classroom and outside classroom observations regarding the impacts of Civics and Ethical Education on learners of the Mekelle University. As secondary sources books, journals, proclamation and working papers are employed.

V. SAMPLING TECHNIQUES AND SAMPLING SIZE

Identifying sampling size and technique is very important when somebody studies a large number of populations. Thus, this study employed purposive sampling technique because it involved the observations and reflections of the researcher who has been teaching Civics and Ethical Education in different batches and departments.

VI. DATA ANALYSIS AND SCOPE OF THE STUDY

The information collected through qualitative data was critically analyzed by using explanation, and interpretation. This study delimited to assess the roles of Civics and Ethical Education in attitude change of the students at Mekelle University since 2009.

VII. THE ROLES OF CIVICS AND ETHICAL EDUCATION IN SHAPING THE ATTITUDE OF STUDENTS IN HIGHER EDUCATION

This article discusses the roles of Civics and Ethical Education in cultivating the moral and ethical values of the students followed by the efforts of Civics and Ethical Education in development of democratic outlook and strengthening democratic values. It also gives attention to the contribution of Civics and Ethical Education as a channel to create peaceful citizen.

7.1 The Roles of Civics and Ethical Education in Cultivating Moral and Ethical Values of the Students

The major role of Civics and Ethical Education is to produce good citizen. A good citizen is a citizen who believes in equality of opportunity for all (Akalewold, 2005). Civics and Ethical Education also cultivates student's character positively by teaching about morality and also enable them to discharge their responsibilities to the best of their capability. Moreover, it helps the students of the Mekelle University to appreciate and recognize the cultures and ways of life of the Nation, Nationalities and Peoples, as well as, develop personal responsibility for the wise use of resources of the University. Through Civics and Ethical Education students have knowledge and skill about active participation in economic, social and cultural aspects. It is possible to argue that Civics and Ethical Education is promoting the idea of live and let Live.

The acquisition of civic knowledge and skills can't alone be helpful in practice, if the appropriate attitudes are not developed. That is why Civics and Ethical Education course aimed to help students to develop suitable behavior and attitude, personal and public characters that matters the willingness of citizens to act in public affairs (Shankar, 2009).

Civics and Ethical Education is developing and promoting civic skills, knowledge and disposition in Mekelle University to affirm both changes in behavior and attitude of the learners. It also promotes cohesion and harmony among learners in the university in the sense that it creates a conducive environment to co-exist with other socio-cultural groups and have a culture of respect for one another's view. Besides, it also enforces the students so as to develop a culture of hardworking due to the fact

that it discusses issues titled patriotism, responsibility, industriousness and self-reliance. These issues are more closely related with character development and moral education (Yamada, 2011).

Civics and Ethical Education is significant for addressing ethical dilemmas of modern society. Regarding this, universities, specifically Mekelle University, Department of Civics and Ethics is working in providing and developing a sense of moral and social responsibility of the students in particular and fostering a reflective culture and attitude that produce self-confidence and commitment of the students at large.

7.2 The Roles of Civics and Ethical Education in Development of Democratic Outlook and Strengthening Democratic Values

Civics and Ethical Education is aimed at promoting foundation of democracy and democratic values to reduce conflict among students with different backgrounds and interests. When students have a good attitude toward their citizens and follow democratic procedures and rules, they can solve conflicts of interest. This means Civics and Ethical Education is maintaining unity in diversity in higher education in particular and in Ethiopia at large. This implies that some contents of Civics and Ethical Education do celebrate and appreciate multiculturalism and the existence of peoples who have different languages, ethnicities, religions or any other elements (Yamada, 2011).

Teaching of Civics and Ethical Education aimed at generating political consciousness in the students and inculcate democratic outlook in the souls of the students. For young democracy a study of Civics and Ethical Education can help a lot to develop proper attitudes in students, which can ultimately strengthen democracy (Gottlieb and Robinson, 2006).

Civics and Ethical Education make students of higher education socially efficient and well-aware of the social and political problems of their country to take active part in them. It is the students of today who think about the destiny of the future of his/her country. Consequently, social efficiency requires the students to have the qualities of sympathy, cooperation, patriotism etc. Such qualities can be developed in students by teaching of civics and ethics in a scientific manner (Shankar, 2009). It would help the students to leave unscientific and unnecessary things in their life.

Civics and Ethical Education is making a sound base against social evils in the minds of the students. It also increases civic engagement which involves learning from others and environment to develop informed perspective on social issues, participating actively in public life, and in the affairs of the University. Moreover, it is strengthening sense of the unity and consensus. This means that a proper teaching of Civics and Ethical Education is creating a sound base for the continued oneness and unity of the students of the Mekelle University. A student can be a real citizen of his/her country only when he/she possesses national outlook. Such an outlook will help him/her to acquire the attitude of co-existence.

Civics and Ethical Education is preparing students of Mekelle University to take part in the ethical and legal governance of public goods such as classroom, dormitory and university's property etc. It also an education based on

constitutional rights and duties of citizens and cultivating democratic cultures in the mind of students as a belief in rule of law, justice, fair and free and periodic election. Besides, it creates capacity that helps students to understand government priorities, the nature of the law, political and economic plans of their country (Naval, Rafaela and Santos, 2011; Jover and Naval, 2006; Lange and Print, 2012).

Civics and Ethical Education is produce ideal citizens, who respects basic human rights, understands democratic principle and exercise his/her right freely, accept his/her civic responsibility and discharges them to the best of his or her capacity (Murphy, 2004). It also important to enables citizens to be equipped with values of democracy, human right, and patriotism and apply these values in their life (Schulz, Fraillon, Ainley, Losito and Kerr, 2008).

It also enables the students to use their right of political participation and to raise a question when there is any violation of human and democratic rights. It is also a very essential course which provides deep knowledge about the importance of participation to solve their problems and differences among themselves in the University in particular and social problems at large. In other words, students by learning their rights and obligations, they are committed to administer themselves.

Civics and Ethics discipline can also reinforce notions of participation, accountability, solidarity, tolerance, courage in particular and promoting democratic citizenship at large. This means that it increases loyalty to democratic values and procedures. Democracy will not function if virtues like tolerance and willingness to follow democratic principles and procedures do not have grounding in everyday life (Banda, 2009).

7.3 Civics and Ethical Education as a Channel to Build Peaceful Citizen

Civics and Ethical Education is the key player discipline that turning away students from violent conflicts in higher education in general and Mekelle University in particular. It is creating productive political and social relationships, through which disagreements can be negotiated nonviolently and constructively. The importance of citizenship education for peace building is tied to the idea of nation building as an object of primary loyalty, so that citizens of a state are motivated to seek the common good of society (Shankar, 2009). Producing responsible, rational and active citizens through civics and ethical education are needed for peace building success and tolerance. Civics and Ethical Education can also 'help to stabilize societies affected by violence and should be seen as an important positive feature of a post conflict landscape' (Purta, Lehmann, Oswald, and Schulz, 2001).

VIII. CONCLUSION AND RECOMMENDATION

Civics and Ethical Education is inculcating and emphasizing the interconnectedness of the core values, social and cross-cultural skills that are critical for character and citizenship development of the students. It aimed to produce rational and ethical citizens who participate in affairs of their community in particular and nation in general. Besides, it prepares students for responsible citizenship and effective participation. It also makes them to involve in activities that promote and demonstrate good

citizenship, community service, and personal responsibility. Generally, promoting students attitudinal/behavior change can be realized when the entire university communities are concerned and committed to work for ethical and attitudinal values. Especially, the instructors are primarily responsible in shaping the attitudes of the students.

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AUTHORS

First Author – Gosa Setu Tafese, Department of Civics and Ethics, College of Law and Governance, Mekelle University, Ethiopia, E-mail address:gosasetu2@gmail.com, Principal author

Second Author – Desta Tamrat Desta, Department of Civics and Ethics, College of Law and Governance, Mekelle University, Ethiopia, E-mail address:destadevelopment@yahoo.com, Co-author

Gag Reflex: A Situational Challenge

Ahmad Naeem*, Bashir Taseer **, Saluja Arti***, Chandel Shilpi****, Krishnan Vijay*****, Yadav Monu *****

*Senior Lecturer, Dept. of Prosthodontics, Career Post-Graduate Institute of Dental Sciences, Lucknow.

**Post Graduate student, Dept. of OMDR, Career Post-Graduate Institute of Dental Sciences, Lucknow.

***Senior Lecturer, Dept. of OMDR, Career Post-Graduate Institute of Dental Sciences, Lucknow.

**** Post Graduate student, Dept. of Oral Pathology, Career Post-Graduate Institute of Dental Sciences, Lucknow.

***** Post Graduate student, Dept. of OMDR, Career Post-Graduate Institute of Dental Sciences, Lucknow.

***** Post Graduate student, Dept. of OMDR, Career Post-Graduate Institute of Dental Sciences, Lucknow.

Abstract- In day to day practice, Prosthodontists and General Dentists frequently come across patients who have extreme oral sensitivity by which they are unable to tolerate any foreign material in the oral cavity. Patients with such sensitivity often complain of nausea, gagging or vomiting during the dental procedures which creates a difficult situation to manage. The objective of this paper is underline and understand the neurophysiology of gag reflex and enable an operator to manage this situational emergency.

Index Terms- Reflex, Posterior Palatal Seal, Deglutition

I. INTRODUCTION

The phenomenon of gagging is responsible for many embarrassing situations both for the patient and the clinician on account of sudden, violent uncontrolled retching. The normal gag reflex is an adaptive vital mechanism for survival controlled by primly parasympathetic division of the autonomic nervous system. Gagging movement alter the shape of the pharynx and its various structures eject foreign bodies from mouth and pharynx and prevents progress bodies from entering the trachea.

II. LITERATURE REVIEW

The literature on Gagging is been divided into two groups, firstly the attempt to analyze the case of gagging & secondly the different methods for the management of gag reflex.

Schote et al (1959)¹ related the gag reflex to the vomiting reflex and describe that the vomiting center lies in the dorsal portion of the lateral reticular formation of medulla oblongata and to some extent, includes tractus solitarius. **Means (1970)²** suggested that majority of patients show history of a precipitating cause. **Singer et al (1973)³** tried to place glass marbles in mouth prior to the treatment of denture patients. **Murphy et al (1975)⁴** surveyed gagging and analyzed medical histories. He attributed the problem to complete or partial maxillary denture. He treated gagging patients by construction clear acrylic training plate combined with relaxation therapy. **Flamer and Connely (1984)⁵** suggested a technique for construction of a plateless denture (not covering palatal vault) but they noted that it is only satisfactory if maxillary ridge is well formed so that minimizes horizontal movement). **Fleed and Linton (1995)⁶** treated cases of hopeless gagger in whom they rapidly eliminated the hyperactive reflex by

a method they formed as behavioral intervention combined with a sedative impression.

III. CAUSES OF GAGGING

Retching is found to be induced due to following reasons:

1. **Anatomical factors:** Abnormal anatomical situations and oro-pharyngeal sensitivity predisposes patient to gag. Over extension of dentures in soft palate. A long soft palate and a sudden drop at the junction of the hard and soft palates are associated with the problem. An atonic and relaxed soft palate elicits gagging by allowing the uvula to contact the tongue and the soft palate to touch the posterior pharyngeal wall. Gagging also has been attributed to undue sensitivity of the soft palate, uvula, fauces, posterior pharyngeal wall and the tongue.
2. **Local factors causing gag reflex includes:**
 - Nasal obstruction.
 - Postnasal drip.
 - Catterah.
 - Sinusitis.
 - Nasal polyps.
 - Congestion of the oral, nasal and pharyngeal mucosa.
3. **Medical conditions believed to contribute to gagging in dentistry includes;** Chronic diseases of gastrointestinal tract which increase its irritability so that normally sub-threshold stimuli excite the reflex. Parasympathetic impulses from severe pain in sites other than the gastrointestinal tract may also causes gagging. It has been associated with chronic gastritis, pattersens dysplasia, carcinoma of stomach, partial gastrectomy peptic ulceration, cholecyastitis, carcinoma of the pancreas diaphragmatic herina, and uncontrolled diabetes.
4. **Fear** some people who gag with dentures are also unable to tolerate other objects intraorally with fear acting as a common cause of gagging.
5. **Dentures stimulate gagging** of moving against the soft tissue or by reducing the tongue spaces and causing the tongue to be displaced posteriorly into pharynx.
6. Gagging can also result from a **restricted airway**. It is difficult for a patient with a very larger tongue or a small nasopharynx to tolerate bulky dentures.

IV. MANAGEMENT OF GAGGING

Several authors have suggested hypnosis relaxation, relaxation plus controlled breathing and positive self statements and performances of incompatible responses such as reading all have been used with some success. Medications such as sedative antihistamine, parasympathetic and topical anesthetics have been used with some success. Appleby and Days finger massage technique and Singers Marble technique. Reduction of palatal coverage of maxillary dentures. Modification of edentulous maxillary custom tray to prevent gagging. Psychotherapy has been recommended for chronic or hysterical gagging. Analgesics. Conditioning prosthesis. Controlled breathing method. Leg lift technique. Acupressure technique.

Marble technique, Appleby and Bay's technique of finger massaging the soft palate and **Singer's marble technique** seems to be the methods by which the gag reflex can be exhausted thereby allowing for graduated exposure to the dental prosthesis or procedure.

Prosthodontic Considerations⁷:

Reduction of palatal coverage of maxillary denture: The maxillary denture can be reduced to a U-shaped border situated approximately 10 mm from the dental arch. Denture wearers with the above type of dentures reported that reduction of the palatal coverage influences their sense of taste positively, and gagging tendency disappears.

A cotton swab is used to apply a light coating of oral 'antiseptic / analgesic' to the soft palate and rear of the tongue to produce some decrease in sensation.

A tongue depressor was used to repeatedly probe the soft palate and rear of the tongue. When the gag reflex consistently failed to occur, the patient inserted the upper denture.

Conditioning prosthesis: A conditioning denture can be used in problem patients which is used to train the patient to gradually control gagging and adapt to reduced taste sensations. This helps the patient in accepting the permanent prosthesis to be inserted later. Such an appliance is worn for 1 weeks of adaptation, with 1 week of respite between prosthesis. This helps the patient in accepting the permanent prosthesis to be inserted later.

Controlled breathing method: This method advocated by the National Child Birth Trust for use by women in labour is similar to that advocated by Murphy. All patients were instructed in controlled rhythmic breathing and told to practice it for one or two weeks before prosthetic treatment commenced. The breathing was slow, deep and even, and the rhythm maintained by concentrating the mind upon a particular verse or tune with an even tempo. The concentration was particularly important so that if the patient experienced a gagging episode, the breathing would become deeper and slower.

V. DISCUSSION

We as prosthodontists usually come across patients who are extremely sensitive which cannot tolerate any foreign substance. It is postulated that gagging reaction is a continued anxiety reaction which is induced by state of mind. It is possible that the

chronic gagers may have more extensive distribution of vagus nerve with such an abnormally physical stimulation of mucous may induce gagging. Gag reflex is of psychogenic in origin. The hyperactive gag reflex produces lots of clinical difficulties for the patient as well as dentist. All the methods which are discussed should be used to manage patients. The rhythmic breathing is found to be most effective method of controlling the reflex.

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AUTHORS

First Author – Ahmad Naeem, Senior Lecturer, Dept. of Prosthodontics, Career Post-Graduate Institute of Dental Sciences, Lucknow.

Second Author – Bashir Taseer, Post Graduate student, Dept. of OMDR, Career Post-Graduate Institute of Dental Sciences, Lucknow.

Third Author – Saluja Arti, Senior Lecturer, Dept. of OMDR, Career Post-Graduate Institute of Dental Sciences, Lucknow.

Fourth Author – Chandel Shilpi, Post Graduate student, Dept. of Oral Pathology, Career Post-Graduate Institute of Dental Sciences, Lucknow.

Fifth Author – Krishnan Vijay, Post Graduate student, Dept. of OMDR, Career Post-Graduate Institute of Dental Sciences, Lucknow.

Sixth Author – Yadav Monu, Post Graduate student, Dept. of OMDR, Career Post-Graduate Institute of Dental Sciences, Lucknow.

Correspondence Author – Dr. Naeem Ahmad. MDS, MGH (Karolinska Institutet, Stockholm, Sweden), Senior Lecturer, Department of Prosthodontics, CPGIDS, Lucknow., Email : naeem_bds@yahoo.co.in. Phone : (+91) 9415142227, Postal Address : Flat No. T1-(A), IMT Estate Apartment, New Hyderabad Colony, Lucknow, Uttar Pradesh-226007

Analysis of Entrepreneurial traits of the Small Business owners in Sri Lanka

H.M. Nishanthi

Department of Human Resource Management, Faculty of Commerce and Management Studies, Universiy of Kelaniya, Sri Lanka

Abstract- Small business entrepreneurs play a significant role in the economic development of Sri Lanka. However statistics indicate that most of the small businesses fail, despite their importance to the economy. Researches signify several reasons for their failure, in which lack of entrepreneurial traits being a major reason. Siropolis (1994) had identified six major entrepreneurial traits to be found in entrepreneurs, while four of them such as creativity and innovation, risk taking, self-confidence and hardworking which are believed to be most significant have been taken in this study for consideration. Pickle (1964) points out that if entrepreneur characteristics condition a business success or failure, then identification of these features is a important value as a predictor, to degree, of a success or failure.

The purpose of the paper is to discuss the presence of entrepreneurial traits among different types of small business owners in the Gampaha District and to determine their impact on small business success. Study was conducted by taking 50 small business owners in Gampaha District. Primary data were collected by administering a well structured questionnaire and holding short interviews while secondary data were gathered through published research articles, text books and other related documentary evidences.

Collected data were presented by using descriptive analysis, like mean and the correlation analysis and it was reported that the small business owners posses entrepreneurial traits to a significant level as per the outcomes generated through spss(version 14+) software. As a result, it was concluded that the small business owners do posses entrepreneurial traits and they have a significant impact on the success of small business owners in the Gampaha district.

Index Terms- Entrepreneurial Traits, Small business owners, Business success, personal characteristics

I. INTRODUCTION

As a developing country, Sri Lankan economy consists of three major sectors namely agricultural, industrial and service sector. During the early stage of independence, importance of the agricultural sector to the economy was around 46% but today (2013) it has reduced to around 12%. Most important thing to highlight here is that the importance of the service sector has increased significantly and today its importance to the economy is around 60%. This shows that the economy has moved towards the service sector. Despite of the current state still there is unemployment prevailing in the workforce for around 4.4% (2013). Central Bank report (2013)

indicated that small and medium enterprises play an important role in the economy through the generation of employment, contributing to the growth of GDP, embarking innovation and stimulating other economic activities. In this circumstance, by providing the opportunity to start up small businesses and promoting entrepreneurship may provide vast range of benefits to the economy.

There are different definitions given for small business based on number of employees, capital invested, asset turnover, etc. Snogress & Biggs, 1988 as cited by Akomea-Bonsu & Sampong, 2012) defined small business as an entity consisting 5-9 employees. World Bank has highlighted it as having less than 49 employees. The statistical definition of small businesses varies by country to country and is usually based on the number of employees or the value of the assets. The lower limit for small scale enterprise is usually set at 5-10 workers and the upper limit at 50-100 workers. (Hallberg 2000, p.01) .U.S. Small Business Administration (SBA) has more than 800 definitions of a small business based on industry categories. A common delineation of a small business is one that employs fewer than 100 employees. (Zimmer & Scarborough, p. 21). Therefore categorization of small businesses based on number of employees can be taken as the most valued criteria based on the definitions given by different authors, institutions and countries.

II. LITERATURE REVIEW

There are different definitions given for small businesses based on number of employees, capital invested, asset turnover, etc. Snogress & Biggs defined small business as an entity consisting 5-9 employees. World Bank has highlighted it as having less than 49 employees. The statistical definition of small businesses varies by country to country and is usually based on the number of employees or the value of the assets. The lower limit for small scale enterprise is usually set at 5-10 workers and the upper limit at 50-100 workers. (Hallberg 2000,p. 01) .U.S. Small Business Administration (SBA) has more than 800 definitions of a small business based on industry categories. A common delineation of a small business is one that employs fewer than 100 employees. (Zimmer & Scarborough, p. 21). Therefore categorization of small businesses based on number of employees can be taken as the most valued criteria based on the definitions given by different authors, institutions and countries.

The issue of what is the essence of entrepreneurship is a long debated one. How to define an entrepreneur is also a long debated issue. One of the ways proposed takes in to consideration the personal characteristics of an individual and states that certain characteristics are typical of an entrepreneurial

personality, concluding that individuals who strongly present those traits are potential entrepreneurs (Macmillan, 1988)

On the other hand Entrepreneur can be defined as a Person who is the founder of market opportunities and combine & allocating resources to perceive them. In other words, carrying out of new combination of organizations under new products, new services, new source of raw materials, new methods of production, new markets are presented (Schumpeter, 1934.)

Although mostly entrepreneurs are defined as those who launch new ventures, entrepreneurship is far more widely practiced in old businesses as well as new ones, and in big businesses as well as small ones. In the words of Professor Nathaniel H. Leff, "Entrepreneurship is the capacity for innovation, investment, and expansion in new markets, products, and techniques." (Siropolis, 1994, p. 41) Therefore it is much more important to identify the entrepreneurial traits invested in the small businesses by the owners and also to identify what they lack of. Here the researcher has focused on several entrepreneurial traits and extent of it used in the small businesses.

The term entrepreneur has also defined differently by the authors. Cale (1959) defined the entrepreneur in different angles. An entrepreneur is a person who has possession of an enterprise, or venture, and assumes significant accountability for the inherent risks and the outcome. Entrepreneur in English is a term applied to the type of personality who is willing to take upon herself or himself a new venture or enterprise and accepts full responsibility for the outcome (Hodgetts (2001). But basically can identify that "entrepreneur is a person who manages his/her venture independently with a sense of risk." All these definitions provide an insight in to the entrepreneurship highlighting the importance of the existence of entrepreneurs in the society.

When it comes to the classification of entrepreneurs, Webster (1977) has considered classification schemes for both the individual entrepreneur and for their ventures. Four types of individual entrepreneurs are recognized with this scheme as Cantillon entrepreneur, industry maker, administrative entrepreneur & small business owner. According to Verma and Singh (2002), Entrepreneurs are classified as innovative, adoptive, fabian, drone and other. Landau (1982) has classified the entrepreneurs based on the characteristics of innovation and risk taking as gambler, entrepreneur, consolidator and dreamer. Jones-Evans (1995) based on Technology as it is an important aspect of modern business. Here the Entrepreneurs are categorized in to four. After going through several classifications it has been understood that these classifications are based on different factors such as Businesses motive, capital investment, country tradition, major characteristics, etc and there is no specific way of categorizing Entrepreneurs.

Although there does not seem to be a single entrepreneurial type there is a great deal of consistency in the way in which entrepreneurs approach their tasks. When identifying the traits of entrepreneurs, Siropolis (1994) has identified six major traits that an entrepreneur should posses. They are Creativity and innovation, risk taking, self confidence, hard working, goal setting and accountability.

In defining those six major entrepreneurial characteristics, creativity and innovation of entrepreneurs takes the focal consideration. Entrepreneurs are highly creative people. They

always try to develop new products, processes or markets. (Ramakishen, 2000) Innovation is generally the most distinctive entrepreneurial trait.

As exemplified by Henry ford,

"entrepreneurs tend to tackle the unknown; they tend to do things in new and different ways; they weave old ideas into new patterns; they offer more solutions than excuses."

Any new business poses risks for entrepreneurs. They may succeed or they may fail, and they cannot foresee which it will be. For protection, entrepreneurs are likely to shun ventures in which the odds against them are high. (Siropolis, 1994) At the same time, most entrepreneurs also shun a sure thing because the satisfaction would be too small to justify the effort. Entrepreneurs are not likely to be found performing routine chores like sorting buttons, grinding coffee,etc.

When it comes to self confidence, a man with self – confidence has clear thoughts and well- defined goals to achieve in his life. An entrepreneur gets into business or industry with a high level of self- confidence. He puts forward his case confidently and gets needed help from concerned agencies/authorities (Ramakishen, 2000).

In defining hard working, entrepreneurs put a lot of physical and mental effort into developing their ventures. They often work long and antisocial hours. After all, an entrepreneur is there own most valuable asset. That said, balancing the needs of the venture with other life commitments such as family and friends is one of the great challenges which faces the entrepreneur (Wickham, 2006)

Psychologists often define happiness as a striving towards meaningful goals, not necessarily the achievements of those goals. This definition of happiness fits many entrepreneurs. Happiest with goal in front of and not behind them, they rarely feel that they have arrived. (Siropolis, 1994)

Entrepreneurs generally want full credit for their success and assume full blame for their failure. To measure their performance, entrepreneurs may use any of the several yard sticks, among the return on investment and rate of profit growth. (Siropolis, 1994)

Apart from these basic traits Wickham (2006) has identified several other traits such as, self starting, assertiveness, eager to learn, commitment to others & comfort with power. Zimmerer and Scarborough (2005) have also identified several other traits relating to entrepreneurs apart from the above as desire for immediate feedback, future orientation and value of achievement over money. A study by Pleitner (1986) found that certain characteristics such as a high need for achievement, and a high degree of self-confidence can determine whether an entrepreneur will be successful or not. Hornaday (1982) identifies 19 characteristics for successful entrepreneurs. These include self-confidence, perseverance, diligence, resourcefulness, ability to take calculated risks, need to achieve, creativity, initiative, flexibility, positive response to changes, foresight, independence, dynamism and leadership, versatility and knowledgeable, ability to get along with people, responsiveness to suggestions and criticism, profit orientation, perceptiveness and optimism. So it is obvious that apart from the major six entrepreneurial traits mentioned by Siropolis (1994) ,researchers and writers have identified many traits relating to successful entrepreneurs but

depending on the basics of having the major six traits under them.

The most common method people use to measure business success is financial worth. The financial success of a business is best measured by focusing upon the *company profits* for the year (Huplao,2000). But too much focus on profit alone may lead to less customer satisfaction which may eventually lead to less success in future. As per Huplao (2000), there are many other measures of success, besides profits, which can be evaluated by looking at the company's financial statements. Increasing profit margins, paying down debt, increasing the effectiveness of advertising are some examples.

Through the revision of preceding literature relating to entrepreneurship, provides an opportunity to understand the true nature of it as well as the real impact it has on the business success & also to determine what should be possessed by an individual to become a true entrepreneur.

III. PROBLEM STATEMENT

Based on the definitions and the traits associated with the entrepreneurship, the researcher has attempted to identify whether the sample entrepreneurs posses the entrepreneurial traits mentioned in the literature. Do those qualities have helped them to succeed in their businesses and whether they have been failed to succeed though they have possessed those traits. Also researcher will be able to provide advice to the entrepreneurs regarding the qualities they are lacking of or explain them theoretically the reasons behind their success.

In describing further, the researcher has to identify whether the small business owners in Gampaha district posses higher levels of creativity and innovation, risk taking, self confidence and hard working as they are identified as main entrepreneurial characteristics that an entrepreneur should posses.

IV. METHODOLOGY

Objectives of the study

Following objectives were developed to be identified through the research.

- To identify level of Creativity and Innovation can be seen in entrepreneurs.
- To identify the extent to which entrepreneurs takes risks in the business.
- To identify the extent to which entrepreneurs have self confidence.
- To identify the extent to which entrepreneurs are hard working.
- To identify any relationship between demographic factors and entrepreneurial traits.

Conceptual Framework

This study is of quantitative nature. A conceptual framework was developed to explain the incident under the study which is supported by an extensive literature review. The researcher has identified four major entrepreneurial traits and the idea here is to test whether these traits are possessed by the small business owners and to what extent. Entrepreneurial traits have

been taken as the independent variable while Entrepreneurship (High, Moderate, and Low) has been taken as the dependent variable.

Hypotheses of the study

- H_1 - Small business owners posses entrepreneurial traits.
 H_0 - Small business owners do not posses entrepreneurial traits.

Sample of the study

Small businesses which consist of employees less than 49 were selected for the research study according to World Bank (2009) classification. The sample consisted of 50 small businesses located in Gampaha district. Convenience of reaching and meeting the small business owners was considered when selecting the sample. Hence by using convenience sampling technique, questionnaire was disseminated to 50 small business owners in manufacturing industry out of the population.

Data Collection

Primary data and secondary data have been collected for the research study. Here quantitative as well as qualitative data were collected, since the entrepreneurial traits have been taken as the dimensions. Secondary data were gathered from various sources such as management journals and internet research articles, etc. The primary data were collected through questionnaire and by conducting short interviews. Observations were made for further verification of the data collected from the questionnaire. Well structured questionnaire was built up according to the conceptualized variables, and it consisted of two parts. First part of the questionnaire attempted to gather information of demographic factors, company information, etc. Second part developed to measure the level of entrepreneurial traits possessed by the small business owners.

Data Analysis

Collected data were analyzed as follows. First responded data were sorted and tabulated. Secondly Responded data were tested under the scaling method of Likert's five point scaling. The items were phrased as statements with the possible response continuum linked to a Likert-style five-point scale (1 = strongly disagree to 5 = strongly agree). There were fifteen (15) questions in the questionnaire apart from the demographic factor related questions .It is important to bear in mind those responses to the self-assessment sections are based on the perceptions of small business owners themselves. Following continuum is developed based on the five point scale in order to measure the level of Entrepreneurial traits based on the **mean** calculation.

Score for extreme favourable = 5

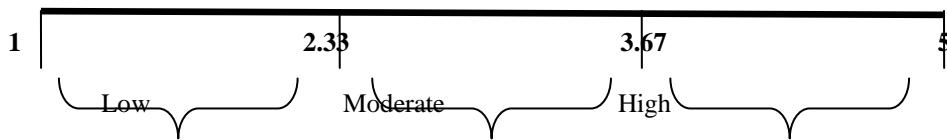
Score for extreme unfavourable = 1

Range = 5-1= 4

Number of classes = 03

Figure 02: Range categorization

The total range can be defined as follows.



Source: author

Further, to analyze and present demographic factors statistical tools; rates, percentages, pie charts, etc were used. In order to measure the relationship between entrepreneurial traits and small business success correlation analysis was employed. Analysis was made using spss 15+ software and also using Microsoft excel.

V. DATA PRESENTATION AND ANALYSIS

Table 01: Reliability Statistics

Cronbach's Alpha	N of Items
.733	50

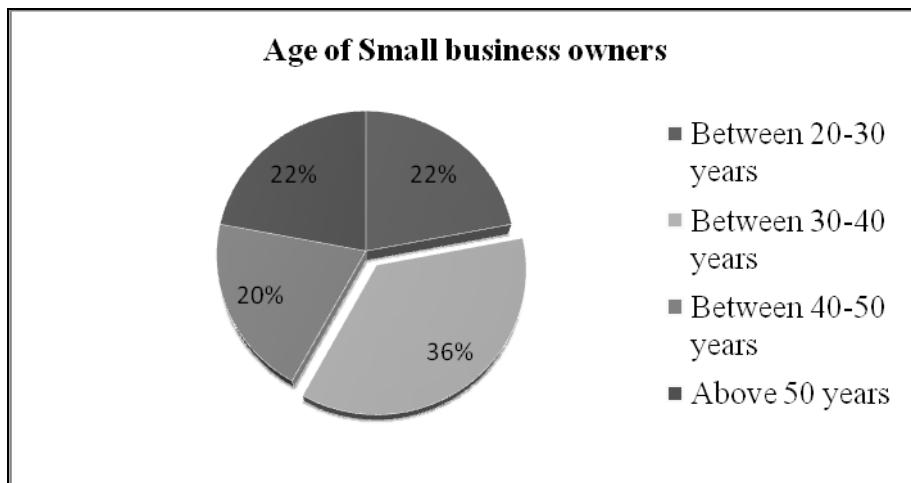
Source: Primary data

Overall reliability of the questionnaire was at .733 which indicated that the questionnaire had been reliable in gathering relevant data.

Analysis of Demographic Factors and Company Information

Here in order provide a descriptive idea regarding the small businesses and the nature of the small business owners, the demographic data as well as the company information were analyzed and presented as follows.

Figure 03: Age

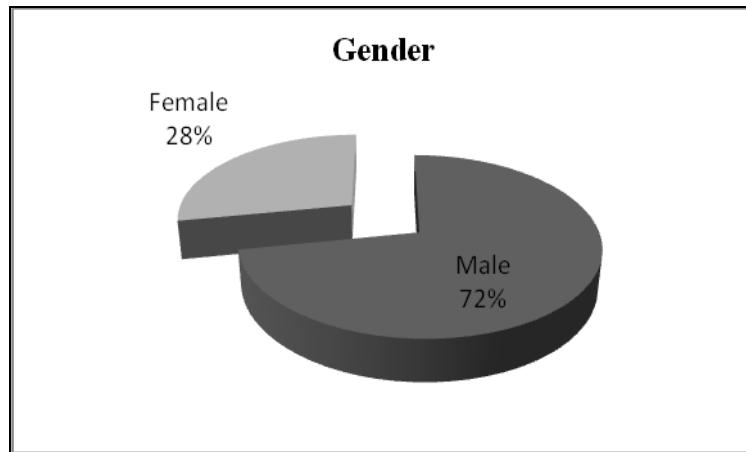


Source: Primary data

According to primary data collected, 36% of the small business owners were in the age category between 30 to 40

years. It was also determined that another 44% of the sample were above 50 years and between the age group of 20-30 years.

Figure 04: Gender



Source: Primary data

In analyzing the Gender of the sample, 72% of the small business owners were men and only 28% were female. This indicated that majority of the small business owners were men.

Table 02: Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below G.C.E (O/L)	11	22.0	22.0	22.0
	Passed G.C.E(O/L)	10	20.0	20.0	42.0
	Passed G.C.E(A/L)	10	20.0	20.0	62.0
	Passed G.C.E(A/L) & Followed extra vocational courses	19	38.0	38.0	100.0
	Total	50	100.0	100.0	

Source: Primary data

There were 38% of small business owners who had passed G.C.E.A/L and also done some other educational or vocational courses. That was the majority. From the sample, 20% had only passed G.C.E O/L. 20% had only done G.C.E.A/L while 22% of small business owners had not passed G.C.E O/L.

Table 03: Age of the Business

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 4 years	4	8.0	8.0	8.0
Between 4 to 8 years	12	24.0	24.0	32.0
Between 8 to 12 years	9	18.0	18.0	50.0
More than 12 years	25	50.0	50.0	100.0
Total	50	100.0	100.0	

Source: Primary data

According to the analyzed primary data, majority of the small business owners has been conducting their businesses for more than 12 years. 50% of the sample has started their businesses 12 years ago and small business owners who were in the industry for 4-8

years were 30% of the sample. It was also noticed that only 8% had started the business around 4 years. **This indicates fewer tendencies towards starting new businesses in the recent past.**

Based on the primary data collected, researcher attempted to produce a correlation analysis between the demographic factors and the entrepreneurial traits but the output was not significant indicating that based on the collected primary data no correlation can be identified between the demographic factors and entrepreneurial traits.

Analysis of Entrepreneurial Traits

Table 04: Descriptive Statistics on level of entrepreneurial traits

	N	Minimum	Maximum	Mean	Std. Deviation
Creativity & Innovation	50	3.00	5.00	4.3200	.55107
Risk Taking	50	4.00	5.00	4.7400	.44309
Self confidence	50	3.00	5.00	4.7800	.54548
Hard working	50	3.00	5.00	4.1200	.52060

Source: Primary data analyzed on SPSS

According to the descriptive analysis, it was identified that the entrepreneurial traits; creativity and innovation, risk taking, self confidence and hard working have obtained overall mean in the values of 4.32, 4.74, 4.78 and 4.12. This provides an insight that small business owners posses higher level of creativity and innovation, risk taking, self confidence and hard working abilities. Overall mean of the four traits is 4.34, which is a higher value.

Testing Hypotheses

Objective of analyzing four characteristics of Entrepreneurs was to test whether the small business owners posses the high levels of traits. Through the analysis it was found that the sample small business owners possessed high levels of Creativity and Innovation risk taking ability ,self confidence and were mostly hard working. When reaching to a general conclusion, it was determined that small business owners of the Gampaha District possess Entrepreneurial traits with a overall higher mean of 4.34 out of 5. Therefore it has been concluded that small business owners posses higher levels of entrepreneurial characteristics.

Therefore as the final conclusion can determine that, small business owners posses entrepreneurial traits. According to that H_1 - 'Small business owners posses entrepreneurial traits' is accepted. As the H_1 is accepted, H_2 - 'Small business owners do not posses entrepreneurial traits' is rejected.

Conclusion: "Small Business owners in Gampaha District posses Entrepreneurial Traits."

VI. RECOMMENDATIONS AND CONCLUSION OF THE STUDY

The main force behind this research study was to test whether Small business owners' posses true entrepreneurial characteristics. And there are various questionnaires available in internet and other recorded materials to test whether the individuals interested in starting their own business are made of true entrepreneurial material.

Therefore this study can be taken as the mile stone in helping the small business owners to understand what they are lacking of

entrepreneurial qualities or to confirm that they have taken the right decision in starting their own businesses. This study also provides an insight into the validity of those questionnaires as this has been tested on entrepreneurs who already started their own enterprise.

Therefore this research study will be useful for the individuals who take the risk of starting their own businesses with huge investments after taking those entrepreneurial tests which are available in internet and other recorded materials. It is recommended that the conclusions and the questionnaires should be distributed to the institutions where young people studying and boost up their morale in an early stage by helping them to understand whether they are made up of entrepreneurial material and this would benefit the society and government in whole which at the end helps in developing an Entrepreneurial culture.

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AUTHORS

First Author – H.M. Nishanthi, Department of Human Resource Management, Faculty of Commerce and Management Studies, Universiy of Kelaniya, Sri Lanka, Email address:
menaka_nishanthi@yahoo.com

Production and Evaluation of Set type Yogurt Incorporated with Water melon (*Citrullus lanatus*)

S.T.S.K. Warakaulle*, W.A.D.V. Weerathilake* and N.R. Abeynayake**

*Department of Livestock and Avian Sciences, Faculty of Livestock, Fisheries and Nutrition,
Wayamba University of Sri Lanka, Makandura, Gonawila 60170, Sri Lanka.

**Department of Agribusiness Management, Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka, Makandura, Gonawila 60170, Sri Lanka.

Abstract- Yogurt is an increasingly popular cultured dairy product in most of the countries. Popularity of yogurt has increased due to its perceived health benefits. Health-promoting attributes of yogurt containing live and active cultures are well documented. Yogurt is easily digested, has high nutritional value, and is a rich source of carbohydrates, protein, fat, vitamin, calcium, and phosphorus. Main objectives of this research were to find out the ability of producing yogurt incorporated with Water melon and to evaluate the consumer preference for yogurt incorporated with Water melon. Prepared yogurts were analyzed for moisture, ash, total solid, fat, and vitamin C content. Titrable acidity, pH, and microbial quality (Total plate count, Coliform and yeast/mold) have been investigated on 1st, 7th, 14th and 21st days of refrigerated storage. The addition of Water melon juice into the yogurt showed an increase in vitamin C content when compared to the plain yogurt. In addition, decreased levels in the fat, total solids, and titratable acidity were observed comparatively to the plain yogurt. Coliform and yeast/moulds count was less than 10cfu/g in both the control and the experimental yogurt. The addition of 25% Water melon juice into milk in order to produce yogurt, improved the yogurt in terms of color, appearance, odor and overall acceptability of yogurt.

Index Terms- Yogurt, Fruit yogurt, Water melon, Milk, Vitamin C

I. INTRODUCTION

Yogurt can be defined as a fermented dairy product manufactured from fermentation of milk [1]. It is a semi solid fermented product made from heat-treated and standardized milk mixed by the activity of a symbiotic blend of *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus* [2]. According to the Code of Federal Regulations of the Food and Drug Administration (1996c) (FDA) yogurt can be defined as the “food produced by culturing one or more of the optional dairy ingredients (cream, milk, partially skimmed milk, and skim milk) with a characterizing bacteria culture that contains the lactic acid-producing bacteria, *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus*” [3]. On the other hand, Codex Alimentarius (2003) defines yogurt as a milk produced with *Streptococcus thermophilus* in conjugation with any *Lactobacillus* species [2]. Milk fermentation with Lactic Acid Bacteria (LAB) also results in products with distinctive tastes and aromas [1]. Milk of various

mammals is used for yogurt making in various parts of the world. However, most of the industrialized production of yogurt uses cow's milk [4]. Since yogurt is a safer product with a unique flavor which has a higher consumer preference, consideration is being given by nutritionists to incorporate inexpensive source of nutrients to make it an almost complete food [5]. Yogurt has some curative characters also. It has been reported that yogurt can lower the blood cholesterol level [6] and helps to control some intestinal disorders like constipation, dysentery etc., [7]. Yogurt is one of the fastest growing cultured dairy products throughout the world [6]. Yogurt and related products continue to increase in popularity in many countries around the world. Consumers, especially children are demanding novel yogurt formulations more than traditional plain yogurt. Few of the novel yogurt formulations are non-fat yogurt, whipped yogurt, yogurt smoothies, organic yogurt and minimally processed fruit yogurt [8].

An increasing demand can be seen for fruit yogurts. Introduction of various fruit-flavored yogurts has significantly contributed to the consumption of yogurt among all ages [9]. There could be many reasons behind this. Incorporation of fruits endorses the healthy image of yogurt. Bardale (1986), reported that the addition of fruit preparations, fruit flavors, fruit purees, and flavor extracts enhances versatility of taste, color, and texture for the consumer [10]. However fruit-flavored yogurts require an appropriate balance of sweetness, sourness and therefore sufficient flavor intensity should be involved in the flavored yogurt to mask the plain yogurt base [11]. There have been many attempts to produce a range of fruit yogurts in Sri Lanka, recently. However, use of Water melon to produce of fruit yogurt has not yet been done so far. Finding the plausibility of producing a yogurt incorporated with Water melon is important since Water melon is a very popular and abundant tropical fruit. Therefore, the aim of this study was to formulate a Water melon incorporated yogurt with higher consumer acceptability. Another objective of this study was to evaluate the effect of Water melon additive on physical, chemical, sensory, and microbiological properties of the yogurt.

II. MATERIALS AND METHODS

Yogurt preparation

Research was conducted in the Laboratories of the Department of Livestock and Avian Sciences and the Department of Food Science and Technology, Wayamba University of Sri Lanka. Full fat cow milk was obtained from the milk collecting center at Makandura, Gonawila, Sri Lanka. Water melon, sugar, and starter culture were purchased from the local market.

Collected Water melon (*Citrullus lanatus*) fruits were washed with clean water and peeled manually. Then the seeds were removed and the Water melon pieces were blended. Cleaned muslin cloth (washed with hot water) was used for filtration of juice. Filtrate was heated at 95°C for 2 minutes. Cow milk was cream separated using the cream separator to obtain milk with 2.5% fat level. Milk was pasteurized and heated to 85°C for 40 minutes. Sugar (8.78%) and gelatin (0.6%) were added to milk and mixed well. Heated milk was divided into four equal portions; one portion for control and the other three portions for the experiment. Water melon juice was added to the experimental milk samples at 20%, 25%, and 30% levels. Commercial yogurt starter culture (0.2 g/1L) containing 1:1 ratio of *Streptococcus thermophilus* and *Lactobacillus bulgaricus* was inoculated to the mixture. Prepared mixtures were incubated at 45°C for 3.5 hours and stored at 4°C after incubation.

Sensory evaluation

Two sensory evaluations were conducted using 50 untrained panelists drawn from the Wayamba University of Sri Lanka. First sensory evaluation was done to select the best inclusion rate of Water melon incorporated yogurt among the three coded samples (20%, 25%, and 30%). Second sensory evaluation was done to evaluate the consumer preference for Water melon yogurt which was selected from the first sensory evaluation. Panelists were instructed to indicate their preference for the samples. Five-point hedonic scale was used, in which 5 as the highest score and 1 as the lowest for each characteristics namely color, appearance, texture, odor, and overall acceptability.

Proximate analysis

Yogurt samples were analyzed for moisture and fat content using sand pan technique and Gerber method [12, 13]. Whereas the ash content and total solids contents were determined according to the A.O.A.C Protocols [14].

Chemical analysis

Standard pH meter (Eutech instrument, model 510, Malaysia) was used for the determination of pH. Total titratable acidity was determined by titration with 0.1N NaOH and Vitamin C content was determined according to the A.O.A.C Protocols [14].

Microbiological analysis

Prepared yogurt samples were analyzed for total bacterial count, total coliform count, and yeast and mold count after 1, 7, 14, and 21 days of fermentation. Peptone water was used for the serial dilution. One gram (1g) of yogurt sample was taken into a culture tube and dissolved with 9 mL of peptone water. Plate count agar was used as the culture media for the determination of total plate count and incubated at 36°C for 48 hours. Colony counter was used for the enumeration of total plate count. Culture tubes with MacConkey Broth was used as the medium for the determination of Coliform, and incubated at 37°C for 48 hours. Presence of air bubbles in the Durham tubes or any color change indicated the positive results of coliform. Yeast and mold count was determined by inoculating the sample on potato dextrose agar and incubated at 25°C for 5 days.

Statistical Analysis

Data obtained for chemical and proximate analysis were analyzed by t-test using SAS 9.2 version. Data obtained for sensory evaluation were analyzed using Chi-square in SAS 9.2 version and Kruskal-Wallis test in MINITAB 15. All the significances were determined at $\alpha = 0.05$.

III. RESULTS & DISCUSSION

Sensory evaluation

Results of the first sensory evaluation shown that the most preferred Water melon juice added yogurt was the one with 25% concentration of Water melon juice having significance difference ($P<0.05$) compared to 20% and 30%. Results from the sensory tests for the color, appearance, texture, odor, and overall acceptability of yogurts are shown in Table 1. Panelists were able to distinguish a significant difference ($P<0.05$) in all attributes among the two yogurt samples. Water melon juice was incorporated with yogurt with the intention of enhancing the color. It was proved by gaining a higher score for the color of Water melon yogurt (4.20) than the plain yogurt (4.12). Analyzed results for odor showed higher score for Water melon yogurt indicating that through the incorporation of Water melon juice, the odor has increased. Average overall acceptability scores ranged from 4.06 to 4.20 among the two yogurt samples. Moreover, results showed that overall acceptability of Water melon yogurt was significantly different ($P<0.05$). However, consumer preference for the texture of Water melon yogurt was lower than the plain yogurt. Reduction of scores for the texture was observed in Water melon yogurt (4.16) than the plain yogurt (4.26) (Table 1).

Proximate analysis

Water melon yogurt showed significant difference ($P<0.05$) against plain yogurt in total solid content (Table 2). Mean mass fraction of total solid in Water melon yogurt was 17.53 ± 0.32 , and this value is similar to that found in yogurts with added raspberry [15]. There was a significant difference in vitamin C content between the Water melon and the plain yogurt ($P<0.05$). Water melon yogurt showed significantly higher vitamin C content (16.46 ± 0.7506 mg/100 g) than the plain yogurt (3.03 ± 0.07 mg/100 g) respectively (Table 2). Mbaeyi and Anyanwu

(2010) also have found that, increased vitamin C content with the increasing concentration of solar dried bush mango pulp with yogurt [16].

Table 1. Sensory attributes of plain yogurt and Water melon juice incorporated yogurt samples.

Note: Mean values in the same row with different letters are

Criteria	Plain cow milk yogurt	Water melon yogurt
Color	4.12 ± 0.629 ^a	4.20 ± 0.689 ^b
Appearance	4.12 ± 0.629 ^a	4.20 ± 0.689 ^b
Texture	4.26 ± 0.755 ^a	4.16 ± 0.664 ^b
Odor	4.06 ± 0.913 ^a	4.40 ± 0.586 ^a
Overall acceptability	4.06 ± 0.752 ^a	4.20 ± 0.586 ^a

significantly different ($P<0.05$), n=50

Table 2. Physicochemical characteristics of plain and Water melon incorporated cow milk yogurt.

Composition	Plain cow milk yogurt	Water melon yogurt
Moisture (%)	79.37 ± 0.11 ^a	79.35 ± 0.11 ^a
Fat (%)	2.43 ± 0.05 ^a	2.46 ± 0.05 ^a
Ash (%)	0.72 ± 0.01 ^a	0.73 ± 0.01 ^a
Total solid (%)	17.53 ± 0.32 ^a	19.71 ± 0.22 ^a
Vitamin C mg/100g	3.03 ± 0.07 ^a	16.46 ± 0.75 ^b

Note: Mean values in the same row with different letters are significantly different ($P<0.05$), n=3

Chemical analysis

Results of the changes in pH during the storage period of two yogurt samples were illustrated in the Figure 1. Significant difference in pH change was observed throughout the storage period at 4°C ($P<0.05$). Reduction of pH may be due to the action of microbial population in the yogurt. Moon *et al.*, (1993) also have reported that there was a decrease in pH during the storage of gel type yogurt [17]. Bonczar *et al.*, (2002) stated that this can be explained by further metabolic activities of starter cultures during storage [18]. Titrable acidity (TA) of both yogurts increased gradually during the storage at 4°C for 3 weeks (Figure 2). But TA of Water melon incorporated yogurt showed lower values compared to the control. TA of the two yogurt samples were significantly different ($P<0.05$) at the first day and similar changes were observed for 7, 14, and 21 days of storage. Kucukoner and Tarakci (2004) also found that the plain yogurt had higher mean value of titrable acidity [19]. This phenomenon might be due to the acid production in the experimental yogurt during storage caused by the fermentation [20].

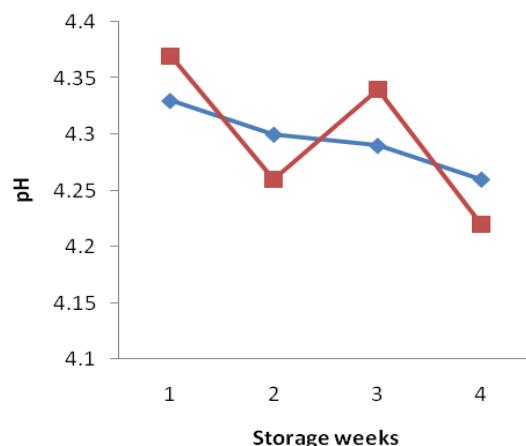


Figure 01. Changes of pH of control (◇) yogurt and Water melon incorporated yogurt (□) during storage.

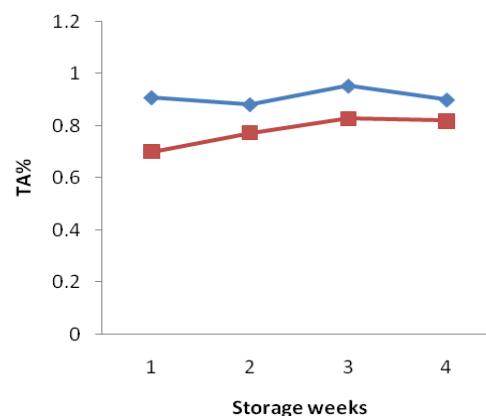


Figure 02. Changes of TA of control (◇) yogurt and Water melon incorporated yogurt (□) during storage.

Microbiological evaluation

Data on the total microbial count in control and Water melon incorporated yogurt samples showed in the Table 3 and was not significantly different ($P>0.05$) during 1, 7, and 14 days of storage, whereas the means for total bacterial count were significantly different ($P<0.05$) during 21 days. Peak total microbial count was observed at 14 days of storage in control ($53.00 \times 10^5 \pm 1.00 \times 10^5$) and Water melon incorporated yogurt ($51.00 \times 10^5 \pm 1.00 \times 10^5$). Total microbial count showed a reduction after 21 days of storage in control ($7.1 \times 10^5 \pm 0.10 \times 10^5$) and Water melon yogurt ($6.4 \times 10^5 \pm 0.34 \times 10^5$). This may be due to the depletion of nutrients and death of some survivors of the products. Mbaeyi and Anyanwu (2010) also observed that drastic reduction of total viable count of the yogurt samples formulated with solar-dried bush mango pulp [16]. Coliform were absent during the 21 days of storage life whilst 1-2 yeast and mold colonies were observed during the latter part of the storage period.

Table 3. Results for the microbial count of plain and Water melon incorporated yogurt.

Day	Plain cow milk yogurt			Water melon yogurt		
	TPC(x10 ³) CFU/g	Coliform	Yeast & Mold	TPC(x10 ³) CFU/g	Coliform	Yeast & mold
1	3.4 ± 0.17	Nil	Nil	3.3 ± 0.10	Nil	Nil
7	6.3 ± 0.30	Nil	Nil	6.2 ± 0.20	Nil	Nil
14	53 ± 1.00	Nil	Nil	51 ± 1.00	Nil	Nil
21	7.1 ± 0.10	Nil	Nil	6.4 ± 0.34	Nil	Nil

IV. CONCLUSION

Based on the results, it can be concluded that twenty five per cent (25%) incorporation rate of Water melon juice into the yogurt mix may enhance consumer appeal of fruit yogurt than that of the 20% and 30% incorporation rates. Moreover, incorporation of Water melon juice could increase Vitamin C content in the fruit yogurt significantly than that of the plain yogurt. Further, addition of Water melon did not change the titrable acidity, pH, and microbial count significantly compared to plain yogurt. Therefore, incorporation of Water melon juice can be suggested as a promising method to enhance the consumer preference towards yogurts while remaining the chemical and microbial qualities of plain yoghurt.

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AUTHORS

First Author – S.T.S.K. Warakaulle, B.Sc, Department of Livestock & Avian Sciences, Wayamba University of Sri Lanka, email: <saumya.stk88@gmail.com>.

Second Author – W.A.D.V. Weerathilake, Mphil;B.Sc.Special (Hons), Department of Livestock & Avian Sciences, Wayamba University of Sri Lanka, email: <dammika_kandy@yahoo.com> ..

Third Author – N.R. Abeynayake, Ph. D; M.Sc; B.Sc Special (Hons), Department of Agribusiness Management, Wayamba University of Sri Lanka, email: <rabenayake@hotmail.com>

Correspondence Author – W.A.D.V. Weerathilake, email: <dammika_kandy@yahoo.com>, Tel: +94 (0)77 989 4142

An Efficient Binarization Technique for Recovering Degraded Document Images

Archana Thange¹, Amina.N², Amruta Nimbalkar³

¹ ME (IT), DKGOI'S COE, Swamichincholi, Maharashtra, India

² ME (COMPUTER), DKGOI'S COE, Swamichincholi, Maharashtra, India

³ ME (COMPUTER), DKGOI'S COE, Swamichincholi, Maharashtra, India

Abstract: *Degraded document images is very difficult to segment in text format due the high inter/intra variation between the document background and foreground text from different document images. In this paper we propose a binarization technique for recovering degraded document images. In the proposed technique firstly adaptive image contrast map is constructed by giving input degraded document images and detect the text stroke edge pixel. Text of the document is segmented by using local threshold estimation then further applying the post processing to improve document binarization quality. The proposed method is simple, effective and involves minimum parameter tuning.*

Key Words: *Degraded document images, adaptive image contrast, binarization technique.*

1. INTRODUCTION

The document image binarization has been studied for many years; the thresholding of document image is still unsolved problem. The handwritten text within the degraded document images shows some variation such as brightness, stroke connection, stroke width and some historical degraded document shows. Some variation in terms of ink of the other side seeps through to the front. So we can use the different binarization technique to improve the degraded document images.

As time passes, the documents degrade making the data unreadable. We need to recover the data from this degraded document. Various other techniques were proposed to recover data, but were less efficient. To provide maximum accuracy and exact recovery of documents, we propose a robust technique for recovery of degraded documents.

2. OBJECTIVES

Main objective is to make use of the adaptive image contrast that combines the local image contrast and the local image gradient adaptively and therefore is tolerant to the text and background variation caused by different types of document degradations. In particular, the proposed technique addresses the over-normalization problem of the local maximum minimum algorithm. Proposed system presents a document binarization technique that extends our previous local maximum-minimum method.

2.1 SCOPE

Document Image Binarization system is image processing based system.

1. To improve the quality of novel document images.
2. Used for different kinds of degraded document images.

3. ARCHITECTURE OF PROPOSED SYSTEM

In this section we propose four methods, which are used in binarization technique. Such as

1. Contrast Image Construction
2. Text Stroke Edge Pixel Detection
3. Local Threshold Estimation
4. Post-Processing

Description

1. Contrast Image Construction

Adaptive image contrast is a combination of local image gradient and local image contrast.

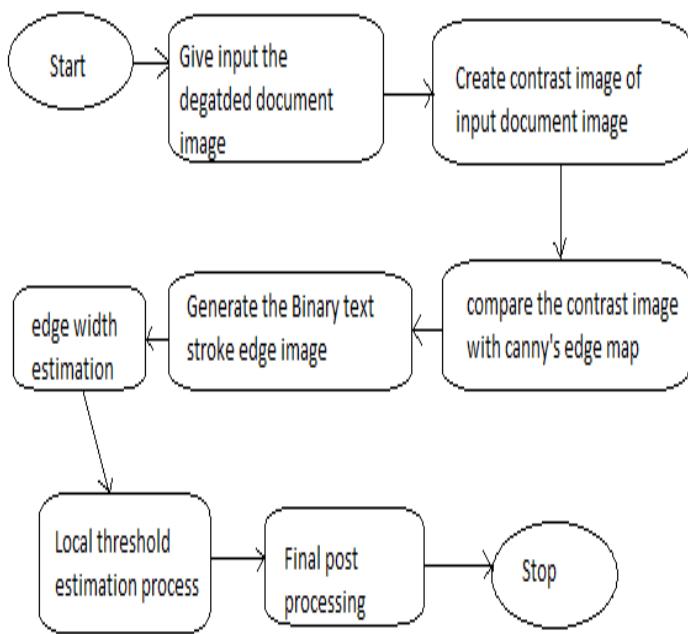


Figure 1:- Architecture of system

The local image contrast and the local image gradient are very useful features for segmenting the text from the document background because the document text usually has certain image contrast to the neighboring document background. They are very effective and have been used in many document image binarization techniques [3] [4].

Ideally, the image contrast will be assigned with a high weight (i.e. large α) when the document image has significant intensity variation. So that the proposed binarization technique depends more on the local image contrast that can capture the intensity variation well and hence produce good results. $C\alpha(i,j) = \alpha C(I,j) + (1-\alpha)(I_{max}(I,j) - I_{min}(I,j))$.

The adaptive combination of the local image contrast and the image gradient in above equation can produce proper contrast maps for document images with different types of degradation.

2. Text Stroke Edge Pixel Detection

The purpose of the contrast image construction is to detect the stroke edge pixels of the document text properly. The pixel at both sides of the text stroke will be selected as the high contrast pixel.

3. Local Threshold Estimation

After detecting the text stroke edge pixel, we calculate the most frequent distance between two adjacent edge pixels in horizontal direction and use it as the estimated stroke width.

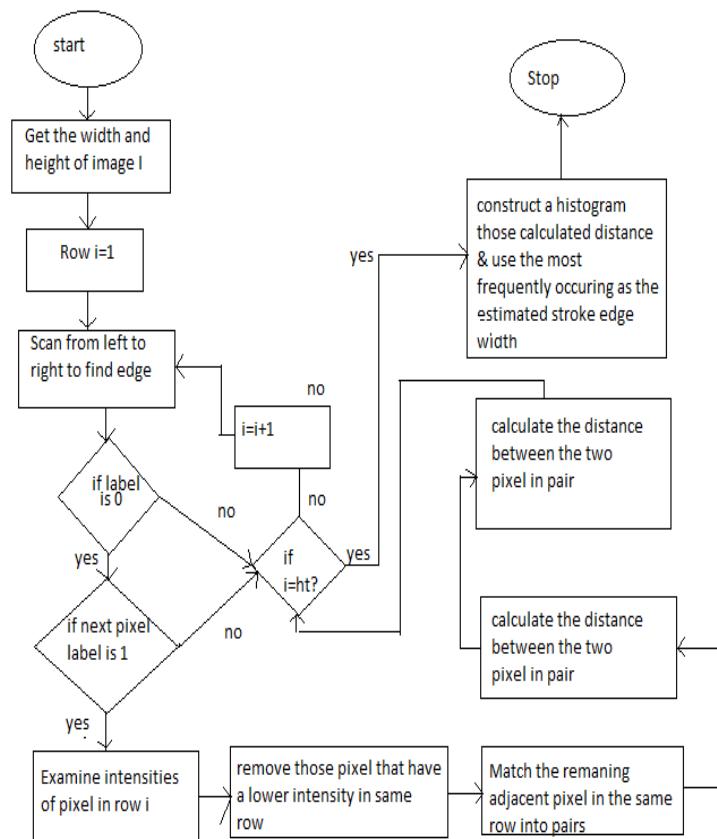


Figure 2:- Flowchart of local threshold estimation

4. Post-Processing

Binarization result can be improved by using Post-Processing method. By using the algorithm of post processing we remove single pixel artifacts along the text stroke boundaries after the document thresholding.

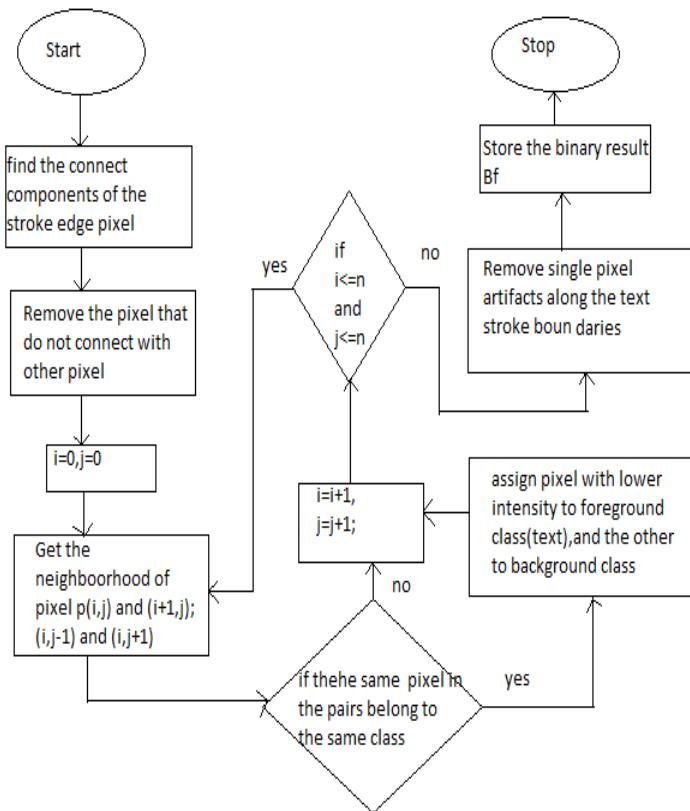


Figure 3:- Flowchart of Post-Processing

CONCLUSION

The proposed system presents an adaptive image contrast based document image binarization technique that is tolerant to different types of document degradation such as uneven illumination and document smear. This proposed system has its work in all areas that are concerned with managing documents for preserving historical data. The Proposed system emphasizes on recovering the data that tends to be damaged due to damaging of the documents.

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Pros and cons of Mobile banking

Renju Chandran

Research Scholar, Dept. Of commerce and Research Centre, St. Albert's College, Ernakulam, Kerala

Abstract- Mobile Banking refers to provision of banking and financial services with the help of mobile telecommunication devices. The scope of offered services may include facilities to conduct bank transactions, to administer accounts and to access customized information. After the launch of mobile banking in India, mobile banking transactions have seen some growth. Still mobile banking has a long way to go as, majority of customers prefer banking in traditional ways. The basic objective is to identify the advantages and limitations of mobile banking and the problems faced by customers in mobile banking. The banking sector reforms and introduction of e-banking has made very structural changes in service quality, managerial decisions, operational performance, profitability and productivity of the banks. There are various factors which have played vital role in the Indian banking sector for adoption of technology. So in order to run the mobile banking effectively, proper care has been taken care of and take adequate steps to improve the quality services.

Index Terms- Mobile banking, MNO, Telecom, E -banking

I. INTRODUCTION

With the globalisation trends worldwide, it is difficult for a nation , whether big or small, developed or developing, to remain isolated from what is happening around. Information technology has shrunken the world, as a result of which, time and distance have become non-entities. It has enveloped every aspect of life. Today, most of the people adopt new generation technologies. In this changing scenario, the banking sector is not an exception. Recent innovations in telecommunications have enabled the launch of new access methods for banking services through various e- channels like , ATMs, credit/debit cards, internet banking, mobile banking, tele banking, EFT etc. One of these is mobile banking; whereby a customer interacts with a bank via mobile phone. Mobile Banking refers to provision of banking and financial services with the help of mobile telecommunication devices. The scope of offered services may include facilities to conduct bank transactions, to administer accounts and to access customized information. After the launch of mobile banking, transactions have seen some growth. Still mobile banking has a long way to go as, majority of customers prefer banking in traditional ways. Most of the customer's problem is that they are not well educated and not aware of the technological innovations.

The present paper studies the benefits, limitations and problems faced by customer through mobile banking. This paper also studies about the future prospects of mobile banking and the methods for improvement.

II. OBJECTIVES

1. To study about the benefits and limitations of mobile banking.
2. To identify the problems faced by the customers through mobile banking.
3. To see the future prospects of mobile banking in India.
4. To give suggestions for improvement.

Methodology

Nature of study

The study is mainly descriptive in nature. Secondary data are used for the purpose of the study.

Secondary data

Secondary data was collected from websites, various articles and journals.

Limitations of the study

- Lack of primary data
- Time consuming
- As the research mainly depends on secondary data, it may not be hundred percent accurate.
- The study is limited to India only.

III. LITERATURE REVIEW

Mobile banking is a system that allows customers of a financial institution to conduct a number of financial transactions through a mobile device such as a mobile phone or personal digital assistant.

Mobile banking differs from mobile payments, which involve the use of a mobile device to pay for goods or services either at the point of sale or remotely, analogously to the use of a debit or credit card to effect an EFTPOS payment.

The earliest mobile banking services were offered over SMS, a service known as SMS banking. With the introduction of smart phones with WAP support enabling the use of the mobile web in 1999, the first European banks started to offer mobile banking on this platform to their customers.

In one academic model, mobile banking is defined as:

Mobile Banking refers to provision and availment of banking- and financial services with the help of mobile telecommunication devices. The scope of offered services may include facilities to conduct bank and stock market transactions, to administer accounts and to access customized information."

According to this model mobile banking can be said to consist of three inter-related concepts:

- Mobile accounting
- Mobile brokerage
- Mobile financial information services

Most services in the categories designated accounting and brokerage are transaction-based. The non-transaction-based services of an informational nature are however essential for conducting transactions - for instance, balance inquiries might be needed before committing a money remittance. The accounting and brokerage services are therefore offered invariably in combination with information services. Information services, on the other hand, may be offered as an independent module.

Mobile banking users are specially concern with security issues like financial frauds, account misuse and user friendliness issue - difficulty in remembering the different codes for different types of transaction, application software installation & updating due to lack of standardization. Mobile banking transactions can be broadly classified into two: push type and pull type. Push type is a one-way transaction where our bank sends us information pertaining to our account via SMS. Pull type is a two-way transaction, where we send a request and the bank replies.

This can be further classified into five types.

1. Inter-bank mobile payment service (IMPS), which is a fund transfer service through National Payment Council of India (NPCI). This service lets you transfer funds from one account to another across banks within the country using your mobile phone. You can use the IMPS via your banks' app, USSD'S dial-in number, encrypted SMS banking or net banking.
2. Bank apps - Here you need to download your bank's application or software on your mobile phone via internet. This works on both GSM and CDMA handsets for Android and iPhone platforms.
3. USSD-based - For this type, all you have to do is dial the bank's service code and you can ask for information on your bank account. You don't need a Smartphone or high end phone to use the USSD platform.
4. SMS-Based -It is the most popular method of mobile banking. You can get your account information via SMS.
5. Internet-based mobile banking - This way of banking is where you use your mobile screen like a computer monitor.

Apart from these there are more options like the mobile wallets, offered by telecom service provider platforms, for instance Vodafone's m-pesa, Bharti Airtel's Airtel Money and Aircel's Mobile Money. Bear in mind that even an un-banked customer can use this service. A smart phone and an internet connection are not essential.

Advantages of Mobile Banking

- Time saving : Instead of allocating time to walk into a bank, you can check account balances, schedule and receive payments, transfer money and organise your accounts when you're on the go.

- Convenient : The ability to access bank accounts, make payments, and even track investments regardless of where you are can be a big advantage Do your banking at a time and place that suits you, instead of waiting in queues.
- Secure : Generally, good mobile banking apps have a security guarantee or send you a SMS verification code you need to input to authorise a payment for added security. Mobile banking is said to be even more secure than online/internet banking.
- Easy access to your finances: with the introduction of mobile banking, you are able to access your financial information even beyond the working hours. It helps to avail banking services even by making a call to the bank.
- Increased efficiency: mobile banking functions are functional, efficient and competitive. It also helps in decongesting the banking halls and reduces the amount of paperwork for both the banker and the customer
- Fraud reduction: one very real advantage to implementing mobile banking. "Customers are being deputized in real time to watch their accounts.
- It utilizes the mobile connectivity of telecom operators and therefore does not require an internet connection.
- You can check your account balance, review recent transaction, transfer funds, pay bills, locate ATMs, deposit cheques, manage investments, etc.
- Mobile banking is available round the clock 24/7/365, it is easy and convenient and an ideal choice for accessing financial services for most mobile phone owners in the rural areas.

Disadvantages of Mobile Banking

- Mobile banking users are at risk of receiving fake [SMS messages](#) and scams.
- The loss of a person's mobile device often means that criminals can gain access to your mobile banking PIN and other sensitive information.
- Modern mobile devices like Smartphone and tablets are better suited for mobile banking than old models of mobile phones and devices.
- Regular users of mobile banking over time can accumulate significant charges from their banks.
- Even though there are 1.5 billion computers on the Internet and 4.5 billion people using mobile phones, there's currently no significant operating system supporting the mobile space. "Hackers want to do the least amount of work for the biggest gain..
- Most mobile banking apps need an internet connection to be able to operate, so if you live in a rural area or experience problems with your internet connection, then you won't be able to access your account. The same applies if your mobile phone runs out of battery.
- Many phones aren't yet compatible with anti-virus software. Most cell phones don't come standard with anti-virus protection even if they have the capacity to browse the internet. Some phones aren't even

- compatible with the anti-virus software available and there are known cases in which people were unable to put anti-virus software registered to them on corporate cell phones. Although identity thieves are still a few steps behind when it comes to learning to implement some of their most successful computer tricks (phishing, spamming, spreading viruses, account hacking, etc...) on a cell phone level, experts agree that is only a matter of time and people shouldn't assume that anti-virus software isn't necessary for cell phones.
- Some banks don't offer the same level of protection for cell phone banking that they do for online or in person transactions. Because the risks are still generally unknown some banks have been slow to make promises about what will or will not be covered when you use cell phone banking.

Problems of customers of Mobile banking

- Not sure about the safety of transactions
- Mobile security
- Network availability
- Heavy charges for transactions
- E-mail and web security
- Identity theft
- Literacy of people in rural areas
- Not aware of new innovation
- Handset operate ability
- Application distribution
- Inadequate guidance

Recent trends in mobile banking

Table No:1

Year	No. of Users (million)	Volume (million)	Value (billion)
2011-12	12.96	25.56	18.21
2012-13	22.51 (73.69%)	53.31 (108.56%)	59.90 (228.94%)
2013-14	35.53 (57.84%)	94.71 (77.66%)	224.38 (274.59%)

*(Figures in bracket is %age changes over previous year) ** source:RBI

The above table states that M-banking usage in India is showing a positive trend. In terms of no: of users it was 12.96 million in 2011-12 and reached at 35.53 million in the year 2013-14. Volume of transactions also increased during the given period. In case of value of transactions it was only 18.21 billion in 2011-12 and reached at 224.38 in 2013-14 i.e. an increase of 274.59%.

So the table reveals the fact that M-banking transactions of the country is growing at a rocket speed and it have more scope in the near future.

Future prospects of Mobile Banking in India

1. Mobile Network Operators and Large Corporate Houses Co-Venture.

With the popularity of collaborations between mobile network operators (MNO's) and banks live up to the promise of financial inclusion, the RBI and TRAI (Telecom Regulatory Authority of India) have announced that they will harmonize and coordinate with each other to avoid any form of regularity conflict. Many large Indian banks have partnered/co-ventured with large mobile network operations (MNO's) and handset

vendors to facilitate their connection through mobile channel by providing access to financial services.

2. Under-banked and Un-Banked Population

Almost half of the country's population is unbanked. The large section of the Indian population not just in rural areas but also in many segments of urban markets, offers a large untapped market with a tremendous business potential.

3. Demographic Factors

In India the population of youth (between the ages of 14-29) is the largest youth population globally, which is around 27% of the total 1.2 billion. Furthermore, adding the age group of 30-44, the proportion is 47%. %. Apart from the huge size of this segment, they are among those who are the early adopters of latest technology and new services, which presents a huge opportunity for e/m-banking service providers. It has been observed that for the majority, access to financial services is a household need, and not only an individual need, and if the account holder is illiterate, other members of the family are competent enough to execute transactions and use electronic or mobile banking services.

IV. CONCLUSION

The process of liberalization, privatization, globalization and deregulation has opened new way for banks to increase their revenues by diversifying into universal banking, investment banking, bank assurance, mortgage financing, depository services, securitization, personal banking etc. Technology is the key to move towards providing integrated banking services to customers. Indian banks have been late starter in the adoption of technology for automation of processes and the integrated banking services. Further the banking sector reforms and introduction of e-banking has made very structural changes in service quality, managerial decisions, operational performance, profitability and productivity of the banks. There are various factors which have played vital role in the Indian banking sector for adoption of technology.

Further, new technology has rapidly altered the traditional ways of doing banking business. Customers can view the accounts, get account statements, transfer funds, purchase drafts by just making a few key punches. Availability of ATMs and plastic cards, EFT, electronic clearing services, internet banking, mobile banking and phone banking; to a large extent avoid customers going to branch premises and has provided a wider range of services to the customers.

Mobile banking is a system that allows customers of a financial institution to conduct a number of financial transactions through a mobile device such as a mobile phone or personal digital assistant.

Banking apps can make bill paying and bank account management incredibly convenient, but the risk of identity theft is a major downside. Fortunately, it's easy to avoid most of the pitfalls with commonsense solutions like strong password protection and secure connections. By keeping these security tips in mind, you can enjoy a safer mobile banking experience.

V. SUGGESTIONS FOR IMPROVEMENT

1. The banks must improve its service quality in terms of communication, responsiveness, reliability and understanding.
2. To provide various effective modes for promotional schemes interaction with the customer, more accuracy in billing, financial security and privacy in transactions.
3. If the banks wants to increase the service quality it should enhance level of services in punctuality, transparency and accountability, quality of customers service, safety and confidentiality of transaction, No. of queues in bank branches, 24 hours services to the customers, individualized attention to customers, necessary information to customers, learns the specific requirement of customers.
4. set standards for on-boarding mobile banking customers
5. set standards for industry agreements between banks and MNOs for handling customer grievances

6. Banks need to see mobile banking channel as a cost saving avenue (reduction of cash handling charges) rather than revenue generation vertical
7. Banks and telcos to work together for addressing customer grievances

3Tips to Use Mobile Banking in the Right Way

1. Don't store important personal information on your smartphone

If you visit your bank's website using your phone, make sure to clear out the cookies and cache regularly. Never store any usernames or passwords in your phone, regardless of how difficult they are to remember. If you were to lose the phone where this information is stored, someone could easily access your bank account. It is also important to change your password regularly. If you use your phone for business purposes, be doubly careful on protecting confidential information.

2. Sign up for SMS alerts

Most banks now offer text message alerts via SMS to alert of a low balance or a paid bill. Larger banks like Bank of America use SMS texts to aid in fraud prevention. Nine times out of ten, consumers can easily sign up for these phone alerts with online banking. Receiving alerts on your phone is a great way to stay on top of your account activity around the clock. It's also an added convenience for times when a computer isn't close at hand.

3. Before downloading an app, check its authenticity

Most banks offer tailored mobile banking applications to their customers which can be downloaded to a Smartphone and used to manage bank accounts. Unfortunately, this has also invited potential fraud in the form of carefully duplicated applications created by scam artists. Before downloading any app to your phone, make sure that it's an authentic application released by your bank. Avoid third party software that asks for any personal information if you can't verify the source. While most apps are legit, it never hurts to be too careful.

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AUTHORS

First Author – Renju Chandran M.com, Research scholar, Department of commerce & research centre, St. Albert's college, Ernakulam, Kerala, renju.chand@gmail.com

A case report of Ranula treated with marsupialization and low level laser therapy

Dr. M.V.S.R.Vineet Kumar, Dr. Deepthi Gulivindala

The Dental Clinic, Hyderabad, India

Abstract- Oral ranula is a retention cyst arising from the sublingual gland on the floor of the mouth as a result of ductal obstruction and fluid retention. There are various techniques to manage ranula in the literature. There is no doubt that excision of the offending sublingual gland will cure all ranulas. Still, some surgeons prefer to initially treat ranulas by marsupialization, perhaps because of the potential surgical complications when removing the sublingual gland, most notably injury to the lingual nerve, injury to Wharton's duct with the possibility of stenosis leading to obstructive sialadenitis, and ductal laceration causing salivary leakage. This paper highlights a case report of ranula in the floor of the mouth which was about 2cm and has been successfully treated by marsupialization and low level laser therapy. (LLLT)

Index Terms- Oral ranula, marsupialization, low level laser therapy, floor of mouth.

I. INTRODUCTION

Oral ranulas are cystic lesions located on the floor of the mouth that arise from obstruction of the excretory duct of the sublingual gland. It is formed by rupture of excretory duct followed by extravasations of the mucus and accumulation of saliva into the surrounding tissue which forms a pseudo cyst that lacks the epithelial lining. There are many methods in the literature for the treatment of ranulas including excision of the ranula only, excision of the ranula and the ipsilateral sublingual gland, marsupialisation and cryosurgery, but the two widely practiced techniques are marsupialisation i.e unroofing of cyst and sublingual gland excision. Recent studies have shown that surgical excision of the ranula along with the sublingual gland excision is a standard method of treatment. By doing these technique there is a risk of damaging the surrounding anatomical structures like lingual nerve and submandibular duct, which are close to the sublingual gland. Hence marsupialisation is still practiced to avoid injury to the surrounding anatomical structures, despite of reported recurrence rates of 61 to 89%. But the recent studies say that, even though there are chances of recurrence, marsupialization followed by low level laser therapy is showing less pain and better healing of tissue. Here with presenting a case report of oral ranula and its management in 22 year old male patient.

II. CASE REPORT

A 22-year-old male reported with a 1-month history of swelling in left submandibular region. The swelling was completely asymptomatic and there was a history of intermittent change in the size of swelling. The patient gave history of surgical intervention and drainage of fluid from the swelling nine months back at his native place, by his family physician. However, the swelling reappeared now after the procedure. The patient was in good health and had no history of any systemic disorder. Family history and personal history were not remarkable. On examination, general condition was good and vital signs were stable. After routine preoperative investigations, as the size of the cyst was small (< 2 cm) and it was superficial in nature, a conservative approach of marsupialization of ranula was planned. Local anesthesia was given. The marking of the cystic swelling of the ranula was done by tacking the edges of the cyst to adjacent surrounding mucosa with resorbable suture, followed by de-roofing of the cystic lesion. The cavity which resulted from marsupialization was packed with betadine gauze (10% povidone –iodine topical antiseptic solution) and the pack size was gradually cut short as per the obliteration of the defect. Low level laser therapy(LLLT) was given to prevent pain and for good post operative healing of the wound. The patient was given LLLT to the area for better healing and has fully recovered. A tissue was sent to histopathology for confirmation. HPE report confirmed the specimen to be ranula. The case was followed up for 6 months at bimonthly interval. There is no reoccurrence of the lesion . Patient is still under follow up.

III. REVIEW OF LITERATURE AND CASE DISCUSSION

Obstruction of excretory ducts or extravasations and subsequent accumulation of saliva from the sublingual gland in the tissue are responsible for the formation of ranulas . Ranula is formed from one of the two processes:

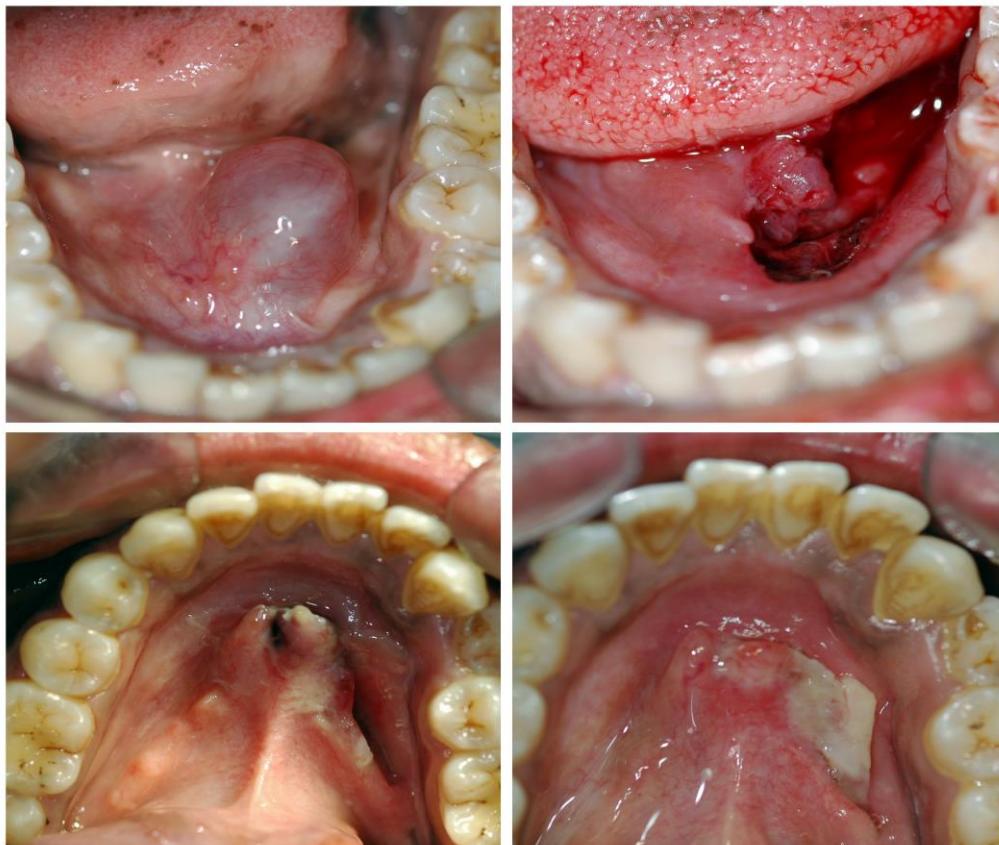
Partial obstruction of a sublingual duct can lead to formation of an epithelial-lined retention cyst which is unusual, occurring in less than 10% of all ranula.

Trauma can lead to formation of ranula. If a duct is obstructed, there is build up of secretory back-pressure leading to salivary duct rupture with mucus being forced into the surrounding tissues. Alternatively, trauma causes direct damage to the duct or acini, leading to mucus extravasation and forms a pseudocyst.

Based on the formation ranula can be classified into two groups, simple (intraoral) and the plunging (cervical) type. Simple ranulas are more common than plunging type. A simple ranula are formed by localized collection of mucus within the floor of the mouth and may arise from the submandibular duct or from the body of the sublingual gland . In plunging ranula, ranulas will attain sufficient fluid pressure as to herniate through the mylohyoid muscle and produce swelling within the neck.

Differential diagnosis of ranula should include dermoid cyst, teratid cyst, lymphangioma, mucocele of the minor salivary gland, lymphoma and HIV- related lymphadenopathy. CT and MRI imaging studies can be helpful in supporting a diagnosis of and in determining the origin of the lesion .

With this literature background marsupialization was opted as treatment choice in our case as this technique is simple, conservative and is not associated with damage to the important anatomic structures in this location . With the simple addition of packing the entire pseudocystic cavity with betadine soaked gauze after the deroofing of the cystic lesion, the rate of recurrence is minimized . The patients were irradiated with a 660-nm continuous wave from an indium-gallium-arsenide-phosphorous (InGaAsP) diode laser, at 100 mW, with a spot size on the tissue. Irradiation was carried out immediately following marsupialization treatment, as well as at 24, 48, and 72 hour post marsupialization and after a week. Also, there is enough documentation to support this technique as treatment of choice . There is a need to do marsupialization for several times to resolve a large ranula. If ranula in oral cavity does not resolve after marsupialization, then surgical removal of the sublingual gland and pseudo cyst is recommended.



IV. CONCLUSION

Though sublingual gland excision is considered as the most effective treatment for ranula, this procedure is very difficult as it involves an extremely fine mucosa that may rupture on excision also there is risk of injury to the lingual nerve and sublingual duct. Hence marsupialization is suitable and effective treatment for intraoral ranula. Low level laser therapy is the most effective treatment for a painless and better healed tissue.

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AUTHORS

Dr. M.V.S.R.Vineet Kumar, BDS, FAGE(manipal), vineet.mallavarapu@gmail.com, Ph no. +919550208080

Dr. Deepthi Gulivindala, BDS, deepz2311@gmail.com, Ph no. +91177677134

Zoom FFT Algorithm in Ultrasonic Blood Flow Analysis Using MATLAB

Shireen Romana ^{*}, Prof. Rajendra Chincholi ^{**}

^{*} Dept of BME&II, PDA College of Engineering, Gulbarga, India

^{**} Dept. of IT, PDA College of Engineering, Gulbarga, India

Abstract- An adequate blood supply is required for the normal functioning of all organs in the body. However this flow can be impeded due to several reasons, thrombus or clot being a major one. Detection of such clots is done with the help of an imaging technique called “DOPPLER ULTRASONOGRAPHY” by transmitting an ultrasound pulse and calculating the frequency of the received signal. If there is no clot the reception is always a homogenous signal, whereas if a certain part being sonographed has a clot the received signal shows a variance in frequency which depends upon the distance from the receiver. Hence blood clot detection in ultrasonography is based on obtaining the frequency variance and applying adaptive thresholding. In this work we propose a ZOOM FFT based technique followed by automated adaptive thresholding to detect the clot. Data files are synthesized by simulation in MATLAB. Also the entire system is developed in a Matlab environment for the system to be both simple and cost-effective.

Experimental results show that the accuracy of the system is very high even under noisy conditions.

Index Terms- Ultrasound, Thrombo-embolism, Doppler Effect, adaptive thresholding, Zoom FFT

I. INTRODUCTION

Blood circulation is essential for a healthy body. Every cell in the body needs to receive oxygen and nutrients. Blood rich in oxygen is sent to the body organs, tissues and cells to nourish them, and the waste products that result are disposed off through the same system. The circulatory system includes several common disorders among them is Embolism which is a blood clot that is able to travel. This is dangerous because it could travel to the brain, lungs or heart. In clinical practice such blood clots are detected using a technique called Doppler Ultrasound Imaging.

II. EXISTING SYSTEMS

Blood clotting is currently detected in time domain based on Doppler delay which is the resonating time of ultrasound pulse from transmitter to blood surface and back to receiver. However time domain based analysis suffers from ripple and salt and pepper noise which affects the accuracy of the system to a great deal. In order to overcome this drawback a frequency-domain analysis based on FFT is adopted. However FFT-based techniques cannot detect minute deviations in frequency which represents minute clots or those present in the deeper vessels.

Therefore we need methods to distinguish the peaks and existence of any secondary peak which is added by the presence of a clot. Hence ZOOM FFT technique is proposed.

III. PROPOSED METHOD

Considering the above mentioned requirements, in this work we propose a novel method called ZOOM FFT with Adaptive thresholding to automatically detect blood clotting from Doppler ultrasound signal. We first simulate the ultrasonic blood flow signal as triangular pulses with sinusoid component followed by inducing delay based clot signal. FFT of this signal is filtered using Hanning window and then performing slicing based main and secondary peak detection.

IV. SYSTEM DESIGN DESCRIPTION

Methodology

I) Basics

“SOUND IS A COMPRESSIONAL WAVE” and is different from Electromagnetic waves in that it requires a medium to travel. The frequency spectrum of sound is shown in figure 7. The audible range of sound lies between 20Hz to 20 KHz. This frequency range of sound is perceivable to humans. Below this range is called infrasonic and is audible to animals. Above audible range are Ultrasonic which propagates as a wave and can travel through different media. Because of this property ultrasound waves find potential applications in medical and industrial diagnostics.

II) Doppler effect phenomenon

Whenever an ultrasound wave propagates in a medium it undergoes various phenomena, the most important is the Doppler effect which is the basis of many diagnostic applications based on ultrasound.

The Doppler Effect is the change observed in the wavelength of sound (and other) waves due to relative motion between a wave source and a wave receiver. When a wave is reflected from a moving target, the frequency of the wave received differs from that which is transmitted. This difference in frequency is known as the Doppler shift. The amount of increase or decrease in the frequency depends upon (a) the speed of motion (b) the angle between the wave direction and the motion direction, and (c) the frequency of the wave emitted by the source. The Doppler Effect occurs for any kind of wave but is commonly experienced in life with sound. This is because speeds of motion experienced commonly can be a significant fraction of

the speed of sound. With light this is not true and only astronomical motions provide speeds great enough to produce a readily observable Doppler effect.

As the ultrasound wave propagates a shift in frequency (f) of the wave will be expected due to the source and observer's motion relative to each other if the distance between them is reduced or increased. That shift in frequency depends on the velocity of sound which also depends on density of the medium, in which it propagates. When a small object is situated in the path of the sound wave, the wave will be resisted (scattered). A direct measurement of this velocity will provide useful information about the dynamic property of the medium. The Perceived velocity is given by

$$V' = V - V_0 \quad \text{equation 1}$$

In terms of frequency (f), as a velocity dependent factor.

$$f_p = f_0 (V + V_0) / (V - V_s) \quad \text{equation 2}$$

for both objects moving towards each other.

$$f_p = f_0 (V - V_0) / (V + V_s) \quad \text{equation 3}$$

for both objects moving away from each other,

f_p : Perceived frequency.

v : velocity of wave.

v_s : source velocity.

v_0 : velocity of observer.

Thus we get the perceived frequency proportionately changed with respect to changes in measuring media. The Doppler Effect can also be explained with respect to pitch or wavelength, since all are dependent to each other.

The Doppler shift frequency is given by the equation-

$$f_D = (2 f_e v \cos \theta) / c \quad \text{equation (4)}$$

Where f_D =Doppler shift,

f_e = emitted frequency,

c =speed of sound in tissues,

v = blood flow velocity,

θ = cosine Doppler angle

It is the Doppler shift that Doppler instruments detect. However, it is the speed of motion or flow of blood in which we are normally interested. The Doppler equation can be rearranged in this sense, to place the speed of motion alone on the left side of the equation.

$$v = (77 f_D) / (f_e \cos \theta) \quad \text{equation 5}$$

The minimum detectable blood flow speed within Doppler ultrasound is few mm.s^{-1} . The maximum is determined by aliasing. The range of commonly detected normal flow speeds is 10 to 100 cm.s^{-1} .

V. WHY TO ZOOM?

Minute variations in blood flow can be seen eg. starting stage of blood clot.

In clinical practice, situations arise wherein the clot in a vessel may be so small or deeper inside that it induces negligible frequency shift which is usually not detected with conventional ultrasonography. However its presence starts to manifest itself through various symptoms. Under such situations it becomes important to be able to detect and locate the clot to avoid undesirable complications and cost of the treatment.

This minute variation in frequency can be seen using Zoom FFT algorithm.

Zoom fft

The Zoom-FFT is a DSP algorithm which is used to enlarge a portion of the signal. As the name implies Zoom FFT increases the frequency resolution of the desired portion of a signal thereby zooming it so that very fine details in the spectrum can be visualized. In this process an input signal is mixed down to a baseband frequency and then decimated, prior to passing it into a standard FFT. The advantage is for example that if you have a sample rate of 10 MHz and require at least 10Hz resolution over a small frequency band (say 1 KHz) then you do not need a 1 Mega point FFT, just decimate by a factor of 4096 and use a 256 point FFT which is obviously quicker.

Zoom-FFT uses digital down conversion techniques to localize the standard FFT to a narrow band of frequencies that are centered on a higher frequency. The zoom-FFT is used to reduce the sample rate required when analyzing narrowband signals eg. in HF communications.

VI. DESIGN APPROACH

Zoom FFT for blood clot detection is based on detecting the additional frequency component added by the clot which is identified as a second prominent peak in the input signal.

The Algorithm can be presented in following steps

- 1) Take FFT of the Signal
- 2) Perform Zooming by applying Hanning Window
- 3) Adjust window parameter to get primary and secondary peaks.
- 4) Locate the peak of highest magnitude. Find its width and location.
- 5) Find if any other peak exists with amplitude and width atleast 40% of that of the primary peak.
- 6) If so then it is recognized as a clot. Amplitude of the secondary peak gives clotting depth.
- 7) If no secondary peak is detected then there is no clotting.

The steps involved in the process are explained below:

Filter

The input signal is filtered using a low pass filter to prevent aliasing when the signal is subsequently sampled at a lower sampling rate.

Decimation

Resampling at discrete instances, the already sampled wave. Decimation is achieved by applying the equation given below

N-1

$$Y(m) = \sum_{k=0}^{N-1} X(k) e^{-j2\pi mk/N}$$
, M=decimation factor

Where Scale is the Zooming range and the value is between 0-1
 $N = \text{number of samples}$

FFT

The Fast Fourier Transform (FFT) is an algorithm that efficiently contains the frequency domain conversion. FFT of a signal is computed using the formula given below

$$X(k) = \sum_{n=0}^{N-1} x(n) e^{-j2\pi nk/N} \quad 0 < k \leq N-1$$

Where $X(K)$ = FFT of input $x(n)$
 $N=\text{number of samples}$
 $k = \text{index}$

Window

After computing FFT of the signal it is windowed. This is the core part of the Zoom process where zooming is actually achieved. The window function is used to select a particular portion of the spectrum. For this work we are using Hanning window which is a fixed type window defined by the formula

$$W_{HN}(n) = \begin{cases} 0.5[1 - \cos(2\pi n/M-1)] & \text{for } n=0 \text{ to } M-1 \\ 0 & \text{otherwise} \end{cases}$$

Where $M=\text{number of samples}$

All the above steps are carried out in a single MatLab program which offers built-in functions for all the steps.

VII. MATLAB®

MATLAB® is a high-level language and interactive environment for numerical computation, visualization, and programming. Using MATLAB, user can analyze data, develop algorithms, and create models and applications. The language, tools, and built-in [math](#) functions enable the user to explore multiple approaches and reach a solution faster than with spreadsheets or traditional programming languages, such as C/C++ or Java™.

MATLAB can be used for a range of applications, including signal processing and communications, image and video processing, control systems, test and measurement, computational finance, and computational biology. A very distinct feature of Matlab is the GUI. A graphical user interface (GUI) is a graphical display in one or more windows containing controls, called *components*, that enable a user to perform interactive tasks. Unlike coding programs to accomplish tasks, the user of a GUI need not understand the details of how the tasks are performed.

VIII. RESULT

Our system has been tested with normal and abnormal ultrasound signals under varying noise conditions. A snapshot of the result is shown in figure1. It is apparent from the results that our system is capable of detecting clots with negligibly small magnitudes. It is also observed that the system is least affected by the presence and amount of noise in the signal.

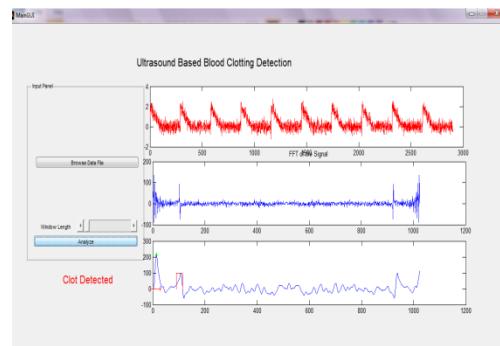


Figure 8: snapshot of the result with an ultrasound signal containing a minute clot along with heavy noise.

IX. ADVANTAGES

1. Increased frequency domain resolution
2. detects the presence of clot at the initial stage itself
3. Reduced hardware cost and complexity
4. Wider spectral range
5. Can be used conveniently by both medical and paramedical staff
6. Accurate and reliable

X. CONCLUSION

Currently the project has been tested on the simulation basis, the output of the simulations are satisfactory.

In the simulation we generated the ultrasound signal with noise and without noise. Noise is added using AWGN. We take several signals which includes both normal as well as abnormal signal. Abnormal signal is generated by adding a delayed signal with the main signal. We then use Zoom FFT technique to detect the abnormality. It is shown that we can detect the clotting with an accuracy of over 90%. The system also gives satisfactory result under heavy noise.

ACKNOWLEDGMENT

I, Shireen Romana, express my gratitude towards prof. Rajendra Chincholi and Rupam Das, my co-authors, for their constant support and dedicated help in completion of this work.

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AUTHORS

- First author-** Shireen Romana , M.Tech IVsem, Dept. Of BME&II, PDA College of Engineering, Gulbarga, India
e-mail: shireen0290@gmail.com
- Second author-** Rajendra Chincholi, Professor, Dept. of IT, PDA College of Engineering, Gulbarga, India
- Third author-** Rupam Das, Integrated Solutions, Gulbarga, India.

Performance Evaluation on EZW & SPIH Image Compression Techniques

Shilpa Jaiswal ^{*}, R.R Sedamkar ^{**}

^{*} Electronics and Telecommunication, Thakur College Of Engineering and Technology Kandivali, Mumbai
^{**} Computer Engineering, Thakur College Of Engineering and Technology Kandivali, Mumbai

Abstract- The wavelet transform is widely used in image processing algorithms. In this paper two different wavelet compression techniques are applied on the image. The compression is performed using EZW and SPIHT wavelet based compression techniques. In compression, wavelets have presented a good flexibility to a wide range of data, while being of reasonable complexity. These techniques are more efficient and provide a better quality in the image. The techniques are compared by using the performance parameters Peak Signal to Noise Ratio (PSNR), Mean Square Error (MSE), Compression Ratio (CR) and Bit rate (BR) at different threshold. In the end the conclusion is observed to know which technique is better for image compression. It is observed that compression ratio for SPIHT is better as compared to compression ratio of EZW.

Index Terms- EZW, MSE, PSNR,SPIHT.

I. INTRODUCTION

Images contain large amount of trivial information and require large storage to store them in their raw form. The main objective of Image compression is to reduce this trivial data and store the image in a more efficient manner. Images can be thought of large array of pixel value, each pixel giving intensity values at that particular point. Therefore images having large and redundancies, and conversely images that have frequent and large changes in color will be less redundant and harder to compress.

Compression is an asset in communication as it reduces the amount of data that is required to be sent. Since the revolution of media mobile phones sending data to different networks on limited bandwidth has been a concern. Tremendous improvements in VLSI over the decade have bought smaller Charge Coupled Device (CCD) and hence higher resolution images. This has led the industry to find compression schemes to compress these images and hence we have higher resolution image which does not take much storage space. To achieve good compression ratio the image needs to be first transformed. This transformed image is stored and when we need to recover the image an inverse transform is applied and we can get the original image back. The types of transform are namely Fourier Transform, Discrete Cosine Transform, Hadamard Transform, Wavelet Transform and many more. All these transform have advantages and disadvantages. Out of this Transform wavelet Transform is used in achieving higher compression ratio while maintaining the image quality and mean square error.

II. IDENTIFY, RESEARCH AND COLLECT IDEA WAVELET AND IMAGE COMPRESSION

Image compression takes advantage of redundancies and reduces the overall size of the image so that it can be stored and transmitted efficiently. Image Compression techniques can be divided into two techniques namely lossless image Compression and Lossy Image Compression. The amount of information retained by an image after compression and decompression is known as the “energy retained”. If the energy retained is 100% then the compression is known as “lossless”, as the image can be reconstructed exactly. If any values are changed then energy will be lost and known as “lossy” compression. Lossless Compression is used in Medical and Technical images and also for archival data. Whereas, Lossy Compression is used in natural images, images that needs to be sent on a communication network.

Wavelet means “Small Wave” [1]. Wavelet Transform like Fourier Transform converts the time signal to a frequency signal using a set of basic functions. Wavelet unlike Fourier transform which uses trigonometric polynomials uses wavelets which are formed from expansions and dilations of the Mother Wavelet. These wavelets have an added advantage in scalability property both in frequency and time domain. This permits a closer connection between the coefficients generated and the functions. Numerical stability and better manipulation is ensured. It can be shown that every Fast Fourier Transform (FFT) coefficients can be formulated using wavelet analysis providing better spatial and frequency information. Wavelet analysis has overcome lot of difficulties which were faced while using Fourier analysis such as how to relate the Fourier coefficients to a local scale. Wavelet is having an average value of zero and it can be defined over a finite interval. The process behind the wavelet transform is any arbitrary function (t) can be defined in the form of a superposition of a set of such wavelets or basis functions. These basis functions are simply called as the baby wavelets. These baby wavelets are obtained from the mother wavelets by scaling (contractions) and shifts (translations). The practical implementation of wavelet schemes Very similar to that of sub band coding schemes [1] [2] [3].

The typical Wavelet Compression and Decompression system as shown in figure 1 and figure 2.

Wavelet analysis can be used to divide the information of an image into approximation and detail sub-signals. The approximation sub-signal shows the vertical, horizontal and details or changes in the image. If these details are very small then they can be set to zero without significantly changing the image.

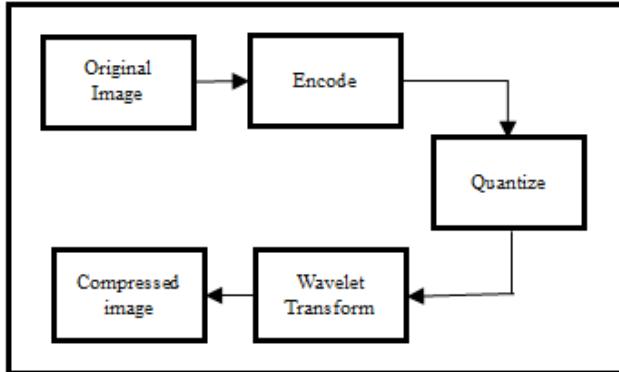


Figure 1: Image compression model using wavelets [4]

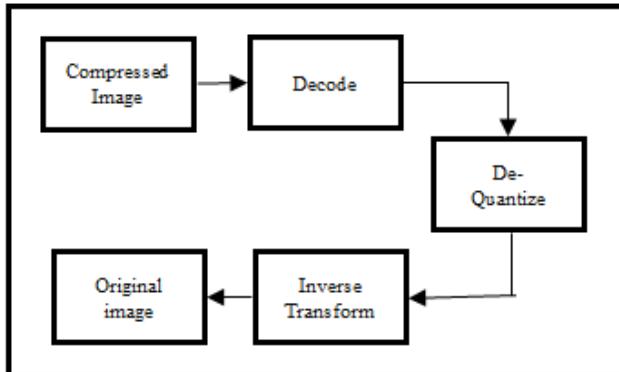


Figure 2: Image decompression model using wavelets [4]

Wavelet Compression techniques takes advantage of this zeros as they can be eliminated without much loss to the quality of the image

2.1 EZW (Embedded Zero-trees of Wavelet Transform)

EZW proposed by J.M. Shapiro is a first lossy image compression algorithm which shows full power of wavelet based compression. It is simple, effective algorithm, having the property that the bits in the bit stream are generated in order of importance, yielding a fully embedded code [2]. The EZW algorithm is based on four principal concepts that is discrete wavelet transform or hierarchical sub-band de-composition, prediction of the absence of significant information across scales, entropy coded successive-approximation quantization, data compression using Arithmetic or Huffman coding.

2.1.1 Terms in EZW:

Embedded -An embedded coding is a process of encoding the transform magnitudes that allows for progressive transmission of the compressed image.

Zero-tree -Zero tree are a concept through which compression is achieved by allowing for a concise encoding of

the positions of significant values that result during the embedded coding process.

A wavelet transform transforms a signal from the time domain to the joint time-scale domain. This means that the wavelet coefficients are two-dimensional. If we want to compress the transformed signal we have to code not only the coefficient values, but also their position in time. When the signal is an image then the position in time is better expressed as the position in space. After wavelet transforming an image we can represent it using trees because of the subsampling that is performed in the transform. A coefficient in a low sub band can be thought of as having four descendants in the next higher sub-band (see figure 1). The four descendants each also have four descendants in the next higher sub-band and we see a quad-tree emerge: every root has four leafs. The EZW encoder is based on two important observations [5]: 1. Progressive encoding is used for compressive wavelet transformed images, since the higher sub-band only add detail. 2. Large wavelet coefficients are more important than small wavelet coefficients.

2.1.2. EZW ALGORITHM

The EZW Algorithm have the following steps.

Step 1 (Initialization)

$$T_0 = 2^{\lfloor \log_2 C_{\max} \rfloor}$$

Threshold is initialized by where C_{\max} is the maximum of the absolute value of the DWT coefficients. In EZW algorithm entire wavelet coefficient matrix is scanned in order to find out the maximum value of the coefficient [6]. We can infer from the computed coefficients for any image that maximum value of coefficient occurs at the lowest frequency sub band (LL band). We see that two passes are used to code the image. In the first pass, the *dominant pass*, the image is scanned and a symbol is outputted for every coefficient [7].

Step 2 (Dominant pass)

Coefficients on Dominant List are compared to T_0 and their significance map is made.

The significance map can be efficiently represented as a string of symbols from a 4 symbols are used:

1. Zerotree root (**t**): If its absolute value is lower than threshold but one of its children has an absolute value higher than the threshold.
 $\text{if } (|x_{WT}| < T_i) \&\& (\text{all descendants of } x_{WT} > T_i)$
2. Isolated zero (**z**): if its absolute value is lower than the threshold and all of its children have absolute values lower than the threshold.
 $\text{if } (|x_{WT}| < T_i) \& ((\text{some descendants of } x_{WT} > T_i) \parallel (x_{WT} \text{ is the last item}))$
3. Significant positive (**p**): if it is positive and has an absolute value higher than the threshold.
 $\text{if } (|x_{WT}| \geq T_i) \&\& (x_{WT} > 0)$
4. Significant negative (**n**): if it is negative and has an absolute value lower than the threshold.
 $\text{if } (|x_{WT}| \geq T_i) \&\& (x_{WT} < 0)$

Step 3 (Subordinate pass)

All the values in the subordinate list are refined. This gives rise to some juggling with uncertainty intervals and it outputs next most significant bit of all the coefficients in the subordinate list. If the value is greater than the current threshold then a 1 is sent, if less than the threshold a zero is sent. The current threshold is then divided by two and the process is repeated till the threshold doesn't reach the minimum bit value or zero. The decoding used is Huffman decoding scheme. The code also involves the decoding of the coded EZW image to prove the validity of the encoding.

Step 4 (New threshold)

We calculate the new threshold .if the minimum threshold or the desired compression ratio is attained, we stop; if not we repeat stages 2, 3 and 4.

III. WRITE DOWN YOUR STUDIES AND FINDINGS

2.1.3 IMPLEMENTATION

The EZW Algorithm was implemented using MATLAB.

2.1.3.1 Initialization

The image is first read in MATLAB and its pixel values are stored. Than a Discrete Wavelet Transform is done on the image of level 4. The following diagram gives an example. Now we have $C_{max}=1255$.

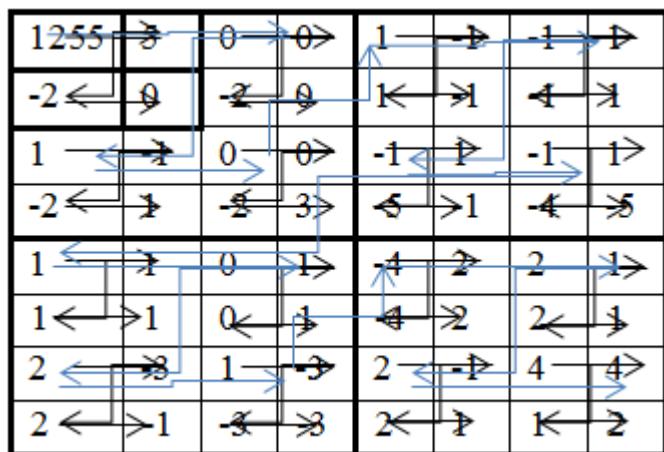


Fig2.1 Morton Scanning.

2.1.3.2 Dominant Pass:

The image is then compared with the threshold. The coefficients are obtained using Morton scanning. The encoded data of the image is shown below.

ppppptppppztzttzzttztztptpt.....

2.1.3.3 Masking.

For obtaining Zero tree coefficients we have used an algorithm for masking the coefficients to check whether it is a zero tree or an isolatedzero. If during the Morton scan if a value less than threshold is encountered then we place a mask on the daughter trees. The values of the mask are compared with the threshold and if they're less than the threshold then the pass is a zero tree pass if not then it is an isolated zero.

1255	5	0	0	1	-1	-1	1
-2	0	-2	0	1	-1	-1	1
1	-1	0	0	-1	1	-1	1
-2	1	-2	3	-5	-1	-4	-5
1	1	0	1	-4	2	2	1
1	1	0	1	-4	2	2	1
2	-3	1	-3	2	-1	4	4
2	-1	-3	-3	2	1	1	2

Fig 2.3

2.1.3.4 Subordinate pass:

The Dominant pass is passed through a refinement pass. This converts the dominant pass values into bit format. The previous values have to be stored to be read again and added to the new values. An example is shown below.

11100011100101011.....

2.2 SPIHT (Set partitioning in Hierarchical tress)

SPIHT algorithm is refined version of EZW algorithm proposed by A. Said, Pearlman [8]. SPIHT stands for set partitioning in Hierarchical tress. Hierarchical tress refer to the quad-tress as defined in in EZW. The SPIHT coding is an improved version of the EZW algorithm that achieves higher Compression and better performance than EZW [9]. Initially we apply wavelet transform on the image and obtain the wavelet coefficient .Then coding is applied on the obtained coefficient. Set partitioning refer to the way these quad-trees divide up, partition and these coefficient at a given threshold. Thus SPIHT provides the best results of PSNR at higher ratios than EZW due to its partitioning property which increases its compressive power. Here the coding algorithm uses three lists called List of Significant Pixels (LSP), List of Insignificant Pixels (LIP) and List of Insignificant Sets (LIS).

- LIS (list of insignificant sets): LIS contains set of wavelet coefficient which are defined by tree structures, and which had been found to have magnitude smaller than a threshold (are insignificant). The sets exclude the coefficient to the tree or all sub-tree roots and have at least four elements.
- LIP (list of insignificant pixel): LIP contains individual coefficient and have magnitude smaller than the threshold.
- LSP (list of significance pixel): pixel found to have magnitude larger than the threshold.

As an initialization step, the number (n) of magnitude refinement passes that will be necessary is determined from the maximum magnitude of the coefficient. Initially all pixels are treated as insignificant. The initialization is followed by three major passes-the sorting pass, the magnitude refinement pass and the quantization step update pass which are iteratively bits are transmitted.

During the sorting pass, the pixels in the LIP, which are insignificant till the previous pass, are tested, and those that become significant are moved to the LSP. Similarly the sets in LIS are examined in order for significance and those which are found to be significant are moved from the list and partitioned. The new subsets with more than one element are added to the LIS and the single pixels are added to LIP or the LSP, depending upon their significance. During the magnitude refinement pass, the pixels in the LSP are encoded for nth MSB.

2.2.1 SPIHT ALGORITHM

Notation used in the algorithm are defined as follows:

$O(i,j)$: set of coordinates of all offspring of node (i,j) ; *children only*

$D(i,j)$: set of coordinates of all descendants of node (i,j) ; *children, grandchildren, great-grand, etc.*

$H(i,j)$: set of all tree roots (nodes in the highest pyramid level); *parents*

$L(i,j) = D(i,j) - O(i,j)$ (all descendants except the offspring); *grandchildren, great-grand, etc.*

Step 1 (Initialization)

$$n = \log_2 (\max |\text{coeff}|)$$

LIP = All elements in H

LSP = Empty

LIS = D's of Roots

Step 2 (Sorting Pass)

Step-2.1: For each entry in LIP, output the significance ("1" if significant "0" if not significant). If found significant remove it from the LIP and add to the LSP.

Step-2.2: For each entry in LIS, output the significance. If found significant output its sign.

Depending upon whether it is the $D(n1, n2)$ set or the $L(n1, n2)$ set perform the partitioning as:

If $D(i, j)$ is found significant, partition it into

$L(i, j)$ plus four single element sets with

$$(i, j) \in O(i, j).$$

If $L(i, j)$ is found significant, partition it into four set of $D(i, j) \in O(i, j)$.

According to the significance, update the LIS, LIP and LSP.

Step 3 (Refinement pass)

For each element in LSP-except those just added above output the nth most significant bit of coefficient.

End loop over LSP

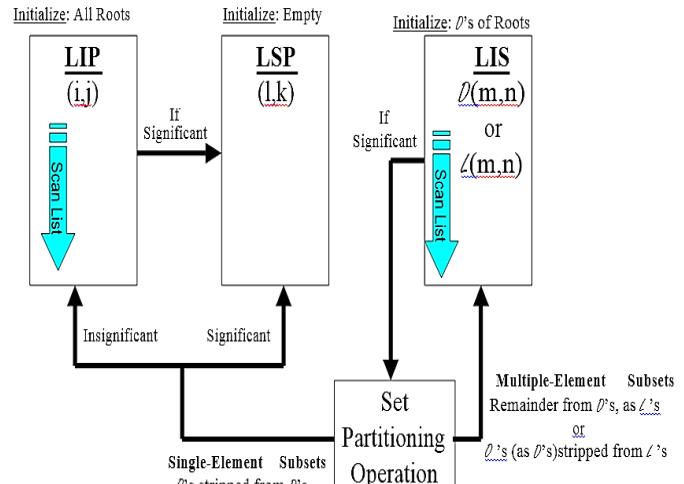


Fig SPIHT Sorting Pass

Step 4 (Quantization state update)

Decrement by 1

Steps 2, 3 and 4 are repeated until $n=0$

It is the characteristic of SPIHT algorithm that it generally operates on an entire image at once.

Due to this the size of the three lists is often quite big and takes a lot of memory. The whole image is loaded and transformed, and then the algorithm requires repeated access to all lists [10].

2.2.2 Implementation (SPIHT)

Step 1 (Initialization)

The SPIHT parameters are initialized.

$$\text{LIP} = [(2, 3) (4, 1) (2, 3) \dots]$$

$$\text{LIS} = [(0, 0) (0, 0) (0, 0) \dots]$$

$$\text{LSP} = []$$

Step 2 (Sorting Pass)

In the sorting pass each bit is compared with the threshold and stored in the respective list. A bit counter is assigned to stop the process once the limit has reached. The specific bit is removed from LIP and added to LSP.

$$\text{LIP} = [(2, 4) (3, 2) (4, 2) (5, 1) (5, 3) (5, 4) \dots]$$

$$\text{LIS} = [(8, 1) (1, 5) (1, 11) (1, 12) (2, 11) (2, 12) \dots]$$

$$\text{LSP} = [(1, 2) (1, 1) (2, 1) (2, 2) (1, 3) (3, 1) \dots]$$

Step 3 (Refinement Pass)

The LSP list is used and for each value is refined. The value of 256, 14, and 7 are headers for the bit stream.

$$\text{Out} = [256 14 7 0 1 0 1 0 1 0 1 1 0 0]$$

Step 4: (Update)

Updating the threshold value

B. Results

The results are found out by performing the compression and decompression on the image using MATLAB.

4.1 EZW

The original Image and its wavelet transform along with the compressed image at different threshold are given below. As the results shows, the PSNR increase as the threshold keeps

decreasing and the MSE keeps reducing as the threshold values is reduced.



Original Image



Wavelet Transform



Threshold: 512
PSNR: 18.803
MSE: 961.0625



Threshold: 128
PSNR: 23.1695
MSE: 313.4029



Threshold: 64
PSNR: 26.7446
MSE: 137.6015



Threshold: 32
PSNR: 30.7411
MSE: 54.8235



Threshold: 16

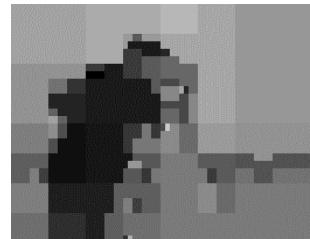


Threshold: 8

PSNR: 35.5198
MSE: 18.2433

PSNR: 40.5582
MSE: 5.7183

4.2 SPIHT:



Threshold: 512
PSNR: 17.9613
MSE : 1039.8



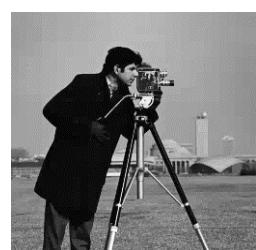
Threshold: 128
PSNR : 22.5741
MSE : 359.47



Threshold : 64
PSNR : 25.849
MSE: 169.10



Threshold : 32
PSNR : 29.95
MSE: 65.75



Threshold: 16
PSNR : 34.977
MSE: 20.67



Threshold : 8
PSNR : 39.88
MSE: 6.68

Table no. 1: Comparison of various values for EZW and SPIHT

Threshold	EZW				SPIHT			
	PSNR	MSE	BR	CR	PSNR	MSE	BR	CR
8	40.56	5.718	0.026	3.46	39.9	6.68	0.089	5.16
16	35.52	18.24	0.016	5.61	35	20.67	0.048	8.089
32	30.74	54.82	0.009	10.5	30	65.75	0.023	14.85

64	26.74	137.6	0.004	22	25.8	169.1	0.009	31.87
128	23.17	313.4	0.002	52.6	22.6	359.5	0.003	78.1
512	18.8	961.1	0.0002	435	18	1040	0.001	675.6

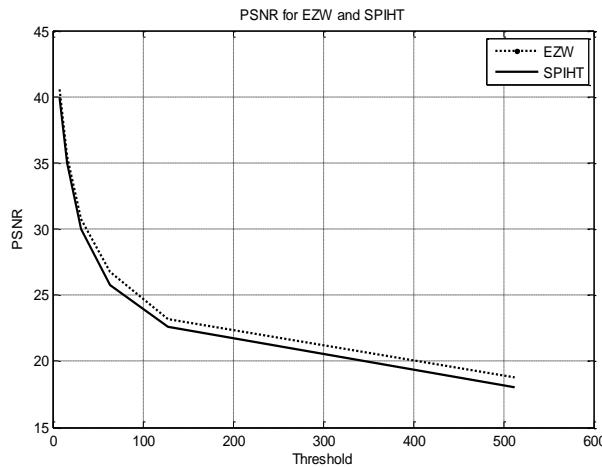


Fig 5.1 PSNR for EZW and SPIHT

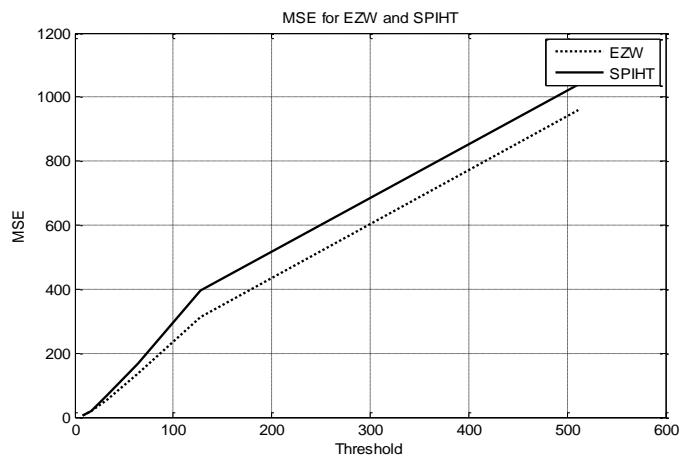


Fig 5.2 MSE for EZW and SPIHT

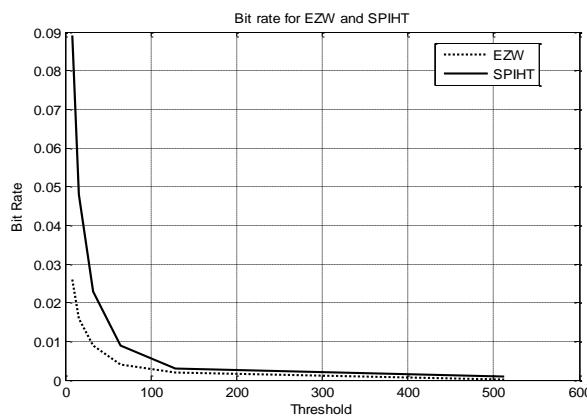


Fig 5.3 Bit rate for EZW and SPIHT

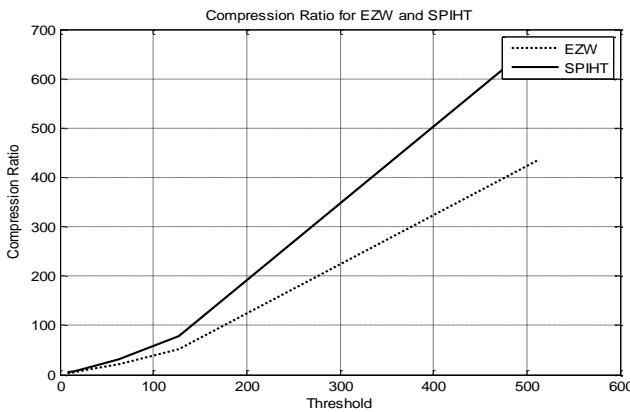


Fig 5.4 Compression ratio for EZW and SPIHT

IV. CONCLUSION

In this paper we have implemented two efficient algorithms EZW and SPIHT which have some common strength such as, depending on the requirement of the application, the encoding and decoding can be stopped and the desired output quality of image can be retrieved. Also each algorithm gives a significant data compression.

After implementing EZW & SPIHT algorithms we found following results:

5.1 EZW:

For threshold 8, 16, 32, 64, 128, 512 the respective bit rates are 0.0257, 0.0160, 0.0086, 0.0041, 0.0017, 0.0028 and the PSNR are 40.5582, 35.5198, 30.7411, 26.74, 23.16 and 18.80. We can see as the threshold increases the bit-rate goes on decreasing and the decreases in bit-rate is very significant at the same time the PSNR values also decreases and with Compression Ratio (CR). From the graph plotted in figure no. it can be seen that if the compression ratio increases then PSNR increases and MSE decreases.

5.2 SPIHT:

For threshold 8, 16, 32, 64, 128, 512 the respective bit rates are 0.0887, 0.0483, 0.0225, 0.0092, 0.0031, 0.0010 and the PSNR are 39.88, 34.97, 29.95, 25.84, 22.57 and 17.96. At lower threshold the change in PSNR and bit-rate is not much distinguishable as threshold changes from 8 to 16 PSNR changes 0.00887 to 0.0483. But at higher threshold bit- rates decreases to greater extent and the subjective quality of the image is also degraded.

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AUTHORS

- First Author** – Shilpa Jaiswal, M.E(EXTC-pursuing)
 ,B.E(EXTC), Thakur College Of Engineering And Technology Kandivali, Mumbai and e-mail-Jaiswalshilpa45@yahoo.com
Second Author – Dr R.R. Sedamkar ,Ph.D, M.E, B.E Thakur College Of Engineering And Technology Kandivali, Mumbai

Design Intervention & Craft Revival

Harita Kapur *, Suruchi Mittar **

* National Institute of Fashion Technology, Hauz Khas , New Delhi, India-110016

** Associate Professor, National Institute of Fashion Technology, Hauz Khas , New Delhi, India-110016

***"To write about Indian handicrafts is almost like writing about the country itself.
So vast, complex and colourful, and yet with a simplicity and charm, difficult to attain under
comparable conditions"***

- Upadhyay, M.N.: *Handicrafts of India.*

Abstract- The purpose of this paper is to measure if Design intervention helps in the revival of dying crafts and illustrate how interesting ideas and new intervention models can be developed for several purposes, whether for revitalizing a languishing craft or for developing new products to create livelihoods

Design/methodology/approach – This paper is based on a review of the literature and takes a case study approach. The paper aims to suggest that Collaborative innovation between designer and craftspeople is a means of expanding the craft vocabulary and reviving dying craft traditions and tapping contemporary markets.

Originality/value – The research will cover 30 Designers / Ngo's and Craftspeople for Design intervention in the form of questionnaire in certain regions of Kutch to ascertain that a link between the apparently conflicting tenets of sustainability can be achieved through responsible and strategic design intervention which integrates the social, economic, ecological and cultural aspects and thus help in the revival of dying craft traditions.

Index Terms- Design Intervention, Craft Revival, Craft traditions

Paper type- This paper is an exploratory & conclusive study

I. INTRODUCTION

I. Background:

Indian Handicrafts have been a traditional craft and the skill of making handicraft has been passed in families from generation to generation. Millions of Indians still depend on indigenous modes of production, traditional skills and techniques to make a living based on handmade products.

They are unique expressions of a particular culture or community through local craftsmanship and materials. With increased globalization, however, products are becoming more and more commoditized and artisans find their products competing with goods from all over the world.

This demand for a product and change in its style, design, and colour, offer a great threat to craftsmen producers and push

these deep-rooted traditional handmade products out, replacing them with mass,factory-made, machine crafts.

Also one of the biggest issues in India is that our markets do not recognize the true value of craft. When this value is recognized, and if people are willing to pay a higher price for craft based products, this should translate into higher wages for weavers and craftspeople and act as a boost to millions of rural-based livelihood opportunities associated with this sector.

Propelled by loss of markets, declining skills and difficulty catering to new markets, a large number of artisans have moved to urban centres in search of low, unskilled employment in industry.

"Handicraft is the second largest source of employment in the country, after agriculture. Yet India's hand industries are in a crisis of misunderstanding."

Crafts council of India-2011

"According to the United Nations, over the past 30 years, the number of Indian artisans has decreased by 30%, indicating the need to re-invest in artisans to safeguard history, culture and an important source of livelihood."

William Bissel, MD, Fabindia

The starting point of this research is inspired by the fact that if we accept that crafting objects by hand is one of the defining traits of being human, then our present state of culture in which craft has disappeared in the "overdeveloped" world and is rapidly disappearing in the developing world should cause us to pause and think about what it is that has been lost or is about to disappear.

Craft today is defined by preciousness, and an extraordinary value is attributed to the handmade as an exotic species. In our developing world, it is either considered to be lowly hand-work, or a resurrected practice for the poor to gain access to valuable foreign exchange.

Caught between a rock and a hard place, people in the West fetishize the object, while in our world we romanticize the humble craftsman and his poor condition.

But neither of these approaches really looks past the artefact (as either fetish or commodity) to the role of craft as a catalyst for spurring thought and innovation in society.

We may lament the loss of the beautiful objects we now view in museums, but what if the ultimate value of craft lies not in the artefact but rather in the process by which it comes to be? (Ken Botnick, Ira Raja, 2011)

And it is this process which seems to be getting lost as the artisans are trained in the art forms by their ancestors over generations and craft was not about making a simple product. Rather, it was about a historic legacy of generations and centuries, a tedious brutal labour and a proud skill, a battle between tradition and industrial modernity, an expression of unique style and a vision of revival, all connected to the heart and spirit of each individual artisan. (Alexandra Soteriou,1998)

Has Indian design, in fifty years of the country's independence, empowered the crafts community to become "freshly involved and "seek solutions themselves" on how to resolve this problem of designing for new markets? Have designers asked the right questions of the crafts community to lead to such empowerment?

Perhaps it is now time to do so. "With adequate social opportunities, individuals can effectively shape their own destiny and help each other. They need not be seen primarily as passive recipients of the benefits of development programs."(Poonam Bir Kasturi,2005)

While design intervention in crafts is welcomed by some as a necessity and an opportunity for exploring new prospects and help in craft revival, it is often considered by others as a threat.

It is however argued that a link between the apparently conflicting tenets of sustainability can be achieved through responsible and strategic design innovation which integrates the social, economic, ecological and cultural aspects.

In short, collaborative innovation between designer and craftsperson is a good means of expanding the Craft vocabulary and tapping contemporary markets.

II. DEFINING CRAFT

"Crafts can be defined as "those activities that deal with the conversion of specific materials into products, using primarily hand skills with simple tools and employing the local traditional wisdom of craft processes.

Such activities usually form the core economic activity of a community of people called 'craftsmen'." (Professor M.P. Ranjan)

One definition states that crafts developed out of necessity to fulfil everyday needs of people. The products and objects made were for personal use and were instrumental in expressing their individuality and their way of life. The very act of creation gave a new meaning to their life, to their self expression and to the rituals, and also helped to develop an aesthetic sensibility. In the Indian context crafts have been both for personal use and an expressional fulfilment and economic activity. It evolved out of being a product of use, then was ornamented and given an aesthetic appeal to it.
(Dhamija, 1979).

A craftsperson is one who is skilled in a craft technique and though he may produce a number of similar objects, each one however expresses the maker's creativity.
(Jasleen Dhamija-2003)

It can also be defined as a personal journey of the craftsperson where the main objective is self expression. The personalization, imperfections imparted because of hand work and use of indigenous tools and skills are the factors that differentiate "craft" from a commodity. (Design Intervention and its execution in Crafts of India-Amita Panda)

III. CURRENT STATE OF THE CRAFT INDUSTRY

Today, an argument, an attitude faces crafts and artisans in India. This is the argument of economics, of sustainability, of marketability, which is the argument of financial survival (Crafts Council of India- April 2011)

One question is still unsolved is and unanswered. What is the state of Craft & craftsmen in India? This question carries a huge and thick question mark at its end.

India, no doubt is a very big country. It is big also because of its diversity and racial character. More than 3000 castes, 432 tribal communities, believers of Hinduism, Islam, Christianity, Sikh, Jain, Buddhism and Zoroastrian have been living together since centuries. Over 1650 dialects are spoken by the people of India. The harmony among the people of India is worth mentioning.

The planners and policy makers of India have been addressing many problems and concerns of this country. They are also addressing the need of the craftsmen and their craftsmanship but probably the issue is so vast and complicated that the issue has not been touched in complete form.(Gandhi National Centre for the Arts- Under UNESCO's Programme on Cultural Industries and Copyright Policies and Partnerships)

"An estimated 71% of artisans work as family units and 76% attribute their profession to the fact that they have learnt family skills."Fab India

While crafts received royal and aristocratic patronage during pre-Independence days and played a central role in Gandhi's independence struggle, they have slowly lost relevance with the advent of industrialization.

Currently, the sector carries the stigma of inferiority and backwardness, and is viewed as decorative, peripheral and elitist. This is compounded by the Government's treatment of crafts as a sunset industry, which has resulted in a lack of well-developed policies and programs to protect and strengthen the ecosystem for artisans.

Traditional crafts have largely been marginalized by mass produced consumer goods, which tend to be cheaper due to the economies of scale associated with mechanization.

The nature of the crafts sector and challenges faced by artisans reduces their ability to compete with machine-made products .Catering to the mainstream market often necessitates a

decline in quality and /or workmanship, leading to the eventual loss of skills over a few generations.

IV. FACTORS AFFECTING THE DYING OF CERTAIN CRAFT TRADITIONS

Artisans were traditionally an essential part of the village economy, producing everyday utilitarian objects catered towards local markets, using designs and motifs that were of significance to their communities.

However, with the advent of industrialization and increasing urbanization of markets for crafts, the historical artisan-consumer relationship has broken down, and largely been replaced by traders. This has rendered artisans' knowledge and skill, acquired over generations, virtually useless and made crafts an unsustainable source of livelihood. (Crafting a Livelihood-Building sustainability for Indian Artisans-William Bissel, Managing Director, Fabindia)

Also the marketplace isn't what it used to be. In the recent past, globalization has brought great changes across the world. The key characteristic of today's global market is the speed with which the demand for a product and change in its style, design, and colour, offer greater opportunities as well as threats to producers.

The precarious nature of handmade craft markets invites strategic approaches to reach global consumers. But, delayed response can push these deep-rooted traditional handmade products out, replacing them with mass, factory-made, machine crafts. (Vanaja Menon Vadakepat, Faisal Al Khateeb- 2012)

V. ROOTS OF INDIAN DESIGN

India's oral culture and its intense religious mysticism might give one the idea that there is an absence of rational thinking and scientific systems, but this is far from the truth.

Historically, it is evident from the Mohenjo-Daro-Harappa excavations that, as early as 2500 BC, there was highly developed architecture, town planning, and technology in many places. India's traditional knowledge was highly organized and meticulously articulated. Even in the arts, there were extremely detailed canons and highly sophisticated structured treatises.

Arts and crafts have always been an integral part of India's rich tradition and heritage. They are in fact the cultural symbols of the nation. These art forms are unique and demand a high adroitness. The artisans are trained in the art forms by their ancestors over generations.

Indian art forms are well popular all over the globe since the wake of ancient civilization. The artisans have transformed all the art forms from mere passion to a real economic activity over the past few decades unconsciously by acquiring basic business acumen. (Dr.P.T. Vijayshree, B.Hema- 2011)

"Ancient India had Shilpa Shastra for sculpture, Natya Shastra for dance, Sangeetha Ratnakara for music, Vishnu Dharmottara for art, and Vaastu Shastra for architecture.

Since Indian culture did not distinguish between applied art and fine art, there was no separate treatise on design"
(Singanapalli Balaram)

VI. DESIGN THINKING

Design is currently considered a cross-functional and multidisciplinary innovation activity, capable of making sense of social challenges while devising strategic and holistic solutions to support competitiveness. It is considered a fundamental ingredient in business innovation through its ability to shape ideas and translate them into practical and appealing propositions for users, while improving national performance. (Marzia Mortati and Beatrice Villari)

VII. THE DESIGNER-AS-FACILITATOR

Design innovations in India's fashion products result from a fusion of modern technologies and traditional craft skills. The design process in fashion begins with research and observation. The uniqueness of a designer's creation lies in the interpretation of design sources. Sources of inspiration exist everywhere; anything visual, tactile, indeed sensual, can lead to inspiration in design.

In India the craft and design sectors share a symbiotic relationship. Through craft the designer connects with the natural world and the collective past. Traditional craft skills are adapted to contemporary design (Sanjeev Kumar and Nandini Dutta-2011)

Designers bridge the gap between the market and the artisan, as today the artisan is geographically apart from his/her client, to be able to understand his/her aesthetic and socio-cultural needs.

Designers help in finding the relevance of craft with respect to the artisan, the consumer and to the global market.

Designers are thus an interface, between the past and the present, the traditional and the modern, trying to match craft production to the needs of modern times and demands (Sethi, 2005)

Designers should be trained not only to solve problems, but what is more important they should be trained to help others solve their own problems.

One of the most valuable functions of a good designer today is to ask the right questions and of those concerned so that they become freshly involved and seek a solution themselves.(Charles and Ray Eames-“India Report ”)

Also the biggest question today is that has Indian design, in fifty years of the country's independence, empowered the crafts community to become “freshly involved” and “seek solutions themselves” on how to resolve this problem of designing for new markets?

Have designers asked the right questions of the crafts community to lead to such empowerment?

Perhaps it is now time to do so. “With adequate social opportunities, individuals can effectively shape their own destiny and help each other.”(Poonam Bir Kasturi- 2005)

VIII. DESIGN INTERVENTION

Design intervention is a process that involves designing new products; redesigning existing products, with changes in shape, size, colour, surface manipulation, function and utility; exploring new markets and reviving lapsed markets; applying traditional skills to meet new opportunities and challenges; and the introduction of new materials, new processes, new tools and technologies.

It is seen as an interface between traditional and modernity, that matches craft production to the needs of modern living.

Design interventions have a very important role in every step of the process in creation of the craft. They should focus on the identity of a craft, its social and cultural relevance to its region, and the processes and materials involved, to incorporate the interventions in the right situations, with efficient expected outcomes and reasoning's.(Design Intervention and its execution in Crafts of India- Amrita Panda)

Design interventions also assist in creating an awareness among artisans of methods, materials, tools, processes and clientele base.

In many cases the artisans of a region have lost or rather do not have a documented form of the craft. Traditional crafts are memory based, and only memory is the knowledge bank of their traditional methods and materials (Design Intervention and its execution in Crafts of India- Amrita Panda)

REVIVAL OF DYING CRAFTS

We're living in a new golden era of good design, and collaboration between designers & craftspeople is largely the reason to be thankful for.

As consumers, we're more aware of materials now – not just their visual and sensual appeal, but also where they come from, why they matter. We're more curious about how things are made and who made them (The Craft of Design- Joyce Lovelace-2013)

Collaborative innovation between designer and craftsperson is a means of expanding the craft vocabulary and tapping contemporary markets. It is also argued that a link between the apparently conflicting tenets of sustainability can be achieved through responsible and strategic design innovation which integrates the social, economic, ecological and cultural aspects. (Rebecca Reubens 2010)

It has now been recognized that indigenous innovations are crucial for any developing nation in order to achieve cumulative growth, both economically and socially.

These innovations, as they will be mostly in the form of appropriate modifications in the existing products, will require further critical interventions and hand-holding efforts for their transition into markets.

Design intervention can help bring in the much needed empathetic understanding and holistic vision to connect and integrate the various efforts towards a positive outcome. One would come across amazing indigenous innovations in India that can be developed into marketable products and thereby help in creating business success. These could provide vital directions for a country like India, to transform into an innovation-driven economy. (Ascertaining the Scope for Design Interventions for their Successful Commercialization- Ravi Mokashi-Punekar, Shashank Mehta- 2011)

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AUTHORS

First Author – Harita Kapur, National Institute of Fashion Technology, Hauz Khas , New Delhi, India-110016, email-haritakapur@gmail.com

Second Author – Suruchi Mittar, Associate Professor, National Institute of Fashion Technology, Hauz Khas , New Delhi, India-110016, email-suruchi.mittar@nift.ac.in

Paradise Regained: Spiritual Intuition in Lessing's *Shikasta*

Hossein Shamshiri

Department of English Literature, The University of Guilan, Iran
E-mail: Shamshiri333@gmail.com

Abstract: The Noble Prize winning Doris Lessing created a flurry of discussion about her relevance to spiritualism, mysticism, and Sufism after her turn from realism to speculative fiction. It is the purpose of this study to show that Lessing's proclivity for portraying imagined worlds in her later speculative space fiction reflects a paradigm shift that sheds light on the contemporary apocalyptic climate of clashing moral certainties. In her space fiction novels, the most important of which is *Shikasta*, Lessing, like a prophet, captured a zeitgeist and unveiled the wounds of our time. By analyzing the narrative techniques that Lessing uses in *Shikasta* I try to prove that *Shikasta* is central in Lessing's prolific oeuvre because it so clearly sets forth the basic terms of her debate about universal identity and the way that it can be represented through fiction. My main discussion is that Lessing's epistemology and ontology can be embodied in her belief in the Utopian future of the earth; the narrative structure of *Shikasta* shows that such a Utopia or Paradise can be regained by practicing the spiritual practices of Sufism.

Index Terms: Mysticism, Narrative Technique, Collective Identity, Prophet, Utopia

1. Introduction

Take warning from the misfortunes of others, so that
others need not have to take warning from your own.
- Saadi, *Rose Garden*¹

Doris Lessing won the noble prize in literature in 2007; the year that marked the 800th birthday of Jalal al-Din Muhammad Rumi² (1207-1273). Being honored with such a prize makes us curious about the reasons of such a selection. What kind of features made her to win the Noble prize? It is obvious that being a woman novelist was not the reason, because there are lots of other women that won the prize before Lessing. Also, writing about racism in Africa cannot be the real reason. Even her political activities had nothing to do with her selection. What that distinguished Lessing from other great writers was the prophetic role that she played in the age of chaos and atomic bombs.

Throughout her life, Doris Lessing witnessed wars between different countries. When she was born in 1919 in Iran, her parents were in a state of psychological and physical breakdown, since her father had lost a leg during World War I and her mother saw lots of war cruelties upon soldiers since she worked as a nurse; therefore, war is always depicted in a pessimistic mood in most of Lessing's novels, *Shikasta* included.

In *Shikasta* (1979), the first volume of the 'Canopus in Argos: Archive' series (vol. 1–5, 1979–1984), Lessing identifies the universal problem: society's division into competitive and predatory groups, and places it outside the bounds of time and space, encouraging a social critique which takes into account our inherited blindness, our 'degenerative disease' in the 'century of destruction', which must be addressed before genuine progress can be made.

By drawing on Christian, Islamic, and other religious belief systems, Lessing in *Shikasta* forsakes the rank of a mere writer and acts like a prophet. Through *Shikasta*, Lessing first condemns the world, its politics, history, wars, calamities, and blind human actions, and then, with great narrative skill, proceeds to propose a utopian substitution. Lessing's repudiation of history and the present makes her to evoke strange new worlds in *Shikasta* which have their root in the contemporary reality; indeed, much of the appeal of *Shikasta* lies in Lessing's ability to fuse the religious and the fantastic. Apocalypse and utopia meld in Lessing's work: the former paves the way for the latter. *Shikasta*'s content shares with other texts in the prophetic genre an approach at once fantastical and acrimonious.

In *Shikasta*, Lessing through the space fiction genre establishes the known and familiar earth in a fantastic way in order to critique it. Therefore, such kind of serious parody that Lessing uses in her space fiction like *Shikasta* installs a preexisting history, the result of which is, in Katherine Fishburn's (1985) analysis, subversive: "In short, Lessing's science fiction opens the doors of perception to a fantastic, shape-shifting, and utterly unexpected universe. In so doing, it functions to transform the very world itself." (p.17)

In this paper, by analyzing the narrative techniques in *Shikasta*, I try to prove that Lessing's retreat from her early social realistic and political novels into a Sufi realm in *Shikasta* is a retreat with artistic and religious implications. Because Lessing tries to play the role of a prophet for mankind she presumes to speak to us with divine or inspired guidance. Therefore, the reader is expected not only to interpret, understand, foretell, or engage sympathetically when reading *Shikasta*, but also to be convinced and be moved to convert to Lessing's religion, a religion that its aim is to get ride of all the differences and to get united. By depicting a utopian future without politics and minor controversies at the end of the novel, Lessing is trying to eliminate those cantankerous human beings who engage with and against one another in history. Through *Shikasta*, Lessing yearns for unity and cannot abide the human diversity of purposes and she suggests that all conflicts and dissensions lead inevitably to creating an enmity which turns earth into a dystopia. All those who cannot respond to the spiritual solution that Lessing creates in the world of *Shikasta* are compared to those poor fools who laughed as Noah built his ark.

2. Narrative Technique in *Shikasta*

Doris Lessing's works display a tremendous versatility and cover a wide range of themes; she has written both realistic and space fiction novels. In her novels, Lessing represents the range of themes and concerns that stem from her experiential life and imagination. By turning to scientific fiction and space fiction in *Shikasta*, Lessing tries to push the boundaries of her early realist novels in order to give us a glimpse of the future. Lessing also tries to address the problems of her day and to introduce new ways of looking at those problems. Roberta Rubenstein (1979) about the worth of Lessing's later works says: "Her [Lessing's] efforts to break through not only the intellectual blinders to perception and knowledge, and conventional assumptions concerning the nature of reality itself, but also the limitations of verbal expression, should assure her stature as one of the major, unique and visionary writers of our time" (p.256).

Mona Knapp in *Doris Lessing* (1984) approves the shift in Lessing's style and narrative and explains that this shift in technique coincides with Lessing's studies in Sufism (p.14-17); indeed, Lessing's aim at finding solutions to the problems that mankind faces in the twentieth century made her change both her worldview and her narrative technique. This commitment to change her worldview is what Lee R. Edwards, in *Psyche as Hero: Female Heroism and Fictional Form* (1984), sees as the root of Lessing's shift in technique: "The realistic novel, with its commitment to logic, causality, and rationality, was gradually strained beyond containment by Lessing's developing awareness that these commitments worked against the solutions she was beginning to define. The new wine threatened the old bottles." (p.272)

The change in theme necessitates a change in the form and narrative technique; as Lessing's concerns have changed, her narrative techniques also changed. Lessing in her review of Idris Shah³, her Sufi master, "What Looks Like an Egg and Is an Egg?" from the New York Times Book Review (May 7, 1972) points out that: "The Sufis themselves seldom conceal that they are concerned with presentation and effectiveness, not indoctrination. Hence their writings are abundant with phrases like 'The colour of the wine is the same as the color of the bottle'" (p.149); that is, one cannot separate the message from the form in which it comes. This would seem to have a direct bearing on the narrative changes which take place in Lessing's *Shikasta*, the best manifestation of Lessing's Sufi ideology. Elizabeth Maslen in her "Narrators and Readers in Three Novels" (1986) suggests that Lessing's tendency to write in different genres and in different narrative techniques is the best ways to engage the readers; that Lessing "uses a variety of narrative voices to demonstrate linguistic traps, to exploit them, or to probe them. In her later works she makes ever increasing demands on her readers to work out for themselves what her narrative voices are up to." (p.4)

In *Shikasta*, Lessing uses lots of unfamiliar narrative techniques to engage the readers not only with the form, but more importantly, with the content. With Lessing's obvious concern for mankind's future, it seems appropriate that she should attempt to engage her readers in a more direct way when she comes to discussing the breakdown, and the possible future, of our society. It might have been because of this that Lessing in *Shikasta* becomes more daring in her narrative challenges to her readers. But surely the essence of Sufism must have interested Lessing because it addressed problems with which she was already concerned. So far, it is clear that the language of *Shikasta*, perhaps more than any of the Lessing's early novels, reflects the ideologies behind it; it is constructed both of the language of religion and of art. Based on Knapp and Maslen, we can conclude that Lessing's ideological and artistic attitudes shape the form and content of *Shikasta* in important ways.

Nancy Hardin (2003), while praising the fantastic realms of Lessing's later novels argues that Lessing's mystical fantastic novels, *Shikasta* included, are the locus of a saving vision that will teach us to "break out and away from contemporary conditioning" so that "we can awaken from the roles to which we have been so skillfully programmed" (pp. 324, 325). The purpose of creating such an alternative critical fictional world, Nancy Walker (1990) adds, is for getting ride of the conventional novel writing: "In order to free themselves from the 'love story', some writers, such as Doris Lessing... have used the mode of speculative fiction to propose full blown alternative worlds-whether utopian or dystopian."

Lessing's narrative technique in *Shikasta*, her use of diaries, reports, notes, self-containing titles, preface, and other extra fictional structures as Susan Lancer states in *The Narrative Act: Points of View in Prose Fiction* (1981) have a number of uses to the author, among which are "to establish rapport with the audience; ... to clarify the (real or ostensible) purpose of the text; to establish the relationship between the story and history." (p.125) Moreover, "because the extra-fictional voice carries the ontological status of history, it conventionally serves as the ultimate textual authority. All other voices that the text creates are subordinate to it." (p.128). It is obvious that such extra-fictional structures help Lessing to become a faithful 'messenger' and disappear from all levels of the text and the text itself conveys the message; therefore, the text addresses the readers directly. As Wallace Martin in *Recent Theories of Narrative* (1986) says, the disappearance of the author from the text and the "the appearance of problematic and fragmentary narratives" in the text force the readers "to participate in the production as well as the interpretation of texts." (p.157)

At the same time as Lessing is introducing these meta-fictional elements like self-contained titles, diaries, notes, and reports into her work, she also intersperses her fiction with such a quantity of verifiable facts of mankind's history from creation to the twentieth century that we are tempted to read the novel as a documentary of the breakdown of western civilization. The most striking attribute of the prophetic text of *Shikasta* is that it leaves the reader floating out of frame; it relies heavily on unconventional techniques. Presented with a world resembling in many parts like that of our familiar earth, the reader begins to settle into a realistic frame; however, no sooner is he settled there than he is presented with a mystic dimension in which the laws of time and space go beyond those that the reader is familiar with. Throughout the novel, Lessing shifts frequently between these two incompatible universes. As soon as the reader finds a similarity between the real world and that of *Shikasta*, he is shocked by a fantastic or mystical event.

This shift between the real world and scientific and fantastic world is very effective in making the reader aware of the shortcomings of the real world in comparison to that of the ideal one. By symbolizing the prophetic relation of the ideal world to that of the fallen *Shikasta*, Lessing sets the standards against which the real world can be measured. In this movement from the real world, the material world, to that of the world of imagination, fantasy, and vision, Lessing moves from Marx to Jung, while at the same time applying her

Eastern spiritual vision of Sufism; thus, the primary world of the novel is materialistic; the secondary is purely mental and spiritual. The account of Lessing's spiritual journey through history in *Shikasta* resonates with classical archetypes and allusions as well as transcendental intimations of mystical experiences. Ruth Whittaker (1988) notes Lessing's use of "the fantastic, the mystic, the archetypal and the symbolic, not merely as literary devices to alert us to the paucity of realism, but because she genuinely needs those modes of expression to convey her experience of another dimension than that of the everyday world" (p.76).

Point of view in *Shikasta* is constantly shifting from one emissary to the other. After having been immersed in Johor's reports for a time, we leave them behind in the second internal text of this novel, which comes in the form of Rachel's diaries about *Shikasta*'s problems. Lessing, for conveying her Sufi ideas creates different kinds of characters in *Shikasta* who have different spiritual understanding. In *Shikasta* we have different characters that play different roles; some play major roles in the novel and others are stock characters that just help develop the plot of the story. As Phelan (2008) puts it, we can observe three types of characters in a novel: representational characters, superficial characters, and foundational characters. In *Shikasta*, there are superficial characters that are used to develop the plot of the story and they do not change through the story, most of the unnamed characters in *Shikasta* are of this type; and there are representational or dramatic characters who are more active and hold different characteristics that the writer attributes to them; Rachel is of the second type. Still, there is a third level of characters that are the foundation and basis of the whole novel. In *Shikasta* Johor is such a main character that is an impeccable representative of a Sufi and who stands for the ideal Sufi that Lessing has in her mind.

The main characters like Johor act in a way that not only convey the main ideas that Lessing has in mind, but also invite the readers to participate in the different experiences that the main character acquires. The mere personality of such character is of no importance for a Sufi like Lessing, but the ideas that they represent are of value. Lessing's move toward space fiction shows that she is not very interested in the dramatic role of the characters and the characters for her are like prototypes that convey different key ideas. Through Johor we find out about the difficult life on earth and through his symbolic actions we find about our different dimensions as human being. Johor as a messenger and prophet in *Shikasta* tries to show the people of earth the right way through salvation and warns them of the different problems that they may have. He warns us to study the past and to plan our future based on not only logic but also faith.

To conclude, according to Hinchman and Hinchman (2001) there are two different types of narrative. The one that views narrative as a means to create "order out of chaos, i.e. out of a manifold of disordered impressions, sensations, memories, and inner states" (p.19); the other school views it as representing a "pre-narrative identity that is already there 'in itself'" (p.19). Lessing's narrative in *Shikasta* belongs to both types of narratives; because Lessing believes that mankind has a utopian past and a true identity that is there but which is forgotten and by applying the spiritual belief system of Sufism, Lessing, in a prophetic act, tries to regain such a lost paradise and to create order out of chaos. Therefore, a permanent revision of the religious texts and a permanent insight into the past of the planet earth in needed for recreating and rewriting the present in terms of one's own ideology. Through *Shikasta*, Lessing, by delving into the realms of imagination and knowledge, tries to put order in the chaotic condition of both her thoughts and that of the actual earth which she lives on; doing this, she comes out with both an external artistic product called *Shikasta* and an internal spiritual peace in the way of a true Sufi.

3. Sufism as Religion and Art

The relationship between Sufism and literary style, both in the history of all religions and in the comparative literature around the world, is a new artistic trend. Every kind of study about Sufism and Literature make us to think about the way they are related. The key to such a question is in Sufism's tendency toward spiritualism, mysticism and symbol which makes Sufism related to the fantastic world of fiction.

Lessing's effort to create a spiritual world in *Shikasta* has its precedent in prophet-writers like Milton, Blake, and W.B. Yeats. Yeats was interested in spiritualism throughout his life. He tried to create a religion of his own and he found it in 1880s and 1890s in an organization that he called Order of the Golden Dawn. As Yeasts says, spiritualism for him was not just a hobby and it was his way of life: "the mystical life is the centre of all that I do and all that I think and all that I write" (Ellmann, 1948, p.94). Like Lessing, Yeats believed in the idea of progress and he believed that by purification and cultivation of the will and aided by secret knowledge, one can ascend by gradual steps to oneness with the divine. As can be observed Yeats' and Lessing's works share basic concepts with Sufism. Everybody who reads Lessing's *Shikasta* finds the same elements that one can find in the Sufi stories and the same kind of "intuition", in Hardin's (2003) word, can be found both in Lessing and other Sufi stories (p.319). Beside different structural layers, a Sufi story, as it may move through different times and different places, acquires deeper layers of meaning. It is because of this multidimensional characteristic of the Sufi stories that as we go on reading we find out it more complicated and with a lot of layers to be discovered. Lessing says that such kinds of Sufi stories are like "Chinese boxes" (A. Shah, 2009, p.11); a story opens into another one and the reader gets lost in the complex net of different stories. The purpose of such kind of stories, as Lessing says, is not only entertainment; they also serve for making the reader aware of an important meaning.

Lessing's *Shikasta* is a sacred Sufi work that invites us to participate in a new way of *being* in the world that actualizes freedom and justice. It shows us what is really possible, what we can actually achieve with perseverance and effort; and what is possible, in turn, can become an object of passionate utopian hope. But *Shikasta*'s proclamation will remain forever mute if we fail to appropriate it *imaginatively*. Thus in Johor's anguished cry, we hear Lessing's claim that the real cause of human impoverishment is not so much sin, in the traditional sense, as atrophied imagination, a figurative hardness of hearing that deafens civilization after civilization to the very words that can breathe life into spiritual deserts:

They [men] did not dream of Utopias in the future: their imaginations were not tuned to the future at all, unlike those of previous revolutionaries or religionists: it was not that "next year, or in the next decade, or next century, we create

paradise on earth..." only, "This is what you are like." When this hypocritical, lying, miserably stupid system was done away with, then everyone would be able to see... (*Shikasta*, pp.158, 159)

The Sufi stories like *Shikasta* try to make a change in the ontology of the readers and help them to observe the multidimensional aspects of life. Sufi stories have no central point and they invite their own readers to go beyond the logical ways of solving a problem. Ornstein (2006) suggests that the Sufi stories show the readers ways not yet taken; some of them include "patterns" (p.18) that the reader can understand difficult problems if he follows such patterns; and some are like impulses that make the conventional mind familiar with strange and bizarre worlds. In *Shikasta* we can observe easily the way that Lessing violates the conventions of the common stories by creating alien and strange worlds and this creation makes the conventional reader change the way of reading and become more active through the process of reading.

4. Individualistic Identity vs. Collective Identity

Lessing's special narrative in *Shikasta* helps us understand and review the past historical events on earth and to analyze them in the light of new ideas that Lessing tries to teach us. Understanding what we are now unavoidably involves the recollection of the past; thus, the temporal dimension of existence is significant in terms of understanding the universal identity that we have now at the present moment. The temporal dimension of human existence is fully conveyed in *Shikasta* by Lessing's narration of the history of mankind from the creation to its hopeful future. The search for a viable universal identity in *Shikasta*, inevitably, involves narrating the past and relating it to the present conditions to find out the shortcomings and the solution.

In *Shikasta* the universal identity emerges from the narrative and the reader's spiritual and psychic journey into the history of mankind can be considered as various versions of experiencing this identity. It is exactly this mode of individual self exploration from the part of every reader that makes them aware of a universal whole and they, guided by the logic of the text and the different turns of the narrative, move toward the universal identity that the writer prepares them to move toward. Thus, Lessing believes that individual's salvation depends on that of the society one lives in. The free will might give us the impression that we can construct ourselves however we wish, but we have to bear in mind that "the story of one's individual life depends on the larger stories of the community to which one belongs" (Hinchman&Hinchman, 2001, p.24).

David Carr (2001), in "Narrative and the real world: An argument for continuity", attempts to prove that the above utterance about the relation of individual and community is accurate. He uses Husserl's theory which claims that we cannot view anything as happening in the present without intertwining it with the past and the future (p.11). According to this theory, the manner in which we view our life is by "explicitly consult[ing] past experiences, envisag[ing] the future, and view[ing] the present as a passage between the two" (p.12). This shows that our actions have a "means-end structure" which is similar to that of the "beginning-middle-end" structure of narrative. In *Shikasta*, Lessing tries to create a collective identity by first giving a short history of the utopian past of mankind, and then describing our present situation on earth and prophesying a utopian future that can be created by feeling a sense of responsibility toward each other and by creating a collective identity.

Since identity is said to be constructed through narrative, and that in different narratives we could encounter different types of identities, Lessing creates a special narrative in order to establish a universal and collective identity. Lessing chooses some of the most important real events in the mankind's history, like the life in heaven, the Fall, Noah's flood, the first and second World Wars, the Cold War and lots of other important events in the history of the earth, to give her narration a coherence and to give a general picture of the world from the beginning to the present moment; Lessing does so because one of the ways to create order and coherence in life writing is by analyzing "causal connections", i.e., the significant experiences that mark the growth of one's individual or that of a community. Jennifer L. Pals (2006) uses this theory in order to analyze the manner in which people construct narratives about their past experiences and their relations to the society they live in by drawing upon the most important events or circumstances in their lives and that of the world around them, and interpreting the manner in which these have shaped them into individuals they are at the moment of recounting these experiences: "One of the advantages of thinking of the formation of causal connections as an interpretative strategy for creating coherence within the life story is that it shifts our conceptualization of coherence toward the idea that it is something we continually try to do as we construct our life stories – an interpretative act of self-making and away from the idea that coherence is a static characteristic that the life story as a whole does or does not possess" (ibid, p.177).

A reader, for analyzing the relationship between the important events that Lessing narrates in *Shikasta*, first should find such key events and then interpret them in order to find out the general pattern and the general goal that they pursue. To elaborate more on this point, then, the analysis of 'causal connections' is divided into three phases: first, we have to find the causal connections in the narrative of *Shikasta* "in which the narrator spontaneously and explicitly interprets an aspect of the past experience, broadly defined (e.g. relationships, life stages etc.) as having enduring causal meaning in relation to an aspect of the self or identity" (ibid, p.179). The second phase involves looking into the nature of the experiences, then evaluating the importance of those experiences in developing a specific identity of the individual or the society. The third phase involves "identifying patterns of self making across multiple causal connections within a person's life story" (Pals, 2000, p.180) and those of the society.

The individual's relationship with the collective is always Lessing's concern in her novels, though she presents the subject as always struggling to find a balance between their own needs and those of the collective. Many critics emphasize the dialogic logic of Lessing's work, her preoccupation with the relation of self and others, individual and collective, inner and outer worlds. Betsy Draine (1983) explains that in the dialectic of the individual and the collective, "Lessing is fascinated with the dynamics of this relation and with the evolution of human consciousness through this dynamic" (p.13).

In *After the Thirties: the Novel in Britain and its Future*, Jack Lindsay (1956) mentions that "human unity" becomes possible only when "man holds the universe in his hands," and it is therefore necessary to create "a new consciousness" to "see each separate aspect in relation to the whole—and the whole is the whole of human life in its struggle, its unity with the whole of nature" (82-84). But the

question is how to arrive at a dialogic relation between self and collective through the dialectical transformation of both sides. Lessing invents a new kind of ‘collectivist protagonist’ that reflects a more relational subjectivity, as opposed to a purely autonomous or independent individuality. The allegory at the end is a way for the individual to realize the unconscious collective through the mythic relationship. Lessing’s adoption of Sufism is one of the most important elements in her allegories in order to search for spiritual breakthrough, otherwise difficult to obtain in a world largely conceived in materialist terms. The evidence of Sufism in many of Lessing’s works, *The Four-Gated City*, *The Memoirs of a Survivor*, *Briefing for a Descent into Hell*, and *Shikasta*, all suggest Lessing’s prophetic ambition to surpass the limitations of an exclusively individualistic world toward a collective consciousness and unity; as Lessing proposes that the responsibility of the writer is to fill the gap “between the public and the private conscience” (SPV, 1956, p.11).

5. Lessing’s Alchemy: Dialogue among Civilizations

As was discussed in the previous section, Lessing’s stress on the prophetic capacity of her fiction reveals its timely engagement with real problems in her society and her deployment of a nonrealistic narrative for such a kind of projection shows her desire for a true and possible globalization. Therefore, she can be considered not only as a successful experimental novelist but as a prophet of globalization searching for a unified identity. Also, Lessing’s use of the Eastern Sufi belief system in a Western literary style makes her like an eastern messenger in the west that tries to establish a dialogue among different civilizations.

Galin (1997) believes that when we try to evaluate Lessing as the “eastern messenger in the west” we should pay attention to the “western literary conventions” through which Lessing tries to convey her Sufi ideas to her western readers. For such a purpose Lessing uses the science fiction, psychology, and spiritualism in *Shikasta*. Lessing, more than any writer or philosopher, finds the way to unify the east and the west in Sufism.

As was mentioned above, Sufism makes a connection between religion and literature, and between the spiritual and the material. Thus, because of the appealing aesthetic nature that Sufism has among other religions, it is regarded as a bridge between the east and the west. More importantly, Sufism is a combination of science and poetry, religion and philosophy, art and divinity, and materialism and spirituality. Sufism can be regarded as being not only religious, but also artistic and literary. For this reason, the Sufi always is interested in combining literary style of the west with the spiritual stories of the east in a creative way.

Lessing’s belief in a possible unity between east and west is revolutionary in its own; she speaks in a time when anti eastern ideas dominate west and “clash of civilizations” and “death of God” are proposed as a solution to mankind’s problems. Against such hostile ideas, Lessing’s Sufism links all nations and individuals through creating a spiritual system of thought. Her cosmic totality is like the German Romantics whose dream was creating an “organic national community”. They stressed the “oneness of all things” and they believed in an ontological unity of man’s nature which was spoilt by the modern civilization. (Hitler, 1975, P.51)

Lessing suggests that globalization without applying any divine outlook is an engine of disintegration. Without finding a unifying spiritual identity an eternal peace is impossible and turning the world into a globalized utopia is just a dream. Samuel Huntington (1996) recommends the westerners to forget their “universalists pretensions” and their effort toward globalization. Such kind of hopelessness is because of secularization; Lessing fully understands the conditions and the different views and still she thinks there is a way out of the chaos, a spiritual one.

In *Shikasta*, Lessing shapes the eastern ideas of Sufism a new form by applying them to western issues. The result is a two directional and recursive model that unites the east and the west and all human being. Instead of treating the eastern subject of Sufism and the western problems monolithically, Lessing posits a mutual relationship in which both sides are changed by their interaction. Lessing’s goal is to account for the dynamic and open-ended nature of cultural interaction as opposed to essentially static formulation of those in the west or east. Although applying the spiritual ideas of Sufism to the rigid and materialistic world of the west seems impossible, Lessing believes that the beliefs and cultures are like meandering streams that can confluence and spread everywhere.

The geopolitical identity of *Shikasta* epitomizes the mutual relationship of the west and the east. In its dynamism, the utopian world that Lessing tries to create at the end of the novel is a process of re-inscription and re-interpretation of the concepts shared among all mankind whose notion of identity is homogeneous and collective. This kind of globalization, for Lessing, contains a positive dimension which can potentially oppose the twin dangers of mere ideology or utopia. The collective identity that is fictionalized in *Shikasta* is a fluid and trans-national identity which is a relation among the network of differences. By rejecting the absolutes of the different political groups and different extreme separatist opinions, Lessing finds a way for universalism in *Shikasta* which, she believes, is applicable. Although Lessing is well aware of the history of imperialism, capitalism and other –isms and the extent to which they tend to create an imbalance between human beings for the sake of power, her critique of mankind’s history up to the twentieth century in *Shikasta* comes not from her denial of political groups, but from an attempt to re-conceptualize politics in a more humanized way and away of negative ideologies. Lessing believes that the western tradition that begins with the pre-Socratic philosophers and continues into existentialism and postmodernism, failed to create a peaceful and harmonized utopian life on earth and she suggest an alternative by using her Eastern Sufi ideas. To summarize, then, Lessing’s fictional spaces in *Shikasta* broaden the horizons of the home culture on earth and creates a hope for having a utopian future.

6. Apocalypse: The Third World War

Lessing’s apocalyptic narrative in *Shikasta* represents the failure of humankind’s efforts to find a way out of the chaos and by mentioning the Cold War and its aftermath Lessing tries to show the surging violence and the open-ended insecurity that threatened earth during the twentieth century; this crisis is defined by Eric Hobsbawm (2000) as a secular crisis “whose nature was unclear, and without an obvious mechanism for either ending it or keeping it under control” (*Age of Extremes*, p.562). The fear of a nuclear holocaust after the Second World War, the long dominant and paralyzing fear that human civilization would bring about its own

annihilation come true in the fictional narrative of *Shikasta* and a Third World War destroys earth symbolically. The fictional third World War suggests that human beings cannot find a way out of the trouble themselves and a prophetic, superhuman, should show the way. Thus, if we can recognize the history of the fictional *Shikasta* with our own world, we come to find the similarity between the ‘Century of Destruction’ in *Shikasta* with twentieth century on earth. If we fail to do so, as Johor says, we will become extinguished like the inhabitants of *Shikasta* by a third World War:

Here we must emphasize that most of the inhabitants of *Shikasta* were not aware that they were living through what would be seen as a hundred-years' war, the century that would bring their planet to almost total destruction.
(*Shikasta*, p.103)

Lessing's emphasis in *Shikasta* on the destructive function of wars in human history shows her belief in the fact that wars are the most important factor that prevents mankind in creating a universal peace. Her symbolic Third World War in *Shikasta* and the utopian world that is created after this war shows Lessing's hope is a better future based on spiritual progress and dialogue among civilizations. Despite the fact that Doris Lessing was born after the First World War, and experienced the Second World War only indirectly, she considers war as one of the worst things that a human being can go through. She makes a strong claim about the influence that the war had upon her: “We are all of us made by war, twisted and warped by war, but we seem to forget it” (*Under my skin*, p.10). Therefore it is not surprisingly many of her novels are about war, conflict, and the end of the world scenarios. She faces us with the destructiveness that is present within ourselves, the “horrible things” that her father was faced with after the war are present in all of us “but the war had made them worse, that was all” (*ibid*, p.7). Lessing's space fictions, specially *Shikasta*, serve as a sort of warning about the destruction that we will face if we do not stop and think that war is the worst thing that can ever happen: “If we make war impossible the world will be full of whole and healthy and sane and marvelous people who... In my mind I lived in utopias, part from literature and part the obverse of what I actually lived in” (*ibid*, p.156).

Lessing's view of history, like that of Blake and Yeats, is apocalyptic in the sense that all of them believe that when the utopian future comes it is final and everlasting. Such a belief is based on the religious books like Bible and Koran which is best represented in Lessing's Sufi ideology. Lessing in *Shikasta* depicts this fact in a future when the evil would be expunged and history would end in a utopia; an atomic third World War extinguishes the ninety-nine percent of the population of the earth and just a few select are survived and they, by the help of the envoys of *Canopus*, establish the current of SOWF, the substance-of-we-feeling. This sense of apocalypse and final utopian future is also expressed by Yeats in his *The Land of Heart's Desire* (1894); Yeats believes that God “at the end/ Shall pull apart the pale ribs of the moon/ And quench the stars in the ancestral night;” (p.10) he also adds that when the “last autumn” is over men's hearts and the nature “grow gentle as time fades into eternity.”

Lessing observes the societies in collapse and finds out that the unleashed consequences of modernization make the earth into a dystopia forever and the civilization soon will be consumed by what Robert Kaplan (2000) calls “the coming anarchy” and earth in the near future will be nothing but a “planet of slums” in Mike Davis' (2004) words. This end of the world narratives by different thinkers are described in Lessing's prophetic novel. The chaotic and dystopian landscape imagined for the post Cold War era by Kaplan, Davis, Huntington and others is imagined decades in advance by Lessing in her *Shikasta*.

The emphasize of *Shikasta*'s narrative on the ongoing and runaway crisis, and the catastrophes of the end of the world events shape the pessimistic narrative of the future of the earth if no solution is suggested out of the dystopia. Lessing looks beyond the pressing nuclear threats in order to attend to a wider field of threats which have their roots in the fundamental operations of society; therefore, she suggests that any effort to change the present situation should be fundamental and she proposes a third World War. After the war the few select that are survived are those humble people who practice Lessing's Sufi principles and adhere to her message. In all religions such a reward is honored to the selected ones after the apocalypse:

Blessed are the poor in spirit, for theirs is the kingdom of heaven.

Blessed are those who mourn, for they shall be comforted.

Blessed are the meek, for they shall inherit the earth. (*Matthew*, 5:3–11)

7. Second Coming: Paradise Regained

Lessing's solution to end the dystopian life on earth in *Shikasta* is creating a golden age to follow after the symbolic destruction of a world grown tawdry and horrible. Total change requires a total solution and the symbolic total destruction of earth is proposed through some mysterious cosmic process and transforms the dystopian earth into a New Jerusalem, a world of unity and peace. Lessing, as the utopian prophet of the contemplative mode, sees the decay of the old world and the coming of a new as a foreordained certainty. Her utopia is a world in which competing passions and beliefs are eliminated in order that harmony and equilibrium prevail.

One of the characteristics of Lessing's later novels when she was practicing Sufism in her fiction is her faith and hope in human salvation. Although such kind of faith and hope can be attributed to Sufism, but Galin (1997) believes that Lessing does not write merely Sufi novels and she is not a writer of one convention. Lessing is not a Britain writer, Rhodesian, Iranian, Christian, or Muslim, nor is she a pessimist western writer or a pure eastern spiritual novelist; Lessing is like an inquisitor; a prophet who by questioning the prevalent condition tries to introduce new way of communication between all human beings. Lessing's jovial way of life also proves her true understanding of life as she says: “I don't understand people being bored. I find life so enormously exciting all the time. I enjoy everything enormously.” (Ingersoll, 1994, p.12)

One of the main features of Lessing's dealings with religion in the context of the broader discussion of ideology is her notion of apocalyptic. In the scene when the Third World War is occurring Lessing gives the reader a sense of the end of the world by describing an atomic war. The apocalyptic feeling of the reader has two diverse functions that include the two extremes of complete obliteration and the inauguration of a new age, of the end of the history and its beginning *anew* on an entirely different plane. Symbolically, the atomic bomb kills ninety-nine percent of the people and a new utopian era begins. The utopian world begins after

the atomic bombardment and a new community that is formed around the apocalyptic vision is shaped. In *Shikasta*, Lessing portrays this atomic holocaust as a spaceship air raid. Johor, the emissary from Canopus, reports:

We went back to the cities. [...] In each were a few people who could hear us, and these we told to leave at once with any who would listen to them. [...] Having made sure of the safety of those who could be saved, we signaled in the space-fleet, and the cities were blasted into oblivion. (*Shikasta*, pp.107, 108)

In *Shikasta*, Lessing shows how *Rohanda* collapses from a lack of SOWF and how mankind, in the midst of cultural rot, finds itself faced with two alternatives: the evil *Shammat* or radical change. By suggesting a second stage of mysticism and creating a fantastic world again, Lessing finds a cure for the upheavals of the twentieth century. The intention of creating the final ideal world is to fuse the two worlds of *Rohanda* and *Shikasta* into one new and different universe; a new everlasting ideal world that uses both the idealism of *Rohanda* and the experience of *Shikasta* amidst chaos. This is experienced as a considering the text as a whole. By playing the role of a spiritual seer, Lessing is successful in turning the two different worlds into a perfect and harmonious one.

8. Conclusion

The Night passed and our talk did not end:
What sin was the night's?

It was our speech which was too long.
-Jalal al-Din Rumi, *Table-Talk*

In *Shikasta*, Lessing uses a combination of scientific, historical, and literary elements with Sufism to create a discourse which urges a competent reader to investigate and understand the history of the earth as a construct created by transgressing the borders of reality and by entering the realms of imagination or the worlds we finally build in our interpretation of our inner self and the outer space. For doing so, Lessing applies a deep spiritual insight into the collective consciousness and the past of humanity in order to either obliterate or cope with the reality of world around herself and to trigger a heartrending view toward the world. The way Lessing puts together the pieces of the story depends on her previous experiences with the Sufi ideology and also this representation is faithful to the real history of the world. Thus, the reader can recreate the true history of the world out of the tumultuous world of Lessing's novel beset by spiritual representation of such a world and haunted by the Sufi doctrines. The spiritual representation of the history of the world breathes novelty and flavor to the mere linear events, creating an original account of the history of the world.

Lessing, as a prophet and a seer, gives the inevitable need for a total change a boost through her wholesale condemnations of the present state of the earth. Lessing's vision of a utopian future is a peculiar mix of utopianism, dystopianism, and spiritualism. Expressing, as it does, many utopian hopes and desires, *Shikasta* contains a muted critique of the current social and political order. Yet in accepting the possibility of change through spiritual unity and collective human action, Lessing softens her critique and situates her utopia in human reach. This is to say that the kind of utopia, dystopia, and spiritual dialectics that is found in Lessing's *Shikasta* is peculiar to her novel alone because of ending with a different ending.

Notes

1. Jalal al-Din Muhammad Rumi (1207-1273) was one the foremost and celebrated poets and Sufi figures in the Muslim world whose Sufi thoughts and practices gave rise to the famous 'whirling dervishes'.
2. The *Gulistan* (Rose Garden) and *Bustan* (Orchard) of Saadi of Shiraz (1184-1291) are two classics of Sufism and Persian literature which provide the moral and ethical basis of the reading of millions, in Iran, India, Pakistan, Afghanistan, and Central Asia.
3. Idris Shah (1924-1996) was a modern Sufi teacher in the west. Doris Lessing discovered his school of Sufism in the 1960's and Shah's ideas were a source of inspiration for Lessing in her space fiction.

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Morphometrical Assessment of Kidney in Fetuses of Different Gestational Age Groups

Khayati Sant Ram¹, Mahesh Sharma², Anshu Sharma³, Kanchan Kapoor⁴, Kunal Chawla⁵, Richa Gupta⁶, Daisy Sahni⁷

¹ MBBS,MD. Dept. of Anatomy,Post Graduate institute of medical education and research, Chandigarh, INDIA

² MBBS,MD Dept. of Anatomy, Government Medical College& Hospital Chandigarh, INDIA.

³ MBBS,MD Dept. of Anatomy, Government Medical College& Hospital, Chandigarh, INDIA

⁴ MSC,PHD Dept. of Anatomy, Government Medical College& Hospital, Chandigarh, INDIA

⁵. MBBS,MD Dept. of Anatomy,Post Graduate institute of medical education and research, Chandigarh, INDIA

⁶. MBBS Dept. of Anatomy,Post Graduate institute of medical education and research, Chandigarh, INDIA

⁷. Msc,PHD Dept. of Anatomy,Post Graduate institute of medical education and research, Chandigarh, INDIA

Abstract- The study was made on morphometric parameters of human fetal kidney. The present study was carried out in the department of Anatomy, Government Medical College & Hospital, Chandigarh. The material for the study consisted of 30 spontaneously aborted human fetal specimens from 12th to 28th weeks of gestational ages. The kidneys were taken from fetal specimens for morphological study. The measurements were done compass, scale and vernier caliper. The present study established a significant and positive correlation between the length,breadth and thickness of kidney. All the parameters increased with increase in gestational age maximum increase was observed from group B-C. Correlation of kidney with suprarenal gland were positive. Length and thickness of kidney was more than suprarenal length and thickness, whereas breadth of kidney was less than breadth of suprarenal gland in all the age groups. All the parameters of kidney increased from that of suprarenal by approximately two or more than two times from end of 1st trimester to 3rd trimester. A linear correlation of kidney parameters with suprarenal parameters was observed.

Index Terms- breadth, kidney, length, suprarenal gland, thickness.

I. INTRODUCTION

The kidney plays an important role in maintenance of internal milieu. The slightest difference in its function may lead to an exponential alteration which can cost the life of a patient. The knowledge of the gland is important in understanding, diagnosis and treatment of prenatal renal disorders like Wilms` tumor, multicystic renal dysplasia, hydronephrosis...etc¹.

Morphologic, functional and maturational aspects of the human fetal kidney are unique.

Over the past years, the evaluation of fetal morphometrical growth parameters have been subject of increased awareness for the assessment of fetal growth and development. Some important parameters were used as standards like crown- rump length, biparietal diameter, head, chest and abdominal circumferences. In some studies fetal organs were also measured to see their gross development at various gestational ages. In this study the fetal kidney were measured. These measurements can give us

indication of gestational age. Therefore an attempt was made to determine the growth rate of fetal kidney with increasing gestational age.

Present study was undertaken to determine the average size (length/breadth/thickness), of kidney and ratio of suprarenal gland to kidney in aborted fetuses in an Indian population. A comparison was made between these dimensions. The study will establish the macro development of kidney and its correlation with suprarenal in human fetuses in North-West Indian population.

II. MATERIAL AND METHOD

The present study was carried out in the department of Anatomy, Government Medical College & Hospital, Chandigarh. The material for the study consisted of 30 aborted human fetal specimens from 12th to 28th weeks of gestational ages. The specimens were provided by the department of Obstetrics & Gynaecology Government Medical College & Hospital, Chandigarh for routine fetal autopsy. All fetuses were result of the intra uterine death or spontaneous abortion. Consent for autopsy and brief antenatal, medical, past history from the mother was taken from the parents to perform the study.

The fetuses were divided into four groups according to the gestational age:-

GROUPS	GESTATIONAL AGE	NUMBER OF FETUSES
A	11-15 weeks	5
B	>15-20 weeks	9
C	>20-25 weeks	10
D	>25 weeks	6

For all fetuses, the Crown Rump Length (CRL) was measured.

The right and left kidneys were measured in 30 fetuses from the gestational age of 12th to 28th weeks. Linear measurements were taken with the help of vernier caliper, divider and compass. All the measurements were taken thrice and then average of them was taken.

The following morphological measurements were taken on kidney: (Fig: 1)

- 1) Length (l): The length was measured from the superior pole to inferior pole.
- 2) Breadth (b): The breadth was measured as the widest distance at the hilum.
- 3) Thickness (t): The thickness was measured at the region of maximum anterior and posterior diameter

Means of various measurements of fetal kidney, for each group were taken. A graph was plotted with gestational age on x axis and measurements of length, breadth and thickness in millimeters on y axis.

Statistic evaluation- Statistical analysis was carried out using Statistical Package for Social Sciences (SPSSInc; Chicago, IL, version 15.0 for windows).All quantitative variables were estimated using measures of central location (mean, median) and measures of dispersion (standard error and standard deviation) and the data were presented in form of figures and tables. Correlation of each parameter with crown rump length was calculated using Pearson's correlation coefficient. Mann-Whitney U test was used to note sexual dimorphism. P value of <0.05 was considered significant.

III. OBSERVATIONS AND RESULT

The following measurements were taken respectively for kidney:-

LENGTH- There was a constant and linear increase in the length of right and left kidney from >15 week to >30 weeks of gestation. The total increase in right kidney length in group D was 2.47 times than that observed in group A. The total increase in left kidney length in group D was 2.38 times than that observed in group A. It was observed that rate of increase in length of kidney was more on right side.

The line graph plotted between the mean length of kidney showed a sharp increase in length seen in group B-C. The line graph plotted overlapped on each other in group C-D, due to there similar growth pattern (Fig 2).

BREADTH- The total increase in right kidney breadth in group D was 2.63 times than that observed in group A whereas left kidney breadth in group D was 2.72 times than that observed in group A. However, the breadth of kidney was more on left side.

The line graph plotted between the mean breadth of kidney showed a sharp increase in breadth seen in group B-C. The line graph overlapped on each other in group C-D and B-C (Fig 3).

THICKNESS- There was a constant increase in the thickness of right kidney. However the increase was not uniform in various gestational age groups. The total increase in right kidney thickness in group D was 2.80 times than that observed in group A whereas in left kidney thickness in group D was 2.72 times than that observed in group A. It was observed that rate of increase in thickness of kidney was more on right side.

As plotted in the line graph there is parallel increase of thickness in group A-B. There is growth spurt seen in group B-C. (Fig 4).

From the above observations it is obvious that the growth of kidney was seen to be proportional to gestational age. Maximum growth of kidney was observed from group B to C, thereby

implying that there is a sudden spurt in the growth in these age groups.

The percentage increase in length of left kidney from 11th to 30th week of gestation was 57.8% (23.7-9.93/23.7) and was seen to be more than right kidney 59.53%.

Similarly, the total increase in the breadth of left kidney was 7.5 mm and right kidney was 7.04 mm. The percentage increase in left kidney was 63.23% (11.86-4.36/11.86)and was seen to be more than right kidney 59.7% (11.78-4.74/11.78).

The increase in thickness of left kidney was 7.35 mm and right kidney was 7.78mm. The percentage increase in left kidney was 63.30% (11.61-4.26/11.61)and was seen to be less than right kidney 64.4% (12.08-4.3/12.08).

IV. DISCUSSION

Some of previous studies have been done from ultrasound measurements. Only few studies have been conducted by direct measurements of the fetal kidney for the accurate estimation of the gestational age.

Few studies²⁻⁵ are available in the literature regarding dimensions of fetal kidney for comparison with the data of the present study.

Previous study on morphometry of fetal suprarenal gland was done by the same author so its morphometric comparison was done with the kidney. It was found out that length of right kidney was increasing at a faster pace than the right suprarenal length whereas the thickness of right kidney was > 2 times than that of right suprarenal gland. Length and thickness of left kidney are < 2 times that of suprarenal gland. Breadth of right and left kidney was less than that of right suprarenal gland in all the age groups. There was a significant linear correlation of length, breadth, thickness of both the glands. Peak growth of both the glands was seen from group B-C.

Damen et al² calculated the length of suprarenal gland in relation to length of the kidney. A strong linear correlation between suprarenal and kidney length was found. According to them length of suprarenal gland was on an average 27% of that of kidney and this relation remained constant with increased gestational age or kidney size but no study on correlation of breadth and thickness was found.

Vlajkovic et al³ found out found out that the period from 14th to 16th week of intrauterine life was the fastest period of kidney growth during fetal development. In our study peak growth of both the glands was seen from group B-C.

Jovevska et al⁴ measured the length, breadth, thickness and volume of 60 extracted kidney en bloc. The kidneys were analysed both anatomically and echotomographically; the authors opined that the parameters of both kidneys have almost the same value and also there is no significant difference between male and female fetuses. According to them the mean length of the left kidney was 2.036 cm and right 2.055cm. The width was 1.038cm and 1.045cm in both left and right kidneys respectively. The volume of both the kidneys were 0.693 and 0.790 respectively. However mean values calculated by the authors from the fetuses of 18-31 weeks with no division in different age groups.

In our study the length of kidney showed an increase of 9.4 mm from group A to 23.65 mm in group D. The increase in length from group B to C was less in our study compared to other

studies. All the observed lengths in our study were less compared to other studies. However, sudden increase in length was noticed in group C which is in accordance with other studies, peak growth was observed from group B-C. The breadth of kidney in the present study increased from 4.5 mm in group A to 11.82 mm in group D. Thus an increase of 7.32mm was observed from group A-D. The increase in breadth from group C to D was less (0.66) in the present study when compared to study done by Kansaria et al (2.2mm)⁵.

In the present study increase in thickness of 1.79 mm was observed from group C-D. The thickness was less in our study when compared to study done by Kansaria et al. Values in the present study are comparatively lower than the other studies^{6,7,8}. The difference in values could be because of difference in race, technique& observer's bias cannot be ruled out.

V. CONCLUSION

The present study established a significant and positive correlation between the length,breadth and thickness of kidney. All the parameters were correlated to one another.Based on the present study the normal standard of renal development is set and pathological changes are possible to define.Morphological characteristics of fetal kidney would give a clue to elucidate pathogenesis of abnormal kidney.

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Government Medical College& Hospital, Chandigarh

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AUTHORS

First Author – Khayati Sant Ram, MBBS,MD. Dept. of Anatomy,Post Graduate institute of medical education and research, Chandigarh, INDIA

Second Author – Mahesh Sharma , MBBS,MD Dept. of Anatomy, Government Medical College& Hospital Chandigarh, INDIA.

Third Author – Anshu Sharma, MBBS,MD Dept. of Anatomy, Government Medical College& Hospital, Chandigarh, INDIA

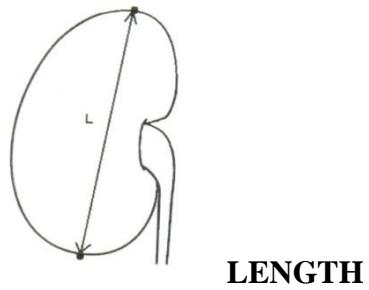
Fourth Author – Kanchan Kapoor, MSC,PHD Dept. of Anatomy, Government Medical College& Hospital, Chandigarh, INDIA

Fifth Author – Kunal Chawla, MBBS,MD Dept. of Anatomy,Post Graduate institute of medical education and research, Chandigarh, INDIA

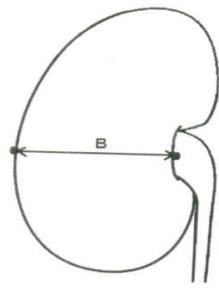
Sixth Author – Richa Gupta, MBBS Dept. of Anatomy,Post Graduate institute of medical education and research, Chandigarh, INDIA

Seventh Author – Daisy Sahni, Msc,PHD Dept. of Anatomy,Post Graduate institute of medical education and research, Chandigarh, INDIA

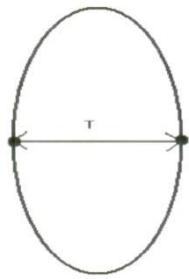
Correspondence Author – Khayati Sant Ram, Institution: Dept.: Dept of Anatomy, post graduate institute of medical education and research, chandigarh, india, City: Chandigarh Country :India, E-mail: khayati_santram@yahoo.com



LENGTH



BREADTH



THICKNESS

FIGURE 1:-ANATOMICAL PARAMETERS MEASURED ON KIDNEY ON EACH SPECIMEN:-LENGTH (L), BREADTH (B), THICKNESS (T)

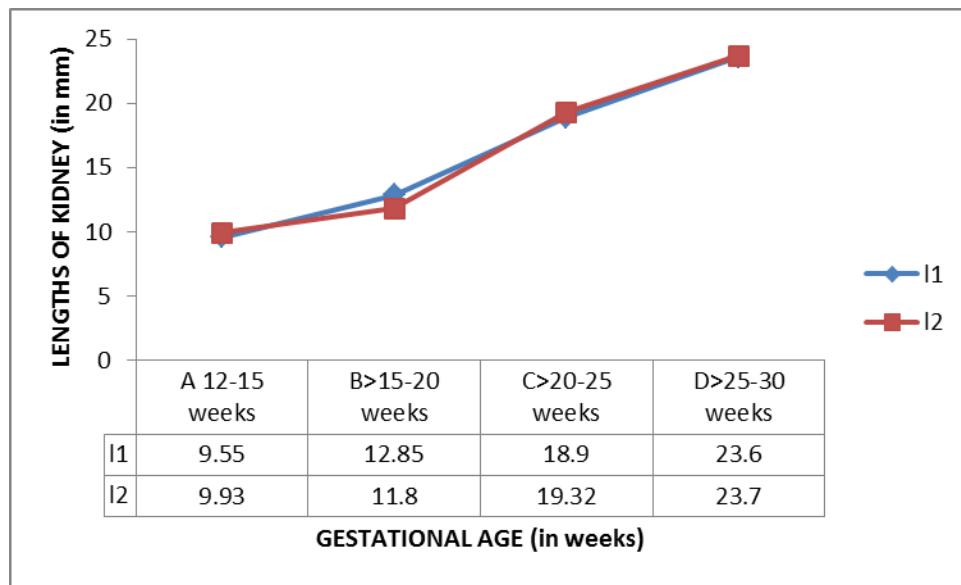


FIGURE 2: INCREASE IN RIGHT AND LEFT LENGTHS OF KIDNEY IN DIFFERENT AGE GROUPS

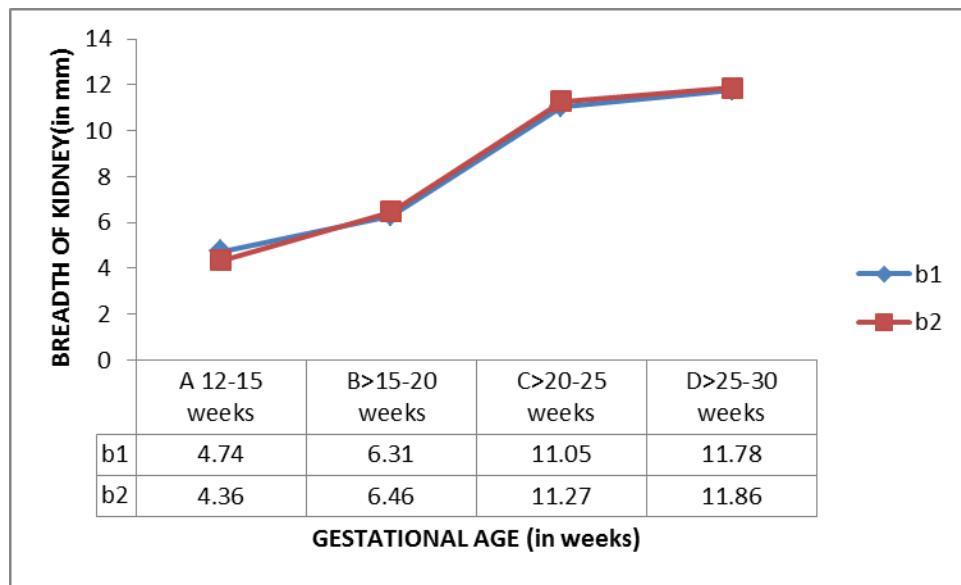


FIGURE 3: INCREASE IN RIGHT AND LEFT KIDNEY BREADTH IN DIFFERENT AGE GROUPS

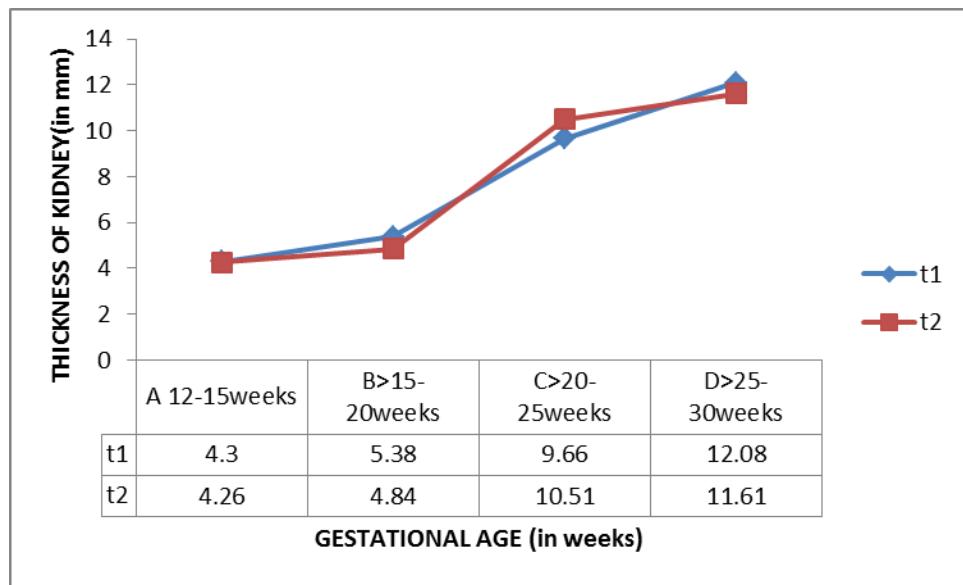


FIGURE 4: INCREASE IN RIGHT AND LEFT KIDNEY THICKNESS IN DIFFERENT AGE GROUPS

Clinical evaluation of post traumatic cataract in tertiary care hospital

Dr(Prof) U. Srivastava*, Dr. Regina Lalramhluni**, Dr. Preeti Rawat **, Dr(prof) V. Bhaisare **

* Professor & Head, Dept. of Ophthalmology, MGM Medical College, Indore

** Resident, Dept. of Ophthalmology, MGM Medical College, Indore

** Associate Professor Dept. of Ophthalmology, MGM Medical College, Indore

** Professor Dept. of Ophthalmology, MGM Medical College, Indore

Abstract- Purpose: The aim was to present the experience in the management of cases of traumatic cataract with special reference to age, sex, type of injury, preoperative status of the eye, associated ocular injury, timing of injury and its effect on the final visual outcome.

Methods: 35 eyes of 35 patients who underwent surgery for traumatic cataract were included. Specific information were collected and analysed. The patients underwent necessary ophthalmic and systemic investigations and then underwent cataract surgery. The final visual acuity was assessed at the end of 6 weeks.

Results: Majority of the cases were seen in age group 5-14 years with male preponderance. 54% were penetrating trauma and 46% were blunt trauma. Corneal and iris tissue injuries were the most common associated injuries. Final visual acuity was 6/6-6/18 in 43% of patients, 6/24-3/60 in 31% of patients and less than 3/60 in 26% of patients. The most common late complication was PCO. On comparing final visual outcome among adult and paediatric age group, there was no significant difference. The time interval between injury and intervention had no significant effect on final visual outcome.

Conclusion: Patients with traumatic cataract can have an optional or best possible visual outcome depending upon management and complications.

Index Terms- injury, traumatic cataract, time of intervention, cataract surgery, visual outcome

I. INTRODUCTION

Ocular trauma is the leading cause of unilateral blindness all over the world. Traumatic cataract is a common sequelae of ocular injuries in adults and children. The incidence of ocular injuries varies in different parts of the world. Any prevention strategy requires knowledge of causes of injuries, which may enable more appropriate targeting of resources toward preventing such injuries. For both eye trauma victims the society bears a large potentially preventable burden.

The method used to evaluate the visual outcome in eyes managed for traumatic cataracts and senile cataracts are similar, but the damage to ocular tissues owing to trauma may compromise the visual gain in eyes treated surgically for traumatic cataracts. Hence, the success rate may differ between eyes with these two types of cataract.

Extent of associated damage to anterior and posterior segment, time of intervention, operative and post operative

complications go a long way in determining the ultimate prognosis. The type of trauma, extent of lenticular involvement and associated secondary rise of intraocular pressure are factors of paramount importance which could dictate the exact time of management of cataract.

Based on lenticular opacity, the cataracts are classified as total, membranous, white soft, and rosette type. When there is no clear lens matter between the capsule and nucleus, the cataract was defined as total. When the capsule and organised matter are fused and formed a membrane of varying density, it is defined as a membranous cataract. When loose cortical material is found in the anterior chamber together with a ruptured lens capsule, the cataract is defined as white soft. A lens with a rosette pattern of opacity is classified as a rosette type cataract.

Management of traumatic cataract that results from either blunt or penetrating ocular trauma needs special consideration because of associated injury to ocular and periorbital structures. It is important to study the effect of time interval between injury and first intervention, as the morphology of traumatic cataract is influenced by this interval.

The present study presents the experience in the management of cases of traumatic cataract with special reference to age, aetiology, preoperative status of the eye, time of surgery following trauma, type of surgery and final visual outcome.

II. MATERIAL AND METHODS

In a prospective clinical study, all patients coming to our hospital i.e MYH, indore operated for traumatic cataract between Jan 2013 to July 2014 were enrolled.

SELECTION CRITERIA:-

1. Patients who were cooperative and willing for the surgery were included.
2. Patients with extensive ocular damage were not included

PREOPERATIVE ASSESSMENT:-

1. History

- a) Patients were registered with their name, age, sex and address
- b) Relevant history from the patients was taken regarding
 - Diminution of vision and associated complaints like pain, redness, watering etc with duration.
 - Nature of trauma and associated ocular damage.
 - Time lapse between the occurrence of trauma and institution of treatment recorded.

2. Examination

- a) A comprehensive general examination of all patients was done to rule out any systemic illness.
- b) Ocular examination:
 - Visual acuity (unaided and aided)
 - Retinoscopy (where possible)
 - Detailed anterior segment examination under diffuse illumination and slit lamp microscopy.
 - Tonometry by Schiotz tonometer.
 - Syringing for patency of lacrimal apparatus.
 - Limbal ring x-ray in cases with IOFB for exact localization.
 - USG-B Scan to rule out posterior segment pathology.
 - Keratometry to determine preoperative astigmatism and A-scan to determine power of IOL to be implanted.

3. Surgical procedures undertaken prior to cataract surgery

Corneal or scleral tear – tear repair done as soon as possible under LA or GA and cataract surgery postponed for at least 1 month. However, in some cases simultaneous cataract extraction was done and secondary implantation done at a later date.

4. Management of Traumatic cataract

Depending on condition of lens and status of capsule and zonules

Type of cataract surgery can be of :

- Irrigation and aspiration
- Anterior capsulectomy + irrigation and aspiration
- Lens extraction and vitrectomy
- Phacoemulsification
- SICS
- ICCE
- ECCE
- ECCE + membranectomy

5. Follow up

All patients were regularly followed up at first, second, fourth, sixth post operatively weeks. Parameters recorded were-

- Visual acuity (unaided and aided).
- Retinoscopy and best corrected visual acuity by subjective test.
- IOP with Schiotz tonometer.
- Detailed anterior segment evaluation with Slit lamp.
- Any complications like PCO, iris atrophy etc recorded. Grading of PCO done.
- Keratometry for post operative astigmatism.
- Posterior segment evaluation done by direct and indirect ophthalmoscope.

III. RESULTS

In the current study majority of the cases were seen in 5-15 years with a male preponderance.

Table 1: Age Distribution

Age	No. of patients	Percentage%
0-15	14	40%
15-24	11	31%
25-34	3	9%
35-44	5	14%
>45	2	6%

Table 2: Sex Distribution

Sex	No. of patients	Percentage %
Male	25	71%
Female	10	29%

54% were penetrating trauma and 46% were blunt trauma.
Wooden stick was the most common object causing trauma

Table 3: Type of injury

Type of injury	No. of patients	Percentage %
Penetrating	19	54%
blunt	16	46%

Table 4: Objects causing trauma

Objects causing trauma	No. of patients	Percentage %
Wooden stick	17	49%
Hand and fist	3	8%
Plastic	3	8%
Metallic	6	18%
Fire cracker	1	3%
RTA	1	3%
Acid	1	3%
Brick and stone	3	8%

Associated ocular injuries:

Associated ocular injuries go long way in determining the ultimate visual prognosis in cases of traumatic cataract.

Corneal and iris injuries were the most common associated injury.

Table 5: Associated Ocular Damage

Associated Ocular Damage	No. of patients	Percentage
Corneal (corneoscleral) tear	19	54%
Injury to iris	10	28%
Zonular disruption	02	06%
Corneal opacity	02	06%
Old RD	01	03%

Type of surgery:

Depending on the condition of the eye, the type of surgery done were SICS with PCIOL, SICS with PCIOL and lens extraction with anterior vitrectomy

Table 6: Type of Surgery

Type of Surgery	No. of Eyes	Percentage
SICS with PCIOL	32	91%
SICS with ACIOL	01	3%
Lens extraction with Ant. vitrectomy	02	6%

Final visual outcome compared among adult and paediatric groups:

On comparing final visual outcome among adult and paediatric group, there was no significant difference statistically with a p value of 0.658

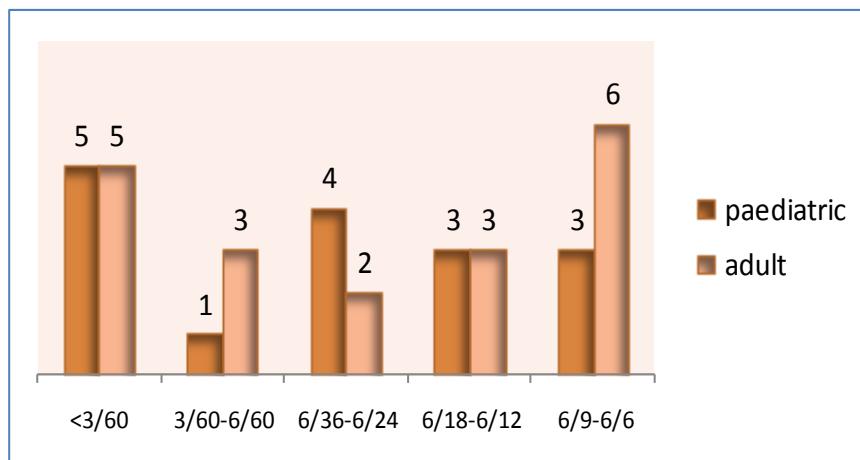


Figure 1: Final visual outcome compared among adult and paediatric group (bar chart)

Effect of time interval between injury and cataract surgery

The time interval between injury and intervention had no significant effect on final visual outcome.

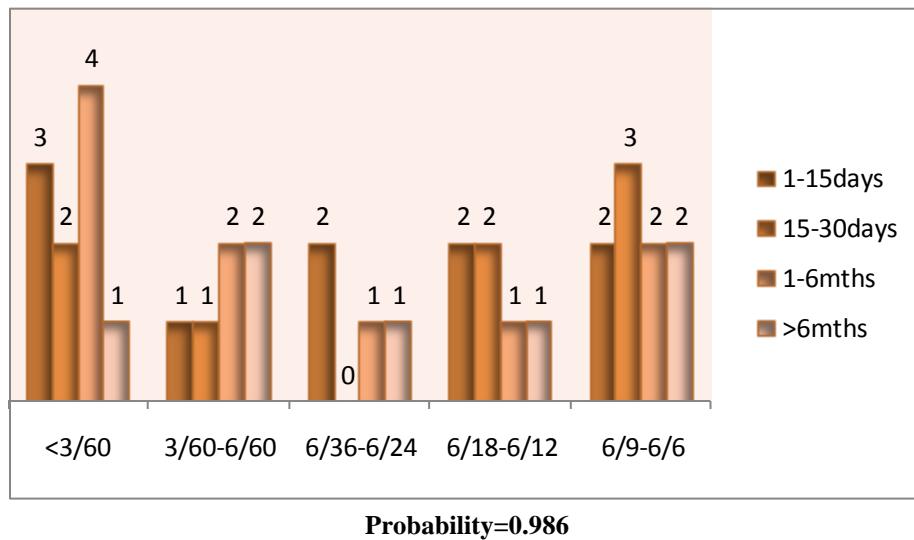


Figure 2: Effect of time interval between injury and cataract surgery (bar chart)

Final visual outcome:

The final visual outcome was 6/6-6/18 in 43% of patients, 6/24-3/60 in 31% of patients and less than 3/60 in 26% of patients

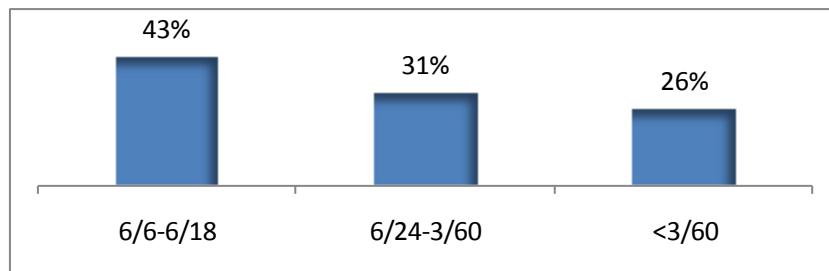


Figure 3: final visual outcome (bar chart)

Comparision of visual outcome between penetrating and blunt injury

In our study though the visual outcome was better in blunt injury, the difference was not statistically significant.

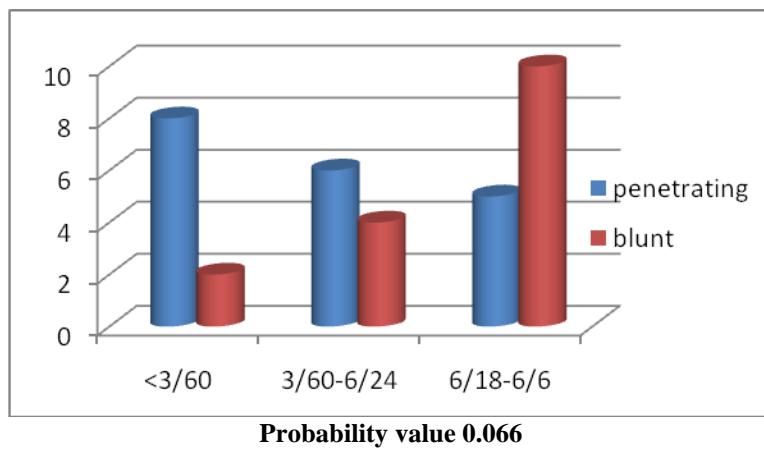


Figure 4: comparison of visual outcome between penetrating and blunt injury.

IV. DISCUSSIONS

- This study included 35 cases of traumatic cataract managed at MYH, Indore
- Male preponderance was found with a male to female ratio of 1:2.5 . It is due to involvement of males in sports and outdoor activities.

- Zaman et al stated that majority(50-64%) of traumatic cataract patients ranged between 5-15 yrs which is consistent with the present finding i.e cases ranged between 1-15yrs
- On comparing our study with different studies regarding regarding the incidence of blunt and penetrating injury, our study is same with other three studies i.e penetrating injury has a higher incidence.

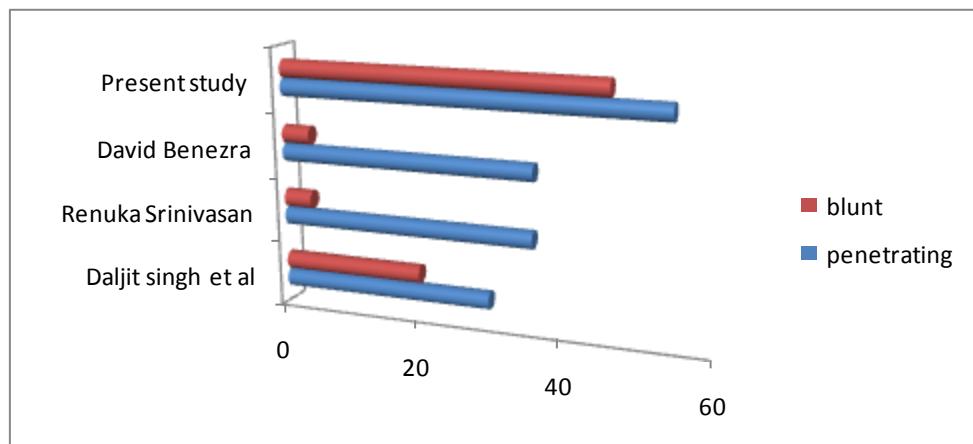


Figure 5: Comparison of incidence of type of injury with other studies (bar chart)

- On comparing the effect of time interval between injury and intervention on the final visual outcome with different studies, our conclusion i.e timing of intervention has no effect on the visual outcome is same with most of the studies except for the study which was conducted by mehul and co-workers in which they found a significant effect on visual outcome.

Table 7: Comparison of effect of time of intervention with other studies.

Studies	Other	Effect of time interval between trauma and intervention on visual outcome
Wos and Mirkiewicz Sieradzka		No effect
Behbehani et al		No effect
Mehul and co-workers		Has significant effect
Present study		No effect

- The major postoperative complication encountered on 1st postoperative day were ant. uveitis and C.odema which responded to medical therapy
- The commonest late postoperative complication was PCO
- Gain et al concluded that postoperative visual acuity depends on complications. The main cause of no

- improvement in VA in the present finding was due to central corneal opacity and high astigmatism
- 32 patients were fitted with PCIOL, and one with ACIOL and two patients were left aphakic.

V. CONCLUSION

In conclusion, in our study males were predominantly affected by traumatic cataract because of their nature of work and outdoor occupation. The age group of 5-25 years formed the core group of people to get traumatic cataract.

Though, in our study most of the patient were fitted with PCIOL and one with ACIOL , newer surgical techniques like PCIOL with capsular tension ring and sclera fixation IOL and other newer technique can be done in complicated cases like zonular dehiscence and/or posterior capsular rupture. The final visual outcome showed good result however the final visual outcome depends upon the extent of associated ocular injuries. Effective Intervention and management are the key points in preventing monocular blindness due to traumatic cataract.

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AUTHORS

First Author – Dr (Prof) U. Srivastava, Professor and Head, MGM Medical College, Indore, ulkasrivastava@yahoo.com .

Second Author – Dr. Regina Lalramhluni, Resident, MGM Medical College, Indore, regina.lrh@gmail.com

Third Author – Dr. Preeti Rawat, Associate Professor, Dept. of Ophthalmology, MGM Medical College, Indore, drpreeti.eye@rediffmail.com

Fourth Author – Dr(Prof) V. Bhaisare, Professor, Dept. of Ophthalmology, MGM Medical College, Indore, drbhaisare@yahoo.co.in

Correspondence Author – Dr. Regina Lalramhluni, regina.lrh@gmail.com , 09893012478.

Screening of *Trichoderma* and antagonistic analysis of a Potential Strain of *Trichoderma* for Production of a Bioformulation.

Dr. Ramanuj Patel * and Deepika Patel **

*Department of Biological Sciences R. D. University, Jabalpur Madhya Pradesh

**Department of Zoology & Biotechnology research lab, Govt. (Auto) Science College Jabalpur Madhya Pradesh

Abstract- Seven different strains of *Trichoderma* are isolated from wilt infected leguminous crops of a Madhya Pradesh state and tested for their antagonistic activity against *Fusarium* (soil borne pathogen) which is expressed as a zone of inhibition in the culture plates. The seven strains are identified as *Trichoderma viride*, *T. harzianum*, *T. asperellum*, *T. koningii*, *T. atroviride*, *T. longibrachiatum*, and *T. virens*. Upon successful identification, morphological description of the isolated strains. This study aims at selecting the best strain of *Trichoderma* species (*Trichoderma viride*) and then preparing a simple bioformulation that is cheap, easy to apply and readily accessible to the farmers. Shelf life of the prepared bioformulation is even checked for 180 days and it is concluded that the number of prop gules start declining from 30th day onwards when the bioformulation is prepared in talc as a carrier material.

Index Terms- Antagonism; Biocontrol agent; *Trichoderma*.

I. INTRODUCTION

The genus *Trichoderma* has its own significance in the agricultural industry due to its varied activities ranging from being a valuable antagonist against the soil-borne pathogens to acting as a provider of nutrition to the soil as well. Several scientists have worked on how this genus acts as a potential biocontrol agent against a range of pathogenic fungi. Harman et al. [1] have even reported *Trichoderma* as opportunistic, avirulent plant symbionts. They have explained the features of *Trichoderma* as to how it colonizes the roots that eventually proves beneficial to the soil in terms of nutrition and plant growth increasing crop productivity simultaneously. The biocontrol activity of *Trichoderma* is of immense importance not only to agriculture and its crops but also the environment as it does not accumulate in the food chain and thus does no harm to the plants, animals and humans [2]. The genes and gene products involved in the biocontrol mechanism of *Trichoderma* provide a vast array of research to the scientists in Biotechnology and Bioinformatics as well. The infrageneric classification by Bisset [3] shows significant morphological similarities between *Trichoderma* and *Hypocrea* and have defined genus *Trichoderma* to include the anamorphs of *Hypocrea*. The morphology of *Trichoderma* spp. is very interesting to study as there are a finite number of morphological descriptors to study and disseminate the genus and its features [4,5]. It is believed that the identification of any microorganism becomes quite easy by a

careful morphological observation; hence, a detailed morphological description of some of the commercially important strains of *Trichoderma* has been carried out in this study. Samuels [6] described the systematics, the sexual stage and the ecology of *Trichoderma* and mentioned in his study that the morphology of *Trichoderma* is not only limited to a few characters but many species may be included in this genus due to their geographical distribution.

Druzhinina and Kubicek [7] studied and brought forth the species concepts and biodiversity in *Trichoderma* and *Hypocrea* by aggregating the morphological, studies and presented an update on the taxonomy and phylogeny of a number of taxa. This helped us in understanding that the identification of *Trichoderma* only on the basis of morphology of high precision. The study now focuses upon developing a strain-specific morphological for the identification of *Trichoderma* species. The study also includes the behavior of these BCAs against fungal wilt pathogens affecting leguminous crops. *Fusarium* wilt causes huge loss to the leguminous crops in India every year ranging from 15 to 20% thereby reducing the production of important legumes. Various management strategies such as use of resistant cultivars are been undertaken to prevent the crops and soils as well from the wilt caused by *Fusarium* as it may last for several years. Thus, it becomes necessary to derive a cheap and better way to fight against the pathogen and increase the crop production. Bioformulation containing *Trichoderma* has emerged as an effective alternative to this problem and thus has been disseminated in this report. But, before preparing a bioformulation with *Trichoderma*, the effect of media, temperature and pH on the growth and sporulation of *Trichoderma* species should be known [12, 13]. *Trichoderma* species, when grown either in PDA within a pH range of 7-7.5 and at an optimum temperature range of 25-30°C gives the best growth and sporulation rates both. Talc-based bioformulation of *Trichoderma* [14] has proven beneficial to the wilt infected leguminous crops but an important aspect to be taken into prior consideration is the shelf life of spores that are present in talc. Various methods and measures are still to be taken that can result in the longevity, competitiveness and survival of *Trichoderma* on fields.

II. MATERIALS AND METHODS

Isolation and selection of strains

Trichoderma strains were isolated from the soil of pulse fields of various districts of Uttar Pradesh (India) and were tested against phytopathogenesis. The most promising isolates were selected for biochemical, molecular and disease suppressiveness tests. Initially, a total of seven strains were identified and were selected for further study. Based on the descriptions of Bissett [3], we classified these fungi as: *Trichoderma* anamorph and *Hypocrea* teleomorph. The isolates were screened for antagonistic activity towards the major soil borne fungi such as *Fusarium solani*, *Rhizoctonia solani*, *Pythium ultimum*, *Macrophomina phaseolina*, *Sclerotinia sclerotiorum*, *Phytophthora*, *Fusarium oxysporum* and *Sclerotium cepivorum* that were previously isolated and identified in the Fungal Germplasm Culture Collection Center Mycological research Laboratory, Department of Biological Sciences Rani Durgawati University Jabalpur Madhya Pradesh, India.

In vitro bioassay

In vitro bioassay was conducted between the *Trichoderma* isolates and the phytopathogenic fungi in petridishes containing PDA. Isolates which showed a marked effect towards pathogens were selected and used for further study. Each *Trichoderma* isolate was separately inoculated into 100 ml Potato Dextrose Broth and incubated at 20°C for 10 days. After incubation, the cultures were filtered through 0.22 mm Millipore filters and the aliquots (2 ml) of these filtrates were placed in sterile petridishes and 25 ml of 1/4 strength PDA at 45°C was added. Once the agar solidified, mycelial discs of the pathogens (7 mm in diameter) obtained from actively growing colonies were placed gently on the centre of the agar plates. The petridishes were incubated at 20°C for 6 days. There were three replicates for each experiment and the growth reduction of the pathogens was recorded. Morphological descriptors such as colony morphology, colony color, colony edge and others of each strain were studied.

Electrophoresis

The amplification products were analyzed by electrophoresis according to Sambrook and Russell [15] in 2% agarose in TAE buffer (for a litre of 50X TAE Stock solution, we used: 242 g Tris Base, 57.1 ml Glacial Acetic Acid and 100 ml 0.5 M EDTA), stained with 0.2 µg/ml ethidium bromide. Nucleic acid

bands were photographed and detected by BioRad Gel Doc system.

Preparation of bioformulation

Talc powder was evaluated as carrier material to produce bioformulation of *Trichoderma* sp. The carrier was dried under sun, powdered (sieve pore, 1mm) and sterilized at 1.05 kg/cm² pressure for 30 min. The substrate was mixed with 7 days old culture of respective *Trichoderma* spp. which were previously grown on potato dextrose agar in 2:1 (solid culture) w/v and CMC 5 gm/kg was added as adjuvant. Fifty grams of such mixture was then filled in polypropylene bags (25x30 cm) tied and stored at 25 ± 2°C. Observations on colony forming units (cfu) of *Trichoderma* spp. was recorded initially and at monthly interval up to 6 months for shelf life study.

Seed treatment

Required quantity of fungicide (Vitavax @ 2 gm/kg seed), insecticide (Chloropyriphos 20 EC @ 8ml/kg seed), biocontrol agent (*Trichoderma viride* @ 4 gm/kg seed) and biofertilizer *Rhizobium* culture @ 1 packet/ acre or 30 gm/kg seeds) along with different combination with 100 seeds of lentil and Chickpea taken from the healthy fields and 100 seeds of lentil and chickpea taken from the infected fields were used for studies.

III. RESULTS AND DISCUSSION

A total of seven isolates of *Trichoderma* species were isolated from the soil of pulse fields of various districts of Uttar Pradesh, India. These include *Trichoderma viride*, *T. harzianum*, *T. asperellum*, *T. koningii*, *T. atroviride*, *T. longibrachiatum* and *T. virens*.

All tested strains in genus *Trichoderma* had high or moderate antagonistic activity towards pathogens expressed as a zone of inhibition and fungal growth reduction by using culture filtrate. Among all isolated strains, *T. harzianum* and *T. viride* were found to be the most effective species against all pathogens. *Trichoderma* strains that were isolated and taken into consideration in this study have been validated and submitted to the Indian Typ

Table 1: Details of *Trichoderma* strains.

Strain No.	Name of Bioagent	FGCC# Accession No	Strain code Source
T1	<i>T. viride</i>	FGCC#2437	(U.P., India)
T2	<i>T. harzianum</i>	FGCC#2245	(U.P., India)
T3	<i>T. asperellum</i>	FGCC#3427	(U.P., India)
T4	<i>T. koningii</i>	FGCC#3121	(U.P., India)
T5	<i>T. atroviride</i>	FGCC#3740	(U.P., India)
T6	<i>T. longibrachiatum</i>	FGCC#3386	(U.P., India)
T7	<i>T. virens</i>	3 FGCC#3315	(U.P., India)

Table 2: Morphological descriptors used for the characterization of native isolates of *Trichoderma* spp.

Name of Strains,	Colony Growth ratecm/day),	Colony color,	Reverse color	Colony edge,	Mycelial form	Mycelial color	Conidiation Conidiophore branching	Conidia wall	Conidial color	Chlamydo spores
<i>T. viride</i>	8-9 in 3 days	Dirty green	Dark greenish	Smooth	Floccose to Arachnoid	Watery white	Ring like zones	Ball like structure	Rough Green	
<i>T. harzianum</i>	8-9 in 3 days	Dark green	Colorless	Wavy	Floccose to Arachnoid	Watery white	Ring like zones	Highly branched, regular	Smooth Dark Green	
<i>T. asperellum</i>	5-6 in 3 days	Snow white	green Orange	Smooth	Floccose Watery	White	Ring like zones	Branched, regular	Smooth Green	
<i>T. koningii</i>	7-8 in 3 days	Dirty green	Yellowish	Smooth	Floccose to Arachnoid	Watery white Ring like zones	Highly branched, regular	Rough Grayish	Green	
<i>T. atroviride</i>	5-6.5 in 3 days	Light dark effuse	Colorless	Effuse	Floccose to Arachnoid	Watery white r	Irregular	Irregular Rough Yellowish	Green	
<i>T. virens</i>	8-9 in 3 days	Snow white	Colorless	Smooth	Floccose to Arachnoid	Watery White	Flat Highly branched, regular	Smooth Dirty	Green	
<i>T. longibrachiatum</i>	8-9 in 4 days	White to green	Colorless	Effuse	Floccose to Arachnoid	Watery white	Circular zones	Rarely rebranched	Smooth	

Morphological description

Morphological study of the *Trichoderma* strains has been done and the characteristics include various parameters such as colony growth rate, colony color, colony edge, mycelial form, growth pattern and speed. Along with morphology of conidia and phialids, conidia color, shape and size etc. were studied for the identification of each strain of the genus *Trichoderma* (Table 2).

Bioformulation and its validation under *in vitro* conditions

Talc-based bioformulation of *Trichoderma* is prepared as it is relatively cheap and easily accessible to farmers for use on fields. It can be stored in plastic bags for long as it has been observed that storing the talc-based bioformulation in plastic bags increases the shelf-life of *Trichoderma* preserving its bioefficiency simultaneously. The shelf life of all the seven isolates was also ascertained at ambient environment prevailing

during a period of 6 months on the basis of spore load per gram. The talc based powder of the bioagent was prepared (*Trichoderma viride* (FGCC#2437) (spore+mycelium) 1.0% w/w+Talc 98.5% w/w+0.5% carboxyl methyl cellulose) and used for shelf life, bioefficacy etc. studies. The talc based bioformulation was stored in LDPE pouches. The powder was dull white in color, pH 7.0, moisture 8% and cfu of 29.7×10^6 . It was found that the bioformulation has good shelf life up to six months and then the spores started declining. Shelf life of *Trichoderma* in talc as a carrier material was determined at a time interval of 30 days that further indicated that the number of propagules started declining from 30th day onwards. Talc-based bioformulation was found to be the best material to retain maximum number of viable propagules i.e., 29.7×10^6 cfu/g at 180 days of storage. It has also been found that the isolates can

retain their viability up to 120 days in all the cases (Figure 3). Under natural conditions, application of talc-based

BCAs, which begins with a safe characterization of biocontrol strains in the new taxonomic schemes of *Trichoderma*, is equally important since the exact identification of strains at the species level is the first step in utilizing the full potential of fungi in specific applications. that *Vitavax* followed by treatment with *Trichoderma viride* were found superiorsolidformulation of *Trichoderma* in soil provides protection against wilt disease in leguminous crops. Higher reduction in wilt was obtained in lentil and pigeon pea crops. As compared with the control and other strains, application of *Trichoderma viride* (FGCC#2437) was more effective in reducing the wilt disease caused by *Fusarium* in Pigeonpea. *Trichoderma* species can act as biocontrol agents through different synergistic mechanisms. However, it is difficult to predict the degree of synergism and the behavior of a BCA in natural system. Considering that the environmental conditions are important, the right selection of Strains of *Trichoderma* can produce extracellular enzymes and antifungal antibiotics, they may also be competitors to fungal pathogens, promote plant growth, and induce resistance in plants. The different pre-sowing seed *Trichoderma* species play an important role in controlling fungal plant pathogens, especially soil borne fungal pathogens.

treatments when taken from healthy fields showed different response for all seven seed quality attributes i.e. germination, root length, shoot length, seedling length, dry weight, vigour index I and vigour index II. The data revealed

The commercial use of *Trichoderma* BCAs must be preceded by precise identification, adequate Formulation and studies about the synergistic effects of their mechanisms of biocontrol. *T. viride* have been reported as the most important BCAs against plant pathogenic fungi. The strain distribution in several genotypes could also support the idea of developing antifungal formulations in which different *Trichoderma* BCAs could be combined. The use of *Trichoderma*-based products is not only safe for the farmers and consumers but it also proves friendly to the environment. The morphological characters of the fungus under study agree very closely with the description given by Vasudeva and Srinivasan [16] and Booth [17]. Cornea et al. [18] found that the allow the confirmation of previous taxonomic determination of *Trichoderma harzianum* (FGCC#2245) and *T. viride*. (FGCC#2437) However, also reported that germination and seedling length along with seedling dry weight are important attributes, which determine the quality of seed of any seed lot. Besides these quality seed parameters seed vigour index also plays very crucial role in predicting the fate of any seed lot under biotic and abiotic stress conditions

Figure 3: Effect of Talc as a carrier on the population of *Trichoderma spp.*

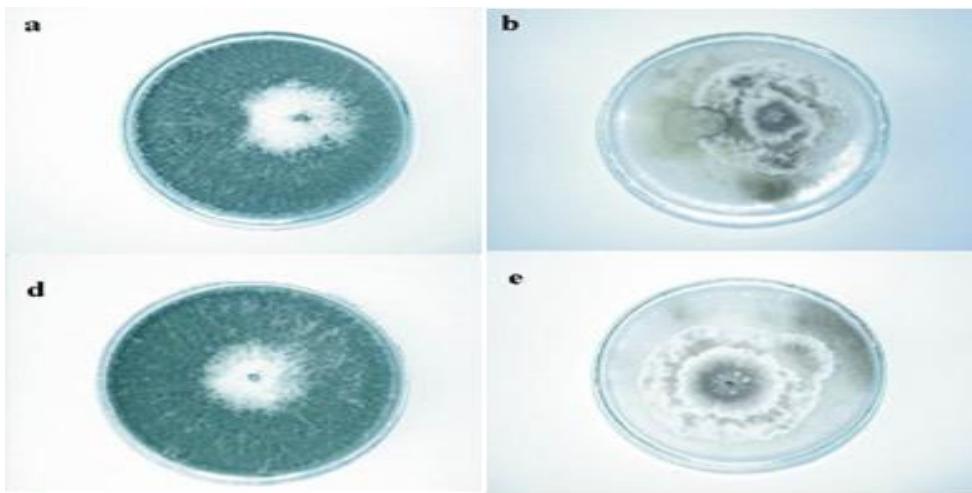


Table3: Evaluation with special reference to the use of pesticides in seed treatment in combination with bioagents.

<i>Trichoderma species</i>	Treatment	Germination %	Root length	Shoot length (cm)	Seedling length (cm)	Dry weight	Vigour index-I	Vigour index-II
<i>Trichoderma viride</i>	86.67 4.41	7.58	11.70	19.28	0.14	1671.00		
<i>Vitavax</i>	85.00 7.31	11.26	18.57	0.13	1578.45	11.05		
<i>Chlorpyrifos</i>	81.00 7.27	8.87	16.14	0.11	1307.34	8.91		
<i>Rhizobium</i>	81.33 6.45	9.69	16.14	0.11	1312.67	8.95		
<i>Trichoderma viride+Vitavax</i>	90.00 7.91	13.08	20.99	0.14	1889.10	12.60		
<i>Trichoderma viride+Chlorpyrifos</i>	77.67 5.90	10.41	16.31	0.11	1266.80	8.54		

<i>Trichoderma viride+Rhizobium</i>	84.33 6.59	9.35	15.94	0.11	1344.22	9.28
<i>Vitavax+Chlorpyriphos</i>	67.67 5.51	9.35	14.86	0.12	1005.58	8.12
<i>Vitavax+Rhizobium</i>	9.73.67	12.75	0.11	939.29	8.10	10.00
<i>Chlorpyriphos+Rhizobium</i>	84.67 3.95	7.16	11.11	0.11	940.68	9.31
<i>Trichoderma viride+Vitavax+Chlorpyriphos</i>	8.34 77.33	6.57	10.85	0.12	1347.09	9.28
<i>Trichoderma viride+Vitavax+Rhizobium</i>	78.33 5.84	8.92	14.76	0.12	1156.15	9.40
<i>Trichoderma viride+Chlorpyriphos+ Rhizobium</i>	80.00 5.57	9.74	15.31	0.11	1224.80	8.80
<i>Vitavax+Chlorpyriphos+Rhizobium</i>	79.33 5.70	8.83	14.53	0.10	1152.66	7.93
<i>Vitavax+Chlorpyriphos+Vitavax+Rhizobium</i>	74.00 5.45	9.05	14.5	1073.00	7.40	0.10
Control	66.33 3.87	7.10	10.97	0.10	727.64	6.63
CD=	5% 5.69	1.22	0.63 1.	72 0.02	321.60	1.81
S.D.	2.79 0.60	0.31	0.86	0.01	157.88	2.03

IV. CONCLUSION

It is concluded from this study that *Trichoderma* has been successfully isolated, identified, characterized and used as an effective biocontrol agent against wilt caused by other pathogenic fungi. The seven strains of *Trichoderma* have been isolated from wilt infected leguminous crops and tested in the laboratory for the identification of pathogens infecting the crops. The strains have been examined morphologically level as well. The effect of enzyme activities during interaction with the pathogen is also counted and the data reveals the best carbon source for the enzyme for its induction. In the end, a talc based bioformulation is prepared that showed beneficial effects when applied on wilt infected crops on pulse fields

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AUTHORS

First Author – Ramanuj Patel Assistant Professor, Department of Biological Sciences, Rani Durgawati University Jabalpur M.P. Jabalpur - drramanujpatel@gmail.com

Second Author – Deepika Patel Ph.D, Department of Zoology & Biotechnology research lab, Govt. (Auto) Science College Jabalpur Madhya Pradesh

Correspondence Author – Dr Ramanuj Patel, email drramanujpatel@gmail.com, +917694036

Coliforms Contamination of Households Drinking Water in some parts of Kano Metropolis, Nigeria.

¹Dalha Wada Taura, ²Auwalu Hassan, ²Musa Dahiru.

¹Department of Microbiology, Bayero University, P.M.B. 3011, Kano-Nigeria.

²Department of Biological Sciences, Federal University, Kashere, P.M.B. 0182, Gombe-Nigeria.

Abstract- The association between water, sanitation, hygiene and health are well known. Many diseases are associated with contaminated water which man consume directly or indirectly through cooking, washing utensils, bathing, etc. Such circumstances results in various infections and diarrheal diseases. The aim of the research was to determine the relationship between hygiene practices and microbiological qualities of household drinking water in some parts of Kano, Nigeria. Coliforms were isolated by using membrane filter method with subsequent cultivation on differential and selective media. A total of 212 water samples were collected and 167 questionnaires were administered to each participating household. Of these 212, 83.0% of water samples used had coliform bacteria. A total of 143 (67.5%) households store their drinking water while only 69 (32.5%) collect and use their water without storage. Post-collection contamination was found to vary according to certain parameters like container used in collection and storage of the water, storage duration, number of children and wives and mode of collection.

Index Terms- *Coliforms, Contamination, Drinking water, Households, Hygiene.*

I. INTRODUCTION

Water is essential to life and health; however, over one billion people worldwide do not have access to safe drinking water (WHO, 2000). Waterborne diseases have been estimated to cause more than two million deaths and four billion cases of diarrhea disease annually (WHO, 2000). Infectious diarrhea is responsible for the greatest burden of this morbidity and mortality (Pruss *et al.*, 2002) and children less than five years of age are the most severely affected (WHO, 2000). In 2001, infectious diseases accounted for an estimated 26% of deaths worldwide (Kindhauser, 2003). Gastro - intestinal water – borne infections are among the most emerging and re-emerging infectious diseases throughout the world. They are infections that affect mainly the stomach and the gastrointestinal tract. They are mostly endemic with a worldwide distribution and they have a heterogeneous aetiology (Onyango and Angienda, 2010). In Africa, it has been estimated that every child has five episodes of diarrhea per year and that 800,000 children die each year from diarrhea and dehydration. According to Wittenberg (1998), infective diarrhea is predominantly a disease of poverty, overcrowding and environmental contamination. He noted that within the southern African subcontinent, large-scale epidemics involving *Shigella dysenteriae* type 1 and *Vibrio cholerae* have occurred. In Nigeria, contaminations of drinking water with pathogens have also been reported in several towns (Biu *et al.*, 2009; Adekunle *et al.*, 2007; Ibrahim *et al.*, 2000). Waterborne outbreaks of enteric disease have occurred either when public drinking water supplies were not adequately treated after contamination with surface water or when surface waters contaminated with enteric pathogens have been used for recreational purpose (Johnson *et al.*, 2003). One of the major strategies for tackling this problem is the installation of protected sources such as boreholes, standpipes or wells to provide water of better quality. However, such communal facilities are located some distance from the home, requiring collection and transport from the source and subsequent storage of water within the household. It has frequently been observed that the microbiological quality of water in vessels in the home is lower than that at the source, suggesting that contamination is widespread during collection, transport, storage and drawing of water (Van Zijl 1966; Lindskog & Lindskog 1988). Clearly, point-of-use water quality is a critical public health indicator (Trevett, *et al.*, 2005; Gundry, *et al.*; 2004). Boiling of drinking water is an intervention in the “domestic domain” of infectious disease transmission.

Ideally, drinking water should not contain any microorganism known to be pathogenic or any bacteria indicative of fecal pollution, since the presence of these microorganisms has been traditionally seen as an indicator of fecal contamination, tests are useful for monitoring the microbiological quality of water used for consumption. Recognition that water is source of pathogenic microorganisms dates back to 1800 A. D. (Doestch, 1960). Because it is very expensive and time consuming to test for all pathogens, it is suggested that a single group of microorganisms that come from the same source as human pathogens can be used to indicate the presence of pathogens (Wyn, *et al.*, 2000).

II. MATERIALS AND METHODS

1.1. Study area

The study was conducted in four local government areas of Kano State viz: Dala, Gwale, Kumbotso and Ungogo within Kano metropolis.

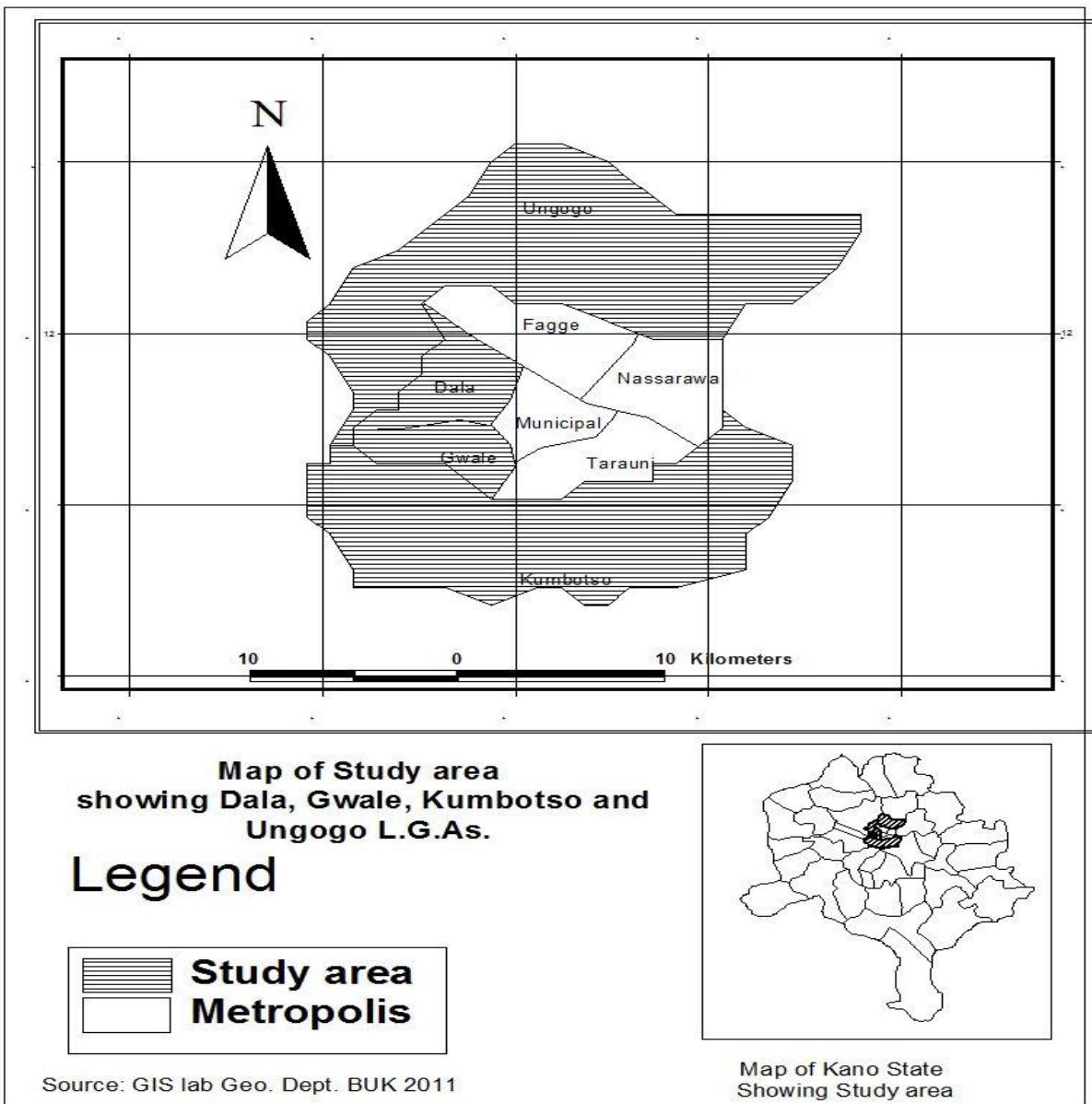


Figure 9: map of Kano metropolis showing study areas.

1.2. Sample size

A total of 212 water samples were collected and 167 questionnaires were administered for the study. Collection of the samples was done in four local governments and in each selected local government; communities were visited very early in the morning before households left the houses.

1.3. Sample collection

Standard method described by American Public Health Association (APHA, 1999) was used for the collection of samples. During collection of samples, in each targeted house, 300ml of water was poured aseptically into 300ml sterilized bottles. For tap water and borehole, the samples were collected by allowing the water to run to waste for 2 or 3 minutes and then aseptically collected in sterile bottles. Water from wells was collected by means of a sterilized bottle fitted with a weight at the base. All samples collected were then labeled with sample number, date of collection, and sample source for analysis purposes, and then sealed. After sampling, a structured questionnaire was administered to each participating household. The questionnaire included variables such as family size, location of the source of water within the house, method of collection, devices used to collect and store water, storage duration and water treatment. Samples collected were then transported to the laboratory in an iced cooler for storage as soon as possible.

1.4. Sample filtration

Membrane filter assembly was set up by inserting the glass funnel bottom in to the opening of arm jar flask. At the side of the flask, there is narrow opening; this was then connected to the vacuum pump machine through rubber tubing. During filtration, membrane filter was placed in to the funnel using sterile forcep. Sample was shaken vigorously at least 25 times up and down to mix the sample and then 100ml of sample for coliforms was poured in to the funnel and the vacuum pump was then turned on to drain the sample through the sterile 47mm, and 0.45µm membrane filters (Whatman, Maidstone, Japan). After filtering the sample, the funnel walls were rinsed three times with 20-30ml of sterile peptone water, then the vacuum pump was turned off and the funnel top was lifted up to remove the membrane filter using sterile forcep and the filter was placed on MacConkey agar, followed by incubation at 35°C for 24hours (APHA, 1999).

1.5. Microbial enumeration

Bacterial colonies from membrane filter on MacConkey (AppliChem Biochemica. Germany) agar were counted based on lactose fermentation (APHA, 1999).

1.6. Isolation and identification of bacteria

After incubation at 35°C for 24hours, colonies were counted based on lactose fermentation. The colonies that appear pink in color were sub cultured by using straight wire loop on to lactose broth as a presumptive test. Colonies that produce gas in the Durham tubes were sub cultured on to Brilliant green lactose bile broth (BGLB) to confirm the presence of coliforms because it suppresses the growth of anaerobic lactose fermenters like *Clostridium perfringens* which may give rise to false positive on MacConkey (APHA, 1999). Colonies that produce gas on BGLB were subjected to biochemical tests to identify the species. Motility-Indole-Ornithine medium was used to detect motility, indole and ornithine production (Macfaddin, 1980). Other biochemical tests such as triple sugar iron agar, Voges – proskauer, citrate, urease and methyl red were also used to differentiate coliforms.

III. RESULTS

Of 167 households studied, 8 (4.79%) had no wife and only 4 (2.4%) had the highest number of wives, that is 4 wives (Table 1). From this table, those with highest number of wives 4 (2.4%) reported the highest level of coliforms contamination 4 (100%) than those with no wife 4 (50%). On the basis of the number of children, out of the 167 households examined, 61 (38.4%) had 0-5 children while only 8 (5.0%) had the highest number of children that is ranging from 21-25. Of the 61 households that have 0-5 children, 32 (52.5%) were contaminated with coliforms while for those with 21-25, out of those 8, only 1 (12.5%) did not report contamination, the rest of the 7 (87.5%) were contaminated (Table 2). In case of location of the source of water within the households, only 72 households had their own private water supply. Of these, 54 (75%) of the sources are some meters away from the source of contamination and 18 (25%) are few meters away from the source of contamination, and out of these, those that are few meters away reported the highest the highest level of contamination 15 (83.3%) than those some meters away 35 (64.8%) (Table 3).

For mode of collection, of the 167 households examined, water collected by children were more contaminated than those collected by self and vendors. In this, out of 65 (38.9%) collected by children, 58 (82.2%) were found to contain coliforms (Table 3). In terms of collection devices, water collected using buckets were found to be less suitable for drinking than those collected using basins and jerry cans in which out of 91 (54.49%), 62 (68.1%) were found to contain coliforms (Table 4). With regards to storage facilities, water stored using buckets reported the highest level of contamination followed by those of clay pots. In this, out of 48 (28.7%) and 51 (30.5%) of those that are stored in buckets and clay pots, 45 (93.8%) and 39 (76.5%) were contaminated with coliforms respectively (Table 5). With respect to storage duration, those that store water within the range of 2 days and above, reported the highest contamination 42 (77.8%) (Table 6).

Table 1. Level of coliforms contamination based on number of wives.

Microorganism	No. of houses (167)											
	Single		1 Wife		2 Wives		3Wives		4Wives		Ps	As
	%	%	%	%	%	%	%	%	%	%		
Coliforms	4 (50)	4 (50) (42.5)	37 (57.5)	50 (70.9)	39 (29.1)	16 (61.5)	8 (38.5)	5 (100)	4 (0)	0 (0)		

Key: Ps = present, As = absent, % = percentage

Table 2: level of coliforms contamination based on number of children.

Microorganisms	No. of houses (167)

	0-5		6-10		11-15		16-20		21-25	
	Ps	As	Ps	As	Ps	As	Ps	As	Ps	As
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Coliforms	32 (52.5)	29 (52.5)	30 (47.6)	33 (52.4)	13 (65.0)	7 (35.0)	5 (71.4)	2 (28.6)	7 (87.5)	1 (12.5)

Table 3. Occurrence of coliforms in relation to location of the source water in houses and mode of collection.

Macroorganisms	Locations (n=72)		Mode of collection (N=167)							
	S. meters (%)	F. meters (%)	Self (%)		Children (%)		Vendors (%)			
	Ps	As	Ps	As	Ps	As	Ps	As	Ps	As
Coliforms	35 (64.8)	19 (35.2) (83.3)	15 (83.3)	3 (16.7)	32(72.7)	12	58 (89.2) (27.3)	7 (10.8)	43(74.1)	15 (25.9)

Key: n = number of households with private water supply.

N = Total number of houses, S. meters = some meters away from the source of contamination only within the household

F. meters = few meters away from the source of contamination only within the household

Table 4. Occurrence of coliforms in relation to collection facilities.

Microorganisms	Devices for collection (N = 167)					
	Bk		Bs		Jr	
	Ps %	As %	Ps %	As %	Ps %	As %
Coliforms	62 (68.1)	29 (31.9)	2 (20)	8 (80)	40 (60.6)	26(39.4)

Key: Bk = Bucket, Bs=Basin, Jr=Jerry can, N = Total number of houses.

Table 5. Occurrence of coliforms in relation to storage facilities.

Microorganisms	Devices for storage (N=167)											
	Ct		Cp		Br		Bk		Jr		Nn	
	Ps	As	Ps	As	Ps	As	Ps	As	Ps	As	Ps	As
Coliforms	3 (75)	1 (25)	39 (76.5)	12 (23.5)	14 (73.7)	5 (26.3)	45 (93.8)	3 (6.3) (71.4)	15 (28.6)	6 (29.2)	7 (29.2)	17 (70.8)

Key: Ct = Cistern, Cp=Clay pot, Br = Barrel, Bk = Bucket, Bs=Basin, Jr=Jerry can, Nn = none, N = Total number of houses.

Table 6: Occurrence of coliforms in relation to storage duration.

Microorganisms	Number of households that store water (n=143)							
	<24 Hours		24 hours		<or>2 days		<1 week	
	Ps (%)	As (%)	Ps (%)	As (%)	Ps (%)	As (%)	Ps (%)	As (%)
Coliforms	2 (66.7)	1 (33.3)	40 (61.5)	25 (38.5)	42 (77.8)	12 (22.2)	18 (85.7)	3 (14.3)

Key: n = number of households that store their water

< = less than, > = greater than

IV. DISCUSSION

In this study, 167 households were examined for the presence of coliforms based on the number of population and their level of hygiene practices and sanitation. From this study, household population had significant influence on the occurrence of microorganisms in drinking water, in that, for household that had highest number of wives (3 and 4) reported the highest level of contamination, this is because all of the four households that had 4 wives reported the occurrence of coliforms and eight out of thirteen households with 3 wives reported the occurrence of coliforms in their drinking water. Number of children also influences the occurrence of microorganisms in drinking water for the fact that as the number of children increases also the occurrence of coliforms increases. This might be associated to the chances for the children to contaminate the drinking water more frequently through their dirty hands. However, there was no significant difference in the quality of water between number of children and wives ($p=0.7791$). In case of location of the source of water within the household, there was statistically significant difference between sources that are some meters and few meters away from the source of contamination, in that sources that are few meters away from the source of contamination were more contaminated than those some meters away from the source of contamination ($p=0.0059$). This might be due to the infiltration of contaminated water (sewage) through cross connection, leakage points and back siphonage. However, some studies have associated the occurrence coliform bacteria with rainfall events (Stukel *et al.*, 1990). This results was not in agreement with the work conducted by Nguendo – yongsi, (2011) in which he reported no significant difference between improve and non improve water sources.

From the results, water collected by children were more contaminated than those collected by households and vendors with significant increase in the occurrence of microorganisms ($p=0.0427$), this could be attributed to the chances of children to contaminate the water with their dirty hands either during collection or on their way to home. The results show that collection devices had significant influence on the quality of water used for drinking. This might be because when comparing water collected using buckets and jerry cans, those collected using buckets were more contaminated than those collected using jerry cans($p=0.01$). This shows that container type is also a strong predictor of fecal contamination. Water is safer from contamination in containers with a small opening than in those with a wide opening (Vanderslice and Briscoe 1993; Jensen *et al.*, 2002; Roverts *et al.*, 2001; Trevett *et al.*, 2004; Deb *et al.*, 1986; Yeager *et al.*, 1991). Fecal contamination increased as water was followed from its sources to drinking water storage containers. In addition, longer storage time implies more opportunity for contamination, because hands and the handle or outer surface of collecting devices frequently carry fecal pathogens. Also Use of uncovered water containers is likely to increase water contamination between source and point-of-use as hands are dipped into vessels to scoop a cupful of water (Chidavaenzi *et al.*, 1998). Furthermore, the decline in water quality between source and household has been shown to be greater when source water is clean (Wright *et al.*, 2004). In comparisons of health impacts due to water source and household level interventions such post-source contamination has been shown to increase diarrhea risk (Clasen *et al.*, 2006). This highlight the need for improved personal and domestic hygiene practices. The detection of these microorganisms might be mainly associated with post treatment contamination from outside sources or from microorganisms growing within biofilms or other materials in the distribution of system (in the case of tap water), or the contamination was from the source. Detection of these organisms could be possible because majority of the households do not treat their drinking water; in fact only one household out of 167 was treating his drinking water after collection. Ideally, in-house water connections would provide chlorinated water directly from the tap to the drinker, eliminating the need for storage. However, as long as water storage remains a fact of life in communities like these; interim measures will be needed to address these problems. In addition, long storage time implies more opportunity for contamination.

V. CONCLUSION AND RECOMMENDATIONS

These results enabled us to understand the relationship between sanitation, hygiene practices and water quality and also show that fecal contamination is becoming common in some part of Kano state, Nigeria. In general, the quality of household water examined was poor and this is an indication that whenever basic sanitation and hygiene are lacking, there is more likely hood of indicator bacteria from feces to be introduced in to stored water. On the basis of these results, the following recommendations are necessary. People should ensure that their source of water is not close to source of contamination (pit latrines or septic tanks); they should ensure effective post collection and storage treatment which will help to reduce significantly the risk of waterborne diseases, there should be effective hygiene and sanitation, when collecting water, effective precautions should be taken in order not to contaminate the water, collection and storage devices should have proper coverings to avoid contamination by wind, and lastly government should intervene in creating awareness to people regarding the dangers associated with waterborne diseases.

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AUTHORS

First Author- Dalha Wada Taura, Department of Microbiology, Bayero University, Kano-Nigeria. dalhawt@gmail.com.

Second Author- Auwalu Hassan, Department of Biological Sciences, Federal University, Kashere, Gombe-Nigeria. auwal_hssn@yahoo.com.

Third Author- Musa Dahiru, Department of Biological Sciences, Federal University, Kashere, Gombe-Nigeria. musahanifa@yahoo.com.

A REVIEW PAPER ON BIG DATA AND HADOOP

Harshawardhan S. Bhosale¹, Prof. Devendra P. Gadekar²

¹Department of Computer Engineering,
JSPM's Imperial College of Engineering & Research, Wagholi, Pune
Bhosale.harshawardhan186@gmail.com

² Department of Computer Engineering,
JSPM's Imperial College of Engineering & Research, Wagholi, Pune
devendraagadekar84@gmail.com

Abstract: The term ‘Big Data’ describes innovative techniques and technologies to capture, store, distribute, manage and analyze petabyte- or larger-sized datasets with high-velocity and different structures. Big data can be structured, unstructured or semi-structured, resulting in incapability of conventional data management methods. Data is generated from various different sources and can arrive in the system at various rates. In order to process these large amounts of data in an inexpensive and efficient way, parallelism is used. Big Data is a data whose scale, diversity, and complexity require new architecture, techniques, algorithms, and analytics to manage it and extract value and hidden knowledge from it. Hadoop is the core platform for structuring Big Data, and solves the problem of making it useful for analytics purposes. Hadoop is an open source software project that enables the distributed processing of large data sets across clusters of commodity servers. It is designed to scale up from a single server to thousands of machines, with a very high degree of fault tolerance.

Keywords -Big Data, Hadoop, Map Reduce, HDFS, Hadoop Components

1. INTRODUCTION

A. Big Data: Definition

Big data is a term that refers to data sets or combinations of data sets whose size (volume), complexity (variability), and rate of growth (velocity) make them difficult to be captured, managed, processed or analyzed by conventional technologies and tools, such as relational databases and desktop statistics or visualization packages, within the time necessary to make them useful. While the size used to determine whether a particular data set is considered big data is not firmly defined and continues to change over time, most analysts and practitioners currently refer to data sets from 30-50 terabytes(10 12 or 1000 gigabytes per terabyte) to multiple petabytes (1015 or 1000 terabytes per petabyte) as big data. Figure No. 1.1 gives Layered Architecture of Big Data System. It can be decomposed into three layers, including Infrastructure Layer, Computing Layer, and Application Layer from top to bottom.

B. 3 Vs of Big Data

Volume of data: Volume refers to amount of data. Volume of data stored in enterprise repositories have grown from megabytes and gigabytes to petabytes.

Variety of data: Different types of data and sources of data. Data variety exploded from structured and legacy data stored in enterprise repositories to unstructured, semi structured, audio, video, XML etc.

Velocity of data: Velocity refers to the speed of data processing. For time-sensitive processes such as

catching fraud, big data must be used as it streams into your enterprise in order to maximize its value.

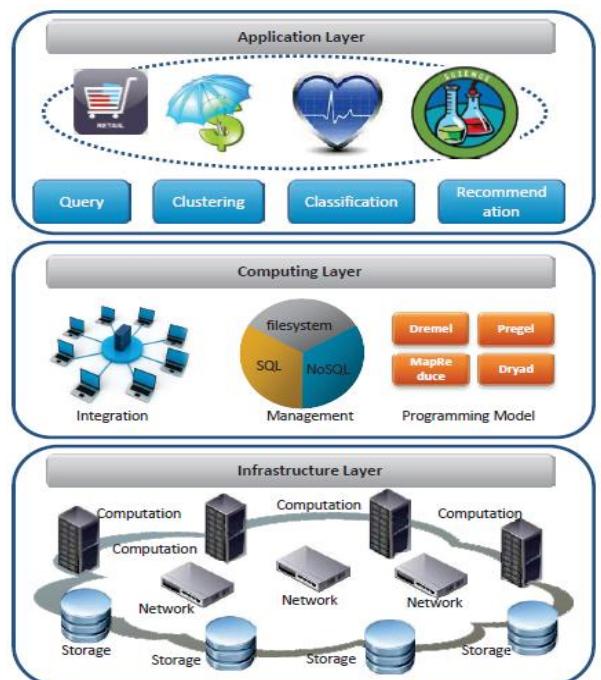


Figure 1: Layered Architecture of Big Data System

C. Problem with Big Data Processing

i. Heterogeneity and Incompleteness

When humans consume information, a great deal of heterogeneity is comfortably tolerated. In fact, the nuance and richness of natural language can provide valuable depth. However, machine analysis algorithms expect homogeneous

data, and cannot understand nuance. In consequence, data must be carefully structured as a first step in (or prior to) data analysis. Computer systems work most efficiently if they can store multiple items that are all identical in size and structure. Efficient representation, access, and analysis of semi-structured data require further work.

ii. Scale

Of course, the first thing anyone thinks of with Big Data is its size. After all, the word “big” is there in the very name. Managing large and rapidly increasing volumes of data has been a challenging issue for many decades. In the past, this challenge was mitigated by processors getting faster, following Moore’s law, to provide us with the resources needed to cope with increasing volumes of data. But, there is a fundamental shift underway now: data volume is scaling faster than compute resources, and CPU speeds are static.

iii. Timeliness

The flip side of size is speed. The larger the data set to be processed, the longer it will take to analyze. The design of a system that effectively deals with size is likely also to result in a system that can process a given size of data set faster. However, it is not just this speed that is usually meant when one speaks of Velocity in the context of Big Data. Rather, there is an acquisition rate challenge

iv. Privacy

The privacy of data is another huge concern, and one that increases in the context of Big Data. For electronic health records, there are strict laws governing what can and cannot be done. For other data, regulations, particularly in the US, are less forceful. However, there is great public fear regarding the inappropriate use of personal data, particularly through linking of data from multiple sources. Managing privacy is effectively both a technical and a sociological problem, which must be addressed jointly from both perspectives to realize the promise of big data.

v. Human Collaboration

In spite of the tremendous advances made in computational analysis, there remain many patterns that humans can easily detect but computer algorithms have a hard time finding. Ideally, analytics for Big Data will not be all computational rather it will be designed explicitly to have a human in the loop. The new sub-field of visual analytics is attempting to do this, at least with respect to the modeling and analysis phase in the pipeline. In today’s complex world, it often takes multiple experts from different domains to really understand what is going on. A Big Data analysis system must support input from multiple human experts, and shared exploration of results. These multiple experts may be separated in space and time when it is too expensive to assemble an entire team together in one room. The data system has to accept this distributed expert input, and support their collaboration.

2. Hadoop: Solution for Big Data Processing

Hadoop is a Programming framework used to support the processing of large data sets in a distributed computing environment. Hadoop was developed by Google’s MapReduce that is a software framework where an application break down into various parts. The Current Appache Hadoop ecosystem

consists of the Hadoop Kernel, MapReduce, HDFS and numbers of various components like Apache Hive, Base and Zookeeper. HDFS and MapReduce are explained in following points.

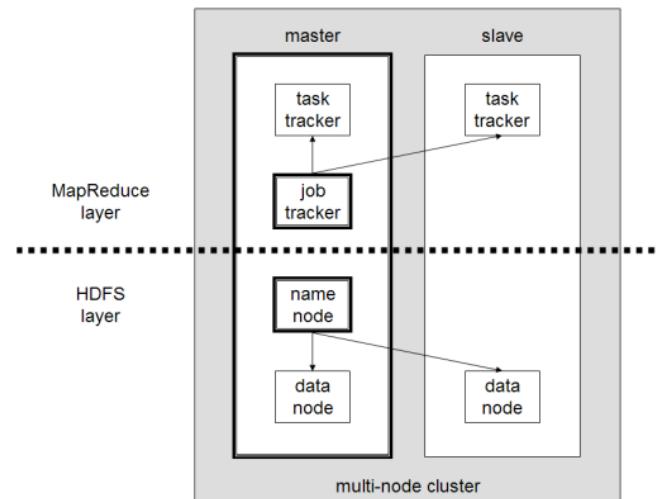


Figure 2: Hadoop Architecture

A. HDFS Architecture

Hadoop includes a fault-tolerant storage system called the Hadoop Distributed File System, or HDFS. HDFS is able to store huge amounts of information, scale up incrementally and survive the failure of significant parts of the storage infrastructure without losing data. Hadoop creates clusters of machines and coordinates work among them. Clusters can be built with inexpensive computers. If one fails, Hadoop continues to operate the cluster without losing data or interrupting work, by shifting work to the remaining machines in the cluster. HDFS manages storage on the cluster by breaking incoming files into pieces, called “blocks,” and storing each of the blocks redundantly across the pool of servers. In the common case, HDFS stores three complete copies of each file by copying each piece to three different servers.

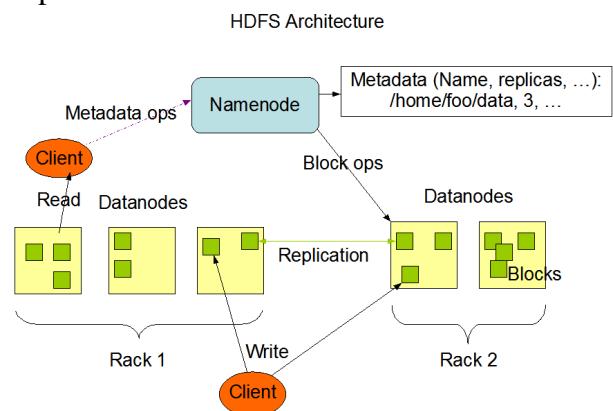


Figure 3: HDFS Architecture

B. MapReduce Architecture

The processing pillar in the Hadoop ecosystem is the

MapReduce framework. The framework allows the specification of an operation to be applied to a huge data set, divide the problem and data, and run it in parallel. From an analyst's point of view, this can occur on multiple dimensions. For example, a very large dataset can be reduced into a smaller subset where analytics can be applied. In a traditional data warehousing scenario, this

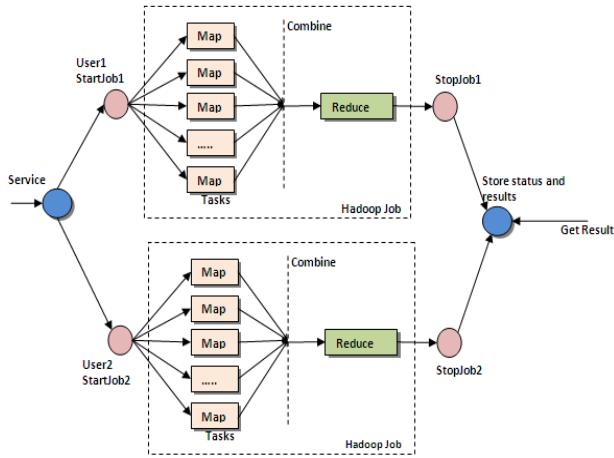


FIGURE 4: MAPREDUCE ARCHITECTURE

might entail applying an ETL operation on the data to produce something usable by the analyst. In Hadoop, these kinds of operations are written as MapReduce jobs in Java. There are a number of higher level languages like Hive and Pig that make writing these programs easier. The outputs of these jobs can be written back to either HDFS or placed in a traditional data warehouse. There are two functions in MapReduce as follows:

map – the function takes key/value pairs as input and generates an intermediate set of key/value pairs

reduce – the function which merges all the intermediate values associated with the same intermediate key

3. LITERATURE REVIEW

S. Vikram Phaneendra & E. Madhusudhan Reddy et.al. Illustrated that in olden days the data was less and easily handled by RDBMS but recently it is difficult to handle huge data through RDBMS tools, which is preferred as "big data". In this they told that big data differs from other data in 5 dimensions such as volume, velocity, variety, value and complexity. They illustrated the hadoop architecture consisting of name node, data node, edge node, HDFS to handle big data systems. Hadoop architecture handle large data sets, scalable algorithm does log management application of big data can be found out in financial, retail industry, health-care, mobility, insurance. The authors also focused on the challenges that need to be faced by enterprises when handling big data: - data privacy, search analysis, etc [1].

Kiran kumara Reddi & Dnvs1 Indira et.al. Enhanced us with the knowledge that Big Data is combination of

structured , semi-structured ,unstructured homogenous and heterogeneous data .The author suggested to use nice model to handle transfer of huge amount of data over the network .Under this model, these transfers are relegated to low demand periods where there is ample ,idle bandwidth available . This bandwidth can then be repurposed for big data transmission without impacting other users in system. The Nice model uses a store –and-forward approach by utilizing staging servers. The model is able to accommodate differences in time zones and variations in bandwidth. They suggested that new algorithms are required to transfer big data and to solve issues like security, compression, routing algorithms [2].

Jimmy Lin et.al. used Hadoop which is currently the large –scale data analysis “ hammer” of choice, but there exists classes of algorithms that aren’t “ nails” in the sense that they are not particularly amenable to the MapReduce programming model . He focuses on the simple solution to find alternative non-iterative algorithms that solves the same problem. The standard MapReduce is well known and described in many places .Each iteration of the pagerank corresponds to the MapReduce job. The author suggested iterative graph, gradient descent & EM iteration which is typically implemented as Hadoop job with driven set up iteration &Check for convergences. The author suggests that if all you have is a hammer, throw away everything that’s not a nail [3].

Wei Fan & Albert Bifet et.al. Introduced Big Data Mining as the capability of extracting Useful information from these large datasets or streams of data that due to its Volume, variability and velocity it was not possible before to do it. The author also started that there are certain controversy about Big Data. There certain tools for processes. Big Data as such hadoop, strom, apache S4. Specific tools for big graph mining were PEGASUS & Graph. There are certain Challenges that need to death with as such compression, visualization etc.[4].

Albert Bifet et.al. Stated that streaming data analysis in real time is becoming the fastest and most efficient way to obtain useful knowledge, allowing organizations to react quickly when problem appear or detect to improve performance. Huge amount of data is created everyday termed as “ big data”. The tools used for mining big data are apache hadoop, apache big, cascading, scribe, storm, apache hbase, apache mahout, MOA, R, etc. Thus, he instructed that our ability to handle many exabytes of data mainly dependent on existence of rich variety dataset, technique, software framework [5].

Bernice Purcell et.al. Started that Big Data is comprised of large data sets that can't be handle by traditional systems. Big data includes structured data, semi-structured and unstructured data. The data storage technique used for big data includes multiple clustered network attached storage (NAS) and object based storage. The Hadoop architecture is used to process unstructured and semi-structured using map reduce to locate all relevant data then select only the data directly answering the query. The advent of Big Data has posed opportunities as well challenges to business [6].

Sameer Agarwal et.al. Presents a BlinkDB, a approximate query engine for running interactive SQL queries on large volume of data which is massively parallel. BlinkDB uses two key ideas: (1) an adaptive optimization framework that builds

and maintains a set of multi-dimensional stratified samples from original data over time, and (2) A dynamic sample selection strategy that selects an appropriately sized sample based on a query's accuracy or response time requirements [7].

Yingyi Bu et.al. Used a new technique called as HaLoop which is modified version of Hadoop MapReduce Framework, as Map Reduce lacks built-in-support for iterative programs HaLoop allows iterative applications to be assembled from existing Hadoop programs without modification, and significantly improves their efficiency by providing inter-iteration caching mechanisms and a loop-aware scheduler to exploit these caches. He presents the design, implementation, and evaluation of HaLoop, a novel parallel and distributed system that supports large-scale iterative data analysis applications. HaLoop is built on top of Hadoop and extends it with a new programming model and several important optimizations that include (1) a loop-aware task scheduler, (2) loop-invariant data caching, and (3) caching for efficient fix point verification [8].

Shadi Ibrahim et.al. Project says presence of partitioning skew1 causes a huge amount of data transfer during the shuffle phase and leads to significant unfairness on the reduce input among different data nodes In this paper, author develop a novel algorithm named LEEN for locality aware and fairness-aware key partitioning in MapReduce. LEEN embraces an asynchronous map and reduce scheme. Author has integrated LEEN into Hadoop. His experiments demonstrate that LEEN can efficiently achieve higher locality and reduce the amount of shuffled data. More importantly, LEEN guarantees fair distribution of the reduce inputs. As a result, LEEN achieves a performance improvement of up to 45% on different workloads. To tackle all this he presents a present a technique for Handling Partitioning Skew in MapReduce using LEEN [9].

Kenn Slagter et.al. Proposes an improved partitioning algorithm that improves load balancing and memory consumption. This is done via an improved sampling algorithm and partitioner. To evaluate the proposed algorithm, its performance was compared against a state of the art partitioning mechanism employed by Tera Sort as the performance of MapReduce strongly depends on how evenly it distributes this workload. This can be a challenge, especially in the advent of data skew. In MapReduce, workload distribution depends on the algorithm that partitions the data. One way to avoid problems inherent from data skew is to use data sampling. How evenly the partitioner distributes the data depends on how large and representative the sample is and on how well the samples are analyzed by the partitioning mechanism. He uses an improved partitioning mechanism for optimizing massive data analysis using MapReduce for evenly distribution of workload [10].

Ahmed Eldawy et.al. presents the first full-fledged MapReduce framework with native support for spatial data that is spatial data Spatial Hadoop pushes its spatial constructs in all layers of Hadoop, namely, language, storage, MapReduce and operations layers. In the language layer, a simple high level language is provided to simplify spatial data analysis for non-technical users. In the storage layer, a two-layered spatial index structure is provided where the *global* index partitions

data across nodes while the *local* index organizes data in each node. This structure is used to build a grid index, an R-tree or an R+-tree. Spatial-Hadoop is a comprehensive extension to Hadoop that pushes spatial data inside the core functionality of Hadoop. Spatial Hadoop runs existing Hadoop programs as is, yet, it achieves order(s) of magnitude better performance than Hadoop when dealing with spatial data. SpatialHadoop employs a simple spatial high level language, a two-level spatial index structure, basic spatial components built inside the MapReduce layer, and three basic spatial operations: range queries, k-NN queries, and spatial join. Author presents an efficient MapReduce framework for Spatial Data [11].

Jeffrey Dean et.al. Implementation of MapReduce runs on a large cluster of commodity machines and is highly scalable: a typical MapReduce computation processes many terabytes of data on thousands of machines. Programmers and the system easy to use: hundreds of MapReduce programs have been implemented and upwards of one thousand MapReduce jobs are executed on Google's clusters every day. Programs written in this functional style are automatically parallelized and executed on a large cluster of commodity machines. The runtime system takes care of the details of partitioning the input data, scheduling the program's execution across a set of machines, handling machine failures, and managing the required inter-machine Communication. This allows programmers without any experience with parallel and distributed systems to easily utilize the resources of a large distributed system. Author proposes Simplified Data Processing on Large Clusters [12].

Chris Jermaine et.al. Proposes a Online Aggregation for Large-Scale Computing. Given the potential for OLA to be newly relevant, and given the current interest on very large-scale, data-oriented computing, in this paper we consider the problem of providing OLA in a shared-nothing environment. While we concentrate on implementing OLA on top of a MapReduce engine, many of author's most basic project contributions are not specific to MapReduce, and should apply broadly. Consider how online aggregation can be built into a MapReduce system for large-scale data processing. Given the MapReduce paradigm's close relationship with cloud computing (in that one might expect a large fraction of MapReduce jobs to be run in the cloud), online aggregation is a very attractive technology. Since large-scale cloud computations are typically pay-as-you-go, a user can monitor the accuracy obtained in an online fashion, and then save money by killing the computation early once sufficient accuracy has been obtained [13].

Tyson Condie et.al. propose a modified MapReduce architecture in which intermediate data is pipelined between operators, while preserving the programming interfaces and fault tolerance models of other MapReduce frameworks. To validate this design, author developed the Hadoop Online Prototype (HOP), a pipelining version of Hadoop. Pipelining provides several important advantages to a MapReduce framework, but also raises new design challenges. To simplify fault tolerance, the output of each MapReduce task and job is materialized to disk before it is consumed. In this demonstration, we describe a modified MapReduce architecture that allows data to be pipelined between operators. This extends the MapReduce programming model beyond batch processing, and can reduce completion times and

improve system utilization for batch jobs as well. We demonstrate a modified version of the Hadoop MapReduce framework that supports online aggregation, which allows users to see “early returns” from a job as it is being computed. Our Hadoop Online Prototype (HOP) also supports continuous queries, which enable MapReduce programs to be written for applications such as event monitoring and stream processing [14].

Jonathan Paul Olmsted et.al. Derive the necessary results to apply variation Bayesian inference to the ideal point model. This deterministic, approximate solution is shown to produce comparable results to those from standard estimation strategies. However, unlike these other estimation approaches, solving for the (approximate) posterior distribution is rapid and easily scales to ‘big data’. Inferences from the variation Bayesian approach to ideal point estimation are shown to be equivalent to standard approaches on modestly-sized roll call matrices from recent sessions of the US Congress. Then, the ability of variation inference to scale to big data is demonstrated and contrasted with the performance of standard approaches.[15]

Jonathan Stuart Ward et.al. did a survey of Big data definition, Anecdotally big data is predominantly associated with two ideas: data storage and data analysis. Despite the sudden interest in big data, these concepts are far from new and have long lineages. This, therefore, raises the question as to how big data is notably different from conventional data processing techniques. For rudimentary insight as to the answer to this question one need look no further than the term big data. ‘Big’ implies significance, complexity and challenge. Unfortunately the term ‘big’ also invites quantification and therein lies the difficulty in furnishing a definition. The lack of a consistent definition introduces ambiguity and hampers discourse relating to big data. This short paper attempts to collate the various definitions which have gained some degree of traction and to furnish a clear and concise definition of an otherwise ambiguous term [16].

Albert Bifet et.al. Discuss the current and future trends of mining evolving data streams, and the challenges that the field will have to overcome during the next years. Data stream real time analytics are needed to manage the data currently generated, at an ever increasing rate, from such applications as: sensor networks, measurements in network monitoring and traffic management, log records or click-streams in web exploring, manufacturing processes, call detail records, email, blogging, twitter posts and others. In fact, all data generated can be considered as streaming data or as a snapshot of streaming data, since it is obtained from an interval of time. Streaming data analysis in real time is becoming the fastest and most efficient way to obtain useful knowledge from what is happening now, allowing organizations to react quickly when problems appear or to detect new trends helping to improve their performance. Evolving data streams are contributing to the growth of data created over the last few years. We are creating the same quantity of data every two days, as we created from the dawn of time up until 2003. Evolving data streams methods are becoming a low-cost, green methodology for real time online prediction and analysis [17].

Mrigank Mridul, Akashdeep Khajuria, Snehasish Dutta, Kumar N. et.al did the analysis of big data he stated that Data is generated through many sources like business processes, transactions, social networking sites, web servers, etc. and remains in structured as well as unstructured form . Today's business applications are having enterprise features like large scale, data-intensive, web-oriented and accessed from diverse devices including mobile devices. Processing or analyzing the huge amount of data or extracting meaningful information is a challenging task. The term “Big data” is used for large data sets whose size is beyond the ability of commonly used software tools to capture, manage, and process the data within a tolerable elapsed time. Big data sizes are a constantly moving target currently ranging from a few dozen terabytes to many peta bytes of data in a single data set. Difficulties include capture, storage, search, sharing, analytics and visualizing. Typical examples of big data found in current scenario includes web logs, RFID generated data, sensor networks, satellite and geo-spatial data, social data from social networks, Internet text and documents, Internet search indexing, call detail records, astronomy, atmospheric science, genomics, biogeochemical, biological, and other complex and/or interdisciplinary scientific project, military. Surveillance, medical records, photography archives, video archives, and large-scale ecommerce [18].

Kyong-Ha Lee Hyunsik Choi et.al. Proposes a prominent parallel data processing tool MapReduce survey intends to assist the database and open source communities in understanding various technical aspects of the MapReduce framework. In this survey, we characterize the MapReduce framework and discuss its inherent pros and cons. We then introduce its optimization strategies reported in the recent literature. author also discuss the open issues and challenges raised on parallel data analysis with MapReduce [19].

Chen He Ying Lu David Swanson et.al develops a new MapReduce scheduling technique to enhance map task’s data locality. He has integrated this technique into Hadoop default FIFO scheduler and Hadoop fair scheduler. To evaluate his technique, he compares not only MapReduce scheduling algorithms with and without his technique but also with an existing data locality enhancement technique (i.e., the delay algorithm developed by Facebook). Experimental results show that his technique often leads to the highest data locality rate and the lowest response time for map tasks. Furthermore, unlike the delay algorithm, it does not require an intricate parameter tuning process [20].

4. Other Components of Hadoop

The Table 1, Comparison among Components of Hadoop, gives details of different Hadoop Components which have been used now days. HBase, Hive, MongoDB, Redis, Cassandra and Drizzle are the different components. Comparison among these components is done on the basis of Concurrency, Durability, Replication Method, Database Model and Consistency Concepts used in the components.

Table 1: Comparison among Components of Hadoop

Name	HBase	Hive	MongoDB	Redis	Cassandra	Drizzle
Description	Wide-column store based on Apache Hadoop and on concepts of Big Table	Data Warehouse Software for Querying and Managing Large Distributed Datasets	One of the most popular Document Stores	In-memory Database with configurable options performance vs. persistency	Wide-column store based on ideas of BigTable and DynamoDB	MySQL fork with a pluggable micro-kernel and with an emphasis of performance over compatibility
Implementation language	Java	Java	C++	C	Java	C++
Database Model	Wide Column Store	Relational DBMS	Document Store	Key – Value Store	Wide Column Store	Relational DBMS
Consistency Concepts	Immediate Consistency	Eventual Consistency	Eventual Consistency, Immediate Consistency	-	Eventual Consistency, Immediate Consistency	-
Concurrency	Yes	Yes	Yes	Yes	Yes	Yes
Durability	Yes	Yes	Yes	Yes	Yes	Yes
Replication Method	Selected Replication factor	Selected Replication factor	Master – Slave Replication	Master – Slave Replication	Selected Replication factor	Master – Master Replication, Master – Slave

5. Conclusion

We have entered an era of Big Data. The paper describes the concept of Big Data along with 3 Vs, Volume, Velocity and variety of Big Data. The paper also focuses on Big Data processing problems. These technical challenges must be addressed for efficient and fast processing of Big Data. The challenges include not just the obvious issues of scale, but also heterogeneity, lack of structure, error-handling, privacy, timeliness, provenance, and visualization, at all stages of the analysis pipeline from data acquisition to result interpretation. These technical challenges are common across a large variety of application domains, and therefore not cost-effective to address in the context of one domain alone. The paper describes Hadoop which is an open source software used for processing of Big Data.

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