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Quo Vadis Ultimum Remedium in Tax Criminal Crimes In Indonesia

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Abstract - Tax Revenue is a mandatory contribution that is paid by the people to the state without direct contradiction and will be used for the benefit of the government and the general public Mardiasmo (2011). According to Siti Resmi (2013) tax has two important functions in a country's economy. First, taxes are a source of government funding for development, both the central and regional governments. Both taxes function as tools that govern government policies in the socio-economic field. Tax revenue has increased significantly both in nominal and percentage amounts to total state revenue. On the other hand the percentage of taxpayers is still very small when compared to the total population in Indonesia. This shows the awareness of the people of Indonesia to pay taxes is still low. The responsibility for tax payment obligations, as a reflection of the legal obligations in the field of taxation, rests with the community members themselves to fulfill these obligations. This is in accordance with the self assessment system adopted by the Indonesian Taxation System. The government, in this case the Directorate General of Taxes, in accordance with its function is obliged to conduct guidance / counseling, service, and supervision. In carrying out these functions, the Directorate General of Taxation tries its best to provide services to the public in accordance with the vision and mission of the Directorate General of Taxes. Ultimum Remedium is one of the principles contained in Indonesian criminal law which says that criminal law should be made a final effort in the case of law enforcement. This has meaning if a matter can be resolved through other lines (family, negotiation, mediation, civil, or administrative law) should the passage be passed. Tax Criminal Law Arrangement based on Law Number 28 Year 2007 regarding General Provisions and Tax Procedures along with the Implementing Regulations. These Regulations have been in place since 2008 so there is a need for changes, especially related to the era of Information technology in Business transactions The application of Ultimum Remedium in Taxation Crimes in Indonesia does not provide a legal certainty for taxpayers, because the regulation instrument has uncertainty in its application whether to use the Ultimum Remedium Principle or Premum Remedium, this is because the Directorate General of tax has a very broad authority related to granting Criminal sanctions or administrative sanctions.

Index Terms- Tax Payer, Self Assessment, Tax Criminal, Ultimum Remedium

I. INTRODUCTION

Tax Revenue is a mandatory contribution that is paid by the people to the state without direct contradiction and will be used for the benefit of the government and the general public Mardiasmo (2011). According to Siti Resmi (2013) tax has two important functions in a country's economy. First, taxes are a source of government funding for development, both the central and regional governments. Both taxes function as tools that govern government policies in the socio-economic field. Tax revenue has increased significantly both in nominal and percentage amounts to total state revenue. On the other hand the percentage of taxpayers is still very small when compared to the total population in Indonesia. This shows the awareness of the people of Indonesia to pay taxes is still low.

According to Widayati and Nurlis who in the research of Ramadiansyah, Sudjana, & Dwiatmanto (2014) outline several forms of taxpaying awareness that encourage taxpayers to pay taxes, one of which is the awareness that taxation is a form of participation in supporting state development. Public understanding of tax regulations is very important, it will encourage public awareness, especially taxpayers to fulfill their tax obligations. This is in line with the results of research by Masrurroh Siti & Zulaikha (2013) which states that the knowledge and understanding of tax regulations is the process of taxpayers knowing and applying that knowledge to pay taxes.

Tax has a very important role in the life of the state, especially in the implementation of development because the tax is a source of state revenue to finance all expenses including development expenses. On the other hand taxes are also very important in

regulating economic growth through tax policy. On the other hand taxes have a very important role in the life of the state, taxes have several functions, including:

1. Budget function, which is a tax used as a tool for optimally entering funds into the state treasury based on applicable tax laws, so that the tax functions to finance all expenses related to government processes. The tax is used for routine financing, such as: employee expenditure, goods expenditure, maintenance, and others. For development financing, money is spent on government savings, i.e. domestic revenues minus routine expenses. The government savings are continually increased from year to year according to the increasing development financing needs.
2. Regulatory Functions, i.e., taxes are used by the government as a tool to achieve certain goals and are complementary to the budget function. The government can regulate economic growth through tax policies. For example: in the context of investment, both domestically and abroad, various tax relief facilities are provided. In order to protect domestic production, the government sets high import duties on foreign products.
3. Stability Function, which is a tax that makes the government have funds to carry out policies related to price stability, so that inflation can be controlled. This can be done by regulating the circulation of money in the community, tax collection, and effective and efficient use of taxes.
4. Income Retribution Function, which is a tax used to finance all public interests. Including to finance development so as to open job opportunities, so as to increase community income. Taxes are the main source of state revenue. Without taxes, most state activities are difficult to implement. The use of tax money covers everything from personnel expenditure to financing various development projects. Construction of public facilities such as roads, bridges, schools, hospitals, police stations is funded using tax money. Tax money is also used for financing in order to provide security for all levels of society. Every citizen from the moment of birth until death, enjoys the facilities or services of the government which are all funded with money from taxes. Thus it is clear that the role of tax revenue for a country becomes very dominant in supporting the running of government and development financing.

The responsibility for tax payment obligations, as a reflection of the legal obligations in the field of taxation, rests with the community members themselves to fulfill these obligations. This is in accordance with the self assessment system adopted by the Indonesian Taxation System. The government, in this case the Directorate General of Taxes, in accordance with its function is obliged to conduct guidance / counseling, service, and supervision. In carrying out these functions, the Directorate General of Taxation tries its best to provide services to the public in accordance with the vision and mission of the Directorate General of Taxes.

One of the strategies used by the Directorate General of Taxes to Increase Tax Compliance and Receipt is by Law Enforcement. Enforcement of tax law means as a step how to enforce the legal norms contained in the Tax Law. Law on General Provisions and Tax Procedures Number 6/1983 (UU KUP) states that law enforcement can be done in two ways, namely, the administrative or criminal way. Enforcement of tax law means as a step how to enforce the legal norms contained in the Tax Law. Namely General Provisions and Taxation Procedures Number 28 Year 2007 As Last Amended With Law Number 16 Year 2009 (UU KUP) states that law enforcement can be done in two ways namely, administrative or criminal ways.

In Tax Crime there is a legal principle known as "Ultimum Remedium" which makes criminal sanctions the last resort of a series of stages of law enforcement, which is a general principle inherent in the formal legal system of taxation throughout the world, both in countries adhering to continental and Anglo- European legal systems. Saxon. This can be understood, because unlike the Antiterrorism Law or the Anti-Corruption Law which applies the principle of "Primum Remedium" the tax system is intended to collect state revenue, not to punish terrorists or corruptors. From this purpose the application of the principle of ultimum remedium has its justification and legitimacy.

According to Sudikno Mertokusumo (2006:128) it implies that Ultimum Remedium as the last tool in law enforcement that ultimum Remedium is not only a term, but also a legal principle. According to Sudikno Mertokusumo (2006:7), among others, he said that the principle of law is abstract. Because of its nature, the principle of the law in general is not not poured in the form of concrete rules or articles, such as:

1. Point D'interet Point d'action (who has a legal interest can file a lawsuit);
2. Restitutio in integrum (return to its original state);
3. In Dubio pro reo (in the case of doubt the judge must decide so to benefit the defendant);
4. Res judicata Pro veritate Habetur (what the judges are disconnected should be considered correct);
5. Everyone is deemed to know the law;
6. Protection against good-faith third parties.

Ultimum Remedium is one of the principles contained in Indonesian criminal law which says that criminal law should be made a final effort in the case of law enforcement. This has meaning if a matter can be resolved through other lines (family, negotiation, mediation, civil, or administrative law) should the passage be passed.

The term Ultimum Remedium according to Wirjono Prodjodikoro (2003:17) says that norms or conventions in the field of constitutional law and State administrative law must first be addressed by administrative sanctions, as well as norms In the field of civil law must first be addressed by civil sanction. Only, if the administrative sanction and the civil sanction is not sufficient to achieve the goal of the public balance sheet straightening, then only a criminal sanction as the ultimate (last) or Ultimum Remedium. According to Wirjono (2003:50) says that the nature of criminal sanctions as the ultimate weapon or Ultimum Remedium when compared with civil sanction or administrative sanction. This trait has caused a tendency to save in criminal sanctions. So, from here we know that the Ultimum Remedium is a term that describes a nature of criminal sanctions.

In addition to being known in criminal law, the term is also known in the law of dispute resolution, that conventionally, the settlement of disputes in the business world, such as in trade, banking, mining projects, oil and gas, energy, Infrastructure, and so on is usually done through litigation. In the litigation process placing the parties opposite each other, in addition to litigation dispute resolution is the final means (*Ultimum Remedium*) after another dispute resolution alternative does not yield results.

With the description in the background above, there are 2 (two) problems which consist of:

1. How the Legal Regulations Related to Tax Criminal law in Indonesia ?
2. Is in a tax criminal act applied *Ultimum Remedium* principle?

II. LITERATURE REVIEW

1. Legal State Theory

a. Indonesian State Law Theory

Article 1 paragraph (3) of the 1945 Constitution and Article 4 letter a of Law Number 37 Year 2008 About the Ombudsman of the Republic of Indonesia stipulates that Indonesia is a legal state. The rule of law is a state which in all aspects of life, society, nation and state including in the administration of government must be based on law and general principles of good governance and aims to improve democratic life that is prosperous, just and responsible. According to Sri Sumantri in Hufron, the elements of the state of Pancasila law are: (1) There is recognition of human rights guarantees and citizens; (2) There is a division of power; (3) Implementation of duties and obligations of the government must always be based on applicable law, both written and unwritten; (4) The existence of an independent judicial power, meaning that it is independent of the influence of government power.

In line with this opinion, Padmo Wahyono in Muhammad Tahir Azhary (2004: 94-99) cited by Hufron stated about the theory of the state of Pancasila law, namely: 1) The root of the family principle stated in the 1945 Constitution; 2) The family principle prioritizes: "the people are many, but human dignity and values are still respected"; 3) Understanding the state and legal understanding seen from the principle of family are: a) The Indonesian state was formed not because of "community agreement" from "naturalist status to civil status with protection of civil rights, but" thanks to Allah Almighty with the noble desire to free national life; b) There are three functions of law that are safeguarding from a family principle, namely: - Upholding democracy in accordance with the system of government of the country contained in the 1945 Constitution; - Realizing social justice in accordance with Article 33 of the 1945 Constitution; - Uphold humanity based on the One Godhead in a Just and Civilized manner. (Hufron 2012: 48-49).

The legal state of the Republic of Indonesia is a country with a conscience or a country that has concern. The legal state of Indonesia is not a country which only stops its duty to carry out various public functions, not the State "by job description", but a country that wants to realize the moral contained in it. Indonesia's legal state is more of a "moral design" state. Therefore, running a state of law in Indonesia is to carry out state activities that have a conscience, so that every actor in a state position is obliged to find out what concerns the State (the conscience of the state) are attached to the tasks and work carried out. Concern is the essence of work that animates the implementation of the work, namely compassion, empathy, dedication, commitment, honesty and courage. The results of work are not only measured in terms of quantity, but also quality, because they are based on "moral description". With that guideline and enthusiasm, the Indonesian legal state will truly become Indonesia (Satjipto Rahardjo, 2009: .93). Indonesia is a legal state which in all aspects of life, community, nation and state including in the administration of government must be based on law and general principles of good governance and aims to improve democratic life that is prosperous, just and responsible.

b. *Rechtstaat* Law's Theory of State

According to S F.Marbun in Hasan Zaini (1974: 154,155), one expert who was quite instrumental in expressing the concept of the rule of law was F.J. Stahl, a scholar from Germany. According to Sthal: "The state must be a legal state that is the driving force of the development of the times. The state must determine carefully the streets and the boundaries of its activities as well as the environment (atmosphere) that can not be penetrated. The state must realize or impose moral ideas in terms of the state according to the existing legal atmosphere ". (SF.Marbun 2001: 7) According to Freidrich Julius Stahl as quoted by Donald A. Rumokoy in Kuntjoro Purbopranoto (1969: 18) in Continental European countries, the rule of law contains elements: (1) The existence of protection of human rights (*grondrechten*); (2) The sharing of power (*scheiding van machten*); (3) The government must be based on legal regulations (*wetmatigheid van bestuur*); (4) The existence of an administrative court (*administrative recommendations*).

c. State Law Rule of Law Theory

In Anglo-Saxion countries a concept of legal state developed which was originally pioneered by A.V. Dicey from England, as the rule of law, in his book *Introduction to the Law of the Constitution* was quoted as saying by Mariam Budiardjo. According to A.V. Dicey the concept of the rule of law contains three elements, namely: (1) Supremacy of the rule of law (*supremacy of law*), absence of arbitrary power, in the sense that someone can only be punished if violating the law; (2) The same position in the face of law (*equality before the law*), this argument applies both to ordinary people and officials; (3). Guaranteed human rights by law (in other countries by the constitution) and court decisions. (Soetanto Soepiadhy, 2012)

2. Norma Level Theory (*Stufenbau Des Theory Recht*)

Norms are a measure that must be obeyed by a person in relation to others or with the environment, the term norm comes from Latin, or rules in Arabic, and is often also referred to as guidelines, standards, or rules in Indonesian. In its development the norm is interpreted as a measure or benchmark for someone to act or behave in society. So, the core of a norm is all rules that must be

obeyed. (Maria Farida 2006: 6) According to Hans Kelsen, legal norms are rules, patterns or standards that need to be followed. Then explained further that the function of legal norms is:

- a) Governing.
- b) Prohibit.
- c) Authorize.
- d) Allow.
- e) Deviating

from the provisions (Yuliandri, 2010.:21) In specifying the discussion or discussion of legal norms or norms, it is necessary to understand more deeply the theory of "stufenbau" from Kelsen. According to Kelsen, then the rule of law of a country, is a system of hierarchical legal rules which in its very simple form. (Purnadi Purbacaraka, 1979.:41 According to Adolf Merkl, a legal norm upward is sourced and becomes a source for the legal norms below it so that a legal norm has a validity period (rechtskracht), therefore the validity period of a legal norm depends on the legal norms above it so that if the legal norms above are revoked or deleted, then the legal norms under them are revoked and deleted as well. Based on Adolf Merkl's theory, in the norm level theory, Hans Kelsen also put forward his theory regarding the level of legal norms (stufentheori), where he argues that legal norms are tiered and layered in a hierarchy of arrangements, where a lower norm applies, sourced, and based on higher norms, higher norms apply, sourced and based on higher norms, and so on come to a norm that cannot be traced further and is hypothetical and fictitious. So the basic rules above are often called "grundnorm" or "ursprungnorm".

According to Kelsen, grundnorms are generally meta juridisch, not the product of the legislative body (de wetgeving), not part of the laws and regulations, but are the source of all sources of the legislative order below. The basic norms which are the highest norms in the norm system are no longer formed by a higher norm, but the basic norms are determined first by the community as the basic norm which is a hanger for the norms that are below it so that a basic norm is said pre-supposed. (Maria Farida Indrati Soeprapto 2010.:4) Based on the explanation, it is known that the legal norms in a country according to Hans Kelsen are as follows: 1) A rule of law is a hierarchical system of legal rules.

2) The simplified structure of the rule of law from the lowest level up.

3) The validity of the legal rules of the lower level group depends or is determined by the rules which belong to the higher level.

Furthermore, in the viewpoint of establishing legal norms, Benjamin Akzin argues that the formation of public law norms is different from the formation of norms of private law because if we look at the norm structure, then public law is above private law, whereas when viewed from an institutional structure, Public Authority is located on the population. In terms of its formation, public legal norms are formed by state institutions (state authorities, people's representatives) or also called infrastructure so that in this case it is clear that the legal norms created by these state institutions have a position that higher than legal norms formed by the community or also called infrastructure.

Because public legal norms are formed by state institutions, the actual formation must be carried out carefully, because these public legal norms must be able to fulfill the wishes and desires of the people, so that the norms of private law are different. The norms of private law are usually always in accordance with the wishes / desires of the people because this private law is formed by the community concerned with agreements or transactions that are civil in nature so that the community can feel for themselves whether the legal norms are appropriate or not with the will or people's wishes. Hans Nawiasky argues that in addition to the norms are multi-layered and tiered, legal norms of a country are also groups. Hans Nawiasky classifies legal norms in a country into four major groups consisting of: (1) Group I, Staatsfundamentalnorm (fundamental norms of the state). (2) Group II, Staatsgrundgesetz (state basic rules). (3) Group III, Formell Gezetz (formal law). (4) Group IV, Verordnung & Autonome Satzung (implementing rules & autonomous rules) These groups of legal norms almost always exist in the arrangement of legal norms of every citizen even though they have different terms or the number of legal norms that are different in each group. The highest legal norm is the first group is staatsfundamentalnorm. The term staatsfundamentalnorm was translated by Notonagoro in his speech at the first Anniversary of Airlangga University (November 10, 1955) with "fundamental principles of the state", then by Joeniarto, in his book entitled the history of constitutional republic of Indonesia, called the "first norm", fundamental norms the country which is the highest norm in a country is a norm that is not formed by a higher norm, but is determined in advance by the community in a country and is a norm that becomes the place of dependence on legal norms below it. It is said that the highest norms are not formed by higher norms because if the highest norms are formed by even higher norms, it is not the highest norm. Staatsfundamentalnorm of a country is a basic foundation of philosophy that contains basic rules for further state regulation. According to Hans Nawiasky, the term staatsfundamentalnorm is a norm that is the basis for the formation of a constitution or constitution of a country (staatsverfassung), including the norm of its modification. The legal nature of a staatsfundamentalnorm is a condition for the enactment of a constitution or constitution. He existed before the constitution or constitution. According to Carl Schmitt, the constitution is a joint decision or consensus about the nature and form of a political unity (e-artifactscheidung uber art und form einer politischen einheit), agreed upon by a country.

3. Legal Purpose Theory

A. Justice

By Aristotle justice is generally divided into 3

1. Legal Justice (Iustitia Legalis):

The definition of legal justice is justice according to the law where the object is a society protected by the law for the common good or banum commune. Justice means being one-sided, putting things in the middle, impartial, siding with the right, not

arbitrary. Justice also has another meaning, namely a state of life for the people, the nation and the state to get what is their right so that they can carry out their obligations.

2. Commutative Justice

This commutative justice is a treatment for someone without seeing the services that have been given. This justice regulates fair relations between one person and another or between one citizen and another citizen. Commutative justice concerns horizontal relations between citizens and other citizens. business, commutative justice is also called or applies as exchange justice. In other words, commutative justice involves fair exchange between the parties involved.

3. Distributive Justice

The basic principle of distributive justice known as economic justice is equitable economic distribution or that is considered fair for all citizens. Distributive justice has relevance in the business world, especially companies. Based on the principle of justice in Aristotle's style, each employee must be paid according to the achievements, duties, and responsibilities given to him. According to Lon Fuller, the book "The Morality Of Law" is thoroughly familiar: law. That is (the only formula that can be called the legal definition offered by these writings is "now it is true- really familiar: law is a company of subduing human behavior with rules. Unlike most modern theories of law, this view treats law as an activity and regards the legal system as a product of continuous purposive efficiency).

B. Certainty Normative legal

certainty is when a regulation is made and promulgated with certainty because it regulates clearly and logically. Obviously the meaning does not cause doubt (multi-interpretation) and logically means that it becomes a norm system with other norms so that it does not clash or cause norm conflicts. According to Hans Kelsen, law is a system of norms. Norms are statements that emphasize the "supposed" aspect or *das sollen*, by including some rules about what to do. Norms are products and deliberative human actions. The law which contains general rules becomes a guideline for individuals behaving in a society, both relationships with fellow individuals and their relationship with the community. These rules become a limitation for the public to burden or take action against individuals. The existence of these rules and the implementation of these rules lead to legal certainty. Legal certainty will be achieved if the law is as much as possible. the law contained contradictory provisions (laws based on a logical and practical system). The law was made based on the reconciliation agreement (a serious legal situation) and the law contained no terms that could be interpreted in different ways. Lon Fuller, his book, the Morality of Law, proposes 8 (eight) principles that must be met by law, which if not fulfilled, the law will fail to be called a law, or in other words there must be legal certainty. The eight principles are as follows:

1. A legal system consisting of regulations, not based on misguided decisions for certain matters;
2. The regulation is announced to the public;
3. Not retroactive, because it will damage the integrity of the system;
4. Formulations that are understood by the public are made;
5. There must be no conflicting rules;
6. It may not require an action that exceeds what can be done;
7. May not be changed frequently;
8. There must be conformity between regulations and daily implementation. The opinion of Lon Fuller above can be said that there must be certainty between the rules and their implementation, thus entering the realm of action, behavior and factors that influence how positive law is implemented.

C. Benefits

Etymologically, the word "usefulness" comes from the basic word "benefit", which according to the Indonesian Language Dictionary, means useful or useful. Law is the lifeblood of a nation to achieve the ideals of a just and prosperous society. For Hans Kelsen the law itself is a *sollens* category (category of necessity) rather than synonymy (factual category). What that means is that the law is constructed as a necessity that regulates human behavior as a rational being. This issue which is questioned by law is not 'how the law should be' (what the law ought to be) but 'what is the law' (what is the law). Some people argue that the utility of law (utility) is highly correlated with the purpose of predatory punishment. specifically so that the defendant does not repeat the act against the law, and the general prevention of everyone being careful not to violate the law because they will be subject to sanctions. Therefore the judge's decision must benefit the world of justice, the general public and the development of science. This research tries to link the Utilitarianism flow of Rudolf von Jhering known as the originator of the theory of Social Utilitarianism or *Interessen Jurisprudence* (interest). The theory is a combination between Bentham and Stuart Mill's theory and legal positivism from John Austin. The focus of Jhering's legal philosophy is about purpose, as his book states that the goal is the creator of all laws, there is no legal rule that does not have its origin in this purpose, that is, in practical motives. Furthermore according to Jhering, my position in the world rests on three propositions: First, I am here for myself, Second, the world is for me, and Third, I am here for the world without harming me. Then Jhering introduced the objective suitability theory as an answer to the interests of individual social life. Conformity of objectives or more precisely adjusting these objectives is the result of uniting interests for the same purpose namely benefit. So that the law functions in addition to guaranteeing the freedom of individuals to achieve their goals, namely pursuing benefits and avoiding losses, the law is also tasked with organizing individual goals and interests so that they are related to the interests of others.

According to Jhering, there are four interests of the people who are the targets of the law which are selfish, which are rewards and benefits which are usually dominated by economic motives. Whereas moralistic ones are obligation and love. Law is in charge of arranging in a balanced and harmonious manner between these interests.

4. Authority Theory

Large Indonesian Language Dictionary (KBBI), the word "authority" means: Rights and power to act; authority, Power makes decisions, rules and delegates responsibility to others. Functions that may be carried out. Whereas "authority" means:

- a. Thing authorized,
- b. Rights and powers that have to do something. In addition, the KBBI power has the meaning:
 - a. Power (to take care, govern, etc.),
 - b. Ability; ability,
 - c. Areas (places etc.) that are controlled,
 - d. The ability of people or groups, to control other people or groups based on authority, authority, charisma, or physical power
 - e. The function of creating and strengthening peace, justice and preventing and acting against injustice or injustice.

Formally, the authority of the government to regulate the land sector comes from Article 33 paragraph (3) of the 1945 Constitution of the Republic of Indonesia which states that the earth and water and natural resources contained therein are controlled by the state and are used for the greatest prosperity of the people. Then solidly realized UUPA. Authority or authority is a term commonly used in the field of public law. But actually there is a difference between the two. Authority is what is called "formal power", power that comes from powers granted by the Act or the legislature from executive or administrative powers. Therefore, it is the power of a certain group of people or power over a sector of government or a certain government affairs. While the authority is only about a certain part of the authority. Authority is the right to give orders, and the power to ask is obeyed. 2. Types of Authority Every act of government must rest on a legitimate authority. Without legal authority, an official or institution cannot carry out a government action. Therefore, legitimate authority is an attribute for every official or institution. Based on the source, the authority is divided into two namely personal authority and official authority. a. Contributions Attribution is the authority attached to a position. review of constitutional law, this attribution is shown the authority possessed by government organs to run their government based on the authority established by the legislators. This attribution refers to the original authority on the basis of the constitution (Constitution) or legislation. b. Abundance of authority Delegation of authority is the surrender of part of the authority of the superior officer to the subordinate helping to carry out the duties of his duty to act alone. Delegation of this authority is intended to support the smooth running of the task and order the flow of communication that is responsible, and insofar as it is not specifically determined by applicable laws and regulations.

In addition to attribution, authority can also be obtained through a delegation process called: Delegation, namely Delegation is given usually between government organs one with another government organ, and usually the authorizing party has a higher position than the party given the authority. Whereas the Mandate is given an internal working relationship between superiors and subordinates. Lutfi Effendi's book, legitimate authority if it is reviewed from where the authority was obtained, then there are three categories of authority, namely attributive, mandate, and delegation.

a. Attributive Authority

Attributive authority is usually outlined or derived from the division of state power by the Constitution. Another term for attribute is authentic authority or authority that cannot be shared with anyone. attributive authority, the implementation is carried out by the official or the body itself, the basic regulations are stated. As for responsibility and accountability are with officials or the body as stated in the basic regulations.

b. Mandate Authority

The authority of the mandate is the authority that comes from the process or procedure of delegation from a higher official or body to an official or lower body. The authority of the mandate is that there is a routine relationship between subordinate superiors, unless explicitly prohibited. Then, at any time the author can use the delegated authority himself.

c. Delegative authority

Delegative authority is the authority that comes from delegating a government organ to other organs on the basis of legislation. In contrast to the mandate authority, delegative authority, responsibility and accountability turn to those who are given the abundance of authority or turn to delegataris. In this way, the giver of authority is not able to use that authority again except after the revocation is held by adhering to the principle of *contrarius actus*. Therefore, the delegative authority of the basic regulations in the form of legislation is the basis for the birth of the delegative authority. Without the legislation that regulates the delegation of authority, there is no delegative authority. Meanwhile, according to Philipus M. Hadjon, "The authority to make decisions can only be obtained in two ways, namely by attribution or by delegation. Attribution is the authority inherent in a position" (Philipus M. Hadjon, 2001: 130) Philipus added that "Speaking of delegations there is a transfer / transfer of an existing authority. If the authority is not perfect, it means that a decision based on that authority is not lawful. " Delegation is the surrender of authority that belongs to the organ of government to other organs. The delegation contains a submission, that is, what was originally the authority of one party, which subsequently became the authority of the second party. The authority given by the delegate is then the responsibility of the authority. The mandate, there does not occur a new authorization or delegation of authority and Agency or TUN Officials to one another. The responsibility of authority on the basis of the mandate remains with the creditor, does not change to the recipient of the mandate. F.A., M. Stroink and J.G. Steenbeek, as quoted by Ridwan HR, argued that two ways government organs obtain authority, namely: attribution; and delegation. As a legal system, authority consists of at least three components, namely: influence; legal basis; and legal conformity. The component of influence is that the use of authority is intended to control the behavior of legal subjects. The basic legal component is that the authority must always be able to be appointed by its legal basis and the component of legal conformity

implies the existence of authority standards, namely general standards (all types of authority) and special standards (for certain types of authority).

III. DISCUSSION

A. REGULATION OF TAXATION CRIMINAL LAW

Legal Regulations Related to Tax Crimes can be described as follows:

1. Legal Basis

1. Law number 28 year 2007 on the third amendment to Law No. 6 of 1983 on general provisions and taxation procedures (KUP)
2. ACT number 16 of year 2009 concerning the determination of the government regulation of the Substitute Law number 5 year 2008 on the Fourth Amendment to Law No. 6 of 1983 concerning general provisions and taxation procedures of law
3. Regulation of the Minister of Finance No. 239/PMK. 03/2014 On procedures for evidence of preliminary proof of criminal offence in taxation
4. Regulation of the Director general of taxation number PER-3/PJ/2011 On procedures for implementing development and analysis of information, Data, reports, and complaints through observation or taxation intelligence activities
5. Regulation of the Director general of taxation number PER-19/PJ/2013 on revocation of some regulation of the Director General of taxation relating to the issuance of regulation of the Minister of Finance in the field of general provisions and taxation procedures
6. Regulation of the Director general of taxation number PER-04/PJ/2014 on the decision revocation of the Director general of tax KEP-272/PJ/2002 regarding instructions on observation implementation, preliminary proof examination, and criminal investigation in the field of taxation
7. Regulation of the Director general of taxation number PER-18/PJ/2014 On instructions for implementation of information development and analysis, Data, reports, and complaints
8. Circular Letter of the Directorate General of tax Number SE-23/PJ/2015 on Technical Instructions for evidence of preliminary crimes in taxation

2. Types of sanctions

1. (Article 38 Act No. 28 year 2007)

Violation of the tax obligations conducted by the taxpayer, as long as the action of taxation administration, is subject to **administrative sanctions** by issuing a tax assessment letter or tax bill, while those concerning criminal acts in the taxation field are subject to **criminal sanctions**.

2. Offences involving tax crimes

(Article 38 Act No. 28 year 2007)

Violations involving taxation crimes, among others, because:

1. Idolatry; Or
2. Intentional

In addition, criminal sanctions may also be imposed against officials or third parties who commit acts involving criminal acts in the taxation field as referred to in the KUP .

3. Sanctions for Negligence (Article 13A jo. Article 38 of Law Number 28 Year 2007)

Taxpayers are declared to have neglected, if the Taxpayer:

- a. do not submit SPT; or
- b. submit SPT, but the contents are incorrect or incomplete, or attach information that is incorrect so that it can cause losses to state revenues. If the negligence is done for the first time by the Taxpayer, the Taxpayer will not be subject to criminal sanctions but will be subject to administrative sanctions in the form of an increase of 200% (two hundred percent) of the amount of underpaid tax determined through the issuance of the Underpayment Tax Assessment Letter (SKPKB). However, if the WP is declared to repeat or commit negligence as referred to above, the sanctions that arise are:
 - a. sanction of fines, at least 1 (one) time the amount of tax owed that is not or not fully paid and at the most 2 (two) times the amount of tax payable that is not or underpaid, or
 - b. sentenced to confinement for a minimum of 3 (three) months or a maximum of 1 (one) year. Negligence referred to in this article means that it is not intentional, negligent, careless, or does not heed its obligations so that the act can cause a loss in state income.

4. Sanctions for Intentions (Article 39 paragraph (1) of Law Number 28 Year 2007)

Taxpayers are declared intentional, if the Taxpayer intentionally:

- a. did not register themselves to be given a Taxpayer Identification Number or did not report their business to be confirmed as a Taxable Entrepreneur;
- b. misuse or use without rights Taxpayer Identification Number or Inauguration of a Taxable Entrepreneur;
- c. do not submit SPT;

- d. submit SPT and / or information whose contents are incorrect or incomplete;
- e. refuse to be examined according to Article 29 of the KUP Law;
- f. show books, records, or other documents that are fake or falsified as if they were true, or did not represent the actual situation;
- g. does not keep books or records in Indonesia, does not show or do not lend books, records or other documents;
- h. do not keep books, records or documents which form the basis of accounting or other records and documents, including the results of data processing from books that are managed electronically or held online by application programs in Indonesia in accordance with Article 28 paragraph (11) of the KUP Law; or
- i. not deposit taxes that have been deducted or collected.

so that it can cause a loss in state income, which is sentenced to a maximum of 6 (six) months imprisonment and a maximum of 6 (six) years and a fine of at least 2 (two) times the amount of tax payable which is unpaid or underpaid and a maximum of 4 (four) times the amount of unpaid or underpaid tax payable.

In this act or action it also includes any person who intentionally did not register, misused or used without the right of the Taxpayer Identification Number, or misused or used without the inauguration rights of the Taxable Entrepreneur. The aforementioned provisions also apply to representatives, power of attorney, employees of taxpayers, or other parties who order to do, who participate in committing, who advocate or who assist in committing criminal acts in the taxation field. (Article 43 paragraph (1) of Law Number 28 Year 2007) If WP is declared intentionally repeating or committing acts that are classified as criminal acts in the taxation field before the passing of 1 (one) year, starting from the completion of serving the prison sentence imposed, the WP is subject to heavier criminal sanctions, which are added 1 (one) time to 2 (two) times the previous criminal sanctions. (Article 39 paragraph (2) of Law Number 28 Year 2007) Sanctions imposed if WP submits application for temporary restitution of the SPT that is submitted is incorrect or incomplete (Article 39 paragraph (3) of Law Number 28 Year 2007) "Anyone who tries to commit a crime of abusing or using without the right a Taxpayer Identification Number or Inauguration of a Taxable Entrepreneur, or submits a tax return and / or information whose contents are incorrect or incomplete, in the context of applying for restitution or tax compensation or tax crediting, shall be punished with imprisonment for a minimum of 6 (six) months and a maximum of 2 (two) years and a fine of at least 2 (two) times the amount of restitution being applied for and / or compensation or credit done and at most 4 (four) times the amount of restitution requested and / or compensation or credit made. "

5. Expiration of Prosecution (Article 40 of Law Number 28 Year 2007)

Criminal acts in the field of taxation cannot be prosecuted after the past 10 (ten) years from the time the tax becomes due, the end of the Tax Period, the end of the Tax Year, or the end of the relevant Tax Year. This is intended to provide legal certainty for taxpayers, public prosecutors and judges. The period of 10 (ten) years is to adjust to the expiration of the storage of tax documents which are used as the basis for calculating the amount of tax owed, for 10 (ten) years.

6. Sanctions for Officials (Article 41 of Law Number 28 Year 2007)

Sanctions that can be imposed on officials who violate the prohibition of disclosing the confidentiality of taxpayers can be threatened with criminal sanctions as follows:

- a. Because of negligence, a sentence of up to 1 (one) year imprisonment and a maximum fine of Rp. 25,000,000.00 (twenty-five million rupiah). To guarantee that confidentiality regarding taxation will not be notified to other parties and so that taxpayers in providing data and information will not hesitate, in the framework of implementing the Taxation Law, criminal sanctions are needed for the official concerned that causes disclosure of the confidentiality. Disclosure of confidentiality is done because negligence in the sense of neglect, carelessness, or lack of respect so that the obligation to keep the information or evidence that is on the Taxpayers protected by the Taxation Law is violated. For the negligence, the offender was sentenced to the appropriate punishment.
- b. Because of intent, sentenced to a maximum imprisonment of 2 (two) years and a maximum fine of Rp 50,000,000.00 (fifty million rupiah). Acts or actions carried out intentionally are subjected to more severe sanctions compared to acts or actions taken due to negligence so that the officials concerned are more careful not to commit acts of divulging taxpayers' secrets. This provision also applies to someone who does not fulfil the obligations of the official. Prosecution of the criminal acts referred to above is only carried out on complaints of people whose confidentiality has been violated.

7. Sanctions for Other Parties (Article 41A, Article 41B, Article 41C and Article 43 of Law Number 28 Year 2007)

Other parties that may be subject to tax criminal sanctions:

- a. every person who is obliged to provide the requested information or evidence as referred to in Article 35 of the KUP Law but intentionally fails to provide information or evidence, or provides information or evidence that is not properly sentenced to a maximum imprisonment of 1 (one) year and a maximum fine of Rp. 25,000,000.00 (twenty-five million rupiah). (Article 41A of Law Number 28 Year 2007) This provision also applies to other parties who order to do, who participate to do, who advocate or who help commit criminal acts in the field of taxation. (Article 43 paragraph (2) of Law Number 28 Year 2007)
- b. every person who intentionally obstructs or complicates the investigation of criminal acts in the field of taxation shall be sentenced to a maximum imprisonment of 3 (three) years and a maximum fine of Rp. 75,000,000.00 (seventy-five million rupiah). (Article 41B of Law Number 28 Year 2007) This provision also applies to other parties who order to do, who

- participate to do, who advocate or who help commit criminal acts in the taxation field. (Article 43 paragraph (2) of Law Number 28 Year 2007)
- c. every person who intentionally fails to fulfil the obligations referred to in Article 35A paragraph (1) of the KUP Law shall be liable to a maximum imprisonment of 1 (one) year or a maximum fine of Rp 1,000,000,000.00 (one billion rupiah). (Article 41C paragraph (1) of Law Number 28 Year 2007)
 - d. everyone who intentionally causes the fulfilment of the obligations of officials and other parties as referred to in Article 35A paragraph (1) of the KUP Law shall be liable to a maximum imprisonment of 10 (ten) months or a maximum fine of Rp. 800,000,000.00 (eight hundred million rupiahs). (Article 41C paragraph (2) of Law Number 28 Year 2007)
 - e. everyone who intentionally fails to provide data and information requested by the Director General of Taxes as referred to in Article 35A paragraph (2) of the KUP Law shall be liable to a maximum imprisonment of 10 (ten) months or a maximum fine of Rp. 800,000,000.00 (eight hundred million rupiah). (Article 41C paragraph (3) of Law Number 28 Year 2007)
 - f. every person who intentionally misuses taxation data and information that causes losses to the state shall be sentenced to a maximum imprisonment of 1 (one) year or a maximum fine of Rp. 500,000,000.00 (five hundred million rupiah). (Article 41C paragraph (4) of Law Number 28 Year 2007)

8. Preliminary Evidence Check

Examination is a series of activities to collect and process data, information, and / or evidence that is carried out objectively and professionally based on an inspection standard to test compliance with tax obligations and / or for other purposes in the context of implementing the provisions of tax legislation.

Preliminary Evidence is a condition, deed, and / or evidence in the form of information, writing, or objects that can provide a clue that there is a strong allegation that a Tax Crime is being done or has been committed by anyone who can cause a loss in state income.

Preliminary Evidence Check is an examination carried out to obtain Preliminary Evidence regarding an alleged Tax Crime has occurred.

The Director General of Taxes has the authority to conduct Initial Evidence Checks based on Information, Data, Reports and Complaints. Complaint is a notification accompanied by a request by an interested party to an authorized official to act according to the law of an individual or entity who has committed a Criminal Act in the Field of Taxation which has caused a loss.

The scope of the Preliminary Evidence Examination is the alleged occurrence of a Criminal Event specified in the Preliminary Evidence Examination Order. A Letter of Preliminary Evidence Check is the basis for conducting the Preliminary Evidence Check by the Preliminary Evidence checking team.

Type of Preliminary Evidence Check consists of:

1. Open Proof of Examination

An open Evidence Check is conducted in the case of:

- a. Initial Evidence Checks related to requests for returning tax overpayments as referred to in Article 17B of the KUP Law; or
- b. The Initial Evidence Check is a follow-up to the Examination to test compliance with tax obligations, the Initial Evidence Check is openly carried out with a written notification regarding the Initial Evidence Check to an individual or entity that is conducted the Initial Evidence Check.

2. Examination of the Preliminary Evidence is closed

Examination Preliminary Evidence is conducted privately without notification of the Examination of the Preliminary Evidence to an individual or entity who carried out the Preliminary Evidence Examination. Examination of the Preliminary Evidence is openly carried out within a period of not later than 12 (twelve) months from the date of submission of the Notification of Preliminary Evidence notification letter up to the date of the Preliminary Evidence Inspection Report. Examination of the Preliminary Evidence is carried out in a maximum period of 12 (twelve) months from the date of the Preliminary Evidence Inspection Order received by the Preliminary Evidence Inspector until the date of the Preliminary Evidence Inspection Report. Preliminary evidence. The Head of the Executing Unit for the Preliminary Evidence Audit can provide an extension of the period referred to in paragraph (3) no later than 24 (twenty four) months from the end of the specified period. Taking into account and taking into account the expiration of taxation, the expiration of prosecution in Taxation, and other considerations.

The Preliminary Evidence Check must be carried out in accordance with:

1. general standard for Preliminary Evidence Examination;
2. the standard implementation of the Preliminary Evidence Audit; and
3. Preliminary Evidence Check reporting standards.

General Standards for Preliminary Evidence Examination, namely Preliminary Evidence Examination carried out by Civil Servant Investigators within the Directorate General of Taxation who:

1. given the task, authority, and responsibility by the Head of the Executing Evidence Examination Unit to carry out the Preliminary Evidence Examination;

2. get sufficient technical education and training as a preliminary evidence checker;
3. use his skills carefully and thoroughly;
4. is honest, free from despicable actions, and always prioritizes the interests of the state; and
5. obey the provisions of the legislation in the field of taxation.

The standard implementation of the Preliminary Evidence Audit is regulated with the following conditions:

1. Carried out by a team of Preliminary Evidence examiners;
2. Supervised by the head of the Executing Evidence Examination Unit;
3. Preceded by good preparation;
4. implemented in the office of the Directorate General of Taxes and / or other places deemed necessary by the Preliminary Evidence examiner;
5. implemented within a certain period;
6. documented in the Preliminary Evidence Check Paper; and
7. obtained conclusions based on valid and sufficient Evidence.

The Standard for Proofing Examination reporting standards is governed by the following conditions:

1. The Preliminary Evidence Check report is prepared based on the Preliminary Evidence Check Working Paper; and
2. The Preliminary Evidence Audit report discloses the implementation, conclusions, and follow-up recommendations for the Preliminary Evidence Audit.

Preliminary Evidence Checker must:

1. Submit a letter of notification of the Preliminary Evidence Audit to an individual or entity carried out the Preliminary Evidence Inspection, if the Preliminary Evidence Examination is conducted openly;
2. Show the identity card of the Preliminary Evidence examiner, if requested by an individual or body carried out the Initial Evidence Check;
3. Show a Preliminary Evidence Audit Warrant or a Change Evidence Initial Investigation Order, if requested by an individual or entity who has carried out the Preliminary Evidence Check;
4. Returning evidence that has been obtained through borrowing and is not needed in the investigation process;
5. Conceal to other parties who are not entitled to everything that is known or notified to him in the framework of the Preliminary Evidence Check; and
6. Securing the Evidence Found in the Preliminary Evidence Check.

An individual or body that is carried out with Open Preliminary Examination, must:

1. to give an opportunity to the Preliminary Evidence examiner to enter and / or inspect the place or space, movable and / or immovable property that is suspected or reasonably suspected of being used to store the Evidence;
2. provide an opportunity for the Preliminary Evidence examiner to access and / or download data managed electronically;
3. show and / or lend Evidence to the Preliminary Evidence examiner;
4. provide verbal and / or written information to the Preliminary Evidence examiner; and
5. provide assistance to the Preliminary Evidence examiner in order to facilitate the Preliminary Evidence Examination.

A related party or third party that has a relationship with an individual or entity undertaken by the Preliminary Evidence Check is obliged to provide the information and / or evidence requested by the Preliminary Evidence examiner. An individual or body that is carried out with Open Preliminary Examination has the right to ask the Preliminary Evidence examiner to:

1. submit notification letter for the Preliminary Evidence Audit;
2. show the identity card of the Preliminary Evidence examiner;
3. show a Proof of Initial Proof of Examination or Proof of Initial Proof of Change; and returning evidence that has been borrowed and is not needed in the investigation process.

Preliminary Evidence Checker is authorized:

1. Enter and / or inspect the place, space, and / or goods that are suspected or reasonably suspected of being used to store evidence;
2. access and / or download data managed electronically;
3. borrow and / or examine Evidence;
4. Sealing certain places or spaces as well as movable and / or immovable property;
5. request information from related parties;
6. ask for information and / or evidence that is suspected to be able to give instructions on Criminal Acts in the Field of Taxation to third parties who have a relationship with an individual or entity;
7. requesting assistance from other parties in connection with their expertise in the context of carrying out the Preliminary Evidence Audit; and
8. take other actions needed in the framework of the Preliminary Evidence Examination.

9. Investigation Basis (Article 1 number (31) of Law Number 28 Year 2007)

Investigation of criminal acts in the taxation field is a series of actions carried out by investigators to search for and collect evidence which with evidence makes the light of criminal acts in the taxation field occur and find the suspect. Investigators are certain

Civil Servants in the Directorate General of Tax environment who are given special authority as investigators to conduct criminal investigations in the field of taxation in accordance with statutory provisions. Certain Civil Servants in the Directorate General of Tax environment who are appointed as investigators of criminal acts in the field of taxation by the authorized officials are investigators of criminal acts in the field of taxation. Criminal investigations in the field of taxation are carried out according to the provisions stipulated in the applicable Criminal Procedure Act. Investigation is a process of continuation of the examination results which indicate the beginning of evidence of tax crime. Taxpayers (WP) suspected of committing criminal offenses in the field of taxation cannot be directly investigated but must first be observed or examined. If based on observations or examinations found indications of criminal acts in the field of taxation, the Preliminary Evidence Check is conducted. If the results of the Preliminary Evidence Examination indicate that there is evidence of preliminary criminal acts in the taxation field, then it is proposed to be followed up with an investigation. (Article 43A paragraph (1) of Law Number 28 Year 2007)

10. Duties and Authorities of the Investigator

The task of the investigator (Article 1 number (31) of Law Number 28 of 2007) The task of the Investigator is to search for and collect evidence which makes the light of criminal acts in the taxation field occur and find the suspect. Authority of the investigator (Article 44 of Law Number 28 Year 2007) The authority of the Investigator is:

- a. receive, seek, collect, and examine information or reports relating to criminal acts in the taxation field so that the information or report becomes more complete and clear;
- b. examine, search for and collect information about individuals or entities concerning the truth of acts committed in connection with criminal acts in the taxation field;
- c. request information and evidence from individuals or entities in connection with criminal acts in the field of taxation;
- d. examine books, records and other documents relating to criminal acts in the taxation field;
- e. conduct a search to obtain evidence of books, records and other documents, and confiscate said evidence;
- f. requesting assistance from experts in the context of carrying out the task of investigating criminal offenses in the taxation field;
- g. order to stop and / or prohibit someone from leaving the room or place while the inspection is taking place and checking the identity of the person, object, and / or document being carried;
- h. photographing someone related to criminal acts in the field of taxation;
- i. summon people to hear their statements and examine them as suspects or witnesses;
- j. stop the investigation; and / take other actions necessary to smooth the investigation of criminal acts in the field of taxation according to the provisions of the legislation.

The authority mentioned above includes confiscation. The confiscation can be carried out, both for movable and immovable property, including bank accounts, receivables, and securities of taxpayers, tax bearers, and / or other parties that have been designated as suspects. In addition to protecting the evidence found in the investigation process, the Tax Investigator is authorized to carry out sealing actions in accordance with the provisions of the applicable tax legislation. In the context of carrying out the authority of the investigation referred to above, the investigator may request the assistance of other law enforcement officers. The investigator notifies the commencement of the investigation and submits the results of his investigation to the public prosecutor through the investigator of the Republic of Indonesia National Police official in accordance with the provisions stipulated in the Criminal Procedure Act.

11. Termination of Investigation (Article 44A and Article 44B of Law Number 28 Year 2007)

The investigation can be stopped in the event of:

- a. there is not enough evidence;
- b. the incident did not constitute a criminal offense in the taxation field;
- c. the investigation was stopped because the event had expired, or
- d. the suspect died.

In the event that an investigation of a criminal offense in the field of taxation is terminated unless the event has expired, a tax assessment letter can still be issued. In addition, in the interest of state revenue, at the request of the Minister of Finance, the Attorney General can stop investigating criminal acts in the field of taxation no later than 6 (six) months from the date of the request letter. Termination of investigation of criminal acts in the field of taxation as referred to above is only carried out after the Taxpayer has paid tax debt that is not or underpaid or that should not be returned and is supplemented with administrative sanctions in the form of 4 (four) times the amount of tax that is not or underpaid, or that should not be returned.

B. ULTIMUM REMEDIUM OR PREMUM REMEDIUM IN THE ENFORCEMENT OF TAX LAW

Related to the Ultimum Remedium Or Premum Remidium Aspect, if we look at the provisions of tax legislation related to the Law Enforcement Process by the Directorate General of Taxes in accordance with Law Number 28 of 2007 concerning General Provisions and Taxation procedures, it can be concluded that the Directorate General of Taxes Has Very extensive discourse related to

the Criminal Process in Taxation Violations, In the Meaning of the Directorate General of Taxation Subjectively Allow When to Use the Instrument of Criminal Sanctions or Administrative Sanctions.

Conditions That Enable These Subjectivities can be seen from the Process of Beginning Evidence Inspection derived from Data, Information, Reports and Complaints (IDL). Data Processing, Information, Reports and Complaints Completely are the authority of the Directorate General of Taxes. From the results of the IDLP Processing, the Directorate General of Taxes has the full discretion to choose to use Administrative Sanctions or Criminal Sanctions related to the results of IDLP Processing which can harm the country's Finances by Taxpayers.

Even though the Taxpayer still has the right to disclose his actions, there is no clear parameter for the results of the disclosure by the taxpayer with the calculation from the Directorate General of Tax Investigators, so there is legal uncertainty related to the disclosure of the untruth done by the taxpayer. Assembled by Article 44b, where the Attorney General Can Stop the Investigation Process of the Minister of Finance's Proposal if the Taxpayer conducted an Investigation to Pay Taxpayers Add 400% Sanctions, This Provision also does not provide certainty, because in that article there are the words "Can", so it is a creation of the Attorney General to stop the investigation.

Related to Ultimum Remedium in Tax Criminal Acts if Observed Corporate Penalty Sanctions that will be applied are Minimum and Maximum penalties, this condition is less precise if it is considered the ultimum Remedium principle must be applied.

As a result of the above reasons it is very clear if the Tax Criminal Enforcement does not always always apply the Ultimum Remedium Principle but is more inclined to Premum Remidium, this condition is not appropriate if we use a comparison of criminal enforcement in taxation in other countries such as the Netherlands, Germany, and Other European Countries.

IV. CONCLUSION

Based on the results of the research and analysis of the subject matter discussion, the following conclusions from the answers to the problems in this study, namely

1. Tax Criminal Law Arrangement based on Law Number 28 Year 2007 regarding General Provisions and Tax Procedures along with the Implementing Regulations. These Regulations have been in place since 2008 so there is a need for changes, especially related to the era of Information technology in Business transactions
2. The application of Ultimum Remedium in Taxation Crimes in Indonesia does not provide a legal certainty for taxpayers, because the regulation instrument has uncertainty in its application whether to use the Ultimum Remedium Principle or Premum Remidium, this is because the Directorate General of tax has a very broad authority related to granting Criminal sanctions or administrative sanctions.

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Design and Implementation of Acoustic Echo Cancellation on Xilinx Zynq for FPGA Co-simulation using LMS Adaptive Filter

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Abstract: An adaptive filter is a filter that can adapt the given environment through self-learning process using optimization algorithm by adjusting the filter coefficient of the input signal. Adaptive filter is the very essence for today's different applications such as Echo Cancellation, Noise Cancellation, System Identification and so on. In this paper we present the design and implementation of acoustic echo cancellation using the art of Xilinx Zynq platform Zed board and by applying a model-based design approach for hardware software co-simulation in Simulink. From the original signal echo generating model is designed for multiple path delay. The echo version of the original signal will be removed by using LMS adaptive filter algorithm which is a simple and robust in performance. RTL (Register Transfer Level) design is generated from the subsystem of echo cancellation design model by converting to intellectual property (IP) core for FPGA implementation using HDL workflow advisor in Matlab Simulink, finally the custom board reference design from Vivado will apply for real time audio output test that integrated with the model design. The hardware software co-simulation shows that the proposed FPGA implementation has cancelled the echo with high performance.

Key word: acoustic echo, FPGA, adaptive filter, Matlab®, Simulink®, software/hardware-co-simulation

I. INTRODUCTION

In the last decades, adaptive filter design and FPGA implementation has been a very active area of research and Innovation. Adaptive filter is a filter that can adapt the given environment through self-learning process using optimization algorithm by adjusting the filter coefficient of the input signal. The basic element in any adaptation filters is filter structure, performance criterion and adaptation rule. Adaptive filters have different real-world application in the area of signal processing and communications such as channel equalization, system identification, active noise cancellation, echo cancellation, speech coding, smart antenna system and so on. From those application acoustic echo cancellation is the most widely used. Since today's the number of hands-free communication users are increasing but still the problem of sound quality due to interference and echo are challenging the industry of hands-free communication. There are two types of echo one is a network echo and the other one is acoustic echo. Adaptive filter that used for acoustic echo cancellation is as shown in Figure.1. Echo is the distorted and delayed version of the original signal reflecting back to the source either from single path or multiple path propagation. Thus, it is desired to eliminate these echoes and the process is called echo cancellation as shown in the below Figure. 2. FPGA implementations are extremely important for the real time acoustic echo cancellation hardware software co-simulation using the Xilinx Zynq 7000 SOC which is a first in its kind that offer hardware, software and IO programmability in the single chip. Such hardware implementation can be realized using the hardware description language such as VHDL or Verilog and the hardware-software co-simulation can be implemented in Matlab-Simulink using model-based design approach that will simplify the work from specification to prototype on single platform. using the attribute of a modern FPGA chip design we can actually use a custom board reference design that will integrate seamlessly with existing intellectual property (IP) such as for audio codec that will allow as to import and play audio file to and through Zed board, this and many other reason makes FPGA software/hardware co-design choice for many real time applications. Therefore, it is crucial and important to design and implement a real time software hardware co-simulation of acoustic echo cancellation based on FPGA co-design.

The rest of the paper is arranged as follows. In Section 2, the proposed adaptive filter algorithm (LMS) and acoustic echo cancellation are discussed briefly. In Section 3, the hardware-software co-design implementation in FPGA Zynq using Zed board will be discussed in details. The hardware software co-simulation experimental result is presented in Section 4. Finally, the paper concluded in Section 5.

II. ADAPTIVE FILTER FOR ACOUSTIC ECHO CANCELLATION

This Section discusses the adaptive filter LMS algorithm, echo and the processes of echo cancellation

A. Least Mean Square Algorithm

The most widely used adaptive filter algorithm for acoustic echo cancellation application is the Least Mean Square algorithm which was developed by Widrow and Hoff in 1960. It is a member of stochastic gradient algorithm in which the cost function is minimized by adjusting the filter coefficients and it is a robust and at the same time computationally simple and high-performance during adaptation process. It can be used for solving the Weiner-Hopf equations without finding the inversion matrix and LMS algorithm has two basic processes: those are filtering process and adaptation process. The procedures in the adaptation process of LMS algorithm are described in the table below.

Table.1. Steps to implement LMS algorithm:

| | |
|--|---|
| Initial condition | Filter length= M Step-size factor = μ , Input data to the adaptive filter = $x(n)$ $x(0) = w(0) = [0 \ 0 \ 0 \dots]^T$ |
| For each instant of $n = 1, 2, 3, \dots$ | |
| Compute the following | |
| Filter output | $y(n) = w^T(n) x(n) = x(n)^T w(n)$ |
| Estimation error | $e(n) = d(n) - y(n)$ |
| Tap-weight adaptation | $w(n + 1) = w(n) + 2\mu e(n) x(n)$ |

For the stability of LMS algorithm μ must be chosen such that $0 < \mu < \frac{2}{\text{tap-input power}}$

Where tap-input power = $\sum_{k=0}^{M-1} E\{|x(n-k)|^2\}$ which in theory is equivalent to λ_{\max} where λ_{\max} is the maximum Eigen value of Correlation matrix (R) of input signal. Using this stability factor μ will be chosen according to $0 < \mu < \frac{2}{\lambda_{\max}}$.

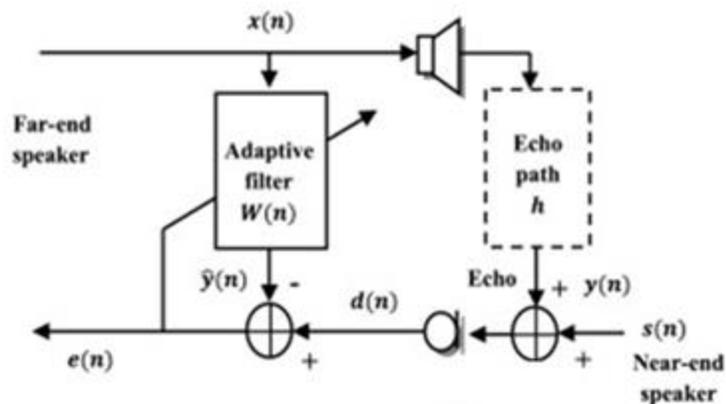


Figure.1. Acoustic Echo Cancellation

Where $x(n)$ is far voice, $h(n)$ is echo path $y(n)$ is far voice plus echo, $s(n)$ is near voice, $d(n)$ is the sum of $y(n)$ and $s(n)$, $\hat{y}(n)$ is estimated filter output and $e(n)$ is the error. Note that $s(n)$ is not considered in this work.

B. Echo and Echo Cancellation

Echo can define as a phenomenon within which a delayed and distorted version of an original sound or electrical signal is reflected back to the source. The echoes of speech waves will be heard from different sources like floor, wall, and other neighbouring objects. In such a case when the reflected wave arrives after a couple of tens of milliseconds delay after the direct sound, it is heard as a clear echo. These echoes are bothering and will unexpectedly interrupt a conversation. Thus, it's desired to eliminate these echoes and therefore the process is called echo cancellation.

In telephone communication, there are two main kinds of echo: network and acoustic echoes. The network echo results from the impedance mismatch at points along the cable, for instance, at the hybrids of a Public Switched Telephone Network (PSTN) exchange, where the subscriber two-wire lines are connected to four-wire lines. Acoustic echo is because of the acoustic coupling between the loudspeaker and microphone in hands-free telephone systems. When far end speaker speak and that speech signal transmit to loudspeaker when the signal from loudspeaker takes different path and reflected back and picked by near end microphone then it'll transmit back to the source as an echo, we called these phenomena acoustic echo. The multipath propagation echo generation shown in Figure.2

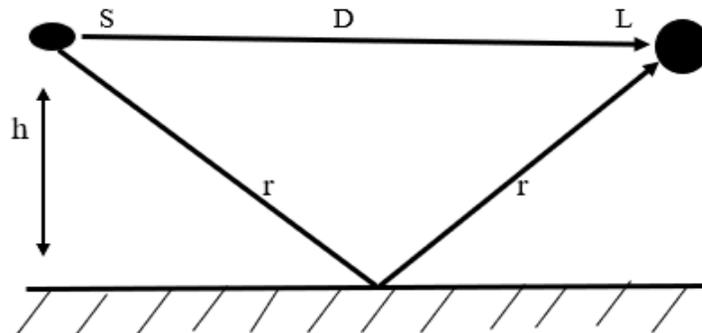


Figure.2. Multipath Propagation

Echo cancellation is as we mentioned in the above it is the process of removing the echo version of audio signal from the original audio. The echo cancellation process is started from knowing the originally transmitted audio that re-appear after some delay in the transmitted or received audio or speech signal. Once the echo is recognized it can easily subtract from the received or transmitted signal. Mostly this technique is implemented on DSP's and FPGA co-simulation.

III. FPGA IMPLEMENTATION

In this Section we describe the Matlab-Simulink implementation model of acoustic echo cancellation algorithm and the hardware-software co-simulation of FPGA using HDL workflow advisor

A. Matlab-Simulink implementation model

1. Echo model:

The given model shown in Figure.3 will generate the echo version of the original signal by considering the delay is due to multiple path scenario. Here we use PCM 16-bit signed, 16000Hz speech signal and from multimedia block, delay block, sum block, gain block, audio device writer and to workspace block are used to design the echo model. the delay parameter which is 4000 sample time for each path is describe the time for which the sound wave takes to travel from the source to the listener after the bouncing back off from reflecting objects whereas the gain is the signal loss due to propagation and reflection.

The transfer function of the single echo filter can be expressed as

$$H(z) = 1 + \alpha z^{-R}, |\alpha| < 1, \text{ Where } \alpha \text{ is the signal loss and } R \text{ is the time delay take by the sound wave.}$$

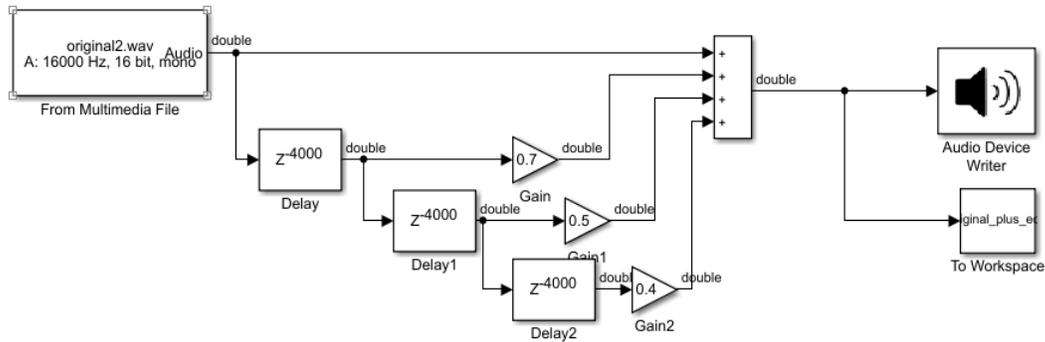


Figure.3. Echo Simulink model

2. Echo cancellation model:

We implemented the acoustic echo cancellation using LMS algorithm as shown in Figure.4 below. The only adaptive filter that Xilinx Zynq FPGA hardware support from DSP system toolbox HDL support is LMS filter block. since LMS filter is configurable to fit our design we assign signals $x(n)$ for input signal which contains the original plus the echo speech signal $d(n)$ for the desired signal which is the original speech signal from workspace block and $e(n)$ for error signal which is the result of desired signal minus the input signal.

In order to generate the HDL code for the Simulink for FPGA implementation using HDL coder the input data type must be a fixed-point number by using the data type conversion block. Both the input and desired signal is converted to fixed point. For a visual inspection of a signal the input signal $x(n)$, the desired signal $d(n)$ and the error signal $e(n)$ is transmitted to time scope.

For audio playback of the output from the echo generation model and from the LMS output port we use two to workspace block and one audio device writer to hear output audio in the Simulink. In the process of updating the filter coefficient the selection of the right step-size is the most crucial part in order to achieve a better performance during echo cancellation using LMS algorithm in adaptive filter. The smaller the step-size the longer it takes to converge to optimal solution the higher the step-size the faster the convergence rate but it leads to unstable. The overall filtering and adaptation process of the LMS algorithm is taken place according to the step wise equation of which is given in the above Table.1 and the complete Simulink model for acoustic echo cancellation is as shown in Figure.5 below.

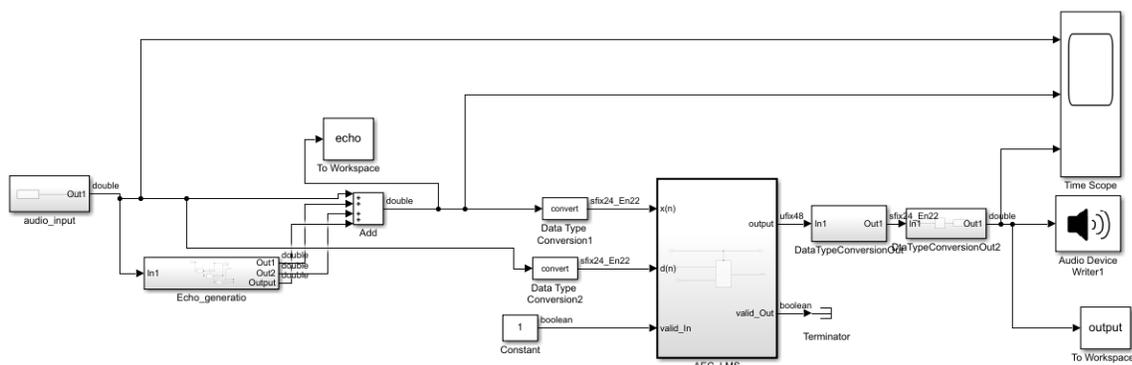


Figure.4 Acoustic Echo Cancellation model for FPGA implementation (Filter length $M = 32$, step-size $(\mu) = 0.013$)

B. FPGA co-simulation implementation

1. Zynq 7000 SOC evaluation kit overview:

The overall Simulink model design of echo cancellation is implemented and exported to Xilinx Zynq platform. Xilinx Zynq is a single chip SOC platform that contains two main part Processing system (PS) and a programmable logic (PL). the PL is the equivalent form of FPGA which contains a high-speed interface that will connect to the PS. those interfaces are called advanced extensible interface (AXI) the current version of AXI interface is AXI4.from different types of AXI4 interface we use AXI4-stream interface for this work. PS is the software part or operating system which support implemented by using C programming language to communicate with hardware and it is an ARM cortex A9 chip. So, in Xilinx Zynq platform every system design should be partitioned in to two-part PL side and PS side. The PL part is which is converted in to IP core so we distinguished it as a subsystem of a design model and we

generate Verilog code for implementation. The PL part also a flexible part which can reuse by other designers according to their system requirement and specification but the PS has a fixed architecture.

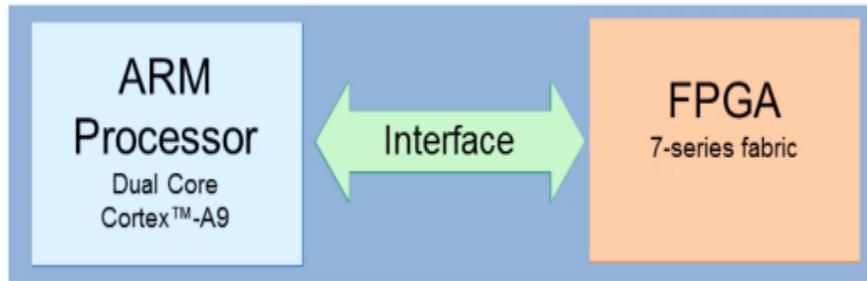


Figure.5. Simplified model of Zynq architecture

For every design project using Xilinx Zynq platform it has a similar design flow starting from system requirement and specification to testing as shown in Figure.7. after deciding in specification and requirement of the design the first thing to do is partitioned the overall design in to software (PS) and hardware (PL) part then defining and use the appropriate interface between PL and PS then if any third party custom reference design is required integrated in to the existing model and create IP from PL and generate VHDL or Verilog code for hardware implementation. For the software side generate a C code and verifying continuously the complete design system after verification the last stage will be building and testing. In present work LMS adaptive filter for echo cancellation subsystem is implemented in the Programmable Logic (PL) and the LMS adaptive filter signal $x(n)$, $d(n)$ and $e(n)$ are in software Section which is under processing system (PS) the interface between PL and PS is AXI4-Stream which is integrated with audio codec for audio output in Zed board.

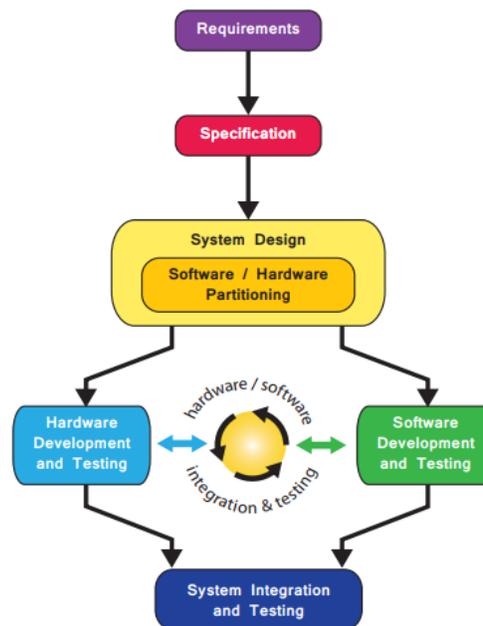


Figure.6. Basic model for design flow of Zynq SoC

2. FPGA implementation:

The complete design and implementation work flow is based on a model-based design approach which uses a single environment for the all process of from design specification and requirement to prototype. HDL workflow advisor used the Simulink echo cancellation adaptive filter model to transfer into RTL description which is then converted into IP for hardware implementation. The interface between PS and PL is AXI4-Stream for the purpose of fast and real time data transfer. In order to implement AXI4-stream interface in IP core in our DUT (device under test) we included data in valid signal which is used to control data transmission between AXI4-slave and Master. When the input data is valid the valid signal is asserted. Generally, in this work to implement AXI4-Stream we start by converting the Simulink model of echo cancellation subsystem into an enable subsystem then we add an input control port Valid in

and output control port Valid out finally we use valid into drive both the algorithm subsystem enable port and valid out the input signal $x(n)$ assigned as data in. The enable subsystem is as shown in Figure.7.

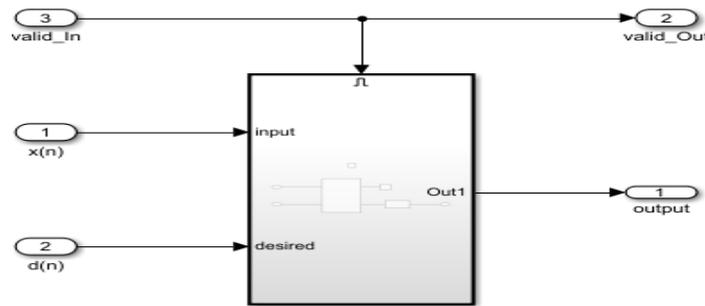


Figure.7. Enabled subsystem for AXI4-stream interface

In order to receive audio input through Zed board line input and process it on FPGA which contain IP core of echo cancellation LMS filter and transmit the echo cancelled audio output through HPN out to speaker we use audio reference design. It uses an audio codec to interface to the peripheral and to convert ADC and vice-versa. The audio codec IP core from the reference design is used to configure the audio codec and for transferring audio data between Zynq board and audio codec. The LMS echo cancellation IP is used for echo cancellation process of the input audio or speech signal. Finally, we integrate the custom reference design with our IP in order to create a single IP core.

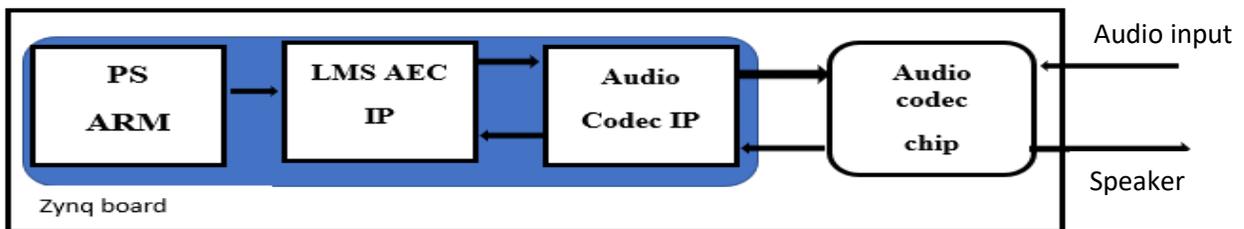


Figure.8. High level architecture of the system on Zed board

Generally, the FPGA hardware co-simulation process involves the following steps.

Step 1: Design adaptive filter with LMS algorithm for acoustic echo cancellation using Simulink DSP toolbox HDL support block as shown in Figure.5.

Step 2: Simulate the design by giving audio input from Matlab workspace and take observation from the output according to the system requirement and specification.

Step 3: Prepare the Simulink echo cancellation model to generate RTL design and create IP core from the subsystem. This will be done by using Xilinx Vivado toolbox as shown in Figure.9.

```
>> hdlsetuptoolpath('ToolName', 'Xilinx Vivado', 'ToolPath', 'C:\Xilinx\Vivado\2018.2\bin\vivado.bat');
Prepending following Xilinx Vivado path(s) to the system path:
C:\Xilinx\Vivado\2018.2\bin
>> addpath(fullfile(matlabroot, 'toolbox', 'hdlcoder', 'hdlcoderdemos', 'customboards', 'ZedBoard'));
>> addpath(fullfile(matlabroot, 'toolbox', 'hdlcoder', 'hdlcoderdemos', 'customboards', 'ipcore'));
```

Figure.9 Matlab command to generate and integrate reference design in Zynq board

Step 4: Create IP core, generate Verilog code for hardware implementation and target platform interface which is AXI4-Stream using HDL workflow advisor.

Step 5: Generate the software model of echo cancellation design using HDL workflow advisor.

Step 6: Generate the bit stream for implementation of the design in Zynq board using HDL workflow advisor.

Step 7: Prepare the software model and hardware kit for implementation. First connect Zed board with required peripheral device and to host PC and dump the generated bit stream to Zed board then generate the software C code for PS part from the generated software model in step 5 finally run the software model using external mode in Simulink to run on Zed board.

IV. EXPERIMENTAL RESULTS

We implemented the FPGA design of the adaptive acoustic echo cancellation system using LMS algorithm by following the steps given under Section 3.

1. This design and implementation require the following software tools those are currently available version of Matlab and Simulink, HDL verifier support package for Xilinx Zynq7000 platform, HDL coder support package for Xilinx Zynq7000 platform and Vivado design suit version 18.2.

2. Simulate the echo cancellation Simulink model using step-size 0.013 and filter length $M=32$ for LMS adaptive filter block. As expected from the echo generation subsystem we get echo plus original audio signal which is then given to input data in $x(n)$ port and original is given to the desired port $d(n)$ after simulation we get the echo cancelled audio output at output port as shown in Figure.10.

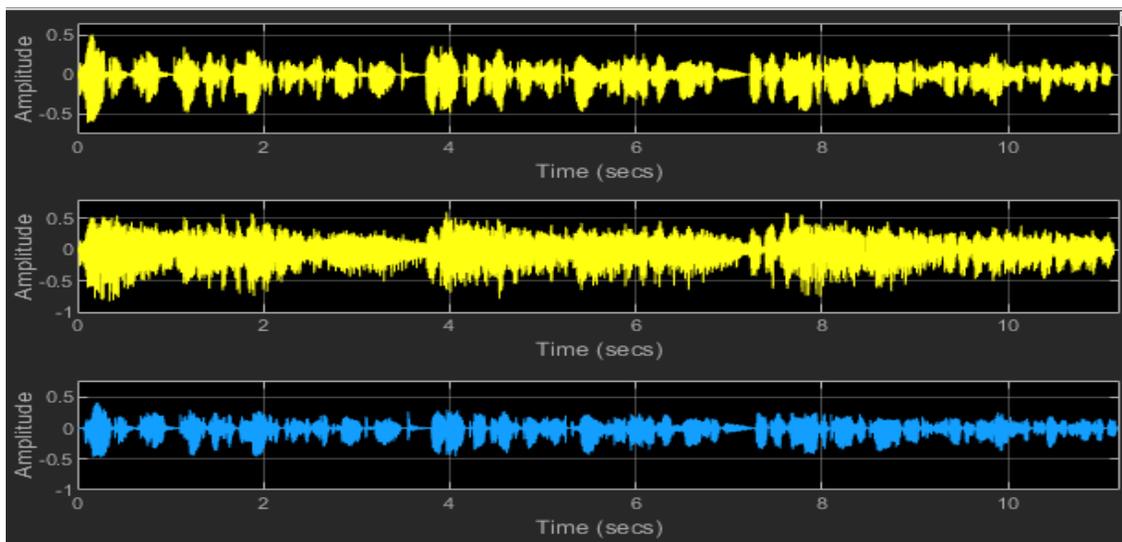


Figure.10. The top signal represents the original input signal (from workspace), the middle signal represents the echo plus original signal the bottom signal is the filtered output signal from LMS system after removing echo, it shows the performance of the LMS algorithm.

3. After the simulation run successfully in Simulink the LMS filter block will be used for RTL by converting it into IP core using HDL coder support in HDL workflow advisor design tasks by specifying the target device for implementation using Xilinx Vivado synthesis tool and selecting reference design in workflow advisor which is audio system with AXI4 stream interface. The most important part is establishing a communication stream or interface between each component and IP block in evaluation Zed board as shown in Figure.12.

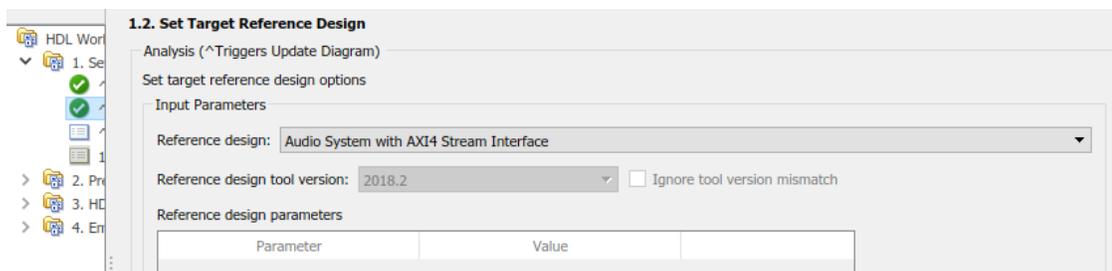


Figure.11 Target reference design for audio codec with AXI4 stream interface

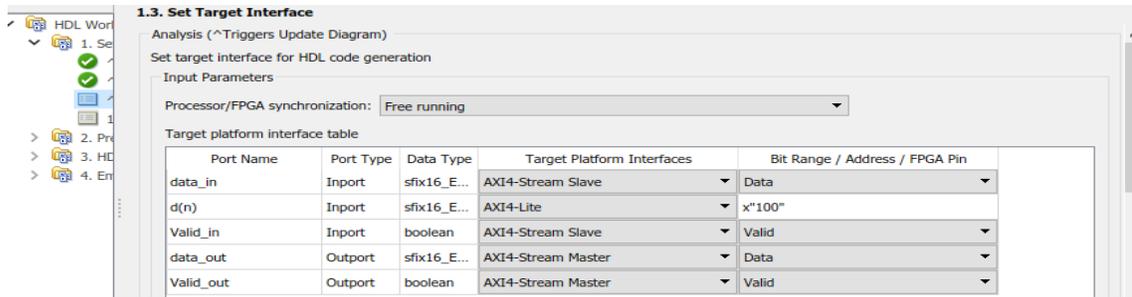


Figure.12 Target interface between PS and PL

4. After setting the target interface by following the design task provided by HDL workflow advisor, we generate Verilog code for hardware implementation in code generation Section and create LMS echo cancellation IP at the same time. Then the software model will be generated which can run on Zed board after bit stream generated and downloaded to Zed board by JTAG cable

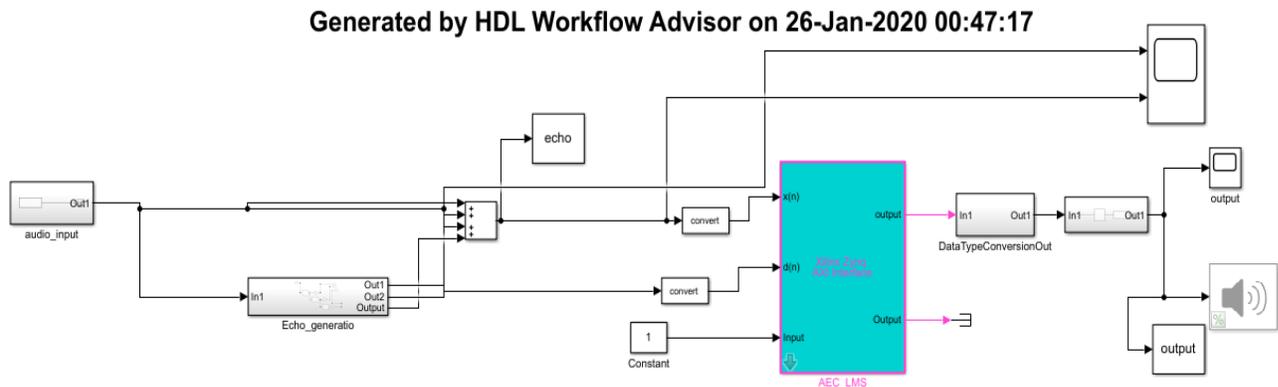


Figure.13. Generated software model of echo cancellation for Zynq evaluation board

5. Finally prepare the generated software model to run on Zed board using external mode and build the program to generate the C code for the software model then run the model by giving audio input from Matlab workspace to Zed board by line in and the output will be heard from the speaker which is echo cancelled audio as we expected.

V. CONCLUSION

In this paper an adaptive filter with LMS algorithm for echo cancellation application was successfully designed and implemented on Zed board using hardware software co-simulation and using the reference design integration with existing IP core for audio codec has a significant contribution in making possible of getting audio output from Zed board and it solve exporting create IP to Vivado design suite or using another environment for implementation. The experimental result shows that the proposed hardware software co-simulation implementation method has a high performance of echo cancellation.

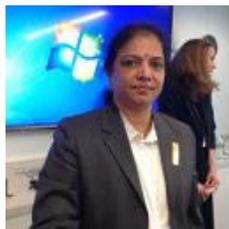
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Quizziz: ESL Students' Perceptions in rural school.

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Abstract: Online Formative Assessment is one of the process to boost the quality of curriculum and learning English language as a second language in Malaysian classroom environment. The aim of using online assessment tool is to attract the students' interest and passion in learning English. Therefore, this study is executed to find out the students' perceptions towards the use of online formative assessment tool, Quizziz. The design of this study is quasi-experimental where the control group is using the traditional way of assessment, while the experimental group being introduced the online formative assessment through Quizziz. It is found that the experimental group increase their engagement during the learning session as well as be flexible towards their self-learning. Therefore, this online formative assessment is practical and relevant to be used as one of the teaching evaluation tool in Malaysian English classes. The results suggest that there is a big change in almost all the marks scored by the students on their online formative assessment post-test. Thus, it is confirmed that the online formative assessment tool is a good way of evaluating the pupils' performance with stress free. This form of evaluation or assessment is helpful for the students to achieve better academic achievement. Optimistically, the practicality of implementing online formative assessment could forecast a positive achievement among students to score better marks in the final test and they are able to refine the English language acquisition amongst the community members.

Keywords: *achievement, engagement, interest, online formative assessment, practical.*

Introduction

The use of technology in education unlock a brand-new space of comprehension and offers a tool that has the potential to alter some of the prevailing educational methods. The teacher acts as a key to the effective exploitation of this resource within the educational system. As technology use continues to increase in society, teachers need to put themselves together for the use of technology within the four walls of the classroom (McCannon & Crews 2000). Some past studies have reviewed and suggested different outcomes to discover the effects of using technology on students' performance in learning English. However, there are still some lacking information that are missing and required the new researcher to fill up the gap that occurred. One of the technology applications that often takes place in the classroom is the use of language Web-based quizzes and activities for classroom evaluation.

Research Problem / Gap

This research intended to study the perceptions of the rural students' towards the usage of Quizziz as a tool of online assessment in learning English. This is due to the lack of research that had been conducted on online formative assessment for rural students in Malaysia. Thus, this study needs to be conducted to reveal the true level of rural students' performance specifically on online formative assessment. In spite of that, the application of online formative assessment will focus more on learning grammar. This exploration intended to discover the different strategies used by the students for language learning especially when they were exposed to online learning and assessment. The application of traditional learning methodology, such as emphasis on teaching various grammar rules, rote learning and textbook-bound lectures had made the students demotivated, and wait for their teachers to pamper them with an explicit instruction in the classroom. Thus, this study is important to close the loop of knowing the level of students' performance by the introduction of the online formative assessment in the learning of English especially for rural students.

Research Objectives

Generally, this study aimed to explore the perceptions of the rural students' towards the usage of Quizziz in learning English. As this is the online way of learning English, thus; it is necessary to check their level of mastery and also their performance in taking the test. Furthermore, this study also try to examine the factor of learning strategies used by the students in learning through online. Thus, this study is relevant in knowing the learning strategies used by the students involved. Finally, this study is important in investigating the differences in students' performance through manual assessment and Quizziz by conducting the pre-test (manual) and the post-test (Quizziz).

Literature Review

In order to obtain their own personal mental model of the real world, the learners need to experience and pick up from their perceptions of that world. As they perceive each new experience, learners will continually update their own mental models as to reflect the new information, and will construct their own interpretation of reality. Due to the need of using online formative assessment tools, the theory says that the acceptance of users must include the behavioural intention, perceived the usefulness and also perceived ease of usability. This is explained by the theory of technology acceptance model by Davis (2003). Thus, this online formative assessment is really applicable to be used to access the capability of students in the classroom where we can get the feedback instantly.

In the current context (rural area), the application of online assessment is still new due to the insufficient facilities especially the provider of the internet line. In order to align with the current trends in the Malaysian curriculum, the unification of Information Communications Technology (ICT) in schools is very useful and beneficial. (Hashim et al. 2019). Due to that, the application of the diffusion of innovations theory by Rogers (2003) can be applied. The procedure of conducting the online formative assessment is considered as the application of technology which can be communicated through specific channels that is the tool such as the Web-based quizzes and can be done for quite some times. The length of usage will familiarise the students and therefore, this type of online formative assessments would be a great success. It is paralleled with the diffusion of innovations theory by Rogers (2003) and also technology acceptance model by Davis (2003). Thus, this online formative assessments really supported by those theories to be used in the real context and cater the need of the students to have the chance to apply and master the technological skill in the learning processes.

Online formative assessments are believed to be capable in providing significantly instant feedback to both parties, which are the teacher and students. In this modern era, technology does play a vital role in enhancing the quality of the education system. In 1920s', the use of technology in assessment is widely used when Sidney L. Presses designed a machine for automatic testing (Skinner 1958). The learning process has developed from time to time since e-learning and online assessments been introduced. The incorporation of technology into language pedagogy has become a continuous phenomenon. Educational multimedia operating system as resource materials to assist and improve the teaching and learning of English language was manufactured broadly. (Melor Md Yunus et al 2010). Online formative assessment tools has intensify the measurement of the learner outcomes and made it possible for them to obtain immediate and direct feedback (Gilbert et al. 2011). Sitthisak et al. (2008) proposed that, online assessment is the assessment that apply the use of computer with web-based assessment tools. In terms of students' performance, research proved that students who learn using the game-based learning are significantly better than students who still follow the traditional medium (Jui-Mei Y et al. 2011).

In conclusion, a study of language game-based learning based on different situations should be conducted in order to identify the constraints and resistances in implementing the online formative assessment test in the teaching and learning processes especially in Malaysian setting.

Research Methodology

This research employed a quasi-experimental design. It compared the performance of the students by comparing the means of the pre-test and the post-test after three weeks of intervention. Comparisons of performances across pre-test and post-test were restricted to the data of 30 pupils. It is one of the preliminary steps where the experimenters used the controlled and experimental groups and not assigning the students randomly (O'Brien 2007; Chua 2006; Creswell 2003). It is a favoured approach in which group A and the controlled group B were designated without random assignment (Creswell 2003). Only the experimental group received the treatment while the controlled group used the traditional method.

This study had been conducted at Sekolah Kebangsaan Kuala Jengal, Dungun which is situated 50 kilometres away from Dungun town. It is classified as a remote area school. The population of the students is 120 from Year 1 to Year 6. As for this study, the sample chosen was 30 pupils which consists of 13 boys and 17 girls. They are all of equal proficiency level which is categorised as moderate proficiency.

The marks of the pre-test and post-test were analysed by using the Statistical Packages for Social Sciences (SPSS) Version 26. The mean marks of the questionnaires of SILL were also being analysed by SPSS Version 26. The data or the findings were being analysed by the Statistics Descriptive to find the frequencies, mean and standard deviation; compare the means of all the questionnaires, pre-test and post-test marks through Paired Sample T-test and Independent Sample T-test. The checklists of the observation were analysed manually to find out what is really happening throughout the intervention or the teaching and learning processes within that three weeks.

Results and Discussion

All the data were analysed through SPSS Version 26 to get all the necessary analysis especially for the pre-test and post-test marks and also the mean of the questionnaires for SILL.

Table 1: The mean and median of the mean scores for pre-test and post-test

| | | Postmark | Premark |
|--------|---------|----------|---------|
| N | Valid | 30 | 30 |
| | Missing | 1 | 1 |
| Mean | | 15.67 | 11.23 |
| Median | | 15.00 | 11.50 |

Based on the above table 1, it showed that the mean for the post-test is 15.67 while the mean for the pre-test is only 11.23. Therefore, it could be said that the performance of the pupils is much increased. The median for the post-test is 15.00 while the median for the pre-test is 11.50.

Table 2: The mean scores for both the boys and girls in pre-test and post-test

| | student | N | Mean | Std. Deviation | Std. Error Mean |
|-----------|---------|----|-------|----------------|-----------------|
| Pre-mark | boys | 13 | 11.15 | 1.72 | .478 |
| | girls | 17 | 11.29 | 1.53 | .371 |
| Post-mark | boys | 13 | 15.54 | 1.89 | .526 |
| | girls | 17 | 15.76 | 1.82 | .442 |

Based on the above table 2, it showed that the pre-test marks scored by the pupils were slightly differ based on the gender. The mean of the boys' marks was 11.15 with SD=1.72; while the means of the girls' marks was 11.29 with SD=1.53. It showed that the variability in the two conditions (boys and girls) is about the same. It interprets that the scores in one condition do not vary too much more than the scores in the second condition. In other words, it means that the variability in the two conditions is not significantly different.

For the post-test, the mean of the boys' marks was 15.54 with SD= 1.89; while the mean marks for the girls was 15.76 with SD=1.82. It still showed that the mean of the girls' marks is slightly higher than the boys. Thus, it can be concluded that the mean for the girls' marks are higher for both the pre-test and post-test.

Table 3: Analysis of the means of the pre-test and post-test

| Variables | Mean | SD | t-value (df) | sig.(2-tailed) |
|-----------|-------|------|--------------|----------------|
| Pair 1 | 11.23 | 1.59 | 23.34 (29) | .000 |
| | 15.67 | 1.82 | | |
| | | | | |

*(p<0.05)

Based on the above table, the paired sample t-test was used to compare the mean of the pre-test and the mean of the post-test. The t-test results determined a significant difference (t=23.348, df=29, p<0.05). It was found that there was a significant difference in the scores for pre-test (M=11.23, SD=1.59) and the post-test (M=15.67, SD=1.82); t=(29)=23.34,p=0.00. These results suggest that the scores of the post-test was higher than the scores of the pre-test showing that it had shown increment after the three weeks session of intervention. Specifically, the results suggest that there is a big change in almost all the marks scored by the students on their online formative assessment post-test. Thus, it is confirmed that the online formative assessment tool is a good way of evaluating the pupils' performance with stress free. Thus, this form of evaluation or assessment is helpful for the students to achieve better performance.

Table 4: Correlation between pre-marks and post-marks

| | | Postmarks | |
|---------|-------|---------------|--|
| Premark | R | P value | |
| | 0.823 | 0.000(P<0.01) | |

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

Based on the above table, the Pearson Product-Moment Correlation analysis determined there is a correlation between the pre-test and post-test. The result showed a significant correlation at the level of confidence of 99 percentages (r=0.823,

$p < 0.01$). Based on this finding, it showed a strong correlation ($r = 0.823$) between the pre-test and post-test. It portrayed that the two tests were answered by the pupils in a conducive way with less stress due to the online tools of assessment. Thus, the two tests showed a strong correlation and the pupils scored higher specifically for the post-test. Therefore, this online formative assessment is really a good way of assessing the students' performance with stress free.

Table 5: Analysis of language learning strategies on post-test

| Variables | Mean | SD | t-value (df) | sig.(2-tailed) |
|------------|-------|------|--------------|----------------|
| Pair SILL | 9.23 | 2.69 | -24.32 (29) | .000 |
| 2 Postmark | 15.67 | 1.82 | | |

*($p < 0.05$)

Based on Table 5, the paired-sample t-test was used to compare all the means of the language learning strategies with the mean of the post-test. The means of the language learning strategies were collected based on the data tabulated of 10 questions adapted from the SILL (Strategy Inventory for Language Learning). There was a significant difference in the scores for language learning strategies ($M = 9.23$, $SD = 2.69$) and the post-test ($M = 15.67$, $SD = 1.82$); $t(29) = -24.32$, $p < 0.05$). These results suggest that there is a significant difference for language learning strategies factor with the post-test. Specifically, the results suggest that when the students have applied various language learning strategies, the mean scores for the post-test is higher. Thus, any strategy being used by the learners will determine the success in achieving the better performance in scoring the post-test.

For the observation, it is found that all the students involved in this intervention of involving in the online formative assessment programme we really enjoyed the process of answering the questions provided through online.

Recommendations

It is suggested that by using online assessment tool, it can help to increase the students' engagement in the learning session. When students obtain their test results immediately, they are more likely to be interested in the outcome than have to wait for days just to get the results. Besides, the assessment can be done in a flexible manner, but it must abide the rules and regulations that the teacher has set. Students can take the test from anywhere that provides access to the Internet. They can have more control by their own, friendly interfaces and the tests are carry out in a game-based that make it fun and easy to use. In this global era, most of the learners, especially school students, currently known as the alpha generation, get along and always evolve with the development of technology.

Apart from that, it assists the teacher to reduce his or her burden and save his or her time in marking the endless exam papers. It also can help to improve the quality of feedback for the students' performance and make analysis of the items in the focused topic. Testing online is one of the easiest ways to begin using technology on a regular basis. It is a painless way to integrate technology in the classroom when the teacher is not being provided with a supple resources and time they need in order to implement the technology plans.

Conclusion

It is being said that the mastery of technological skill is essential to activate the 21st Century Learning, which is in line with the education policy, which stresses on the building of all-rounder person to be a capable human capital in future. Thus, the online formative assessments can fulfil the need of the new way of assessing the students instead of the usage of the traditional method of paper and pencil assessment. Therefore, it is recommended that the use of online formative assessment should be emphasised to be used throughout the teaching and learning processes, especially in assessing the four skills of listening, speaking, reading and writing. Not forgetting the assessing of vocabulary and grammar mastery. It is indicated that the perceptions of the students in the experimental group had shown the positive indicator. In conclusion, the online formative assessments will be a great help not only to teachers and students but also for the administrative.

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A View On Employee Attrition

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Abstract- Attrition is the most common phenomena found in the private sector. when it come to IT companies attrition has become a disease in which all the IT companies are trying to get the best solution for that problem. In this paper an attempt is made by taking forty convenient sampling from IT company to identify the reason for attrition and ways to reduce attrition are discussed in the paper.

Index Terms- Attrition, salary, Human resource, IT employees and job expectation.

I. INTRODUCTION

Attrition is an alarming concern for all the organizations across various sectors. Anything that involves manpower would be affected by employee attrition. Whenever employees leave an organization, the knowledge and intellect also leaves. Human Resource practitioners can try and capture the knowledge and intellect of the talent, however, this is easy said than done. Nowadays, the importance and relevance of the employees is well understood by the organizations and hence the focus is on understanding the key factors that affects employee attrition. The aim of this research is to understand and identify various researches conducted on employee attrition across sectors. For the same, the literature starting from 1955-2014 is studied. The research has highlighted the factors like dissatisfaction with compensation offered , payment below prevailing market rate and inadequacy in the internal and external equity, Inappropriate Reward and recognition, toxic work environment & incompatible work culture, employee attitude, Insufficient support, unsatisfactory relationships with superior, colleagues and subordinates (work relationship), and inadequate opportunities for growth, hiring practices, and managerial style, which affect employee attrition. Understanding attrition is imperative for every organization. Mere recognition of factors would not do any better, both for employees as well as employer. This study focuses on compiling the factors that affect attrition and has a further scope where these factors can be empirically tested in different sectors and recommendations can be incorporated as to observe the difference in the attrition rate

II. ATTRITION

Attrition can be understood as the irregular and overwhelming, but normal decrease of workforce due to resignations, retirement, sickness, or death (as cited in www.citehr.com, 2010). It signifies the rate of change in the

working staff of a concern during a definite period. In other words, it refers to the shifting of workforce into and out of an organization. Most of the HR managers feel that retaining their talented workforce is one of the most challenging tasks, and it is becoming more and more difficult for them to tackle the problem of excessive turnover in their companies and to find ways of retaining their staff.

III. ATTRITION RATE.

There is no standard formula to calculate the attrition rate of a company. This is because of certain factors (Dev, 2005), such as:

1. The employee base changes each month. So if a company has 1,000 employees in April 2004 and 2,000 in March 2005, then they may take their base as 2,000 or as 1,500 (average for the year). If the number of employees who left is 300, then the attrition figure could be 15% or 20% depending on what base is considered.
2. Many firms may not include attrition of new graduates who leave because of higher studies, especially within three months of joining.
3. In some cases, attrition of poor performers may also not be treated as attrition.

Employee Attrition

$$= \frac{\text{No. of Employee who left in the year}}{\text{Average Number of Employees in an organization in a year}} \times 100$$

Thus, if the company had 1,000 employees in April 2004, 2,000 in March 2005, and 300 quit in the year, then the average employee strength is 1,500 and attrition is $100 \times (300/1500) = 20$ percent. Formula to calculate employee attrition rate (Source: TVS Infotech as cited in Dev, 2005).

There are various other types of attrition that should be taken into account (Dev, 2005). These are:

1. Fresher attrition tells the number of fresher's who left the organization within one year. It tells how many are using the company as a springboard or a launch pad.
2. Infant mortality is the percentage of people who left the organization within one year. This indicates the ease with which people adapt to the company.
3. Critical resource attrition tells the attrition in terms of key personnel like senior executives leaving the organization.

- Low performance attrition tells the attrition of those who left due to poor performance. According to studies conducted by Hay Group, the cost of attrition of an employee can be higher than apparent.

March 1, 2018. In an [article](#) in Forbes, points out the Mercer survey highlights that no fewer than 54% of Indian workers are seriously considering leaving their jobs, and that figure spikes to

66% in the 16-24 year age bracket. It also points out the other independent studies “confirm the correlation between intention to leave and actual turnover.” What puzzling is that the people considering leaving are not even highly disengaged employees. 76% of Indians surveyed reported satisfaction with their jobs and 75% with their organizations.



Sourced from: <https://economictimes.indiatimes.com/tech/ites/it-companies-go-all-out-to-stop-attrition-of-skilled-young-staff/articleshow/70693130.cms?from=mdr>

RESEARCH METHODOLOGY.

Descriptive method has been used in the paper.

SCOPE OF THE STUDY.

The scope of the study is confined to the VST company located in electronic city Bangalore. More focus on reason for attrition.

SOURCE OF DATA.

Data was collected from both primary and secondary sources. Primary data was collected through structured questionnaire methods. The secondary data was extracted from different publishers and websites.

SAMPLE DESIGN.

Non Probability sampling technique was used for the paper. Convenient random sampling had been used.

IV. SAMPLE SIZE.

Forty convenient samples were taken for the study.

Table :1

| Reliability Statistics | |
|------------------------|------------|
| Cronbach's Alpha | N of Items |
| .738 | 10 |

The **Table 1**.shows the value of Cronbach’s Alpha reliability test for the questionnaire employee engagement comprising 4 statements. The alpha coefficient for the four items is 0.738, suggesting that the items have relatively high internal consistency.

(Note that a reliability coefficient of 0.70 or higher is considered "acceptable" in most social science research situations.)

Table: 2

| Descriptive Statistics | | | | |
|------------------------|--|----|------|----------------|
| Sl.No | Reasons for change of job | N | Mean | Std. Deviation |
| 1 | Able to get Better Salary Elsewhere | 40 | 3.44 | 1.095 |
| 2 | Having Issues with Co-worker | 40 | 1.64 | .986 |
| 3 | Working in Shifts becomes problematic | 40 | 1.67 | 1.108 |
| 4 | Better Job Opportunities elsewhere | 40 | 2.95 | 1.075 |
| 5 | Problems with manager and higher authority | 40 | 1.38 | .847 |
| 6 | Health issues become major constraint | 40 | 1.56 | .821 |
| 7 | My Job Expectation is not matched | 40 | 3.10 | 1.273 |
| 8 | Difficult to balance family pressure | 40 | 2.74 | 1.517 |
| 9 | Difficult to adjust with local Culture | 40 | 1.97 | 1.367 |
| 10 | Existence of inadequate career prospects | 40 | 2.38 | 1.138 |
| | Valid N (list wise) | 40 | | |

Sourced from : Primary data.

From the above **Table 2**, it can be seen that there are 10 reasons for change of job for which the mean and standard deviation was tabulated. The most important reason for change of job will have highest mean. Accordingly, the prominent statements specifying the reasons for change of job were:

Able to get better Salary elsewhere 3.44, employees give more importance to monetary rewards.

My job expectation is not matched 3.10, if employee expectation are not full filled than employees like to change the job.

Better Job Opportunities elsewhere 2.95, Young IT employees also look out more of mobility and Challenges in the job.so this leads to change of job.

Difficult to balance family pressure 2.61.when the employees feel unable to balance family pressure they like the change the job.

Existence of inadequate career prospects 2.38,all employees need career growth in the job if there is no growth in the job.

V. DISCUSSION AND CONCLUSION:

Employees are in the age group of twenty three to thirty years only, when you have very young professionals. They look out for the different needs. It becomes very much essential for them to Employees start to look out for better monetary rewards. They are ready to go any were to make money. Employees always come with different types of expectation understanding them becomes a major challenge for the employers. All employees need growth when they are not given opportunity they start to look for another job was their need is fulfilled. When employees face personal problems automatically they cannot perform better in the job so this condition somehow leads to change of job. Claiming the career ladder becomes very much essential to all professional so the amount of initiation taken to do so will lead to the change of job.

If IT employees are given more importance on cross cultural training giving importance to the job fit, understanding the young professional needs, providing the young employees more opportunity in decision making, making employees more valued in the job, Helping the employees to learn new skills , making the job stress free, having the open system to share the information, having the cordial relationship in the work environment will lead reduction in the attrition level.

The concept of attrition has been studied for almost three to four decade but they are not able to give the golden button solution for such problems .so the existence of attrition becomes one of the major discussed and research topic in the field of human resource management.

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To Evaluate and Compare the Efficacy of Propofol, Etomidate as Induction Agent in Maintaining Haemodynamic Stability in Elective Surgery Under General Anaesthesia

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ABSTRACT

Hemodynamic stability at the time of induction of anaesthesia and during surgery has been major concern for the anaesthetist of both ancient and modern era's .Induction agent's causes vasodilatation, myoclonic seizures, nausea and vomiting and attenuation of axis thereby decreasing blood pressure. The aim and objective of this study is to evaluate the hemodynamic effect of etomidate and propofol and as induction agents in elective surgeries under general anaesthesia.

To observe any postoperative adverse effects such

To observe any postoperative adverse effects such as nausea , vomiting or seizures with propofol and etomidate as induction agent.

INTRODUCTION

Hemodynamic stability at the time of induction of anaesthesia and during surgery has been a major concern for the anaesthetist of both Ancient and modern eras. The maintenance of hemodynamic stability during induction of anaesthesia is dependent on both basal tone of the autonomic nervous system and also importantly influenced by baroreceptor reflex regulation of autonomic outflow influencing cardiac function and peripheral vascular resistance.⁽¹⁾

Direct laryngoscopy and intubation produces marked circulatory effects known as pressor response, characterised by a sudden increase in heart rate and altered rhythm. Pressor response to laryngoscopy and intubation is documented fact in patients, under a variety of anaesthetic techniques. ⁽²⁻³⁾

The effects of laryngoscopes and intubation on the cardiovascular system were noted early that the cardiac reflex could originate in the trachea, larynx and bronchi. These reflexes were named vasovagal since both the afferent and efferent paths of the reflex were assumed to the vagus nerve, however In 1990 concluded that these changes could be attributed to the stimulation of cardio accelerator nerves implying an increase in the cardiac sympathetic tone rather than vagal stimulation .This response is due to an increase in cardiac output rather than an increase in systemic vascular resistance. ⁽⁴⁾

It is proposed that the mechanism of hemodynamic and catecholamine response to or tracheal intubation is that of somato-visceral reflex. Direct laryngoscopy activates proprioceptors at the base of the tongue which leads to hypertension, tachycardia and other

arrhythmia in proportion of magnitude of stimulus. Subsequent intubation stimulates the receptors in larynx and trachea with enhancement of hemodynamic and epinephrine response⁽⁵⁾

The mean increase in arterial pressure due to laryngoscopy and intubation may be upto 20-25 mmHg. This peak response occurs approximately 30-35 sec after laryngoscopy. These cardiovascular changes due to direct laryngoscopy and intubation are transient, variable and unpredictable and usually well tolerated by healthy individuals, however these changes may be fatal in patients with hypertension, coronary artery disease or raised intracranial tensions.

It was also demonstrated that there is an increase in concentration of catecholamines like adrenaline and non adrenaline in response to the stimulus of laryngoscopy and intubation⁽⁶⁾

Wide range of intravenous induction agents of anaesthesia is now available. Thiopentone, propofol, etomidate, ketamine are used for induction to lower the stress response to laryngoscopy and intubation and to maintain better hemodynamic stability at the time of induction and during surgery.

Induction agents cause vasodilatation, myoclonic seizures, nausea, vomiting and attenuation of Autonomic Nervous System thereby decreasing blood pressure. Each intravenous anaesthetic induction agent affects hemodynamic changes differently. Thiopental is a commonly used induction agent.

In this study, we aim to evaluate the hemodynamic effects of propofol and etomidate in order to find the better hemodynamic stability during induction, laryngoscopy, intubation and during surgery under general anaesthesia in elective surgeries.

MATERIAL AND METHODS

This randomized double blind clinical study was conducted in the department of anaesthesia National institute of medical sciences Rajasthan jaipur, after approval from Institutional Ethical Committee ,on 60 patients aged between 18 to 60 years of either sex , ASA physical status I and II undergoing elective surgery lasting for approximately 2 hrs under general anaesthesia. Written informed consent was taken from all patients. The patients were randomly divided into three groups. Randomization was done by computer generated random numbers tables.

Group I induction with inj.propofol (2mg/kg IV)

Group II induction with inj.etomidate (0.3mg/kg IV)

Patient having following criteria were excluded from the study

- 1) Cardiac, hepatic and renal disease
- 2) Respiratory diseases
- 3) Known hypertensive
- 4) Known diabetic
- 5) Epilepsy
- 6) Pregnant patients
- 7) Known case of difficult airway (MP grade III and IV)

Baseline heart rate (preoperative) systolic blood pressure (SBP) diastolic blood pressure (DBP) mean blood pressure (MBP) and oxygen saturation (SPO2) and end tidal carbon dioxide (ETCO2) were noted.

The patients were kept nil per oral for 8 hours prior to the surgery. All patients were premedicated with tab.alprazolam 0.25mg; tab Rantidine 150mg at night before surgery and in the morning. All patients received inj.glycopyrolate 0.2mg i.v.In preoperative ward prior to the surgery. On arrival at operation theatre standard anaesthesia monitors including pulse oxymetry, electrocardiogram, non invasive blood pressure (NIBP) was attached and hemodynamic parameters were recorded. A 18 G intravenous cannula was secured and ringer lactate infusion was started. Inj midazolam 0.025 mg/kg iv and inj. Nalbuphine 0.1mg/kg was given 2 minutes before

induction. Group I received inj. Propofol 2mg/kg iv and group II etomidate 0.3mg/kg iv. All study drugs were prepared by an anaesthesiologist who was blinded to the details of the study. Volume of medication and speed of injection were equal in all three groups. After induction of anesthesia, hemodynamic variables were recorded. Inj rocuronium 1-2mg/mg given. Laryngoscopy and endotracheal intubation was done by experienced anaesthesiologist. Duration of laryngoscopy was kept less than 10 seconds. Trachea was intubated with adequate size of endotracheal tube. Proper placement of ETT was confirmed by capnography and bilateral auscultation of chest. Following successful placement of ET tube anesthesia was maintained by isoflurane 1-1.5% and equal mixture of oxygen-nitrous oxide (4 L/min) along with intermittent bolus of rocuronium as required throughout the surgery. Heart rate, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure and oxygen saturation were continuously monitored and recorded before induction and after induction at 1 minute, 2 minute, 5 minutes, 10 minutes, 20 minutes, 30 minutes, 60 minute by the anaesthesiologist who is blinded to the study.

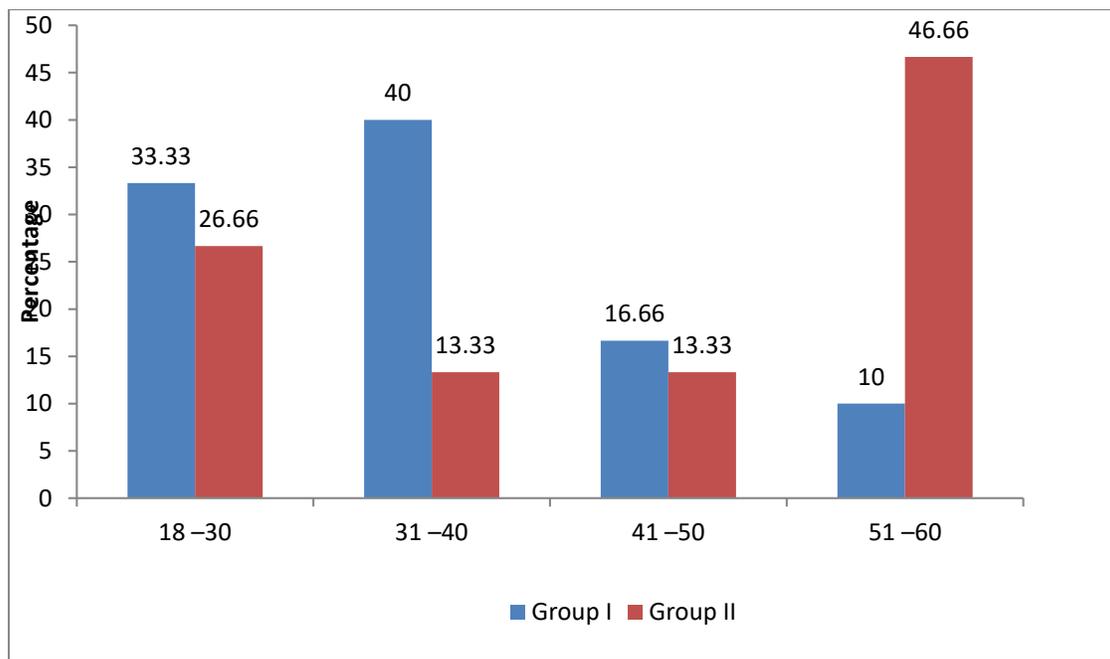
OBSERVATIONS AND RESULTS

This prospective randomized double blind study was carried out on 60 patients between the age group 18-60 years at MIMS, Rajasthan Jaipur to evaluate the hemodynamic effects of etomidate and propofol as induction agent in elective surgeries.

Age distribution of patients in different groups(Table 1)

| Age(in years) | N | Group I (n-30) | | Group II (n-30) | | x ² | p-value |
|---------------|----|----------------|----|-----------------|----|----------------|---------|
| | | F | % | F | % | | |
| 18 –30 | 10 | 33.33 | 8 | 26.66 | 8 | 11.45 | 0.009 |
| 31 –40 | 12 | 40 | 4 | 13.33 | 4 | | |
| 41 –50 | 5 | 16.66 | 4 | 13.33 | 4 | | |
| 51 –60 | 3 | 10 | 14 | 46.66 | 14 | | |

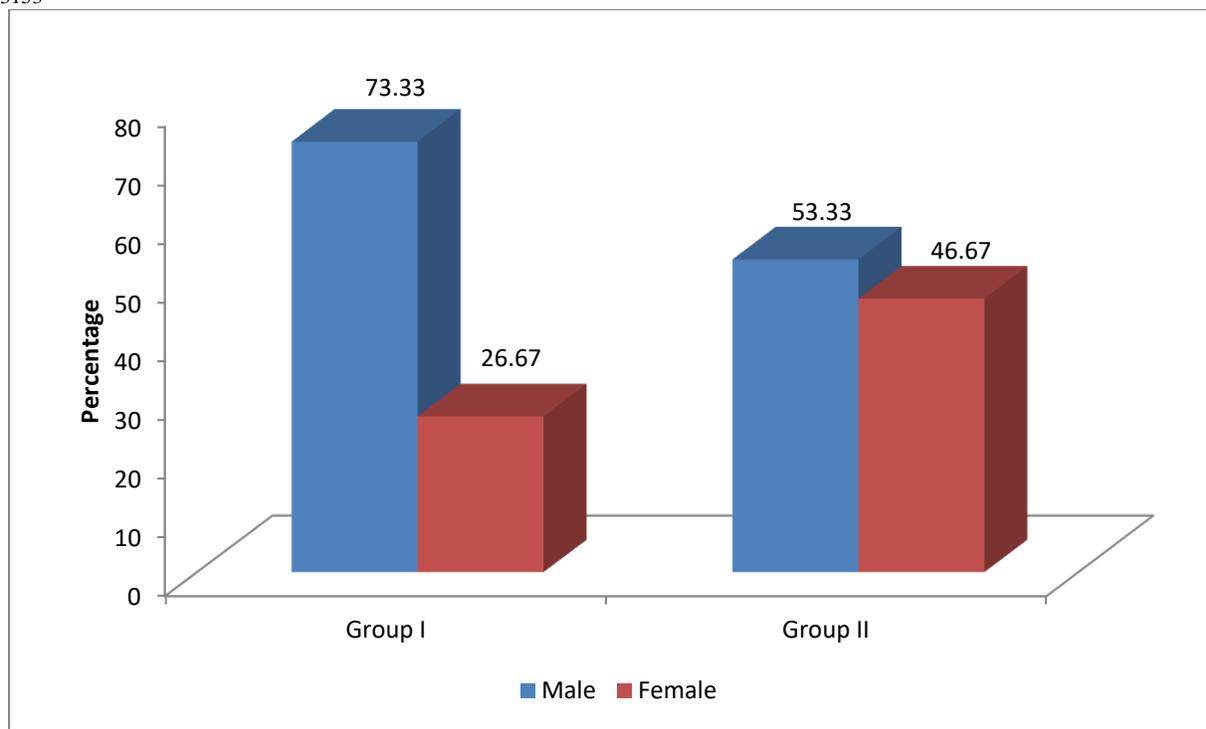
As evident from the table age of the patients was comparable both the groups.(p=0.990). The minimum numbers of patients were in the age group of 41- 50 years.



Distribution of patients in different groups according to gender (Table 2)

| Gender | Group I (n-30) | | Group II (n-30) | | x ² | p-value |
|--------|----------------|-------|-----------------|-------|----------------|---------|
| | F | % | F | % | | |
| Male | 22 | 73.33 | 16 | 53.33 | 2.58 | 0.107 |
| Female | 8 | 26.67 | 14 | 46.67 | | |

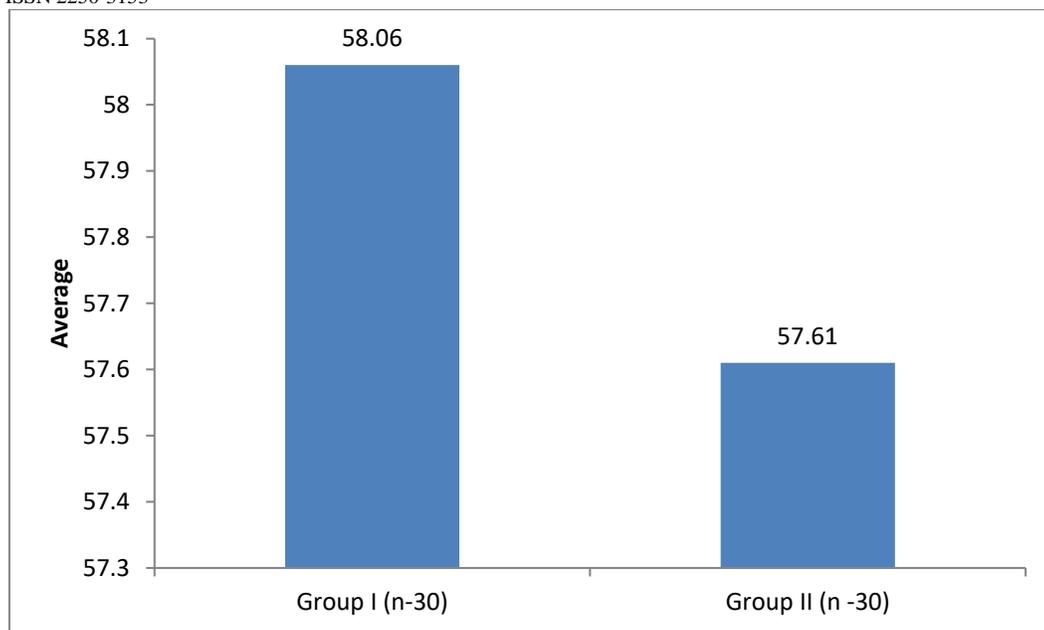
As evident from the table there were 38 males and 22 females in our study. Gender comparison was comparable among both groups. (p =0.107)



Mean distribution of weight in different groups(Table 3)

| | Weight(in Kg) Mean ± SD | F | P-value |
|------------------|----------------------------|-------|---------|
| Group I (n-30) | 58.06±1.76 | 0.241 | 0.308 |
| Group II (n -30) | 57.61±1.61 | | |

As evident from the table mean weight (kg) in group I was 58.06 ± 1.76, in group II was 57.61± 1.61 which was statistically non significant. (p=0.308)



HEART RATE (Table 5.1)

| Time | Group I (n-30) | Group II (n-30) | F | p-value |
|--------------|----------------|-----------------|-------|---------|
| Baseline | 81.53±12.29 | 84.53±9.81 | 2.79 | 0.300 |
| At 0 minute | 73.03±11.37 | 76.73±8.33 | 4.32 | 0.156 |
| At 1 minute | 69.03±10.65 | 74.83±8.65 | 2.68 | 0.024 |
| At 2 minute | 79±8.53 | 80.76±10.22 | 0.000 | 0.471 |
| At 5 minute | 75.90±8.26 | 79.13±9.19 | 0.185 | 0.157 |
| At 10 minute | 74.86±9.11 | 78.60±8.70 | 0.572 | 0.110 |
| At 30 minute | 73.43±9.79 | 78.53±10.14 | 0.266 | 0.052 |
| At 60 minute | 74.23±9.52 | 79.06±10.05 | 0.000 | 0.061 |

As evident from the table the baseline heart rate was comparable among the groups. Mean HR in Group I was 81.53±12.29, in group II was 84.53±9. The F value was 2.792 and p value was 0.300. Statistically significant fall in heart rate was seen at 1 minute of induction (p<0.05)

Systolic blood pressure (SBP) (Table 6.1)

| Time | Group I (n-30) | Group II (n-30) | F | p-value |
|--------------|-------------------|--------------------|-------|---------|
| Baseline | 139.16±9.39 | 135.13±8.71 | 1.07 | 0.090 |
| At 0 minute | 101.86±7.94 | 118.56±14.44 | 18.10 | 0.000 |
| At 1 minute | 94.10±9.38 | 112.93±17.06 | 14.30 | 0.000 |
| At 2 minute | 94.76±7.37 | 127.26±10.97 | 3.44 | 0.000 |
| At 5 minute | 96.40±8.70 | 125.60±9.34 | 0.60 | 0.000 |
| At 10 minute | 97.33±6.37 | 120.26±13.42 | 9.35 | 0.000 |
| At 30 minute | 99.13±6.53 | 125.23±7.84 | 0.21 | 0.000 |
| At 60 minute | 99.76±5.65 | 125.30±8.01 | 1.36 | 0.000 |

As evident from the table base line SBP was comparable among the groups. Mean SBP in Group I was 139.16 ± 9.39 , in group II was 135.13 ± 8.71 . The F value was 1.07 and p value was 0.090. Statistically significant fall in SBP was observed in group I at 0min which persisted till 60 minutes.

Diastolic blood pressure (Table 7.1)

| Time | Group I (n-30) | Group II (n-30) | F | p-value |
|--------------|-------------------|--------------------|-------|---------|
| Baseline | 87.43±4.04 | 86.40±4.53 | 0.799 | 0.355 |
| At 0 minute | 58.06±6.17 | 74.66±10.63 | 7.74 | 0.000 |
| At 1 minute | 56.23±5.70 | 69.73±11.97 | 13.73 | 0.000 |
| At 2 minute | 57.86±5.37 | 80.36±7.55 | 3.37 | 0.000 |
| At 5 minute | 58.56±7.69 | 80.20±6.25 | 0.06 | 0.000 |
| At 10 minute | 56.93±5.81 | 79.63±6.17 | 0.80 | 0.000 |
| At 30 minute | 61.30±9.21 | 80.43±5.82 | 1.95 | 0.000 |
| At 60 minute | 58.23±6.32 | 80.56±7.33 | 4.97 | 0.000 |

As evident from the table base line DBP was comparable among the groups .Mean DBP in Group I was 87.43 ± 4.04 , in group II was 86.40 ± 4.53 . The F value was 0.799 and p value was 0.355. Statistically significant fall in DBP was observed throughout the procedure

Mean blood pressure (Table 8.1)

| Time | Group I (n-30) | Group II (n-30) | F | p-value |
|--------------|-------------------|--------------------|-------|---------|
| Baseline | 104.33±3.86 | 98.83±17.24 | 2.64 | 0.094 |
| At 0 minute | 72.36±6.39 | 88.63±11.76 | 15.36 | 0.000 |
| At 1 minute | 68.36±6.29 | 84.20±13.40 | 18.92 | 0.000 |
| At 2 minute | 70.60±7.10 | 95.96±8.22 | 2.30 | 0.000 |
| At 5 minute | 70.83±8.14 | 95.03±6.78 | 0.01 | 0.000 |
| At 10 minute | 70.13±6.03 | 94.53±5.70 | 0.35 | 0.000 |
| At 30 minute | 70.46±4.56 | 95.73±5.86 | 0.31 | 0.000 |
| At 60 minute | 72.26±6.18 | 95.33±5.76 | 0.98 | 0.000 |

As evident from the table base line MBP was comparable among the groups .Mean MBP in Group I was 104.33 ± 3.86 , in group II was 98.83 ± 17.24 . The F value was 2.64 and p value was 0.094. Statistically significant fall in MBP was observed at 0min which persisted till 60 minutes.

SpO₂ (Table 9.1)

| Time | Group I (n-30) | Group II (n-30) | F | p-value |
|--------------|-------------------|--------------------|------|---------|
| Baseline | 99.10±0.80 | 99.13±0.86 | 0.76 | 0.877 |
| At 0 minute | 99.10±0.80 | 98.83±2.03 | 1.47 | 0.507 |
| At 1 minute | 96.10±16.28 | 99.13±0.86 | 3.30 | 0.312 |
| At 2 minute | 99.10±0.80 | 99.13±0.86 | 0.07 | 0.877 |
| At 5 minute | 96.10±16.47 | 99.23±0.77 | 3.35 | 0.302 |
| At 10 minute | 99.13±0.81 | 99.16±0.74 | 0.58 | 0.870 |
| At 30 minute | 96.16±16.48 | 98.93±0.82 | 3.40 | 0.362 |
| At 60 minute | 99±0.78 | 99.36±0.71 | 0.09 | 0.065 |

No significant change was seen in SPO2 among both the groups at various time intervals (p>0.05)

ETCO₂ (Table 10.1)

| Time | Group I (n-30) | Group II (n-30) | F | p-value |
|--------------|-------------------|--------------------|------|---------|
| Baseline | 37.23±3.09 | 38.23±3.96 | 2.19 | 0.280 |
| At 0 minute | 34.83±1.17 | 34.83±1.20 | 0.08 | 1.000 |
| At 1 minute | 36.73±0.84 | 38.16±6.63 | 1.82 | 0.246 |
| At 2 minute | 34.56±1.07 | 34.80±1.06 | 0.02 | 0.401 |
| At 5 minute | 34.23±1.65 | 34.73±1.28 | 3.34 | 0.196 |
| At 10 minute | 36±1.48 | 32.93±1.96 | 0.28 | 0.000 |
| At 30 minute | 32.96±0.76 | 33.20±0.80 | 0.99 | 0.255 |

| | | | | |
|--------------|------------|------------|------|-------|
| At 60 minute | 39.60±1.45 | 39.56±1.65 | 0.07 | 0.934 |
|--------------|------------|------------|------|-------|

Base line ETCO₂ was comparable at 0 min among both the groups. Statistically significant rise was seen at 1 min which persisted up to 60 minutes. (p <0.05)

DISCUSSION

General anesthetic induction agents may decrease arterial blood pressure via cardio vascular depression and attenuation of autonomic nervous system activity. On the other hand laryngoscopy and endotracheal intubation elicit vasopressor responses such as hypertension and tachycardia. Various attempts have been made to overcome and attenuate hemodynamic instability during induction, laryngoscopy, and intubation. In many studies induction agents, either alone or in combination have been used to achieve minimum cardiovascular. Although many studies used thiopentol sodium as sole induction agent, it was found unsatisfactory as it does not suppress airway reflexes. Propofol has been advocated as a preferred i.v induction agent but induction with propofol alone causes remarkable reduction in blood pressure. Various studies shows that etomidate provide better hemodynamic profile but for its adverse effect like myoclonus and adrenal suppression. Recently Hacettepe University, studied propofol and etomidate for availability of admixture and reported that etofol (admixture of etomidate and propofol) can be used for induction agent.

After approval from institutional ethical committee we conducted a randomized double blind study in the department of anesthesia NIMS during the period of 20-02-2018 to 10-04-2018, comprising 60 patients of ASA grade I and II, age between 18-60 who were randomly selected and divided into two groups 30 each.

Informed consent were taken from all the patients were induced in Group I Induction with Propofol 2mg/kg, Group II induction with etomidate 0.3mg/kg and the patient was intubated and maintain on oxygen and nitrous (50-50%), isofluraine

Hemodynamic parameters and adverse effects if any were noted at various time intervals. The data obtained from this study was organised and analysed statistically. Observation was made and results were drawn.

Demographic profile

In our study out of total (60) number of male patients was 38 and female patients were 22. No significant difference (p=0.107 and $X^2=2.58$) was observed in gender distribution between the groups (table 2).

Demographic profile of the study done by **K Meena et al** also had comparable age group (p=0.178) and comparable gender distribution (p=0.241).⁷

Heart rate (HR)

In our study baseline heart rate was comparable among the groups. Mean HR in Group I was 81.53 ± 1.76 , in group II was 84.5 ± 9.8 . The F value was 2.792 and p value was 0.300. Statistically significant fall in heart rate was seen at 1 minute of induction (p<0.05) (table 5.1)

Masoudifar M et al concluded there were no significant difference among groups I (Propofol) and II (Etomidate) in terms of HR (P = 0.47).⁽⁸⁾

Singh R et al studied there was a significant increase from baseline in heart rate (P = 0.001) at 1 minute after intubation. This statistically significant difference can be due to ASA grade III patients with coronary artery disease and left ventricular dysfunction.⁽⁹⁾

Mulier JP et al studied cardiovascular effects of propofol in comparison with thiopental and observed no statistically significant difference in heart rate and cardiac index.⁽¹⁰⁾

SYSTOLIC BLOOD PRESSURE

In our study base line SBP was comparable both the groups. Mean SBP in Group I was 139.16 ± 9.39 , in group II was 135.13 ± 87.1 . The F value was 1.07 and p value was 0.090. Statistically significant fall in SBP was observed in group I at 0min which persisted till 60 minutes (table 6.1).

Findings of our study are comparable with the studies of **Masoudifar M et al**⁸, **Geeta Karki et al**¹¹, **Kalogridaki M et al**¹² and **Meena et al**⁷.

Masoudifar M et al concluded that changes of SBP in the group B (Propofol) was statistically significantly ($P = 0.019$), clinically significant hypotension was seen in 26.1% of patients in group B (Propofol) and 8% of patients in group A (Etomidate). Patients of group A (Etomidate) had more stable hemodynamic parameters.⁽⁸⁾

Geeta Karki et al concluded that Etomidate offers superior hemodynamic stability during induction compared to thiopentone and propofol, similar to our study.⁽⁹⁾

Kalogridaki M et al found statistically significant drop in systolic blood pressure in group P (Propofol) when compared with the baseline value (mean decrease 15.2 mmHg, 95% CI 5.6-24.8 mmHg, $p=0.001$).⁽¹⁰⁾

Meena et al observed significant fall in systolic blood pressure in group I (Propofol) as compared to group II (etomidate) Systolic blood pressure prior to induction was non significant ($p=0.536$). There was significant fall in blood pressure in group I at induction which persisted till 5 minutes after intubation ($p=0.000$). The combination of etomidate plus propofol had better hemodynamic stability than etomidate or propofol alone.⁽⁷⁾

DIASTOLIC BLOOD PRESSURE

In our study base line DBP was comparable among the groups. Mean DBP in Group I was 87.43 ± 4.04 , in group II was 86.40 ± 4.53 . The F value was 7.99 and p value was 0.355. Statistically significant fall in DBP was observed throughout the procedure (table 7.1).

Masoudifar M et al found that changes of the DBP was significantly higher in the group B (Propofol) ($P = 0.001$) at various time intervals, which is comparable with our study.⁽⁸⁾

MEAN BLOOD PRESSURE

In our study base line MBP was comparable among the groups. Mean MBP in Group I was 104.3 ± 3.86 , in group II was 98.83 ± 17.24 . The F value was 2.64 and p value was 0.94. Statistically significant fall in MBP was observed at 0min which persisted till 60 minutes. (table 8.1)

Masoudifar M et al found that changes in MBP was statistically significant in group B ($P = 0.008$). Hypotension happened in 26.1% of group B and 8% of group A ($P = 0.09$).⁽⁸⁾

Moller et al used propofol and etomidate in general anesthesia induction and found that MBP values after induction in the propofol group were significantly lower than those of the other group. Following intubation, the MBP values in the etomidate group were statistically significantly higher than those of the propofol groups.⁽¹³⁾

SPO2

In our study no significant change was seen in SPO2 in both groups (p value >0.05). (Table 9.1)

ETCO2

In our study ETCO₂ varies from minimum 30mmHg to 45mmHg maximum. This is statistically significant at various time intervals but changes in ETCO₂ are not clinically significant and therefore no clinical intervention was required. (Table 10.1)

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Causes, Management And Outcome DF Stridor In Infants-A Prospective Study In Tertiary Care Hospital In Kanyakurai District

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Abstract- Introduction: Stridor may be congenital or acquired. It can be acute, intermittent or chronic. Laryngotracheal inflammation (croup) is the most common cause of acute stridor. Laryngomalacia is the most common cause of chronic stridor. In the infant and newborn, stridor usually indicates a congenital disorder including laryngomalacia, vocal cord paralysis or subglottic stenosis¹. Most of the studies related to causes, management and outcome of stridor are from western countries. From India there are only limited studies. So, we did this study of stridor in infants and newborns in a tertiary care centre. Here we get the privilege to treat a lot of children with breathing difficulty and noisy respiration^ who are referred from peripheral hospitals because of unavailability of resources and equipment.

So, we did this study to describe the common causes, management and short term outcome of stridor in infants and neonates in an Indian scenario.

AIM:

To study the causes of stridor in infants and describe the management and follow short term outcome of stridor in infants in a tertiary care centre.

MATERIALS AND METHODS

STUDY DESIGN:

A prospective descriptive study

4.1 SAMPLE SIZE

Sample size was calculated using the equation:

$$n = \frac{z_a^2 \times p \times (100 - p)}{d^2}$$

where, a = Type I error « 5%

$z_a = 1.96$

p = expected proportion of variable of interest

% of infants with laryngomalacia = 60%, obtained from the study - Laryngomalacia: 1 / disease presentation, spectrum, and management by Landry AM et al.

p= 60% d= allowable error « 10- 20% of p= (20/1-00) x 60= 12 d= 12

$(1.96)^2 \times 60 \times 40$

Thus, n = — = 64

The sample size, n = 64

Conclusions:

The following conclusions were made from this prospective descriptive study:

Primary outcome - Common causes of stridor in infants

1. Congenital causes were more common than acquired causes.
2. Laryngomalacia was the most common cause of stridor (68.8%) in infants presented our centre. Type I was the most common subtype followed by type II, followed by type III and combination of types I and II.
3. The second common cause was bilateral vocal cord motion impairment (12.5%).
4. The third common cause was vallecular cyst (3.1%) followed by glottic web with subglottic stenosis (3.1%).
5. Other less common causes include subglottic stenosis, upper tracheal web, subglottic hemangioma, foreign body in the glottis, micrognathia, Pierre Robin sequence and benign cystic teratoma of the neck.

Secondary outcomes:

1. Percentage of children who required surgical intervention was 23.4%.
2. Type of surgery-
Tracheostomy was the most required surgery. The other surgeries done were tracheostomy with open excision, tracheostomy with endoscopic excision, aryepiglottoplasty, endoscopic excision of vallecular cyst, endoscopic dilatation and application of mitomycin c, removal of foreign body, endoscopic excision and epiglottopexy. Multistage surgeries including tracheostomy, endoscopic excision with intraleisional steroid injection, endoscopic dilatation with application of mitomycin c and expansion laryngotracheoplasty were required in two children.
.
3. At three months follow up, half of the children (50%) were asymptomatic.

I. INTRODUCTION

The term stridor is derived from the latin verb 'stridulus' which means to make a harsh noise or shrill sound. Stridor is an audible respiratory noise derived from turbulent airflow due to narrowing or obstruction of the upper airway. It is a sign of partial obstruction of the large airways that requires an immediate diagnosis and acute management. Stridor can be classified as inspiratory, expiratory or biphasic. Inspiratory stridor usually indicates a supraglottic pathology. Glottic and subglottic lesions usually produce biphasic stridor¹.

Stridor may be congenital or acquired. It can be acute, intermittent or chronic. Laryngotracheal inflammation (croup) is the most common cause of acute stridor. Laryngomalacia is the most common cause of chronic stridor. In the infant and newborn, stridor usually indicates a congenital disorder including laryngomalacia, vocal cord paralysis or subglottic stenosis¹.

Stridor associated with a fever usually signifies an infectious cause, such as bacterial tracheitis or epiglottitis. In toddlers with acute onset of stridor who are afebrile, aspiration of a foreign body must be in the differential diagnosis. In a child who has been intubated for a long period, iatrogenic subglottic stenosis can be considered, even though it is rare.

The outcome of stridor would depend on proper and timely interventions. Protocol for the investigation and management of infant stridor are now well defined. The gold standard in the workup of stridor is an upper and lower airway endoscopy under general and local anaesthesia. Although important, pre-endoscopy assessment including history, physical examination and radiological examination, is only a guide to the type and degree of pathology found during endoscopy.

Often, due to improper investigations all stridor get erroneously labelled as laryngomalacia thus delaying intervention when needed. Management of a stridulous child can be either conservative or surgery depending on the cause. It requires a close cooperation and team work between the paediatrician, otolaryngologist and anaesthetist for the management of stridor in infants.

Most of the studies related to causes, management and outcome of stridor are from western countries. From India there are only limited studies. So, we did this study of stridor in infants and newborns in a tertiary care centre. Here we get the privilege to treat a lot of children with breathing difficulty and noisy respiration^ who are referred from peripheral hospitals because of unavailability of resources and equipment.

So, we did this study to describe the common causes, management and short term outcome of stridor in infants and neonates in an Indian scenario.

II. AIMS AND OBJECTIVES

AIM:

To study the causes of stridor in infants and describe the management and follow short term outcome of stridor in infants in a tertiary care centre.

III. OBJECTIVES

PRIMARY OBJECTIVE:

To study the common causes of stridor in children from newborn to one year of age.

SECONDARY OBJECTIVES:

To study the need for surgery and the type of surgical intervention needed in the management of stridor in infants. To study the short term outcome of the child at 3 months.

IV. MATERIALS AND METHODS

4.2 STUDY SITE

The study was conducted at the department of ENT & Laryngology in sree Mookambika institute of medical sciences kulasekaram, Kanyakumari district south India.

STUDY POPULATION

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All children in the age group less than one year of both sex including neonates presenting with stridor to the ENT department of sree Mookambika institute of medical sciences kulasekaram, Kanyakumari district south India.

4.3 STUDY DESIGN:

A prospective descriptive study

4.4 SAMPLE SIZE

Sample size was calculated using the equation:

$$n = \frac{z_a^2 \times p \times (100 - p)}{d^2}$$

where, a = Type I error « 5%

$z_a = 1.96$

p = expected proportion of variable of interest

% of infants with laryngomalacia = 60%, obtained from the study - Laryngomalacia: 1 /
disease presentation, spectrum, and management by Landry AM et al.

p= 60% d= allowable error « 10- 20% of p= (20/1-00) x 60= 12 d= 12
(1.96)²X60 X40

Thus, n = — = 64

The sample size, n = 64

4.5 STUDY DURATION

The study was conducted for a period of one and a half years from July 2017 to January 2019.

4.8.1 History:

A thorough history taking was done with special emphasis on the age of onset, duration, severity, and progression of the stridor, precipitating events (eg: crying, feeding), effect of positioning (eg: prone, supine, sitting), quality and nature of crying, presence of aphonia. Other associated symptoms include paroxysms of cough, aspiration, difficulty feeding, drooling, sleep disordered breathing, history of colour change, cyanosis, respiratory effort, and apnea.

Perinatal history regarding maternal condylomata, type of delivery (including shoulder dystocia), endotracheal intubation use and duration, and presence of congenital anomalies was taken.

Past surgical history, particularly neck or cardiothoracic surgeries, any history of NICU stay and history of intubation was asked for to rule out intubation injuries.

A feeding and growth history was evaluated. Any history of regurgitation and spitting up of feed was asked for to rule out gastroesophageal reflux.

4.8.2 Physical examination:

On initial presentation, the child was assessed for the type and severity of stridor and respiratory compromise. Special attention is given to the heart rate and respiratory rate, cyanosis, use of accessory muscles of respiration, nasal flaring, level of consciousness and responsiveness. The presence of subcostal, intercostal and suprasternal recession was looked for. A detailed examination of the craniofacial morphology, patency of the nares and cutaneous hemangioma was done. Examination of the oral cavity and oropharynx was done to look for any mass, cleft palate and other congenital malformations.

Further investigations and management were done as per hospital protocol.

4.8.3 Preendoscopy investigations:

SPECIFIC:

1. Serum calcium
2. Thyroid function test
3. Xray chest and neck
4. VideoFlourosocopy - to assess swallowing in children with feeding difficulties.
5. Echocardiography - to exclude vascular rings or slings.
6. ArterialBlood Gas Analysis (ABG)
7. CT or MRI neck

4.8.4 Endoscopy:

ROUTINE:

Flexible fibre-optic nasopharyngoscopy and laryngoscopy (with patient awake) to detect supraglottic and laryngeal lesions and a few subglottic lesions and observe vocal cord movement.

SPECIFIC:

Laryngotracheobronchoscopy(LTB) under general anaesthesia - using rigid Hopkins rod telescopes.

Once the etiology is established further management can be either conservative or surgical depending on the site and severity of obstruction.

4.8.3 Management:

1. CONSERVATIVE MANAGEMENT-

- prone position
- cardiorespiratory and oxygen saturation monitoring
- intravenous fluids if significant respiratory distress or feeding problems (choking/aspiration)
- oxygen therapy
- continuous positive airway pressure, intubation and mechanical ventilation
- pharmacotherapy with intravenous or oral steroids.

2.SURGICAL MANAGEMENT -

Surgical management depends on the specific lesion that causes stridor. Indications for surgical correction include the following.

1. Failure to thrive, defined as a weight for age that falls below the 5th percentile on multiple occasions or a weight deceleration that crosses two major percentile lines on a growth chart.
2. Cyanotic spells.
3. Severe respiratory distress.

Surgical procedures which were used to treat stridor in this study include the following:

*->

1. Aryepiglottoplasty for laryngomalacia types I and II.
2. Epiglottopexy for laryngomalacia type III.
3. Tracheostomy for bilateral vocal cord motion impairment.
4. Endoscopic dilatation for subglottic stenosis and upper tracheal web.
5. Laryngofissure and expansion laryngotracheoplasty for glottic web and subglottic stenosis.
6. Endoscopic excision of vallecular cyst (coblator assisted).
7. Removal of foreign body under GA.
8. Open excision and tracheostomy for benign cystic teratoma of neck.

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4.8.4 Follow -up:

A short term follow up of all the children was done at three months. At the follow up visit, children were assessed for the presence of stridor. Flexible laryngoscopy was done in postoperative patients and those with no symptom improvement.

4.9 OUTCOME VARIABLES:

1. PRIMARY OUTCOME

Common causes of stridor in infants and neonates.

2. SECONDARY OUTCOMES -

- 1 .Percentage of infants requiring surgical intervention.
- 2.Percentage of infants who were symptom free at the end of three months.

4.10 DATA COLLECTION METHODS:

A structured proforma containing data regarding essential demographic details, clinical features, investigations, diagnosis, treatment and follow up to measure the outcome of this study was filled by the principal investigator. Data collection form is enclosed with the Annexure 1.

4.11 STATISTICAL METHODS:

Statistical analysis was performed using the software SPSS version 17.0. All the categorical variables were expressed in percentages (%) and frequency (n).

4.12 ETHICAL CONSIDERATIONS:

Informed consent was taken from the parents/guardian regarding inclusion in the study.

V. RESULTS AND ANALYSIS

5.1 DEMOGRAPHIC DATA:

Table 2: Age distribution of the study population

| Age | Count | Percent |
|----------|-------|---------|
| Neonates | 17 | 26.6 |
| Infants | 47 | 73.4 |

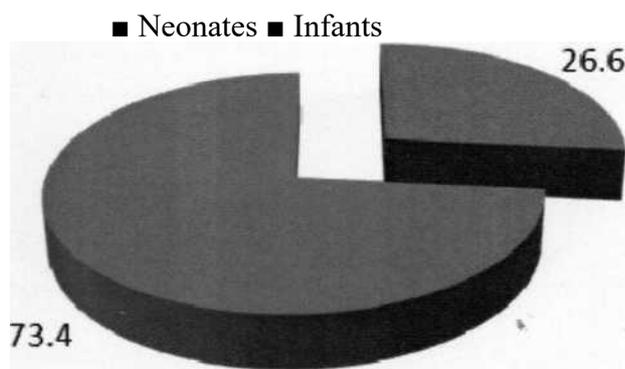
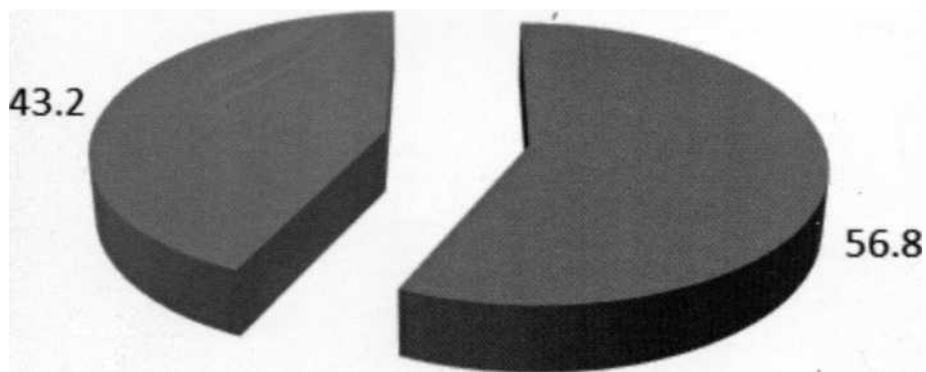


Figure 22: Age distribution of the study population

During the period of study, 64 children presented with stridor. Out of the 64, 47 were infants (73.4 %) and 17 neonates (26.6%).

Table 5: Sex distribution of children with laryngomalacia

| Sex | Count | Percent |
|--------|-------|---------|
| Female | 25 | 56.8 |
| Male | 19 | 43.2 |



■ females ■ males

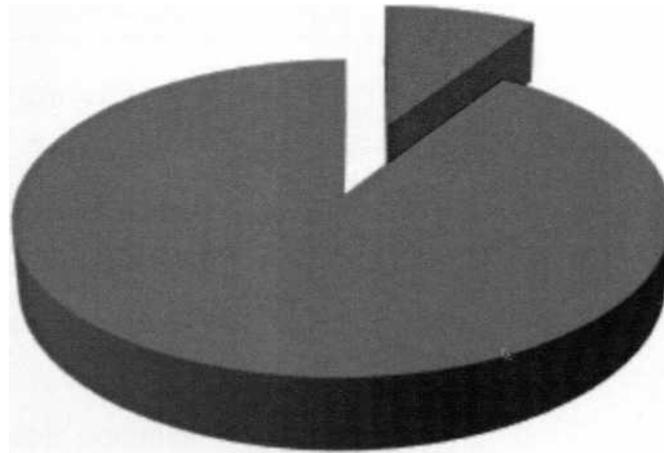
Figure 25: Sex distribution of children with laryngomalacia

Among the children with laryngomalacia, 25 (56.8%) were females and 19 (43.2%) babies were males.

Table7: Distribution of children with laryngomalacia according to term of delivery

| Term of delivery | Count | Percent |
|------------------|-------|---------|
| Pre term | 4 | 9.1 |
| Term | 40 | 90.9 |

9.1



90.9
■ Preterm ■ Term

Figure 27: Distribution of children with laryngomalacia according to term of delivery

Among the babies with laryngomalacia, 40 were term infants (90.9%) and 4 were preterm (9.1%).

Table 8: Presence of associated congenital anomalies

| Associated congenital anomalies | Count | Percent |
|---------------------------------|-------|---------|
| Absent | 48 | 75 |
| Present | 16 | 25 |

16 children (25%) had associated congenital anomalies.

Table 9 : Frequency of congenital anomalies

| Type of congenital anomaly | Count | Percent |
|----------------------------|-------|---------|
| Hypothyroidism | 4 | 6.3 |
| Congenital heart disease | 6 | 9.4 |
| Neurological abnormalities | 3 | 4.7 |
| Pierre Robin syndrome | 1 | 1.6 |
| Benign cystic teratoma | 1 | 1.6 |

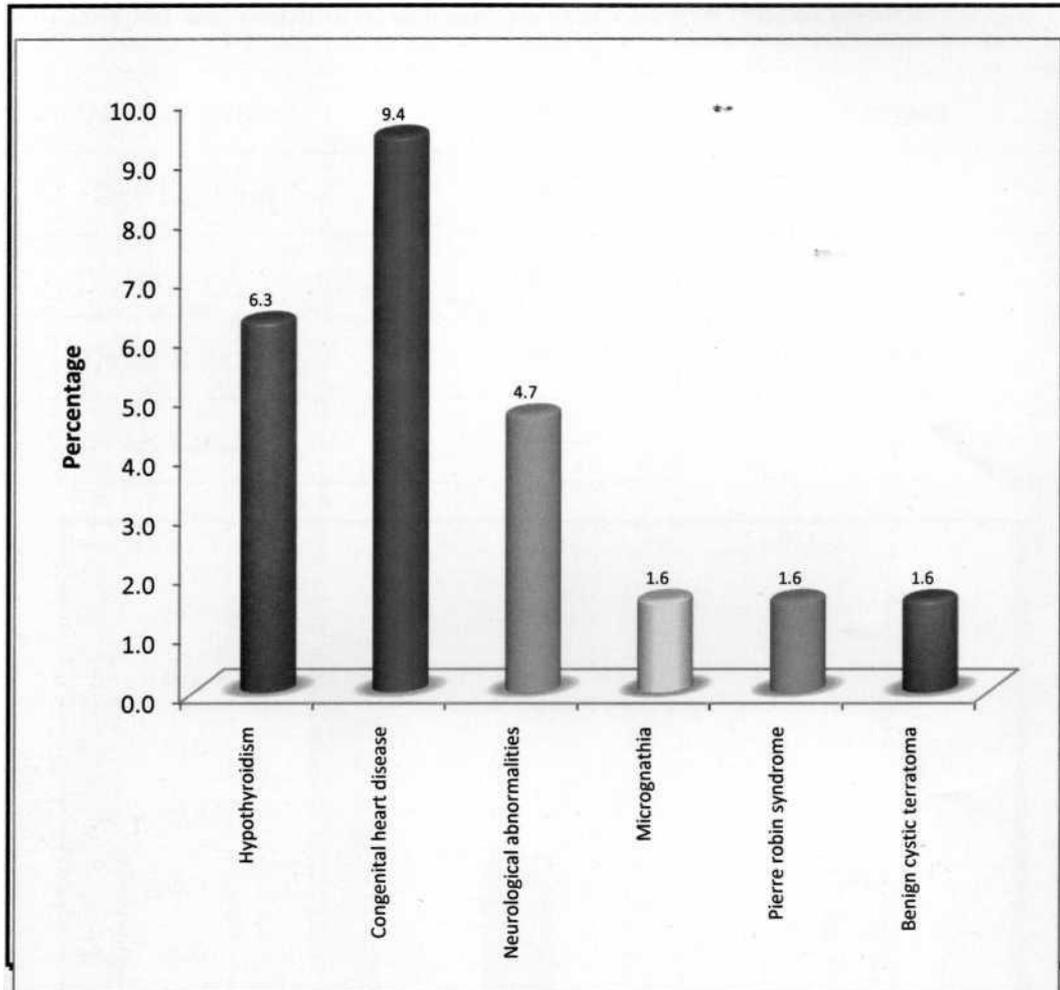


Figure28: Frequency of congenital anomalies

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Most common anomaly was congenital heart disease (9.4%), followed by congenital hypothyroidism (6.3%) and developmental delay (4.7%). One child had Pierre Robin syndrome and one child had benign cystic teratoma of the neck and one child had micrognathia.

Table 10: Distribution of the sample according to time of onset of stridor

| Onset of stridor | Count | Percent |
|------------------|-------|---------|
| Day 1 of birth | 26 | 40.6 |
| Days 2-7 | 16 | 25.0 |
| Day 8-1 month | 7 | 10.9 |
| After 1 month | 15 | 23.4 |

45.0 -

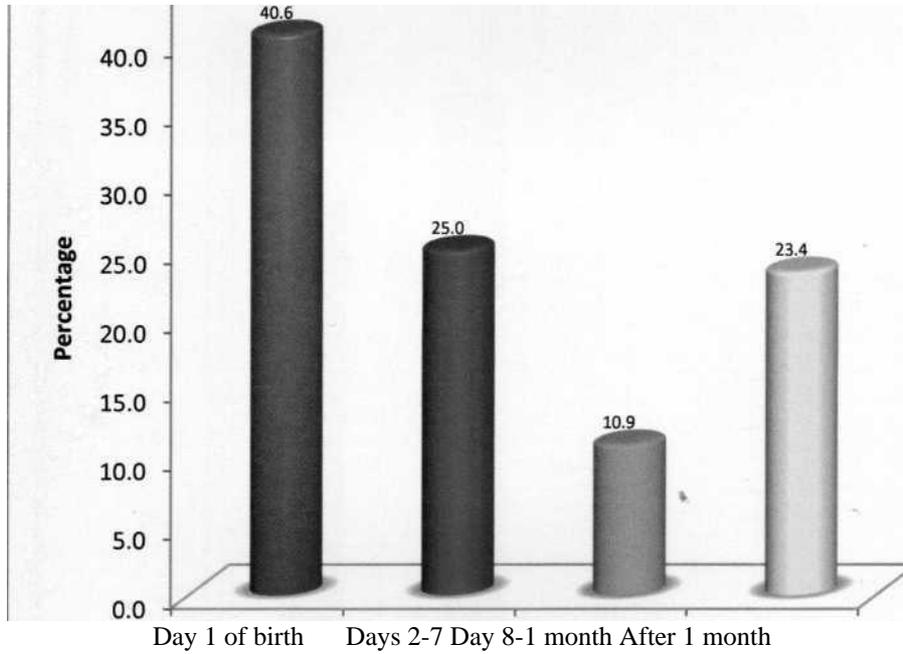


Figure 29: Distribution of the sample according to time of onset of stridor

40.6% children had onset of stridor at day one of birth. 25% babies had onset of stridor in the first week, 10.9% babies had stridor in the first month. 23.4 % babies developed stridor after one month of birth.

Table 17: Frequency of flexible nasopharyngolaryngoscopy findings

| Flexible nasopharyngolaryngoscopy | Count | Percent |
|-----------------------------------|-------|---------|
| Normal study | 3 | 4.7 |

| | | |
|---|----|------|
| Laryngomalacia | 44 | 68.8 |
| Laryngomalacia typel | 20 | 31.3 |
| Laryngomalacia typell | 10 | 15.6 |
| Laryngomalacia typelll | 7 | 10.9 |
| Laryngomalacia type I + II | 7 | 10.9 |
| Vallecular cyst + laryngomalacia type III | 1 | 1.6 |
| Bilateral vocal cord motion impairment | 8 | 12.5 |
| Bilateral vocal cord palsy | 7 | 10.9 |
| Bilateral vocal cord paresis | 1 | 1.6 |
| Vallecular cyst | 2 | 3.1 |
| Upper tracheal web | 1 | 1.6 |
| Subglottic stenosis | 1 | 1.6 |
| Foreign body glottis | 1 | 1.6 |
| Subglottic hemangioma | 1 | 1.6 |
| Laryngeal web | 2 | 3.1 |

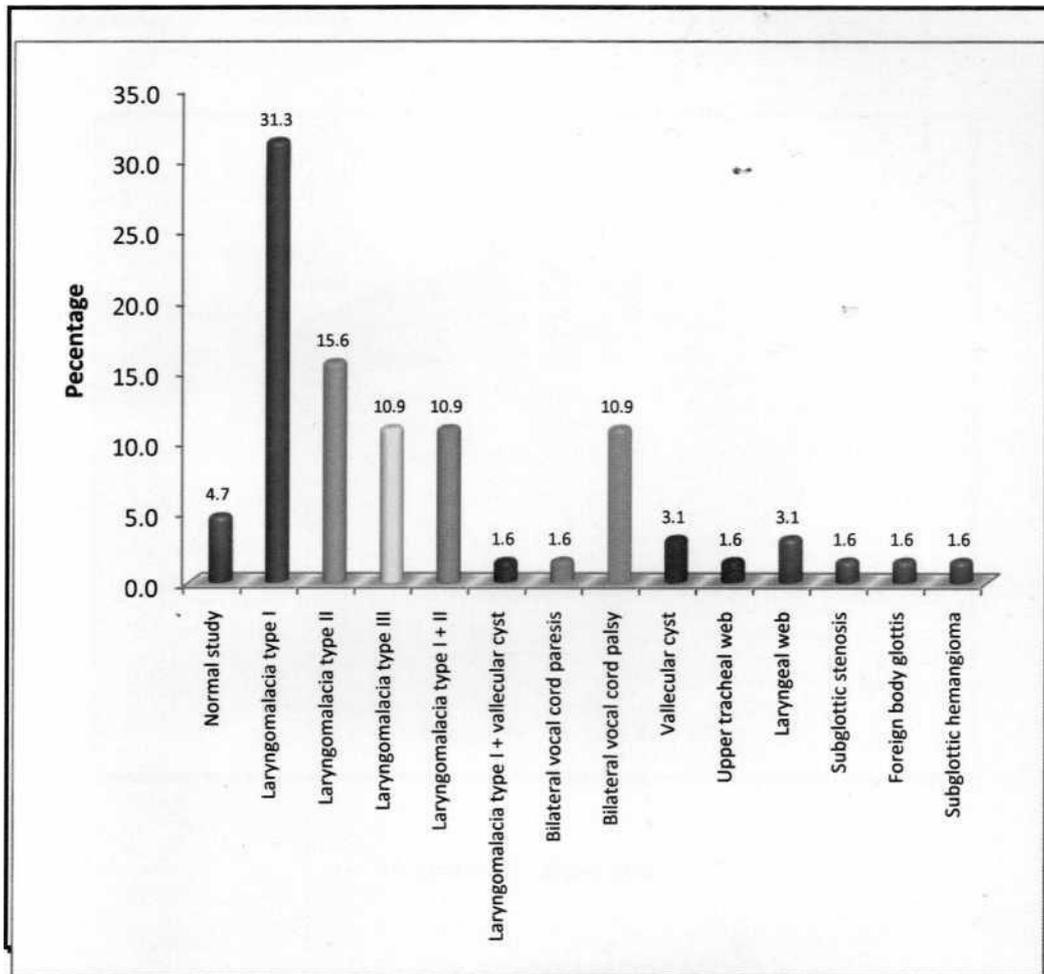


Figure 36: Frequency of flexible nasopharyngolaryngoscopy findings

Flexible nasopharyngolaryngoscopy showed a normal study in 3 children (4.7%). Laryngomalacia was the most common finding in 44 cases (68.8%), type I in 31.3% cases, type II in 15.6% , type III in 10.9% and combination of types I and II in 10.9% cases. Bilateral vocal cord palsy was seen in 7 children (10.9%), bilateral vocal cord paresis was seen in 1 child (1.6%). Vallecular cyst was the finding in 2 cases (3.1%), one child had a vallecular cyst with associated type III laryngomalacia. Glottic web was seen in 2 cases (3.1%). Subglottic stenosis was seen in one case (1.6%). Upper tracheal web was seen in one case (1.6%). Subglottic hemangioma was seen in one case (1.6%). Foreign body in the glottis was seen in one child (1.6%).

Table 18: Frequency of the causes of stridor

| Diagnosis | Count | Percent |
|---|-------|---------|
| Laryngomalacia | 44 | 68.8 |
| Laryngomalacia typel | 20 | 31.3 |
| Laryngomalacia typell | 10 | 15.6 |
| Laryngomalacia typelll | 7 | 10.9 |
| Laryngomalacia type I + II | 7 | 10.9 |
| Vallecular cyst + laryngomalacia type III | 1 | 1.6 |
| Bilaeral vocal cord motion impairment | 8 | 12.5 |
| Bilateral vocal cord palsy | 7 | 10.9 |
| Bilateral vocal cord paresis | 1 | 1.6 |
| Vallecular cyst | 2 | 3.1 |
| Upper tracheal web | 1 | 1.6 |
| Subglottic stenosis | 1 | 1.6 |
| Foreign body glottis | 1 | 1.6 |
| Subglottic hemangioma | 1 | 1.6 |
| Glottic web with subglottic stenosis | 2 | 3.1 |
| Micrognathia | 1 | 1.6 |
| Pierre robin syndrome | 1 | 1.6 |
| Benign cystic teratoma of neck | 1 | 1.6 |

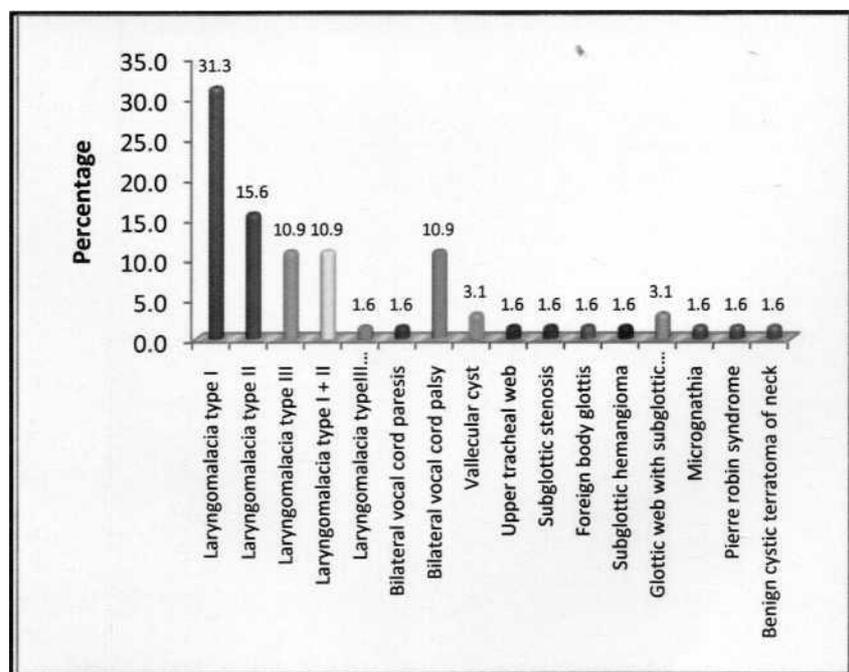


Figure 38: Frequency of the causes of stridor

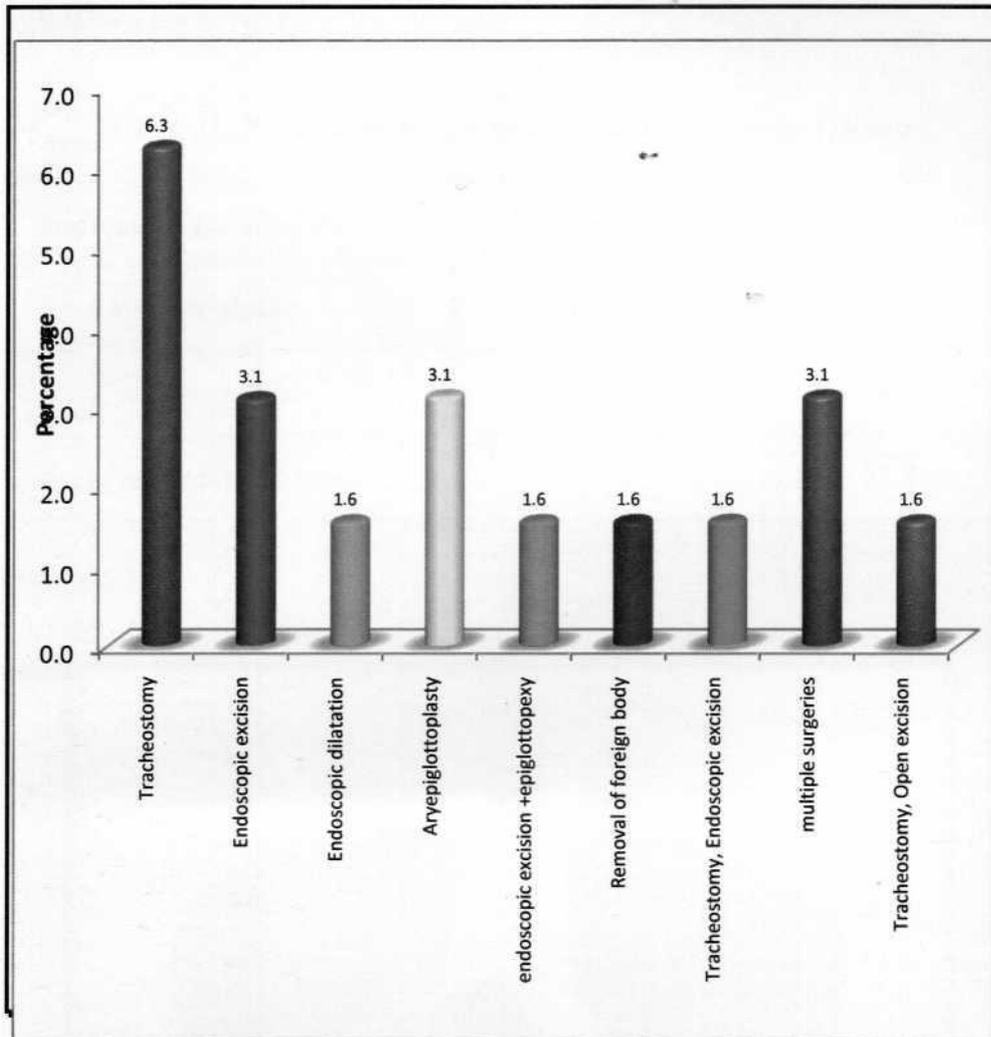


Figure 40: Frequency of surgeries required

The most common surgery was tracheostomy, done in 4(6.3 %) children. Endoscopic excision was done in 2(3.1%) children. Aryepiglottoplasty was done in 2children (3.1%). Endoscopic excision with epiglottopexy was needed in one child (1.6%). Tracheostomy with endoscopic dilatation was needed in one case. Tracheostomy with endoscopic excision was done in one child (1.6%). Tracheostomy with open excision was needed in one case (1.6%). Removal of foreign body from the glottis was needed in one child (1.6%). Multiple surgeries were required in 2 children (3.1%), one with laryngeal web and another child with subglottic stenosis.

5.7 OUTCOME AT 3 MONTHS:

Table 22: Distribution of study population according to outcome at 3 months

| Outcome at 3 months | Count | Percent |
|-------------------------------------|-------|---------|
| No stridor | 32 | 50.0 |
| Has stridor, but better than before | 12 | 18.8 |
| Has stridor, no relief | 11 | 17.2 |
| On tracheostomy | 6 | 9.4 |
| Lost follow up | 3 | 4.7 |

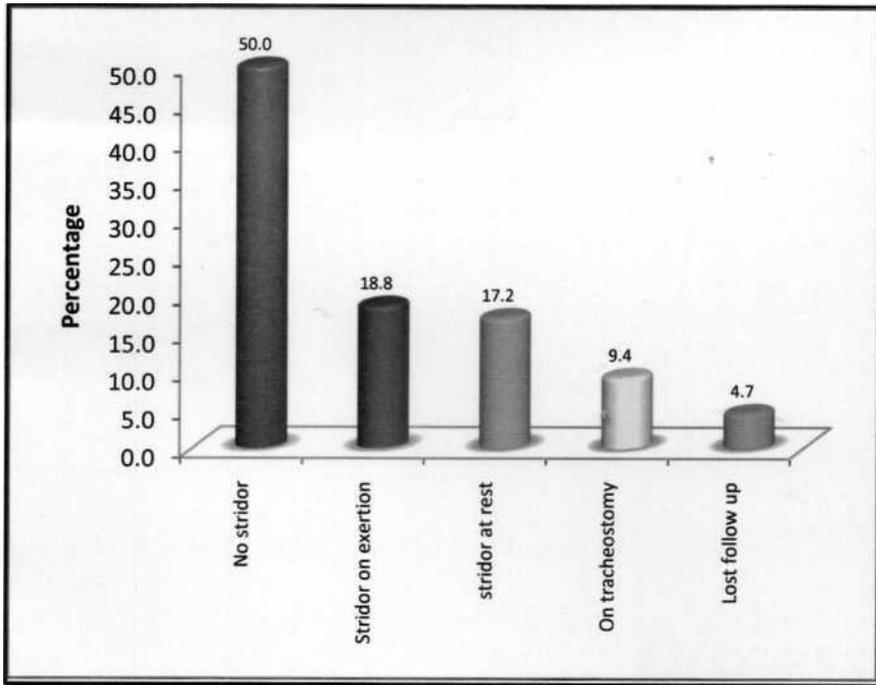


Figure 42: Distribution of the study population according to outcome at 3 months

32 children (50%) had no stridor at three months. 12 children (18.8%) had stridor on exertion. 11 children (17.2%) had stridor at rest. 6 children (9.4%) were on tracheostomy and 3 children (4.7%) were lost to follow up.

VI. DISCUSSION

This was a prospective descriptive study conducted at a tertiary care centre in Trivandrum. During the study period of one and a half years, 64 children under one year of age who presented to ENT OP and also referred from Pediatrics and Neonatology departments with the complaint of stridor were included in the study.

6.1 Demography:

Of the 64 children in the study population, 17 (26.6%) were neonates and 47 (73.4%) were infants, with 35 females (54.7%) and 29 males (45.3%). There were 44 children with laryngomalacia, of which 11 (25%) were neonates and 33 (75%) were infants. Of them, 25 children (56.8%) were females and 19 (43.2%) were males. Females outnumbered males in this study, which is in variance with the study done by Zoumalan et al⁶⁵, where 59% were boys and 41% were girls.

6.2 History:

Majority of the children were term infants (84.4%). Only 15.6% were preterm. Among the children with laryngomalacia, term babies were 90.9%, while preterm babies were only 9.1%. This is in accordance with the study by Landry AM et al¹¹, which states that congenital stridor is more common in term children than in preterm children.

16 children (25%) had associated congenital anomalies. The most common associated anomaly was congenital heart disease (9.4%) followed by congenital hypothyroidism in 6.3% and neurological abnormalities in 4.7%.

The peak time of onset of stridor was on the first day of birth (40.6%). 25% children developed stridor in the first week, 23.4% developed stridor between eight days to one month. 10.9% children developed stridor after 1 month. Among the children diagnosed with laryngomalacia, the peak period of onset of stridor was in the first week of birth seen in 36.4% children closely followed by 29.5% on the first day of birth. 18.2% children developed stridor after one month and 15.9% had onset of stridor between 8 days to one month of birth.

10 children (15.6%) had history of failure to thrive, 6 (9.4%) children had history of cyanotic spells. These were important indicators for the choice of management, whether conservative or surgical. Feeding difficulty was present in 40.6% children.

6.1 Physical examination:

Stridor was inspiratory in 60 children (93.8%) which suggests supraglottic causes were more common than glottic and subglottic causes. 78.1% children had a normal cry. Cry was weak in 20.3% and absent in 1 child (1.6%). Chest retractions were present in 60.9% children.

6.2 Investigations:

Flexible nasopharyngolaryngoscopy is the gold standard investigation for children with stridor. It was done in all 64 children, either in the OP or on the bedside for babies who were in-patient. Findings were recorded. The most common finding was laryngomalacia seen in 44 children (68.8%) followed by bilateral vocal cord motion impairment in 8 children (12.5%). This is in par with the study done by Botma M et al⁹ to know the use of flexible fiberoptic laryngoscope in infants with The most common cause of stridor was laryngomalacia, seen in 44 cases (70.3%), followed by bilateral vocal cord motion impairment seen in 8 children (12.5%), vallecular cyst seen in 2 children (3.1%), congenital glottis web with subglottic stenosis seen in 2 children (3.1%). There was one case (1.6%) of vallecular cyst with type III laryngomalacia. The other causes were subglottic stenosis (1.6%), upper trachea web (1.6%), subglottic hemangioma (1.6%), foreign body in the glottis (1.6%), micrognathia (1.6%), Pierre Robin syndrome (1.6%), benign cystic teratoma of the neck (1.6%). This in contrast to the Indian study done by Rajan Joshi et al⁸¹ where the most common cause was laryngomalacia (40%), followed by subglottic stenosis (28%), bilateral vocal cord palsy (15.6%), laryngeal web (12.5%) and interarytenoid cleft (3.1%).

6.6 Management:

6.6.1 Conservative Management:

Out of the 64 children, 49 were managed conservatively (76.6%). Conservative management included proper positioning of the child, oxygen or CPAP, mechanical ventilation, intravenous fluids, intravenous steroids, nebulisation with budesonide or adrenaline, proton pump inhibitors. Among the 44 children with laryngomalacia, 42 children (95.5%) were managed conservatively with reassurance of the parents, education to look for warning signs in the baby and regular follow up at 3 months interval. Of these 42 children, 3 had history of failure to thrive, one child with type III, one with type II and one child with combination of type I and II laryngomalacia, one child with type I laryngomalacia had history of cyanotic spells. Although these were indications for surgical intervention, these children were

managed conservatively as their parents were not willing to give consent for any surgery.

Of the 7 children with bilateral vocal cord abductor palsy, 3 children were managed conservatively with regular follow-up whose parents were not willing to give consent for surgery. One child with bilateral abductor paresis was also managed conservatively. The child with subglottic hemangioma was managed with oral propranolol at 2mg/kg day in three divided doses, gradually and stopped over 6 months. There was one child with micrognathia, who had only mild stridor and there was no indication for surgical intervention. The child was discharged after reassuring the parents and advised follow up at 3 months. One child who presented with the classical features of Robin sequence, u-shaped cleft palate, retrognathia and glossoptosis, did not require any active intervention as the stridor was only mild. There was no history of failure to thrive or cyanotic spells. Repair of cleft palate was advised by the pediatric surgeon after 10 months of age. The child was discharged with advice regarding prone positioning, warning signs and follow up after 3 months.

6.6.2 Surgical management:

All the surgeries were under general anaesthesia. Difficulty in intubation was anticipated in all of these cases. When intubation was not possible, apnoeic ventilation was used.

The most needed surgery was tracheostomy. Tracheostomy alone was needed in 4 children (6.3%) with bilateral vocal cord abductor palsy who presented with severe respiratory distress. Two children diagnosed with vallecular cyst were treated with endoscopic excision with coblator. One child who had vallecular cyst with associated type III laryngomalacia had failure to thrive and severe respiratory distress. She was treated with endoscopic coblator assisted excision of the cyst and epiglottopexy.

For two children with combination of laryngomalacia types I and II, the indication for surgery was failure to thrive. They were treated with endoscopic aryepiglottoplasty with microscissors.

There was a child who presented with sudden onset respiratory distress and stridor, started following a feed. Flexible nasopharyngolaryngoscopy showed foreign body in the glottis. The child was immediately taken to the operation theatre and the foreign body, which was a plastic cover was removed under general anaesthesia.

One child who presented with stridor and severe respiratory distress with a history of prolonged intubation for seizures few months back. Laryngotracheobronchoscopy under anaesthesia showed a concentric web in the upper trachea 1 cm below the glottis. The child was managed with endoscopic dilatation and local application of mitomycin c. He was extubated on postoperative day 2 and discharged when he started taking oral feeds normally on second postoperative day.

One newborn baby who was referred with a large swelling on the right side of neck since birth. There was a gradually progressing stridor and cyanotic spells. MRI of the neck was suspicious of soft tissue tumour. Open excision of the mass and tracheostomy was done. Postoperative child was kept on ventilator support for 48 hours. Oral feeding was started on the third postoperative day. The child was decannulated on the 15th postoperative day.

An infant presented with biphasic stridor and respiratory distress, with no past history of intubation. Flexible nasopharyngolaryngoscopy was suggestive of subglottic stenosis. Laryngotracheobronchoscopy under anaesthesia showed soft subglottic stenosis grade 3 according to Myer-Cotton staging. Tracheostomy was done. Endoscopic dilatation with intraleisional steroid injection was done twice at 1 month interval. There was difficulty in decannulation. Hence, laryngofissure and expansion laryngotracheoplasty with anterior costal cartilage graft was done after 2 months.

Another newborn child who was referred with history stridor and breathing difficulty since birth, on flexible nasopharyngolaryngoscopy showed glottic web involving anterior two-thirds of vocal cords. Laryngotracheobronchoscopy showed thick anterior glottis web with Myer-Cotton staging grade 3 hard subglottic stenosis. Tracheostomy was done. Child was then treated with endoscopic excision of the web with diode laser and expansion laryngotracheoplasty with anterior costal cartilage graft after one month. There was difficulty in decannulating the baby. The child needed endoscopic dilatation with intraleisional steroid injection twice after the surgery at six weeks interval.

Another newborn baby diagnosed with glottic web on flexible nasopharyngolaryngoscopy was subjected to laryngotracheobronchoscopy under general anaesthesia. Glottic web grade 3 according to Cohen's classification was seen involving the entire length of membranous vocal cords extending into the anterior subglottis. Web was excised with diode laser and tracheostomy was done. On the 7th postoperative day the child was discharged with plan for laryngotracheoplasty at a later date.

6.6 Indication for surgery:

15 children (23.4%) needed surgery. The main indicators for surgery were failure to thrive in 7 children (43.8%), severe respiratory distress in 6 children (37.5%) followed by cyanotic spells in 3 children (18.8%).

6.7 Follow -up:

All 64 children were advised regular follow up. Among the children who were managed conservatively, 48 were advised follow up at 3months interval. The child with subglottic hemangioma was followed up at 2weeks interval for modification of the dose of oral propranolol. All postoperative cases were advised first follow up at 2weeks, then at 6 weeks and then at 3 months. For the purpose of this study, the follow up of all children at 3 months of presentation to our department was documented.

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On follow up at 3 months, 32 children (50%) had no stridor. 12 children (18.8%) had stridor on exertion. 11 children (17.2%) had stridor at rest. 6 children (9.4%) were on tracheostomy, 3 of them were cases of bilateral abductor palsy and one child was a case of glottic web. We lost follow up of three children (4.7%).

Of the 49 children who were managed conservatively, 24 (49%) children were symptom free at 3months. This included 10 children with type I laryngomalacia, 6 children with type II laryngomalacia, 4 children with type III laryngomalacia, 2 children with combined laryngomalacia types I and II, 1 child with micrognathia, 1 child with bilateral vocal cord abductor palsy.

12 (24.5%) children had stridor on exertion. This included 5 children with laryngomalacia type I, 3 children with laryngomalacia type II, 1 child with type III laryngomalacia, 1 child with laryngomalacia combined types I and II, 1 child with subglottic hemangioma and 1 child with bilateral vocal cord abductor palsy.

10 (20.4%) children had stridor at rest, which included 4 children with type I laryngomalacia, 1 child with type II laryngomalacia, 2 children with type III laryngomalacia, 2 children with laryngomalacia combined types I and II. 1 child with Robin sequence, 1 child with bilateral vocal cord abductor paresis.

One child (2%) with type I laryngomalacia was lost to follow up.

Of the 15 children who were managed with surgery, 8 (53.3%) children were asymptomatic at 3 months followup. This included 2 children who underwent aryepiglottoplasty, 2 children who underwent endoscopic excision, 1 child who underwent foreign body

removal, 1 child who underwent open excision with tracheostomy, 1 child who was treated with endoscopic dilatation and application of mitomycin c and 1 child who underwent endoscopic excision of vallecular cyst and epiglottopexy.

6 (40%) children were still on tracheostomy at 3 months. This included 3 children with bilateral vocal cord abductor palsy, 2 children who underwent expansion laryngotracheoplasty and 1 child with laryngeal web who underwent endoscopic excision and tracheostomy. One child (6.7%) who was a case of bilateral vocal cord abductor palsy was lost to follow up.

VII. SUMMARY AND CONCLUSIONS

7.1 Summary:

During this one year prospective descriptive study, 64 children under one year age presented to the study centre with complaints of stridor. There were 17 neonates and 47 infants, 35 females and 29 males, 54 term and 10 preterm babies. 16 children had other associated congenital anomalies, congenital heart disease being the most common anomaly.

The peak period of onset of stridor was on the first day of birth in 40.6% children. Stridor was inspiratory in 60 children (93.8%) and biphasic in 4 (6.3%). Chest retractions were present in 39 children (60.9%) and 26 babies (40.6%) had feeding difficulties.

The cause of stridor in infants in this study was congenital in 96.9% cases and acquired in 3.1% cases. The most common cause of stridor was laryngomalacia, seen in 44 cases (70.3%), followed by bilateral vocal cord motion impairment seen in 8 children (12.5%), vallecular cyst seen in 2 children (3.1%), laryngeal web seen in 2 children (3.1%). There was one child (1.6%) with a vallecular cyst with associated laryngomalacia type III. The other causes were subglottic stenosis (1.6%), upper tracheal web (1.6%), subglottic hemangioma (1.6%), foreign body in the glottis (1.6%), micrognathia (1.6%), Pierre Robin syndrome (1.6%), benign cystic teratoma of the neck (1.6%).

Laryngomalacia was the most common cause of stridor in children under one year of age. It was more common in infants (75%) than in neonates (25%), in females (56.8%) more than males (43.2%) and in term babies (90.9%) than in preterm babies (9.1%). The peak period of onset of stridor was in the first week of birth (36.4%). Type I laryngomalacia was the most common, seen in 20 children (31.3%), followed by type II in 10 children (15.6%), type III in 7 children (10.9%) and combination of types I and II were seen in 7 children (10.9%).

49 (76.6%) children were managed conservatively with prone positioning, nebulisation, proton pump inhibitors and regular follow up. 15 children (23.4%) underwent surgery. The main indications for surgery were failure to thrive in 7 children (43.8%), followed by severe respiratory distress in 6 children (37.5%) and cyanotic spells in 3 children (18.8%).

The most done surgery was tracheostomy. Tracheostomy alone was done in 6.3% children. Tracheostomy with open excision was needed in one child (1.6%). Tracheostomy with endoscopic excision was done in one child (1.6%). Aryepiglottoplasty was done in 3.1% children. Endoscopic excision was done in 3.1% children. The other surgeries required include endoscopic dilatation and application of mitomycin c (1.6%), removal of foreign body (1.6%), endoscopic excision and epiglottopexy (1.6%). Multiple surgeries in different stages were required in two children (3.1%).

At three months follow up, 32 children (50%) had no stridor. 12 children (18.8%) had stridor on exertion. 11 children (17.2%) had stridor at rest. 6 children (9.4%) were on tracheostomy and 3 children (4.7%) were lost to follow up.

7.1 Conclusions:

The following conclusions were made from this prospective descriptive study:

Primary outcome - Common causes of stridor in infants

6. Congenital causes were more common than acquired causes.
7. Laryngomalacia was the most common cause of stridor (68.8%) in infants presented our centre. Type I was the most common subtype followed by type II, followed by type III and combination of types I and II.
8. The second common cause was bilateral vocal cord motion impairment (12.5%).
9. The third common cause was vallecular cyst (3.1%) followed by glottic web with subglottic stenosis (3.1%).
10. Other less common causes include subglottic stenosis, upper tracheal web, subglottic hemangioma, foreign body in the glottis, micrognathia, Pierre Robin sequence and benign cystic teratoma of the neck.

Secondary outcomes:

4. Percentage of children who required surgical intervention was 23.4%.

5. Type of surgery-

Tracheostomy was the most required surgery. The other surgeries done were tracheostomy with open excision, tracheostomy with endoscopic excision, aryepiglottoplasty, endoscopic excision of vallecular cyst, endoscopic dilatation and application of mitomycin c, removal of foreign body, endoscopic excision and epiglottopexy. Multistage surgeries including tracheostomy, endoscopic excision with intraleisional steroid injection, endoscopic dilatation with application of mitomycin c and expansion laryngotracheoplasty were required in two children.

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6. At three months follow up, half of the children (50%) were asymptomatic.

Though not the main objective of this study, the following observations were also made:

1. Laryngomalacia was more common in term infants, more in females than in males.
2. The peak period of onset of stridor in laryngomalacia was in the first week of birth.
3. Majority of the children with laryngomalacia could be managed conservatively. Only few required surgery.
4. The main indication for surgery in laryngomalacia was failure to thrive.

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An Investigation Into The Comparisons Of Exhaust Emissions Through Catalytic Converters Installed On A Kia Sportage Lx (Exhaust System)

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Abstract- This paper presents a study on the comparisons of the HC and CO emission levels on exhaust gases that expels through an existing home used (imported) car converter, a refurbished catalytic converter with a new honeycomb. The performance of a home used catalytic converter, refurb damaged catalytic converters by replacing the worn-out catalyst elements with imported ceramic honeycomb catalysts and compare the performance of the used catalytic converter to that of refurbished and two other locally developed converter of a Kia Sportage LX exhaust system were studied. The experimental results indicated that the refurbished catalytic converter with welded test and eco-liquid wash, produced lower emission than the home used, locally developed converter 1 (Suame Magazine) and locally developed converter 2 (Abossey Okai). For the locally made ones, the welded part of the case was not uniform therefore creating space for the exhaust gas to escape without proper filtration. The result also indicated that HC emission of 60.0 ppm was recorded for the refurbished converter at an initial speed of 10.0 km/hr which is relatively lower than the HC emission recorded for the home used (65.8 ppm) catalytic converter. In addition, the refurbished type achieves a significant HC emission reduction of 5.8 ppm when compared with the other types. The CO emission, the refurbished type had a reduction of 0.01% Vol when compare with the home-used converter at varying speeds. Furthermore, the maximum test speed of 60 km/hr both the home-used and refurbished converters recorded the highest amount of HC (70.9 ppm, 63 ppm) and CO (2.52 % Vol, 2.42 % Vol) from the engine exhaust respectively. The refurbished converter yielded about 3.41% reduction in HC emission and 7.92 % CO emission which is better as compared to the Locally Developed converter 1 (Magazine). Again, the refurbished converter attained 4.39% reduction in HC emission when compared to the Locally Developed converter 2 (Abossey Okai) at idling speed.

Index Terms- hydrocarbon, carbon monoxide, refurbished, converters, catalyst.

I. INTRODUCTION

In a diesel engine, the engine condition is different from spark-ignition engines, because power is directly controlled by the fuel supply, not by controlling the air supply [1]. So when running at low power, there is enough oxygen present to burn the fuel, and diesel engines only create a large amount of carbon monoxide when running under load. Diesel exhaust has been found to contain many toxic air contaminants [2]. Lean-burning properties of diesel engine combined with a high temperature and pressure of the combustion process result in significant production of nitrogen oxides and provide a unique challenge in the reduction of these compounds [3, 4].

1.1 Catalytic converter

A catalytic converter (colloquially, "cat" or "catcon") is a device used to reduce the toxicity of emissions from an internal combustion engine. A catalytic converter provides an environment for a chemical reaction wherein toxic combustion by-products are converted to less toxic substances (Fig. 1).

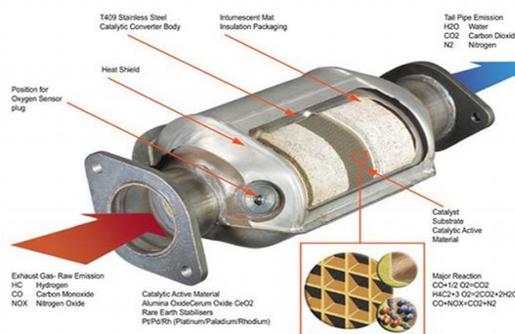


Fig. 1. Three-way Catalytic converter.

Since their inception, the car has been largely supported by the internal combustion engine. Related to the engine combustion process is responsible for releasing hazardous emissions including carbon monoxide (CO), unburned hydrocarbons (HC) and nitrogen oxides (NOx), which has a severe negative effect on humans and the environment. This has led to the development of

exhaust emission control systems to treat and convert them into less harmful products called catalytic converter [5, 6]. In three decades, automobile manufacturers recognize the need to treat the product of the combustion process that occurs in the internal combustion engine [7]. The initial solution to this challenge is the use of catalytic converter pellets. Pellets are spherical particles with a diameter ranging from 2.5 mm to 5 mm and are made of gamma-alumina. Pellets enclosed in a steel shell to form a catalytic converter and laden with precious metals and stabilizers for the treatment of exhaust emissions. The catalytic converter technology has many drawbacks. Due to the design of catalytic converter pellets of this, a large pressure drop occurs across a converter that directly affects the performance of the engine. In addition, a higher risk of losing catalyst for wear particles [8, 9]. Losses encourage scientists and engineers to develop a monolithic catalytic converter found in today's vehicles. Monolith substrates are the main components of the discharge line after the processing systems found in today's cars. They provide superior performance compared with other types of support pellets. monolith substrate typically characterized by cell density and wall thickness channel them. Because the total surface area of the channels and a small thermal mass of the substrate, the heat transfer is greatly improved, which increases the conversion efficiency indicates improved thermal performance [10]. The thermal performance of the catalytic converter is usually measured in terms of the time required for the catalytic converter to reach the light-off temperature. The " temperature 'light-off was calculated as the temperature at which the conversion efficiency of the pollutant reaches 50% [11]. Cheng and coauthors suggested many techniques for the mathematical model of the flow field in the substrate ranging from a 1D model of unidirectional to a full and comprehensive 3D model [12-14]. In their study, CFD (Computational Fluid Dynamics) analysis was used to predict the behavior of the flow, and thermal characteristics of the monolith substrate conversion efficiency. In addition, Young and co-researchers [15-17] developed a mathematical model of the earliest to study the physical and chemical processes in catalytic converters. Their model included the effects of heat and mass transfer in laminar flow in the monolith and the monolith channels. Many researchers investigate and steady state flow simulation under conditions of reacting flows [18-20] and other researchers investigating the flow steady-state non-reacted in a catalytic converter [21, 22]. Transient flow simulation is also used by some researchers to investigate the performance of catalytic converter during the cold-start period including [23-25]. In addition, other researchers studied only flow in the hydraulic behavior of the monolithic substrate under cold flow conditions stable state [26, 27]. According to Shelef and co-authors [28, 29] reviewed the catalytic converter system to control automobile emissions. Their study covered the main principles and the performance of catalytic converters. They discussed the catalytic converter durability and performance of catalytic converters influence on the thermal management of the engine. A more uniform flow distribution increases conversion efficiency and durability of the catalytic converter [11, 30-32]. This leads to less greenhouse gas emissions (Green House Gas) [33, 34]. On the other hand, the study included, Shuai and Wang [35], Chen and Schirmer [36] and Cho *et al.* [37] focused on the effect of the monolith exhaust manifold design and distribution properties on the flow and hydraulic performance of

the catalytic converter. Lai *et al.* [38] studied the effect of the geometry of the exhaust manifold inflow distribution pipe bending tends to distort the flow and increase the flow misdistribution. They used 3D simulation incorporating robustness brick into the simulation to obtain an accurate prediction. They concluded that streams are becoming more evenly when the inlet pipe shorter in length and smaller bending angle. In addition, they examined the effects of nature brick concluded that the higher the flow distribution more uniform brick resistance observed flow distribution [23, 30, 33, 39]. Liu *et al.* [40] conducted an experimental and numerical study on reverse flow catalytic converters for natural gas / diesel dual engine. They concluded that the CO and HC conversion efficiency improved for reverse flow catalytic converters for low inlet temperature and light engine load only when the initial temperature of the catalytic converter is quite high. Many researchers have studied the effect of pressure drop in the hydraulic performance of the catalytic converter [26, 27, 41, 42]. They examined the effects of inlet flow conditions, properties and catalytic converter substrate geometry on the pressure reduction utilizing a variety of modelling strategies. In addition, the thermal behavior of the catalytic converter has been studied by many researchers [11, 25, 43, 44]. The limits lowered the feasibility study and the more feasible approach is required [45]. It can be concluded that the need for a new catalytic converter technology has continued to grow in order to meet the more stringent standards of global emissions of the vehicle and the increasing demand for environmental protection and rising fuel prices. In view of these, most Ghanaian vehicles are for both commercial and private purpose as a means of transporting goods and providing services. Apart from walking (65.6%), trotro (16.0%) is the most popular means of transport to the market [46]. The percentage of used cars being patronized in Ghana is significantly high because of relatively cheaper duty and importation charges. Used vehicles imported into Ghana come with old catalytic converters that might have exhausted their lifespan. The life span of these catalytic converters cannot be determined because of how they have been used on a particular vehicle. Almost all the malfunction catalytic converters are replaced with home used ones which are cut open and are usually sold in the local market (spare parts dealers) such as Abossey Okai, Accra [47, 48] or Suame Magazine, Kumasi [49, 50]. The extent of damage of the ceramic honeycomb catalyst which is widely used as *catalyst* support and as particulate, filters for vehicular emission control in a used converter cannot be detected. Most People with faulty catalytic converters on their vehicles are forced to use home-made type converters of different brands whose qualities cannot be guaranteed. They cut open and later weld these parts without considering the design parameters such as the accuracy of the angles formed within the converter and the space between the catalyst and the inner housing.

The purpose of this work is to compare the HC and CO emission levels on exhaust gases expelling through an existing home used (imported) car converter, a refurbished catalytic converter with a new honeycomb and two other locally developed (purchased in local market) converters installed on a Kia Sportage LX (2009 model) exhaust system. This study further goes on to study the performance of a home used catalytic converter, refurb damaged catalytic converters by replacing the worn-out catalyst elements with imported (brand new) ceramic honeycomb catalysts

and also to compare the performance characteristics of the home used catalytic converter of refurbished and two other locally developed converter on Kia Sportage LX exhaust system.

II. MATERIALS AND METHODS

2.1 Design of catalytic converter

2.1.1 Fabrication

Assembly of all sub-components together with a catalyst wash coat filled will make a new catalytic converter that is ready for testing as shown in Fig. 2 and 3.

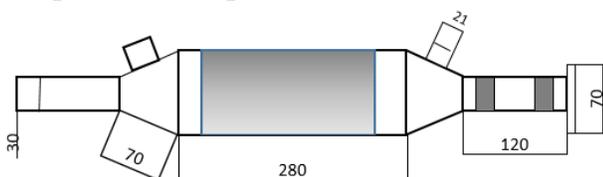


Fig. 2. Assembled Drawing of Catalytic Converter

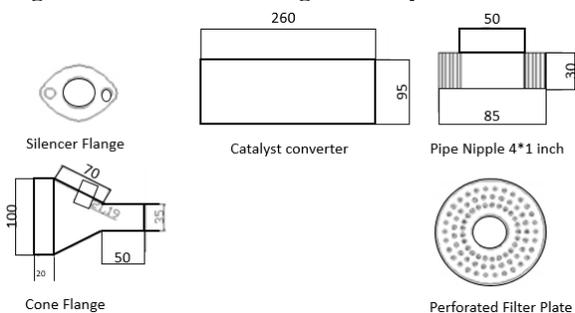


Fig. 3. Detailed Drawing of Catalytic Converter

2.1.2 Assessment of the Selected Converter

The starting point of the conversion process is the selection of an old catalytic converter to be converted (refurbished). In this study, four (4) identical old catalytic converters of Kia Sportage (performance characteristics) were obtained from the open market (Abossey Okai and Suame Magazine). Out of these four (4), one was selected for the refurbishment. Figure 4 shows various Catalytic converters of Kia Sportage available in the local market.



Fig. 4. Four Old Catalytic Converters

The various converters were assessed and converter ‘A’ was selected to enable the selection of appropriate honeycomb for this work. The selection of converter “A” was based on the fact that its exhaust manifold has the same dimensions as the control type.

Table 1 Physical Properties of All Four Catalytic Converters

| No | Types | Cell density (cells/in ²) | Hydraulic diameter(mm) | Uncoated wall thickness | Washcoat thickness |
|----|------------------------------------|---------------------------------------|------------------------|-------------------------|--------------------|
| A | Home used Car’ converter unit | 400 | 1.14 | 0.15 | 25 |
| B | Refurbished | 400 | 1.14 | 0.15 | 25 |
| C | Locally developed 1 (Suame) | 400 | 1.14 | 0.15 | 25 |
| D | Locally developed 2 (Abossey Okai) | 400 | 1.14 | 0.15 | 25 |

Source: Kia Sportage LX Manual Book

The physical properties obtained in the analysis were used to determine other parameters that cannot be obtained experimentally such as geometric surface area, open frontal area and cell pitch.

2.1.3 Cleaning of residuals in the converter

A flash cleaning is carried out to remove the residuals in the converter with eco liquid. Eco-Liquid is water-based cleaning and degreases liquid with excellent anti-corrosion properties for parts. The converter was washed thoroughly with a high-pressure water hose. Figure 5 shows the cleaning of the catalytic converter.



Fig. 5. Cleaning of residuals in the converter

2.1.4 Conversion of Selected Home Used Converter

To convert the selected home used converter to a refurbished converter, the steel shell is cut open from the top using gas torch of an electric arc welding machine and the honeycomb was removed. The angles and length were all checked to avoid distortion. The brand new imported honeycomb was placed inside the seats. Both the inlet and outlet were also inspected to suit the design of the converter. The system was then put together after thorough checks on the converter to avoid any air space on the walls before fabrication. Figure 3-5 shows the cutting of the catalytic Converter (Refurbished) with an electrical Grinding Machine.

2.1.5 Gas Welding Process Overview

Oxygen and acetylene together in a flame provided the heat necessary to melt the metals. This combined with a neutral welding atmosphere and suitable filler material is suitable for heating and cutting purposes. Figure 6 shows a diagram of the Gas welding process of the refurbished converter.



• Fig. 6. Oxy-Acetylene Gas Welding of the Converter

2.2 Installation of the refurbished Catalytic Converter to Exhaust Systems

The last stage of the preparatory process was to join the various catalytic converters to the exhaust system of the Kia Sportage Lx. This was done by directly bolting the refurbished converter to the heads and lead down in the exhaust system with a basic set of hand tools. These processes were repeated for all other converters for the experimental studies. The diameters of the pipes of all the converters were the same for conformity. Figure 3-7 shows the Installation of the Catalytic Converters bolted to the Exhaust Systems of the Kia Sportage LX in the at DVLA-PVTS at Dodowa.



• Fig. 1. Installation of the refurbished Catalytic Converters to Exhaust Systems

2.3 Exhaust Gas Analyzer

There are various types of gas analyzers with various guidelines. They are equipped to evaluate various types of gas.

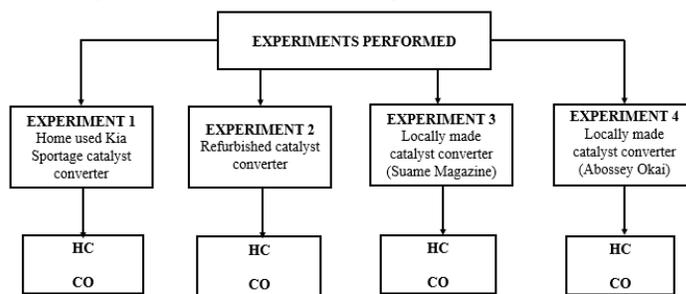
The gas analyzer is the ideal tool to investigate the types of substances present in the sample gas. He acknowledged the species and has the ability to give a good estimate of the number of structures show a numerical or graphical. Depending on the type of examination guidelines opt for gas, can be named both gas chromatography, IR gas analyzer, thermal conductivity gas analyzer, gas analyzer paramagnetic and electrochemical analysis, orsat devices, gravimetric or methanometer gas analyzer. Figure 2-8 shows the smoke gas analyzer. Exhaust emission from the engine was measured with an AVL five gas 444 gas analyzer (Fig. 8).



Fig. 8. AVL Gas Analyzer.

2.4 Experimental and Theoretical Formulation (Conceptual framework)

To achieve the specific objectives of this study, a series of experiments carried out at Kia Sportage LX. These can be grouped into four main sections. The first part consists of experiments were conducted to determine the HC and CO of the house used Kia Sportage Catalytic Converter. The second part includes the experiments carried out to study the general performance of the type of refurbished with a new honeycomb and finally, the two purchased locally (updated) converter from Suame Magazines and Abossey Okai respectively. The experimental data would be based on the HC and CO values of each converter. Figure 9 illustrated the conceptual framework of the study.



• Fig. 9. Conceptual framework of the study

2.5 Specifications of the Kia Sportage

The 2009 Kia Sportage is the ranking is based on its score in 2009 Affordable Compact Sports utility vehicle (SUV) category and it is front-wheel drive. Sportage has a long list of standard interior features. Sportage list of standard features is quite impressive and includes a six-speaker audio system with USB port, air conditioning and satellite radio. features available include a navigation system, leather-wrapped steering wheel and remote

engine start. Table 3-2 shows some of the specs of the house used 2009 Kia Sportage LX model.

Table 2 Specifications of the Kia Sportage LX

| Specifications of Kia spot age Lx | |
|-----------------------------------|-----------------------|
| Car type | Sport utility vehicle |
| Transmission | Automatic |
| Engine type | Petrol |
| Number of Cylinders | Inline 4 |
| Drive Train | Front-wheel Drive |

III. RESULTS AND DISCUSSION

Tests were conducted to determine the effectiveness of catalytic converters used Kia Sportage Lx house, refurbished with brand new honeycomb and two other types of renewable locally installed on a Kia Sportage-house exhaust system is used. The test results of control tests (home-ex converter) compared with the performance of three identical conversational converters and discussion was made on the performance characteristics of the type of converter tested. This section is divided into four main parts as follows:

3.1 Performance Kia Sportage LX Converter Local Converter Compared with three refurbished

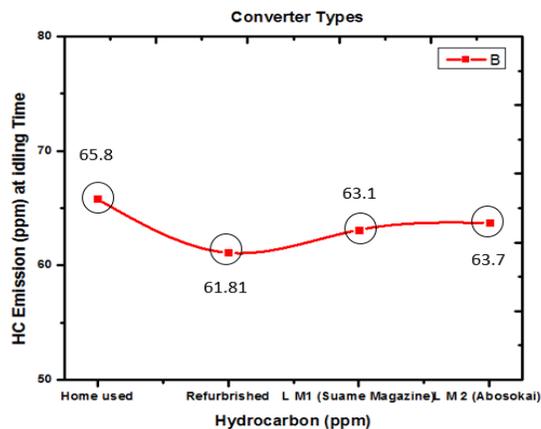
This section presents results of experiments conducted to study the performance characteristics of the catalytic converter that already exist on the Kia Sportage, the converter refurbished with brand new honeycomb and two converters purchased locally in relation to the content of the emissions of hydrocarbons and carbon monoxide them through the exhaust system of the Kia Sportage LX, Table 4-1 presents the results of the test. Four major tests performed on four types of converters. Of emission values, the percentage reduction achieved in each case calculated and presented as shown in Table 4-1.

Table 3 Readings of HC's and CO's values of the four converters and their percentage reductions

| Result at idling speed | | Emissions | | | | |
|------------------------|---------------------------------|--------------------|--------|-----------|-------------------------|------------------|
| No | Converters type | Hydrocarbons (ppm) | HC (%) | Reduction | Carbon Monoxide (% Vol) | CO Reduction (%) |
| 1 | Home used | 65.8 | 0 | | 2.37 | 0 |
| 2 | Refurbished | 61.1 | 7.69 | | 1.68 | 41.07 |
| 3 | Locally made 1 (Suame Magazine) | 63.1 | 4.28 | | 1.79 | 33.15 |
| 4 | Locally made 2 (Abaosokai) | 63.7 | 3.3 | | 1.85 | 28.11 |

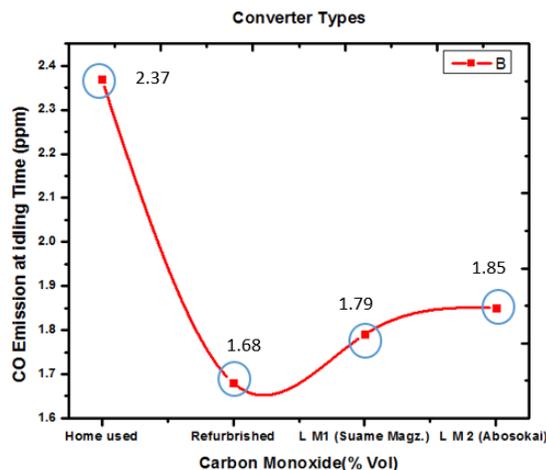
3.1.1 Emissions (idling)

Figure 10 shows emission values in the idling case for the test involving the four converter types used for study as presented in table 3. In Figure 10 it can be seen that the level of hydrocarbon released by the refurbished converter is 61.1 ppm, which is relatively lower compared with the other converters. The home used converter registered the highest levels of HC emission with a value of 65.8 ppm. Per the results depicted in figure 10, it can be said that the refurbished converter performs much better than the other samples tested. In comparison, the refurbished converter released about 7.69 % of HC emissions less than the home-used type. However, it can be observed that the emissions recorded for all samples tested are much lower than the standard value of 200 ppm.



• Fig. 10. Comparison of HC Values for types of Converters

Figure 11 shows emission values in the idling case for the test involving the four converter types used for study as presented in table 3. According to figure 11, it can be observed that the refurbished converter recorded the lowest CO emission levels of 1.68 % Vol followed by the locally developed type 1. The home home-used type recorded the highest value of 2.37% Vol. in comparison with the standard recommended value, however, it can be seen that the CO emission values for all samples tested fall far above the mark of 0.2 % Vol. CO.



• **Fig. 11. Comparison between of CO of Various Converters**

3.1.2 Emission Reduction

The refurbished converter achieved the highest emission reduction of about 7.69% HC and 41.07 % CO in comparison with the other samples tested. Thus, the refurbished converter can be said to be the most effective sample in this regard.

3.2 HC and CO emissions with the Engine Speed

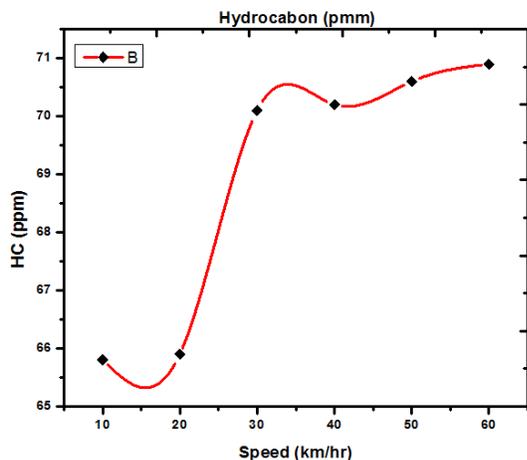
HC and CO emission measurements were also done at varying speeds in order to determine the effect of speed on emissions. For safety reasons, the speed of the vehicle for the test was run from 10.0 km/hr to 60.0 km/hr at 5.0 seconds intervals for the entire period of 30 minutes. Table 4 shows emission values of the converters types from four sets of tests when the vehicle was run from an initial speed of 10.0 km/hr to 60 km/hr on rollers at DVLA - Ghana.

Table 4 Emissions recorded at varying speeds

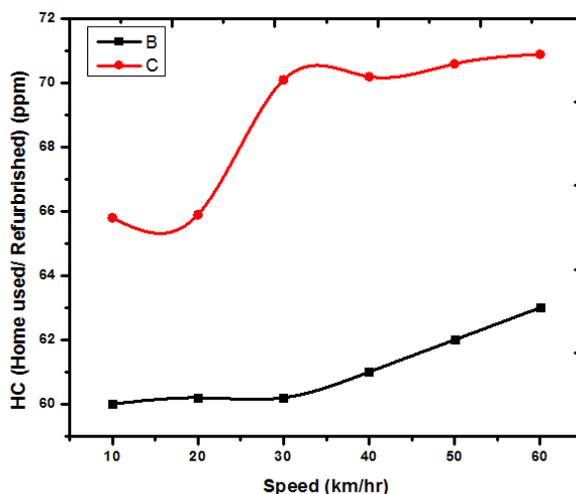
| Converter Types | Selected converters | EMISSIONS | | | | | | | | | |
|-----------------|---------------------|--------------------|----------------------|-----------------------|-------------------------|---------------------------------|-------------------------|----------------------------|-------------------------|--|--|
| | | Home used | | Refurbished | | Locally made 1 (Suame Magazine) | | Locally made 2 (Abaosokai) | | | |
| Emission Types | | HC (ppm) Home Used | CO (% Vol) Home Used | HC (ppm) Refurbish ed | CO (% Vol) Refurbish ed | HC (ppm) Locally Develop ed 1 | CO (% Vol) Develop ed 1 | HC (ppm) Develop ed 2 | CO (% Vol) Develop ed 2 | | |
| Speed km/hr. | 10 | 65.8 | 2.37 | 60 | 2.36 | 60 | 2.38 | 61 | 2.37 | | |
| | 20 | 65.9 | 2.38 | 60.2 | 2.36 | 60.21 | 2.37 | 61.2 | 2.27 | | |
| | 30 | 70.1 | 2.38 | 60.2 | 2.37 | 61.1 | 2.38 | 61.9 | 2.38 | | |
| | 40 | 70.2 | 2.4 | 61 | 2.38 | 61.2 | 2.39 | 62.2 | 2.39 | | |
| | 50 | 70.6 | 2.5 | 62 | 2.41 | 62.3 | 2.41 | 62.3 | 2.42 | | |
| | 60 | 70.9 | 2.52 | 63 | 2.41 | 63.2 | 2.42 | 63.1 | 2.42 | | |
| Av Emissions | 35 | 68.916667 | 2.425 | 61.06667 | 2.3816667 | 61.335 | 2.39166667 | 61.95 | 2.39183333 | | |

3.2.1 Variations of HC Emissions versus Engine Speeds

Figure 12 shows a graph of HC emissions with respect to engine speed. It can be observed that (see table 4-2) the HC emissions increase with increasing speed. Results show that the HC emission rises from 65.8 ppm at a speed of 10.0 km/hr to a value of 70.9 ppm at a speed of 60.0 km/hr. The average speed was 35.0 km/hr with a recorded average emission value of 70.8 ppm.



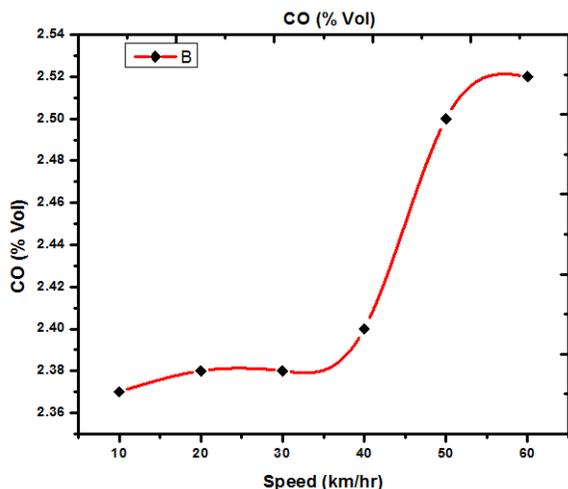
• Fig. 12. Graph of HC emission vs Engine Speed



• Fig. 14. HC Emissions of Home Used Converter versus Refurbished Converter

3.2.2 Variation of CO emissions with Engine Speed

Figure 13 shows that CO emission of the home-used converter varies linearly with engine speed. As indicated in figure 13, it is observed that the CO emissions increase with increasing engine speed. The results show that the CO emission rises from 2.37 % Vol at a speed of 10.0 km/hr to a value of 2.52 % Vol at a speed of 60.0 km/hr. At an average speed of 35.0 km/hr the CO emission recorded was 2.39 % Vol.

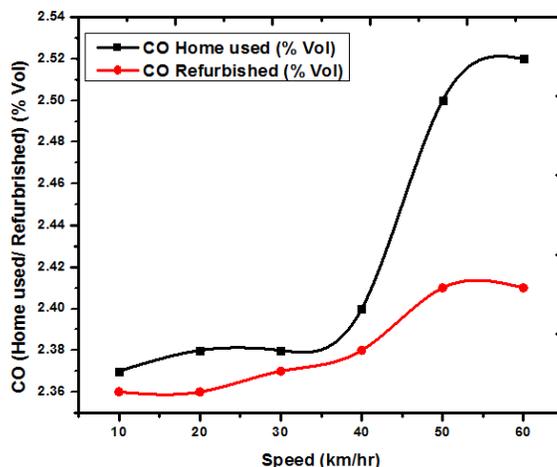


• Fig.13. CO (% Vol) vs Speed (km/hr)

At the same time, there is a significant reduction of 0.01 % Vol in the CO emission between the home-used converter and the refurbished. Over the speed range of 10-60 km/hr, the CO emission recorded for refurbished and home-used converters were 2.52 % Vol and 2.41 % Vol respectively. In other words, the refurbished catalytic converter was able to reduce the HC emissions by 12.54% and CO emissions by 4.56%. Figure 15 shows a graph of CO versus speed for home used and refurbished converters. It can be observed that as speed increases % Vol of CO emission for refurbished converter increases from 2.36 to 2.41 % Vol. whereas the CO emissions for the home-used type remains fairly constant. It can also be observed that HC emission level of the refurbished type remains constant with increasing speed whereas that of the home-used converter varies between 60 and 63 ppm.

3.3 Emissions results of Home-used converter and Refurbished converter

Figure 14 shows that the HC emitted from the refurbished converter exhaust system at a speed of 10.0 km/hr was 60.0 ppm which is relatively lower than that of the home used (65.8 ppm) catalytic converter. This implies that there is a significant improvement in reduction (5.8 ppm) of HC emission present in the exhaust gas. Figure 4-5 indicates that, at the highest speed of 60 km/hr, HC emissions of the Home-used and refurbished converters were 70.9 ppm and 63.0 ppm respectively. Figure 14 shows a graph of HC versus speed for home used and refurbished converters.

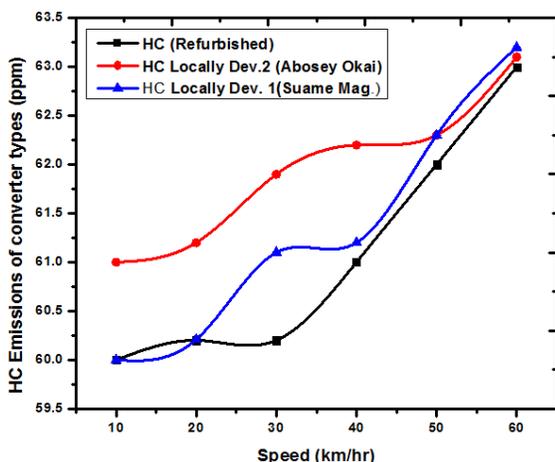


• Fig. 15. CO Emissions of Home Used Converter versus Refurbished Converter

3.4 Comparison of HC and CO Emissions of Refurbished and Locally Developed Converters

3.4.1 Comparison of HC Emissions of refurbished and locally developed Converters

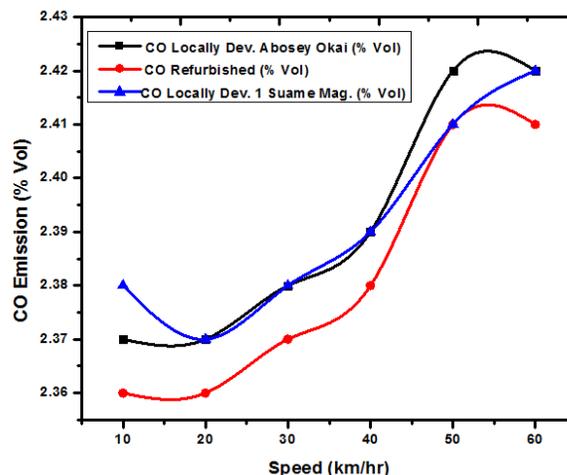
By comparing the HC emissions of the refurbished and locally developed converters, it can be stated that the difference in HC values are significantly high. The differences in HC emission values were obtained from table 4. The refurbished converter had an average HC emission of 61.067 ppm as compared to the converters from Suame magazine (Locally Developed 1) and Abossey Okai (Locally Developed 2) which had average HC emission values of 61.335 ppm and 61.950 ppm at an average speed of 35 km/hr respectively. According to figure 16, it can be observed that the refurbished converter had the lowest HC emissions making it the most effective among the three converters. It can also be seen that the developed converter from Abossey Okai had the highest HC emission. Considering idling condition from table 4-1, the percentage reduction of the HC emissions of the refurbished and the two locally developed converters were also calculated. This gives the percentage emission reduction value of the refurbished converter as 7.69 % whilst the Suame Magazine and Abossey Okai converters recorded 4.28% and 3.3% respectively. Again, there was a significant improvement in the percentage reduction of HC emission when compared to the Locally Developed converter bought from Abossey Okai. From the percentage reductions, it can be observed that there was an improvement in the HC emissions for the refurbished converter as compared to the other converters when the vehicle was idling.



• Fig. 16. Comparison of HC Emissions of refurbished and locally developed Converters

3.4.2 Comparison of CO Emissions, refurbished and locally developed Converters

Similarly, the CO emissions of the three converters were also considered during the experiment. It was also observed that the refurbished converter had a lower average CO emission of 2.381 %Vol as compared to the locally developed converter 1 (2.391 %Vol) and locally developed converter 2 (2.391 %Vol) respectively. In figure 17, it can be observed that the refurbished converter achieves a better performance with respect to CO emissions since it recorded to the lowest value of 1.68 %Vol. for the scenario involving idling speed. However, the values of CO recorded for all samples were far higher than the recommended value of 0.2 %Vol. Hence it is advised that a brand new honeycomb should be considered since that works better with CO emission and also have a longer lifespan.



• Fig. 17. Comparison of CO Emissions of refurbished and locally developed Converters

IV. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

This study examined the catalytic converter performance of HC and CO emission for home used Kia Sportage LX's catalytic converter, a refurbished type and the performance of two locally developed types from the local market installed on the home used Kia Sportage exhaust system.

From the results of the study, the following conclusions are made:

1. The refurbished catalytic converter with welded test and eco-liquid wash, produced lower emission than the home used, locally developed converter 1 (Suame Magazine) and locally developed converter 2 (Abossey Okai). For the locally made ones, the welded part of the case was not uniform therefore creating space for the exhaust gas to escape without proper filtration.
2. An HC emission of 60.0 ppm was recorded for the refurbished converter at an initial speed of 10.0 km/hr which is relatively lower than the HC emission recorded for the home used (65.8 ppm) catalytic converter. Results further show that the refurbished type achieves a significant HC emission reduction of 5.8 ppm when compared with the other types. For CO emission, the refurbished type had a reduction of 0.01% Vol when compare with the home-used converter at varying speeds.
3. At the upper speed of 60.0 km/hr, both the home-used and refurbished converter recorded the maximum HC emission values of 70.9 ppm and 63.0 ppm respectively, whereas the corresponding maximum CO emission values recorded were 2.52 % Vol for the home used type and 2.42 % Vol. for the refurbished type.
4. At the upper speed of 60.0 km/hr, the refurbished converter reduces its HC emission by 12.54% and CO emissions by 4.56 % compared with the home-used converter. On the other hand, at the upper speed of 60.0 km/hr, local type 1 and local type 2 reduce HC emission by 12.18 % and 12.36 % respectively whereas the corresponding reduction values for CO emission was 4.13 % for both local types

5. At the maximum test speed of 60 km/hr both the home-used and refurbished converters recorded the highest amount of *HC* (70.9 ppm, 63 ppm) and *CO* (2.52 % Vol, 2.42 % Vol) from the engine exhaust respectively.
6. The refurbished converter yielded about 3.41% reduction in *HC* emission and 7.92 % *CO* emission which is better as compared to the Locally Developed converter 1 (Magazine). Again, the refurbished converter attained 4.39% reduction in *HC* emission when compared to the Locally Developed converter 2 (Abossey Okai) at idling speed.

5.2 Recommendations

In respect to the results obtained, the following recommendations are made:

- further work should be carried out to compare the performance of the four converters for the recommended maximum speed limit on the high way in Ghana (being 100km/hr)
- In terms of *HC* performance, the refurbished type is recommended since it produced the lowest *HC* emissions, which falls far below the international standard. However, all samples tested could not meet international standards for *CO* emissions. Hence, it is recommended that the DVLA should enforce existing regulations by ensuring that all converters used on registered vehicles should be brand new.

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Breast Disease Pattern In Jos North Central Nigeria: A Review Of Mammography Reports.

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Abstract- Objectives: Mammography has remained the gold standard globally for breast cancer screening. Patients with breast lesions in our environment are generally anxious due to the fact that breast cancer is associated with high mortality. This study aims to review the pattern of breast lesions in our environment.

Method: This is a Retrospective study of Mammographic reports of women who had mammogram for screening and diagnostic purposes between March 2017 and November 2019.

Results: The commonest indication for mammography in the study was breast lump (38.6%). BIRADS II was the most prevalent category constituting 40.3% followed by BIRADS I accounting for 27.3%. Patients with Positive BIRADS (IV and V) for malignancy account for 19.1% while Negative BIRADS (I, II and III) accounted for 79.6%.

Conclusion: Majority of the breast lesions were benign and breast lump was the most prevalent complaint.

Index Terms- Breast cancer, Mammography, BIRADS, Breast Lump

I. INTRODUCTION

The American College of Radiology (ACR) developed Breast Imaging Reporting and Data System (BI-RADS), which was first published in 1993 and subsequently upgraded in 2003 to cover findings in Ultrasonography and Magnetic Resonance Imaging have so far achieved the goal of harmonizing and standardizing the system of reporting breast diseases. The BIRADS system of reporting uses specific terminology to describe lesions in the breast and which conclusions are derived and classified into groups ranging from 0 to 6¹.

Guidelines for imaging a palpable breast lump differ for different age groups. However, mammography remains the mainstay for patients above age forty and ultrasonography for patients who are thirty and below. Current ACR guidelines for evaluation of women age 30-39 years with palpable breast masses still stipulates mammography in addition to ultrasonography². This is as a result of its high sensitivity to depict subtle breast lesions³. In Nigeria and most developing countries of the world, the increase availability of mammography and other imaging modalities has help in early detection of Breast cancer^{4,5}.

Breast lumps are generally a cause of anxiety and worry to patients, their relations and the care givers, especially knowing

that the outcomes of such conditions like cancer comes with high rates of mortality and morbidity^{5,6}.

Breast lesions are generally grouped into benign or malignant breast lesions. The pattern of breast lesions on mammography differ worldwide with studies in sub-saharan Africa showing over 70% of breast lesions are benign with malignant lesions account for the balance.^{6,8}

This study seek to evaluate the pattern of breast lesions as depicted by mammography in women presenting for routine screening and diagnostic purposes in Jos North Central Nigeria.

II. MATERIALS AND METHODS

This is a retrospective study conducted in a privately owned diagnostic center in Bukuru, Jos North Central Nigeria covering a period of two years (2017-2019). Mammography request forms were used to extract patient's data e.g. age, sex, clinical history/indications and provisional diagnosis. Information corresponding to mammographic reports and BIRADS classifications which were previously reviewed by two qualified radiologist were then recorded.

In this study BIRADS 1, 2 and 3 are classified as Negative result for cancer, BIRADS 4 and 5 are classified as Positive result for cancer while BIRADS 0 is classified as inconclusive result that required additional evaluation with other imaging modality^{7,9,10,19}. The data collected was collated and analyzed using the IBM SPSS STATISTICS VERSION 22.0 and EXCEL OFFICE 2013 was used to plot the charts.

Statistical significance was tested using Chi-square distribution (for test of difference in proportions). A p-value less than or equal to 0.05 was considered statistically significance.

III. RESULTS

The mean age of participants in the study was 47.1±11.2 years with age range of 30-83years. Participants aged 40 – 49 years (42.9%) dominated the study population. Only 2.3% were 80 years and above. (Table 1).

The commonest indication for mammography was breast lump which accounts for 38.6 % followed by pain in the breast which accounts for 24%. Others include Itching (1.0%), Nipple discharge (6.2%), Nipple retraction (3.2%), Routine check (23.7%) and Breast swelling (3.2%) (Table 2).

The study revealed BIRADS category 2 accounting for majority 124(40.3%) followed by BIRADS 1 which accounts for 84(27.3%). A total of 59(19.1%) had positive BIRADS for cancer while the majority 245(79.6%) had negative BIRADS for cancer. Only 4(1.3%) were inconclusive needing additional investigation. Mean BIRADS score was 3.3 ± 1.3 with minimum score as 0 and the maximum score as 5. (Table 3).

The age group with the most participant with positive BIRADS score for cancer is 50-59 (22) followed by 40-49(14) and the least is age groups 70-79 and 80 and above with (4) each.

The study showed a significant statistical relationship between BIRADS Score and Age distribution of breast disease. (Chi-square 37.614, P-value = 0.023) (Table 4).

IV. DISCUSSION

Universally, mammography has remained the gold standard for breast cancer screening and diagnosis due to its ability to depict small tumors that are hitherto not clinically palpable^{9,11}. Dense fibroglandular breast tissue and overlap of tissues which beforehand has remained a stumbling block in the evaluation of breast masses has been overcome by the introduction of Digital Breast Tomosynthesis (DBT) which allows for three dimensional images of the breast to be reviewed¹².

The indications for mammography are fluid globally and our study showed these accession, where majority of the participants indicated breast lump as the reason for undertaken the test, followed by breast pain and routine breast cancer screening. This is in agreement with previous findings by researchers on presenting complaints for mammography^{4,5,9,15}. Breast pain as a presenting complaint accounted for 56.3% of the participants in a similar study in south east Nigerian¹⁴ and the most common complaint in another study done by Ehsanbakhsh MD et al in Iran⁷. The anxiety and worry that comes with the feeling of a lump in the breast most have been the reason for the percentage of women who presented at the center. However, a similar study in the same city under taken by Ozoilo KN et al on breast cancer screening indicated breast pain as the most common reason why women present for mammography¹⁶. The participants in our study were for both diagnosis and screening mammography and possibly the reason for the difference.

The BIRADS category 2 and 1 accounts for 40.3% and 27.3% respectively for the mammographic reports reviewed. Similar findings were documented in studies done by Obajimi MO et al, Akande HJ et al and Akinola RA et al in southwest Nigeria and Brakohiapa EK et al in Ghana. Positive BIRADS for Malignancy (category 4&5) accounted for 19.1% while a majority 79.6% are negative for malignancy (category 1,2 &3). Studies globally have shown that benign breast lesions account for majority of breast lesions^{3,6,7,13,19}.

In 1993, an international collation of randomized trials of breast cancer screening from various studies showed no significant benefit in outcomes for women aged 40-49 who have been enrolled into a screening program between 5-7years. It however, showed that screening reduces breast cancer deaths by about one third in women aged 50-59years²⁰.

The peak age for breast cancer in Asia and the Western nations differ considerably with a lower peak age range (45-50) recorded in Asia and higher range noted in the west²¹. Our findings

revealed age group 50-59 years have the highest number of women with BIRADS categories 4 and 5. Mawahib Rizig et al in Khatoum found a higher percentage of breast cancer in age group 41-55. Although our study encompasses both diagnostic and screening mammography and possibly the reason for this findings when compared with other studies in other parts of Nigeria and other developing Sub-Saharan countries where higher incidence of breast cancer were a decade earlier^{14,17,22,23}.

of breast lesions world-wide are non-cancerous in nature and our study showed that with over 79% of the mammograms reviewed fall within BIRADS categories 1-3 while 19.1% of the participants had positive result for malignancy^{3,19,20,26,27}. Ehsanbakhsh et al showed 91.7% accounting for benign breast disease while 11.9% of participants (screening and diagnostics) had positive results for cancer. Obajimi MO et al in a screening mammographic study in the south west of Nigeria reported 1.7% of the participants within the BIRADS categories 4 and 5. The lower percentage is attributed to the screening for breast cancer as against ours that encompasses both screening and diagnostic.

The study showed a significant statistical relationship between BIRADS Score and Age distribution of breast disease.

According to the American Cancer Society all women are at risk for developing breast cancer and estimates that one woman in every eight will develop the disease during her life time. A majority of such women will not have previous family or exposure histories that would have placed them at higher risk.

Our finding showed majority of the breast lesions are benign and the age group 50-59 years accounting for the highest number of BIRADS category positive for cancer.

V. CONCLUSION

Breast lump and pain accounted for more than half of the reason for mammography in this study. The most prevalent BIRADS category was BIRADS II and majority of the findings were negative for cancer (BIRADS I, II and III). The need for regular awareness on breast cancer and screening among young women within the internationally recommended age should be encouraged.

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TABLES AND FIGURE OF LEGENDS

Table 1: Age distribution of participants

| Age (Years) | F | % | Mean±Std. |
|-------------|-----|-------|-----------|
| 30-39 | 33 | 10.7 | 47.1±11.2 |
| 40-49 | 132 | 42.9 | |
| 50-59 | 91 | 29.5 | |
| 60-69 | 36 | 11.7 | |
| 70-79 | 9 | 2.9 | |
| 80+ | 7 | 2.3 | |
| Total | 308 | 100.0 | |

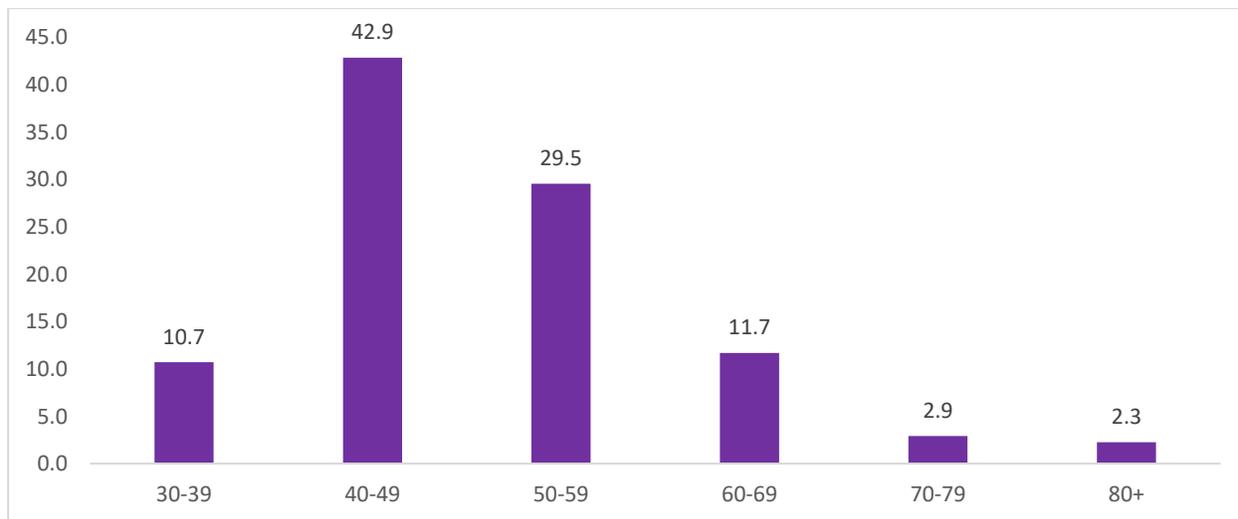


Figure 1: Age distribution of participants

Table 2: Frequency distribution of Indication

| INDICATION | f | % |
|-------------------|-----|-------|
| Itching | 3 | 1.0 |
| Pain | 74 | 24.0 |
| Lump | 119 | 38.6 |
| Nipple discharge | 19 | 6.2 |
| Nipple Retraction | 10 | 3.2 |
| Routine check | 73 | 23.7 |
| Breast swelling | 10 | 3.2 |
| Total | 308 | 100.0 |

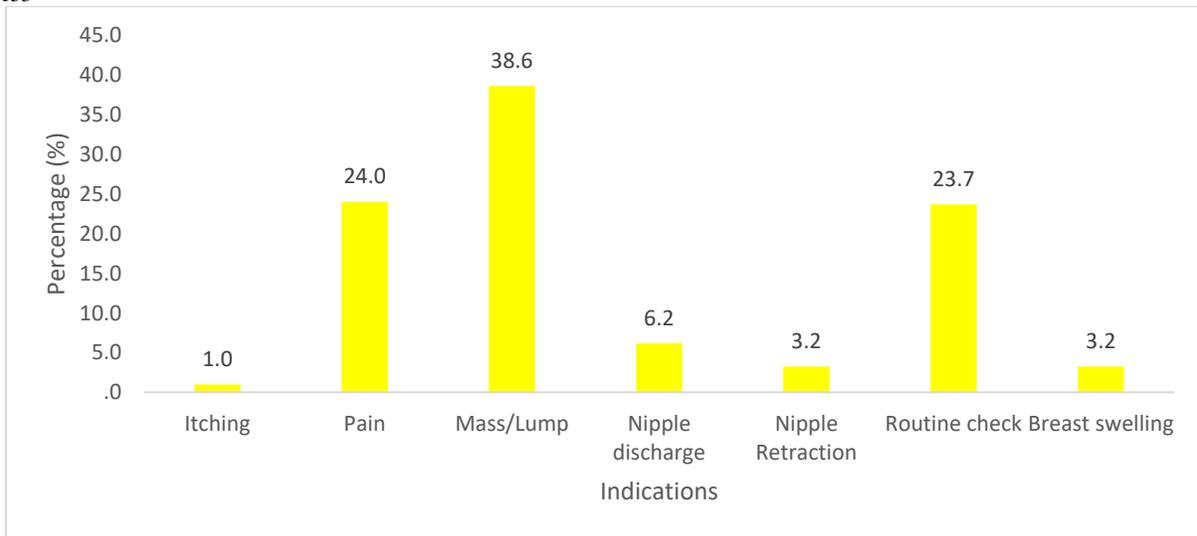


Figure 2: Frequency distribution of Indication

Table 3: Distribution of participants by BIRADS Scores

| BIRADS | F | % | Mean± Std. | Min. | Max. |
|--------|-----|-------|------------|------|------|
| 0 | 4 | 1.3 | 3.3±1.3 | 1 | 6 |
| 1 | 84 | 27.3 | | | |
| 2 | 124 | 40.3 | | | |
| 3 | 37 | 12.0 | | | |
| 4 | 29 | 9.4 | | | |
| 5 | 30 | 9.7 | | | |
| Total | 308 | 100.0 | | | |

Table 4: Distribution of Age and BIRADS Scores

| Age (Years) | BIRADS SCORES | | | | | | | Chi-square | P-value |
|-------------|---------------|----------|----------|----------|----------|----------|-----------|------------|---------|
| | 0 | 1 | 2 | 3 | 4 | 5 | Total | | |
| 30-39 | 0(0.0) | 9(10.7) | 14(11.3) | 4(10.8) | 4(13.8) | 2(6.7) | 33(10.7) | 37.614 | 0.023* |
| 40-49 | 1(25.0) | 41(48.8) | 61(49.2) | 15(40.5) | 9(31.0) | 5(16.7) | 132(42.9) | | |
| 50-59 | 1(25.0) | 24(28.6) | 34(27.4) | 10(27.0) | 10(34.5) | 12(40.0) | 91(29.5) | | |
| 60-69 | 2(50.0) | 10(11.9) | 10(8.1) | 5(13.5) | 4(13.8) | 5(16.7) | 36(11.7) | | |
| 70-79 | 0(0.0) | 0(0.0) | 2(1.6) | 3(8.1) | 1(3.4) | 3(10.0) | 9(2.9) | | |
| 80+ | 0(0.0) | 0(0.0) | 3(2.4) | 0(0.0) | 1(3.4) | 3(10.0) | 7(2.3) | | |

| | | | | | | | |
|-------|----------|-----------|------------|-----------|-----------|-----------|------------|
| Total | 4(100.0) | 84(100.0) | 124(100.0) | 37(100.0) | 29(100.0) | 30(100.0) | 308(100.0) |
|-------|----------|-----------|------------|-----------|-----------|-----------|------------|

* = Fisher's Exact Test

An Evaluation of The Relationship Between Family Stress And Job Stress Among Military Officers In Nigeria

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Abstract- Background

This study investigated the relationship between family stress and job stress among military officers. The participants for this study comprised a total of 70 workers selected from 82 divisions Army Barrack located at Enugu Abakaliki Express Way Enugu comprising 60 male and 10 female officers. The participants were selected through the use of Convenience sampling technique. Their age ranged from 25 – 55 years, with a mean age of 34.34 years and standard deviation of 5.34. The participants were selected across the three major tribes in Nigeria (Igbo, Hausa and Yoruba) and also from both Muslim and Christian religion. Participants that took part in this study were all married living with their spouses and have at least one child. Officers who have at least O'level certificates participated in the study. Instruments administered on them included Coping Skills, Job Related. Correlational design and Pearson Product Moment Correlation Coefficient Statistic was used to analyze the data collected. Result showed that the first hypothesis was not confirmed, there was significant relationship between family stress and job stress among Military Officers. This means that a significant relationship exists between family stress and job stress among Military Officers. Based on the above tested hypothesis there was a significant relationship between family stress and job stress among Military Officers. Therefore, based on these results, it was recommended that Military Officers and others should put a balance between their job and their family to avoid job interference with family and vice versa. The finding of this study should be guides to the Government when hiring Military Officers to know that work overload and things like that could lead to family stress thereby affecting the productivity of such ministry.

Index Terms- Family stress, job stress and military officers.

I. INTRODUCTION

Stress from time to time is an inevitable experience for all humans. This is because the modern life has brought with it not only innumerable means of comfort but also many demands

that task human body. Thus, in this modern life characterized by fast changing world, no individual is free from stress. Military officers experience stress within and outside the family. Stress is the non-specific responses of the body to any demand placed upon it (Selye, 1956). Further, stress is any external event or internal drive which threatens to upset the organism equilibrium (Selye, 1956). Stress is one psychological reaction which occurs when people perceive an imbalance between the level of demand placed upon them and their capability to meet those demands (Kroemer & Grandjean, 2001). Stressors on the other hand are regarded as problems requiring solution to which the family must adopt in order to maintain the functioning of the family system. Sources of stress include family relationships, occupation and how we think.

Family stress is a change in the family equilibrium and appraised by a person as taxing or exceeding her resources and endangering his/her well being (Lazarus & Folkman, 1984). Family stress occurs when feedback indicated that the system does not have the requisite variety of rules to transform comfortably inputs into outputs that meet desirable standards (Burr & Klein, 1994). Moreover, it occurs when family resources are threatened with costs, resources are actually cost and there is a failure to adequately gain resources following significant resources investment (Hobfoll, 1998). Similarly, it is that quality of experience, produced through a person-environment transaction that, through either over arousal or under arousal, results in psychological or physiological distress (Aldwin, 1994).

In Nigerian, family environment is entangled with stress and strains which directly affect homeostasis. In the family, stressors not only refer to major life events but also long-term patterns of marital and family interaction that can affect the individual's ability to cope with stressful events. Examples of crisis events may include divorce, separation, death, illness of a family member, or a move to a new house or community (Mc Cubbin, Joy, Comean, Patterson & Needle, 1980). Long-term interactive patterns which may result in family stress include the quality of marital and parent – child relationships, the nature of decision-making and problem solving, and existence of abusive relationships and behavioral problems (Mc Cubbin, et al. 1980). Family stress may also arise

over time from significant changes in family roles and relationships associated with life cycle stages, such as the transition to parenthood, and empty nest period (Mc Cubbin et al., 1980).

The fore-most family related variable that has drawn the attention of most researchers on family stress is the number of children and the presence of very young children in the home have been associated with family role strain (Lero, 1992). This seems to imply that younger children generally require more attention from working parents and that more time is needed to spend on them. Similarly, the need to care for aging parents or other elderly relatives is becoming a reality for many parents today leaving many with the responsibility of caring for both children and parents (Duxbury & Higgins, 1998). Given the rising cost of living over the past decade with no related increase in real family income, financial worries are reality for many families today. Financial hardship can be ongoing stressors in the family when individuals must face the challenges of providing for a family in uncertain economic times. In addition, the lack of monetary resources greatly reduces the coping options available to individuals in almost any stressful transaction as it can limit access to legal, medical, financial, or other professional assistance (Lazarus & Folkman, 1984). Although neighbours and community provide an important means of social support, they also can increase the level of stressors in an individual's home environment. Neighbourhoods differ in the level of services they offer to individuals, such as access to recreation, shopping and entertainment facilities, or the availability of counseling services. They also differ in terms of orderliness, natural beauty, cleanliness, safety, transportation and road conditions (Matteson & Ivanceviah, 1987). These among other factors could mete out stress to parents in the family.

However, Ali (2008) noted that work is an important part of an individual's life; it provides a source of income, helps to fulfill personal aims, builds social networks and serves communities, yet it is a major source of stress. Thus people in various professions experience different types of stress at different degrees (Asad & Khan, 2003). Beehr (1981) defined occupational stress as a condition arising from the interaction of people and their jobs and characterized by changes within people and force them to deviate from their normal functioning. Cobb (1975) has the opinion that, the responsibility load creates severe stress among workers and managers. If the individual manager cannot cope with the increased responsibilities, it may lead to several physical and psychological disorders among them. Brook (1973) reported that qualitative changes in the job creates adjustment problem among employees. The interpersonal relationship within the department and between departments creates qualitative difficulties within the environmental demands and the response capability of the focal organism. Lazarus and Folkman (1984), also substantiated the discussion that stress will generate among human beings where a particular relationship between the person and environment, that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well – being. The salience of job stress as a research area has been due in part to the magnitude of its effects. In addition to being associated with a variety of physical diseases including hypertension (O'Connor, White, & Bundred, 2000; Tindall, 1998), high levels of job stress can have a negative effect on emotional well being (Pataniti, Niedhamman

Lang, & Consoli, 2002). On the organizational level, high levels of job stress have been linked to low levels of productivity (Reynolds, 1997). In view of these controversies and dearth of empirical study on family stress among military officers in Nigeria, this present study looked at the relationship between family stress and job stress among military officers.

Purpose of the Study

The purpose of this study was to determine whether there will be statistical relationship between family stress and job stress among military officers.

Specifically, the aim was:

- To examine if family stress and job stress have any relationship among military officers in Enugu.

Statement of the Problem

The goal of every organization is to improve productivity on daily basis. This is to realize the goal and objectives of the organization and when this is not achieved, it has a lot of implications both to the employers and employees. It then becomes imperative to look into the employee's family life for optimal performance of their respective jobs. This is because, family stress and job stress may be important factors that may retard or enhance productivity in the military. This study therefore attempt to provide answer to this question:

- Will there be a statistical significant relationship between family stress and job stress among military officers in Enugu?

Operational Definition of Terms

Family Stress: This refers to a real or imagined imbalance between the demands on the family and the family's ability to meet those demands as measured by scores in Thomason and Havice (2009) Coping Skills for Families.

Job stress: This refers to a person's response to a stressor such as an office condition, workload, etc, as measured by scores in Kahn, Wolfe, Quinn, Snoek and Rosenthal (1964) Job-related Tension (JT).

Military Officers: Refer to some selected workers of 82 Division Enugu located at Enugu Abakaliki Express Way Enugu.

II. METHOD

Participants

A total of 70 workers selected from 82 divisions Army Barrack located at Enugu Abakaliki Express Way Enugu comprising 60 male and 10 female officers. Convenience sampling technique was applied to select the participants. Their age ranged from 25 – 55 years, with a mean age of 34.34 years and standard deviation of 5.34. The participants were selected across the three major tribes in Nigeria (Igbo, Hausa and Yoruba) and also from both Muslim and Christian religion. Participants that took part in this study were all married living with their spouses and have at least one child. Officers who have at least O'level certificates participated in the study.

Instruments

Two sets of instrument were adopted for the study. The first one was Thomason and Havice (2009) Coping Skills for Families and Kahn, Wolfe, Quinn, Snoek and Rosenthal (1964) Job Related Tension.

Coping Skills for Families

Coping Skills for Families Revised and Reviewed by Thomason and Havice (2009) is a 20-item inventory designed to a real or imagined imbalance between the demands on the family and the family’s ability to meet those demands. The response format of the scale ranged from 1 (weak) to 5 (strong). The higher the response the more the family is coping with the family stressors. To validate the instrument as well as to establish its reliability, the researcher did a pilot study.

Scoring

The questionnaire has a direct scoring method i.e. 1 is scored as 1 and so on. The participants were instructed to place a check (✓) in the column that best described their status. Based on the scores reflected by the frequency of the items in the lives of the participants, they were classified into having family stress and coping with family stress using the median score as the point of discrimination.

Reliability/Validity Test

The scores obtained from the responses of the 20 officers selected from 103Batallion Gariki Awkunanaw Enugu was used and a test-retest reliability coefficient of .81 was obtained while face validity was adopted as the questionnaires were exposed to 3 experts in the department including the researcher’s project supervisor for their scrutiny. Among the items in questionnaires include: our family does many things together and our roles in the family are shared.

Job-Related Tension

Is a 15-item inventory designed to assess the nature, causes and consequences of two aspects of organizational stress which is defined as the feelings of tension, discomfort, uncertainty, indecisiveness and distress that a worker experiences as a result of the social and physical circumstances of the work setting. The two components of organizational stress which the inventory assesses are: (a) Role conflict and (b) Role ambiguity. The inventory was developed by Kahn, Wolfe, Quinn, Snoek and Rosenthal (1964). The response format of the scale ranged from 1 (very dissatisfied) to 5 (very satisfied). The higher the response the more job satisfaction is indicated. The psychometric properties for Nigerian samples as provided by Oseghare (1998) are as follows:

Samples

Norms: The norms are the mean scores obtained by workers in the general population. M&F (n=238), 2.81

Reliability/Validity

Reliability was determined by the coefficient of alpha reported by Sheridan and Vredenburgh (1978) and Oseghare (1988) are .87 and .39 respectively.

A concurrent validity coefficient of .01 was obtained by correlating JT with rated performance (Sheridan et al. 1978) while

Oseghare (1988) obtained a coefficient of .46 when he correlated JT equivalent with Checklist Symptoms Stress by Kyriacou and Sutcliffe (1978).

Procedure

The researcher introduced himself to the General Officer Commanding (GOC) 82-divisions Enugu through a letter of introduction from the Head, Department of psychology, Enugu State University of Science and Technology (ESUT). After rapport was established, the GOC approved the administration of the questionnaires. The participants responded to the two questionnaires in their offices and returned same to the researcher. On the whole, 125 copies of the two questionnaires each were administered to all the officers in their places of work. Out of this number, only 116 were completed and returned representing 92. 8 percent return rate. Of this number also, eight (8) questionnaires were discarded for improper completion while 38 questionnaires were removed for not having both family stress and job stress as indicated by the test instruments and finally the remaining 70 questionnaires were used to analyze the data.

The tests were scored adding together the values of the numbers shaded in all the items. The Nigerian norms or mean scores are the basis for interpreting the scores of participants.

In Coping Skills for Families, scores higher than the norms also indicate adequate coping skills for families while scores lower than the norms indicate inadequate coping skills for families. Also in JT, scores higher than the norms indicate higher levels of job tension and stress while scores lower than the norms indicate the absence of organizational job stress.

Design/Statistics

This is a survey design and a Pearson Product Moment Correlation Coefficient was employed to analyze the data.

III. RESULTS

Table 1:

Summary table of Pearson product moment correlation coefficient on the relationship between family stress and job stress among Military Officers.

| | | Table of moment correlation | |
|-------------------|---------------------|-----------------------------|----------------|
| | | Family Stress (X) | Job Stress (Y) |
| Family Stress (X) | Pearson Correlation | 1 | .282* |
| | Sig. (2-tailed) | | .018 |
| | N | 70 | 70 |
| Job Stress (Y) | Pearson Correlation | .282* | 1 |
| | Sig. (2-tailed) | .018 | |
| | N | 70 | 70 |

*. Correlation is significant at the 0.05 level (2-tailed).

From the table above, r-calculated value of 0.282 is greater than r-critical value of 0.232 at p<.05 indicating a significant positive relationship between family stress and job stress among

Military Officer. Hence, the hypothesis which stated that “there will be no significant relationship between family stress and job stress among Military Officers” is hereby rejected. This means that a significant relationship exists between family stress and job stress among Military Officers. Based on the above tested hypothesis there was a significant relationship between family stress and job stress among Military Officers at $p < .01$; indicating that family stress is related to job stress based on the fact that high score on family stress inventory indicate high score on job stress.

IV. DISCUSSION

The finding of this study indicates that the hypothesis tested was not confirmed. The hypothesis that state: “there will be no significant relationship between family stress and job stress among Military Officers” was not confirmed. Rather, a significant positive relationship was observed between family stress and job stress among Military Officers. This means that family stress is linearly related to job stress based on the fact that family stress leads to job stress and vice versa. In other words, an increase in the family stress scores which indicates job stress will correlate positively with high scores on job stress. A positive correlation obtained in this situation is based on the fact that the participants scored high on family stress and high on job stress and vice versa. This disagrees with the findings of other researchers like [Hauk and Chodkiewicz \(2013\)](#) who found that both general and occupational stresses were not significant mediators in the relationship between workaholism recognized as a behavioural tendency and the conflicts described. Also, there was no difference between female physicians working full-time or reduced hours in regard to work interfering with family or family interfering with work (Carr, Gareis, & Barnett, 2003).

The finding of this study was in line with this study, thus in a study by Alexandros-Stamatios, Matilyn and Cary (2003), it questions whether the workers have to take work home, or inability to forget about work when the individual is at home. Home-work interface is important for the workers to reduce the level of work-related stress. A common finding is that work stress has negative effects on families and home life (Muchinsky, 2000). Robinson, Flowers, and Carroll (2001), for example, reported that work stress negatively affects marital cohesion. In addition, Crouter and Bumpus (2001) highlighted the negative spillover effect of work stress into family life. They reported that work stress has detrimental implications on the quality of family interactions. Work interfering with family had a direct relationship with work exhaustion in a 4-year study of medical technologists, 80 percent of whom were female (Blau, Tatum, & Ward-Cook, 2003). Family interfering with work, however, was not studied. A study of 101 female nurses found that work interfered with family more than family interfered with work (Gottlieb, Kelloway, & Martin-Matthews, 1996). The investigators noted, however, that most of the nurses, who were in their mid-40s, were between the demands of child care and elder care. This finding is consistent with findings from a study of 170 Australian nurses: the principal determinant of stress was workload; nurses were unlikely to bring personal stress to work (Bryant, Fairbrother, & Fenton, (2000).

Work-family conflict is a form of inter role conflict in which role pressures from work and family domains become an obstacle to employees' job performance. In study by Ogbogu (2013) using

250 randomly selected female academic staff from 3 purposively selected Public Universities in Southern Nigeria. Results revealed that several factors such as long hours of work, overcrowded job schedules, inadequate working facilities, family and domestic responsibilities, teacher-student ratio and cohesive Heads of Departments accounted for greater work family conflict. It was also found that women's experiences of work-family conflict impacted negatively on their level of job performance and well-being.

In another study that examined the main and interaction effects of work-family conflict and job stress on job burnout among working mothers in post-consolidation banks in Nigeria. Using a randomly selected sample of 311 working mothers, Balogun (2014) results showed that work-family conflict and job stress had a significant main and interaction effects on overall job burnout and its three dimensions. Finally, the result of this study implies that Military Officers' family stress level affects their job stress.

Implications of the Findings

The implication of the above findings is that since the null hypothesis stated was disconfirmed, Military Officers and others should put a balance between their job and their family to avoid job interference with family and vice versa. Again, eustress is good for people to function well in their job but when it turns to distress it may bring about family stress and or job stress.

The finding of this study should be guides to the Government when hiring Military Officers to know that work overload and things like that could lead to family stress thereby affecting the productivity of such ministry. Theoretically, the finding of this study will be a useful contribution to the existing body of knowledge in the areas of job/family.

Limitations of the Study

The size of the population used is a factor that may affect the generalization of the finding of this study to a large population. Other variables such as; job commitment, payment package, hours spent on job, role conflict, etc., and should be studied in relation to family stress. Despite the level of rapport, and confidentiality generated before administering the tests, some difficulties were encountered. They involve: production of the questionnaires and getting the attention of some of the Military Officers because of the nature of their work.

Suggestions for Further Research:

Hence, further research on this study should try and find out other factors not studied in this research on family stress and job stress among Military Officers such as:

To sample Military Officers in other Barracks and States; to study more on the influence as well as the relationship between the variables in this study; to sample workers in other professions like hospital workers (Doctors/Nurses), University lecturers, bank workers and to sample larger population and also large sample size, etc.

V. SUMMARY AND CONCLUSION

Military Officers and others should continually seek the therapeutic advice of Military psychologists to know the factors

responsible for being happy and healthy on the job. Again, offices as well as other ministries that recruit workers should also start employing psychologists to work in their ministries/organizations to be in charge of worker's psychological well-being while boosting productivity.

Compliance with Ethical Standards Conflict of interest:

All authors declare that they have no conflict of interest. All participants filled the consent form to declare their free will to participate in the study. Again, this study was not funded by any person, group or organization.

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The investment prospects of Uzbekistan

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Abstract- This research empirically demonstrates the current status quo of investment environment and potential of Uzbekistan - one of the dynamically developing countries of Asia. By providing relevant and clear evidences of investment prospective of country and highlighting main features of national economy, paper aims to investigate primary important factors, which stands for paradoxical growth and some actual problems as well. The results serve to point out key trends and gaps in which to focus future research on this topic and they might be useful in formulating public policies and strategies for further defining of investment potential and economic development of country.

Index Terms- Investment, Foreign investor, Uzbekistan, Invest potential, developing countries, Central Asia.

I. INTRODUCTION

The last decade have seen an incredibly successful to one of the largest economies of Central Asian region-Uzbekistan – dynamic growth of GDP around 8%, negligible amount of domestic and international debt, underestimated exchange rate and even more interestingly relatively distribution of income. (Vladimir Popov, 2014) Moreover the foreign direct investments, which is considered as a vital factor of growth in many newly developing countries, is become one of the primary part of national investment policy of states with transition economy like Uzbekistan. On this basis, the government has done successful implementation the notion of free investment climate into legislature by inaugurating different acts and laws, which regulate flow of sources and simultaneously help foreign investors by providing various forms of information. (B. B. Valiev, 2014)

Conservatively, it is widely held perception that oil and gas industry are the main sectors of economy and paramount source of people's welfare. The lion's share of national economy, such as heavy and light industry excessively rely on fuel industry. Equally importantly, Uzbekistan proclaimed and currently is working under executing national program called 'On the priorities of industrial development for 2011–2015' which accumulates more than 500 most-promising invest-projects, which assessed approximately 50 Billion USD. (Parpiev, 2014) Summarizing the annual results for 9 month 2014, the implementation of the State Investment Program approved by government in the share of attraction of foreign investments extended 102,7% over the yearly prognosis.

Main part of foreign investments was put into the following sectors of economy:

- oil and gas 64,8%

- power generation 6,6%
- telecommunication and IT-technology 4,7%
- credit lines for the development of small business entities 4,7%
- road construction 4,4%
- drinking water supply and sewage 3,8%
- construction and construction materials 3,1%
- agriculture and water management 2,1%
- textile 1,9%

The majority of investment projects have been done in the collaboration with more than 30 countries all over the world such as China, Germany, South Korea, Japan, Netherlands, Great Britain, Malaysia, and Russia etc. («MFERIT - Statistics investing activities».)

Background information about investment potential in Uzbekistan

As one of the Central Asian countries Uzbekistan possesses a range amount of natural and mineral resources as well as pleasing weather, extraordinary background, hospitality, multiculturalism, tourism and recreation infrastructure like hotels and international class airports which highlight economic potential of state. It is also one of the few and unique countries which combines the high living standards, comprehensive medical care and sophisticated education system and minimum cost of living. In addition, Uzbekistan is the country which is well known for the greatest towns with hundreds of architectural monuments of different epochs. Samarkand, Tashkent, Bukhara, Khiva and other cities are regarded as the main industrial trade centers of country and architectural heritages of the world as well.

According to statistics given by states in 2014, there was a remarkable increase by 8.1% (Table 1), making it in marginal advantage over the results that demonstrated in 2013. Strike encountered in Russian federation has directly exerted on lesser growth owing to fact that Russia represents as one of the major trade companions as well as big contributor of finance transmission. As a result, depletion occurred in both external and internal scales in trade and remittance. Moreover, lower income from export expedited devaluation of the Uzbek sum toward the US Dollar. States, however, in order to keep interior demand, augmented expenditures to public and commercial loaning. In balance, two deployment industry and services benefited most, while industry's rate revealed slight decrease from 8.8% in 2013 to 8.3% in following year with eliminating from construction, from 13.7% in 2013 to 15.4 has increased the percentage of services. Due to current condition of modernization program that is implementing in industry by tremendous assistance of public investment, there was a huge contribution in production of

machinery, metals and chemical, thereby surged to 10.2% and made approximately 40% of entire production. As regard to services, nucleus output has seen in information and communication technology with 24.1% and finance strongly backed from demand as well as local lending. («Macroeconomic indicators of the Republic of Uzbekistan»)

Table 1. Macroeconomic indicators in January-September 2014

| | Billion. UZS | Annual growth comparing with previous year |
|------------------------|--------------|--|
| Gross domestic product | 100309,5 | 8,1% |
| Industrial output | 54401,3 | 8,4% |

Table 2. Index of External Trade Turnover

| | Amount (in million USD) | Annual growth comparing with previous year |
|--------------------------|--------------------------|--|
| External trade turnover. | 21277,0 | 0,6% |
| Exports | 11096,9 | 0,2% |
| Imports | 10180,1 | 0,9% |
| Balance | 916,8 | |

Source: *The State Committee of the Republic of Uzbekistan on Statistics*

Total trade turnover of country which calculated by adding quantity of exports and imports of state reached 21,2 billion USD with the 0,6% growth in comparison with analog period of previous year. The balance of export and import is positive, about 916 million USD with 11,1 billion USD against 10,1 billion USD respectively. But annual growth of imports is more than export rise, 0,9% versus 0,2%.

Moreover, Gross fixed finance foundation has enlarged by 10.9% . Investment taken by foreign businessmen has comprised just under \$3.0 billion, from total \$14.6 billion capital investment. There were perceptible assignments that aid to escalate the economy of Uzbekistan. First of all, project of extension of the General Motors Uzbekistan car manufacturing that has perfected in 2014. In order to supply gas to the People’s Republic of China gas pipeline has launched and already terminated. This gas channel will bond Central Asia with the Republic of China. Furthermore, the serious considerable upturns were seen in pecuniary lending by commercial banks elevated to 31.2%, while by official report that has done by the state there was 6.1% as average per annum in inflation rate in last year. Depletion in price of food in a global scale eventuated slow inflation in official consumer price. According to certified information presented by the International Monetary Fund, there were quiet different ratios with lessening in inflation rate from 11.2% in 2013 to 8.4% currently. It is expected to have a rise in fourth quarter as a result of devaluation of Uzbek sum to US dollar. As regard to informal restraint market ratio, national currency lose its worth in one fifth in previous year with last quarter being poised as a high point of

| | | |
|------------------------------|---------|-------|
| Agricultural output | 28094,5 | 6,8% |
| Investments in fixed capital | 23831,2 | 10,7% |
| Construction work | 15034,6 | 18,9% |
| Retail trade turnover | 41664,3 | 4,2% |
| Services, total | 57197,2 | 4,7% |

Source: *The State Committee of the Republic of Uzbekistan on Statistics*

Trade and catering that are considered as an important subsector has amplified with 17.5%. Awful weather condition, though, was not impediment for yielding a positive account in agriculture which demonstrated a better output assimilating to production of 2013 owing to healthy vegetable yields and enhancement of livestock goods. Complements in emoluments and pensions, public investment mercantile loaning were main assistance in growth of demand within country. Private intake has remained as a result of 19.1% escalation in public sector salaries.

acceleration, though owing to reduction in price of global fuel. However, the Central Bank of Uzbekistan responded by expediting official depreciation of currency to US dollar and legislated a strict regulation related to import controls.

The similar rise has encountered in percentage of 2013-2014 year’s broad money with 26% in both years, thus accentuating greater domestic credit. Questionnaire made to calculate finance as broad money is not accessible, though quota of foreign tenures within banking system might fall in quantity as a result of overcoming in rate of domestic credit over broad money. As to 2014 budget surplus in GDP of country was at level of 0.2% relying on data proliferated by government. It has been computed that advanced budget balance have comprised 2.4% surplus of GDP in 2014, making it barely less than results of 2013 with 2.7%. Annual income to budget has seen depletion in 0.1% in 2014 year comparing to rate of 2013 year with 36.1% and 36.2% respectively. Similarly, prices for international major export goods was in minus as well. Consecrating funds to escalate the compartments of wages, pensions, health care as well as education have composed a great bulk from entire budget making enhancement in allocation of expenditure from 33.5% of GDP in 2013 and 33.7% of GDP in following year. Moreover as a result of enlargement in the share of loaning finance from external sources the sheer governmental debt has increased in this account. Ongoing states surplus assessed to comprise smaller percentage to last year repercussions, thereby portraying lesser trade surplus as

well as minor remittances. Exterior markets' requirement for local commodities from Uzbekistan was frail as usual, while key export goods have crossed margin of debilitation as it have been ever before. This phenomenon emerged after presenting reduction in output from energy that compiles almost 30% of exports. Detailed looking at the number of exports, it will be apparent that exhaustion in price for energy has followed the identical trend in global oil prices. Whole exports in other words abridged to 2.0%, which mainly on account of progress of the economy in Russian Federation where remittances have also suffered a considerable diminution. Frail consumer demand and swift nominal appreciation of the Uzbek sum to Russian ruble have resulted in

suffering depreciation in bilateral trade. Dwindling of remittances from Russia that is estimated to compose 10%, in other words up to \$5.0 billion, which was mainly dumped on account of thinning of labor demand in construction and logistics. The key two commodities that account for lion's share of importing goods were consumer goods and chemicals. The whole trend of imports went up by 1.1%, in contempt of reduction in quantum of machinery and equipment to about 10% assimilating to 2013, these aspects held a nucleus position counting for 40% of entire import rate. If we look in details of import goods (Figure 1), it could be noticed the prevalent role of machinery and chemical industries which occupy more than half part of total.

Figure 1.

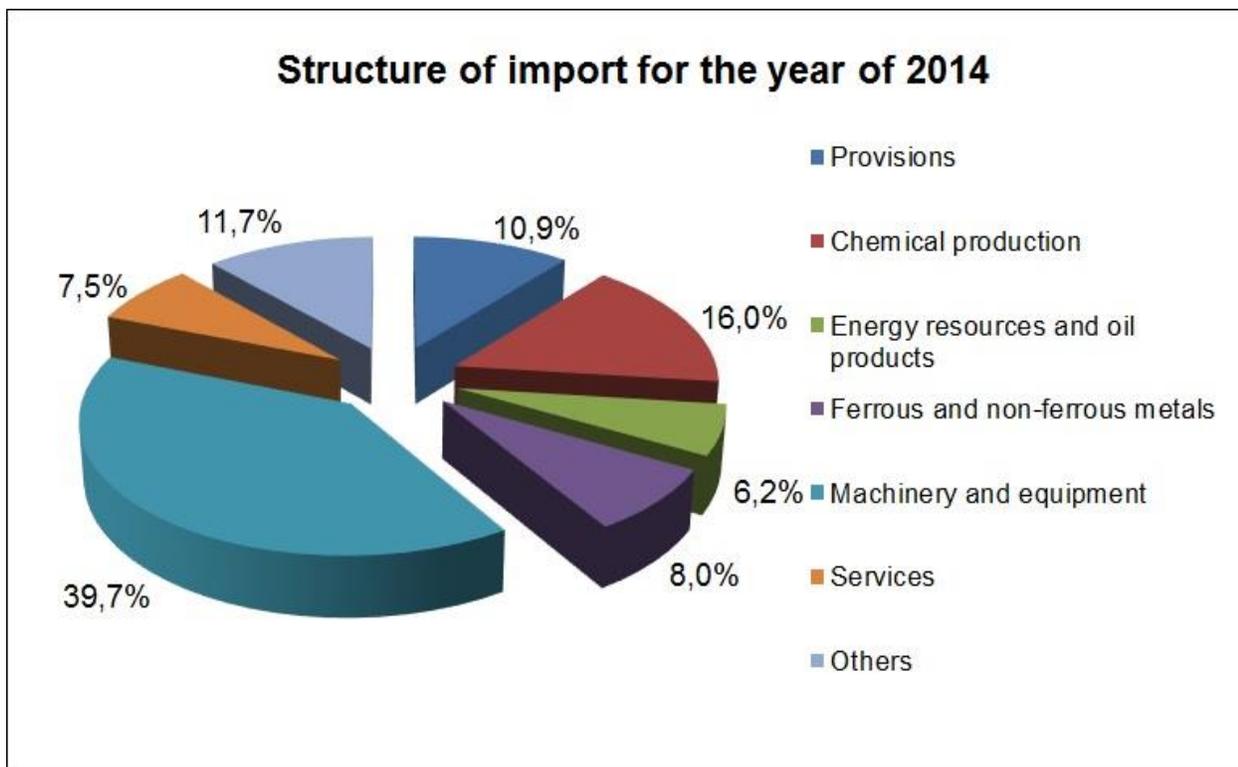
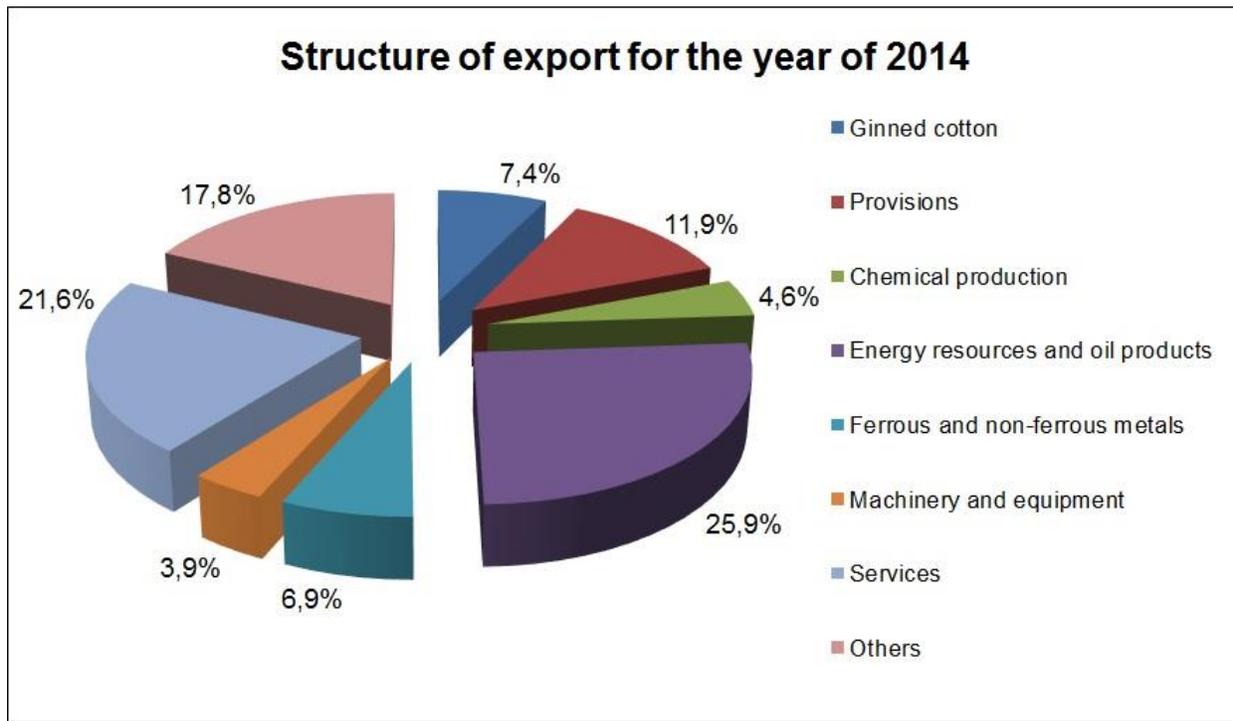


Figure 2.



In contrary, Figure 2, which reveals the share of various industries into total export goods of country, is predominated by raw materials-based industries and energy resources. Also, machinery equipment and chemical production have significant contribution to export consistency of state.

Main industries which appeal investors. Promising investment projects

Having possessed an enormous investment potential, Uzbekistan also has an adequate distribution of this financial sources into various forms of industry. Government pay a great deal of attention for appropriate investment of strategic sectors of economy and serves as a catalyst between entrepreneurs and foreign investors.

In general, the investment attractiveness of different forms of Uzbek national economy is pre-disposed due to the following reasons:

- Relatively low cost the basic thing which is necessary for manufacturing (price for a thousand cubic meters of natural gas is about \$37, price for one megawatt of power is \$35, average real salary in the country is \$300)

- Considerable domestic market -about 31 million people who live permanently(«Uzbekistan population 2015 | Current population of Uzbekistan»,)
- Free access to the CIS(Commonwealth of Independent States) which population is more than 280 million

One of the key evidences which represents invest opportunity in Uzbekistan could be found in official report of Ministry Of Foreign Economic Relations, Investments and Trade of the Republic of Uzbekistan. According to this report, the total amount of projected investment proposals evaluated as much as 5,886 Billion USD and this is only short-term invests from different financial organizations around the world. («MFERIT - Promising investment projects»,) The Table 1 presents information about most valuable and promising projects of investment, each line shows only major projects which accumulate more than 50 million USD. The mains sector of economy which appeal the main part of direct foreign investments are - complex of geology, energy, chemical, petrochemical and metallurgical industries (about 30 percent) and the complex of development of mechanical, electrical engineering and aviation industry, standardization of products(its market’s share is not completely assessed).

Table 3. Most Promising invest projects (Table includes only projects which cost more than 50 million USD)

| N | Name of project | Initiator | Cost of project (Million USD) | Evaluated period of implementation |
|---|-----------------|-----------|-------------------------------|------------------------------------|
| | | | | |

| | | | | |
|-----|--|--|---------|-----------|
| 1. | Organization of production of polymers (polycarbonate, polystyrene, ABS-plastics and etc.) on the basis of deep processing of hydrocarbons | "Uzbekneftegaz" National Holding Company | 700,00 | 2015-2016 |
| 2. | Conduction of exploration works on Akjar and Chimbay investment blocks of Uzbekistan | "Uzbekneftegaz" National Holding Company | 56,10 | 2014-2017 |
| 3. | Conduction of exploration works of oil and gas bearing investment blocks (Khorezm and Meshekli-Tuzkoy investment blocks) of the Republic of Uzbekistan | "Uzbekneftegaz" National Holding Company | 200,00 | 2014-2018 |
| 4. | Implementation of projects to increase oil recovery from long-developed fields with hard extractable reserves (application of new methods of oil recovery) | "Uzbekneftegaz" National Holding Company | 151,47 | 2014-2020 |
| 5. | Organization of production of polycrystalline silicon | "Uzkimesanoat" SJSC | 400,00 | 2014-2017 |
| 6. | Development of Tebinbulak deposit with further production of cast-iron (In association with State Committee of Geology and Mineral Resources) | "Uzmetkombinat" OJSC | 3100,00 | 2013-2020 |
| 7. | Production of units and components for automotive power packages (transmissions) | "Uzavtosanoat" JSC | 310,00 | 2014-2015 |
| 8. | Organization of production of basic glass | "Uzavtosanoat" JSC | 90,00 | 2014-2016 |
| 9. | Establishment of textile complex using the facilities of unfinished construction in Dzhondor district of Bukhara region | "O'zbekyengilsanoat" SJSC | 65,50 | 2014-2015 |
| 10. | Establishment of textile complex using the facilities of unfinished construction in Shafirkan district of Bukhara region | "O'zbekyengilsanoat" SJSC | 66,50 | 2014-2015 |
| 11. | Establishment of the textile complex on production of finished fabrics and textiles in Kashkadarya region. | "O'zbekyengilsanoat" SJSC | 50,00 | 2014-2015 |

Oil-and-gas industry

As it can be concluded from Table 1, the most attractive sector of economy for foreign investors is oil-gas industry. National Holding Company (NHC) "Uzbekneftegaz" which accumulate 6 major joint shareholding companies, including more than 120 entrepreneurship in the complex, controls oil and gas industry in country.

The complex performs exploration, investigative drilling and drilling of oil and gas wells production, oil and gas fields improvement, oil, production of gas and gas condensate, natural gas processing, carriage and gas underground storage, administration of the facilities that transport natural gas from Uzbek gas producers to local consumers and overseas, as well as providing transit of the natural gas from neighbor countries, project works, cardinal construction and development

of production, transport, oil and gas processing facilities, oil products are realized to economy sectors and population of the country, the production of engineering products for businesses and organizations of oil and gas and gas chemical complexes . The state is the major stake holder of the company.(«Structure of Uzbekneftegaz»)

The main oil and gas bearing region of the country can be divided into five districts:

- Ustyurtsky,
- Bukhara-Khiva,
- Hissar,
- Surkhandarya
- Ferghana

This regions combine more than 232 discovered deposits of oil, gas and gas condensate. Except of them, 103 are being developed, 60 - equipped for development, and 69 are in the process of research. Moreover, the country possesses a widespread gas transportation system. The total length of gas pipeline is more than 13 thousand km and about 250 compressor stations are located on their way. («Industry - Uzbekistan»)

Chemical industry

The other attractive sphere of Uzbek economy is chemical industry, which aggregate enterprises producing fertilizers, chemical fibers, synthetic resins, polymer products and also plant protection chemicals. Like oil-gas industry it controlled by State Joint Stock Company (SJSC) "Uzkimyosanoat.", which integrate 12 primary industrial companies, 13 regional distribution enterprises and also different academic institution along with transportation organization.

Currently, SJSC enterprises are producing the following products:

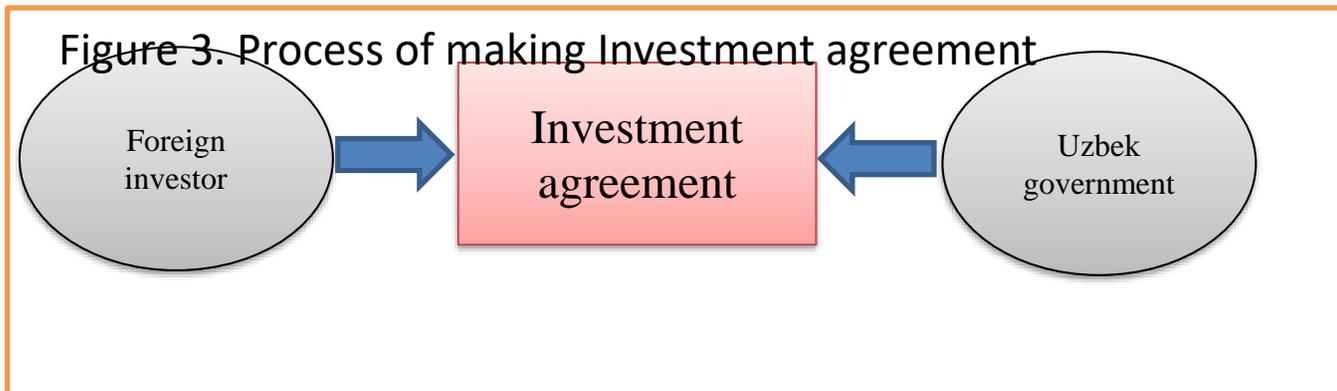
- Mineral fertilizers and inorganic products (nitrogen, phosphate potash fertilizers, ammonia, caustic soda and soda ash);
- Organic chemistry, synthetic fibers and polymer materials (cellulose and cellulose acetate, fiber, acetate yarns, polyethylene products);
- Chemicals for energy and chemical industries, as well as for gold production (sodium cyanide, thiourea, polyacrylamides, azotic, sulfuric, hydrochloric acid, catalysts, acetic acid, acetylene, etc.);
- Chemical-based plant protection products (chlorate magnesium defoliant) («By Industry | "UZINFOINVEST" the Information Support & Foreign Investments Promotion Agency».)

Automobile manufacturing and engineering industries

One of the fast developing branch of industry – automotive manufacturing industry is represented and monitored by Joint Stock Company "Uzavtosanoat.". This concern collect 21 enterprises and organization and institution of tertiary education – Turin Polytechnic University in Tashkent. This sphere, which has surged in recent times exponentially and induce internal growth in demand of vehicles as well as enhanced its share in the global market. In collaboration with multinational companies such as GM, ISUZU, MAN, MERCEDES BENZ, national regulator modernize current material base of plants, factories which aggravate in itself. («Structure of Uzauto»)

Legal procedure of registration investment activity in Uzbekistan

The main licit document, which provides information about guarantees and privileges in each particular case, is - investment agreement which is concluded between the Government of the Republic of Uzbekistan and foreign investor (Figure 3). This legal act instructs rights, duties and responsibility of entrepreneurs with regard to their investment activity. The responsible body which represents the country and conclude investment is - Ministry of foreign economic relations, investments and trade of the Republic of Uzbekistan. Moreover, the negotiation can also include list of other measures and protections to those requires by the legislation, for instance, creation special custom, reducing the burden of tax and payments regime, forming the state monitoring on execution of investment projects. («Procedure of investment agreements conclusion and fulfillment | "UZINFOINVEST" the Information Support & Foreign Investments Promotion Agency»)



According to legislation of country (Government decree №180, 02/08/2005) investment agreement should include following information:

- Object and capacity of investment sources;
- Terms, conditions and period of validity of investment agreement;
- the investor's privileges and responsibilities, including those concerning: a capacity of financing, warranting a particular size of production, quality of product and guaranteed level of localization, labor rights and protective measures and other lines of its activity.
- both privileges and responsibilities of the Government of the Republic of Uzbekistan, including rights and obligations on

granting of guarantees and safety measures excessively to those specified by the legislature;

- information on term of preparation of design estimations, conclusion of agreements for contractor's work, foundations of funding, timetable of contentment of the mission, a technique for practical supervision of the sequence of gratification of investment project;
- process and terms of presentation by the foreign investor of reports on the sequence of fulfillment of his responsibilities;
- responsibility of the parties for non-observance of circumstances of the investment agreement;
- process of outlining of amendments;
- termination process;

- process of the sanctions' application and a place of contemplation of the disputes arisen under the investment agreement.

In addition, depending on intrinsic features of particular invest project, investment agreement might contain other specific terms and requirements:

- Shared responsibilities of the sides on the improvement of both social structure and production capacity of the region;
- the right of investor which includes to export manufactured good from country and received profit as well
- responsibility of the investor to hire and train workforce from representatives of local population, in terms of using technologies and managing working process

In order to conclude investment agreement with government, the foreign investor should provide following document to responsible authority (in this case the Ministry of foreign economic relations, investments and trade of the Republic of Uzbekistan):

- draft version of the investment agreement;
- fundamental measurements, in terms of economic, financial and technical side of the project, which is accepted by special body.
- Acceptance of Ministry of Justice in regard of the appropriateness of investment agreement to national legislature
- Acceptance of financial regulations, including Ministry of finance, the Ministry of economics and the State tax committee – in regard of guaranteeing of tax privileges and preferences to foreign investors and newly formed enterprise with the share of foreign investor

In some particular cases when it is required the body can request some additional details on further evaluation of the draft.

The presented draft and other supplementary documents are considered by authorizes bodies within 14 working day from registered date. If necessary, with view to monitor provisions of the investment agreement between the regulator in the face of Ministry of foreign economic relations, investments and trade of the Republic of Uzbekistan and the foreign investor negotiations are approved.

After having signed by foreign investor and regulatory body, the agreement will be submitted by the latter to the government (Cabinet of Ministers of Uzbekistan) and requested for a relevant decision on its approval.

Signed by the foreign investor and the Ministry of foreign economic relations, investments and trade of the Republic of Uzbekistan the investment agreement, is submitted by the latter to the Cabinet of Ministers of the Republic of Uzbekistan for taking a relevant decision on its approval by the Government.

The investment agreement with the foreign investor starts to have licit power from the date when decision on its approval has been taken.

Supplementary guarantees and procedures of protection and privileges shall be given to foreign investors in particular situation if they invest following spheres:

- priority divisions providing sustainable economic growth, enlightened essential modifications of a national economy;
- priority projects providing establishment and development of industrial and an export prospective of the state;
- projects in the sphere of small entrepreneurship which execution is targeted to aid the manufacture of consumer goods and services,

maintenance of engagement of the people. («Procedure of investment agreements conclusion and fulfillment | “UZINFOINVEST” the Information Support & Foreign Investments Promotion Agency»)

Preferences and opportunities for investors

External fund raising in the Republic of Uzbekistan is discriminating with appropriate conditions that are provided to investors that support projects in Uzbekistan accomplished by legal bodies and natural persons that are preferable for every investor from third country.

Licit legislation enacted by the government in Uzbekistan as well as general warranties and routes of security that have destined on foreign investors, that can widely back investors from another countries are main contributors in such a attractiveness of this site alongside with permitting unconditional bilateral performance by partners. Numerous cases for allowing investors to raise finances that are given below represent investment agreement with expletive guarantees and measures of protection:

- ✓ Make a stress on particular projects that render assistance to enlargement and reinforcement in country's economic potential and its share on global market.
- ✓ Domains proliferating great potential to maintain economic progress, therefore creating appropriate structural vicissitudes in local economy.
- ✓ Contribution in facet of small business distinctively dedicated toward manufacturing raw materials, production of services and goods destined to consumers and providing local inhabitants with vocations.

Emanating from aforementioned features the Government of the Republic of Uzbekistan offers supplementary guarantees and procedures of safety and with bilateral agreement of sides contracts will be signed.

The Government of the Republic of Uzbekistan and the Ministry for Foreign Economic Relations, Investments and Trade of the Republic of Uzbekistan and the foreign investor will decide further concatenation of circumstance.

The rights of investors from third countries who conduct investment projects in Uzbekistan will be under protection of the government.

Once following legislation endorsed by the Republic of Uzbekistan, the apropos condition will be presented to foreign investors with long-term perspective of 10 years instituting from moment of consent. Investment date that confirmed by legislation act will be applied. Investor has been permitted to select new legislation consecrated to improving investment state within Uzbekistan by his/her own will.

Given legislation instructs the constant reclamation in timescale of 10 years' warranty. Thereby, at interim when descent investment environment is coming, foreign investor requires application of a guarantee from corresponding legal entity.

Par excellence, brand-new entrepreneurship with minimum \$5 million dollars cash share of foreign investors, as a result of potential changing tax laws can be harnessed by investors in period of 10 years from the date of governmental recording.

The state organizations including: Ministry of Foreign Affairs, Ministry of Internal Affairs, Ministry for Foreign Economic Relations, Investments and Trade, the State Tax

Committee of Uzbekistan and the servicing banks are considering as authorized entities in state registration where foreign investors' guarantees will be notified in the form of application.

Announcement that delivered to foreign investor is the fundamental feature for the application done by authorized individual that destined to legislature of foreign investor at the time of raising funds.

The several cases of lessening of taxed income for legal entities accounting for amount of:

- ✓ Approaches mostly devoted to intensifying of nucleus domains such as creating new construction, renovation of edifices and compositions used for manufacturing needs as well as payment of intentionally obtained credits with design to debilitate calculated depreciations in consummate tax phase, though with deduction of maximum 30% from taxed benefit.
- ✓ Routes addressed for renovation and technological refurbishing of production, procuring finance to credits distributed toward new technological utensils, loaned object's reimbursement price with slight rebate of confirmed devaluation in a corresponding tax period. Shrinking of taxed base conducted in five year period inaugurating from commencement when lion's share of expenses spent to technological apparatus to starting utilization of them into production. However, once realization and free of charge transmission of novel technological instruments in border of 3 years from date of gaining, given benefits will lost in vain. In case of realization and gratis transfer of new technological equipment within three years from the moment of its obtaining, this privilege is annulled with the rehabilitation of duties on payment of income tax for the whole period of application of the privilege

Another stupendous fact is that, local producers of goods with aim to export manufactured commodities, one exception is raw materials, on basis of external currency in contempt of origin of the fabrication will be granted to:

- ✓ Hefty 50% deductions of profit tax-in the case if the company transmits goods that should not get over 30% from entire production.
- ✓ Modest 30% rebate in income tax--if the company exports wares in interval from 15% to 30% from total sales.«Economy and Trade / Investment Climate»

Foreign investments in the Republic of Uzbekistan enjoy the national treatment which provides foreign investors with conditions not less favorable, than corresponding conditions for investments, made by legal entities and natural persons of the Republic of Uzbekistan.

The legislation, alongside with the general guarantees and measures of protection of foreign investors, may envisage additional guarantees and measures of protection, including providing unconditional performance by partners.

In some cases on the basis of concluding investment agreement additional guarantees and measures of protection can be given to foreign investors at investment in:

-the priority sectors providing steady economic growth, progressive structural changes of a national economy;

-the priority projects providing strengthening and expansion of an export potential of the country, its integration into world economic relations;

-projects in sphere of small business oriented at processing of raw material and materials, production of consumer goods and services, providing population with employment.

In case the Government of the Republic of Uzbekistan provides the foreign investor with additional guarantees and measures of protection (privileges and preferences), without fail, the investment agreement shall be concluded.

The investment agreement shall be concluded on behalf of the Government of the Republic of Uzbekistan between the Ministry for Foreign Economic Relations, Investments and Trade of the Republic of Uzbekistan and the foreign investor.

Also, the state guarantees and protects the rights of the foreign investors carrying out investment activity within the Republic Uzbekistan.

In case the subsequent legislation of the Republic of Uzbekistan deteriorates investment environment to foreign investors, within ten years from the moment of investment, the legislation acted on date of investment shall apply. The foreign investor is entitled to apply at own discretion those provisions of the new legislation which improve investment environment.

The legislation stipulates the notifying order of use of a ten years' guarantee. Thus, at approach of deterioration investment environment, the foreign investor notifies the corresponding authorized body on application of a guarantee.

In particular, the newly established enterprises with foreign investment, in which the foreign investor's contribution in cash of not less than five million U.S. dollars, in case of changing tax laws may be used within 10 years from the date of state registration rules and regulations in the payment of income tax law those value-added tax (turnover of sales of goods and services), property tax, tax on improvement and development of social infrastructure, unified social tax, single tax, as well as mandatory contributions to the Republican Road Fund and reconstruction, repair and equipping of educational and medical institutions operating on the date of their registration.

Authorized agencies, which shall be notified of the application by a foreign investor guarantees are state organizations involved in state registration of legal entities - Ministry of Foreign Affairs, Ministry of Internal Affairs, Ministry for Foreign Economic Relations, Investments and Trade, the State Tax Committee of Uzbekistan and the servicing banks.

Notification to the foreign investor is the basis for the application of the authorized body for the foreign investor legislation in force at the date of investment.

In the framework of investment projects worth over U.S. \$ 50 million and the share of foreign investors is not less than 50 percent of the construction of the necessary external, outside the production site, engineering and communication networks at the expense of budget funds and other domestic sources of funding Taxed profit for legal entities is reduced for the amount of:

- means addressed to expanding of major production in the form of a new construction, reconstruction of buildings and erections used for production needs and payment of credits received for these purposes with deduction of depreciations calculated in a corresponding tax period, but not more than thirty (30) percents of taxed profit;

- means addressed for modernization and technological reequipping of production, obtaining of new technologic equipment, payment of credits issued for the above purposes, compensation of the cost of a leased object with deduction of imposed depreciation in a corresponding tax period. Reduction of taxed base is carried out within five (5) years starting from a taxed period in which the above expenses were carried out and on technologic equipment from the moment of putting it into operation. In case of realization and gratis transfer of new technological equipment within three (3) years from the moment of its obtaining, this privilege is annulled with the rehabilitation of duties on payment of income tax for the whole period of application of the privilege.

SWOT analysis of investment climate in Uzbekistan

Moreover, the enterprises - domestic manufactures who export the produced goods (works, services) for the foreign currency, except raw materials, independently of the origin of production, are granted with:

-50 % reduction in the income (profit) tax – if the company exports not less than 30 % of total amount of sales of produced goods (works, services);

-30 % reduction in the income (profit) tax – if the company exports from 15 % up to 30 % of total amount of sales of produced goods (works, services);

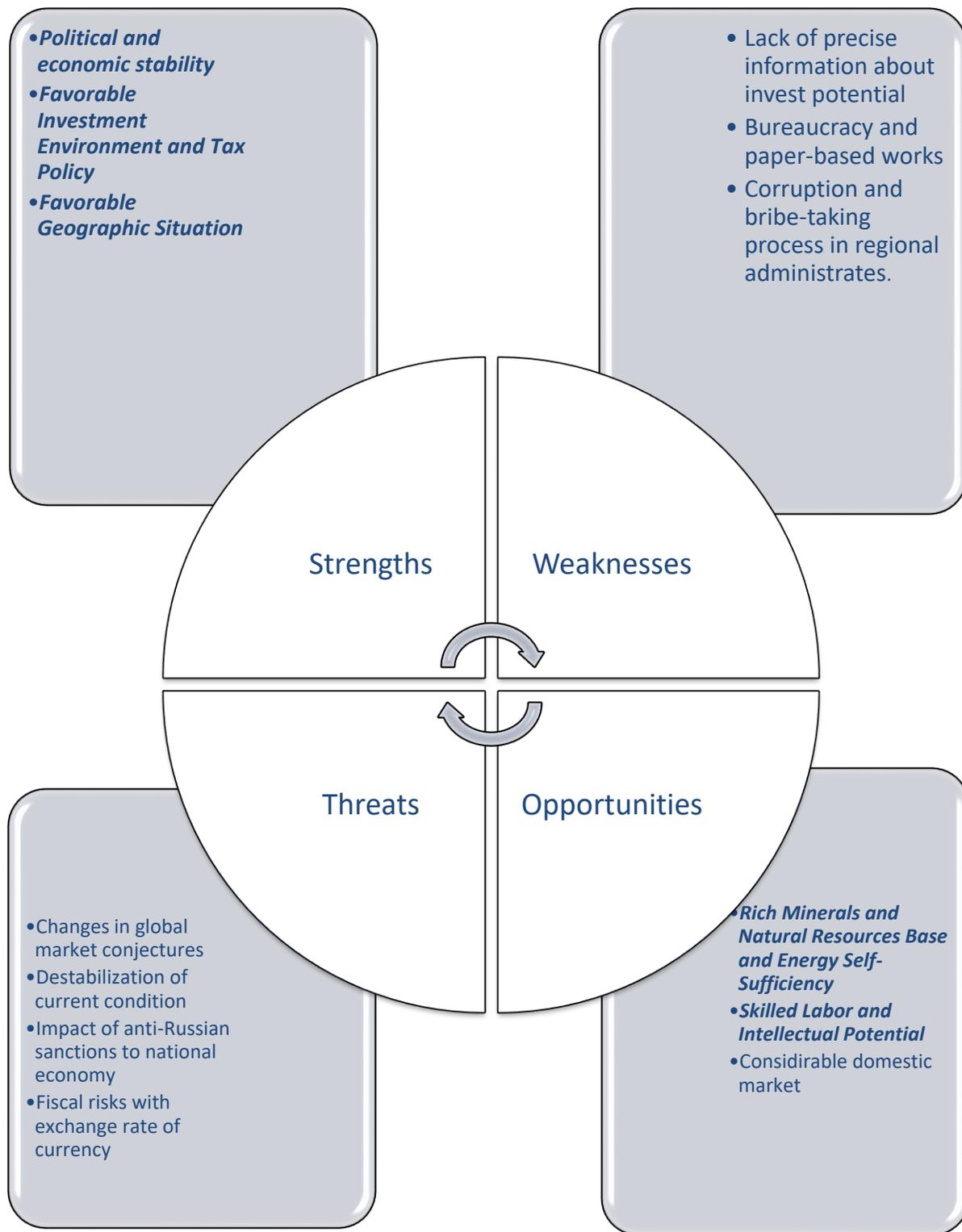


Figure 4. SWOT analysis of investment climate in Uzbekistan

As it can be glanced from SWOT analysis the first point which is considered as a key merit of country is political stability,

sureness in future and reliability of reforms in all fields of public and political life. After collapsing the Soviet Union and obtaining

independence Uzbekistan has done a great effort toward creating an attractive and safe environment for foreign investors and this thesis was included in the program called 'Uzbek Model' which was over accepted by both government and society. Due to successful implementation of this model in life, nowadays Uzbekistan has succeed and provided following opportunities:

- ✓ Macroeconomic constancy, balance of domestic and foreign sectors of economy, rise of currency reserves;
- ✓ Background for sustaining steady high rates of annual economic growth of GDP by 8% at average, prevalently, thanks to inner factors;
- ✓ -decline of cumulative tax burden as much as 3 times, even more interestingly State is offering extra packages of concessions and preferences to exporting enterprises, small enterpreneurships and entities, making direct investments and launching new production;
- ✓ establishment of sustainable banking and finance structures with severe adherence of Basel principles of banking supervision. Especially, one of the main indicators of stability of banking system - the degree of sufficiency of banking capital is estimated in region of 23%, which is almost 3 times higher than global standards;
- ✓ Advancement of novel forms of high technological industries through rigorous investment policy, technical transformation of manufacturing amenities and production substructures.
- ✓ Another important factor which fortify the invest attractiveness of Uzbekistan is scrupulous financial policy of state that guarantee Steady Budget surplus for the last few years.

For the last few decades, Uzbekistan created a range amount of juridical guarantees and preferences for foreign investors, advanced fundamental system of evaluation on reinforcement of enterprises with directly linked to foreign investments. According to latest modifications in legal system, the state guarantees and protects the jus of foreign investors, which execute investment activity within the Republic of Uzbekistan. In order to prevent any kind of misrepresenting, the legislature dictate that in the event, the consequent legislation of Uzbekistan makes investment environment less favorable, then, within 10 years from the moment of venture, foreign investors will be managed by the legislation, which was in power in the date of investment negotiation. Upon its preference, after informing the authorities, the foreign investor is permitted to apply those provisions of new regulation which make the investment climate more desirable. Furthermore, in some events, foreign investors could be provided with additional warranties and evaluation of defense of lex in the event when investor puts its sources into particular sectors and industries, which is regarded as priority and salutary for sustainable economic growth, reinforcement and augmenting, export potential of the country and also projects which related with development of small enterprises.

Representatives of small enterprises and private ownership businesses are provided with the range of priveleges and exceptional advantages on the domains of taxation and loans. According to statistics for 1996-2015, tax rates for small businesses and private enterprises decreased from 38% down to 7% or as much as 5.4 times in other words. In acquiescence with

the Taxation Measuring System of country, micro-firms and small businesses are entitled to select oversimplified system of taxation, which enables to pay amalgamated tax instead of generally recognized range of taxes and other obligatory charges. Even more dramatically, for lessening of the tax burden for small enterprises and private businesses and with target of their monetary support, for the last 5 years, the rate of amalgamated tax was plunged by 6 per cent items from 13% in 2005 to 6% in 2011. («Why Uzbekistan | "UZINFOINVEST" the Information Support & Foreign Investments Promotion Agency», б. д.)

As a part of Central Asia, Uzbekistan is one of the prominent states of the world according to its mineral and natural reserves of gold, uranium, copper, silver, zinc, tungsten, rare metals, natural gas, coal and fossil minerals. Besides, access to vast amount of supplies extremely optimizes the manufacturing costs by considerable lessening of carrying costs for commodities and raw materials, establishes proficiencies for deeply configuration and processing with manufacture of products. Since Uzbekistan revealed about 3000 deposits and potential depositions of minerals and natural sources, with overall mineral-feed potential of the state assessed more than US\$ 3.5 trillion. This fact is obviously glanced at the main role among main producers of traditional commodities, where Uzbekistan regarded as one of the leading states in the world occupying 11th position by reserves of copper, and 7th place in production of gold and uranium as well as one of the five leaders by production of cotton fiber. («Uzbekistan opportunities | Embassy Of The Republic Of Uzbekistan»)

However, the paramount advantage of Uzbekistan among other developing and developed countries in terms of invest attractiveness, particularly in heavy industry, is energy self-sufficiency of the economy, which is very rare occasion, which includes the country in the small group of countries of the globe that also classified as Uzbekistan. Equally importantly, the Republic is currently listed among TOP 10 countries of the world in terms of reserves of raw materials like gas, coal, uranium and exporting them. Collective reserves of energy carriers of Uzbekistan are adequate to fulfil requirements of the national economy at least for one century. Electricity produced in Uzbekistan completely covers exponential rising needs of the country and population and furthermore its actual price is 4 times lower when comparing with average cost paid by the business consumers in developed and some developing countries.

Another main advantage of is certainly qualified and skilled work forces available in country. As maximum part of population are well educated according to over accepted contemporary standards of education in order to challenge with present day tasks. Unique and exceptional by its meaning concept provided by National Program guarantee the persistent and up-to-date general education and professional training.

In contrary, SWOT analysis also reveals some challenges and shortcoming of status quo of investment perspective of Uzbekistan created mainly by both internal and external factors. One of the main drawbacks which barriers development of investment is deficiency of precise data and clear evidences of investment potential. Nonattendance of Uzbek business establishment in various international fairs and shows and hence absence of clear imagination of prospective of national economy among foreign investors. Another main contributing factor is bureaucracy in some administrative bodies, when obtaining some

permissions or other licit acts in order to start up entrepreneurship takes much more time than it presented in legislature due to deliberate attempt to prolong this process by some responsible bodies which linked with another equal important cause – corruption and bribe-taking procedure in many branches of administration. Despite the endeavors of government which make clear and simplified procedure of registration new entities of both with participation of foreign investment and without it as well as establishing strict the anti-corruption norms, country is still listed among countries where rate of corruption is higher than average index. («Blurring the line between licit and illicit: transnational corruption networks in Central Asia and beyond - 02634937.2015.1010799»)

Main fears, which is labelled as actual, are connected mainly with external threats rather than internal conditions. The most serious issue which has direct impact on national economy is volatility of international market situation, particularly case of sanctions executed against the main trade partner of country – Russian Federation. Anti-Russian sanctions serves to lessening the turnover between two strategic partners and as a result reducing amount of financial sources to income of Uzbekistan. In addition, problems with non-evident exchange rate and existing of shadow systems on fiscal policy also cause to potential risk to current stable condition in country.

Proposals for further improving of invest appealing of country

Detailed scrutiny of main tendencies in economy as whole and investment sphere in particular as well as government policies and labor potential the researchers of different world renowned organizations and responsible bodies of country make following suggestions which might directly serves as a way of further development of investment prospects of country:

1. In spite of deterioration of global market conjectures, the country's economic performance was excitingly high due to strong monetary and outward position as well as stable banking system and negligible rate of public debt. However, the quantity of import goods was pushed by external capital and present account surplus rose slightly and global reserves continued to be high.
2. The associated fiscal and monetary position was better than accounted, aiding from complex tax collection and spending in line with the state budget in the first part of 2014. Despite a fall in gold and copper prices, the governmental Fund for Reconstruction and Development's income surpassed spending by 4.3 percent of January-July indexes of GDP.
3. After reaching a peak point at 12.8 percent in May 2013 in regard of annual inflation and the index of inflation decreased significantly (11.3 percent in August of the same year). However, inflation in country remains high and responsible bodies like Central Bank of Uzbekistan and Ministry of Finance should optimize the process of currency exchange and make it more open.
4. As depreciation of national currency is high, monetary policy should be more accommodative. Supported by directed loaning and strong national activity, the growth of credit to the economy remained at 30 percent through the years. Making flexible rate connected which connected with current exchange index rather than

nominal index is considered as one of the possible solutions.

5. Even banking system remained steady, well capitalized, and highly liquid and integration with global financial organizations is the main tendency of state monetary policy and engagement with IMF and World Bank's technical assistance, focused on solidification of provident regulations, on- and off-site supervision is in process, researchers propose to make the system more clear and glanced. By providing and strengthening relation with public and evident statistics of bank, the financial institutions can improve their revenue.
6. The short-term economic outlook is favorable and the principal risks remain controllable. It is obviously seen in the large scale modernization and diversification investment program. After predictable high performance of national in 2014 of 8 percent the government is projecting high GDP growth in region of 7,5 percent in the following year, based on their own evaluation of the possible limited effect of external situation on the national economy and made an action plan and measures on the worst-case scenario. Nevertheless, the government should also take into account the possible sanction on the priority trade partner of country – Russia, as it seems the barrier between Russia and West is going up and this tendency creates undesirable risk for economic performance of country.
7. Going forward by strong policy of lessening the rate of inflation remains a key point of macroeconomic policy. Reducing the rate inflation cardinally and hold it in sustainable region of two digits involves synchronized endeavors in the comportment of monetary, fiscal, and foreign exchange policy of country. The regulator bodies should constrict monetary policy, prevent fiscal loosening, and upsurge the exchange rate flexibility.
8. The authorial bodies should take benefit of their status quo strong position by accelerating structural reforms, which help to proliferate productivity, promote the modernization and diversification and augment competitiveness among entrepreneurial subjects in order to fortify sustainable and continuous growth.
9. Success in improving the business environment and governance hinges on the authorities' determined implementation of these measures in practice as planned.
10. Progress with reinforcement monetary and fiscal statistics, which is successfully implementing currently, is concerned as a well-planned action. However, in order to make a further oversimplification and glance their annual statistics it is suggested to enhance their participating in General Data Dissemination System by opening a country page in International Financial Statistics and distributing up-to-date monetary data in the Government Financial Statistics Yearbook. This activity could be implemented more intensively with the help of international financial institutions such as International Monetary Fund and World Bank

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Efficacy And Characterization Of Synthesized Zinc Oxide Nanoparticles Against *Tribolium Castaneum* And *Trogoderma Granarium*

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Abstract: Nano sciences and nanotechnology are the study of extremely small things at nm scale. The present studies were carried at Chemistry Laboratory, Punjab Bioenergy Institute, University of Agriculture Faisalabad. Different and mixed age *Tribolium castaneum* and *Trogoderma granarium* was collected from grain market which is located to be Faisalabad. The population for each of the two insect were acclimatized to the laboratory. To raise homogenous population, pupa of the same age were collected during in rearing of insect and in separate plastic jars for adult emergence (2 weeks). After extraction of plant materials, biosynthesis of nanoparticles was done accordingly to standard procedure. Toxicity Bioassays were done by three concentrations (5, 10 and 15 %) of the plant extracts (for each of the simple plant oils as well as nano-particles). Data according to mortality was recorded after 24, 48 and 72 hours of the treatment. Highest mortality (15.10%) and lowest (46.12%) was noticed against *Tribolium castaneum*. In case of nanoparticles data, 66.32% mortality was recorded by ZnO oxide particles against the *Tribolium castaneum* and 49.51% against *Trogoderma granarium*. Repellency bioassay was done by area preference method. ZnO gave highest repellency 79.17. 77.56% ZnO highest repellency was, against the *Trogoderma granarium*. Data of all the bioassays were analyzed by factorial under CRD statistical design.

Key words: nanotechnology, Bioenergy, mortality, *Tribolium castaneum*, ZnO oxide particles, *Trogoderma granarium*

INTRODUCTION

Nano sciences is an emerging and vastly developed form that can encompasses the fundamental's elements which can understand and advanced arising form of exploitation of materials, which have one dimension. It has an ability to control individual atoms and molecules. It is the one of the most effective technology in recent decades [1]. It has an application to control the matter at molecular stage. It also have an ability to design, characterized structural application and also control the shape and size of the molecule at nano scale. Nano particle (Nano powder, Nano cluster, Nano crystal) are the small building block of Nano technology[2]. Recently nanoparticles have become commercial in nature because of their new application such as environmental protection, data storage, biology, cosmetics products, medicines due to their optical, physical and magnetic properties [3]. Nano particles can be characterized into following parts such as Quantum dots, organic nanoparticles or metal oxides (Al₂O₃, In₂O₃, NiO, TiO₂, ZnO, ZrO₂, SnO₂, CuO, MgO, Cu₂O, La₂O₃, CeO₂), carbon nanotubes and fullerenes are also part of this and inorganic or metals (Al, Co, Ni, Fe, Au, Mo, Zn, Ag, Ti, Bi, W) [4]. Store grains and their products are attacked different insects which can cause huge losses. [5]. Storage of cereals is about to 9 % losses occurred in developed countries and 20% in more developing countries [6] its effects on the qualitative

and quantitative losses of grains [7]. Postharvest losses range from 10 to 25% throughout the world due to infestation of insect pests and microbial deterioration [8]. Wheat is the staple food of Pakistan, also cultivated all over the world except the Antarctica [9]. Globally, Pakistan is the 3rd largest food crop and eighth in world-wide wheat producing country [10]. All stored grain insect pests most disreputable is red flour beetle *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae), is a pervasive pest of store commodities like wheat flour and a crushed cereals, is also the cosmopolitan and most destructive insect pest [11]. The quality of grains reduced due to frass and excreta in damage grains, it can create an adverse effect on environment but infested grain an acute effect on human health [12]. *T. granarium* makes unable to germinate the grain because when it attacks there larvae during feeding consume specific nutrients [13].

The *T. castaneum* and *R. dominica* are primarily controlled by fumigant insecticides [14] but use of fumigants has become limited due to development of resistance and environmental hazards because of their reckless and injudicious use against these insect pests [15]. Other chemicals like pyrethroids are being also used for the control of stored grains insect-pests, but consistent use of these insecticides may lead to serious problems related to biochemical and hematological changes in the human beings [16]. Conventional insecticides also pose hazardous effect on non-target organisms including beneficial insects [17]. Due to less efficiency of traditional method can't control the insect pests to damage the store grained crop therefore now we can use the advance technology such as nano materials. Nano materials can deliver the DNA and the many reactive chemicals into plant tissues for the protection of host plants against insect pest. But now we can use the advance technology such as silver, zinc and titanium oxide nanoparticle. It can be prepared through following method such as Physical Method, Chemical Method and Biological Method.

METHODOLOGY

The present works will be carried out at energy physics Laboratory, Punjab Bioenergy institute, University of Agriculture Faisalabad.

Collect and rearing the test culture insect

Different and diverse age *T. castaneum* and *T. granarium* will be collected through grain market which is situated in Faisalabad. The population for all of the two insect assimilate to the laboratory and 1.5 kg capacity having commodity in plastic jars (firstly decontaminate the store grains for *T. granarium* and store grain flour for *T. castaneum*, it can decontaminate for 30 minutes in 70 °C through the oven (Lab Line Instrument Inc. Model No.3512-1) and it shielded through muslin cloths. Both insects' after three days from commodity adults will be sieved out. Target insects can have eggs which can be sieved commodities, will be placed in jars and it can place in an optimal condition (65±5% R.H. and 30±2 °C) and it can be homogeneous and also getting the F₁ population (Hbib-ur-Rehman, 2018). Bottles will be removed after 3 days then shift the bottles into new jars, the floor left behind will contain the eggs, hatching time period is near about 3 to 5 days [18].

To raise homogenous population pupa of the same age will be collected during rearing of insect and in separate plastic jars for adult emergence (2 weeks) [18]. Firstly we can collect the leaves of *R. communis*, *Jatropha curcus* and *Citrus paradise* from different localities in Faisalabad, The identified samples were bought to the Department of Chemistry, Punjab Bioenergy Institute for further work. The sample leaves was thoroughly washed with tap water followed by distilled water to remove the impurities [19].

The wet plant leaves were kept on shade for 25 days and put in air dry. Dried leaves will be converted into powder form through the electrical grinder (Pascal engineering Co. Ltd., Gatwick road crawley Sussex, England) and it will be sieved through a mesh (40mm) then we acquire a fine powder form [20]. After shading, drying and grinding, 50g of *Ricinus communis* leaves powder material extract were put in the Soxhlet apparatus by dipping or mixing 100ml of the methanol, chloroform, petroleum ether and n-hexane for 24 hours at 220 revolution per minute [21]. For the storage of plant powder we were used the opaque screw capped air tight containers, which would make them moisture free. After this containers were kept at room temperature for further use. The samples were also being stored in refrigerator at 4°C. We can form different concentration such as 8%, 10.0% and 12% from the stock solution of each plant [22]. We were use the filter paper dip method. As an exposure chamber we can use the petri dish. In each petri dish, can placed the 5cm in diameter paper. Ethanol mixed extract *R. communis*, *Jatropha curcus* and *Citrus paradise* were used. Through the use of syringe required concentration of botanical extracts sprayed on the filter paper which is placed on the petri dish. We can give 20 pupa of *T. granarium* and *T. castaneum* was put in each petri dish on the filter paper sprayed with different concentration of extracts. For the prevention of run out of pupas on the dish, we can cover the petri dish with lid [23].

BIOSYNTHESIS OF NANOPARTICLE

Silver nitrate, titanium oxide, Magnesium oxide and Zinc oxide used in this study, will be obtained from Punjab Bioenergy Institute Laboratory, Agriculture University, Faisalabad.

Preparation of silver Nano-particles

Firstly we can prepare the silver Nano particle like this way, Take the leaves powder from *R.communis*, *Jatropha curcus*, *Citrus paradise* purchased from the local market. Deionized water used in all experiments, I took 10g of *R. communis*, *Jatropha curcus* and *Citrus paradise* extracts by using weight balance, which can be boiled in 100ml distill water in 250ml conical flask. Then this extract were cooled at room temperature, filter through Whatmans No. 1 filter paper. This filtrate was an act of reducing and stabilizing agent for the synthesis of Silver nanoparticles [23]Ammonium solution will be added to AgNO3 (solution followed by addition of plant material extract 1-10ml) as described in [24]

Preparation of Zinc oxide Nano-particles

Firstly we can prepare the silver Nano particle like this way, Take the leaves powder from *R.communis*, *Jatropha curcus*, *Citrus paradise* purchased from the local market. Deionized water used in all experiments, I took 10g of *R. communis*, *Jatropha curcus* and *Citrus paradise* extracts by using weight balance, which can be boiled in 100ml distill water in 250ml conical flask. Then this extract were cooled at room temperature, filter through Whatmans No. 1 filter paper. This filtrate was an act of reducing and stabilizing agent for the synthesis of zinc oxide nanoparticles. Ammonium solution will be added to ZnO (solution followed by addition of plant material extract 1-10ml) as described in [25].

Bioassay of Zinc Oxide

Zinc oxide was synthesized by using green synthesis method. 5 ml solution of plant extracts oil from the stock solution mixed in 50 ml of distilled water, heated at 80°C for 30 minutes at hot plate. We can add the 10 ml plant extract (oil +Distill water) in 1.5 M solution of zinc nitrate hex hydrate. The salt solution of different concentration (0.5- 2.5M) was used. The pH maintained 7-9 by adding the ammonia solution. The solution mixture was boiled at 60-80°C or 400rpm stirring till the color would be changed to yellow paste form. Then this paste were transferred into a crucible, which was kept on furnace at 400°C for 2 hours until the color of the precipitates changed into light yellow to white color. Then this precipitates were grinded and stored for further analysis [26].



Zinc-Oxide Dried nano-composits)

Change in color of solution during formation of zinc oxide nanoparticles by using *Jatropha curcus*, *Citrus paradise* and *R. communis* plant extracts.

| Solution | Before Reduction | After Reduction | Color intensity | Time |
|-------------------------------|------------------|-----------------|-----------------|---------------|
| <i>Jatropha curcus</i> | Dark Yellow | | | |
| 1.5M zinc nitrate hex hydrate | Transparent | Pale Yellow | + | Immediately |
| | | Yellowish white | ++ | After 7 hours |

| | | | | |
|-------------------------------|-------------|-----------------|-----|----------------|
| | | White | +++ | After 24 hours |
| <i>Citrus paradise</i> | Lite Yellow | | | |
| 1.5M zinc nitrate hex hydrate | Transparent | Dark Yellow | + | Immediately |
| | | Pale Yellow | ++ | After 7 hours |
| | | Lite Gray white | +++ | After 24 hours |
| <i>R. communis</i> | | | | |
| 1.5M zinc nitrate hex hydrate | Transparent | Orange yellow | + | Immediately |
| | | Pale Yellow | ++ | After 7 hours |
| | | Lite white | +++ | After 24 hours |

RESULTS

Current details and studies were planned to give the explanations about the toxicity, growth inhibitory activities and repellent of *Jatropha curcus* ,*Citrus paradise* and *R. communis* against *T.castaneum* and *T.granarium* under there laboratory conditions. We can conduct the experiments under specialized designs Completely Randomized Design (CRD) with all different treatments were replicated in thrice along with the control factor. Plants extracts were used at three different types of concentrations i.e., 5, 10 and 15 %, data will be regarding mortality were observed after 24, 48 and 72 hours of treatment application. At same application type/rate of plants extracts we were conducted the repellency experiments and growth inhibition individually. The data were collected regarding larval inhibition, pupa; inhibition and adult inhibition after regular intervals, while the repellency data was recorded after 24 hrs.

MORTALITY DATA AFTER EXPOSURE OF 24 HRS

Table 1 reveals the analysis of variance (ANOVA) of data regarding mean percentage mortality of *T. castaneum* at different concentrations of *Jatropha curcus* ,*Citrus paradise* and *R. communis*. Data showed that main effects, plants (F=4.66; df=1: p<0.05) and concentration (F=11.10 df=;2 p<0.05) were significant regarding mortality values of *T. castaneum* after exposure period of 24 hours.

Table 1. Analysis of variance (ANOVA) of the data concerning % mortality of *Tribolium castaneum* (Herbst) for different plant extracts

| S.O.V | DF | SS | MSS | F value |
|----------------------------|----|----------|---------|---------|
| Plant | 3 | 293.667 | 97.222 | 4.76* |
| Concentration | 2 | 463.500 | 233.250 | 11.12** |
| Plant*Concentration | 6 | 70.843 | 11.87 | 1.576* |
| Error | 24 | 500.000 | 20.843 | |
| Total | 35 | 1326.000 | | |

NS = Non-significant (P>0.05);* = Significant (P<0.05); ** = Highly significant (P<0.01)

Table 2. Comparison of the mean percentage mortality of *Tribolium castaneum* after exposure to different concentrations of plant extracts after 24 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| 5 | 4.68 ± 1.43 c |
| 10 | 9.37 ± 1.29 b |
| 15 | 13.40 ± 1.66 a |

The mean mortality was 4.68 % at 5% concentration and 13.40% mortality was observed at 15% concentration of the plant extracts. From results we can conclude that concentration has significant effect on percent mean percent mortality of *T. castaneum*.

4.3 Comparison of the mean percentage mortality of *Tribolium castaneum* after exposure to different plant extracts after 24 hrs Table 4.3 for percent mean mortality values of different plant extracts at different concentration levels showed that extracts of *R. communis* and *Jatropha curcus* gave mortality values 12.23 and 11.65%, correspondly . While least mortality 5.57% was given by extract of *Citrus paradise*.

4. Comparative mean percentage mortality of *Tribolium castaneum* after exposure to different concentrations of plant extracts after 24 hrs.

| Plant extracts x Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------------------|-------------------------|
| <i>Citrus paradise</i> x 5 | 1.77±0.09 d |
| <i>Citrus paradise</i> x 10 | 8.04±1.75c |
| <i>Citrus paradise</i> x 15 | 11.26±2.64 bc |
| <i>Jatropha curcus</i> x 5 | 5.02±1.91 cd |
| <i>Jatropha curcus</i> x 10 | 13.76±3.03 bc |
| <i>Jatropha curcus</i> x 15 | 18.44±3.12 a |
| <i>Ricinus communis</i> x 5 | 10.22±1.96 bc |
| <i>Ricinus communis</i> x 10 | 14.73±3.39 ab |
| <i>Ricinus communis</i> x 15 | 15.10±3.57 ab |

Table 4 showed that maximum mortality 18.34% was observed with 15% concentration of *Jatropha curcus* after exposure of 24 hr followed 15.00 with extract of *Ricinus communis* and *Citrus paradise* are 11.16% at same concentrations. Mean percentage mortality of 10.12% was recorded at 5% concentration of *Ricinus communis*, followed by *Jatropha curcus* 5.01%. Minimum mean mortality 1.67% was given by *Citrus paradise* at 5% concentration, respectively. The mean mortality was found 14.63, 13.67% in case of *Ricinus communis* and *Jatropha curcus* at 10% concentration of plant extract. From results we concluded that there was a gradually increase in mortality values with increase in concentration of plant extracts.

MORTALITY DATA AFTER EXPOSURE OF 48 HRS

Table 45 reveals the analysis of variance (ANOVA) of data regarding mean percentage mortality of *T. castaneum* at different concentrations of *Jatropha curcus*, *Ricinus communis* and *Citrus paradise*. Data showed that main effects, plants (F=12.2602; df=1: p<0.05) and concentration (F=11.4878 df=;2 p<0.05) were significant regarding mortality values of *T. castaneum* after exposure period of 48 hours

Table 5 Analysis of variance (ANOVA) of the data concerning % mortality of *Tribolium castaneum* (Herbst) for different plant extracts

| S.O.V | DF | SS | MSS | F value |
|---------------------|----|---------|--------|-----------|
| Plant | 3 | 1047.22 | 349.07 | 12.2602** |
| Concentration | 2 | 654.17 | 327.08 | 11.4878** |
| Plant*Concentration | 6 | 90.28 | 15.05 | 1.5285* |
| Error | 24 | 683.33 | | |
| Total | 35 | 204.86 | | |

NS = Non-significant (P>0.05);* = Significant (P<0.05); ** = Highly significant (P<0.01)

Table 6 Comparison of the mean percentage mortality of *Tribolium castaneum* after exposure to different concentrations of plant extracts after 24 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| 5 | 13.75 ± 1.95 c |
| 10 | 19.58 ± 1.89 b |
| 15 | 24.16 ± 2.56 a |

Data table 6 showed that mortality 13.75% mean percentage mortality was observed at 5% concentration and 24.16% mortality was observed at 15% concentration of the plant extracts. From results we can conclude that concentration has significant effect on percent mean percent mortality of *T. castaneum*.

7 Comparison of the mean percentage mortality of *Tribolium castaneum* after exposure to different plant extracts after 48 hrs.

| Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------|-------------------------|
| <i>Jatropha curcus</i> | 23.32 ± 2.63 a |
| <i>Ricinus communis</i> | 25.54 ± 2.42 a |
| <i>Citrus paradise</i> | 15.01 ± 1.86 b |

Table 7 showed percent mean mortality values of different plant extracts at different concentration levels. Extracts of *Ricinus communis* and *Jatropha curcus* gave mortality values 25.54 and 23.32 %, correspondly. While least mortality 15.01% was given by extract of *Citrus paradise*.

8 Comparative mean percentage mortality of *Tribolium castaneum* after exposure to different concentrations of plant extracts after 48 hrs

| Plant extracts x Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------------------|-------------------------|
| | |

| Plant extracts x Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------------------|-------------------------|
| <i>Citrus paradise</i> x 5 | 10.02±2.88 |
| <i>Citrus paradise</i> x 10 | 11.16±1.66 |
| <i>Citrus paradise</i> x 15 | 16.65±2.64 |
| <i>Jatropha curcus</i> x 5 | 14.01±2.88 |
| <i>Jatropha curcus</i> x 10 | 25.06±2.92 |
| <i>Jatropha curcus</i> x 15 | 29.34±2.89 |
| <i>Ricinus communis</i> x 5 | 21.66±1.66 bc |
| <i>Ricinus communis</i> x 10 | 24.32±3.38 ab |
| <i>Ricinus communis</i> x 15 | 31.67±3.40ab |

Table 8 revealed that maximum mortality 31.67% was observed with 15% concentration of *Ricinus communis* after exposure of 48 hr followed 29.34 % with extract of *Jatropha curcus*, *Citrus paradise* gave 16.65 at 15% concentrations. Mean percentage mortality of 21.66 % was recorded at 5% concentration of *Ricinus communis* followed by *Jatropha curcus* 14.01%. Minimum mean mortality 10.02 % was given by *Citrus paradise* at 5% concentration, respectively. The mean mortality was found 25.06 and 24.32 % in case of *Jatropha curcus* and *Ricinus communis*, respectively at 10% concentration of plant extract. From results we concluded that there was a gradually increase in mortality values with increase in concentration of plant extracts.

MORTALITY DATA AFTER EXPOSURE OF 72 HRS

Table 4.9 reveals the analysis of variance (ANOVA) of data regarding mean percentage mortality of *T. castaneum* at different concentrations of *Jatropha curcus* , *Ricinus communis* and *Citrus paradise*. Data showed that main effects, plants (F=4.66; df=1: p<0.05) and concentration (F=11.10 df=;2 p<0.05) were significant regarding mortality values of *T. castaneum* after exposure period of 72 hours.

Table 9. Analysis of variance (ANOVA) of the data concerning % mortality of *Tribolium castaneum* (Herbst) for different plant extracts

| S.O.V | DF | SS | MSS | F value |
|----------------------------|----|---------|---------|-----------|
| Plant | 3 | 2054.07 | 684.69 | 7.9962* |
| Concentration | 2 | 3257.89 | 1628.94 | 19.0000** |
| Plant*Concentration | 6 | 545.58 | 90.93 | 2.0706* |
| Error | 24 | 2057.61 | | |
| Total | 35 | 7915.15 | | |

NS = Non-significant (P>0.05);* = Significant (P<0.05); ** = Highly significant (P<0.01)

WITH ZnO NANO-PARTICALS against *Tribolium castaneum*

MORTALITY DATA AFTER EXPOSURE OF 24 HRS

To evaluate the mortality of *T. castaneum*, homogenous adults were released on treated diet in small plastic jars. Adults were allowed to feed on treated diet and data regarding mortality was recorded. Wheat grains were used as diet and three concentrations of each plant extract were used viz., 5, 10 and 15%. Mortality data was recorded for 24, 48 and 72 h of exposure period. For mortality assessment insects were kept in incubators at 30±2 °C and 60±5 % RH. Each treatment and control were replicated three times.

Table 4.1 reveals the analysis of variance (ANOVA) of data regarding mean percentage mortality of *T. castaneum* at different concentrations of *Jatropha curcus*, *Citrus paradise* and *R. communis*. Data showed that main effects, plants (F=4.66; df=1: p<0.05) and concentration (F=11.10 df=;2 p<0.05) were significant regarding mortality values of *T. castaneum* after exposure period of 24 hours.

13. Analysis of variance (ANOVA) of the data concerning % mortality of *Tribolium castaneum* (Herbst) for ZnO based nano-particals

| S.O.V | DF | SS | MSS | F value |
|----------------------|----|----------|----------|-----------|
| Plant | 2 | 2137.520 | 1068.760 | 54.1791** |
| Concentration(Conc.) | 2 | 1438.431 | 719.215 | 36.4594** |
| Plant*Concentration | 4 | 400.542 | 100.136 | 5.0762* |
| Error | 18 | 355.076 | 19.726 | |
| Total | 26 | 4331.569 | | |

Table 14. Comparison of the mean percentage mortality of *Tribolium castaneum* after exposure to different concentrations of plant extracts after 24 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| 5 | 9.16 ± 1.99 c |
| 10 | 18.09 ± 3.35 b |
| 15 | 27.04 ± 4.99 a |

Data in table 2. represents the insecticidal effect of different concentrations of 3 different oil against *Tribolium castaneum*. The experimental data revealed that maximum mortality (27.04 %) at 15% was recorded. The mean mortality was 18.09 % at 10% concentration and 9.16% mortality was observed at 5% concentration of the plant extracts. From this it is concluded that mortality only increased with increase in concentrations of the 3 different plant oil and also shows that concentration has significant effect on percent mean percent mortality of *T. castaneum*.

15 Comparison of the mean percentage mortality of *Tribolium castaneum* after exposure to different plant extracts after 24 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| P1 | 8.34 ± 1.67 c |

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| P2 | 16.12± 2.16 b |
| P3 | 29.85 ± 4.79 a |

Table 4.3 for percent mean mortality values of different plant extracts at different concentration levels showed that extracts of *R. communis* and *Jatropha curcus* gave mortality values 29.85 and 16.12%, correspondingly. While least mortality 8.34 % was given by extract of *Citrus paradise*.

16 Comparative mean percentage mortality of *Tribolium castaneum* after exposure to different concentrations of plant extracts after 24 hrs

| Plant extracts x Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------------------|-------------------------|
| <i>Citrus paradise</i> x 5 | 3.34±1.67 g |
| <i>Citrus paradise</i> x 10 | 8.34±1.67 efg |
| <i>Citrus paradise</i> x 15 | 13.34±1.67 def |
| <i>Jatropha curcus</i> x 5 | 8.34±1.67 fg |
| <i>Jatropha curcus</i> x 10 | 18.34±1.67 cd |
| <i>Jatropha curcus</i> x 15 | 21.67±1.67 bc |
| <i>Ricinus communis</i> x 5 | 15.82±1.68 de |
| <i>Ricinus communis</i> x 10 | 27.69±6.06 b |
| <i>Ricinus communis</i> x 15 | 46.12±1.68 a |

Table 4. showed the interaction between different concentrations (5, 10 and 15%) and different exposure time period. Mean mortality of *T. castaneum* was given in percentage by the application of extract of *Ricinus communis*, *Jatropha curcus*, *Citrus paradise* oil along with standard error in table 4.

Mean comparison of percentage mortality values of *T. castaneum* at different concentrations of selected plant extract were highest at maximum concentration. Extract of *Ricinus communis* gave the highest mean mortality revealed that maximum mortality (46.12 %) at 15% was recorded. The mean mortality was 27.60% at 10% concentration and 15.82% mortality was observed at 5% concentration of the plant extracts. Extract of *Jatropha curcus* gave the mean mortality revealed that maximum mortality (21.67%) at 15% was recorded. The mean mortality was 18.34% at 10% concentration and 8.34% mortality was observed at 5% concentration of the plant extracts. Extract of *Citrus paradise* gave the mean mortality revealed that maximum mortality (13.34%) at 15% was recorded. The mean mortality was 8.34% at 10% concentration and 3.34% mortality was observed at 5% concentration of the plant extracts. The given outcome showed that interaction of exposure time and concentration was significant. From results we concluded that there was a gradually increase in mortality values with increase in concentration of plant extracts.

5. MORTALITY DATA AFTER EXPOSURE OF 48 HRS

Table 17. Analysis of variance (ANOVA) of the data concerning % mortality of *Tribolium castaneum* (Herbst) for ZnO based nanoparticles

| S.O.V | DF | SS | MSS | F value |
|-----------------------------|----|---------|---------|-----------|
| Plant | 2 | 2093.50 | 1046.75 | 65.5597** |
| Concentration(Conc.) | 2 | 2732.05 | 1366.03 | 85.5566** |
| Plant*Concentration | 4 | 418.65 | 104.66 | 6.5552* |
| Error | 18 | 287.39 | 15.97 | |
| Total | 26 | 5531.59 | | |

Table 18. Comparison of the mean percentage mortality of *Tribolium castaneum* after exposure to different concentrations of plant extracts after 48 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| 5 | 11.95 ± 1.33 c |
| 10 | 22.54 ± 1.33 b |
| 15 | 36.51 ± 1.33 a |

Data in table 18. represents the insecticidal effect of different concentrations of 3 different oil against *Tribolium castaneum*. The experimental data revealed that maximum mortality (36.51 %) at 15% was recorded. The mean mortality was 22.54 % at 10% concentration and 11.95 % mortality was observed at 5% concentration of the plant extracts. From this it is concluded that mortality only increased with increase in concentrations of the 3 different plant oil and also shows that concentration has significant effect on percent mean percent mortality of *T. castaneum*.

19 Comparison of the mean percentage mortality of *Tribolium castaneum* after exposure to different plant extracts after 48 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| P1 | 12.77 ± 2.51 c |
| P2 | 23.89± 3.31 b |
| P3 | 34.34 ± 5.51 a |

Table 4.19. for percent mean mortality values of different plant extracts at different concentration levels showed that extracts of *R. communis* and *Jatropha curcus* gave mortality values 34.34 and 23.89%, correspondly . While least mortality 12.77 % was given by extract of *Citrus paradise*.

20 Comparative mean percentage mortality of *Tribolium castaneum* after exposure to different concentrations of plant extracts after 48 hrs

| Plant extracts x Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------------------|-------------------------|
| <i>Citrus paradise</i> x 5 | 5.00±0.00 g |
| <i>Citrus paradise</i> x 10 | 11.67±1.67 efg |
| <i>Citrus paradise</i> x 15 | 21.67±1.67 def |
| <i>Jatropha curcus</i> x 5 | 11.67±1.67 fg |
| <i>Jatropha curcus</i> x 10 | 26.67±1.67 cd |
| <i>Jatropha curcus</i> x 15 | 33.33±1.67 bc |
| <i>Ricinus communis</i> x 5 | 19.19±0.00de |
| <i>Ricinus communis</i> x 10 | 29.29±2.91 b |
| <i>Ricinus communis</i> x 15 | 54.54±5.05 a |

Table 20. showed the interaction between different concentrations (5, 10 and 15%) and different exposure time period. Mean mortality of *T. castaneum* was given in percentage by the application of extract of *Ricinus communis*, *Jatropha curcus*, *Citrus paradise* oil along with standard error in table 20.

Mean comparison of percentage mortality values of *T. castaneum* at different concentrations of selected plant extract were highest at maximum concentration. Extract of *Ricinus communis* gave the highest mean mortality revealed that maximum mortality (54.54%) at 15% was recorded. The mean mortality was 29.29% at 10% concentration and 19.19% mortality was observed at 5% concentration of the plant extracts. Extract of *Jatropha curcus* gave the mean mortality revealed that maximum mortality (33.33%) at 15% was recorded. The mean mortality was 26.67% at 10% concentration and 11.67% mortality was observed at 5% concentration of the plant extracts. Extract of *Citrus paradise* gave the mean mortality revealed that maximum mortality (21.67%) at 15% was recorded. The mean mortality was 11.67% at 10% concentration and 5.00% mortality was observed at 5% concentration of the plant extracts. The given outcome showed that interaction of exposure time and concentration was significant. From results we concluded that there was a gradually increase in mortality values with increase in concentration of plant extracts.

6. MORTALITY DATA AFTER EXPOSURE OF 72 HRS

Table 21. Analysis of variance (ANOVA) of the data concerning % mortality of *Tribolium castaneum* (Herbst) for ZnO based nanoparticles

| S.O.V | DF | SS | MSS | F value |
|---------------------|----|---------|---------|-----------|
| Plant | 2 | 3675.23 | 1837.62 | 196.074** |
| Concentration | 2 | 3386.81 | 1693.40 | 180.686** |
| Plant*Concentration | 4 | 1354.42 | 338.61 | 36.129* |
| Error | 18 | 168.70 | 9.37 | |

| S.O.V | DF | SS | MSS | F value |
|-------|----|---------|-----|---------|
| Total | 26 | 8585.16 | | |

Table 22. Comparison of the mean percentage mortality of *Tribolium castaneum* after exposure to different concentrations of plant extracts after 72 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| 5 | 10.28 ± 1.99 c |
| 10 | 22.55 ± 3.14 b |
| 15 | 37.66 ± 7.63 a |

Data in table 22. represents the insecticidal effect of different concentrations of 3 different oil against *Tribolium castaneum*. The experimental data revealed that maximum mortality (37.66 %) at 15% was recorded. The mean mortality was 22.55 % at 5% concentration and 10.28 % mortality was observed at 10% concentration of the plant extracts. From this it is concluded that mortality only increased with increase in concentrations of the 3 different plant oil and also shows that concentration has significant effect on percent mean percent mortality of *T. castaneum*.

23 Comparison of the mean percentage mortality of *Tribolium castaneum* after exposure to different plant extracts after 24 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| P1 | 10.56 ± 1.54 c |
| P2 | 21.12± 3.51 b |
| P3 | 38.83 ± 7.31 a |

Table 4.23 for percent mean mortality values of different plant extracts at different concentration levels showed that extracts of *R. communis* and *Jatropha curcus* gave mortality values 38.83 and 21.12%, correspondly . While least mortality 10.56 % was given by extract of *Citrus paradise*.

24. Comparative mean percentage mortality of *Tribolium castaneum* after exposure to different concentrations of plant extracts after 24 hrs

| Plant extracts x Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------------------|-------------------------|
| <i>Citrus paradise</i> x 5 | 5.00±0.00 g |
| <i>Citrus paradise</i> x 10 | 11.67±1.67 efg |
| <i>Citrus paradise</i> x 15 | 15.00±0.00 def |

| Plant extracts x Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------------------|-------------------------|
| <i>Jatropha curcus</i> x 5 | 8.33±1.67 fg |
| <i>Jatropha curcus</i> x 10 | 23.33±1.67 cd |
| <i>Jatropha curcus</i> x 15 | 31.67±1.67 bc |
| <i>Ricinus communis</i> x 5 | 17.50±1.68 de |
| <i>Ricinus communis</i> x 10 | 32.65±1.68 b |
| <i>Ricinus communis</i> x 15 | 66.32±3.36 a |

Table 24. showed the interaction between different concentrations (5, 10 and 15%) and different exposure time period. Mean mortality of *T. castaneum* was given in percentage by the application of extract of *Ricinus communis*, *Jatropha curcus*, *Citrus paradise* oil along with standard error in table 24.

Mean comparison of percentage mortality values of *T. castaneum* at different concentrations of selected plant extract were highest at maximum concentration. Extract of *Ricinus communis* gave the highest mean mortality revealed that maximum mortality (66.32%) at 15% was recorded. The mean mortality was 32.65% at 10% concentration and 17.50% mortality was observed at 5% concentration of the plant extracts. Extract of *Jatropha curcus* gave the mean mortality revealed that maximum mortality (31.67%) at 15% was recorded. The mean mortality was 23.33% at 10% concentration and 8.33% mortality was observed at 5% concentration of the plant extracts. Extract of *Citrus paradise* gave the mean mortality revealed that maximum mortality (15.00%) at 15% was recorded. The mean mortality was 11.67% at 10% concentration and 5.00% mortality was observed at 5% concentration of the plant extracts. The given outcome showed that interaction of exposure time and concentration was significant. From results we concluded that there was a gradually increase in mortality values with increase in concentration of plant extracts.

WITH ZnO NANO-PARTICALS against *Trogoderma granarium*

MORTALITY DATA AFTER EXPOSURE OF 24 HRS

Table 25. Analysis of variance (ANOVA) of the data concerning % mortality of *Trogoderma granarium* (Herbst) for ZnO based nanoparticles

| S.O.V | DF | SS | MSS | F value |
|----------------------------|----|----------|---------|-----------|
| Plant | 2 | 994.669 | 497.334 | 58.8831** |
| Concentration | 2 | 881.393 | 440.697 | 52.1773** |
| Plant*Concentration | 4 | 166.266 | 41.566 | 4.9214* |
| Error | 18 | 152.030 | 8.446 | |
| Total | 26 | 2194.358 | | |

Table 26. Comparison of the mean percentage mortality of *Trogoderma granarium* after exposure to different concentrations of plant extracts after 24 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| 5 | 6.36 ± 1.31 c |
| 10 | 12.51 ± 2.54 b |
| 15 | 20.33 ± 3.16 a |

Data in table 26 represents the insecticidal effect of different concentrations of 3 different oil against *Trogoderma granarium*. The experimental data revealed that maximum mortality (20.33 %) at 15% was recorded. The mean mortality was 6.36 % at 5% concentration and 12.51 % mortality was observed at 10% concentration of the plant extracts. From this it is concluded that mortality only increased with increase in concentrations of the 3 different plant oil and also shows that concentration has significant effect on percent mean percent mortality of *T. granarium*.

27 Comparison of the mean percentage mortality of *Trogoderma granarium* after exposure to different plant extracts after 24 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| P1 | 7.23 ± 1.68 c |
| P2 | 10.56± 1.54 b |
| P3 | 21.43 ± 3.37 a |

Table 27 for percent mean mortality values of different plant extracts at different concentration levels showed that extracts of *R. communis* and *Jatropha curcus* gave mortality values 21.43 and 10.56%, correspondly . While least mortality 7.23 % was given by extract of *Citrus paradise*.

28. Comparative mean percentage mortality of *Trogoderma granarium* after exposure to different concentrations of plant extracts after 24 hrs

| Plant extracts x Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------------------|-------------------------|
| <i>Citrus paradise</i> x 5 | 3.34±1.67 g |
| <i>Citrus paradise</i> x 10 | 5.00±0.00 efg |
| <i>Citrus paradise</i> x 15 | 13.34±1.67 def |
| <i>Jatropha curcus</i> x 5 | 5.00 ±0.00 fg |
| <i>Jatropha curcus</i> x 10 | 11.67±1.67 cd |
| <i>Jatropha curcus</i> x 15 | 15.00±0.00 bc |
| <i>Ricinus communis</i> x 5 | 10.77±1.68 de |

| Plant extracts x Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------------------|-------------------------|
| <i>Ricinus communis</i> x 10 | 20.87±3.36 b |
| <i>Ricinus communis</i> x 15 | 32.65±1.68 a |

Table 28. showed the interaction between different concentrations (5, 10 and 15%) and different exposure time period. Mean mortality of *T. granarium* was given in percentage by the application of extract of *Ricinus communis*, *Jatropha curcus*, *Citrus paradise* oil along with standard error in table 28.

Mean comparison of percentage mortality values of *T. granarium* at different concentrations of selected plant extract were highest at maximum concentration. Extract of *Ricinus communis* gave the highest mean mortality revealed that maximum mortality (32.65%) at 15% was recorded. The mean mortality was 20.87% at 10% concentration and 10.77% mortality was observed at 5% concentration of the plant extracts. Extract of *Jatropha curcus* gave the mean mortality revealed that maximum mortality (15.00%) at 15% was recorded. The mean mortality was 11.67% at 10% concentration and 5.00% mortality was observed at 5% concentration of the plant extracts. Extract of *Citrus paradise* gave the mean mortality revealed that maximum mortality (13.34%) at 15% was recorded. The mean mortality was 5.00% at 10% concentration and 3.34% mortality was observed at 5% concentration of the plant extracts. The given outcome showed that interaction of exposure time and concentration was significant. From results we concluded that there was a gradually increase in mortality values with increase in concentration of plant extracts.

MORTALITY DATA AFTER EXPOSURE OF 48 HRS

Table 29. Analysis of variance (ANOVA) of the data concerning % mortality of *Trogoderma granarium* (Herbst) for ZnO based nanoparticles

| S.O.V | DF | SS | MSS | F value |
|----------------------------|----|----------|---------|------------|
| Plant | 2 | 1535.136 | 767.568 | 117.4032** |
| Concentration | 2 | 1183.249 | 591.625 | 90.4918** |
| Plant*Concentration | 4 | 494.613 | 123.653 | 18.9133** |
| Error | 18 | 117.682 | 6.538 | |
| Total | 26 | 3330.680 | | |

Table 30. Comparison of the mean percentage mortality of *Trogoderma granarium* after exposure to different concentrations of plant extracts after 48 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| 5 | 6.36 ± 1.31 c |
| 10 | 14.18 ± 2.30 b |

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| 15 | 22.58 ± 4.77 a |

Data in table 4.30. represents the insecticidal effect of different concentrations of 3 different oil against *Trogoderma granarium*. The experimental data revealed that maximum mortality (22.58 %) at 15% was recorded. The mean mortality was 6.36 % at 5% concentration and 14.18 % mortality was observed at 10% concentration of the plant extracts. From this it is concluded that mortality only increased with increase in concentrations of the 3 different plant oil and also shows that concentration has significant effect on percent mean percent mortality of *T. granarium*.

31. Comparison of the mean percentage mortality of *Trogoderma granarium* after exposure to different plant extracts after 48 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| P1 | 7.23 ± 1.21 c |
| P2 | 11.12± 1.82 b |
| P3 | 24.80 ± 4.48 a |

Table 4.31 for percent mean mortality values of different plant extracts at different concentration levels showed that extracts of *R. communis* and *Jatropha curcus* gave mortality values 24.80 and 11.12%, correspondly . While least mortality 7.23 % was given by extract of *Citrus paradise*.

32. Comparative mean percentage mortality of *Trogoderma granarium* after exposure to different concentrations of plant extracts after 24 hrs

| Plant extracts x Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------------------|-------------------------|
| <i>Citrus paradise</i> x 5 | 3.34±1.67 g |
| <i>Citrus paradise</i> x 10 | 8.34±1.67 efg |
| <i>Citrus paradise</i> x 15 | 10.00±0.00 def |
| <i>Jatropha curcus</i> x 5 | 5.00 ±0.00 fg |
| <i>Jatropha curcus</i> x 10 | 11.67±1.67 cd |
| <i>Jatropha curcus</i> x 15 | 16.67±1.67 bc |
| <i>Ricinus communis</i> x 5 | 10.77±1.68 de |
| <i>Ricinus communis</i> x 10 | 22.55±1.68 b |
| <i>Ricinus communis</i> x 15 | 41.07±1.68 a |

Table 32. showed the interaction between different concentrations (5, 10 and 15%) and different exposure time period. Mean mortality of *T. granarium* was given in percentage by the application of extract of *Ricinus communis*, *Jatropha curcus*, *Citrus paradise* oil along with standard error in table 32.

Mean comparison of percentage mortality values of *T. granarium* at different concentrations of selected plant extract were highest at maximum concentration. Extract of *Ricinus communis* gave the highest mean mortality revealed that maximum mortality (41.07%) at 15% was recorded. The mean mortality was 22.55% at 10% concentration and 10.77% mortality was observed at 5% concentration of the plant extracts. Extract of *Jatropha curcus* gave the mean mortality revealed that maximum mortality (16.67%) at 15% was recorded. The mean mortality was 11.67% at 10% concentration and 5.00% mortality was observed at 5% concentration of the plant extracts. Extract of *Citrus paradise* gave the mean mortality revealed that maximum mortality (10.00%) at 15% was recorded. The mean mortality was 8.34% at 10% concentration and 3.34% mortality was observed at 5% concentration of the plant extracts. The given outcome showed that interaction of exposure time and concentration was significant. From results we concluded that there was a gradually increase in mortality values with increase in concentration of plant extracts.

MORTALITY DATA AFTER EXPOSURE OF 72 HRS

Table 33. Analysis of variance (ANOVA) of the data concerning % mortality of *Trogoderma granarium* (Herbst) for ZnO based nanoparticles

| S.O.V | DF | SS | MSS | F value |
|---------------------|----|----------|---------|-----------|
| Plant | 2 | 1774.278 | 887.139 | 95.0392** |
| Concentration | 2 | 1746.274 | 873.137 | 93.5391** |
| Plant*Concentration | 4 | 774.255 | 193.564 | 20.7365** |
| Error | 18 | 168.020 | 9.334 | |
| Total | 26 | | | |

Table 34. Comparison of the mean percentage mortality of *Trogoderma granarium* after exposure to different concentrations of plant extracts after 72 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| 5 | 8.59 ± 1.27 c |
| 10 | 18.01 ± 2.67 b |
| 15 | 28.16 ± 3.23 a |

Data in table 34. represents the insecticidal effect of different concentrations of 3 different oil against *Trogoderma granarium*. The experimental data revealed that maximum mortality (28.16 %) at 15% was recorded. The mean mortality was 8.59 % at 5% concentration and 18.01% mortality was observed at 10% concentration of the plant extracts. From this it is concluded that mortality only increased with increase in concentrations of the 3 different plant oil and also shows that concentration has significant effect on percent mean percent mortality of *T. granarium*.

35 Comparison of the mean percentage mortality of *Trogoderma granarium* after exposure to different plant extracts after 72 hrs

| Concentrations (%) | Mean percentage mortality ± SE |
|--------------------|--------------------------------|
| P1 | 9.45 ± 1.54 c |
| P2 | 15.06± 2.04 b |
| P3 | 27.73 ± 3.58 a |

Table 4.35 for percent mean mortality values of different plant extracts at different concentration levels showed that extracts of *R. communis* and *Jatropha curcus* gave mortality values 27.73 and 15.06%, correspondly . While least mortality 9.45 % was given by extract of *Citrus paradise*.

36. Comparative mean percentage mortality of *Trogoderma granarium* after exposure to different concentrations of plant extracts after 72 hrs.

| Plant extracts x Concentrations (%) | (%) Mean Mortality ± SE |
|-------------------------------------|-------------------------|
| <i>Citrus paradise</i> x 5 | 5.00±0.34 g |
| <i>Citrus paradise</i> x 10 | 8.30±1.65 efg |
| <i>Citrus paradise</i> x 15 | 15.01±0.85 def |
| <i>Jatropha curcus</i> x 5 | 9.47±1.81 fg |
| <i>Jatropha curcus</i> x 10 | 16.64±3.31 cd |
| <i>Jatropha curcus</i> x 15 | 20.05±2.98 bc |
| <i>Ricinus communis</i> x 5 | 12.45±1.68 de |
| <i>Ricinus communis</i> x 10 | 25.15±2.91 b |
| <i>Ricinus communis</i> x 15 | 49.51±3.16 a |

Table 36 showed the interaction between different concentrations (5, 10 and 15%) and different exposure time period. Mean mortality of *T. granarium* was given in percentage by the application of extract of *Ricinus communis*, *Jatropha curcus*, *Citrus paradise* oil along with standard error .

Mean comparison of percentage mortality values of *T. granarium* at different concentrations of selected plant extract were highest at maximum concentration. Extract of *Ricinus communis* gave the highest mean mortality revealed that maximum mortality (49.51 %) at 15% was recorded. The mean mortality was 25.15% at 10% concentration and 12.45% mortality was observed at 5% concentration of the plant extracts. Extract of *Jatropha curcus* gave the mean mortality revealed that maximum mortality (20.05%) at 15% was recorded. The mean mortality was 16.64% at 10% concentration and 9.47% mortality was observed at 5% concentration of the plant extracts. Extract of *Citrus paradise* gave the mean mortality revealed that maximum mortality (15.01%) at 15% was recorded. The mean mortality was 8.30% at 10% concentration and 5.00% mortality was observed at 5% concentration of the plant extracts. The given outcome showed that interaction of exposure time and concentration was significant. From results we concluded that there was a gradually increase in mortality values with increase in concentration of plant extracts.

ZINC OXIDE Nano-composites

Electromagnetic radiation such as visible light is commonly treated as a wave phenomenon, characterized by a wavelength or frequency. Visible wavelengths cover a range from approximately 200 to 800 nm. Optical properties of the as-prepared ZnO nanostructure sample was revealed by UV-Vis spectrum at room temperature, as shown in Figure No. 2. This graph was shown that the intense peak would be in 365nm at room temperature in dried nanopowder form.

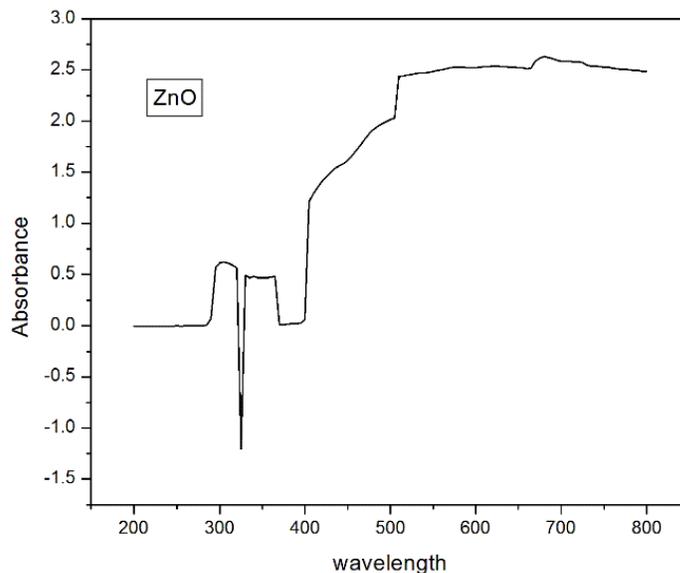


Figure 2: UV-Visible spectral analysis of ZnO

FTIR Spectra analysis of ZnO

Two milligram of ZnO nanoparticules were prepared by FTIR spectra were recorded using a Nicolet 520P spectrometer with detector at 4000-400 cm⁻¹ resolution and 20 scans per sample. FTIR Spectra of aqueous Zinc oxide nanoparticles prepared from the *Ricinus communis* extract was carried out to identify the possible biomolecule responsible for capping and efficient stabilization of the metal nanoparticles synthesized by leaf broth. And their peaks was 3411.30 O-H Stretching, 2469.38 P-H Phosphine, 2174.39 C=C=O Stretching, 1557.44 C=O Vibration, 1409.53 CH₂ Bending, 1117.32 O-C Stretching, 1085.04 O-C Stretching, 1020.47 P-OR Esters, 865.44 = CH₂ Stretching, 842.14 P-O Stretching, 654.00 C-H Bending, 548.98 Zn-OH Rocking

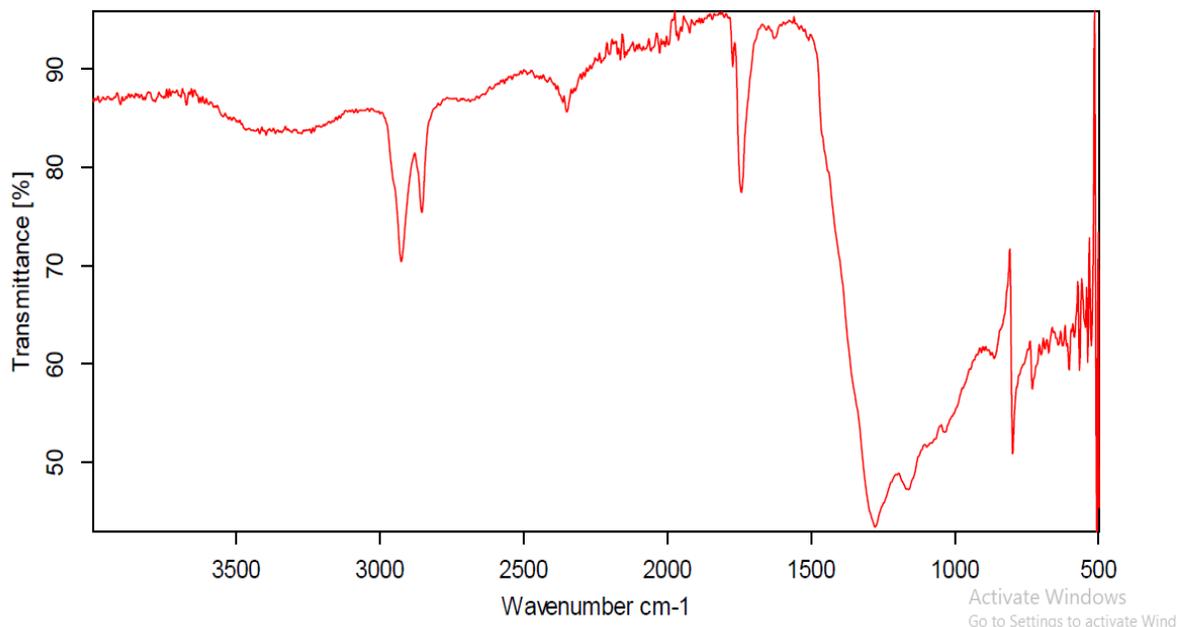


Figure.3

CONCLUSION

The present data gives the evidence that the modern Nanotechnology would also be prepared through the green synthesis method. Different solvents of plants extracts were used to prepare these nanoparticles. *Tribolium castanum* and *Trigoderma granarium* pests were created the huge effect on the soil fertility or growth. Different oil of plant extracts were used to control these effects in past years, but it will not work properly. Hence now we can use the nano particles to control the huge disorder of fertility in our country. Our experiments show that the nanoparticles work so well and so fast than the oil extracts. Results that given in the article can prove that thing properly. Therefore we can say that the nanoparticles recommended to farm level as for its cheap quality, availability, eco-friendly nature and good alternative form against the pest control.

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Evaluation of *Antidiarrhoeal Potential of Azadirachta Indica* Stem Bark Extact in Rats

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ABSTRACT

The present study was undertaken to evaluate the antidiarrhoeal potential of *Azadirachta indica* stem bark extract against the several experimental models of diarrhoea in rats. I've studies the effect of aqueous extract of the stem bark of the *Azadirachta indica* in the castor oil induced diarrhoea model Weight and the amount of intestinal content induced by castor oil was studied entropolating method. Gastrointestinal infection rate was expressed as percentage of longest distance obtained by charcoal divided by total length of the small intestine. The three method was use for detect the antidiarrhoeal activity that was castor oil induced diarrhoea, gastrointestinal motility and PGE₂ induced enteropooling. The aqueous extract shows significant activity against the castor oil induced diarrhoea. A significant reduction was also found gastrointestinal motility in small intestine transit test and a significant inhibition was found in PGE₂ enteropooling. Results obtained in study quantify the antidiarrhoeal effect of aqueous extract of *Azadirachta indica* stem bark and its use by traditional practitioner's treatment of diarrhea.

KEYWORDS

Azadirachta indica, Antidiarrhoeal potential, Stem bark aqueous extract, Castor oil, Loperamide drug.

I. INTRODUCTION

Diarrhoea is the disorder of digestive system which is characterised by defecation, frequent, high of fluid fecal matter that is watery stools. The primary cause is greater intestinal motility with less time for absorption and the delivery of a large volume of fluid to the large intestine overloading its capacity to absorb salts and water. It may be caused from any intestinal infections, any allergy, also improper dieting, any toxicological agents etc.¹

Diarrhoea occurs from the imbalance between of the absorption and secretary mechanisms in the intestinal tract resulting in an excessive lose of the fluid in the faeces. The inhibition of diarrhoea experimentally depends on potential antidiarrhoeal agent pharmacologically. Some antidiarrhoeal agents act by reduction of gastrointestinal motility and also secretion.²

Acute diarrhoeal is most frequent in adults, it's create most frequent health problem of travellers and dehydration and electrolyte disturbance is common in all causes of acute diarrhoea. Antidiarrhoeals not be used in children's because they do not reduce the electrolyte and fluid loss and also cause adverse effects. When diarrhoea are persisting for longer then one month is known as chronic diarrhoea. In this type of diarrhoea mild malabsorption syndrome and tropical enteropathy are causes. Its appears in most healthy indigenous populations of tropical countries. Chronic diarrhoea causes non infection including gluten sensitivity and inherited metabolic disorders like inflammatory bowel diseases in the majority.³

The Ayurvedic pharmacopoeia mentioned more than 1200 species of plants in which the antidiarrhoeal activity found. Acharya Charka has mentioned a group of plants of antidiarrhoeal activity named as *Purish Samgarahania Mahakasashaya*. The castor oil induced diarrhoea model used in this study is logical because the autacoids and prostaglandins cause the diarrhoea in human beings, so this model appears the similarity with the diarrhoea in human beings.⁴

The aqueous extracts of *Azadirachta indica* stem bark showed the significant inhibitory effect against the castor oil and show the significant reduction effect in gastrointestinal motility during the charcoal meal test and also show significant inhibits PGE₂ induced enteropooling. The results of present study of aqueous extracts of *Azadirachta indica* stem bark showed the inhibitory activity of diarrhoea.

II. MATERIALS AND METHODS

Plant Material: The stem bark of *Azadirachta indica* was collected from Village Pabla, Distt Baghpat, Uttar Pradesh (India). The crude stem bark sample of *Azadirachta indica* was Authenticated by Dr. Sunita Garg, Chief Scientist, Raw Material and Herbarium And Museum, Delhi (RHMD), Council of Scientific and Industrial Research – National Institute of Science Communication and information Resources (CSIR – NISCAIR), Satsang Vihar Marg, New Delhi, with the Ref. No. NISCAIR/RHMD/Consult/2018/3139-88 Dt. 18/01/2018.

Chemicals reagents and drugs used

Atropine sulphate and Loperamide, castor oil, normal saline (NaCl 0.9% w/v) and charcoal, aqueous gum acacia, PGE₂, NaOH, Distilled Water etc.

Animals

Wistar rats of either sex weight of 200g-250g was selected. The rats were fasted for overnight before every experiment. The experimental protocols were approved by the International Animal Ethical committee with the reference no. of protocol IAEC/PH-17/TIPER/101 Dt. 25-08-2017. These animals were housed in polypropylene boxes under standard conditions of light cycle (12 h light , 12 h dark) and temperature (20°C ±2°C), for least 7 days before the experiments. Animals were acclimatized for laboratory conditions before experiment testing's.

Experimental procedures for antidiarrhoeal activity

Acute oral toxicity study

According to the Environmental Protection Agency (EPA), and National academy Press, Washington D.C., 1992 USA, reported that data submitted on acute oral toxicity in rats showed no negative effect upto a dose of 5ml/kg. Methanolic leaf and bark extracts showed an oral LD₅₀ (Lethal dose, 50%) of about 13g/kg in acute toxicity studies on mice's. Oral toxicity was evaluated in albino rats by orally single administration of doses 25mg/kg, 50mg/kg, 100mg/kg respectively in three groups of rats. Observed for 6 weeks for progressively decrease of respiratory rates, pulses and body weight along with diarrhoea. The maximum tolerated safe oral dose of stem bark extract upto 100mg/kg for six weeks in rats was safe. 100mg/kg did not cause any death in rats. So, selected dose (50mg/kg and 100mg/kg) of *Azadirachta indica* stem bark extract has no toxicity effect.⁵

Castor oil induced diarrhoea

The animals (5 animal each group) were treated as follows

- Group I (Normal control) : Received only vehicle (Saline 2ml/kg) orally
- Group III (Standard) : Received Loperamide 2.5mg/kg orally.
- Group IV (stem bark extract-1) : Received the aqueous extract at the dose of 50mg/kg orally
- Group V (stem bark extract-2) : Received the aqueous extract at the dose of 100mg/kg orally.

After 30 min of the above treatment the diarrhoea was induced by using the oral administration of 0.2 ml of castor oil to every rat. Each animal were keep housed in a individual cages, the cage of floor was lined by the blotting paper. The lining of floor was changed in every hour. Observed for four hrs, during observations period the total numbers of fecal output and the numbers of diarrhoaic faeces were recorded of the animals. Numbers of the both wet and dry dropping of diarrhoeal were counted at every hours for the period of 4 hours.⁶

Gastrointestinal motility test

The animals were treated as follows

- Group I (Normal control) : Received only vehicle (Normal distilled water) orally
- Group II (Standard) : Received Atropine sulphate of the dose of 0.1mg/kg orally.
- Group III (stem bark extract-1) : Received the aqueous extract at the dose of 50mg/kg orally
- Group IV (stem bark extract-2) : Received the aqueous extract at the dose of 100mg/kg orally.

After the 30 min of administration, orally given 1ml of activated charcoal meal to every animals (10% activated charcoal in 5% of gum acacia). After 30 min of charcoal meal administration, every animal were sacrificed and the distance of the travelled by the charcoal meal in intestine was measure and expressed the percentage of move of distance. The travelled distance by charcoal in length of fraction was measured.

PGE₂ (Prostaglandin E₂) induced enteropooling

The animals were treated as follows

- Group I (Normal control) : Received only vehicle (Normal saline) orally
- Group II (Standard) : Received PGE₂ of the dose of 100µ/kg orally.
- Group III (stem bark extract-1) : Received the aqueous extract at the dose of 50mg/kg orally
- Group IV (stem bark extract-2) : Received the aqueous extract at the dose of 100mg/kg orally.

After the 30 min of administration, orally given 1ml of aqueous gum acacia to every animal (0.2 % of aqueous gum acacia). After 30 min of aqueous gum acacia administration, every animal were sacrificed and the complete length of the intestine from the pylorus to caecum was dissected and contents of it were collected in the test tube and the volume was measured. The fluid volume of rat's intestine was measured.

Statistical Analysis

All data values expressed as MEAN±SEM. Statistical analysis data was done by ANOVA by following Dunnett's test. *p*<0.05 considered as significant.

III. RESULTS

The phytochemical evaluation of aqueous extract *Azadirachta indica* was shows presence of different different phytochemical constituents such as alkaloids, flavonoids, carbohydrate and reducing sugar, glycosides, Tannins, proteins and amino acids, and also triterpenoids and steroids was founded. In the aqueous extract of *Azadirachta indica* phytochemical component Saponins was absent, Saponins not found in aqueous extract.

Effect of Castor oil induced diarrhoea

In this model all test groups were compared with disease group on the behalf of stool passed by every group animals. The mean of the stools passed by all test groups was calculated. The aqueous extract of *Azadirachta indica* stem bark at the doses of 50mg/kg and 100mg/kg, reduce the frequency of defecation and also the total weight of faeces significantly, in a dose dependent manner, and the results were statistically unique as summarized in table

Table 1: Effect of aqueous extract of *Azadirachta indica* stem bark in castor oil induced diarrhoea

| Treatment | Frequency of defecation | Total wt. of faeces |
|-----------------------|-------------------------|---------------------|
| Normal control | 5.466 ± 0.412 | 0.764 ± 0.082 |
| Standard (Loperamide) | 3.358 ± 0.427 # | 2.034 ± 0.214 # |
| Aq. Bark extract -1 | 3.795 ± 0.237 # | 2.816 ± 0.161 # |
| Aq. Bark extract -2 | 3.498 ± 0.237 # | 2.357 ± 0.161 # |

Values are expressed as MEAN ± SEM, of n=5 per group. Where # *p*< 0.05 when compared to normal control group.

The aqueous extract of the stem bark of *Azadirachta indica* at the doses of 50mg/kg and 100mg/kg reduces the total weight of faeces significantly which was almost similar to the effect of standard drug in the terms of the total weight of faeces.

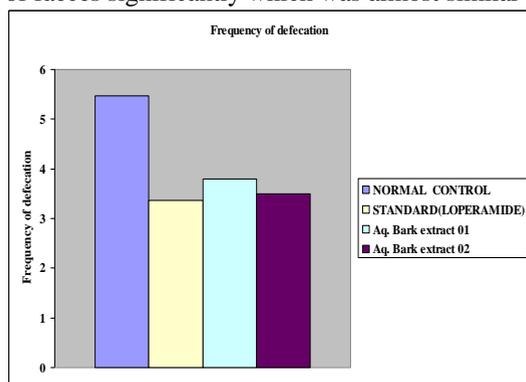


Fig 1 : Effect of aqueous extract of *Azadirachta indica* stem bark extract on frequency of defecation

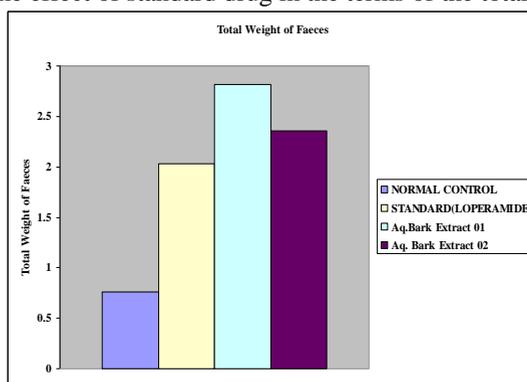


Fig 2 :Effect of aqueous extract of *Azadirachta indica* stem bark on weight of faeces.

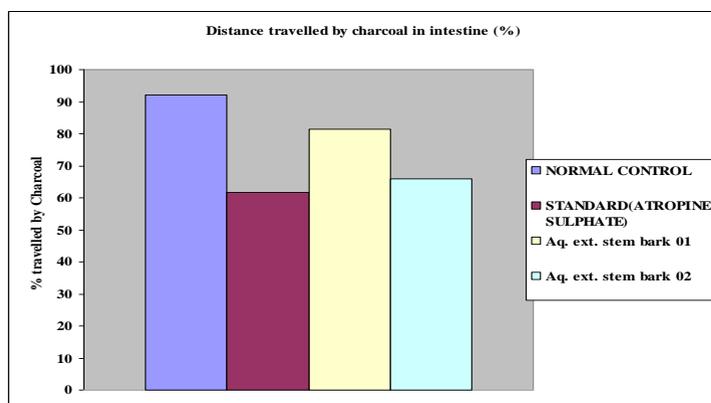
Effect of Gastrointestinal motility test

In the gastrointestinal motility test, the aqueous extract of stem bark at the dose of 100mg/kg retarded the intestinal transit of charcoal meal in the rats as compared to the control group but at the dose of 50mg/kg of stem bark extract not shows any significant delayed of intestinal transit of charcoal meal in the test of animals. On the basis of below data we said that the lower dose of stem bark extract not showed the significant result but the result of higher dose of stem bark extract nearby to standard result and the results was statically significant and summarized in table 2

Table 2 Effect of aqueous extract of *Azadirachta indica* stem bark in gastrointestinal motility test

| Treatment | Distance travelled by charcoal in intestine (%) |
|------------------------------|---|
| Normal control | 92.041 ± 1.386 |
| Standard (Atropine sulphate) | 61.548 ± 0.794 |
| Aq. ext. stem bark 01 | 81.492 ± 1.306 |
| Aq. ext. stem bark 02 | 65.903 ± 0.577 |

Values are expressed as MEAN±SEM, n=5 per group where, p<0.05 when compared to normal control to using one way ANOVA followed by Dunnett’s test.



On the basis of above data we found that the antisecretory effect of the test drug is more prominent and can be attained the even at low dose but the antimotility effect of higher dose achieve better then low test dose of stem bark.

Figure 3 Effect of aqueous extract of *Azadirachta indica* stem bark on distance travelled by charcoal in intestine (%)

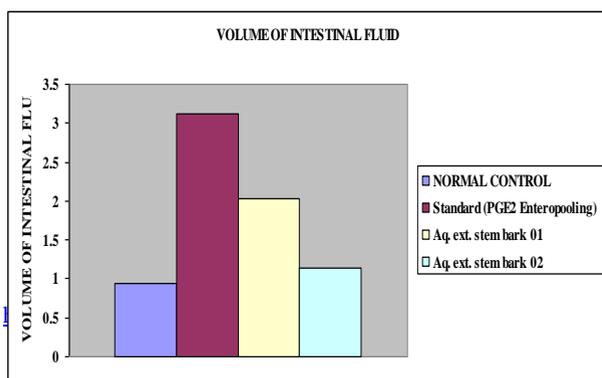
Effect of PGE₂ (Prostaglandin E₂) induced enteropooling

The both aqueous extract of the stem bark at the doses of 50mg/kg and 100mg/kg significantly inhibits PGE₂ induced enteropooling. In the PGE₂ induced enteropooling significantly increases in fluid volume of animals intestine were observed when compared with control animals receiving’s only in normal saline. The both aqueous extract of the stem bark significantly inhibits PGE₂ induced enteropooling.

Table 3 Effect of aqueous extract of *Azadirachta indica* stem bark in PGE₂ (Prostaglandin E₂) test

| Treatment | Volume of intestinal fluid |
|---|----------------------------|
| Normal Control | 0.937±0.051 |
| Standard (PGE ₂ Enteropooling) | 3.125±0.041 |
| Aq. ext. stem bark 01 | 2.037±0.081 |
| Aq. ext. stem bark 02 | 1.142±0.057 |

Values are expressed as MEAN±SEM, n=5 per group where, p<0.05 when compared to normal control to using one way ANOVA followed by Dunnett’s test.



On the basis of above data we found that in the PGE₂ induced enteropooling significantly increases in fluid volume of animal’s intestine were observed when compared with control animals receiving’s only in normal saline. The both aqueous extract of the stem bark at the doses of 50mg/kg and 100mg/kg significantly inhibits PGE₂ induced enteropooling.

Figure 4 Effect of aqueous extract of *Azadirachta indica* stem bark in PGE₂ (Prostaglandin E₂) induced enteropooling.

IV. DISCUSSION

The present study involve the evaluation of antidiarrhoeal activity of *Azadirachta indica* stem bark aqueous extract against castor oil induced diarrhoea in wistar rats and also study of the effect of aqueous stem bark extract on gastrointestinal motility and prostaglandin(PGE₂) induced enteropooling. In the castor oil induced diarrhoea method, after the administration of castor oil produced the semisolid diarrhoeal droppings in animals of control group during 4 hours of observations period. Both the doses of the test drug and aqueous extract of *Azadirachta indica* stem bark significantly ($p < 0.05$) inhibited the frequency of defecation to 3.795 ± 0.237 in aqueous bark extract-1, 3.498 ± 0.237 in aqueous bark extract-2 respectively. The standard drug Loperamide further decrease the diarrhoeal droppings to 3.358 ± 0.427 , showing the significant antidiarrhoeal activity. Results according to above data the aqueous extract of the stem bark at the doses of 50mg/kg and 100mg/kg significantly reduce the frequency of defecation. In the terms of defecation the effect of aq. bark extract sample almost equal to the effect of the standard drug. For the measured data of weight of faeces in the castor oil induced diarrhoea method, after the administration of castor oil produced the semisolid diarrhoeal droppings in animals of control group during 4 hours of observations period. Both the doses of the test drug and aqueous extract of *Azadirachta indica* stem bark significantly ($p < 0.05$) inhibited the weight of faeces to 2.816 ± 0.161 in aqueous bark extract-1, 2.357 ± 0.161 in aqueous bark extract-2 respectively. The standard drug Loperamide further decrease the diarrhoeal droppings to 2.034 ± 0.214 , showing the significant antidiarrhoeal activity. Results according to above data the aqueous extract of the stem bark of *Azadirachta indica* at the doses of 50mg/kg and 100mg/kg reduces the total weight of faeces significantly which was almost similar to the effect of standard drug in the terms of the total weight of faeces. The gastrointestinal motility with activated was carried out for find out the effect of aqueous extract of stem bark on peristaltic movement in charcoal meal feed of the animals. The distance travelled by charcoal meal in standard group was found to be 61.548 ± 0.794 at 30 minutes as compared to normal control group amount was founded 92.041 ± 1.386 at 30 minutes. Distance travelled by charcoal in the plant aqueous extract-1 of stem bark was 81.492 ± 1.306 founded when animals treated with 50mg/kg of dose. When dose increased upto 100mg/kg dose respectively in aqueous extract-2 of the stem bark then the distance travelled was founded 65.903 ± 0.577 ($p < 0.05$) after 30 minutes of evolutions. The results on the basis of above data we found that the antisecretory effect of the test drug is more prominent and can be attained the even at low dose but the antimotility effect of higher dose achieve better than low test dose of stem bark. The high dose of stem bark extract suppressed the transmission of charcoal meal in intestine and increased the water and electrolytes absorption in gut. In PGE₂ induced enteropooling the both aqueous extract of the stem bark at the doses of 50mg/kg and 100mg/kg significantly inhibits PGE₂ induced enteropooling. In the PGE₂ induced enteropooling significantly increases in fluid volume of animals intestine were observed when compared with control animals receiving's only in normal saline. The both aqueous extract of the stem bark significantly inhibits PGE₂ induced enteropooling. The fluid volume travelled by PGE₂ in standard group was found to be 3.125 ± 0.041 at 30 minutes as compared to normal control saline group amount was founded 0.937 ± 0.051 at 30 minutes. Fluid volume of PGE₂ induced diarrhoea by the plant aqueous extract-1 of stem bark was founded 2.037 ± 0.081 when animals treated with 50mg/kg of dose. When dose increased upto 100mg/kg dose respectively in aqueous extract-2 of the stem bark then the fluid volume of PGE₂ induced diarrhoea was founded 1.142 ± 0.057 ($p < 0.05$) after 30 minutes of evolutions. The results founded on the basis of above data we found that in the PGE₂ induced enteropooling significantly increases in fluid volume of animals intestine were observed when compared with control animals receiving's only in normal saline. The both aqueous extract of the stem bark at the doses of 50mg/kg and 100mg/kg significantly inhibits PGE₂ induced enteropooling.

V. CONCLUSION

The aqueous extract of *Azadirachta indica* stem bark showed the antidiarrhoeal activity in the models of diarrhoeal conditional animals. The aqueous extracts of *Azadirachta indica* stem bark significantly decrease the propulsion of charcoal meal through the gastrointestinal track and also decreased the frequency of defecation and faecal droppings. Similarly the aqueous extracts of *Azadirachta indica* stem bark inhibit significantly PGE₂ induced enteropooling. The both aqueous extracts of *Azadirachta indica* stem bark extract at the doses of 50mg/kg and 100mg/kg show the therapeutic effect against diarrhoea. So on the bases of these findings we can say that *Azadirachta indica* stem bark showed the antidiarrhoeal activity. It can be assumed that *Azadirachta indica* stem bark extract could be a potential source for novel lead discovery for antidiarrhoeal drug development.

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Symbolic Computing

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ABSTRACT

Symbolic computation refers to using machines or computers to manipulate mathematical equations and expressions in symbolic form, as opposed to numerical manipulation. Using symbolic computing to solve mathematical problems involves manipulations of symbolic objects, rules or programs, with the main goal of being exact.

This is unlike most numeric calculations where computations use approximate floating point arithmetic. This paper provides a brief introduction to symbolic computing, its applications, benefits, and challenges.

Key words: symbolic computing, algebraic computing, computer algebra systems

INTRODUCTION

Conducting scientific research via numerical computation is an established practice today. Computing is powerfully impacting the way that modern science and engineering are carried out. Symbolic computing (or algebraic computing) is one of fastest growing areas of scientific computing. Since its earliest development in 1953, symbolic computing has increased in popularity and has been used in science, engineering, and other disciplines.

Symbolic computing is mainly concerned with the representation of information in symbolic form and how that information can be processed using computer systems. It allows solutions to be given exactly. Symbolic computing simplifies and streamlines calculation and reduces the potential for arithmetic error [1].

In contrast with numeric or conventional representation, symbolic computing deals with the representation and manipulation of information in symbolic form. Examples of numeric and symbolic computations are:

- Numeric multiplication: $F = 6 * 5 = 30$.
- Symbolic multiplication: $F = (2+j)*x_1*x_2*x_3 + x_1 + x_2 + 5*\sin(2*x_4)$

Symbolic computing can be used for symbolic integration or differentiation, substitution of one expression into another, simplification of an expression, etc. Symbolic computation requires large computational resources. It entails developing an infrastructure built upon massively distributed computational environments

CONCEPT OF SYMBOLIC COMPUTING

In a nutshell, symbolic computing is a computer algorithm that requires input from the user in either numerical values or exact terms such as fractions, radicals, and symbols and then performs mathematical operations on the input. Both the input and output are symbolic. The tools for symbolic computations are standalone systems that require human interpretation and control. A symbolic computer has three major components: architectures, languages, and algorithms. Parallel computing requires coordinated evolution of these three components.

A key requirement in symbolic computation is to efficiently combine computer algebra systems (CASs) in order to be able to solve complex problems. CAS has become the main tool for symbolic computations. MACSYM, developed at MIT, was one of the oldest CASs. Common examples of CAS are the Symbolic Computation Software Composability Protocol (SCSCP) and SymPy [2]. A computer algebra system stores mathematical expressions as data structures.

Languages commonly used for symbolic computing include FORTRAN, C, C++, Lisp, ML, Prolog, Python, and Java.

Examples of symbolic algorithms include sorting, compiling, symbolic algebra, procedure calling, expert systems, and artificial intelligence systems.

EXAMPLE OF SYMBOLIC COMPUTING

One of the major successes in symbolic computation research has been the development of software systems. A representative example of software capable of performing symbolic computing is SymPy. SymPy is a computer algebra system (CAS) written in the Python, which is programming language that has a focus on ease of use and readability. It is a robust CAS which provides a wide spectrum of features in a wide range of scientific disciplines. Unlike several other CASs, SymPy does not attempt to develop and use its own programming language. Rather, it exclusively uses Python both as the internal language and the user language. This makes it easier for people already familiar with Python to use SymPy. All operations are performed symbolically. Symbolic variables or simply symbols, must be defined and assigned to Python variables. SymPy also supports matrices with symbolic dimension values. Computations on matrices with symbolic entries are necessary for many algorithms in SymPy. SymPy has equation solvers that can handle ordinary differential equations, recurrence relationships, and algebraic equations [3].

SymPy supports a wide range of mathematical facilities such as discrete math, concrete math, plotting, geometry, statistics, sets, series, vectors, combinatorics, group theory, code generation, tensors, simplifying expressions, performing common calculus operations, manipulating polynomials, pretty printing expressions, solving equations, precision numerics, and representing symbolic matrices. It also supports several higher mathematical functions such as gamma functions, Bessel functions, orthogonal polynomials, elliptic functions and integrals, zeta and polylogarithm functions, and generalized hypergeometric function are supported [3]. The fact that SymPy is readable, free, and open source makes it attractive in spite of its limitations.

APPLICATIONS

Symbolic computing is useful in different areas of mathematics such as computer algebra, linear algebra, computational logic, symbolic geometric methods, solution of algebraic equations, equational theorem proving and rewriting, factorization of polynomials and operators, integration theory, and recurrence relation [4]. Whatever the application, users have a variety of symbolic processors to choose from. These include MAPLE, MATHEMATICA, MATHCAD and MAXIMA.,

Functional programming and logic programming are two common applications of symbolic computing. To functional programming, pure functions are the basic unit of computation and they are entirely characterized by the results they return for a given set of arguments. To logic programming, logical predicates are the basic unit of computation and a predicate is defined as a true relationship [5].

BENEFITS AND CHALLENGES

Symbolic computation has been used extensively in developing closed form solutions to engineering problems. It has been observed that the use of symbolic computational improves the reliability of calculations as well as provides a method to shorten the time required for performing extensive and repetitive calculations [6].

Development of symbolic computing has been slow until recently due to the inadequacy of available computational resources such computer memory and processor power. Now a variety of symbolic computing software packages are available for engineering use. Also, computer algebra systems (CASs) are now capable of solving large problems such as the Grid [7]. Symbolic computations are hard to parallelize due to their complex data and control structures.

CONCLUSION

Scientific research via symbolic computation is less widespread than other techniques.

However, with the advent of time-sharing and virtual memory operating systems, research on symbolic computation have flourished.

Notable, impressive results have been achieved in symbolic computation over the last two decades [8]. Symbolic computation has made mathematics more useful to other scientific fields. It is now routinely used in a number of diverse disciplines such as mathematical research, physics, engineering, education, and economic. The needs for symbolic computation have grown.

Universities should introduce symbolic computation as a tool into existing courses.

For additional information on symbolic computing, one should consult books in [9-14] and the journal exclusively devoted to it:

Journal of Symbolic Computation.

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Network Economy: An Introduction

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Abstract: In few decades, we transitioned from the industrial economy to the IT economy and the Internet economy. The network economy is the next economic revolution. It may be regarded as the convergence of business and consumer networks. It is the business environment that has emerged as a result of ubiquitous information technology allowing access to information anytime and anywhere. This paper expounds the concept of the network economy.

Key words: network economy, networked economy, networked information economy, Internet economy

INTRODUCTION

Networks have served as the means of connecting humans to one another. The modern economy would not exist without the transportation, communications, information, energy, and railroad networks. The Internet (the “information superhighway”) is the most important digital network of the last part of the 20th century. It is a global network interconnecting networks and computers [1]. The Internet has been making progress across all parts of our lives in several ways such as online shopping, home banking, bill payments, and emails. The Internet changes everything. As a society, we are becoming more connected and resourceful. Everything we touch, say, and do is connected. We are in the era of hyper-connectivity.

The development of networks makes the main aspects of economic power more and more associated with the ability to control and handle information. Such networks are blurring the boundaries between a company and its environment. This enables companies to search for the most profitable pattern of interactions with other companies for the trades of goods. Pioneering companies that have leveraged such networks to create new business models include Google, Uber, eBay, General Motors, General Electric, Facebook, Microsoft, and IBM.

CONCEPT OF NETWORK ECONOMY

Network economy (NE) refers to an emerging economic world reliant on information and communication technologies (ICT). It emerged in 1990s and may be regarded as a kind of new economic pattern, a transition from the industrial economy to the networked economy. It is based on modern electronic information technology, enabled by the Internet. It will involve changes in the way goods and services are created, produced, sold, and distributed. The elements of the networked economy are computers, connectivity, and knowledge. These three elements work together to create new economic relationships, as shown in Figure 1 [2].

The idea of a network economy allows fundamental aspects of the new economy to be integrated into one single concept. The new economy is compared with the old as illustrated in Figure 2 [3]. Some see the networked economy as the natural outcome of what happens when all the actors inside a business ecosystem are interconnected. The interconnectedness takes some of the power away from producers of goods/services and puts it in the hands of consumers. At the heart of the network economy is the effective management of finite metabolic and cellular resources.

CHARACTERISTICS

Network economy may be viewed from a number of perspectives: transition from the industrial economy, digital and information infrastructure, global scale, value networks, and intellectual property rights [4]. It is an emerging type of economic environment in the era of hyperconnectivity and arising from the digitization of fast-growing, real-time connections among people, devices, and businesses. The main feature of the network economy is a radical decentralization of physical capital necessary for the production, storage, distribution, and processing of information.

The three pillars of the networked economy are earning customer loyalty, enabling open innovation, and enhancing resource optimization [5].

1. Earning Customer Loyalty: The networked economy is already helping companies provide better, more personalized customer experiences. Customized delivery capability opens up all kinds of bundling and promotional opportunities.

2. Enabling Open Innovation: The networked economy will create entirely new ways of working. As the first generation of digital natives — people who have never known the world without computers and the Internet — millennials are natural networkers. That is a reality that businesses must embrace to attract the best employees and leverage their talents to fuel true innovation.

3. Enhancing Resource Optimization: The networked economy will make it possible for businesses to use all kinds of resources more efficiently and tap the capacity that we already have. If there is one area where resource optimization is needed more urgently than any other, it is agriculture.

In the network economy era, information resources have become the main resources in economic activities. Information resources are the main resources. Information is a form of signal, message, or data. It may be useless information or false/harmful information. In network economy, the pervasive flow of economic and financial information will be common.

The twelve principles of the network economy are listed as follows [6]:

1. The Law of Connection
2. The Law of Plentitude
3. The Law of Exponential Value
4. The law of Tipping Points
5. The Law of Increasing Returns
6. The Law of Inverse Pricing
7. The Law of Generosity
8. The Law of Allegiance
9. The Law of Devolution
10. The Law of Displacement
11. The Law of Churn
12. The Law of Inefficiencies

APPLICATIONS

It would be very difficult, if not impossible, to list every way that network economy has changed our lives. To stay competitive in recent years, companies had to change their inter-firm relationships and focus on their core competences. Network economies are the result of competition on price and quality [7]. The network economy has also quickly found its way into policy-making. Typical applications of network economy are presented as follows.

- *Information Marketing*: The continuing development of network economy is radically transforming information markets. Based on the modern marketing economy, the network economy has its own ethics, which may be multifold in different

countries, nations and regions. One benefit of competitive markets is that producers are likely to lose their ability to extract monopoly prices and profits [8].

- *Libraries:* The value of a library is ability to offer its patrons access to a range of information goods and service. Libraries face new challenges and competition. They compete with alternative storage, retrieval, and distribution systems. They will need to adapt. Consumers increasingly place little value on the value of the content (information) and their ability to find, access, and utilize it [8].
- *Internet Economy:* This refers to economic activities where Internet acts as the core infrastructure. The Internet is changing many lives and providing a great deal of new wealth to society. The Internet creates value by reducing the costs of transmitting information. The new economy enables businesses to create value by leveraging the Internet to expand their reach to customers and establish virtual markets [9].
- *eCommerce:* Electronic commerce (ecommerce) is the process of conducting business over computer networks such as the Internet. It has revolutionized business transactions by enabling the consumers to purchase, invest, bank, and communicate from virtually anytime, anywhere. Continuous changes in consumer preferences, technology, and the competitive environment are posing risks and creating opportunities with existing business and operational model. Trust is key to enable eCommerce and interpersonal transactions. Ecommerce has created opportunities for businesses to reach consumers directly [10]. We are beginning to cut out the middle man.

BENEFITS AND CHALLENGES

In the near future, network economy will offer unprecedented opportunities for innovation, and businesses and improve the lives of billions worldwide. Since information can be shared instantly and inexpensively on a global scale, centralized decision making and expensive bureaucracies are minimized. Large companies will manage their sales, invoicing, and logistics through global networks that connect a billion computing devices without customers being aware of the enterprise physical location [4]. NE creates unprecedented new opportunities for innovation, collaboration, and customization. It is remolding labor market.

As with any revolution, the shift to the networked economy comes with a wide range of challenges that must be addressed. A network economy raises some vital issues with respect to intellectual property, privacy, and security. Ownership is being replaced by access rights. The network economy increases the difficulties of protecting copyrights. Being a newly built economic world, there are not yet laws and ethical standards. Standards are necessary for network economy to function optimally because of two factors: (1) consumer

expectations and (2) interoperability. Standards provide the information to producers and consumers that enable them to judge the quality and safety of the products [11]. The potential benefits of the NE far outweigh any growing pains.

CONCLUSION

The development of network economy creates infinite and boundless growth, knowledge-based production, increased productivity, optimal allocation of resources, and the perfect competitive market system. The new economy is meant to designate the future manner of life, which translates into the individual freedom, social and economic autonomy, and the abolition of bureaucratic interventions and regulations of the states [12]. Network economy will act as the engine that drives world development and serve as the carrier of new economic exchanges and social life.

Organizations can no longer be contented doing the same thing they have been doing for years. They must adapt and stay ahead of competitors. The borderless nature of the Web guarantees that in the economy of future will be increasingly global, electronic, and Internet-based. More information about network economy can be found in the books in [13-21].

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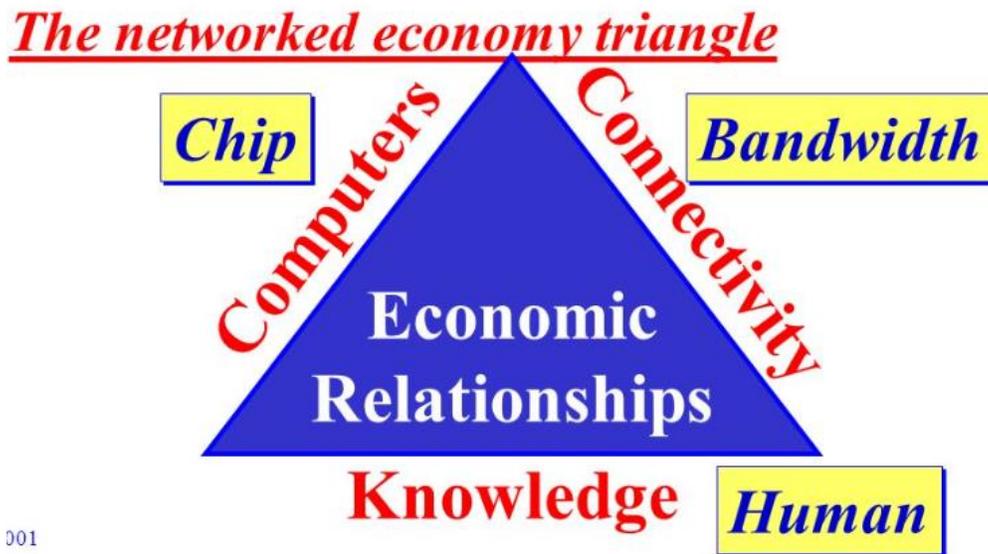


Figure 1 Elements of the network economy [2].

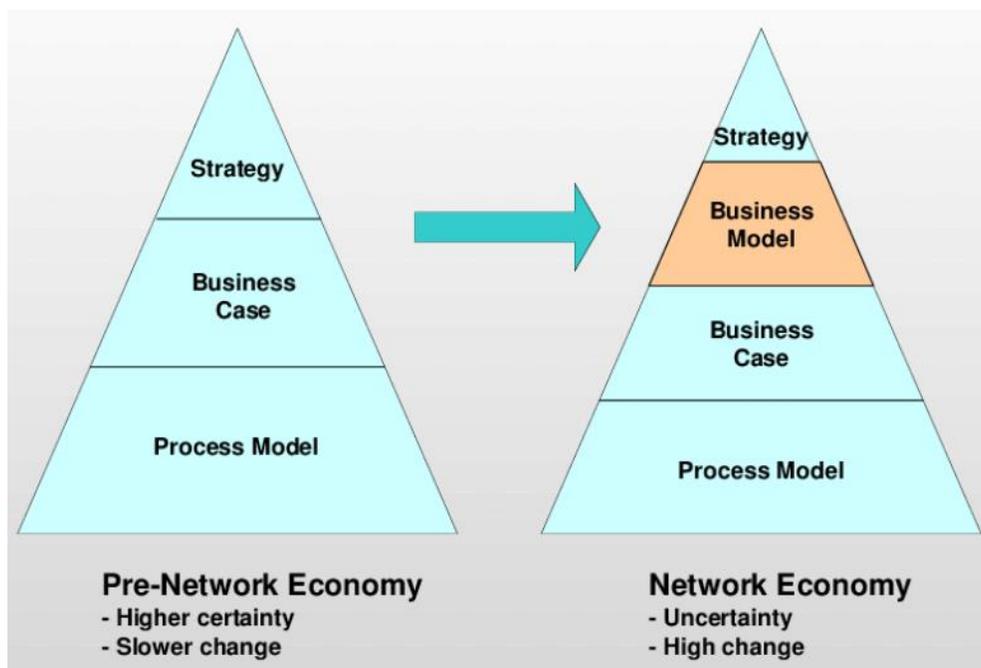


Figure 2 Comparing the network economy with the traditional economy [3]

Reconstruction Of The Execution Regulation Of Administrative Court Decision In Legal Protection Principle Perspective

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⁵ Mukti Fajar, *Tipe Negara Hukum*, (Malang: Bayumedia Publishing, 2005), p. 42

⁶ Paulus Effendi Lotulung, *Lintasan Sejarah dan Gerak Dinamika Peradilan Tata Usaha Negara (PERATUN) Di Mata Paulus Effendi Lotulung*, (Jakarta: Salemba Humanika, 2013), p. 72.

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Abstract- The establishment of Administrative Court aims to provide legal protection for the people from government actions that are not in accordance with the law. However, the existence of Administrative Court does not fully provide legal protection due to the difficulty of executing of Administrative Court decisions that have permanent legal force. Therefore, it is necessary to reconstruct the execution regulation in Article 116 of Law Number 51 Year 2009. The reconstruction is based on the principle of legal protection for the people. Based on these principles, execution is a people's right which must be guaranteed by government officials. In the reconstruction, it is necessary to regulate coercive measures, regulation for adequate compensation, and institutions of execution.

Index Terms- Execution, Decision, Administrative Court, Reconstruction.

I. PRELEMINARY

The establishment of the Administrative Court cannot be separated from the ideals of the rule of law. Administrative Court is one of the characteristics of the rule of law.¹ In rule of law, Administrative Court is intended to provide legal protection to the people from government actions. In this regard, Paulus Effendi Lotulung said that the establishment of Administrative Court is to resolve disputes between the government and its citizens as a result of government actions that were considered violating the rights of citizens with the aim of providing legal protection to the people (both individual rights and community rights).²

Administrative Court is a court to question or to review the actions of the government that violate citizen's right. In practice, not a few government actions that contrary to the law are canceled

by the Administrative Court. But in practice too, the Administrative Court decision is very difficult to execute. This is due to the weakness of regulation regarding the execution of Administrative Court decisions in Article 116 of Law Number 51 Year 2009. In other words, these provisions are not effective in providing guarantees of the execution of the Administrative Court decision. It can be seen that there are still many Administrative Court decisions that are not executed, for example (1) Verdict Number 127/G/2017/PTUN.SBY *juncto* Decision Number 108/B/2010/PT.TUN.SBY between Ratna Endang Hartatiek T vs. Mayor of Surabaya, (2) Decision Number 18/P/FP/2018/PTUN.SBY between Saroni vs Head of Kepuh Village, Papar District of Kediri Regency, and (3) Decision Number 17/P/FP/2018/ PTUN.SBY between Muhammad Zainul Irsyadi vs. Head Kepuh Village, Papar District, Kediri Regency. These decisions were not executed by government officials. Therefore, this paper proposes the reconstruction of the execution regulation of Administrative Court's decision in legal protection principle perspective.

II. FORMULATION PROBLEM

How is the reconstruction of the execution regulation of Administrative Court decisions in legal protection principle perspective?

III. METHOD RESEARCH

This research is a legal research using a statutory, conceptual and philosophical approach. The legal materials used are primary, secondary, and tertiary which are analyzed using normative/prescriptive analysis.

¹ Mukti Fajar, *Tipe Negara Hukum*, (Malang: Bayumedia Publishing, 2005), p. 42

² Paulus Effendi Lotulung, *Lintasan Sejarah dan Gerak Dinamika Peradilan Tata Usaha Negara (PERATUN) Di Mata Paulus Effendi Lotulung*, (Jakarta: Salemba Humanika, 2013), p. 72.

IV. ANALYSIS

Problems in the Execution Regulation of Execution of Administrative Court Decisions

The law was established to be a guideline for the government to act and limit its actions, and at the same time as a protector/save guard for the people from the government arbitrariness. Even though the law has provided restrictions on government actions, but there are always government actions contrary with the law (*onrechtmatig*). Therefore, in the rule of law, the people are guaranteed legal protection i.e the right to submit a review of government actions to court (judicial review). In this regard, Juli Ponce said that "...where statute ends, tyranny begins-and the only effective protection against tyranny is judicial review. Therefore, traditional administrative law is not especially interested in good administrative decisions but in the judicial review of illegal decisions, to protect citizens against public arbitrariness...".³ In order to provide legal protection, Administrative Court was established as one of the executor of judicial power. The existence of the Administrative Court is closely related to the principle of the rule of law guaranteed in Article 1 paragraph (3) of the Constitution of the Republic of Indonesia Year 1945 and the effort to provide legal protection to the people. The people are given the right to review government decisions. However, the principle of legal protection has a meaning if there is a guarantee that the government executes Administrative Court decision that have permanent legal force. The guarantee of the execution of the Administrative Court decision is not included in Article 116 of Law Number 51 Year 2009, so that the Administrative Court decision is very difficult to execute. Therefore, the existence of Administrative Court is not fully as an instrument of legal protection to the people. This condition certainly raises legal uncertainty in the implementation of government and development.⁴

According to the author there are some weaknesses in the regulation of the execution of Administrative Court decision in Article 116 of Law Number 51 Year 2009, namely as follows:

- a. Article 116 of Law Number 51 Year 200 gives an authority of Government to execute Administrative Court decisions themselves, so that there are no executing institutions as in the case of criminal and civil court decisions.
- b. The time to declare an invalid administrative decision does not have legal force in Article 116 paragraph (2) and paragraph (3) is too long.
- c. The time to declare an invalid administrative decision does not have legal force in Article 116 paragraph (2) and paragraph (3) is too long.
- d. There are no implementing regulations regarding the imposition of coercive measures, specifically regarding the about coercive fines (*dwangsom*)
- e. The regulation regarding the submission of a report on the non-executing of an Administrative Court decision to the President and to a representative body in article 116 paragraph (4) is not compelling because it is not

accompanied by legal consequences if it is not implemented.

- f. The absence of criminal sanctions for government officials who do not carry out Administrative Court decisions.

Reconstruction of Execution Regulation of Administrative Court Decision in the Perspective of Legal Protection Principles

Weakness in the regulation of Article 116 of Law Number 51 Year 2009 causes there are Administrative Court decisions is not executed by government officials. That condition has negative legal implications for legal protection for the people. Therefore, the execution regulation in Article 116 of Law Number 51 Year 2009 need to be reconstructed. The reconstruction is based on the principle of legal protection as the main legal principle with the following characteristics:

1. The execution of the Administrative Court decision is a right for the people given by the Administrative Court decision. Therefore, repressive legal protection must be redefined, so that it contains the right of people who have been harmed by the actions/decisions of government officials, to sue the people to Administrative Court and the right of execution for the people whose claim was granted by the Administrative Court decision.
2. Execution regulation of Administrative Court decision must be based on legal principles aimed at upholding the principles of legal protection for the people, such as the principle of *res judicata pro veritate habetur*, the principle, the principle of justice, and the principle of legal certainty.
3. Execution regulation of Administrative Court decision must be in accordance with the principles of forming legislation such as the principle of clear norm formulation, the principle of consistency, and the principle can be implemented.
4. Execution regulation of Administrative Court decisions must be regulated to provide guarantees to people to obtain their rights and guarantee that government officials will carry out what is required by Administrative Court decisions. Therefore, regulation regarding coercive measures are urgently needed, including the imposition of criminal sanctions as *ultimum remedium*.
5. Regulation regarding the provision of adequate and fair compensation in accordance with the losses suffered by people.

Based on these five concepts, the reconstruction of the execution regulation of Administrative Court includes the following matters: (1) The legal strength of the administrative decision that was canceled by the Administrative Court; (2) Models of automatic execution and non-automatic execution; (3) The timeframe for the head of the court to order the government official to execute; (4) Imposition of coercive measures i.e coercive fines and/or administrative sanctions; (5) Announcement in the local print mass media; (6) Reporting to the President; (7)

³ Juli Ponce, *Good Administration and Administrative Procedure*, (Indiana Journal of Global Legal Studies, Volume 12 Issue 2, 2005), p. 554.

⁴ Supandi, *Kepatuhan Pejabat Dalam Menaati Putusan Pengadilan Tata Usaha Negara*, (Medan: Disertasi Program Pascasarjana Universitas Sumatera Utara, 2005), p. 266.

Amount of compensation; (8) Guarantees for the people to obtain executions after coercive measures were made; (9) Model of execution of Administrative Court decisions whose authority is regulated in Law Number 30 Year 2014; (10) The need for criminal sanctions; and (11) An execution agency should be formed in certain cases. The results of the reconstruction are as follows:

1. The canceled administrative decision has no binding legal force since *inkracht* of Administrative Court decision.

The canceled administrative decision has no binding legal force since the Administrative Court decision has permanent legal binding (*inkracht van gewijsde*). Administrative Court's decision that *inkracht van gewijsde* has binding legal force. Supposedly, an administrative decision that was canceled has no binding legal force since the decision of the Administrative Court is *inkracht*.

2. Obligations for government officials to execute Administrative Court decisions in Article 97 paragraph (9) letter a, letter b, and letter c, paragraph (10) and paragraph (11) within a period of 10 days

There is no more automatic execution, so all Administrative Court decisions that require/punish government officials must be executed. In addition, the time period is shortened to 10 days to provide legal protection for the people.

3. The chairman of the court must order the government official to execute after the plaintiff submits the application no later than 5 days

To provide legal certainty as a characteristic of the theory of the rule of law in a formal aspect, it is necessary to provide a period of time.

4. Government officials who do not execute Administrative Court decisions in Article 97 paragraph (9) letter a, letter b, and letter c, paragraph (10) and paragraph (11) are subject to coercive measures i.e *dwangsom* and/or administrative sanctions. The coercive measures was imposed on the person of the official

Imposition of *dwangsom* (coercive fines) not to government agencies, but personally to officials who do not carry out Administrative Court decisions. This is very closely related to the official fault (*faute de personele*), not function's fault (*faute de service*), because the non-execution of the Administrative Court decision was caused by the personal mistake of the official concerned. The non-execution of an administrative court decision by a government official can be categorized as an act of maladministration as determined in Article 1 number 3 of Law Number 37 Year 2008 namely to ignore or neglect its legal obligations. On the one hand, if *dwangsom* is applied to officials personally, it will facilitate its execution, because if *dwangsom* is charged to government agencies it will cause its own problems, because payments must be in accordance with state financial management procedures.

5. The coercive fines determined in the decision by amount of Rp. 100,000,-.

In the dictum of decision, the Administrative Court also imposed a cutting of official salary as guarantee of coercive fines payment. In addition, the provisions of coercive fines in the Civil Procedure Code apply automatically (*mutatis mutandis*).

6. Forms of administrative sanctions, authorized officials, and sanctions for officials who do not apply administrative sanctions.

The form of administrative sanctions for government officials are (a) Temporary termination by obtaining office rights; (b) Temporary termination without obtaining office rights; and/or (c) Permanent termination from office without obtaining office rights. In addition, officials who do not impose sanctions are also given sanctions.

7. Announcement on print media, online mass media, Administrative Court website or website of representative institutions

To ensuring the execution of Administrative Court decision, announcements are not only limited to print media, but also need to make announcements online that can be accessed by everyone on the Administrative Court website, the representative body website, and etc.

8. The President must follow up on the report of the Head of the court within 10 days. In addition, there are sanctions for officials who do not carry out the President's order.

Regulation regarding the time period for the President to follow up on the report of the head of the Administrative Court are very necessary, so that it does not depend solely on the President's judgment. In addition, it is necessary to impose sanctions for the President if he does not carry out his obligations or there are also sanctions for officials who do not carry out the President's order.

9. The higher-ranking official is obliged to execute the Administrative Court decision if the official still does not execute even though all forced efforts have been made.

It is intended that the execution of the Administrative Court decision has an edge. Thus, justice and legal certainty for the people will be guaranteed.

10. The enactment, automatically (*mutatis mutandis*), of the regulation of the execution of Administrative Court decision in this Law and the provisions in the Civil Procedure Code of the Administrative Court authority regulated in Law Number 30 Year 2014.
11. Compensation is determined according to factual conditions by Administrative Court. The government is also required to budget compensation in the budget planning, both in state budget planning and local budget planning.
12. Optimizing the role of bailiffs as an execution agency for the execution of Administrative Court decisions related to compensation, coercive fines (*dwangsom*), and unlawful acts by the government.

V. CONCLUSION

The execution of Administrative Court decision has been regulated in Article 116 of Law Number 51 Year 2009. However, the article has weaknesses, the execution time is too long, there is no mechanism for applying coercive measures, and other weaknesses. This makes, the Administrative Court decision is very difficult to execute, so it is not in accordance with the principles of legal protection. Therefore, the article needs to be reconstructed based on the principle of legal protection, where the execution is

a people's right which must be guaranteed by government officials. The results of the reconstruction of execution regulation are decisions that are null and void since the decision was *inkracht*, the obligation of government officials to execute all condemnatoir decisions for 10 days, the obligation for the head of court to order officials to execute decisions within 5 days, coercive fines and/or administrative sanctions handed down to officials personally, announcements not only in print media, but also in online media, the obligation for the President to order officials to execute within 10 days, executions by higher officials in the event that all coercive measures have been made, the determination loss based on the amount of loss, and optimize the role of the bailiff as an executing agency in the case of compensation, *dwangsom*, and unlawful acts by the government.

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A Study On Outcome of Epidural Analgesia for Painless Labour

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Abstract- OBJECTIVE:- To assess the quality of pain relief , obstetrical outcome, effect on rate of cesarean section & instrumental delivery.

MATERIAL & METHOD:- 100 patient in labour were selected based on inclusion criteria, informed consent taken prior to study . Epidural analgesia given and we retrieved the course of labour & delivery and management of epidural analgesia done.

RESULT:- A total 100 patients, 94 patients was having adequate pain relief, 38 normal vaginal delivery, 47 instrumental delivery, 15 cesarean section.

CONCLUSION:-Epidural analgesia for painless labour is safe & effective method with very less side effect, no increase in rate of CD &IVD or prolongation of labour.

I. INTRODUCTION

Labour pain is probably the most painful event in womens life¹. It has been well established & stated best by ACOG and ASA, that in absence of medical contraindication maternal request is a sufficient medical indication for pain relief during labour. By the present consensus neuraxial analgesia technique including Epidural, spinal, and combined spinal epidural approaches are the most effective & least depressant treatment for labour pain. Previous studies disclosed the increase incidence of cesarean deliveries rate in parturient who received epidural in early stage of labour. However recent randomized control trial showed no difference in the incidence of cesarean delivery.The ACOG committee opinion in 2006, recommended that” The fear of unnecessary cesaerean delivery should not influence the method of pain relief that women wish to choose during labor. Study is carried out in NALANDA MEDICAL COLLEGE &HOSPITAL, Patna, Bihar. In this study effect of epidural analgesia on mode of delivery,course of labour,& outcome of pregnancy done in detail.

II. MATERIAL AND METHOD

This study was approved by ethical committee of our hospital.It was prospective study on patient attending the emergency in Department of obstetric & gynaecology at nalanda medical college & hospital, patna from dec 18 to dec19.

Patients were educated & counseled about labour analgesia. Epidural analgesia was initiated at parturient request. Informed consent taken prior to study, total 100 patients in labour were selected based on inclusion criteria.

Prior to procedure, vitals(BP,Pulse), fetal heart rate, CTG(admission CTG), cervical dilatation is noted as baseline data.

Skin is infiltrated with 1% xylocaine, an epidural catheter was inserted via L3- L4 or L4- L5 intervertebral space through a 16 or 18 Gauge touhy needle in place. The LOR(Loss of resistance) technique was used to identify the epidural space.The catheter was threaded 4-7 cm cephalad through the needle. Then test dose of 3ml 1% xylocaine was given to rule out intravascular or intrathecal catherization before the catheter was secured. Then bolus dose of 10 ml of 0.0625% of Bupivacaine with 20mcg of fentanyl, intermittent dose is given when patient complain of pain. The visual analog scale is used to assess the degree of pain & When to give intermittent dose. During study all parameter &Obstetrical outcome are documented in detail.

III. RESULT

There was total 100 patients, to whom epidural was given, out of 100 patients 38 delivered by assisted vaginal delivery, 47 had instrumental delivery, cesarean section in 15 patients. From this study we found there is no incidence of rate of cesarean section but rate of instrumental delivery markedly increased. We also found that, result are not affected by timing of epidural.

TABLE-1 Distribution of cases according to age group

| AGE IN YRS | NO. OF CASES | PERCENTAGE |
|------------|--------------|------------|
| <20Yr | 12 | 12% |
| 20- 25 Yr | 70 | 70% |

| | | |
|-----------|----|-----|
| 26- 30 Yr | 14 | 14% |
| >30 Yr | 4 | 4% |
| | | |

TABLE-2 Distribution of cases according to Gravida

| GRAVIDA | NO. OF CASES | PERCENTAGE |
|---------|--------------|------------|
| G1 | 74 | 74% |
| G2 | 22 | 22% |
| G3-G4 | 04 | 04% |
| | | |

TABLE-3 Distribution of cases according to Mode of delivery

| MODE OF DELIVERY | NO. OF CASES | PERCENTAGE |
|---------------------------|--------------|------------|
| ASSISTED VAGINAL DELIVERY | 38 | 38% |
| INSTRUMENTAL DELIVERY | 47 | 47% |
| CESAREAN SECTION | 15 | 15% |

TABLE-4 DISTRIBUTION OF CASES ACCORDING TO SUCCESS OF EPIDURAL FOR PAIN RELIEF

| SUCCESS | NO. OF CASES | PERCENTAGE |
|--------------|--------------|------------|
| SUCCESSFUL | 94 | 94% |
| UNSUCCESSFUL | 6 | 6% |

TABLE-5 DISTRIBUTION OF CASES ACCORDING TO MATERNAL SIDE EFFECT

| SIDE EFFECT | NO OF CASES | PERCENTAGE |
|------------------|-------------|------------|
| NAUSEA, VOMITING | 60 | 60% |
| HEADACHE | 20 | 20% |
| MOTOR BLOCK | 12 | 12% |
| PRURITUS | 08 | 08% |
| | | |

IV. DISCUSSION

There was three major finding in this study, first about rate of cesarean section which doesn't increases, secondly there was mild prolongation of 2nd stage of labor which is not significant, thirdly increase in rate of instrumental delivery.

Severity of labor pain is graded highest on pain scale, early labor pain is visceral(T10-L1), and late is somatic(S2-S4).There is multiple way available for relief of labor pain. But epidural is best. However, women who uses this form of pain relief are at increased risk of instrumental delivery, our this result matches with study which was done by Somvah.et.al

The worry about increasing CD rate due to epidural, but we found no significant increase in rate, same view was by shared by Elizabeth MC Grandy . et. al study.

Epidural analgesia can be given at any time at request of patient, it doesn't matter what is the cervical dilatation. Timing of epidural does not effect the mode of delivery & no adverse effect on neonatal outcome, same result was obtained by Wong.et.al .

V. CONCLUSION

Epidural analgesia for painless labour is simple, safe & effective technique. Controversies regarding like rate of CD are irrelevant.

There is no increase in rate of instrumental delivery
Epidural analgesia is better choice rather than to bear labor pain.

VI. ABBREVIATION

CD- cesarean delivery, RCT- Randomized controlled trial,IVD- Instrumental vaginal delivery.

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The Level of Compliance with The Public Procurement Act of Ghana

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Abstract

The Public Procurement Act (Act 663) 2003 became law in Ghana to help reduce the irregularities in public procurement. The Act has as its goal the promotion of fairness, transparent procedures in public procurement and non-discrimination against supplier on any grounds. The implementation of the Act has faced lots of ongoing challenges and has exposed many flaws that it was supposed to address with its inception. This study assessed the level of compliance of procurement entities with the Public Procurement Act. There was a total of 25 ministries in Ghana, out of which 12 ministries were purposively selected. For the assessment of compliance with the key global best practices, the study looked at four core compliance areas namely management systems,

information and communication, procurement process and contract management. The study revealed that the ministry with the highest compliance level is the Ministry of Finance. The Ministry of Finance had the overall compliance level (38.06%), followed by the Ministry of Trade and Industry (27.51%). The Ministry of Youth and Sports had the least level of compliance (11.68%). This finding affirms conclusively that there is a general low level of compliance to the provisions of the Act. In line with the operational activities of the procurement system in Ghana and at the stage of the implementing agencies mandated for initiating procurement activities, it was concluded that procurement officials were not keeping proper records. Proper accounting procedures were not in place for procurement official.

Introduction

Procurement as a public-sector activity is gradually becoming the tool wield by the central government in ensuring the efficient and responsible utilisation of scarce public funds for development and to guarantee a lean government. Going by this tenet, the functions the procurement as a sector of the public service has changed considerably in the last two decades demanding integrity in government and public procurement in general. Countries increasingly have enacted legislation and made rules and regulations that guarantee fairness and transparency in procurement practices and that public funds are deployed to public procurement in the

supreme public good. Adu Sarfo (2011) points out that the bulk of governments revenue goes to the delivery of services via procurement services. It is therefore in the public interest to achieve value for money through planned and orderly processes of acquisition and management of this key government function.

Lloyd and McCue (2004) looks at procurement processes in the public sector as sourcing for goods, services and works from groups and their associated intermediaries to satisfy government and public needs as a whole. In their definition, they added expenditure directed at its citizens on social activities and economic well-being. This is achieved

through formal procurement process involving competitive bidding from the potential vendors. When public procurement is effective, the goals of public sector financial optimisation is realised, thereby achieving good governance in the eyes of the citizens. This is so because procurement forms a big part of government expenditure and much of this comes from the taxes levied in the citizens. In the UK, for instance, it is projected that £150 billion annually in purchases of goods and services needed to keep the government sector going (Dave, 2009; Ahimbisibwe, 2014). Purchasing of goods and services is normally the phraseology used by firms and individuals in describing their contracting relationships with governments (Lloyd, et al., 2004).

In Ghana, rules for public sector procurement are defined by the Public Procurement Act (663) (2003) (henceforth the Act) and supporting regulations promulgated from time to time by the implementing agencies. The rules require, *inter alia*, that the public procurement system cover procurement planning, qualification of tenders, form of communicating, rejecting of tenders, entry into force the procurement contract award, inducement from supplies, contracting agents and their consultants and specified the official language of transactions.

Public procurement, in any form it takes, is a big-ticket item with wider implications for budgeting for the public sectors in terms of public spending and the consumptions of goods and the associated services in a given country. Admittedly, there is not much by way of academic research of the characterisations of public procurement activities in Ghana (with anticipated estimates between 50 percent to 70 percent of total Government expenditures after government salaries and emoluments, accounting for 14 percent of Gross Domestic Product and nearly 24 percent of total imports (Dave, 2009), undoubtedly, a casual observation of the economic activities points at the public sector as the largest customer and so is better positioned to influence competition, governance and socio-economic development of the country. Improving public procurement management in such an environment will no doubt create wealth and reduce poverty. Public procurement, one can say, acts as a channel connecting public requirements of, for example, housing, transportation, educational infrastructure, sanitation, public health and development of

SMEs to private-sector entrepreneurs and providers (Adu Sarfo, 2011).

The public procurement reforms can be situated in the broadly in a wider agenda to bring transparency in governance activities in the developing world of which Ghana is a part. Typical goals of the procurement reforms are to optimise national resources to promote national development, to situate procurement activities within the relevant country and global practices, boost competition, transparency and accountability to attain efficiency, promote the ease procurement and attendance administrative procedure and guarantee value for money for the public (Ministry of Finance-Ghana, 2001). Governments discharge its core mandates of ensuring the well-being of its citizenry by providing goods and services. The items are attained either internally by government entities or sources external to government within the private sector. Governments in a sense employ the mechanisms of their budgeting process to ensure this approach is optimised, should they decide to produce their needs in-house or, given the wider public, the opportunity to participate through the procurement process, thus meeting the goals of value for money via sourcing of the services and good at the most optimum price in the appropriately needed quantities for use. Further, public procurement in government must be conducted and directed with the objectives of accountability, non-discrimination among potential suppliers and a commitment to globally best practices in mind (Adu Sarfo, 2011). Due to this, public procurement is expected to enact the required legislation to define and guide its practice in all countries, in order to protect its interest (Adu Sarfo, 2011).

Despite the importance of the Act, government agencies and departments in Ghana go through enormous bureaucratic processes in acquiring goods and services. This, notes Nketia-Asante (2013), leads to waste of public resources with potentially adverse effects on government finances. The Act was expected to improve public finances, instead, it has weakened it. Some vendors in the country have criticised the covert procurement procedures and inordinate long delays in compensation after executing projects, supplied goods or rendered services (World Bank, 2003). By some accounts, the inception of the Act has increased government domestic

obligations, aside making its management burdensome and reducing potential government investments.

Hence the objective of the study was to find out the level of compliance of public procurement act in Ghana, which was instituted to address some of these observed anomalies.

Literature Review

Procurement can be seen as a set of planned actions undertaken towards sourcing items for the public sector. It comprises steps of sourcing goods, contracts and related functions, from third supplier entities and/or from given in-house facilities. A more formal definition given by Linthorst and Telgen (2006) looks at public procurement as any formal arrangement be it through buying, renting, leasing, hire purchasing, licensing, tenancy franchising or any other contracting mechanism available for public usage. The whole process cycle starts with the identifying of specific needs to the closing out of the contractual relationship with the supplier of these goods and services. Entities statutorily established by law are mandated to undertake procurement on behalf of the government (Public Procurement Act, 2003).

Advocates of modern procurement management systems in governance see it as an enabler of economic development. Public units of democracies, multi-lateral donors and other global aid groups all use public procurement as a vehicle to aid and donor relief programs intended to curb diseases, reduce poverty, creating employment, reduction of damaging environmental impact and promoting socio-economic development (Kashap, 2004). The United Nations Commission on International Law provides an exemplar law aimed at maximising economic effectiveness in procurement and fostering participation in procurement proceedings by small contractors and suppliers with the attending benefits of generating employment and reducing poverty.

One major feature of the approach to compliance with procurement legal norms at the national level is the extent to which governmental authorities adopt tools of enforcement (McCrudden, 2007). Many governments in developing countries rely extensively on regulations as the basic controlling mechanism in public procurement policy implementation. This is particularly so in countries with the dominant political concerns as the principles of openness and

accountability in public procurement management (Schapper, et al., 2006). In this regard, Hunja (2003) write that several countries have instituted reforms aimed at strengthening procurement sectors, promoting competition, openness, efficiency, and ensuring accountability.

According to OECD (2003), a strict commitment to public procurement legislation is vital to judicious utilisation of public funds to achieve development goals. Crucially, a commitment to rigorously enforcing the rules of public procurement and non-discriminatory application of sanctions against erring entities transparently is vital to the operations of an acceptable procurement regime. In the words of Osei-Tutu et al. (2010), it is when enforcement measures are implemented that the reform objectives stated above can be achieved. Adhering to procurement provisions is vital in the achievement of policy objectives. The authors identify that where procurement regulation objectives are not accompanied by strict enforcement and compliance measures, the policy objectives gradually ground to a failure.

OECD (2003) reports that a rational for procurement activities in the three East African countries are disrupted as a result of legal frameworks that are ambiguous, unenforced, not complied with, and hence have been ineffective to ensure efficient and cost-effective purchases. No doubt, the procurement reforms in Kenya, Tanzania and Uganda have focussed more on legislative enforcement. The Public Finance Act 2001 and Public Procurement Act of Tanzania for example, provide clear enforcement mechanisms and specifies clearly sanctions for non-adherence to the provisions of the Act. Osei-Tutu et al. (2010) argue that an inflexible compliance mechanism can lead to process sidestepping. For instance, a strict expedited procurement process might circumvent the transparency of the processes, achieving goals of efficiency but opening the process to administrative corruption.

According to the writers, what is more important in ensuring a high level of compliance is the permanent monitoring of procurement supervision. Control, therefore, plays a key role in procurement enforcement. It is essential for a procurement unit to have frequent external audits including Compliance/Performance Indicators (CPIs) to ensure higher compliance. In Kenya for example, the Public Procurement

Oversight Authority (2007) reports that lax enforcement and follow through on external audit findings account for inefficient and often lengthy mis-procurement corrective actions. This view is supported by Pegnato (2003) that a rigid enforcement framework is not responsive to the needs of the entities and so defeats the goals of efficiency and flexibility in procurement.

The EU Public-Sector Remedies Directive as captured in Gelderman et al. (2006) maintains the inadequacy of existing remedies at the national level to ensure compliance and enforcement of the public procurement actions is usually shown by the inability of governments to correct infringements and ensure a strict adherence to the rules defining procurement in the public services. The enactment of subsidiary directives to deepen decentralisation ensures efficiency by bringing procurement activities to every

Table 1: Rating of Compliance

district. This has helped to address disparities in the urban and suburban SMEs access to opportunities of

participating in the procurement processes and increased competition in pricing thus lowering the overall cost and increasing the offering of products available to the public sector. While conceding that the country's courts are not directly involved in crafting procurement legislation, Thai (2001) reaffirms the importance of the judiciary in enforcing compliance through the adjudication of contract disputes. This process is vital as it inspires the confidence of all parties in the process.

With regards to this research, the PPA is mandated by Sections 3(d) 13(e) and 3(h) of the Act (2003) to evaluate the performance of the various units under its purview to ensure adherence to the specifications of the Act. This research intends to ascertain whether public entities comply with the regulatory framework of the procurement reform. To achieve this, the rating of compliance by the World Bank/OECD/DAC was adopted.

| <i>Main Compliance Areas</i> | <i>Key Compliance Indicators</i> | <i>Information rated on a scale of 0-5</i> |
|--|---|--|
| <i>Management Systems</i> | <i>Effective Leadership</i> | <i>Seeking technical support from the body with oversight role</i> |
| | | <i>Carrying out internal procurement auditing</i> |
| | | <i>Good record keeping</i> |
| | <i>Human Resources Development</i> | <i>Having Staff with professional procurement qualification</i> |
| | | <i>Putting internal auditors in place and giving them procurement training</i> |
| | | <i>Evaluation of performance of procurement staff</i> |
| | <i>Monitoring and Control Systems</i> | <i>Putting proper payment systems in place for every contract</i> |
| | | <i>Capturing procurement transactions in Cash budgets</i> |
| | | <i>Putting in place quality control mechanisms for contracts</i> |
| | | <i>Effective use of available procurement information dissemination</i> |
| | <i>Compliance with ethics and regulatory framework</i> | <i>Appropriate use of procurement plans and contract documents</i> |
| | | <i>Use of Standard Tender Documents (STD) and Manuals</i> |
| <i>Use of right procurement methods</i> | | |
| <i>Complaints system, structure and sequence</i> | <i>Fairness and transparency in resolution of cases within the terms established in the legal framework</i> | |
| <i>Information and Communication</i> | <i>Procurement Information searching and Dissemination</i> | <i>Awareness of use procurement website, procurement internal notice boards and newspapers</i> |
| | | <i>Capacity to use and using the procurement information dissemination systems</i> |
| | <i>Interaction with the</i> | <i>Having knowledge of and interacting with the marketplace</i> |

| | | |
|------------------------------------|---|--|
| | <i>marketplace</i> | <i>Interacting with all procurement stakeholders</i> |
| <i>Procurement processes</i> | <i>Procurement Planning</i> | <i>Having an adequately defined procurement plan</i> |
| | | <i>Posting plan on the net</i> |
| | <i>Procurement Publicity</i> | <i>Advertising tender invitations</i> |
| | | <i>Sending information for placement in procurement bulletin</i> |
| | | <i>Using internal notice boards to display procurement information</i> |
| | <i>Bid Preparation and Invitation</i> | <i>Use of STDs</i> |
| | | <i>All bid documents containing same evaluation criteria</i> |
| | | <i>Stating reasonable date and time for bid opening</i> |
| | <i>Submission, opening and evaluation of bids</i> | <i>Stating date, time and venue for bid submission</i> |
| | | <i>Stating date, time and venue for bid opening</i> |
| | | <i>Having secured tender box in place</i> |
| | | <i>Having tender opening register</i> |
| | | <i>Keeping minutes of bid opening including all opening records</i> |
| | | <i>Evaluating tenders in accordance with tendering requirements</i> |
| | <i>Award of Contract</i> | <i>Notifying Winner of Contract</i> |
| <i>Publicising contract awards</i> | | |
| <i>Notifying losers of bid</i> | | |
| <i>Contract Management</i> | <i>Project Planning and Mobilisation</i> | <i>Taking Works Programme from executers</i> |
| | | <i>Taking Advance payment Guarantees for advance payments made</i> |
| | <i>Project Implementation and Supervision</i> | <i>Preparation of project monitoring reports</i> |
| | | <i>Organisation of project progress meetings</i> |
| | | <i>Comparing and analysing planned progress against actual</i> |
| | <i>Inspection and Inventory control</i> | <i>Preparation of completion or delivery reports</i> |
| | | <i>Preparation of Handing over certificates</i> |
| | | <i>Use of appropriate stock control record system</i> |
| | <i>Disposal</i> | <i>Forming the required membership of Board of survey</i> |
| | | <i>Keeping minutes of meetings of Board of survey</i> |
| | | <i>Keeping records of items disposed</i> |

Source: World Bank/OECD/DAC (2005)

Methodology

For the assessment of compliance with the key global best practices, the study looked at four core compliance areas. A select number of indicators were used to assess the compliance with the levels. Baseline data quality and availability remains a key challenge in much of the developing world with Ghana being a case in point. As a result, we considered only four main aspects of compliance to the procurement protocols. The determination or assessment of compliance levels was determined by administering structured questionnaires. There was a total of 25 ministries in Ghana (Ghana Statistical

Service, 2014), out of which 12 ministries were purposively selected. The research was limited to 12 MDAs out of 25 MDAs. These MDAs were purposively selected for this study based on being perceived as not being active. Generalisation of the level of compliance is therefore limited to the 12 selected MDAs. Compliance assessment

Table 2: Level of Compliance

means adopted for this study came from the Public Procurement Authority; hence any limitations they were exposed to affected this study. The data collection was hampered by the close-ended questionnaire. This, it has been

noted as limiting the amount of data collected. In all probability, relevant data might have escape the attention of the researcher. This caveat must be present in any research involving a close-ended questionnaire. That notwithstanding, the results are thought provoking and can be regarded as a basis for more detailed and analytical work on the topic in future.

Analysis and Discussion of results

The summary statistics in Table 2 indicated low levels of compliance in the Ministries. The procurement systems had a good mechanism in place compared to the other three main areas of compliance. The ministries showed a persistently low levels of compliance with none attaining 50 percent in all the four key compliance areas (see Table 2).

| Name of Ministry | Management Systems | Information and Communication | Procurement Process | Contract Management | Total |
|---|--------------------|-------------------------------|---------------------|---------------------|--------------|
| Ministry of Education | 30.57 | 15.00 | 7.90 | 9.30 | 15.69 |
| Ministry of Youth and Sports | 15.00 | 10.32 | 12.98 | 8.40 | 11.68 |
| Ministry of Health | 15.00 | 20.00 | 33.70 | 12.67 | 20.34 |
| Ministry of Lands and Natural Resources | 28.50 | 1.37 | 14.50 | 2.70 | 11.77 |
| Ministry of Employment and Social Welfare | 29.72 | 8.90 | 27.80 | 5.89 | 18.08 |
| Ministry of Transport | 38.53 | 13.10 | 22.84 | 16.00 | 22.62 |
| Ministry of Env't, Sci, Tech and Innovation | 21.20 | 12.58 | 25.40 | 12.00 | 17.80 |
| Ministry of Works and Housing | 28.90 | 14.00 | 30.40 | 13.51 | 21.70 |
| Ministry of Finance | 35.30 | 28.53 | 55.70 | 32.70 | 38.06 |
| Ministry of Trade and Industry | 30.00 | 18.00 | 40.92 | 21.11 | 27.51 |
| Ministry of Energy and Petroleum | 28.45 | 23.90 | 38.50 | 29.80 | 30.16 |
| Ministry of Roads and highways | 8.50 | 6.40 | 23.00 | 15.85 | 13.44 |
| Overall Compliance | 25.81 | 14.34 | 27.80 | 14.99 | 20.74 |

The ministry with the highest compliance level is the Ministry of Finance. It is noted that the compliance levels of Ministry of Finance were consistently higher, an indication of that ministry as a pipeline for most public construction works which requires a higher knowledge of the provisions of the Act. Some engagements such as supply of furniture for schools were also contracted through the municipal and district assemblies. It was established that contracts for the construction of hospitals are mostly performed through the MMDAs.

The Ministry of Finance had the overall compliance level (38.06%), followed by the Ministry of Trade and Industry (27.51%). The Ministry of Youth and Sports had the least level of compliance (11.68%). Overall the health sector's

compliance was higher than education. Admittedly, the education sector is unique with its numerous schools purchasing a lot of low value consumables. Again, qualified staff are not available at the school levels. This responsibility tends to fall on the shoulders of matrons and accounting staff. (Osei-Tutu, et al., 2010).

Information and Communication had the lowest level of compliance (14.34%). One reason that can be associated with this could be the lack of connectivity to enable procurement personnel access information on practices over the internet particularly in some remote and newly established districts. This makes it difficult of procurement officials to have access to the procurement website and also interact with other stakeholders. Also, the lack of periodic training for staff of the procurement function, manifested itself through the lack of mastery using the World Wide Web effectively in disseminating contracting related information to bidders.

The level of compliance to the Act is a determinant of how entities are abiding by the provisions specified in the legislation. Some industry players have argued that the delays in awarding of contracts in Ghana is as a result of the onerous processes the contracts go through. It has been observed that most contract awards are late due to lack of adequate planning during the procurement processes. Sohail and Cavill (2008) attributes the malpractices in the procurement processes to lack of education on the part of officials of the procurement units.

Generally, low compliance with some of the processes including notifying successful bidder, publicizing contract awards, notifying unsuccessful bidders, using internal notice boards to display procurement information and the use of standard tender documents is attributed to inadequate capacity of procurement personnel. In March 2005, The Paris Declaration on Aid Effectiveness highlighted the need to develop the procurement capacity of developing nations (OECD, 2005). At the top of the agenda of the procurement function in developing countries is the training and skilling of procurement managers and contractors in public entities in both practise and the operation of the procurement law.

The procurement system that registered very low level of compliance were contract management and Information Technology. Institutions and entities did not show enthusiasm in integrating contract management and technology. It is obvious that the path to e-procurement was a long way off in terms of preparation of personnel of the procurement function. There is also a general readily available documentation on contracts. Of the institutions surveyed, it was also discovered that reporting from procurement managers related to project implementation and supervision, monitoring, delivery, and disposed items reports and documents on stock control were not generally comprehensive and compliant with the provisions of the law.

Conclusion

Our assessment is on four main areas of compliance. The overall adherence to the Act's provisions in the Accra Metropolis is 20.74. This show that the compliance level is very low and this confirms other studies by the World Bank and the PPA. This finding affirms conclusively that there is a general low level of compliance to the provisions of the Act.

The public sector with the highest level of compliance was the Ministry of Finance. The Ministry of Youth and Sports had the least level of compliance. Adherence to the Act (2003) by procurement entities remains a big challenge to achieving the goals of accountability, fairness and openness in the public sector in the country. Other area with low levels or in some cases outright noncompliance include invitation to tender and contract awards. This is an area of concern to the researcher. In line with the operational activities of the procurement system in Ghana and at the stage of the implementing agencies mandated for initiating procurement activities, it was concluded that procurement officials were not keeping proper records. Proper accounting procedures were not in place for procurement officials.

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Evaluate the bacterial and fungal growth on the biological tissues preserved by gum Arabic solutions

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Abstract: Silicone-S10 plastination process is a modern technique used in preservation of biological tissues for long term and the preserved specimens are used in teaching gross anatomy for medical students, but it's relatively cost. In the previous study by Satte et al., in 2017, was used gum Arabic solutions as low cost materials in preservation of biological tissues, and the produced samples were maintained their anatomical features for the long-term. The current study was aimed to test the safety of tissues preserved in gum Arabic solution by evaluated the bacterial and fungal growth on the samples surfaces and compared with the same organs preserved in silicone-S10 as control. The study was conducted on 4 groups, each group contained 4brains, 4kidneys, and 4hearts. The first 3 organs from each group were obtained from gum Arabic solution preserved organs (test group), while the fourth organ from each group preserved by silicone-S10 as control group. Swab samples were taken from superficial and deep surfaces of each kidney, heart, and brain subsequently. Each sample was inoculated in different bacterial and fungal culture media then cultured in an incubator at 37 C⁰ for overnight. The gum Arabic solutions preserved tissues revealed no bacterial and fungal growth as in control group. We concludes that; tissues preserved in gum Arabic solutions reveal no bacterial and fungal growth, and this indicated that the preserved specimen could be used as safe and inexpensive samples in teaching gross anatomy for medical students instead of costive silicone-S10 preserved tissues.

Keywords: gum Arabic, bacterial growth, biological tissues, fungal

Introduction

Each year new medical students make their entry into the medical and veterinary colleges. The difficulty of obtaining fresh organs and tissues to study anatomy has encouraged the use of preserved ones. There are several methods for the preservation of biological tissues, which has helped a lot in the study of anatomy for medical and veterinary students and researchers. In ancient times, gum Arabic and some local materials such as natron and herbs were used traditionally by Egyptians to preserve cadavers.¹ Century's later, formalin solutions have been used for fixation of tissues, but formalin has health hazards such as watery eyes; burning sensations in the eyes, nose, and throat; coughing; wheezing; nausea; and skin irritation for students and staff during practical section.² Recently, plastination was introduced as a modern and safe technique for the preservation of cadavers by Von Hagens in 1979. During the plastination process, the tissues were fixed in formalin (5 to 20%), dehydrated in acetone, impregnated in curable silicone-S10 or epoxy resin and cured by silicone-S6. The silicones used in the plastination procedure are relatively expensive, not available and patented.³ Gum Arabic solution components are the gum Arabic powder, glycerin, and distilled water, and these materials are available and safe.⁴ Gum Arabic solutions were tested as an effective material for the biological tissue preservation process, and the produced specimens were maintaining their original anatomical features for the long-term.⁵ This study aimed to evaluate the bacterial and fungal growth on the biological tissues preserved by gum Arabic solutions.

Material and methods

A total of 12 organs of adult sheep were collected from biological tissues preserved in gum Arabic solutions and silicone-S10 for long-term (4years), in anatomy department, medical college, Najran University, KSA. These organs were divided into three groups namely, group 1, group 2, group 3; each group contains 4 brains, 4 kidneys, and 4 hearts respectively (Tables 1, 2, 3). The first three organs from each group were obtained from tissues preserved in three different concentrations of gum Arabic solutions as test groups, while the fourth one organ from each group was obtained from tissues preserved in silicone-S10 as control group.

Swab Sample was taken from each one of the above preserved biological tissues (from superficial and deep surfaces), and each swab taken was labeled (Tables 1, 2, 3). The swab samples were inoculated in different bacterial and fungal culture media such as blood agar, macConkey agar and sabroutes dextrose agar. The sample cultured in an aerobic incubator at 37C⁰ for 24 hours, and then the samples were examined regarded to bacterial and fungal growth on the superficial and deep surfaces of each preserved organ.

Table 1: Brains and their preservative solutions and the swab sample labels.

| Samples | Concentration of gum g/L | Glycerin % | Swab Labels |
|---------|--------------------------|------------|-------------|
|---------|--------------------------|------------|-------------|

| | | | |
|---------|---------------------------------|----|-------|
| Brain 1 | 227 | 10 | 001S |
| | | | 001D |
| Brain 2 | 100 | 85 | 002S |
| | | | 002D |
| Brain 3 | 50 | 80 | 003S |
| | | | 003D |
| Brain 4 | Control solution (silicone-S10) | | 00C1S |
| | | | 00C1D |

S= swab sample from superficial surface of the brain, D= swab sample from deep of the brain

Table 2: Kidneys and their preservative solutions and the swab sample labels.

| Samples | Concentration of gum g/L | Glycerin % | Swab Labels |
|----------|---------------------------------|------------|-------------|
| Kidney 1 | 227 | 10 | 004S |
| | | | 004D |
| Kidney 2 | 100 | 85 | 005S |
| | | | 005D |
| Kidney 3 | 50 | 80 | 006S |
| | | | 006D |
| Kidney 4 | Control solution (silicone-S10) | | 00C2S |
| | | | 00C2D |

S= swab sample from superficial surface of the kidney, D= swab sample from deep part of the brain

Table 3: Hearts and their preservative solutions, and the swab sample labels.

| Sample | Concentration of gum g/L | Glycerin % | Swab Labels |
|---------|---------------------------------|------------|-------------|
| Heart 1 | 227 | 10 | 007S |
| | | | 007D |
| Heart 2 | 100 | 85 | 008S |
| | | | 008D |
| Heart 3 | 50 | 80 | 009S |
| | | | 009D |
| Heart 4 | Control solution (silicone-S10) | | 00C3S |
| | | | 00C3D |

S= swab sample from superficial surface of the hearts, D= swab sample from deep part of the brain

Results:

The preserved brains, kidneys and hearts in gum Arabic solutions showed no bacterial and fungal growth on their superficial and deep surfaces, and they are similar to those obtained from the same organs plastinated in silicone-S10 (Figures 1, 2, 3).



Figure 1: preserved Brain in gum Arabic solutions (A) and their bacterial and fungal culture (B), showed no bacterial and fungal growth.

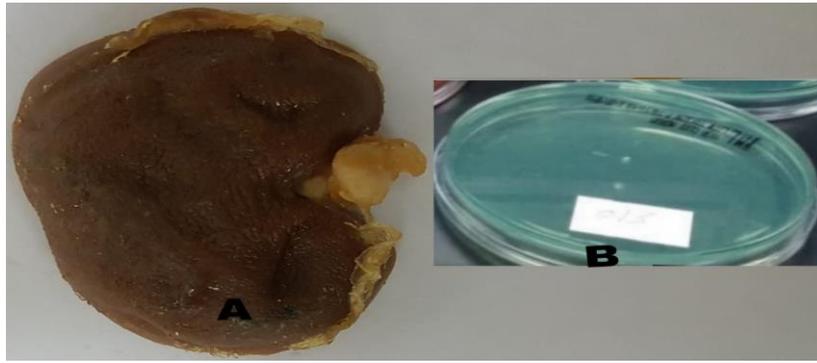


Figure 2: preserved Kidney in Gum Arabic solutions (A) and their bacterial and fungal culture (B), showed no bacterial and fungal growth.

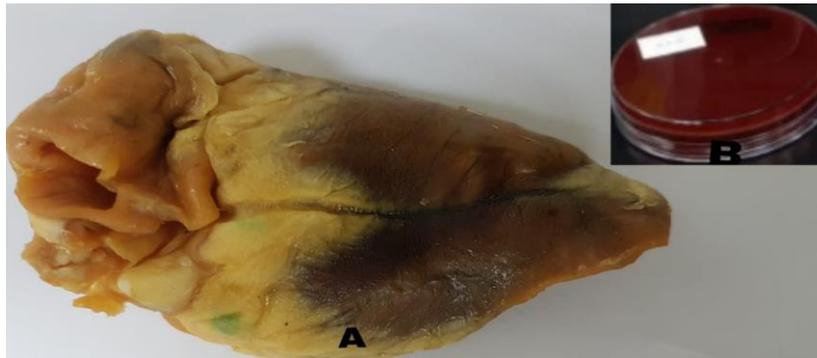


Figure 3: preserved Heart in Gum Arabic solutions (A) and their bacterial and fungal culture (B), showed no bacterial and fungal growth.

Discussion:

In this study, the preserved specimens in gum Arabic solutions are showed no bacterial and fungal growth on their deep and superficial surfaces after stored on shelves at room temperature for 4 years ago. During gum Arabic solutions preservation process, the force impregnation was used to infiltrate the gum Arabic solution within the tissue samples (kidney, heart and brain) and the content of gum Arabic solution were included: the gum Arabic powder, glycerine, and distilled water.⁵ In the current study we put the real reason of absent bacterial and fungal growths on the surfaces of specimens is due to use the gum Arabic solutions in preservation process.

The gum Arabic and glycerine are act as antibacterial growth as records by authors: Gum Arabic in ancient Egypt was used to determine their effectiveness in the preservation of the dead bodies and it's shown has anti-bacterial properties that protected the body from microbial attack.⁶ Gum Arabic is used in food and pharmaceutical industries as an emulsifier and long term stabilizer.⁷ Investigators revealed that the gum Arabic solution is having great power against microbial (Alkarib et al., 2016; Gayed & Hasan, 1966; Bnuyan et al., 2015; Al Alawi et al., 2018; Mohamed et al., 2014).^{8, 9, 10, 11, 12} Thus, all that the authors mentioned is consistent with our results, which the presence of gum Arabic in preservative solution prevented the bacterial and fungal growth on the samples surfaces. Although, in this study, glycerine was the one of the contents of preservative solution and this act as antibacterial agent as mentioned in previous study showed that the glycerine acted as antibiotic.¹³

Conclusion:

Biological tissues preserved by gum Arabic solutions for long-term showed no bacterial and fungal growth on their surfaces and the produced specimens can be use as safe and inexpensive samples in teaching gross anatomy in medical and veterinary colleges.

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A Case Series Of Poorly Differentiated Carcinoma Endometrium IHC Confirmed Reported at AHRCC Cuttack, State Odisha, Country India

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Abstract- Endometrial carcinoma has a high morbidity in advanced countries of eastern Europe and usa and japan, here its morbidity has increased in recent years . therefore it has become increasingly important to understand the oncogenetic mechanism and prognostic factors of endometrial cancer. It has reported that the grade of differentiation is one of the critical prognostic factors. Various studies reveal 5 yrs survival decreases with lower differentiation grades. 92% G1 well differentiated, and 86% and 74% respectively in G2 and G3. The poorly differentiated cancer have a higher rate of metastasis, recurrence and lower overall survival. Diagnosis of poorly differentiated cancer of endometrium may sometimes , be difficult and can be confused with other malignancies. here we report to cases of poorly differentiated carcinoma , confirmed by IHC

Index Terms- ET- ENDOMETRIAL THICKNESS, SOL- SPACE OCCUPYING LESION, BPLND- B/L PELVIC LYMPHADENECTOMY, BSO-B/LSALPINGOOPHERECTOMY, PDL-1 PROGRAM DEATH LIGAND

I. INTRODUCTION

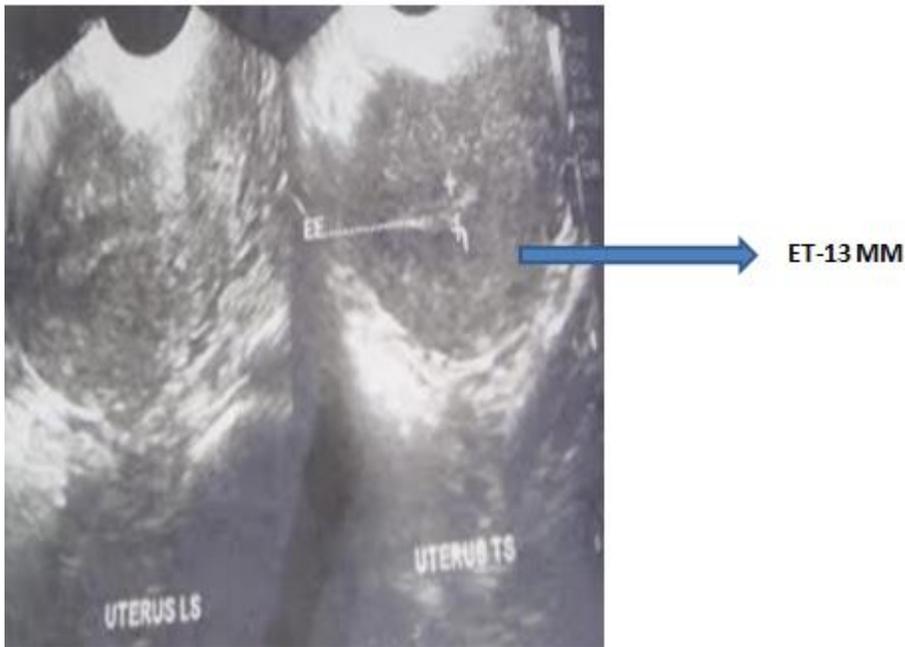
1st case-

History – 72 yrs female presented to opd with ,c/o – postmenopausal bleeding for 2 mths , no watery discharge , no pain abdomen. M/h- attained menopause 20 yrs back. O/H – p414/ all vd, lcb 32 yrs , Not sterilised .F/h – no family history of cancer .T/H- no history of any hormonal therapy

On/examination– average built , good nutritional status no scln, absence of pedal oedema , b/l- breasts normal on examination. P/A - soft ned .P/S- cx and vagina healthy. P/VP/R- Uterus bulky rv, b/l fornices free

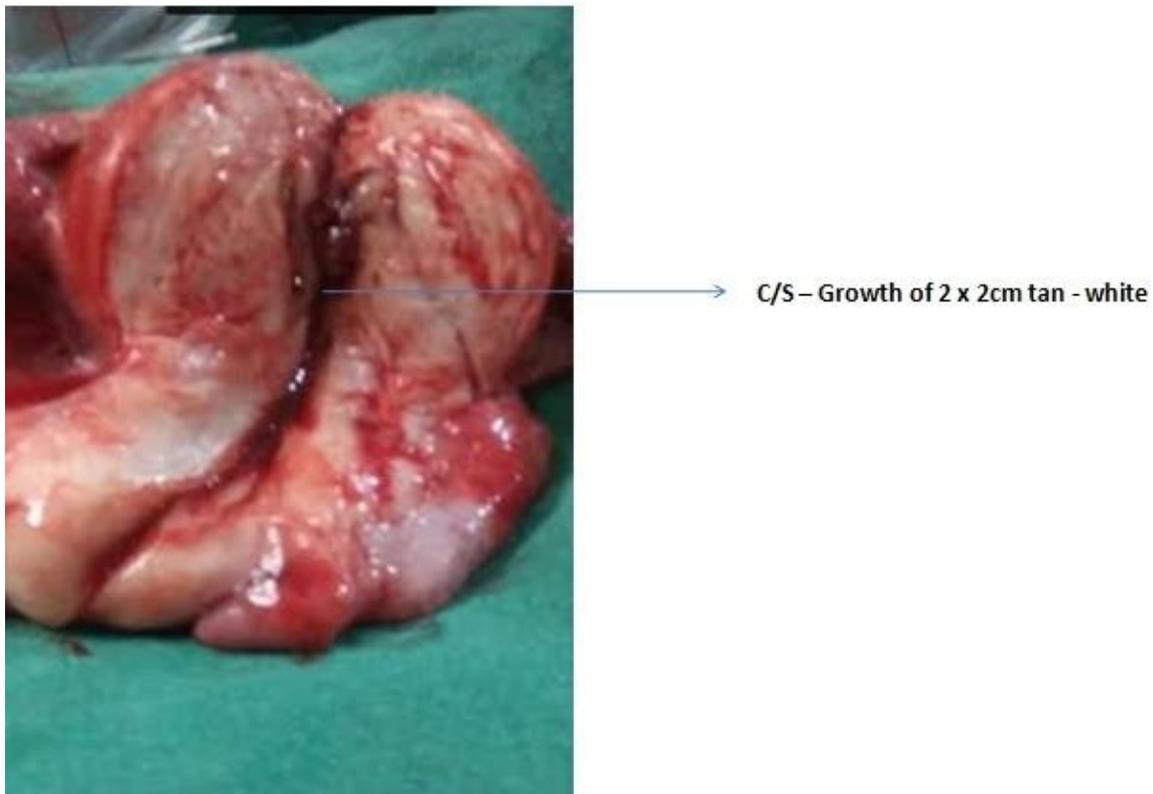
INVESTIGATIONS –

- **PAP SMEAR-** atypical squamous cell can't exclude hsil
- **USG - ET-** 18mm, no sol



- **DIAGNOSTIC HYSTEROSCOPY ENDOMETRIAL BIOPSY**- growth(2x2) seen in posterior wall in the fundus
- **EB**- Endometrial stroma with fragmented glands with areas haemorrhage
Plan - hysterectomy
- **Procedure** – ndvh
IOP – uterus bulky +b/l tubes and ovaries normal
- Cut section - 2x2 cm growth at fundus ,>% 50% myo-invasion, myometrium and endometrium could not be differentiated, endocervical cavity normal

HPS



gross

- cervix- chronic cervicitis and free of tumor
- b/l tubes and ovaries were free of tumor

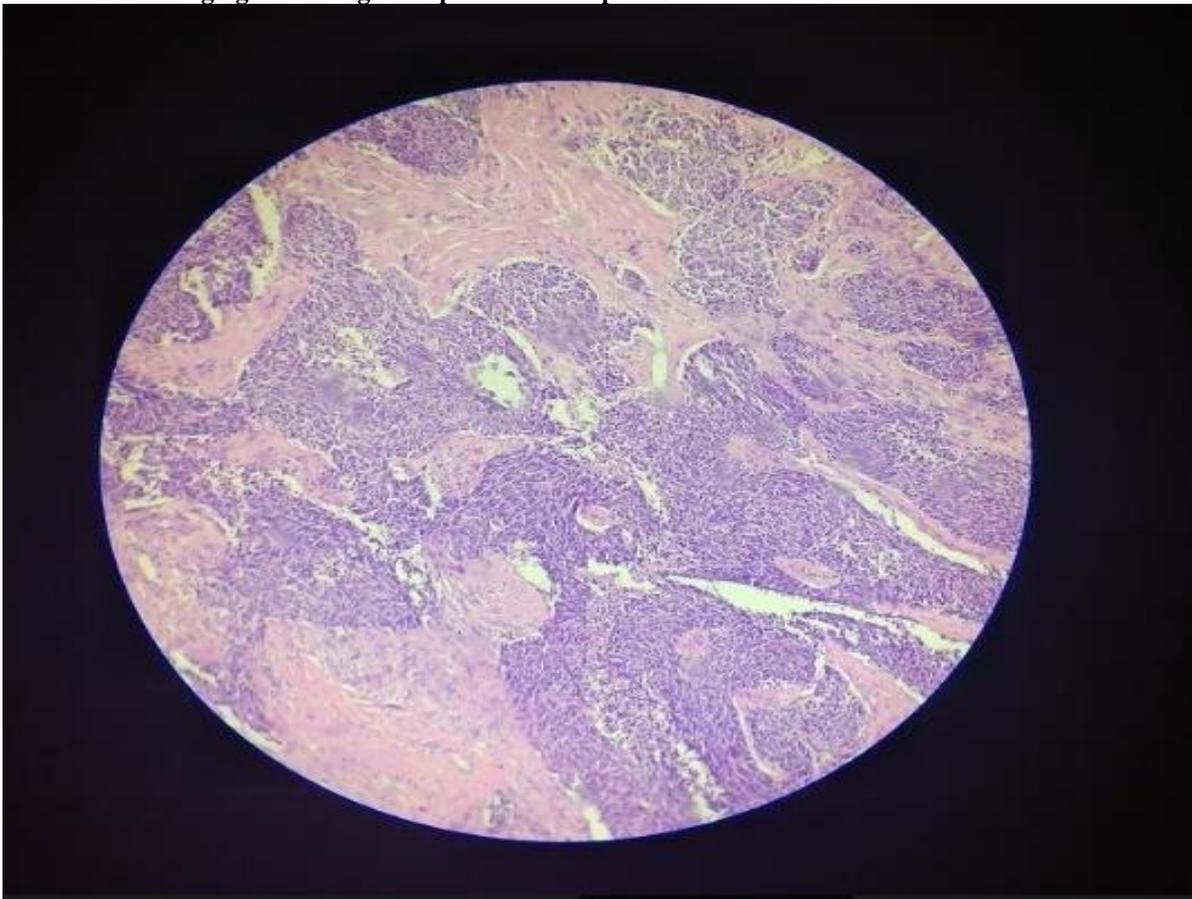


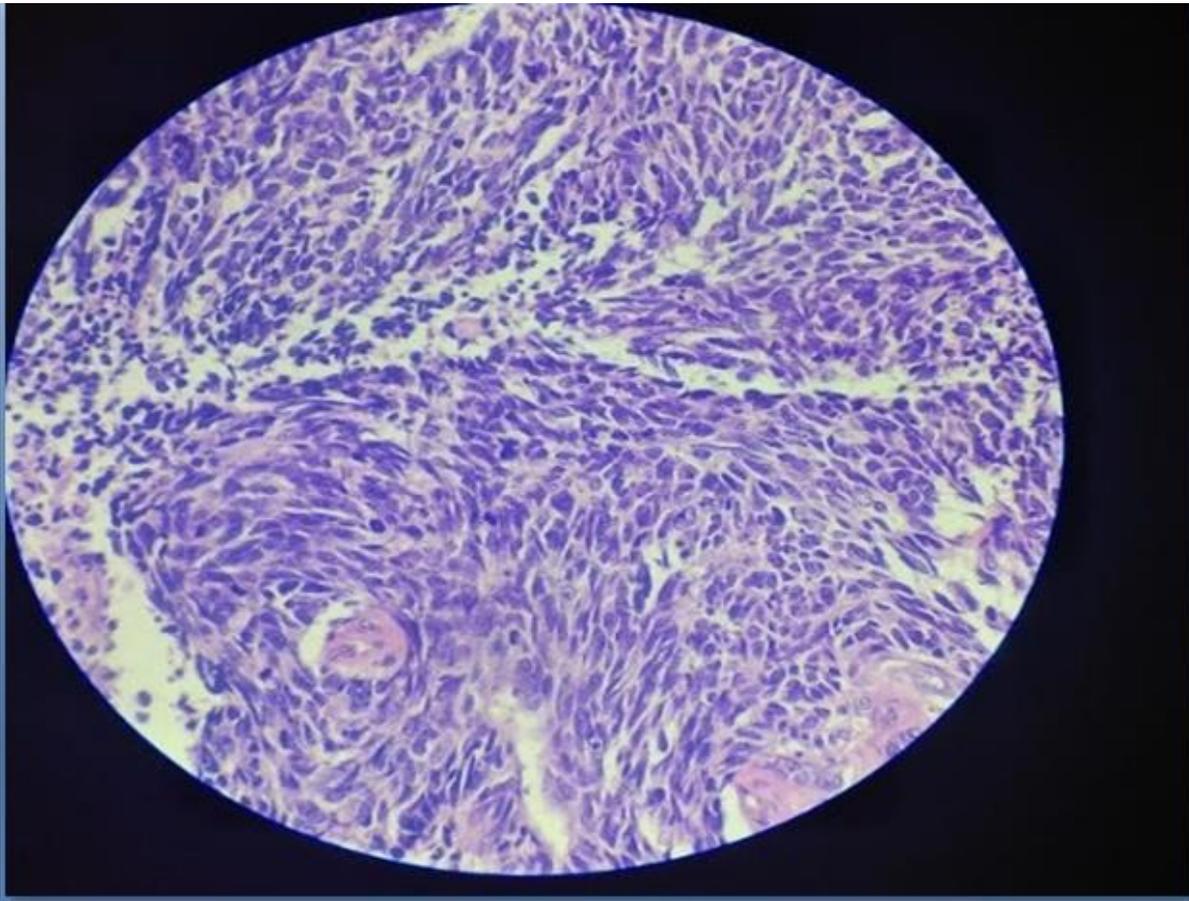
Rt Adnexa



Lt Adnexa

- section from the growth - highly grade malignant tumor consists of **spindloid to oval pleomorphic** cells present in small fascicles , arranged in whorled pattern ,separated by fibrous tissue
- 40-45 / HPF mitotic figures . Both typical and atypical mitotic figures noted
- necrosis seen (<50%), > 50% myo-invasion, uterine serosa free of tumor
- **IMP – high grade malignant spindle cell neoplasm**





- **D/D – poorly differentiated carcinoma**
leiomyosarcoma
undifferentiated sarcoma
uterine stromal cell sarcoma
carcinosarcoma
IHC done
- SMA , CD10 , CK , S100
- SMA –**NON REACTIVE SCORE 0**
- CD-10 – **IMMUNO REACTIVE 1+**
- S100 - **NONREACTIVE**
- CK - **IMMUNO-REACTIVE3+**
- WT-1 – **NON REACTIVE**
- PAX-8- **NON- REACTIVE**
- **IMP- poorly differentiated carcinoma with spindle cell morphology, native endometrial tissue**

Post op usg – normal usg of adomen and pelvis

Planning CT and chest xray – normal

DIAGNOSIS – HIGH GRADE POORLY DIFFERENTIATED ENDOMETRIAL CARCINOMA OF SPINDLOID MORPHOLOGY STAGE IB (sarcomatoid variant of endometrial carcinoma)

Treat ment – planned for adjuvant RT(3drt) with CT
presently receiving EBRT

CASE -2

A 63 yrs female presented to opd c/o –pmb- 10 days

o/h p6lcb 40yrs, menopause 20yrs

G/E-NAD

P/D- NAD

P/S- cervix flushed with endocervicitis

P/V- ut rv, para free ,b/l fornices free

Investigations- **USG**- bulky uterus(8.6x4.8x6.1cm) with hyperplastic endometrium
ET- 30mm
Ovaries-not imaged,No adnexal; mass



MRI – findings reveals a enhancing mass lesion in the anterior fundic region & involving anterior myometrium(>50%) with peri uterine fat plane and sparing b/l parametrium,sparing cervix, no enlarged lymphadenopathy, normal MR evaluation of the upper abdomen, finding consistent with ca endometrium.

EB- invasive squamous cell carcinoma cervix,G2

PLAN – COMPREHENSIVE SURGICAL STAGING

IOP-no free fluid

Uterus 8 wks size, b/l adnexa normal

All lymph nodes enlarged

All abdominal organs normal

Omentum normal, mild adhesion

c/s- 5x6 cm mass in the fundus, with >50% myoinvasion ,endo cervix not involved

PROCEDURE – TYPE II RADICAL HYSTERECTOMY+BSO+BPLND

adhesiolysis

peritoneal washings taken

adequate parametrium, vaginal margin taken, hysterectomy done

HISTOPATHOLOGY – gross – cut open section uterus- growth present in fundus 3x2x1, no myometrial invasion, myometrial thickness free of tumor. Lymphnode isolated largest 1.2 cm diameter.



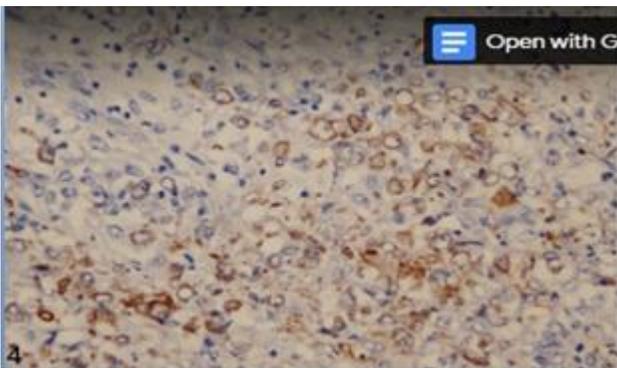
High grade, depth of invasion. .50%, lvsiv-ve,b/l para and b/l adnexa free of tumor, cx- chronic cervicitis

Imp-features suggestive of undifferentiated high grade sarcoma

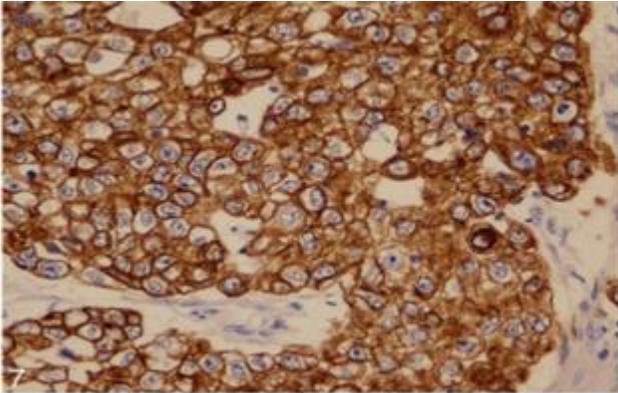
d/d- epithelioid leiomyosarcoma

poorly differentiated carcinoma

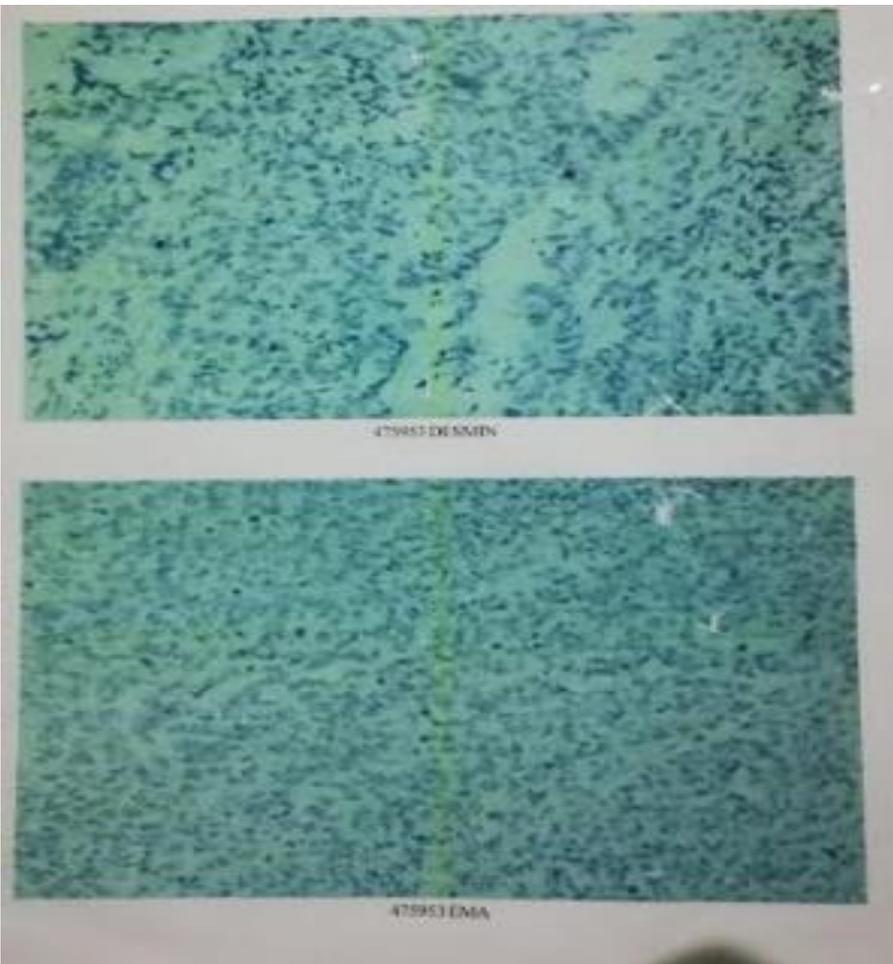
Ihc - panel CK3+VE, EMA -VE,CD10—VE, SMA-VE
DESMIN-VE, Ki-67 -VE3+
CD-117- VE, INHIBIN- VE, CALRETININ-VE,SOX--VE



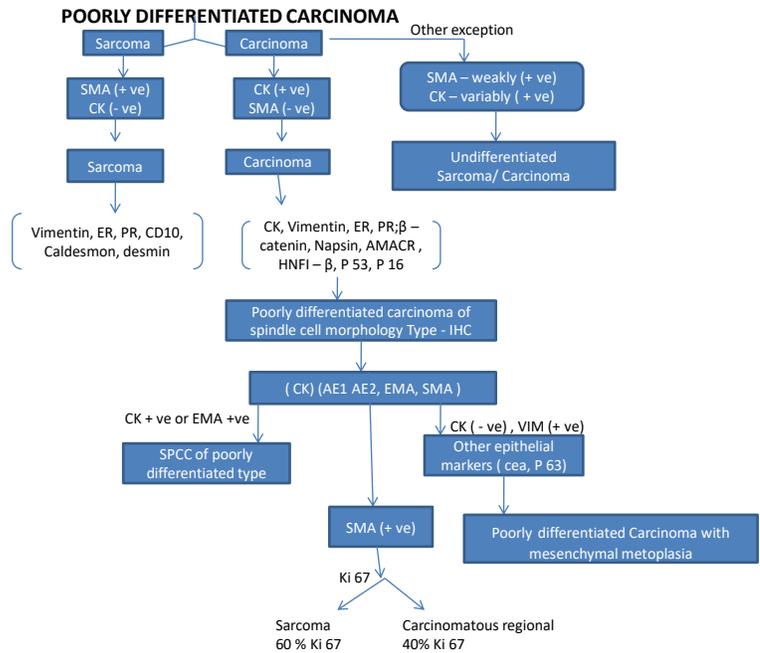
Focal and intense positivity of of cytokeratin in poorly differentiated carcinoma



Intense diffuse positivity of cytokeratin in a poorly differentiated carcinoma



• FLOW CHART TO DIAGNOSE : UTERINE SPINDLE CELL MORPHOLOGY



Immunohistochemical (IHC) markers in the differential diagnosis of endometrial carcinomas

| | Vim | ER | PR | ARID1A | β-cat | AMACR | HNF 1β | Napsin A | P 53 | P 16 | Specific |
|---------------------|-----|-----|-----|--------|-------|-------|--------|----------|------|------|--|
| Endometrial tumours | | | | | | | | | | | |
| EMC | + | + | + | M>wt | M>wt | +/- | - | - | Wt>M | -/+ | PTEN & MMR loss |
| USC | + | - | - | Wt | Wt | - | -/+ | - | M | + | CCNE 1 amplification |
| CCC | + | - | - | Wt | Wt | -/+ | + | +/- | Wt>M | - | MMM loss |
| UC | - | - | - | Wt | M>wt | NA | - | NA | M>wt | -/+ | E-cadherin & MMR loss |
| MMMT | + | -/+ | -/+ | Wt>M | Wt | NA | - | NA | M | + | WT1, desmin, CD10, S100, myogenin, Myo-D1, h-caldesmon, Biphasic pattern |

IHC in favour uterine carcinoma

- **CK- CK-(AE-1/AE-3,8,18)** is frequently positive, **CK- 18** more frequently positive(1)
 - **CAM5.2** (2)
 - **EMA-** usually focally positive, very rarely diffusely positive
- special emphasis should be give **to intensity of staining of keratin AND EMA** than the percentage of staining(3)
- **ER/PR-** CONFLICTING DATA(1)
 - **Vimentin** -ve or may be focally positive,
 - Focally positive **CD-10.**
 - **Focal positivity for S-100, CD- 56**

OTHER IHC MARKERS

- **Synaptophysin, chromogranin,CD56-** usually -ve, may be focally positive(4,5)
- **P-16-is** diffusely / strongly positive +/-ve

- **P53 wt- weakly nuclear positivity seen**

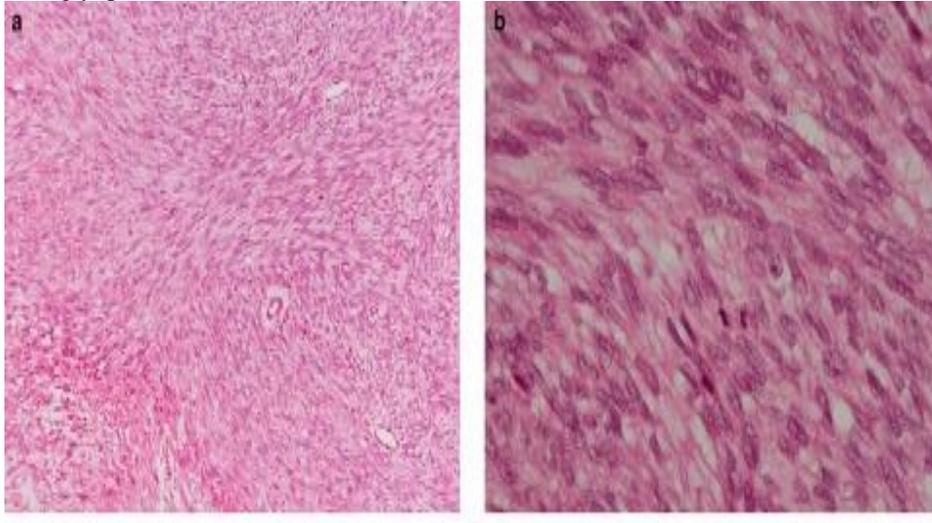
SPECIFIC- loss of , E- CADHERIN(4,5)

Poorly differentiated carcinoma - is completely negative SMA, desmin ,HMB-45

Differential diagnosis

1.UNDIFFERENTIATED STROMAL SARCOMA /PDEC(9)

CK- Negative , negative of epithelial markers
strongly positive for **CD-10,**



LEIOMYOSARCOMA /UEC(2)

- CD 10 - -VE
- **Sma-+ve**
- Desmin+ve
- Caldesmon +ve
- Negative - **Cytokeratin** except the epitheloid leiomyosarcoma may be focally positive
- **RHABDOMYOSARCOMA / UEC (SPINDLE CELL MORHOLOGY)(10)**
- Uniform spindle cell with a **herring bone pattern**
- Negative or else focal reactive FOR CK
- **SMA -+VE**
- **DESMIN+VE, MYOGLOBIN+, CALDESMON**
- **+ve in spccBAF-47(INI-1)** this protein is lost in rhabdoid tumor,

Carcinosarcoma / PDEC(SPINDLE CELL MORPHOLOGY)(8)

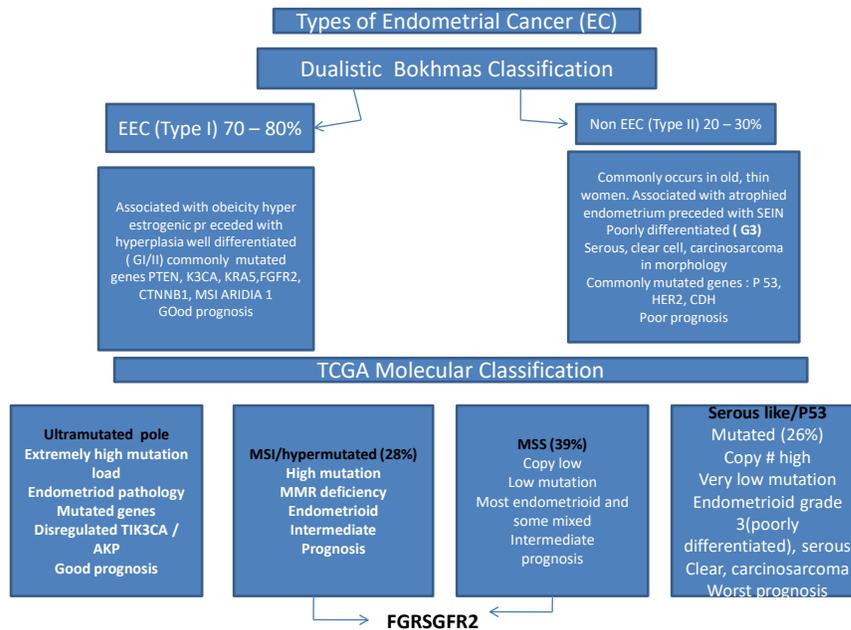
there is disinct compartmentalisation of the carcinoma and sarcomatous component. There are presence of heterologous elements
ihc +VE WT-1/P53 is helpful indifferentiating from spindle carcinoma. Morphological features is enough for diagnosis

uec/ grade 3 endometrial (7)

| Morphology | UEC | ENDOMETROID |
|-----------------------------|------------------------------|-------------------------------|
| Growth | Diffuse | solid and glandular |
| Glands | absent | present in 1-4% of tumor area |
| Cords trabeculae | vague | |
| Component | sharp demacation | intermingled demarcation |
| Cohesive growth | dyshesive squamoid | cohesive |
| Rhabdoid | may present | absent |
| Myxoid | may be present | absent |
| IHC – PANCYTOKERATIN | patchy /focal | diffuse(b) |
| EMA | patchy/focal | diffuse(b) |
| ER/PR | focal | diffuse(b) |

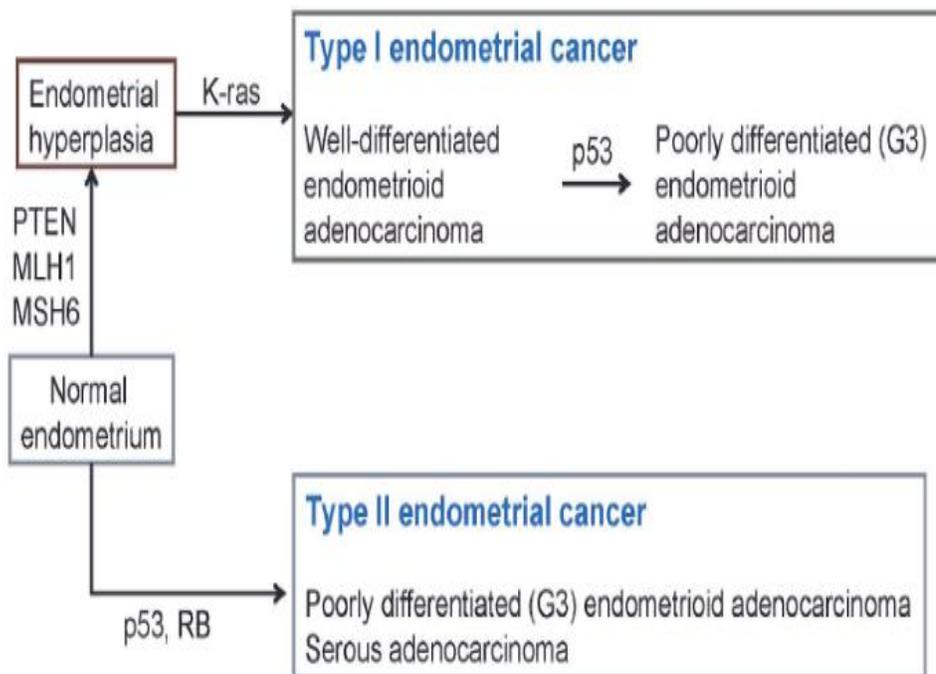
Review literature –

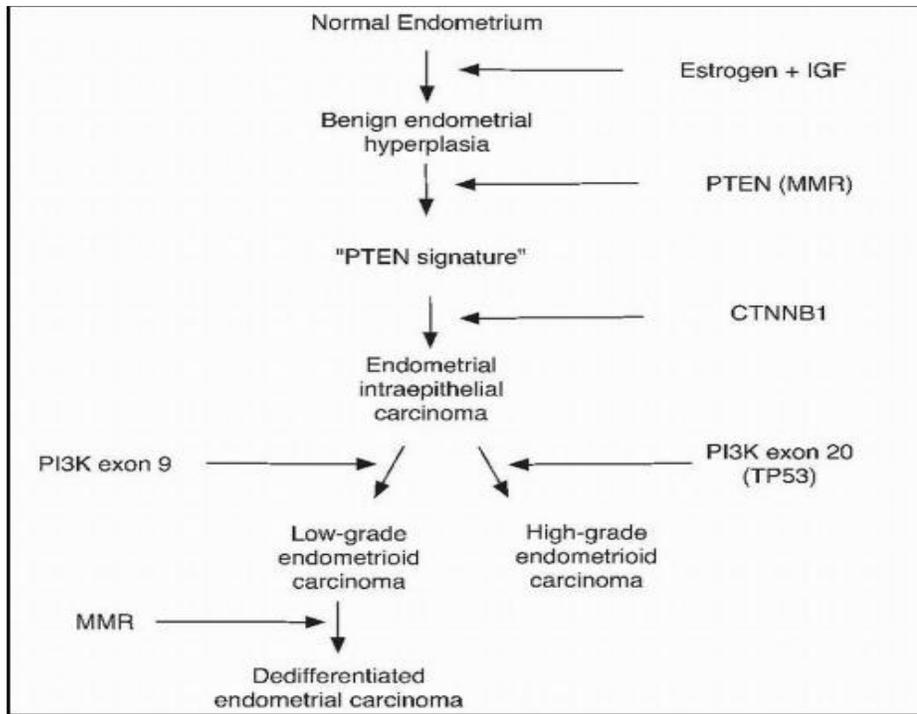
- Poorly differentiated carcinoma is a type II endometrial cancer, about 20% of endometrial cancer(1)



- This group is also associated with hereditary non-polyposis colorectal carcinoma(Lynch syndrome).Significant number of patients display loss of 1 more DNA mismatch repair.

Pathogenesis





About half present in higher stage(III AND IV)(2)

GROSS PATHOLOGY- may present as polypoidal fleshy masses with evident of necrosis

Usually involves the lower uterine segment

MICROSCOPICALLY- solid pattern less growth of medium size relatively monomorphic round or polygonal epithelial cells that lack glandular differentiation. Sometimes pleomorphism detected(5)

Very occasionally- spindle cell pattern, alveolar pattern is found in uc(3,4,5)

PROGNOSIS

- Prognosis is poor irrespective of age, stage, presence an number of tumor infiltrating lymphocytes, any rhabdoid or spindloid morphology
- Prognosis depends in MMR mutation,up AND DOWNREGULATION OF MI-RNAS due abberant methylation thus making it sensitive to taxanes.(6)
- P53 mutant type i.e mss high copy nos, worse pognosis
- variability in expression or of cell adhesive glycoprotein loss e- cadherin can determine the prognosis
- Other HER-2, ECAM poor prognosis
- ploidy status of these tumors usually aneuploid
- High grade g3 has high chances of recurrences in comparison to grade1 and 2.
- However there are instances where grade3 endometrial cancers do show a good prognosis
- The fact is validated by a japanese study taking 12 prognostic factor of grade 3 carcinoma into consideration . Among them absence of adnexal metastasis, no cervical involvement, low pre-surgery CA602 and a low CA-19.9 carried a favourable prognosis .(7)

MANAGEMENT –

Currently there is no difference in management of grade3 endometrioid, undifferentiated and dedifferentiated endometrial carcinoma all are HIGH RISK CATEGORY (8)

- TAH +BSO and chemotherapy and radiotherapy

OR

- surgical staging(TAH+BSO+ PARTIAL OMENTECTOMY+PERITONEAL WASHINGS+ B/LPLND+B/LPAND FOLLOWED BY EBRT +CT)
- PORTEC-3 TRIAL on HIGH RISK PATIENTS IN STAGE I-II OR STAGE III , revealed higher failure free survival and decrease in pelvic recurrences a of chemoradiotherapy(two concurrent cycles of cisplatin in weeks 1 and 4 of ebrt , followed by four cycles of carboplatin and paclitaxel) than EBRT alone

- **GOG 258 AND GOG 249 greater evidence support EBRT+ CHEMOTHERAPY**
- **E-cadherin is an independent predictor of survival of endometrial cancer, regardless of histology.(9,11)**
- **Loss of E-cadherin, is of poor prognosis, advance stage, poor differentiation.**
- **E-cadherin has a central role in organisation of epithelial structure (cohesiveness) it also regulates apoptosis.**
- **Presence of e-cadherin almost precludes invasiveness.**
- **It is also related tumor budding(11)**

Miyamoto et al studied and compared the expression of E-CADHERIN and cytoplasmic E-cadherin related molecules (alpha-catenin, beta catenin, gamma catenin, in well differentiated and poorly differentiated carcinoma .(11)

- **They reported significant difference in expression between the above two histological types.**
- **The recently used drug DASATINIB Increase the expression of e-cadherin, by repressing slug-mrna**
- **The literatures reveals the presence of E-cadherin**

Increases the sensitivity to EGFR inhibitors (10)

Immunotherapy in poorly differentiated endometrial cancer

- **Recent clinical phase II Trials on Nivolumab and Iplimumab in undifferentiated endometrial cancer**
- **The addition of pembrolizumab with paclitaxel and carboplatin is undifferentiated carcinoma in phase III trial**

Immune checkpoint inhibitors (ANTI-PD-1/PD-1 antibody, ANTI CTL-4 antibody) could be effective in treatment of poorly differentiated endometrial carcinoma and the presence of MSI may be a bio-marker for good response to PD-L1 immunotherapy

FOLLOW UP –

- **these patients should be on close follow up**
- **3 monthly for first- 3 months with usg, ct vault examination and cytology**
- **6 monthly for next 3 yrs**
- **thereafter once a year**

CONCLUSION – After correlating the hps and ihc we could reach the final diagnosis of poorly differentiated carcinoma of endometrium, accordingly planned her treatment

PURPOSE – The case series will throw some light in area of diagnosis and management of poorly differentiated carcinoma endometrium, keeping in view of its variety of hps morphology a broad differential diagnosis. To help in diagnosis of a poorly differentiated carcinoma, particularly the sarcomatoid or the spindle morphology can be sometimes be confused with sarcoma i.e undifferentiated sarcoma or a leiomyosarcoma or a rhabdomyosarcoma. Due to the confusing histopathology picture, IHC staining and interpretation may be required, to reach the final diagnosis.

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Causal Relationship of Employee Loyalty & Organizational Commitment Based On Satisfaction Model

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Abstract- This research paper examines causal relationship and impacts of employee's loyalty & organizational commitment in manufacturing industry of Tanzania. Research paper intends to find out the extent to which factors such as: job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training affect the loyalty and commitment. To achieve the purpose, study uses quantitative approach by conducting a survey in manufacturing industry of Tanzania, (Corporate Sector). Slovin's formula will be used for sampling. Further SPSS will be used to analyze the 5 likert scale questionnaire for correlation and regression. The study finds causal relationship between Employees Loyalty and Organizational commitment. Factors that impact the loyalty of an employee in manufacturing industry are: Job Security, Supervisor support, Fringe benefits, teamwork, environment and training. Application of research is theoretical contribution towards manufacturing industry of Tanzania, as manager will be able to practically apply these factors positively and retain good employees in working-team. Research provides insights for Tanzanian Manufacturing industry on satisfying needs of the employees working in organization to attain higher commitment towards organizations and loyalty of employees that will improve production and sales of the corporations.

Index Terms- Job Security, Supervisor support, Fringe benefits, teamwork, environment and training.

I. INTRODUCTION

Employees' turnover appears to be rampant in manufacturing industry of the Tanzania due to de-motivational factors impacting employees' loyalty, resulting in employees seeking better opportunities in organizations within and outside the country. With the dearth of qualified personnel probably occasioned by the abundance of unemployable graduates, employee loyalty and retention become very important. Good employees ought to be retained and this may depend on their loyalty to the organization. This is as a result of many organizations trying to attract and recruit highly priced and competitive employees because they add value to their employers. To obtain employees' loyalty and retention so that they are not poached by competitors, there is the need for employers of labor to provide factors that motivate the employees to stay on.

Employee loyalty and retention are factor-based but there has been no agreement on the generally acceptable factors that motivate staff to be loyal and stay on the job.

(Uzma Hafeez, 2015) expresses that employees are the main asset of any organization and they are the main factors of organizational progress. Employee retention and loyalty is a challenge for HR manager especially in manufacturing industry of Tanzania which is a saturated market already in Tanzania. According to the National Bureau of Statistics (2016), many factors have led to some qualified personnel who possess the right knowledge, skills and abilities to leave Manufacturing industry and find greener opportunities in other lucrative sectors of the Tanzania' economy. Perhaps, longer working hours, increased workload, poor managerial style, job insecurity, poor working environment, insecurity with rewards and recognition, lack of work-life balance have been, lack of trainings, poor compensation and supervisory support are responsible for the incessant turnover in the sector.

This study aims to find the key factors that may affect the employees' loyalty towards the organization and extent to what they impact on loyalty and organizational commitment through regression equation. Factors that study selects for the construct are: Job Security, Supervisor support, Fringe benefits, teamwork, environment and training.

II. LITERATURE REVIEW

Employee commitment is the degree to which an employee identifies with the organization and wants to continue actively participating in it (Herat, 2013). Like a strong magnetic force attracting one metallic object to another, it is a measure of the employees' willingness to remain with a firm in the future. It often reflects the employees' belief in the mission and goals of the firm, willingness to expend effort in their accomplishment, and intentions to continue working there. Commitment is usually stronger among longer-term employees, those who have experienced personal success in the organization, and those working with a committed employee group. According to Allen and Meyer (1990), employee commitment refers to the psychological attachment of workers to their workplace. Brian P. Niehoff, Robert H. Moorman, Gerald Blakely, Jack Fuller (2001) provided a useful outline of the work in the area of "Maintaining

survivors' loyalty in a downsizing environment is a difficult problem for management practitioners". Carr (1939) investigated the relationship between loyalty to supervisor and employee's in-role and extra-role performance in comparison with that of organizational commitment in the People's Republic of China. His results indicated that loyalty to supervisor is positively related to job Security and intent to stay. Loyalty to supervisor explained variance in these two outcome variables over and above that explained by organizational commitment.

As per the literature syntheses it is said that this study intends to find the relationship of the factors affecting the loyalty of an employee in manufacturing industry of Tanzania and their commitment towards the organization they are currently working with.

III. BACKGROUND

Tanzania is an under developed country, striving hard for the economic and industrial growth, by choosing different alternatives and options. Recent crises of dollar appreciation in terms of shilling has left manufacturing industry a very few options of survival. In this critical condition many unseen strategic decision are made by the industries to survive which totally based on quality of information decision based on downsizing has led many employees to turnover because of lack of trust in organization and financial stability of the firm. Even many units have been shut down. These decision of turnover the sector or intent to leave is the impacts of de-motivational factors affecting on the employees' loyalty which has led to poor performance and commitment towards the strategic goals of organization.

Dunning (2000) explains that there are three factors that can influence employee loyalty to the company, namely: (a) personal attributes, such as individual age, gender, education, (b) organizational factors, such as organizational size and economic centralization, and (c) role related factors, such as workload and subordinate skills. I Ketut Andy Hermawan and I Gede Esha (2016) show that the method used is Principal Component Analysis (PCA) of 20 variables used and there are four factors that determine employee loyalty with a value of 74.45% which can explain all the variance in the data. Furthermore, the results of research conducted by Mishra, (1998) states that the motivation of work, compensation, career management, and job pressure had a significant positive effect on work loyalty. PT. Karya Swadaya Abadi (Karsa) is a transportation service company. Employee loyalty in this company is known to decrease. This is evident from the number of employees who leave the company to work in other companies. In 2013, there are 6 employees who moved to work in another company, in 2014 the number increased to 8 employees, Past studies depict bidirectional relationship between employee Security and job performance while recent studies give more insight of unidirectional relationship that employee Security leads to job performance but weak relationship exists when job Security was analyzed as a result of job performance (Bai, Sarkis, & Dou, 2015), (Newell, 1958) and (Al-Zubi, 2015) concluded that employee Security and job performance are directly related and that job Security is the result of job performance. It is necessary for every organization to have full level of its employee commitment in order to have outstanding performance on long term basis (Simoens S, 2017). Currently employees act like

entrepreneurs when they work in a team and every member of the team tries his level best to prove one the best amongst all others (Tian, 27 October 2015). Increase in commitment level of employees in organization ultimately increases the performance of their employees. In past organizations provide job security to its employees to improve their commitment level in the organization and to improve their productivity (Zhou, 2017). Higher level of organizational commitment in the organization for individual projects or to the business is assumed as a major reason for better employee performance that leads to organizational success. The employee performance can also be increased when the employees are more satisfied with their job and duties as well. Their Security may depend on the rewards system, the organizational culture and employee knowledge sharing (topalovic, 2014).

IV. THEORETICAL FRAMEWORK

(topalovic, 2014) brought the term job satisfaction, to limelight, for this he reviewed thirty two studies and observed that it is a combination of environmental, physiological and psychological circumstances and the variables influencing the level of satisfaction of an individual. A number of features: attitudes towards pay, working conditions, co-workers and managers, career prospects and intrinsic aspects of the job may influence the level of employee's satisfaction in the organization. Job satisfaction therefore is a measurement of job and work expectations and not just an overall holistic attitudinal manifestation. The concept of job satisfaction is multifaceted hence a number of theories are advanced to explain what it means and how the theories could be applied to enhance employee performance. (Meyer, 1990) and (U, 2017) suggest that job satisfaction may be regarded as: a cluster of positive and negative dispositions which are acquired and learned through experience, positive or negative attitudes based upon a person's genetic inheritance, an outcome of an individual's construction of his or her workplace reality, experience and mutuality of colleagues and supervisor's evaluation, and an individual's job characteristics and the extent to which an individual attempts to fit in with these characteristics according to his requirements from a job. As earlier stated, job satisfaction at its most general conceptualization, is simply how content an individual is with his job. Simply stated, job satisfaction refers to the attributes and feelings people have about their work. Positive and favorable attitudes towards the job indicate job satisfaction. Negative and unfavorable attitudes towards the job indicate job dissatisfaction (Al-Zubi, 2015). This satisfaction may be affective: one-dimensional subjective construct representing an overall emotional feeling individuals have about their job as a whole (Zhenxiong Chen, 2001), (Yurimoto, 1995) and (Steers, 2015). Among the content theories of motivation, Herzberg (1959) theory emphasizing the motivator-hygiene factors sought to explain satisfaction and motivation in the organization. The theory focuses on outcomes of satisfaction and dissatisfaction. The theory further found that certain aspects of a job cause satisfaction and therefore motivation, but certain aspects caused job dissatisfaction. Herzberg explained that the factors that lead to satisfaction or to dissatisfaction are different. Accordingly, he states that 'the opposite of job satisfaction is not job dissatisfaction but, rather, no satisfaction; and the opposite of job dissatisfaction is not job satisfaction but no satisfaction'

(Herzberg, 2003.91). This theory states that job satisfaction and dissatisfaction is a product of different factors – motivation and hygiene respectively. According to Thompson & Phua (2001) the affective event theory was developed by Psychologist Howard M. Weiss and Russell Cropanzano to explain how emotions and moods influence job satisfaction. The theory explains the linkages between employees' internal influences - cognitions, emotions, mental states etc and their reactions to incidents that occur in their work environment that affect their performance, organizational commitment, and job satisfaction (Wegge, van Dick, Fisher, West & Dawson, 2006). Equity theory, as reviewed by Walster, Berscheid & Walster (1973) shows how a person perceives fairness in regard to social relationships. The theory presupposes that during a social exchange, a person identifies the amount of input gained from a relationship compared to the output, as well as how much effort another person's puts forth. Based on Adam (1965) theory, Huseman, Hatfield & Miles (1987) further suggest that if an employee thinks there is an inequity between two social groups or individuals, the employee is likely to be distressed or dissatisfied because the input and the output are not equal. Inputs encompass the quality and quantity of the employee's contributions to his or her work. Job characteristic theory (Hackman & Oldham 1976), Schermerhorn, Jr (1984), Hellriegel, Jackson & Slocum (1999) and Dugguh (2008) propose a framework to study how particular job characteristics affect job outcomes and job satisfaction. The framework states that there are a number of core job characteristics that impact on job outcomes. According to Bernard, Mills, Swenson and Walsh (2005) motivation is theorized as a "purposeful behavior that is ultimately directed toward the fundamental goal of inclusive fitness" (p. 129). Bernard et al., (2005) propose that due to the randomness of behaviors and interests, an individual's differences may be guided by motives. Based on this theory, the study will attempt to define what guiding factors or motives, employees use to motivate themselves and what impact if any it may have on the feelings of loyalty and commitment shown to one's employer. Every employee has differing motivational factors that can potentially impact their degree of loyalty and commitment. As such, I theorize that if an employee is satisfied with his or her work environment, then he or she will be loyal and committed to one's employer. Similarly, if an employee is motivated to achieve a goal, receive recognition, or has an expectation to receive a promotion, he or she in turn will also be loyal and committed to one's employer. As defined by Logan (1984) loyalty is "a strong tie that binds an employee to his [or her] company even when it may not be economically sound for him [or her] to stay there". Employees' Loyalty is "is a deliberate commitment to further the best interests of one's employer, even when doing so may demand sacrificing some aspect of one's self-interest beyond what would be required by one's legal and other moral duties" (Elegido, 2013, p. 496). Commitment according to Anderson and Weitz (1992) and Morgan and Hunt (1994), "is a long-term relational perspective [that] encourages parties to resist the short-term benefits offered by other [companies] in favor of the benefits associated with remaining in a relationship" (as cited in Dagger, David & Ng, 2011, p. 276). Employee Commitment has three levels. If an employee falls within the affective commitment level, they identify with and are emotionally attached to their organization so much so that they remain with the same employer because they

want to (Pepe, 2010). If an employee falls within the continuance commitment level, they remain with the same employer for numerous years because they are aware of the expenses connected with leaving, so they choose to remain not because they want to, but because they need to (Pepe, 2010). Finally, if an employee exhibits normative commitment, they opt to stay with an organization, not because they want to, or because they have to but it's alternatively because they feel they ought to (Meyer & Allen, 1991 as cited in Pepe, 2010). Motivation can be "defined as purposeful behavior that is ultimately directed toward [a] fundamental goal..." which "may be measured in terms of individual difference in covarying categories of behaviors and interest" (Bernard, Mills, Swenson & Walsh, 2005, p. 129). Work Motivation "is the steering of human activity towards a desired objective by means of motives generated internally in a person or in his or her environment, on the basis of his or her needs" (Peklar & Bostjancic, 2012, p. 57). Intrinsic Motivation "refers to a desire to work primarily because the work itself is interesting, challenging and satisfying to the person" (Cantania 2013). Extrinsic Motivation occurs when an employee "performs an activity with the intention of attaining some separable consequence, such as receiving an award, avoiding guilt, or gaining approval" (Deci, Ryan, & Williams, 1996 as cited in Dysvik & Kuvaas, 2013, p. 413).

V. OBJECTIVES

Objective of this study is to highlight the importance of motivational factors and employees' loyalty in manufacturing industry which is directly related to commitment of an employee towards the organization and performance of employees. Purpose of this study is to correlate the factors with loyalty and commitment. Seemingly in this critical conditions where Tanzania's economy and shilling value is smashed to the earth highly qualified and skill people are leaving country or switching their job for better jobs. In this situation employee retention on low wage or on low provided circumstances is not possible. This study keeping in view the situation intends to highlight the factors that can retain the employees if applied properly and with unbiased behaviors.

VI. STATEMENT OF PROBLEM

Study opts to answer few key questions regarding Loyalty and commitment of employees in manufacturing industry of Tanzania.

1. What is Employee Loyalty in manufacturing sectors and how does it effects the organizational commitment?
2. To what extent factors such as: Job Security, Supervisor support, Fringe benefits, teamwork, environment and training affect the employee loyalty and commitment?

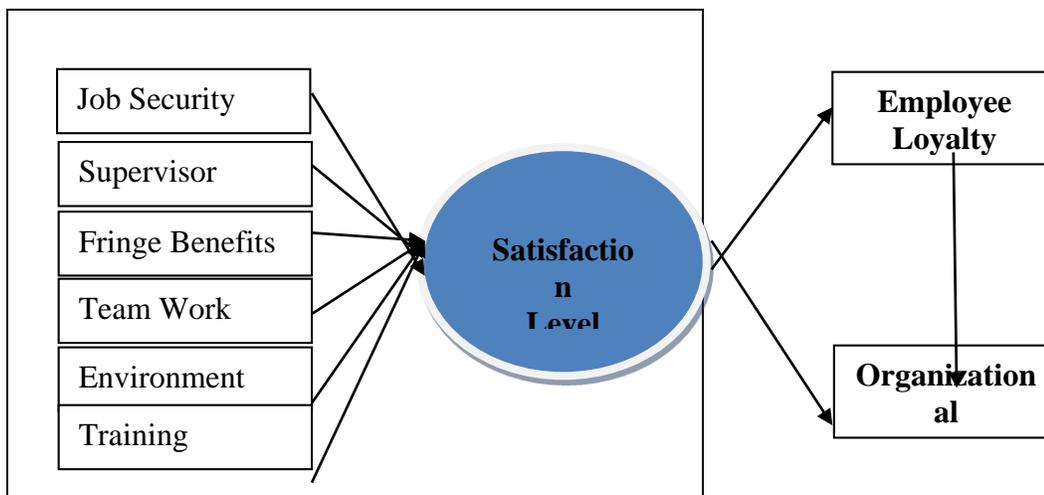
3. Is there any relationship between and within loyalty and commitment of an employee towards the organization?
4. Security level of employees towards the organization and their job given the factors affecting the loyalty of employees?
5. Innovative systematic strategies to retain the employees by increasing their loyalty and commitment

Hypotheses:

H1₀: Employees’ Loyalty in manufacturing industry of the Tanzania is directly proportional to the organization commitment and performance of the employees.

H2₀: Job Security, Supervisor support, Fringe benefits, teamwork, environment and training do not affect the employees’ Satisfaction level and do not affect employee loyalty and commitment towards organization in manufacturing industries of Tanzania.

Figure 1 Conceptual Diagram Based On Satisfaction Model



VII. RESEARCH DESIGN

This study is a quantitative approach to identify the correlation between dependent and independent variable, organizational Loyalty is dependent variable whereas Job Security, Supervisor support, Fringe benefits, teamwork, environment and training are the independent variables. Study uses survey questionnaire to collect data from manufacturing industry of Tanzania. Population of the study is categorized in the Low level employees, Middle level Employees and High level employees who are involved in organization at least for 2 years.

VIII. DATA COLLECTION

Data is collected through self-made five likert scale questionnaire from the manufacturing industry of Tanzania. All the categories of population are randomly selected through cluster sampling.

| S/No. | Scale | Categories |
|-------|----------|-------------------|
| 1 | 0 to 1 | Strongly Disagree |
| 2 | 1.1 to 2 | Disagree |
| 3 | 2.1 to 3 | Neutral |
| 4 | 3.1 to 4 | Agree |
| 5 | 4.1 to 5 | Strongly Agree |

Table 1 interpretation of Ratings in Questionnaire.

IX. SAMPLING

Population sampling is carried out by Slovin’s formula of known sampling. Random selection is conducted through cluster based. Selected manufacturing factories employees from corporations of large scale and medium sized will be contacted for information gathering

$$Research\ Sample = n = N / (1 + N e^2)$$

$$N = 1300 / (1 + 1300 * .07 * .07)$$

$$N = 1300 / 7.37 = 176 (Sample\ Size)$$

| S/No. | Categories | Numbers | Percentage | Total |
|--------------|--------------|---------|------------|-------|
| 1 | Low Level | 31 | 7.19% | 350 |
| 2 | Middle Level | 45 | 21.58% | 400 |
| 3 | High Level | 90 | 64.08% | 550 |
| Total | | 176 | 100% | 1300 |

Source: Survey Data @ 2019 Manufacturing Industry, Tanzania

Slovin's formula was applied to sample the participant size from the population (known) size, producing 176 sampled participant of the study (see table 2). Participants were randomly selected once the sample size was established from manufacturing corporations of Tanzania.

Table 2 Population and Sampling

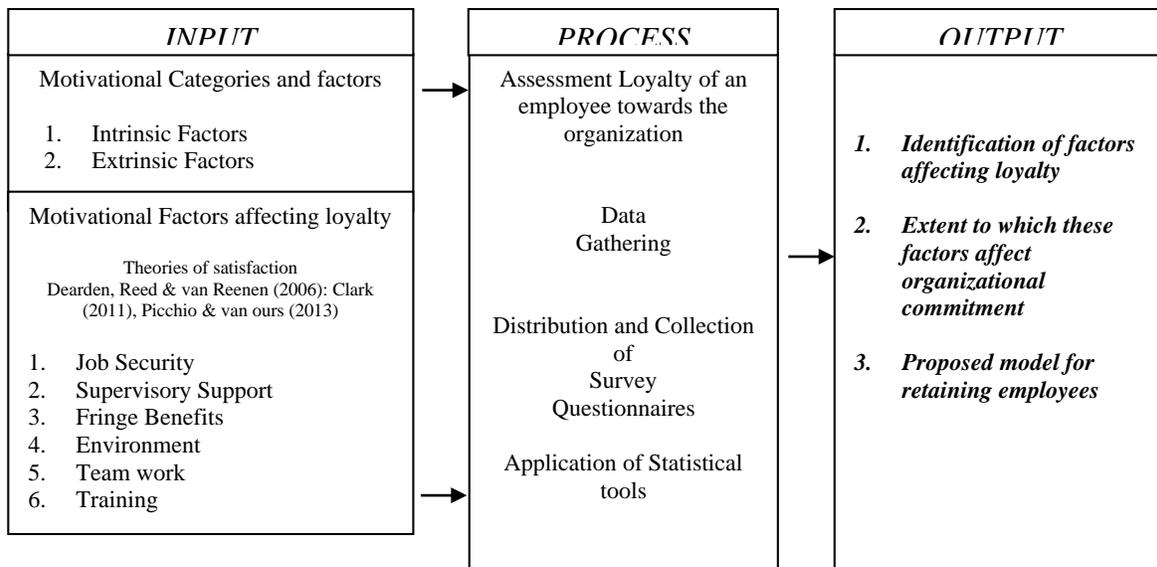


Figure 2 Research Paradigm based on Conceptual Framework

X. INTERPRETATION & ANALYSIS

Reliability analysis:

Before collecting complete data from (176) participants', reliability test was conducted to authenticate the questionnaire. 20 recipients were selected from the sample and distributed the questionnaire for initial test, "Cronbach's Alpha" value for all 5 categories of the questionnaire surpassed .70 or 70% required percentage. Table 3 exhibits the values of Cronbach Alpha for volume, velocity, variety, veracity and value, which implies that categorically all the values of reliability test surpassed required results, hence questionnaire proved reliable for further process.

| S/No. | Variables | No. | Cronbach's Alpha | % |
|----------------|---------------------|-----|------------------|-------|
| 1 | Job Security | 30 | .843 | 84.3% |
| 2 | Supervisory Support | 30 | .789 | 78.9% |
| 3 | Fringe Benefits | 30 | .913 | 91.3% |
| 4 | Environment | 30 | .904 | 90.4% |
| 5 | Team work | 30 | .872 | 87.2% |
| 6 | Training | 30 | .901 | 90.1% |
| overall | | | .911 | 91.1% |

Table 3 Reliability Analysis Test

Hypotheses Testing

Null hypotheses were testes for *t*-values and *p*-values, in order to nullify the null hypotheses and accept study hypotheses. Independent sample test (2 tailed) applied for rejection of null hypotheses exhibited in table 4. Table 4 exhibits *t*-values and *p*-

values of independent sample 2 tailed tests, $t_{js} = 2.4081$, $t_{ss} = 3.39$, $t_{fb} = 5.67$, $t_e = 2.99$, $t_{tw} = 6.34$, & $t_t = 4.34$ all the values are greater than *t*-table values for degree of freedom @ 175. Values exhibited in table 4 imply that all null hypotheses of the study are rejected and study hypotheses are accepted. *P*-values exhibited in table 4 are less than .50 which implies model is significant different and fit for prediction.

| S/No. | Factors | numbers | t-test statistic | P Value | t-table value |
|-------|---------------------|---------|------------------|---------|-----------------|
| 1 | Job Security | 6 | 2.4081 | .012 | > T table value |
| 2 | Supervisory Support | 6 | 3.3932 | .000 | > T table value |
| 3 | Fringe Benefits | 6 | 5.6723 | .013 | > T table value |
| 4 | Environment | 6 | 2.9987 | .023 | > T table value |
| 5 | Team work | 6 | 6.3456 | .000 | > T table value |
| 6 | Training | 6 | 4.3456 | .000 | > T table value |

Table 4 Hypotheses Testing (Independent Sample Test)

Results of the independent sample test (2 tailed) establishes argument that model is fit and null hypotheses of the study are rejected, qualitative expression for this narration is that factors mentioned in table 4 affect the loyalty of employees and commitment towards organizations in manufacturing industry of Tanzania though impact level of some of the characteristics are high and some are low.

Descriptive Statistics

Interpretation of mean ratings of the summary from the participant of the study (Low level, Middle level and high level Employees) is covered in descriptive statistics section of the paper. Study used 5 likert scale ratings to record the ratings of the participant, sharing experienced based knowledge. Employees' commitment and loyalty are dependent on job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training for better and efficient business mechanism and smooth running of affairs. Study covers the expert opinion of employees facing the situation on real grounds of Tanzanian Corporate sectors expressing the narration that improvement in factors (Independent) can affect the loyalty of employee in positive manner which may lead to perfect commitment with corporate as employee loyalty and commitment are positively correlated.

| Factors | Executives | | Directors | | Managers | |
|--------------------|------------|---------------|-----------|---------------|----------|---------------|
| | Mea | Classificatio | Mea | Classificatio | Mea | Classificatio |
| | n | n | n | n | n | n |
| Job Security | 3.9 | S.A | 4.2 | S.A | 3.1 | S.A |
| Supervisor Support | 4.4 | S.A | 4.1 | S.A | 3.7 | S.A |
| Fringe Benefits | 4.2 | S.A | 4.2 | S.A | 3.2 | SA |
| Environment | 3.3 | S.A | 4.5 | S.A | 4.3 | S.A |
| Team work | 4.1 | S.A | 4.1 | S.A | 3.5 | S.A |

Table 5 comparison of mean ratings and classification

Table 5 exhibits value of mean ratings of low level employees, middle level employees and high level employees (Participants)

Adjusted R square of the model is .900 that means $.900 * 100 = 90\%$. It implies that 100 % of change in job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training (+ve or -Ve) will bring 90 % change Loyalty of an employee towards organization and will correlate the commitment of an employee for the measurement with corporate of Tanzania. It also implies that model is highly predictable to dependant variable. Predictor is constant with R-square 90 %. Corporation efficiency is effectively and efficiently increases to 90 %, affected by job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training, thus sector needs to focus on the these factors as linear functionality.

CHANGE STATISTICS

| MODEL | R Square change | F – Change | Df1 | Df2 | Sig. F Change |
|-------|-----------------|------------|-----|-----|---------------|
|-------|-----------------|------------|-----|-----|---------------|

on job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training as independent factors and impacts of these 5 factors on Employee Loyalty and Job Commitment of corporate indexed on Dar es Salaam stock exchange of Tanzania. Values of table 6 imply that all the participants are either agreed or strongly agreed with the statements of the questionnaire level employees and high level employees (Participants) are the employees, measured for the employee loyalty with corporate and extent of commitment with organization. Qualitatively expressed their opinion, in manufacturing industry of Tanzania that issues related to the job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training can lead a positively or negatively affect the employee working in corporate, I handled properly these factors can work magically well for corporate else they may result in worst conditions for corporate of the Tanzania.

Normally, Satisfaction model is applied for the measurement of the factors associating with behavioral and attitudinal impacts of employee working so this study follows the conceptual model of satisfaction and measure the level of satisfaction of Tanzanian corporate sector employees with job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training provided in the firm they employed with for over 2 years.

Regression Analysis

The linear regression was developed to investigate how one or more independent variables influence a dependent variable (Hutchinson, 2011). More specifically, in a linear regression analysis, the result produces one intercept and one slope, based on the mean, which represents the best fit for variable X to predict variable Y. The regression line can be calculated by using the equation (Noon, 2003): This study uses job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training factors affecting the employee, as independent variable and loyalty and commitment of an employee as dependent variable.

| MODEL | R | R Square | Adjusted Square | RStd. Error of the Estimate |
|-------|-------------------|----------|-----------------|-----------------------------|
| 1 | .912 ^a | .900 | .900 | .0435 |

Table 6 Regression Model Summary

| | | | | | |
|---|------|--------|---|-----|------|
| 1 | .900 | 22.776 | 3 | 173 | .123 |
|---|------|--------|---|-----|------|

Data source: survey data dated: October, 2019 @ manufacturing industry, labor zone Karachi industries

Table 7 change statistics of model

Table 7 explains R-Change is the same in change statistics as was in the summary model table 6, with $f(3, 173) = 22.776, p = .123$ model is significant and will bring change for sure as $P < .05$, it can be predict that model is significant and will bring changes in decision making efficiency of corporation for sure with the changes in all the independent variables. It implies that % job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training Value will bring % change in corporate sectors loyalty of employees and commitment that influences the overall performance of the corporate as a team. Corporate sectors

of manufacturing industry have integrated working mechanism all departments are interconnected with each other stitching is connected with production washing in is connection with operations R&D is connected with sales and marketing. Inter-related modules of manufacturing industry depend on each other for the performance improvement, connection of employee with

the corporate needs to be standard and formulated for corporate as a single unit that will bring overall performance up. For the purpose managers, executive and directors need to provide job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training same to all the employees with professional approach without biasness.

| <i>MODEL</i> | | <i>Sum Squares</i> | <i>of Df</i> | <i>Mean Square</i> | <i>F</i> | <i>Sig.</i> |
|--------------|------------|--------------------|--------------|--------------------|----------|-------------------|
| 1 | Regression | 32.124 | 3 | 22.113 | 22.776 | .123 ^b |
| | Residual | .234 | 173 | .004 | | |
| | Total | 32.358 | 173 | | | |

Table 8 Analysis of variance for decision making of manufacturing industry

Table 8 implies the analysis of variance in model. $\sum (Y_1 - Y)^2 = 32.124$ for the mean difference square of predicted value of D.V and I.V and $f(3, 173) = 22.113, p = .123$, implies that model 1 of ANOVA is significantly fit to predict values and explain variation in factors. Qualitative expression for this variance implies that it can be predicted that job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training

(+ve or -Ve) will affect the information employees loyalty to extent that they will be more committed to individual and whole goal of the corporate and that increases the performance as team. Organizations having less committed and loyal employees can get short run benefits but for longer run demand and supply curve decreases.

| <i>MODEL</i> | | <i>Unstandardized Coefficient</i> | | <i>Mean Square</i> | <i>F</i> | <i>Sig.</i> |
|--------------|---------------------|-----------------------------------|-------------------|--------------------|----------|-------------|
| | | <i>B</i> | <i>Std. Error</i> | | | |
| 1 | (Constant) | .456 | .000 | | 2.536 | .123 |
| | Job Security | 2.345 | .000 | 2.037 | 233.516 | .000 |
| | Supervisory Support | 3.233 | .010 | 2.172 | 38.731 | .000 |
| | Fringe Benefits | 1.234 | .123 | 4.232 | 56.345 | .231 |
| | Environment | 6.785 | .342 | 3.234 | 32.124 | .032 |
| | Team work | 4.235 | .101 | 1.345 | 1.223 | .431 |
| | Training | 3.214 | .345 | 1.345 | 4.234 | .142 |

Table 9 Regression analysis

Table 9 exhibits @ $p = .123, .000, .000, .231, .032, .431$ and $.142$ all the values are less than $.005$ model is fit and significant to predict the effect of independent variable on dependent variable. With coefficients @ 2.345, 3.233, 1.234, 6.785, 4.235 and 3.214 Job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training, linear model of regression predicts the degree change in independent variable with coefficients will increase the loyalty and commitment of employee. Linear model exhibits the values that imply research hypotheses are true and characteristics factors associated in corporate sector of Tanzania affect the targeted loyalty and commitment of employee in satisfaction model.

$$\text{Loyalty Measurement} = \alpha + \beta (JS) + \beta (SS) + \beta (FB) + \beta (En) + \beta (TW) + \beta (TN) + e$$

$$L_M = .456 + 2.345 (JS) + 3.233 (SS) + 1.234 (FB) + 6.785 (En) + 4.235 (TW) + 3.214 (TN) + .05$$

Employee Loyalty function is linear in nature, with a constant change unit of .456 (Constantly will change @ 45.6%

without the impact of factors) in measurement of corporate loyalty measurement scale Job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training associating with Loyalty of Employee as constant changing variable. Tanzanian manufacturing industry is in capacity of providing better options for the employees of the firm, affects of factors in corporate sector to measure the ratings of Job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training is provided with the related coefficient. All the coefficients are positive and related with each other that imply positive regression functionality.

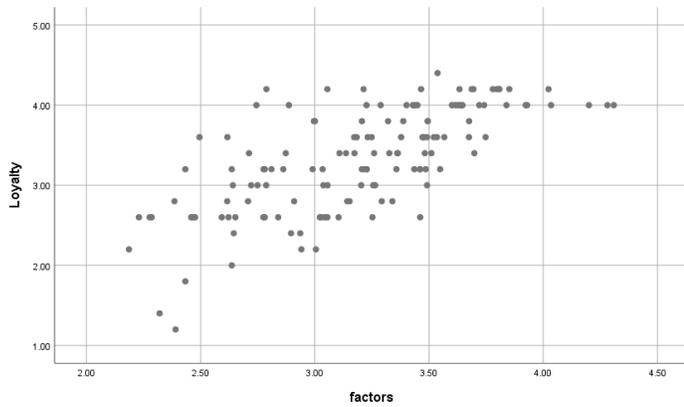


Figure 3 Curve fit Scatter plot for Loyalty of Employee

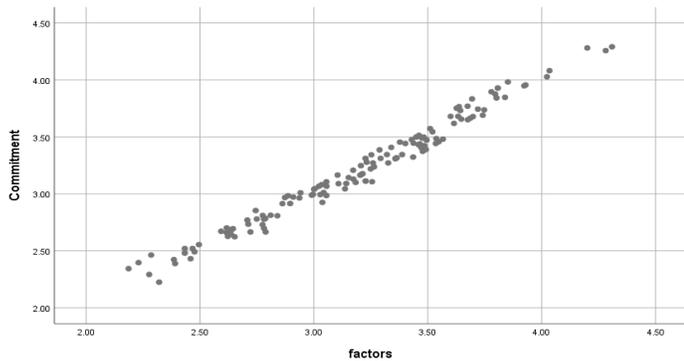


Figure 4 Curve fit Scatter plot for Commitment of Employee

Correlation Analysis

A correlation coefficient is a numerical measure of some type of correlation, meaning a statistical relationship between two variables. The variables may be two columns of a given data set of observations, often called a sample, or two components of a multivariate random variable with a known distribution. Linear function of loyalty of employee is directly related to Job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training and significantly related to commitment of an employee towards corporate in manufacturing and services sectors. Ages of management has learnt that employees not treated will can be dangerous and harmful for corporate infrastructure and managerial impacts. Tanzania is a land where not much high skilled management like European countries is expected, but management tiers are applied for improvement and capacity buildup. Study shows that Job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training have extent high impact on loyalty and commitment directly or indirectly, which corporate and manufacturing sector can use in benefit of organizational goals.

| Items | Description | Employee Loyalty | Organizational Commitment |
|----------------------------|-------------------------|------------------|---------------------------|
| Pearson Correlation | | | |
| Employee Loyalty | Correlation Coefficient | 1 | .718** |
| | Sig. (2-tailed) | | .123 |
| | N | 176 | 100 |

| | | | |
|---------------------------------------|-------------------------|--------|--------|
| Organizational Commitment | Correlation Coefficient | .718** | 1 |
| | Sig. (2-tailed) | .123 | |
| | N | 176 | 100 |
| Non Parametric Kendall's tau_b | | | |
| Employee Loyalty | Correlation Coefficient | 1 | .560** |
| | Sig. (2-tailed) | .000 | |
| | N | 176 | 100 |
| Organizational Commitment | Correlation Coefficient | .560** | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 176 | 100 |

Table 10 Correlation Matrix of Employee Loyalty and Organizational Commitment

Table 10 exhibits the Pearson correlation between Loyalty of an employee with firm and organizational commitment of employee in manufacturing industry of Tanzania, both the variables are positively correlated with each other at 0.718 (Pearson) with N = 176 and .560 (Kendall's tau_b) N = 176. Table 10 implies that there is a positive correlation with strong bonding. Positive usage and change in Loyalty of an employee will bring more commitment within the employee attitude and behavior for the organization and thus will ultimately be fruitful for Tanzanian corporate and manufacturing sector.

XI. LIMITATIONS OF THE STUDY:

This study will examine how intrinsic and extrinsic motivational factors impact employee loyalty and commitment. Although the study does not examine external economic factors or personal situational influences that may impact an employee's decision to stay or quit, this study will however draw on results on self-made questionnaire to reveal what attributes describe an employee committed and loyal to one's employer and what if anything should an employer expect from the average employee who is loyal and committed. Participation in this study is restricted to employees who are above 18 years of age to 40 years, has previous or current work experience with the same employer for two (2) years at least, and who are willing to voluntarily participate. Individuals can be currently working or currently retired. If individuals do not meet the aforementioned criteria, they will be excluded from the study. Due to potential time constraints and the limited sample in which participants will be found, there is a possibility that the size of my sample may not amount to or be greater than 176 participants. Simply put, due to the time constraints and budget constraints only one city will be covered for data collection.

Another limitation of the study is that, this study does not cover the aspects of one's family issues related to turnover and switch for better job. Study does not provide any suitable suggested innovative work model for retaining the employees by increasing their loyalty and commitment towards the organization.

XII. SUMMARY OF FINDINGS:

1. Job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training are six main factors (Independent) associated with employee loyalty
2. All, Job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training factors are inter-related with each other.
3. Job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training are linear in function.
4. Job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training are directly and significantly related with loyalty and commitment
5. There is a significant relationship between loyalty and commitment
6. Research Hypotheses are accepted and null hypotheses are rejected for the manufacturing industry of Tanzania.

XIII. CONCLUSION

Managerial skills required for managing such a corporate sector in heavily saturated market is unavailable and research based investigative business with empirical approach is hard to find in Tanzanian manufacturing and services sectors. Tanzania is less developed than European countries and having less literacy rate than many of the organizations does not provide any managerial leverage for measuring and sensing efficient output. Most the people involved are with low educational background in manufacturing industry. Foreign agencies and firms have firm footed routes in Tanzania, especially in capital city Dar es Salaam. Tanzania is rich in chemical and natural resources, exploration of heavy dearth can lead to a good GDP jump which lack at government level.

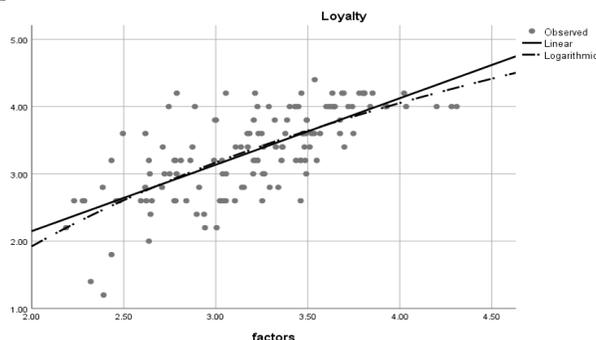


Figure 5 Linear regressions of Loyalty and factors

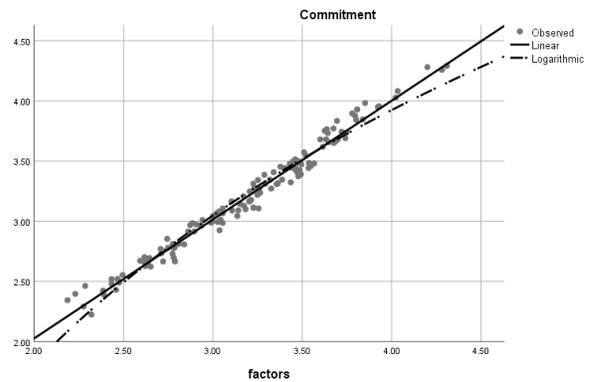


Figure 6 Linear regressions of commitment and factors

Study concludes few lines of investigation suggesting that Tanzanian business portfolios are run with less efficient management of human resource that is one reason of failure. Employee loyalty and commitment of employees to the organizations is ultimate goal of firms to achieve but with understanding the factors affecting the loyalty and commitment this argument remain in depth and not useful. Factors that study finds are Job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training that affect the E.L and O.C in any organization and can change the fate of corporate.

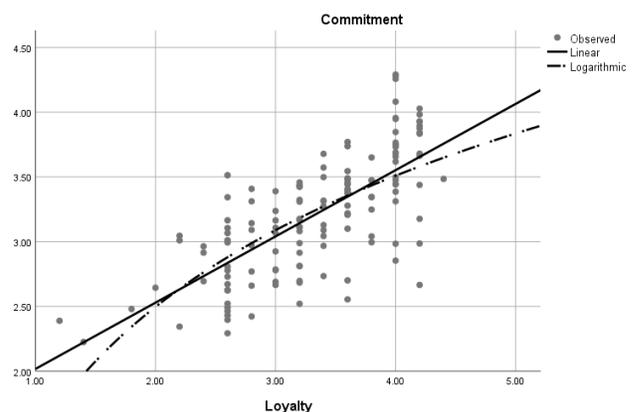


Figure 7 linear regressions of Loyalty and Commitment

Linear functionality of the loyalty and commitment can affect the performance of firm in many orders. Both are correlated with positive attributes and are interlinked with each other, study confirms the causal relationship and significantly different models to predict the impact factor of Job Security, Supervisor Support, Fringe Benefits, Team Work, Environment and Training on loyalty and commitment. Some applications for the conclusion can be seen as of in manufacturing industry of Tanzania; Textile and Clothing and chemicals industry where employees recently observed are leaving the firm and are not loyal to organization due to the influencing factors such as: Team work is less and senior member are not helping new entrants, Fringe benefits are less for skilled labour who are core working human capital of both the industry, supervisors' support is observed less due to less involvement and motivation towards work and Fringe benefits for additional hours working and spouses benefits are not motivating. All of this resulted in negative behavior in employees that

threatens overall goals of strategic management. This research will provide awareness in managerial implications of the decisions regarding the employee and satisfying the needs to gain higher attention in distributive work. This research concludes, integration of work team at all levels is important not only to retain employees within organizations but also to attract new team members by sending positive gesture about corporations in manufacturing industry o Tanzania.

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International Relations and Business Diplomacy

A Case Study Model of China-Pakistan Economic Corridor: Interdependencies

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Abstract- Purpose – Purpose of study is to analyze the diplomatic relationship between People’s Republic of China and Islamic Republic of Pakistan through China-Pak Economic corridor of interdependencies. This paper highlight the interdependent model between both the countries and objectives achieved through it.

Design/methodology/approach – The paper uses data collected secondary source of investigative case studies over the time series of 2012 to 2018. Some interviews collected by the CPEC & OBOR project team in Pakistan. Main it depends upon the scholarly literature and studies previously held on the subject.

Findings – interdependencies model of objectives of both the countries with respect to China-Pakistan Economic Corridor and analysis of business and diplomatic relationship of China and Pakistan in Geo-Economic Scenario.

Originality/value – The use of limited number of case study and less statistical data for the paper makes it less complicated but still firsthand data collection through the real project team through interviews makes it more clear and real for the readers’ and scholars who intend to investigate further. Case Study and literature is carefully selected for just cause.

Index Terms- (Interdependencies, Business Relation, Diplomatic Relation, Geo-Economic)

JEL classification: F02, F15, F53, F59, O19

I. INTRODUCTION

Economic regionalism in South Asia has entailed the search for collective efforts to engulf frail economies, political downfall, social and religious cleavages and the resultant inherent discords among various states. The Economic Corridor (EC) is employed as a means to enhance regional cooperation, invigorating economic development and deeper integration of Asia’s sub-regions. In South Asia, it is a hottest phenomenon that the development of economic corridors has gained impetus. The recent example is the China-Pakistan Economic Corridor (CPEC) (Wolf, May 11 2016).

Interdependencies bring two countries on mutual grounds of business trade and investment. China and Pakistan are two countries interdependent on trade, defense and power games of the world. Both the countries are enjoying this bonded relationship since long. Both have been supportive to each other almost each

forum. Their bilateral relationship is ever increasing with mutual understanding and frequent high-level visits of government officials. Their defense ties are the strongest bond of the relationship. But now with the fast-moving economy, reaching out for more dynamic and active role in global politics and demand for energy, China has diversified its relationship with Pakistan. They are moving towards increasing bilateral trade, investment, infrastructure development, energy projects and people-to-people contact.

In Year 2013, the China-Pakistan Economic Corridor agreement was signed along with the formal handing over of Gwadar Port for further development and operation to China. Various projects will be completed under the CPEC, with the worth of 46 billion dollars and more. This diplomatic relationship of interdependencies and economic benefits has become the key factors of interest for whole of the world as this is the game changer for the entire region. This paradigm of partnership will result in changing the economic superpower and leaders of the world. My paper tends to investigate the dark side interdependencies of both the countries and objectives achieved on the ground level realities. Four project investments in CPEC may help build Pakistani Infra-Structure and overcome energy crises in Pakistan but nothing comes for free. What is the opportunity cost Pakistan is paying to achieve higher goals and what is lay off policies Pakistan is been following to see this project completion. The CPEC is a holistic, comprehensive package of competitive economic initiatives from China, just the energy projects once initiated will kick-start an industrial boom in Pakistan. Thar Coal is one of the Largest Coal asset, was lying untouched in the desert of Pakistan. This Virgin Coal Industry of Pakistan can support energy requirements of the all the region for very long time.

Because of this Diplomatic relationship and Economic adventures of Pakistan and China Ties around the world have been changing U.S entering in Indian market making bonds with India compete in the market against China and Pakistan. Accessing market has become easier but yet very difficult subject to international and political relationships of countries all over the world. Iran, India and U.S are playing their part to establish their own corridor for joint investment. This leaves Pakistan and China to rest aside their major interest and create edge over competitors. The CPEC project is the result of the long cordial bilateral relations based on state-to-state mutually beneficial terms. If to see

it from geo-political and geo-economic angle, one can say that it is an extension of the China's growing economic network. CPEC project is a tiny addition to the China's rise economically and it's growing needs for regional connectivity. Under China's policy of the renewing Old Silk Road, the One Belt One Road initiated in 2013, it is investing even bigger portion of it in Central Asia. This project will boost the economic relations of the two countries through opening up multiple channels of cooperation in the long run. China is investing in Pakistan and the route will connect China's western parts to Gawadar port and in the long run this route will connect Central Asia and the region altogether. CPEC has brought together China and Pakistan for a win-win situation by playing the politics of interdependence'.

II. 2.0 BACKGROUND

"freshly world has seen a paradigm shift from tactical grouping to the establishment of economic cooperation stuck between countries around the world, the diplomatic interest and security of the state being the determinants of this collaboration. States redefine their interests and reshape their policies owing to the realization that it does not seem potential for them to preserve their welfares with their existing capacities" (Ashraf, 2015). Apex height talks and diplomatic consultations are traits of a robust partnership between nations in a variety of fields, such as industrial ventures, development programs, defense, infrastructure and other areas of cooperation (Noor, 2008). For decades, China was deemed as a 'sleeping giant' that has awakened and now playing a key role not merely in South Asia but in the entire world. President Xi Jinping's predecessor Xiaoping followed a conservative foreign policy based on "hide your strength, bide your time, never take the lead", however the current premier, President Xi, calls for a more vigorous, activist and assertive foreign policy, and dreams of a "strong and powerful" Chinese state. The Peoples Republic of China (PRC) and Pakistan's relations date back to 1950 very soon after the creation of the PRC. The long history of camaraderie between the two is underlined by mutual trust and assurance. Mao Zedong, the Chairman of the Chinese Communist Party announced that the PRC was ready to establish diplomatic ties "with any foreign government willing to observe the principle of equality, mutual benefit and mutual respect for sovereignty and territorial integrity" (Mahdi, 1986). Pakistan, in 1950, responded to his call by recognizing the PRC. In 1954, Chinese Premier Chou En-Lai made a statement that summed up one consistent aspect of the Chinese foreign policy by stating that "all people should have the right to choose their own state system and way of life without interference from other nation's revolution cannot be exported" (Mahdi, 1986). In spite of believing in an absolutely opposing ideology, Pakistan accepted the Chinese notion at first, thus, rendering it possible for two states with different socio-political systems to establish durable ties. Secondly, Pakistan was convinced that the PRC harbored no designs of territorial aggrandizement against her neighbors. Thirdly, Pakistan concurred with the Chinese that there was no actual 'conflict of interests' between the two.

Therefore, Sino-Pak relations were founded on a very cordial footing. Maintaining a wholesome connection with China has been a vital feature of Pakistan's foreign policy. Pakistan helped China in sustaining the balance of power in the region (Iqbal,

2015). The Chinese President, explained China's "Good Neighbor Policy as part of a strategy of peaceful development which China sought to promote as an interdependent, rather than competitive, relationship with her neighboring countries and the world" (Iqbal, 2015). In 1966, armed assistance between China and Pakistan began, in 1972, strategic partnership was developed and in 1979, economic collaboration commenced. The relationship is said to be 'higher than the mountains' and 'deeper than the oceans'. Following are a few key events in Pakistan and China relationship. In September 1950, Pakistan voted in favour of a resolution challenging the right of the Nationalist Chinese representation in the United Nations, and asked for the seating of the true representative of the Beijing government. Pakistan also supported the 'One China Policy' and in 1951, trade relations between the two were firmly established. In 1954 and 1955, Pakistan joined SEATO and CENTO respectively due to her search of security against India (Syed, 2013). These pacts were initiated as a cordon solitaire to contain the Soviet Union and China. Meanwhile from mid-fifties to early sixties, Sino-Pak ties were somewhat dented. The decade of the sixties eventually saw a consolidation of the Sino-Pak friendship. In 1961, Pakistan viewed her role as an ally of the West, and renewed her links with China as well. Pakistan again voted for China's seating in the United Nations.

Long relational cordials with China lead to another economical venture and new ties of international relations. China-Pak Economic Corridor strengthened the bond between two countries and acceptance of these ties is welcomed by both the nation. CPEC lead both countries to interdependent economic and political benefits. Today CPEC is sought to be the largest change in world's economic scenario initiated from China and rooted in Pakistan. This study further discusses the importance of OBOR and CPEC for the economic leadership of both the countries and regional dominance of both the countries as it connects China and Pakistan to rest of the world for easy trade.

III. 3.0 LITERATURE REVIEW

3.1 Literature on Pak-China Interdependencies

(JAVAID, 2016) (Akhtar*, 2017) (Chawla, 2017) (Hameed, 2016) All the authors of subcontinent have tried to put the face that CPEC is important for both the countries' Economic and Political ties. One Belt One Road initiatives (OBOR) is a project which showcases China's global outreach in Asia, Africa and Europe. The China-Pakistan Economic Corridor (CPEC) project is an important component of this project. Higher than the Himalayas and deeper than the Indian Ocean" and „sweeter than honey" are some of the clichés often associated with the Pakistan-China diplomatic relations. Six and a half decades of peaceful co-existence with zero number of clashes at states" level presents a unique example of bilateral ties, globally. [Pakistan-China diplomatic relations span over six decades of persistent cordiality, represent a unique example in the current international political system. Until the turn of the century, this relationship was limited mostly to government-to-government, defense, political and diplomatic cooperation. However, since the start of this century, the relationship has expanded in economic and socio-economic spheres. The realization that the two countries need each other more in the changed regional and global setting is visible on both sides. Nevertheless, understanding of each other's society and

culture is still a less-explored domain. An intimate relationship between Pakistan and China is not a novel phenomenon. For decades, they have been ‘all-weather’ friends –both countries enjoy enduring and deep-rooted ties. Initially, China and Pakistan were involved in a geo-strategic context, but since the end of the Cold War, their relations have increasingly become multidimensional. China emerged as an economic regional power, and over the years has been successful in generating her own sphere of influence by developing a huge export capacity along with a robust market. Pakistan had her own way with a long history of rivalry with India and then fighting the war against terror that dragged her into destitute economic conditions. India’s increasing interest and influence in the region and her growing cooperation with the US alarmed both Pakistan and China. Reciprocating, Pakistan and China agreed to build a “One Belt One Road” project; also known as the China Pakistan Economic Corridor.

3.2 Literature on CPEC

(Leight, 2011) (Rohimi Shapiee, 2017) Authors tried to explain that CPEC is an obvious way for Pakistan to overcome the economic crises and other related issues but it will not be possible under the current problem of Pakistan legal system and not suitable infrastructure for the project. For this cause a detailed changing environment is required otherwise dream may not come true. (Naranjan, 2015) In 2013, China and Pakistan announced plans to construct an economic corridor to connect Kashgar in China’s Xinjiang Uygur Autonomous Region with the southwestern Pakistani port of Gwadar. Together with the proposed BCIM Economic Corridor (BCIM-EC), the China-Pakistan Economic Corridor (CPEC) extends to South Asia the broader trend of Asian regional economic integration through economic corridors. This became an alarming problem for India as China-Pak diplomatic relations were already hurting the causes of India now this mutual bond based on economic belt leaving Indian dream of winning the race far behind of his reach. (Rasheed, 2017) Author tends to further explain that CPEC lead ties of not only Pak-China but other countries are also competing in the game. U.S and India since the inception of CPEC have joined hand in many trade contracts and economic ventures in order to cover up the market and leave less for China but CPEC has already changed the game for both the countries. (Mirza, 2016) Says the author China has successfully adopted foreign policy of non-confrontation and has laid undiluted emphasis in pursuit of her political and economic interests. Resultantly, China has emerged as second largest economy of the world. One of the most fascinating manifestations of China’s rise is the One Belt One Road (OBOR) initiative, running overland along the Silk Route Economic Belt (SREB) and through the seas along Maritime Silk Road (MSR).

IV. 4.0 THEORETICAL FRAMEWORK

4.1 Conceptualization of interdependencies

Interdependencies of countries are due to economic bonds and trade contract to safe guard their investment and achieve set goal together many countries under go interdependent on each other. (Moravcsik, 2009) Has argued, interdependence is a key structural feature of the international system, along with anarchy. She argues that anarchy and interdependence do not stand in

opposition to one other as is frequently claimed. To the contrary, anarchy and interdependence are different features of the international system. (Baldwin, 1980), and others have repeated that the concept is not new. Interdependence thinking and theorizing have been at play for a long time and have served as fundamental building blocks in international relations. (Baldwin, 1980) Author illustrated this point by recounting Angell’s frequently cited story about two men in a boat in a stormy sea. The boat was leaking and rapidly taking on water. One man rowed frantically as the other desperately bailed. If either stopped, the boat would sink and both would drown. They were equally dependent on one another. Baldwin suggested that the story reveals several elements commonly addressed by most pre-WWII interdependency writers: a division of labor among parties involved; mutual dependency among the parties; mutual benefits from exchange; reciprocal interdependence constrains behavior; dependency as unpleasant fact; and the effects of interdependence on the effectiveness of the use of force.

Clearly, these examples show that interdependence is relational and refers to the situation of parties engaged in a system of action. CPEC is bridge between China-Pak Interdependencies. Both countries are connected through OBOR on mutual interest ground of Economics and Trade. This also led to security and military ties between both the countries to safe guard their investment from external threats. The catalyzing piece of this scholarship was the publication in 1977 of *Power and Interdependence* (Nye, 1977). These authors suggest that “interdependence” is both an analytical tool and rhetorical device. “In common parlance, dependence means a state of being determined or significantly affected by external forces. Interdependence most simply defined means mutual dependence. Interdependence in world politics refers to situations characterized by reciprocal effects among countries or among actors in different countries” (Nye, 1977). They differentiate interdependence from simple interconnectedness by the existence of costly reciprocal effects. They argue that is distinction is crucial for understanding the politics of interdependence. Keohane and Nye distinguish between two dimensions of interdependence for understanding power and interdependence: sensitivity and vulnerability. According to the authors, “sensitivity means liability to costly effects imposed from outside before policies are altered to try to change the situation. Vulnerability can be defined as an actor’s liability to suffer costs imposed by external events even after policies have been altered (Nye, 1977). Clearly, ambiguity exists over the concept and its usage. What is equally clear, however, is that the concept is central for explaining the nature and dynamics of international organization, as well as international relations more broadly conceived. Broadly speaking, this concept has been used in international relations theorizing to provide the context necessary for understanding its use and potential for understanding the dynamics of international organization and global governance. Specifically, the analysis examines the use of the concept in the study of general international systems, world-systems theory, dependency, international integration, and transnational relations.

4.2 Interdependence in international Relations theory

As reflected by (Baldwin, 1980), interdependence thinking has a long history in contemporary international relations

scholarship. Marx's critique of the capitalism, for example, was based on fundamental interdependence concepts and systems logic. Marx's theoretical foundation would soon be built upon by Lenin and others who saw mode of production, technological change, exploitative economic relations, and the dynamics of interdependent social relations among collectivities.

In many respects, (Carr, 1939) initiated the interwar-time context. To develop a comprehensive image of international relations, he focused on interdependence related to relative power relationships among major powers in the Westphalia interstate order. He distinguished power into three distinct elements: military, economic, and power over opinion. The struggle to fulfill power-related objectives creates an interactive framework in which states cause conflict while attempting to achieve additional power. In this context, the struggle for power among states may cause change at the systemic level, which can serve as a stressor for conflict among them. Carr did not believe in absolutist assumptions. Historical conditions and relative positions, actual and perceived, among state actors conditioned such systemic change.

Writing several decades later, (Bull, 1977) suggested that endeavoring to coping with interdependence can also be an underlying cause of cooperation. (Bull, 1977) He argued that, while the international system is anarchical, it is subject to principles of interdependence. The members of the system form a society with common rules and institutions, providing order in the international arena. These rules and institutions are based on basic goals of the society of states, including (a) preservation of the system and society of states; (b) maintaining the sovereignty of states; (c) preserving peace; and (d) general goals of social life.

V. 5.0 METHODOLOGY AND DESIGN

5.1 Qualitative design

This research is based on qualitative design. As major part of the study is covered by literature available in different studies though this topic is not old and very fewer studies are available but attempt is made to make things clear. CPEC is initiated in year 2013 since then fewer authors have worked on the topic. Especially the topic of interdependencies between China and Pakistan through OBOR and CPEC has not been studied before by many authors.

Secondly for this research purpose the main study of economic interdependencies is designed through the studies of famous author (Nye, 1977). Author of Power and interdependencies book has tried to overcome the topic that two countries become interdependent through mutual investment on a project and power distribution over the project leads to mutual interests and diplomatic interdependencies. For the purpose of this study we have also taken few interviews of the employees working in CPEC projects for understanding the motivation and needs of both the countries and objectives achieved from it.

VI. 6.0 INTERPRETATIONS OF CASE STUDIES

6.1 Driving Force for China to Invest In CPEC

China recently has changed his policy from inward to outward directions and for the cause Pakistan has become the key

ally to china. On the note Pakistan has handed over Gwadar port to china as the mutual contract signed for the benefits of both the countries. China-Pak friendship has led to many interdependencies to each other on different frontiers.

1. First is to reduce the distance for supply of goods and trade. Currently China is dealing with most of the world through the Pacific as well as Indian Ocean. China is dependent on the Strait of Malacca for supply of oil and other energy and trade commodities and; also to deliver its own products in Middle Eastern, African, European markets; and beyond. From the coasts of Middle East to the Port of Shanghai, total distance is about 12000 km and further to include the north-western Sinkiang region of China, it makes about 16000 km. Logistically this is so long distance to be covered and even costly. By the construction of road, railways and pipeline networks across Pakistan to connect Kashgar with Gwadar, it is only 2500 km. The successful completion of CPEC will not only save time for China but also make its supply more secure and quick. United States is also a factor in the current Chinese maritime route where the former possess a huge influence in the Pacific Ocean by supporting its allies and monitoring the region.
2. Chinese second objective is to develop its neglected and backward Sinkiang and other north-western regions. The Chinese motive here is also to create job opportunities and curb the separatist and terrorist tendencies. Bordering with Afghanistan and Pakistan, Sinkiang has been under the threat of separatist organization the 'East Turkistan Islamic Movement', responsible for unrest in the region. Beijing regime believes in the eradication of terrorism from region through the economic emancipation for bringing it into the mainstream politics.
3. Third objective is the security and expansion of energy and trade linkages. Pakistan provides a shortest route to China's linkage with Middle Eastern and African markets. Due to the rapid industrialization and becoming the world's second largest and fastest growing economy; since 2003, China is the second largest consumer of oil and other energy resources. This global hunt for energy has forced China to look for more supply of energy resources from Middle East and to use new markets of Africa, where it is the world's biggest investor.
4. Fourth is Chinese investment in Pakistan's mining and energy sectors where various projects of coal, copper and other minerals are underway with Chinese assistance in Pakistan.
5. Fifth is the development of infrastructure and Gwadar Port. Regional stability as well as Pakistan's internal security is a pre-requisite for all other objectives. China's most parochial motivation for the CPEC is to provide economic support to a flagging ally struggling with internal instability. A stable and economically prosperous Pakistan is in the interest of China to carry on its trade and economic projects with the world.
6. Last objective is to have access to Indian Ocean for monitoring the strategic developments in the region and to expand its presence in the Middle East. It will also help China for more connectivity with the energy-rich and land locked Afghanistan and Central Asian republics. One of China's major domestic security concerns is to ensure that Islamists do not penetrate the western autonomous region of Xinjiang.

Bordering on Afghanistan, this area has experienced unrest in the past decade or more as a result of political influence from the region probably inspired by the increasing insurgencies in a number of Muslim countries. China, it is believed, has expressed its concern to Pakistan on several occasions, with Beijing’s reaction varying from diplomatic protest to extreme annoyance expressed in the form of temporary closures of the border with Pakistan.

6.2 Driving Force for Pakistan to Partner China

1. Pakistan is equally interested to complete the China-Pakistan Economic Corridor. Various factors are responsible for Islamabad’s efforts to make it a success story. First is the overcoming of the power shortfall where the country is lagging behind to facilitate its public and run industries. The country’s short fall has been increased especially since 2007 resulted into the public continuous outrage and less productivity of the industrial sector. Various energy projects of hydropower generation, thermal plants, coal-run installations, wind and nuclear energy are included within the umbrella of CPEC. It is not only useful for creation of more job opportunities but equally significant to produce more commodities and improve the quality by industries. Pakistan’s sinking economy will show a rapid growth by attracting more foreign investment and joint projects with the foreign governments to increase its exports. It will also minimize the current gap in China-Pakistan imbalanced bilateral trade volume, now more favorable to China.
2. Second is the development of infrastructure capability of the country, severely needs improvement particularly since the start of the War on Terror. A country’s development is gauged by various factors where infrastructure is one of the most important elements. Pakistan’s poor transportation and industrial network have created a hindrance in boosting the national economy. The scene is worse to see in the backdrop of the wave of terrorism and militancy in the region where a huge loss has been incurred to infrastructure. Various roads

links, railway tracks, pipelines, industrial parks and economic zones will be established under the CPEC.

3. Third objective Pakistan wants to achieve through CPEC is the development of the deep water seaport at Gwadar. It is situated at a significantly geostrategic location, near the Strait of Hormuz on the Persian Gulf through which about 40 percent of the world oil channelizes on daily basis. The port has already been developed with the Chinese assistance and handed over to her for future operations. The long-remained backward and militancy-ridden area of Baluchistan will be come into mainstream by all the economic initiatives and employment opportunities. Gwadar Port is in competition with the Iran’s Chabahar Port, Oman Port and Dubai Port.
4. Fourth factor is the regional connectivity. The CPEC project is passing through an area which joins together some geopolitically and geo-strategically important regions of South Asia, Middle East, and Central Asia; and further to Africa and Europe. Gwadar provides an easy access to Indian Ocean for Afghanistan and Central Asian republics, to import and export trade. Some Central Asian states and Afghanistan are also part of the China’s One Belt, One Road policy. Pakistan’s trade and energy relations with these countries will be increased with a rapid pace.
5. Fifth motive is to eradicate terrorism and militancy from the country and the region through economic emancipation. Pakistan has suffered huge losses in the War on Terror. Afghanistan, China and Central Asian states also face the challenges of militancy and separatism. The eradication of the menace of terrorism through the economic initiatives is a slow process but with durable impacts. Sixth objective of Pakistan is to explore new minerals and scientifically utilize the already discovered ones. Resource-rich Pakistan is attractive for China and future’s foreign investors to play a win-win game. The jobless youth will be benefited with modern technological skills to raise the living standard high and make economy stronger.

6.3 Objectives of China and Pakistan in CPEC

| | CHINA’S INTERDEPENDENCIES ON PAK | | PAKISTAN INTERDEPENDENCIES ON CHINA |
|-----------|---|-----------|---|
| CA | Reduce the risk of violence in the bordering Xinjiang region from Pakistan-based drivers of instability. Pakistan blockade to the aid of Xinjiang Muslims and support. | PA | Attract aid and foreign direct investment to boost economic growth, create jobs, enhance productivity, and increase exports. |
| CB | Offset slowing domestic economic growth by exporting excess capacity and supply. Making Pakistan and other Asian countries China’s market through accessing Pakistani region. | PB | Obtain financing for electricity generation and transmission projects to eliminate shortfall, meet future residential and industrial demand, and achieve a more affordable and diverse energy fuel mix. |
| CC | Redirect FOREX reserves from US Treasury bills toward projects abroad with higher rates of return with the investment of CPEC project there china is dependent on Pak land and assets | PC | Upgrade road and rail infrastructure to enhance regional connectivity and ground logistics efficiency. |

| | | | |
|-----------|--|-----------|--|
| CD | Demonstrate a new, China-led, win-win model of international development. Diplomatic relationship with Pakistan can lead to an international Business Model for China to become No. 1 Economy of the world | PD | Reduce dependence on the Karachi port and Port Qasim, lowering port congestion and making a potential full Indian naval blockade less likely. For that Chinese help will be required in developing and investing in CPEC |
| CE | China is dependent on Pakistan in sense of accessing its market and skilled labor on low cost in CPEC and more profitable good can be produced with direct benefits to China | PE | Leverage Chinese investment and expertise in industrial zones to bolster and diversify manufacturing sector through industrial zones producing higher value-added goods. |
| CF | Reduce dependence on Straits of Malacca as transit route for energy and trade, as well as raw materials extracted from East Africa. It will also reduce the oil arriving days in china from Arab countries. China will be dependent on Karakoram to get to oil needs less than 10 days where as previously it used to take 45 days | PF | Modernize and diversify agricultural industry through Chinese investment and transfer of technology. |
| CG | Secure refueling, replenishing, and ship repair facilities in the Indian Ocean region. | PG | Expand the Sino-Pak relationship beyond a strategic and military alliance into an economic partnership as well. |
| CH | Break out of US containment efforts. | PH | Use CPEC as a demonstration effect, indicating to other investors that Pakistan is a safe and attractive destination for foreign direct investment. |
| CI | Enhance food security by investing in and sourcing agricultural and livestock products from Pakistan. | PI | Establish Pakistani ports as transshipment hubs for Central and South Asia and western China. |

6.4 China

Pakistan & Power Politic of Interdependencies

International relations and diplomacies has been changing right after WWII and in late 1970s it has become clear that in forth coming future many different interdependent blocks will arise on the world's map. A collaborative environment between the United States and the Soviet Union, normalization of relations between Washington and Beijing; the OPEC states' strategies against the West and the worldwide economic engagements, mostly in Europe, paved the way for avoiding conflicts and power politics. The states 'relations long remained inter-governmental throughout the diplomatic history but now extended to transnational, non-governmental and trans-governmental partnerships. Same is the case of China-Pakistan relationship under the China-Pakistan Economic Corridor by the explanation of the politics of interdependence. This theory was put forward by Robert O. Keohane and Joseph S. Nye in 1977 in their book "*Power and Interdependence: World Politics in Transition*".

Interdependence in world politics refers to situations characterized by reciprocal effects among countries or among actors in different countries (Keohane & Nye, 2012: 7). China and Pakistan, though, not totally dependent on one another but are engaged interdependently. This engagement under interdependence has provided both countries to contribute in various dimensions of their bilateral relationship. China and Pakistan will gain from the projects under CPEC but not necessarily that the advantage will be balanced. Symmetric interdependence is possible but very rare. Asymmetries in

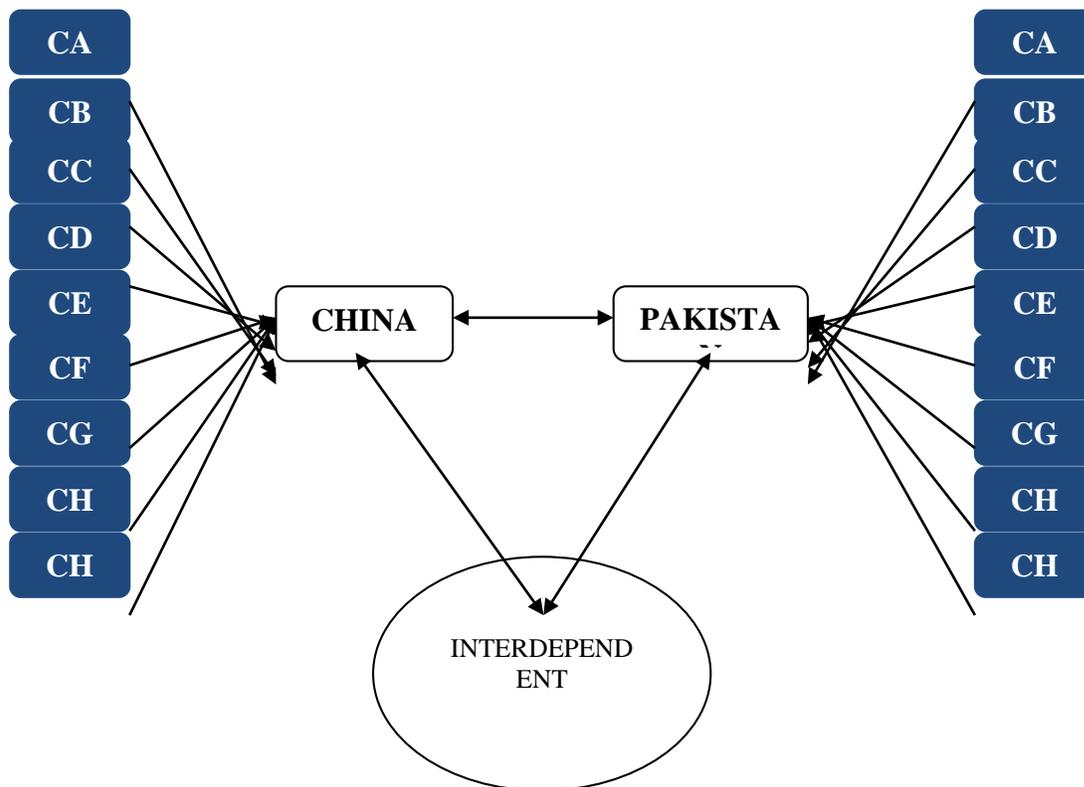
interdependence provide chances of influence to actors in dealings with one another. In such a relationship the less dependent actor can use the asymmetric interdependence for power position in bargaining over an issue or bunch of issues. This asymmetric dimension further provides a political bargaining process to actors (Nye, 1977). Looking into asymmetric interdependence, China has an upper hand in dealing with Pakistan within the CPEC. The 46 billion dollars will be provided by China for various projects in Pakistan. Also, various Chinese companies are involved in extracting different minerals, maximizing energy cooperation and providing technical assistance to develop the Gwadar Port. The China-Pakistan bilateral trade is imbalanced; favoring China. But geographically Pakistan is more advantageous than China. (Nye, 1977) He argues that the vulnerability dimension of interdependence rests on the relative availability and costliness of the alternatives that various actors face. Pakistan provides a shortest route to China to be connected with the Middle East, North Africa and beyond; for its trade and energy supply. Among the three corridors under the *One Belt and One Road* initiative, it is the easiest extension and most economical route for China. Other alternatives of going through Russia or Tajikistan and Afghanistan reaching to Iran; require more time, finance and logistic support.

However the economic infrastructure among states is a challenge when it hinders the transaction. It brings costs to states on two levels. Normal interaction between two states involves an understood accepted cost. For instance, trade routes channelize the

capacity to supply goods and services across the geographical and political boundaries. The economic infrastructure among states is complex, thus states willingly bear costs to achieve the advantages that motivate the trade relations. States make these costs to fully utilize the benefits of trade. However, further costs are possible in case of changing the relationship or the economic infrastructure among those states. The economic infrastructure within Pakistan and China are different from each other. If China has a vibrant economy with a rapid speed to grow, Pakistan's economy is destabilized due to various factors of political instability, corruption and sufferings in War on Terror. Islamabad and Beijing have joined hands together by forming Joint Working Groups (JWGs) to foster the CPEC projects and bear all the political,

economic and security costs to avoid any hindrance. Interdependence in international and regional politics is positive connectivity with immediate neighbors. This will require changes in Pakistan's foreign policy strategy that has, in the past, preferred closer economic ties, trade and security interaction with the far-away states in order to cope with the security threats from within the region of its geographic location. Now, Pakistan will be required to cultivate more active relations with the immediate neighbors for sharing energy and pursuing economic development and trade. This will give a major boost to Pakistan's economy. The areas adjacent to the Corridor will experience a major economic uplift.

VII. 7.0 MODEL OF INTERDEPENDENCIES



VIII. 8.0 DIPLOMATIC RELATIONS

8.1 Indian-American Response to CPEC

CPEC is currently world's largest route under-construction and will be the current economical regimes of the world. India, another neighboring country to China and Pakistan, is directly opposing to this economical interdependent collaboration of both the countries because it will kill the Indian dream of becoming Asian Economic Leader. With the help of America, who is indirectly in opposition to Pak-China Friendship, India has tried to gain with mutual contract on Chabar Port, Iran in Competition. But

this Indian strategy seems failing with naïve Trump's administration requirement from Indian government. India, since 2013, year of CPEC contract, has claimed that Route passing through Kashmir is Indian area but Pakistan has denied it. Both the countries have remained involved in many military and nonmilitary un-conventional wars. Recently India blamed Pakistan for Pulvama attacks in disputed area of Kashmir, in Feb 2019 and Pakistani Prime Minister Imran Khan's speech has completely denied it and invited Indian extremist government for investigative exchange but Narendra Modi's establishment conducted surgical strikes on Pakistan which has worsened the

peace situation of the region. Pakistan continuously offering peace solution as per United Nations resolution on disputed Kashmir but Indian military actions have silently denied to the sit-table arguments. After the Pulvama IAF strike lead to capture of Indian Mix21 Pilot Abhinandan. Imran Khan, being a person of peace gesture released the war criminal to Indian authorities. This blame game from India was to weaken the CPEC project and to diplomatic killing of Pakistan's International Relations but this power politics had no effect on Pak-China relationship and CPEC. U.S.A on the other hand has trade ties with India for covering Asian market and to remain the no. 1 economy of the world had pushed India to access Indian market many contracts of mutual trades were signed. America trying to sustain its economical power has allied Indian regime on many fronts but Indian Government's failure to give American access to Indian market has lead this partnership in perishing moments. [U.S.](#) President [Donald Trump](#) looked set to open a new front in his trade wars on Monday with a plan to end preferential trade treatment for [India](#) that allows duty-free entry for up to \$5.6 billion worth of its exports to the United States. United States policy of partnering India and making power politics of interdependencies with Indian government has not played well and the presumed threat to Pak-China relationship has been decreased by high end nodes and interdependencies

8.2 Sino-U.S.A International Politics and Diplomacy

An important pillar of China's national development and global diplomacy, the "Belt and Road Initiative" has received more attention from the US strategic community. Since 2018, the debates and policy debates around the "Belt and Road" in the United States have heated up significantly, and the US administrative and legislative branches have gained greater consensus on balancing the "Belt and Road". The US strategic community generally believes that the impact of China's continued promotion of the "Belt and Road" construction cannot be underestimated. It not only has the potential to change the geo-economic and geopolitical balance of Eurasia, but also in many fields such as technical standards, military security, and international development. It poses a real challenge to the United States and even undermines the foundation of the global hegemony that the United States established after the Second World War. The Trump administration began to enrich and refine the "free and open Indo-Pak strategy" (hereinafter referred to as the India-Pacific strategy), promote the negative arguments such as the "debt trap" of China's manufacturing; reform the international financing mechanism and many other Ways, constantly increase the balance of the "Belt and Road". It can be said that the game around the "Belt and Road" focuses on the rising competitive factors in Sino-US relations and the overall trends and main features of the US implementation of competitive strategies toward China.

Since the Trump administration took office, it has adhered to the "US priority" line, continuously adjusted the US internal and external policies, and adopted a grand strategy characterized by "repressive retrenchment", focusing on improving the economic competitiveness and military strength of the United States. Reduce the cost of taking on international leadership responsibilities. However, the United States is not trying to abandon its global leadership. Instead, it is trying to use unilateralism and bilateral

pressure as a means to deeply reshape the US alliance system and current rules, thus strengthening the suppression and regulation of the US "opponents."

On the one hand, economic globalization is in a low tide, populism is booming in Western countries, the transatlantic alliance is showing signs of rift, the return of geopolitical conflicts, and the deterioration of the contradictions of ethnic groups. It shows that after the Second World War, the United States led the establishment and after the Cold War to the non-Western the "liberal international order", which is gradually expanding in the world, is in deepening crisis. The US national security strategy has seen a major shift in its core goal of responding to the competition of big countries, and regards China as a more threatening force than countries such as Russia. In December 2017, the Trump administration issued documents such as the National Security Strategy report and the National Defense Strategy report, criticizing China's internal and external policies, and clearly positioning China as a "revisionist country" and a US "strategic competition". ", and will increase the competition for China to the height of "geopolitical competition between the free world order and the repressive world order." These reports highlight the reality of the strategic competition between the two countries, which largely reflect the consensus of the US strategic community and marks the United States' attempt to concentrate on responding to the "China Challenge."

IX. 9.0 CONCLUSION

China and Pakistan are determined to complete the CPEC project at all costs. It will bring economic prosperity and stability to both states as well as to the region. It would only be a quantitative expansion in the domain of economy. CPEC is likely to expand in due course to provide interconnectivity with Afghanistan, Iran, the CARs and others. CPEC is indeed a long project. Geographically, China is more vulnerable as it is dependent on Pakistan's geography having geo-strategic importance. It is for the first time in their bilateral relationship that a huge amount of investment is being provided by China for a number of projects with the help of different government and private companies, banks and business communities.

Private Pakistani companies have already started having some direct interactions with their Chinese counterparts. As far as societal level interactions are concerned, they might also start to have their presence felt, but it would take a long time. The main reason for that is strong language and cultural differences. Viewing the costs, Pakistan is more vulnerable³, as country has suffered negatively due to War on Terror and political instability. But it is hoped that CPEC will enhance the annual bilateral trade volume and make it less imbalanced in future. Last but not least is the fact that China and Pakistan have entered into their interdependent relationship which may evolve into complex interdependence in future.

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Petroleum Industries: Produced Water Effects, Management and Treatment Technologies

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Abstract- When hydrocarbons are produced, the well flow typically consists of water produced in affiliation with these hydrocarbons. Oil field produced water is a complex combination of dissolved and particulate organic and inorganic chemical compounds in water that ranges from essentially freshwater to concentrated saline brine. Produced water from oil fields has raised a lot of environmental concerns, with the rise of an environmental protection and safety movement, the petroleum companies have positioned higher emphasis on minimizing environmental impact of its operations. The main objectives of oil and gas produced water treatment include meeting discharge standards, reusing treated produced water in oil and gas operations, developing agricultural water uses, cattle and animal drinking water, water for human consumption, and meeting water quality requirements for miscellaneous recommended uses. This article reviews effects of produced water on the environment and technologies for the management of produced water in oil fields.

Index Terms- Produced Water, Oil and Gas, Hydrocarbon, Chemical Oxygen Demand and Treatment Technology.

I. INTRODUCTION

Produced water regularly is produced during the generation of oil and gas from coastal and seaward wells [1], produced water results from two procedures in the oil and gas industry. To begin with, during extraction, this gives a blend of water and oil; the wellspring of which is typically seawater encompassing the oil well. Second, the water infused into the oilfield to carry the profound oil to the surface likewise eventually turns out to be a piece of delivered water or wastewater [2]. Oil wastewater from processing plants contains significant levels of poisons and is portrayed by the nearness of huge amounts of treatment facility gushing, for example, oil items and synthetic substances that are difficult to corrupt. Administrative specialists deny grants to release this oil wastewater to keep up the compound, physical and organic trustworthiness of the new water assets [3]. Oil field administrators are especially keen on creating unrefined petroleum yet should figure out how to deal with the "essential abhorrence" (delivered water) that accompanies it so as to guarantee proficiency in their tasks. Because of this reality confronting oil

field administrators, such a large number of research works have been done to figure out how to deal with delivered water the world over. Release particulars are the admissible emanating points of confinement of constituents of delivered water [4]. The constituents of petroleum water are portrayed as follows: disintegrated and scattered oil mixes, broke down, scattered and suspended natural mixes, treatment synthetic substances (erosion inhibitors, mud cuttings and so forth.), delivered solids, microbes, and metals. Effluent limits are portrayed as follows: PH, temperature, oil/oil content, saltiness, turbidity, complete disintegrated solids (TDS), all out suspended (TSS), compound oxygen request (COD), biochemical oxygen request (BOD), lead, iron, copper, chromium, Zinc, sulfide, sulfate, mercury and turbidity. As far as possible can be resolved in the laboratory [5]. Currently, oil and gas administrators treat produced water through at least one of the accompanying alternatives: Evade generation of water: water breaks are obstructed by polymer gel or downhole water separators, yet this choice isn't constantly conceivable. Infuse into developments: delivered water might be infused back to its arrangement or into different developments. This alternative regularly requires transportation of water, and treatment to decrease fouling and bacterial development. In the long haul, the put away created water may contaminate the underground waters. Release to nature: delivered water might be released to the earth as long as it meets inland and seaward release guidelines, reuse in petroleum industry operations: minimally treated produced water may be used for drilling and workover operations within the petroleum industry. Apply in beneficial uses: produced water may be consumed for irrigation, wildlife consumption and habitat, industrial water and even drinking water. However, beneficial uses of produced water may involve significant treatment. [5]

1. What is produced water

Oil wastewater is the biggest waste stream created in oil and gas enterprises. It is a blend of various natural and inorganic mixes. Because of the expanding volume of waste everywhere throughout the world in the ebb and flow decade, the result and impact of releasing produced water on the earth has of late become a huge issue of ecological concern. Delivered water is expectedly treated through various physical, compound, and organic strategies. In seaward stages on account of room imperatives, reduced physical and compound frameworks are used [6]. Regular

water or arrangement water is constantly discovered together with oil in supplies. It is marginally acidic and sits beneath the hydrocarbons in permeable store media. Extraction of oil and gas prompts a decrease in repository pressure, and extra water is normally infused into the supply water layer to keep up water driven weight and improve oil recuperation [5]. Notwithstanding infused water, there can be water leap forward from outside the store region, and as oil and gas generation proceeds, the opportunity arrives when arrangement water arrives at creation well, and generation of water starts nearby the hydrocarbons. This water is known as delivered water or oilfield saline solution, representing the biggest volume of side-effect created during oil and gas recuperation tasks [7]. It is a mixture of injected water, formation water, hydrocarbons and treating chemicals

1.1. Characteristics of produced water

Produced water contains various substances, notwithstanding hydrocarbons, that influence the way where the water is dealt with. The organization and grouping of substances may fluctuate among fields and even between various generation zones inside a solitary field. The phrasing utilized for focus is milligrams per liter (mg/l), which is mass per volume proportion and is around equivalent to parts per million (ppm). A portion of the significant delivered water constituents are examined in this

section [8]. Produced water is definitely not a solitary item, it has an easy to complex organization that is variable, and it is considered as a blend of broke up and particulate natural and inorganic synthetic compounds. Substance and physical properties of delivered water differ significantly which relies upon a few components including, geographic area of the field, age and profundity of the land development, hydrocarbon-bearing arrangement geochemistry, extraction strategy, sort of the created hydrocarbon, just as its compound organization in the store. The poisonous quality of delivered water released from gas stages is multiple times higher than the harmfulness of the oil wells discharge [2]. The primary parts found in produced water are arranged and abridged alongside their focuses from the writing. The significant constituents that are available in created water include: salt substance (estimated as saltiness), all out broke down solids (TDS) or electrical conductivity; oil and oil (O&G); polyaromatic hydrocarbons (PAHs), benzene, toluene, ethylbenzene, and xylenes (BTEX), phenols, natural acids, characteristic natural and inorganic exacerbrates that cause hardness and scaling (e.g., calcium, magnesium, sulfates, and barium); and compound added substances, for example, biocides and consumption inhibitors that are utilized during penetrating, breaking and working procedure of the well

| Parameter | Value | range |
|------------------------------|-----------|-------|
| pH | 8.3–8.9 | |
| Conductivity (ms/cm) | 5.2–6.8 | |
| Total suspended solid (mg/l) | 30–40 | |
| Total dissolved solid (mg/l) | 3800–6200 | |
| SO4 (mg/l) | 14.5–16 | |
| COD (mg/l) | 3600–5300 | |
| Total phenol (mg/l) | 160–185 | |
| Phenol (mg/l) | 11–14 | |
| <i>o</i> -cresol (mg/l) | 14–16.5 | |
| <i>m, p</i> -cresol (mg/l) | 72–75 | |
| N-hexane (mg/l) | 1.8–1.85 | |
| 2,4- and 2,5-DCP (mg/l) | 28–32 | |

Table 1. Main characteristics of petroleum refinery wastewater (adapted from[9]).

Table 2. Contaminants in raw water (adopted from [10])

| Contaminant | Problem | Removal methods |
|-------------------|---|---|
| Turbidity | Makes water cloudy and deposits in water lines and process equipment | Coagulation, settling and filtration |
| Hardness | Primary source of scale formation in heat exchangers and pipe lines | Softening, distillation, surfactants |
| Alkalinity | Causes foaming in steam systems and attacks boiler steel. Bicarbonate and carbonate produce carbon dioxide in steam which is highly corrosive | Lime and lime-soda softening, Zeolite softening, Dealkalization by anion exchange |

| | | |
|---------------------------|---|--|
| Sulphate | Adds to the solids content of water and combines with calcium to form calcium sulfate scale | Demineralization, distillation |
| Chloride | Adds to solids content and increases the corrosive properties of water | Demineralization, distillation, desalination (if sea water is being used) |
| Silica | Scaling on heating and cooling equipment and Pipelines | Anion exchange resins, distillation |
| Iron and magnesium | Discolors the water and precipitates in water lines and process equipment | Aeration, coagulation and filtration, lime softening, cation exchange |
| Oil | Source of scale, sludge and foaming in boilers. Impedes heat exchange. Undesirable in most Processes | Oil/water separators strainers. coagulation and filtration. Diatomaceous earth filtration |
| Oxygen | Corrosion of water lines heat exchange equipment, boilers, return lines, etc. | Deaeration, sodium sulphite, corrosion inhibitors |
| Hydrogen sulphide | Cause of 'rotten egg' odor. Corrosion, toxicity | Aeration, chlorination, highly basic anion exchange |
| Conductivity | Conductivity is the result of ionizable solids in solution. High conductivity can increase the corrosive characteristics of a water | Processes which decrease dissolved solids content will decrease conductivity. Examples are demineralization, lime softening |
| Dissolved solids | 'Dissolved solids' is the measure of total amount of dissolved material. High concentrations of dissolved solids are objectionable because of process interference and as a cause of foaming in boilers | Various softening process, such as lime softening and cation exchange by zeolite, will reduce dissolved solids. Demineralization, distillation |
| Suspended solids | 'Suspended solids' is the measure of undissolved matter. Suspended solid plug lines, cause deposits in heat exchange equipment, boilers, etc. | Sedimentation. Filtration, usually preceded by coagulation and settling |

1.1.1. Salinity

One of the undesirable segments of penetrating liquid at transfer time is salts, similar to sodium or potassium chloride, are frequently added to boring liquid to shield delicate arrangements from responding with the boring liquid. Salt (sodium chloride) in low focuses is basic to the soundness of plants and creatures. At focuses not quite the same as the normally happening levels found in a given environment, in any case, salt can cause an antagonistic effect [11]. Natural impact of created water salts can happen in all districts where oil and gas have been delivered It is as a significant patron of danger [6].

1.1.2. Inorganic Ions

Chloride and sodium are considered as the most abundant salt ions found in produced water, while phosphate has the lowest concentration. In produced water from both conventional and unconventional wells; sodium is considered as the dominant cation with 81% in conventional wells and more than 90% in unconventional wells [2]. In addition, sodium, chloride, magnesium, sulfate, bromide, potassium, iodide and bicarbonate are found in produced water with high salinity. The presence of sulfate and sulfide ions in produced water can lead to insoluble sulfate and sulfide at high concentrations in produced water. Moreover, the presence of bacteria in the anoxic produced water, cause the reduction of sulfate and in turn leads to the presence of sulfides (polysulfide and hydrogen sulfide) in the produced water However, the concentration of these anions and cations varies from location and their ranges are presented in the table above.

1.1.3. Heavy Metals

Heavy metals can enter into drilling fluids in two ways: (1) many metals take place naturally in most formations and will be included into the fluid in the course of drilling. (2) additionally metals are introduced to the drilling fluid as phase of the additives used to alter the fluid properties [11]. Heavy metal concentrations in produced water depend on age of the wells and formation geology. Produced water incorporates small quantities of a variety of heavy metals such as cadmium, chromium, copper, lead, mercury, nickel, silver. Heavy metal concentrations in produced water are typically greater than those of receiving water (for better oil recovery) and these located in sea water [5]. Mostly, mercury, zinc, barium, manganese, and iron are observed in produced water at greater awareness than the seawater attention. However, variations in the type, concentration, and chemical content of the metals are influenced with the aid of the geological age and features, injected water extent and chemical composition [2].

1.1.4. Total Dissolved Solids (TDS)

Oil wastewaters include dissolved solids, but the amount varies from less than 100 mg/l to over 300,000 mg/l, relying on the geographical location as well as the age and type of reservoir. In general, water produced with gasoline is condensed water vapor with few dissolved solids and will be clean with a very low salinity. Aquifer water produced with fuel or oil will be a good deal greater in dissolved solids. Produced water from hot reservoirs tends to have greater TDS concentrations while cooler reservoirs have a tendency to have lower ranges of TDS [8]. The conductivity of produced water can differ widely as it was once discovered that the conductivity of produced water from natural gasoline ranged from 4200 to 180,000 $\mu\text{S}/\text{cm}$ [2]. Produced water is normally characterized as brackish groundwater with elevated concentrations of total dissolved solids. The inorganic elements present in produced water are in particular derived from the rock formations with which the water is in contact; therefore, the water satisfactory involving inorganic materials is prepared and presented through geologic basin. Water from traditional oil and gasoline can showcase a vast range of TDS concentrations; 1,000 mg/L to over 400,000 mg/L [12].

1.1.5. Biochemical Oxygen Demand (BOD)

Biochemical Oxygen Demand is the amount of oxygen required by aerobic microorganisms to decompose the organic matter in a sample of produced water. The BOD of 75–2870 mg/l has been reported for produced water from natural gas field. Reduced inorganic elements such as Fe and Mn, used fluids for well drilling, and additive chemicals can result in higher BOD concentrations in produced water obtained directly from the well [2]. Furthermore, dissolved oxygen can be used up in water bodies receiving produced water with excessive BOD content, because the microorganisms can only utilize the oxygen initially available thus, substantial oxidation of this water should be ensured to prevent the discharge of waste water with high BOD into natural waters [13].

1.1.6. Chemical Oxygen Demand (COD)

The chemical oxygen demand (COD) represents the amount of chemically digestible organics.

COD measures all organics that have been biochemically digestible as well as all the organics that can be digested through heat and sulfuric acid [13]. COD often is used as a measurement of pollutants in wastewater and natural waters, petroleum wastewater COD measure of the capacity of water to consume oxygen at some point of the decomposition of natural count and oxidation of inorganic chemicals such as ammonia and nitrate [2].

1.1.7. Oil and Grease

Oil and grease are the ingredients of produced water that get hold of the most attention in each onshore and offshore operations [14]. The attention of Oil & Gas two in natural gas, produced water range between 6–60 mg/l [2]. Moreover, another find out about used to be carried out on western United States' produced water and the attention of O&G was once discovered to be 40 mg/l to as excessive as 2000 mg/L [12].

1.1.8. Benzene, toluene, ethyl benzene, and xylene (BTEX)

Oil is a mixture of hydrocarbons such as benzene, toluene, ethylbenzene, and xylenes (BTEX), naphthalene, phenanthrene, dibenzothiophene (NPD), polyaromatic hydrocarbons (PAHs) and phenols. Water can't dissolve all hydrocarbons, so most of the oil is dispersed in water [6]. BTEX are volatile fragrant compounds that are naturally existing in oil and fuel merchandise which includes herbal gas, gasoline, and diesel fuel, for that reason they without problems get away to the ecosystem at some stage in the water cure process. two [2].

1.1.9. Phenols

Concentrations of total phenols in produced water commonly are less than 20 mg/L [1]. Phenols or phenolics are section of fragrant natural compounds that include one or more hydroxyl team connected to an aromatic hydrocarbon group. Various tiers of phenols are existing in produced water from oil and gas-operating wells; however, fuel condensate manufacturing was once located to have the best possible awareness of phenols [2]. The comparison of the attention of phenol in produced water from oil and gasoline subject printed that fuel field-produced water has greater concentrations of phenol than oil field-produced water.

1.1.10. Production Chemicals

Production chemicals can be pure compounds or compounds containing lively substances dissolved in a solvent or a co-solvent, and used for inhibition of corrosion, hydrate formation, scale deposition, foam production, wax deposition, bacterial growth, fuel dehydration and emulsion breaking in order to improve the separation of oil and water [5]. In addition Production chemicals are normally delivered to the oil or fuel field for the management of the operational troubles such as to facilitate oil, gas, and water separation process, prevention of pipeline corrosion and methane hydrate formation in the fuel production system [2].

II. USE OF PRODUCED WASTEWATER FOR THE OIL FIELD

Although produced water from oil and gas wells normally is considered a high volume, high salinity waste stream, produced water has the attainable to be used to offset water demands and

over allocation of water supplies. Waste circulate administration is necessary to proceed hydrocarbon production from oil and gas well [15]. Recycled/treated PW should be used for underground injection to enhance oil restoration (it is to be noted that PW cannot be injected to the gasoline reservoirs), use for irrigation, wildlife watering, and various industrial purposes such as dust manipulate (specially in Middle East region), automobile washing, cooling water make-up and fire-fighting systems [16]. Since the demand and production of oil and gas is continuing to make bigger globally, the environmental footprints associated with this production are increasing, such as produced water. Furthermore, as the scarcity of freshwater furnish is increasing, produced water can be a indispensable source of water after appropriate remedy [2]. There has been an increased attention on reclaiming, reusing, and recycling of water that is commonly wasted to meet the communities' needs of freshwater source. Different standards for reuse of dealt with water have been provided based on meant purpose. As expected, the standards for ingesting water are more stringent and therefore, more great therapy of produced water is needed. There are quite a few picks for utilization of produced water such as consuming water, irrigation, livestock watering, habitat and wildlife watering, hearth control, and industrial makes use of such as dust control, oil subject uses, and power generation. Based on the traits of produced water mentioned previously, cure of the produced water is required to meet the quality standards before re-using it.

Table. 1 Standards for water reuse for drinking, irrigation and livestock purposes

| Component | Drinking (g/m3) | Irrigation (g/m3) | Livestock (g/m3) |
|-------------------------------------|--------------------|----------------------|---------------------|
| Li ⁺ | - | 2500 | - |
| K ⁺ | - | - | - |
| Na ⁺ | 200 | Based on SAR | 2000 |
| NH ₃ | 1.5 | - | - |
| Ca ²⁺ | - | Based on SAR | - |
| Mg ²⁺ | - | Based on SAR | 2000 |
| Cl ⁻ | - | - | - |
| Br ⁻ | 250 | - | 1500 |
| HCO ₃ | - | - | - |
| SO ₄ | 250 | - | 1500 |
| TDS | 500 | 2000 | 5000 |
| Conductivity | - | 2.5 | 1.5-5 |
| Sodium adsorption ratio (SAR) | - | 0-6 | - |

1.2. Livestock watering

Water quality consumed by farm animals normally have decrease requirements than the quality of water for human consumption as the contaminant tolerance of livestock is higher than humans. However, contaminants existing in the water used

by way of animals need to be underneath sure restriction to keep away from negatively affecting their health [2]. Livestock can tolerate a range of contaminants in their drinking water. At some concentrations, the animals, even though nevertheless capable to survive, will commence to show some impairment [14]. For instance, water with <1000 mg/l of TDS can be used as a water source for livestock. it can affect the fitness of farm animals by inflicting diarrhea if the fee exceeds 7000 mg/l. This notion was once utilized in some projects CBM in which they hooked up watering stations for cattle to make use of produce water as drinking water [14].

1.3. Habitat and wildlife watering

Produced water can be used after semi-intensive remedy and making sure its innocent nature to create artificial reservoir for providing consuming water source for flora and fauna as well as imparting habitat for waterfowl and fishes [2]. Some Rocky Mountain place CBM tasks have created impoundments that collect and continue massive volumes of produced water. In some cases, these can also have floor areas of at least numerous acres. These impoundments furnish a supply of consuming water for natural world and offer habitat for fish and waterfowl in an in any other case arid environment. It is important to make certain that the first-rate of the impounded water will no longer create health issues for the wildlife [14].

1.4. Irrigation

Produced water, then again after treatment, should be used for agricultural issues, for livestock and animal watering. Such applications are realistic benefits, specifically for arid regions. However, in such case, a suitable cure technological know-how is essential [16]. Reuse of produced water for irrigation specifically in dry lands has been endorsed and reviewed the essential challenges consist of sodality, salinity, unique ion toxicity, and alkalinity which are magnified because of the decrease produced water quality; therefore, it is very crucial to consider the crop type when using produced water for irrigation [17]. After the cure of produced water and removal of all pollutants, if the quality of handled water is assembly with sure requirements and having low enough TDS, we can consider produced water as a precious useful resource for irrigation of crops [2]. Many components of the United States and round the world have limited freshwater resources. Crop irrigation is the largest single use of freshwater in the United States, making up 39% of all freshwater withdrawn, or a hundred and fifty billion gallons per day (USGS 1998). If produced water has low adequate TDS and other characteristics, it can be a treasured aid for crop irrigation [14].

1.5. Industrial uses

The treated Produced water ought to be reused in drilling and/or EOR programs. This can minimize the clean water requirement in oil and gas industries. But, to be successfully reused, the produced water sample wants desirable therapy to meet operational requirements [16]. Produced Water is use in areas the place traditional floor and groundwater sources are scarce, produced water can also be substituted in a variety of industrial practices as lengthy as the first-class of the produced water meets the needs of the industrial technique with or barring treatment. Produced water is already being used for a number of industrial

uses and can also be suitable for others. These are mentioned in this section [14].

III. MANAGEMENT OF PRODUCED WATER.

Produced water treatment and disposal are topics of growing interest in petroleum operations fields two for three essential reasons: Increasing volumes are being produced as greater and greater fields get mature, Federal Environmental Protection Agency is introducing extra stringent discharge widespread and the need to decrease capital and running cost, especially given the contemporary low oil fees [18]. Moreover, PW therapy has the doable to be an innocent and valuable product rather than a waste, and it could be used for irrigation, more than a few industrial uses and livestock/wildlife watering or energy plant make-up [16, 19]. The foremost goals for operators of PW therapy ought to be investigated as follows:

1. Removal of free and dispersed oil and greases present in PW
2. Removal of dissolved organics
3. Removal of microorganisms, algae and bacteria
4. Removal of turbidity via elimination of suspended particles and colloids
5. Removal of dissolved gases
6. Removal of dissolved salts and minerals, excess water-hardness and possible radioactive materials

For managing produced water, a three-tiered pollution prevention the generally favored hierarchy for environmental administration is: (1) reduce; (2) re-use; (3) recycle/recover; (4) treatment/disposal. These are multiplied on below:

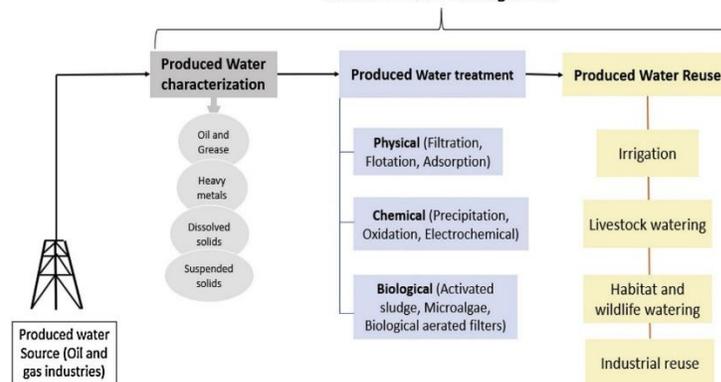
Reduce. two The formation (produced) water is kept in the oil reservoir instead than produced with the oil to surface. Water shut-off treatments (polymers, cement, straddle packers) and re-perforation are practiced.

Re-use. Reuse in oil and gasoline operation: treat the produced water to meet the excellent required to use it for standard oil and fuel fields operations [6]. The produced water is used for re-injection, for reservoir stress renovation or sweep waterflooding. In rare instances with very low salinity, produced water can be re-used, after treatment, for agricultural irrigation or for wash water. Downhole oil/water separation (DHOWS) and re-injection is if truth be told a mixture reduce/reuse option, in which water is separated from oil in the producing well, the usage of an array of hydro cyclones, with an electro-submersible pump (ESP) to pressurize the water for injection to deeper, or shallower zones. DHOWS is solely workable, currently, at a well water-cut above 50% [20].

Recycle/recover. Recovery of heat content material is every now and then practiced, and for uncommon low salinity waters in areas of severe water shortage, desalination to supply potable water has been adopted. However, desalination tactics do lead to a greater targeted effluent move which still has to be disposed of correctly, e.g. through underground injection. Recycling of produced waters for exploration and manufacturing operations within the oil and fuel field is every other principal potential of produced water management. Some therapy can also be required to render the water suitable for reuse in drilling or hydraulic fracturing. Another management approach is the use of produced water for dust suppression and deicing, although some states are looking more.

Treatment/Disposal. Treatment of produced water is an high-quality choice for produced water handling. Treatment of produced water has the viable to be a innocent and treasured product rather than a waste [6]. There are many options for remedy processes, which need to be selected to go well with the final disposal place and environment. two These alternatives are mentioned in further element below. Disposal Options The preferences are: (1) discharge to evaporation pond, if onshore in hot, dry climates; (2) discharge to sea, or other aquatic location (river, lake) if onshore; (3) underground injection by disposal wells [20].

Figure 1 . Produced Water Management Options [2].
Produced Water Management



1.6. Disposal Standards/ Regulations

Discharge of produced water is strictly regulated, though discharge standards differ with location. The quality of produced water is most broadly expressed in terms of its oil content, which acts as a surrogate for different pollutants. Most nations regulate the discharge of produced water, taking into account differing environmental prerequisites and sensitivities between onshore and offshore [21]. Failure to comply with policies can result in: Civil penalties Large fines Lost or deferred production. Currently, guidelines require the “total oil and grease” content material of the effluent water to be reduced to stages ranging from between 15 mg/l and 50 mg/l. Disposal or produced water into onshore surface waters is generally prohibited via environmental regulations. Onshore disposal usually requires the produced water effluent to be injected into a saltwater disposal well.

3.1.1. Onshore Operations

Disposal of produced water into freshwater streams and rivers is generally prohibited without for the very restrained cases where the effluent is low in salinity. Some oilfield brines might kill freshwater fish and vegetation due to excessive salt content. Regulatory requirements for discharge are much greater stringent onshore. In addition to oil and grease, parameters such as biological oxygen demand (BOD) and chemical oxygen demand (COD), TDS, pH, phenols and heavy techniques should meet certain standard [21].

3.1.2. Offshore Operations

Standards for the disposal of produced water are developed with the aid of the authority’s regulatory agencies. Regulatory groups generally specify the analytical for identifying the oil content. Produced water toxicity is regulated only in the Nation

the place a government permit is fundamental to restriction toxicity of produced water discharged into the waters. summarizes offshore disposal requirements for several countries. The requirements are cutting-edge The requirements are modern as of this writing [8].

Table 2: Worldwide Produced waste Water Effluent Oil Concentration Standards/Limitations [8].

| Country | Oil Concentration/Limitations |
|--|---|
| Ecuador, Columbia, Brazil | 30 mg/l All facilities |
| Argentina and Venezuela | 15 mg/l New facilities |
| Indonesia | 25 mg/l All facilities and Zero discharge to inland water |
| Malaysia, Middle East | 30 mg/l All facilities |
| Nigeria, Angola, Cameroon, Ivory Coast | 50 mg/l All facilities |
| North Sea, Australia | 30 mg/l All facilities |
| Thailand, Brunei | 30 mg/l All facilities |
| U.S.A. | 29 mg/l OCS waters and Zero discharge to inland water |

Table 3: The outlet waste water values determined for pH, Sulphide, Nitrogen and Ammonia, COD, Oil and Grease, TSS, BOD and Phenols for comparison with the Chinese and the Sudanese Standards.

| Parameter | Maximum limit in Chinese Standards | Maximum limit in Sudanese Standards |
|--------------------------------|------------------------------------|-------------------------------------|
| pH value at 25°C | 6-9 | 6-9 |
| Sulphide | 1 (mg/L) | 1 (mg/L) |
| Nitrogen and Ammonia | 15 (mg/L) | 10 (mg/L) |
| Chemical oxygen demand (COD) | 100 (mg/L) | 150 (mg/L) |
| Oil and grease | 10 (mg/L) | 10 (mg/L) |
| Total suspended solids (TSS) | 70 (mg/L) | 30 (mg/L) |
| Biological oxygen demand (BOD) | 30 (mg/L) | 30 (mg/L) |
| Phenols | 0.50 (mg/L) | 0.50 mg/L) |

3.2. Impact of Produced Water

3.2.1. Effects on Ecologically important microbial community processes

The results of produced water might also be stimulatory, inhibitory or neutral. Photosynthetic microorganisms are the most important essential producer in marine and fresh water ecosystem, any deleterious results on these most important produced by way of exposure to hydrocarbons and heavy intellectual salts soluble in produced water can alter the tropical shape of the ecosystem [18]. Produced water discharges from offshore oil production comprise a complex mixture of organic substances such as PAH and AP with viable endocrine-disrupting potential [22]. The produced water (at a concentration equivalent to a factor 0.5-1 km downstream from the discharge point) triggered an expand in bacterial biomass but only had a transient, slightly depressant, effect on the price of foremost manufacturing through phytoplankton [23]. The neighborhood structure and variety of microbial communities and activities in the soil ecosystem could be modified beneath the pollution stress. On the other hand, soil micro- organisms and soil enzymatic things to do are touchy biological warning signs of soil pollution [24].

3.2.2. The effects on aquatic lives

Most, but no longer all, produced waters have a salt content material greater than that determined in the local ecosystems. The discharge of water having a greater salt content can have an impact on aquatic organisms. High concentrations of sodium chloride can have an effect on the development of embryos and fetuses and can motive fetal death. High salt concentrations can also affect the development of the musculoskeletal machine and reason eye, skin, and higher respiratory system inflammation [25]. Because the salinity of many produced waters is larger than that of marine waters, the environmental impact of excessive salt concentrations is also of subject involving marine organisms. Highly saline water has a greater density than seawater and will segregate to the backside of any surface waters. This density gradient inhibits the mixing and dilution of the very salty water [11] Produced water effects on aquatic lives are related to the exposure of organisms to concentrations of more than a few chemicals. Factors that have an effect on the amount of produced water elements and their concentrations in seawater, and consequently their doable for have an impact on on aquatic organisms, encompass the following [14]: Dilution of the discharge into the receiving environment, Instantaneous and long-term precipitation, Volatilization of low molecular weight hydrocarbons, -Physical-chemical reactions with different chemical species present in seawater that may additionally have an effect on the concentration of produced water components, Adsorption onto particulate matter, and Biodegradation of organic compounds into different less difficult compounds. APs can have an effect on a number of reproductive parameters in fish, which includes gonadal improvement [26] . Phytoplankton, periphyton and zooplankton, and different important factors of aquatic and marine meals webs, can be affected critically and negatively via disposal of improperly dealt with produced water. Whether these consequences are everlasting or brief depends on a variety of physical and chemical instances atypical to the produced water [18].

3.2.3. *Effects on human Health*

Life within oil producing areas for instance Niger Delta circles round endeavor that entails every day utilization of the natural water bodies. From the local fishing activities to complicated irrigation work by way of mechanized farmers, the water gadget is known as upon as an indispensable part of their culture. Produced water pollution, thus raises fundamental problems as it affects man not directly from consumption of contaminated aquatic animals and flora and extra at once via his direct usage of the herbal water system. Polluted water cannot be drinkable and its utility price reduced [18]. The have an effect on of HCs on human health relies upon rather on whether or not exposure used to be from ingestion, inhalation, or dermal (skin) contact and on whether the publicity was once acute (short-term) or continual (long-term). The acute results of ingestion can also consist of infection to the mouth, throat, and stomach, and digestive problems and/or damage. Small quantities of HCs can be drawn into the lungs, both from swallowing or vomiting, and may reason respiratory impact. The persistent consequences of ingestion might also consist of kidney, liver, or gastrointestinal tract damage, or odd coronary heart rhythms. Prolonged and/or repeated publicity to aromatics like benzene can also reason damage to the blood-producing system and serious blood problem [11]. The chronic results of ingestion may also encompass kidney, liver, or gastrointestinal tract damage, or strange heart rhythms. Prolonged and/or repeated publicity to aromatics like benzene may additionally reason damage to the blood-producing device and serious blood disorders, along with leukaemia [27].

IV. PRODUCED WATER TREATMENT

3.3. *Physical treatment processes*

Physical remedy approaches are characterized by way of the capability to separate a range of phases of a waste barring performing any chemical reaction or changing the chemistry of the mixture. Phase separation, such as keeping apart solids from liquids or oil from Petroleum Industries water, is useful in concentrating components or getting rid of free liquids to render a waste suitable for land disposal. By concentrating the material, extra therapy can be completed more economically or conveniently, or recycling/re-use choices may be possible. Typical treatments utilized in this waste management process include: Adsorption Filtration, Flotation

3.3.1. *Filtration*

Filtration is a method for secondary separation by means of directing go with the flow of produced water via a porous medium that approves passage of the water but retains oil and / or solids. Filters are categorized via the stress difference required to pressure water via the medium by way of the charge of go with the flow / strain relationship and by means of the kind of filter medium used [18]. The drift of produced water through a excellent chosen filter media will reason the small droplets of oil to contact and attach to the filter fibers. Depending on the media format and thickness, these droplets will either remain trapped in the media or ultimately “grow” as other droplets contact them [28]. There are quite a number of porous substances that can be used as filter media, such as sand, crushed stone, and activated carbon. However, the broadly used material is sand due to its availability, low cost and effectivity [2].

3.3.2. *Flotation*

Flotation is a procedure of getting rid of solids from water by way of using bubbles of air or gasoline to raise strong particles to the surface of the liquid, the place they can be eliminated as floth or sludge [18]. The flotation technique is characterised by means of the following: Involves the injection of excellent gas bubbles into the water phase Gas bubbles in the water adhere to the oil droplets Buoyant pressure on the oil droplet is extensively increased with the aid of the presence of the gasoline bubble Oil droplets are then eliminated when they upward push to the water surface, the place they are trapped in the ensuing foam and skimmed off the surface [28]. Dissolved Gas flotation (DGF) and precipitated gasoline flotation are two subdivisions of the gasoline flotation science and the difference between them is in the technique used for the generation of the fuel bubbles and the resultant bubble size. The efficiency of the method usually relies upon on the contaminants to be removed, density differences of liquids, temperature, and the dimension of the oil droplets [2].

3.3.3. *Adsorption*

Adsorption is regarded as one of the nice treatment strategies for accomplishing higher water best as it can decrease the concentration of the contaminant to very low level [2]. Adsorption two has been used to dispose of manganese, iron, whole natural carbon (TOC), BTEX, oil and more than 80% of heavy metals existing in produced water [5]. However, there are a variety of adsorbents, such as activated carbon, organoclays, activated alumina and zeolites [29]. Activated carbon can cast off soluble BTEX but organoclay can take away insoluble free hydrocarbons that make contributions to whole petroleum hydrocarbons (TPH) and O&G measurement. Organoclay is produced through combining sodium montmorillonite clay with a cationic quaternary amine salt [6].

3.3.4. *Electrodialysis (ED)*

Electrodialysis (ED) and electro dialysis reversal (EDR) are each separation processes that are driven by way of electrochemical charge and are used for the treatment of brackish water, seawater desalination and wastewater reclamation, as well as being examined for the therapy of produced water at laboratory-scale [2]. Dissolved salts in water are cations and anions. These ions can connect to electrodes with an opposite charge. In ED, membranes are positioned between a pair of electrodes. The membranes enable both cations or anions to pass by [6]. They use a collection of ion trade membranes containing electrically charged practical web sites organized in an alternating mode between the anode and the cathode to do away with charge resources from the feed water. If the membrane is positively charged, only anions are allowed to skip via it. Similarly, negatively charged membranes enable solely cations to bypass through them. EDR uses periodic reversal of polarity to optimize its operation [5].

3.3.5. *Evaporation pond*

Evaporation pond is an artificial pond that requires a fairly large space of land designed to successfully evaporate water by means of photo voltaic power [5]. Most of the researchers proposed evaporation techniques for treating saline wastewater containing oil factors Vertical tube, falling film, and vapor compression evaporation are wonderful methods for produced water therapy because they: Eliminate bodily and chemical

remedies so no chemical sludge is produced, and fees of waste and existence cycle are lowered, two require less preservation substances and renovation labor and decrease the amount of produced water de-oiling equipment required [6].

3.4. Chemical treatment processes

Chemical therapy approaches are these in which substances are altered by means of chemical reactions. The chemical reactions can improve or enhance a separation/filtration system or, in some cases, create a product that is in a greater handy shape for further processing or disposal. It includes: precipitation, chemical oxidation, and electrochemical applied sciences

3.4.1. Precipitation

Precipitation is considered as one of the traditional chemical remedy tactics of produced water. Through this process, up to 97% elimination of suspended and colloidal particles can be done [30]. In chemical therapy process, coagulation and flocculation can be used to get rid of suspended and colloidal particles, however are not fine for putting off dissolved constituents. Lime softening is the typical manner for water softening. In the modified warm lime system produced water containing 2000 ppm hardness, 500 ppm sulfides, 10,000 ppm TDS, and 200 ppm oil could be efficiently converted to steam generator satisfactory feed-water. In this process, alkali consumption and sludge manufacturing should be decreased by way of 50% in contrast with traditional warm line [31].

3.4.2. Chemical oxidation

Chemical oxidation in a refinery is commonly used for reduction of residual COD, non-biodegradable compounds, and trace natural compounds. It is not frequent to have a chemical oxidation machine in a refinery wastewater treatment plant; small print of this method is protected in this record for statistics purposes. The following oxidation reagents are usually used in a chemical oxidation system: hydrogen peroxide, chlorine dioxide; and ozone [9]. Chemical oxidation remedy relies upon on oxidation/reduction reactions occurring together in produced water because free electrons can't exist in answer [4].

3.4.3. Electrochemical process

Electrochemical Activation (ECA) technological know-how is a progressive water disinfection technology which entails the publicity of water, and the natural salts, to a good sized electrical possible difference. As an anode (+) and a cathode (-) are placed in pure water and direct current is applied, electrolysis of water happens at the poles leading to the breakdown of water into its constituent factors [32]. In a laboratory pilot-scale plant that protected double anodes with active metal, graphite, and iron as cathode and a noble metallic content crystal with a massive surface, the COD and BOD of oilfield produced water ought to be decreased through over 90% in 6 min. In these processes, produced Mn²⁺ ions oxidized and coagulated natural pollution consisting of microorganism [6, 33].

3.5. Biological treatment processes

Biological treatment is among the most useful and reasonable techniques for managing petroleum wastewater. Biodegradation is a natural system by using which HCs and

different organic substances are fed on by microorganisms (such as bacteria or fungi) that utilize these substances as meals sources. Before starting a organic cure operation, one desires to consider various site-specific parameters to decide the feasibility of successfully biotreating the wastes. A threat evaluation will resource in this decision-making method when regulations do not exist. Biological treatment includes: activated sludge, biological aerated filter (BAF)

3.5.1. Activated sludge

Activated sludge is one of the commonly used aerobic remedy method of wastewaters, in which it can adsorb and occlude soluble and insoluble materials [6]. This treatment technique can eliminate trace and suspended solids, in addition to the elimination of metals. Moreover, activated sludge is considered as cheap, clean, and easy remedy technology, but it requires oxygen, massive filter dimensions, and it produces sludge as waste after the treatment procedure is over. It usually requires post-treatment for the separation of precipitated solids, biomass, and dissolved gases [2]. The activated sludge method has the advantage of producing a high first-class effluent for a realistic working and maintenance costs.

3.5.2. Biological aerated filters (BAF)

Biological aerated filter (BAF) is a type of biological technologies which consists of permeable media that uses aerobic prerequisites to facilitate biochemical oxidation and removal of organic elements in polluted water. Media is not more than 4 in in diameter to prevent clogging of pore areas when sloughing take place [5, 34]. Media must have high a surface vicinity per unit volume, be durable, and inexpensive. The kind of media regularly is determined primarily based on what materials are reachable at the site [15]. BAF can do away with oil, suspended solids, ammonia, and nitrogen, chemical oxygen demand, organic oxygen demand, iron, manganese, heavy metals, soluble organics, trace organics, and hydrogen sulfide. Iron and manganese elimination in BAFs is typically due to chemical oxidation instead than a organic process. Since BAFs do not remove dissolved constituents, however, high concentrations of salts can reduce the effectiveness of this technological know-how due to salt toxicity effects [15].

V. CONCLUSION.

Produced water from oil field is often viewed as a high-volume toxic waste however can be useful to human beings if appropriate managed. The remedy of produced water is very vital due to regulation and environmental issues. The main objectives of oil and gas produced water treatment include meeting discharge standards, reusing treated produced water in oil and gas operations, developing agricultural water uses, cattle and animal drinking water, water for human consumption, and meeting water quality requirements for miscellaneous recommended uses. Choice of the quality option for Produced water treatment technology strongly relies upon on the produced water origin, chemical characteristics and space availability in offshore plants.

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Study of frequency of anemia among pregnant women in their first trimester in different clinics of Faisalabad

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Abstract- Introduction: Anemia represents a decrease in red cell mass or hemoglobin contents of blood below physiological needs (11-12mg/dl) as set by tissues oxygen demand. Physiological adaptation in pregnancy leads to physiological anemia of pregnancy so women in child bearing years are particularly susceptible to iron-deficiency anemia. The reasons are both the loss of blood through menstruation and increase blood supply demands during pregnancy.

Materials and methods: Study design: Descriptive cross-sectional study method. **Setting:** It was conducted in Gynecology clinics of Faisalabad, Pakistan. **Duration of study:** 6 months (Jan-June 2019). **Sample Size:** 60 pregnant women. **Sample Technique:** Simple random sampling. **Sample selection:** Pregnant women of first trimester falling in age group of 18-35 years were included while non-pregnant women, pregnant women of second and third trimesters and pregnant women of age < 15 years and > 35 years were excluded. **Data analysis:** SPSS version 20.

Results: Out of 60 pregnant women, 73.3% (44) were anemic, of which 36.7% (22) were mildly anemic (10-10.9 g/dl), 30% (18) were moderately anemic (7-9 g/dl) and only 6.7% (4) were severely anemic (<7 g/dl). The rest of 26% (16) were with normal hemoglobin levels.

Conclusion: Anemia in pregnancy is the most common health issue which needs prime attention of health care workers because a high percentage of women suffer from it. Therefore women of childbearing age should be provided nutritional education and proper awareness about food sources of iron. Adequate diet before and during pregnancy and proper perinatal care are the need of hour.

Index Terms- Anemia, pregnancy, first trimester, Pakistan

I. INTRODUCTION

Iron is critical to a variety of physiologic processes, including respiration, energy production, and cell proliferation. Iron deficiency is a condition in which the iron availability is insufficient to meet the body's needs

Anemia is generally defined as decrease in hemoglobin concentration or it represents a decrease in red cell mass of blood below physiological needs (11-12mg/dl) as set by tissues oxygen demand. Physiological adaptation in pregnancy leads to physiological anemia of pregnancy so there is more chance to suffer from anemia due to iron deficiency in women during child

bearing years. Hence it is normal to have mild degree of anemia during gestational period. The reasons are both the loss of blood through menstruation and increase blood supply demands during pregnancy.

Anemia has many forms, each of which has its own cause. It can be temporary or long term and may range from mild to severe.

Anemia is characterized by the symptoms of fatigue, generalized weakness, dizziness, headache, shortness of breath, rapid heartbeat, tiredness, frequent sore throat, irritability, decreased appetite and dysphagia. Clinical signs of anemia include skin pallor, pale conjunctiva, blue sclera, dermal and nail changes (brittle nails), lower limb edema, changes in tongue and gums (glossitis and stomatitis respectively), increased heart rate and heart murmur. If a pregnant woman becomes victim of anemia, it is likely that she will get more tired than is expected in pregnant woman without anemia. Risk factors leading to severe anemia in pregnancy include low socioeconomic status, grand multiparity, inadequate child spacing, HIV and malarial infestation¹.

World Health Organization(WHO) has classified anemia into three categories on the basis of levels of hemoglobin i.e. normal hemoglobin is 11-12 gm/dL, mild anemia with hemoglobin 10-10.9 gm/dL, moderate anemia with hemoglobin 7-9.9 gm/dL and severe anemia with hemoglobin <7 gm/dL².

The causes of anemia during gestation may include malnourishment, loss of blood, chronic illness, unhealthy lifestyle, multiparity, alcohol and smoking³. If the diet does not contain enough protein, iron, vitamin B12 and folic acid and many other mineral and vitamins which are required for the hemoglobin production and RBCs formation, there are chances of occurrence of nutritional anemia. Iron is an essential requirement for hemoglobin production, red blood cells protein which helps in transporting oxygen to the other cells of our body.

Iron deficiency anemia (IDA) is considered to be one of the most vital factors of anemia (WHO, 2002).

Anemia can occur when your blood doesn't have enough red blood cells. This can happen if: Your body doesn't make enough red blood cells

Bleeding also causes you to lose red blood cells more quickly than they can be replaced.

Globally anemia is an utmost health issue affecting almost 42% pregnant ladies⁴. it is a public health issue. 18% pregnant ladies are found anemic in developed states while prevalence of anemia in under developed states 35 – 75% ⁵. World Health Organization's (WHO) recent estimates show prevalence of anemia in pregnant ladies to be 41.8% worldwide, out of which 52.5% is in South- East Asia⁶. In Pakistan preponderance of

anemia among women aged 15-44 is calculated to be 47% in rural areas and 26% in urban areas⁷.

Indian subcontinent has 50% of the world's anemic women of which 88% develop anemia during gestational period⁸. A prominent drop in mean hemoglobin was noticed as pregnancy progressed, those with gestational age below 6 months had mean hemoglobin of 11g/100ml while those above 6 months of gestation had mean hemoglobin of 10.6g/100ml⁹. Another study done under Demographic and Health Surveys' classification on 214 pregnant women showed that 40% of them were anemic (less than 11g/dL) out of which 194 (90.7%) were mildly anemic (10- 10.9g/dL) and 20 (9.3%) were moderately anemic (7-9g/dL) whereas no case of severe anemia (<7g/dL) was recorded¹⁰.

Untreated anemia is associated with intra-uterine growth retardation, low fetal iron stores, fetal iron deficiency anemia and increased perinatal mortality and morbidity¹¹. Even a moderate hemorrhage in an anemic pregnant woman can be fatal. In the highlight of above stated serious consequences of anemia during pregnancy, antenatal early detection and management is required¹².

Objective: Our aim was to assess the frequency of anemia in the first trimester of pregnancy in age group of 18-35 years.

II. MATERIALS AND METHODS

i) Study design:

Descriptive cross-sectional study method.

ii) Setting:

It was conducted in Gynecology clinics of Faisalabad, Pakistan.

iii) Duration of study:

6 months (Jan-June 2019).

iv) Sample Size:

60 pregnant women.

v) Sample Technique:

Simple random sampling.

vi) Sample selection:

Pregnant women of first trimester falling in age group of 18-35 years were included while non-pregnant women, pregnant women of second and third trimesters and pregnant women of age < 15 years and > 35 years were excluded.

Data collection procedure:

We collected reports of hemoglobin level of pregnant women of first trimester visiting gynecology OPDs, clinics and from general population. We also gave them a close ended well structured questionnaire.

Data analysis:

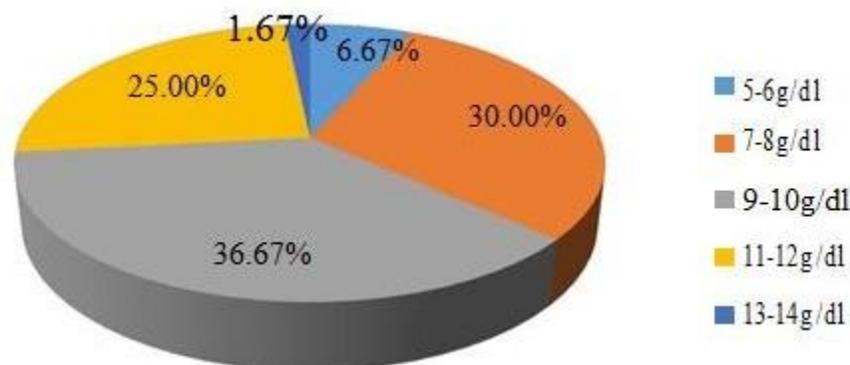
We analyzed our data through SPSS version 20 using chi square test.

III. RESULTS

Many factors including age, education, socioeconomic status, parity and symptoms of anemia like face pallor, fatigue, tachycardia and dizziness were associated with the levels of hemoglobin to assess the frequency of anemia during first trimester in pregnant women.

According to our study out of total 60 pregnant women, 73.3% (44) women were found to be anemic. Of these 73.3% women, about 36.7% (22) were mildly anemic (9-10g/dl), 30% (18) were moderately anemic (7-8g/dl) and only 6.7% (4) were severely anemic (<7g/dl). The rest of 26% (16) were with normal hemoglobin levels (11-12g/dl). Out of 43 multiparous women, 23 were found to be anemic while 11 nulliparous women out of 17 were anemic. All 8 illiterate pregnant women were found to be anemic of various degrees while most of the literate women were mildly anemic. Approximately 53.3% pregnant women complained of face pallor, 78.3% complained of fatigue and 66.67% complained of dizziness in their first trimester.

Figure 1:
Hemoglobin levels among pregnant women



This pie chart shows that 36.6% and 25% of pregnant women found to have Hb levels 9-10g/dl and 11-12g/dl respectively. 30% of women have Hb levels 7-8g/dl and 6.67% have Hb levels 5- 6g/dl. Only 1.67% of pregnant women have Hb levels of 13-14g/dl.

Table 1:
Age group and socio-economic status of surveyed population

| Age group | Percentage % | Socio-economic status | Percentage% |
|-------------|--------------|-----------------------|-------------|
| 18-20 years | 11.7% | Lower class | 35% |
| 21-23 years | 30.0% | Middle class | 43.3% |
| 24-26 years | 28.3% | Upper class | 21.7% |
| 27-29 years | 8.3% | | |
| 30-32 years | 10.0% | | |
| 33-35 years | 11.7% | | |

table shows that 28-30% of women in surveyed group lie in the age group of 21-26 years. 10- 11% of pregnant women were of 30-35 years of age and 11% of women were 18-20 years of age. It also shows that 21% of women belong to higher socio-economic status while 35% belong to poor socio-economic status.

Table 2:
Relation between twin pregnancies in women and hemoglobin levels

| Woman with twin pregnancy | Hemoglobin level | | | | |
|---------------------------|------------------|---------|----------|-----------|-----------|
| | 5-6g/dl | 7-8g/dl | 9-10g/dl | 11-12g/dl | 13-14g/dl |
| YES | — | 42.9% | 28.6% | 28.6% | — |
| NO | 7.5% | 28.3% | 37.7% | 24.5% | 1.9% |

This table shows that 42.9% women with twin pregnancies have 7-8g/dl Hb levels and there is not a single case with Hb levels 13-14 g/dl.

Table 3:
Relation between number of pregnancies in women and hemoglobin levels

| No of pregnancies | Hemoglobin level | | | | |
|-------------------|------------------|---------|----------|-----------|-----------|
| | 5-6g/dl | 7-8g/dl | 9-10g/dl | 11-12g/dl | 13-14g/dl |
| 1 | 15.8% | 15.8% | 31.6% | 31.6% | 5.3% |
| 2 | 5.0% | 25.0% | 30% | 40% | — |
| 3 | — | 33.3% | 55.6% | 11.1% | — |
| 4 | — | 66.7% | 33.3% | — | — |
| 5 | — | 40% | 60% | — | — |

| | | | | | |
|---|-----|------|-----|-----|-----|
| 7 | --- | 100% | --- | --- | --- |
|---|-----|------|-----|-----|-----|

This table shows that women with more number of pregnancies have comparatively lower levels of Hb falling in ranges 7-8g/dl, 9-10g/dl as compared to women with less number of pregnancies in which Hb levels mostly fall in ranges 9-10g/dl, 11-12g/dl, 13-14g/dl.

Table 4:
Relation between socioeconomic status of pregnant women and their hemoglobin levels

| | Haemoglobin level | | | | | Total |
|-----------------------------|-------------------|---------|----------|-----------|-----------|-------|
| | 5-6g/dl | 7-8g/dl | 9-10g/dl | 11-12g/dl | 13-14g/dl | |
| lower class | 4 | 10 | 7 | 0 | 0 | 21 |
| Socio-economic middle class | 0 | 6 | 13 | 7 | 0 | 26 |
| status upper class | 0 | 2 | 2 | 8 | 1 | 13 |
| Total | 4 | 18 | 22 | 15 | 1 | 60 |

The above table shows that more number of surveyed women belong to middle class and of them more women have hemoglobin level in the range of 9-10g/dl.

The chi-square value of this relation is 29.719 with p-value 0.00.

Table 5:
Relation between age and hemoglobin level of the pregnant ladies

| | Haemoglobin level | | | | | Total |
|-------------------|-------------------|---------|----------|-----------|-----------|-------|
| | 5-6g/dl | 7-8g/dl | 9-10g/dl | 11-12g/dl | 13-14g/dl | |
| 18-20 Years | 2 | 2 | 0 | 3 | 0 | 7 |
| 21-23 Years | 1 | 3 | 9 | 5 | 0 | 18 |
| 24-26 Age years | 1 | 6 | 5 | 4 | 1 | 17 |
| Group 27-29 Years | 0 | 1 | 3 | 1 | 0 | 5 |
| 30-32 Years | 0 | 0 | 5 | 1 | 0 | 6 |
| 33-35 Years | 0 | 6 | 0 | 1 | 0 | 7 |
| Total | 4 | 18 | 22 | 15 | 1 | 60 |

The above table shows that more number of pregnant women fall in age group of 21-23 years of which 4 women have hemoglobin level below 8g/dl, 9 have hemoglobin level in the range of 9- 10g/dl and 5 have hemoglobin level in the range of 11-12g/dl.

The chi-square value of this relation is 31.314 with p value 0.051, which is a significant value.

IV. DISCUSSION :

Anemia during pregnancy is a supreme health issue especially in under developed countries like Pakistan. The status of anemia in pregnant women of first trimester remains the same even after following many anemia control programs in different countries¹³. In our study we have found a high frequency of anemia among pregnant ladies of first trimester.

Our study included 60 pregnant ladies out of which 73.3% (44) were found to be anemic while the rest of 26.67% (16) were with normal hemoglobin count. Out of those 44 anemic women, 36.7% (22) were found to be mildly anemic, 30% (18) were found to have moderate anemia and 6.7% (4) were critically anemic. According to a study 36.1% of all surveyed pregnant women had anemia out of which 58% were mildly anemic, 35.7% were moderately anemic and 5.8% were severely anemic¹⁴, which was near to the percentile obtained in our research.

According to another study done in Nekemte Ethiopia, 64% pregnant women were found to be mildly anemic and 21.8% were moderately anemic¹⁵, which was a bit different from our results. The frequency of anemia in our study, 73.3%, was different from that found by study in Enugu, 40.4%¹⁶.

According to a study done in China pregnant women from 13 different countries were surveyed with hemoglobin cut off less than 10g/dl (Chinese Standard) the prevalence of anemia came out to be 69%¹⁷. In a study on the prevalence of anemia in Pakistan, report shows 96% pregnant population of Multan area were anemic¹⁸. Similarly a study done among Pakistani pregnant ladies showed that out of 250 surveyed women, 138 (55%) were anemic. Out of which 83(60%) were moderately anemic, rest 55 women (40%) were mildly anemic. No case of severely anemic was discovered¹⁹.

According to our study out of 60 pregnant women, 43 were multiparous with 16 mildly anemic (9- 10gm/dl), 15 were moderately anemic (7-8gm/dl) and 2 were dangerously anemic (less than 7 gm/dl). However the remaining 10 were in normal range (11-12gm/dl). At every pregnancy, maternal iron stores are reduced due to excessive post-partum bleeding thus causing women with multiple pregnancies having more risk to become anemic. While in a study done in Turkey to check out the pervasiveness of anemia in pregnant women it was found that anemia was 2.2 times more prevailing in women who had at least four or more than four children than the ones with fewer children²⁰. However a study done in Enugu, mother's age and her number of pregnancy showed no association with pervasiveness of anemia²¹. A town named Mekelle in Northern Ethiopia, another study was carried out to find out different factors affecting anemia among pregnant ladies, 38 women with less than 2 number of pregnancies (12.3%) were anemic and 248 (87.7%) were non-anemic. Whereas women who had more than or equal to two number of pregnancies 84 (25.2%) were anemic, however 249 (74.8%) were non-anemic²².

According to our study out of total 8 illiterate respondents, 1 was severely, 6 were moderately while 1 was mildly anemic. Talking about patients with primary education, out of 10, 2 were severely, 3 were moderately, 4 were mildly anemic while 1 was with normal hemoglobin level. Taking in account of women with education up to middle level out of 15, 1 was severely, 5 were

moderately, 5 were mildly anemic while 4 were normal. Lastly, talking about subjects with education level of matric and above out of 27, number of severely, moderately and mildly anemic respondents were 0, 4 and 12 respectively whereas 11 of the subjects were with normal hemoglobin level. According to anemic status, demographic and anthropometric characteristics of pregnant ladies in Hyderabad Pakistan, pregnant women with no formal education showed that 35 (out of 130) have no anemia, 321 (out of 1024) have mild anemia and 97 (out of 212) have moderate to severe anemia. While pregnant women with formal education 122 (out of 130) have no anemia, 703 (1024) have mild anemia while 115 (out of 212) have moderate to severe anemia²³.

Limitations: A few factors limited the results of our descriptive cross-sectional study which included our limitation to gynecological wards and clinics of Faisalabad, small sample size and uncooperativeness of patients hence the results of our study are indicative but not necessarily applicable to all other districts and regions.

Recommendations: In order to circumvent the complications due to anemic status of pregnant ladies, there is a need to educate women to have a good dietary consumption and to have a regular medical checkup in this period. The government should make sure the proper implementation of family planning programs so that strong relationship of anemia with multiparity can be alleviated.

V. CONCLUSION

Anemia in pregnancy is the most common health issue which influences birth weight and preterm delivery and needs prime attention of health care workers of our country. During the first trimester of gestation it was found that a high percentage of women had anemia and multiple factors were associated with it. Through our study we came to know that most of the surveyed pregnant women were suffering from mild to moderate degree of anemia while a less number of women were found to be severely anemic. We obtained a significant relation between mother's age and anemia. In our research we also discovered a significant association between socioeconomic status of pregnant women and their hemoglobin level according to which mild to moderate anemia was more prevalent in women with lower to middle socioeconomic status while severe anemia was found only in women belonging to lower socioeconomic class. Our study also showed that there is a positive correlation between education status of pregnant women and their hemoglobin levels. Increase in number of pregnancies increased the degree of anemia in pregnant women. High frequency of anemic patients during pregnancy are due to increased demand of micro nutrients during this period in background of poor dietary habits. It is also suggested that nutrition plays very important role in causing anemia during pregnancy. Women with higher education level had maximum hemoglobin count. This shows that literacy rate in pregnant women drastically affects hemoglobin levels for which proper education of women is required. As anemia during pregnancy continues to be a common problem therefore proper awareness about anemia, adequate healthy diet before, during and after pregnancy and proper perinatal care are the need of hour. A high level of anemia in pregnant ladies apparently increased the mental

and fetal risks therefore early diagnosis and treatment of anemia should be given priority.

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Antimicrobial Efficacy of Selected Ayurveda Formula against Laboratory Specimen of *Staphylococcus aureus*

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Abstract: Selected formula consisted of three ingredients including dried leaves of *Azadirachta indica*, dried seeds of *Sesamum indicum* and Bees' honey which is clinically use for open wounds. The current study was designed as a microbiological assay and the key objective was to evaluate the antibacterial efficacy of TNK against laboratory specimen of *Staphylococcus aureus* (ATCC25923). The Anti-Bacterial Sensitivity Test was conducted according to the Kirby Bauer method using Agar Well Diffusion method by comparing the effect of Amoxicillin as the positive controller and distilled water as the negative controller in triplicates. The testing drug was assessed as D1 and D2 in 1:2 concentration ratios respectively. Results of the study were obtained through the diameter measurement of inhibitory zone and assessed using one - sample T – test. D1 depicted p value as 0.024 and T – test was 4.44. D2 depicted p value as 0.100 and T- test was 1.89. Comparing to the positive control drug, the hypothesis was generated as $H_0: \mu \leq 19$ mm and $H_1: \mu > 19$ mm. Referring to hypothesis, H_0 of D1 was rejected and H_0 of D2 was not rejected. The significant level was considered less than 5%. D2 concentration of TNK was significant against laboratory specimen of *Staphylococcus aureus*. The study suggests that the TNK is consisted with an extrinsic effective antibacterial application for infected wounds which were caused by *Staphylococcus aureus*. Further clinical study on human subjects will verify the efficacy of TNK in clinical manifestations.

Key Words: Antibacterial Activity, *Staphylococcus aureus*, TNK, Kirby Bauer method

I. INTRODUCTION

Herbs are the key ingredients used in Ayurveda medication. Various parts such as barks, flowers, roots etc. are manually processed in different methods to discover their optimal potential efficacy. Among herbs, *Azadirachta indica* and *Sesamum indicum* are two herbs widely used in Ayurveda pharmacological practice. The current study discusses on antibacterial efficacy of *Thilanimbadi Kalka* (TNK) against laboratory specimen of *Staphylococcus aureus*. The study focusses on wound healing effect due to *Staphylococcul* infections.

Ayurveda authentic text 'Susruta Samhita' and Kaiyadewa Nighantu highlights that *Azadirachta indica* is consisting with *Vruna Shodhana* (wound cleansing) and *Krimighna* (destroying worms / antibacterial) properties. [1-2] Another authentic text ' Bhava Prakash' mentions that leaves of *Azadirachta indica* is effective in cleansing maggot infested wounds. [3] Several recent studies have already proven that *Azadirachta indica* is consisting with antibacterial effects against *Staphylococcus aureus*. [4-5]

Effective antibacterial properties are available in *Sesamum indicum* plant, specially for common skin pathogens such as *Staphylococcus* and *Streptococcus* infections. [6] Ancient Ayurveda literature elaborates positive evidences on antimicrobial effect of *Sesamum indicum* plant including wound cleansing and wound healing effect. [7, 8, 9]

Bees' honey clears wound infection to facilitate healing of deep surgical wounds with infection. [10-11] Antimicrobial effect of bees' honey against *Staphylococcus aureus* is considerably high. [12]

Azadirachta indica, *Sesamum indicum* and Bees' honey individually contain antimicrobial properties against wounds infected with *Staphylococcus aureus*. *Thilanimbadi Kalka* (TNK) is prepared using *Azadirachta indica*, *Sesamum indicum* and Bees' honey. Therefore, the current study was conducted to evaluate the antibacterial activity of *Thilanimbadi Kalka* (TNK) against laboratory specimen of *Staphylococcus aureus*.

II. METHODOLOGY

Collection of Plant Materials

Fresh leaves of *Azadirachta indica* and Seeds of *Sesamum indicum* were collected at Thambagalle area of Nikadalupotha, Kurunegala District in Sri Lanka. Bees' honey was collected at Galgamuwa of Kurunegala District in Sri Lanka.

Culture and Maintenance of Microorganisms

Pure cultures of *Staphylococcus aureus* (ATCC 25923) were obtained from the Medical Technology Division of Gampaha Wickramarachchi Ayurveda Institute, University of Kelaniya, Sri Lanka. The pure bacterial cultures were maintained on nutrient agar medium. Each bacterial was further maintained by sub culturing regularly on the same medium and stored at 4°C before use in experiments. Kirby's Single disc antibiotic sensitivity testing of Staphylococci was used in the current study. [13]

Preparation of Testing Drug Extract

The testing drug was prepared according to the 'Kalka Paribhasha' of Sharangadhara Samhita, 'Fresh raw materials should be obtained in double quantity. Liquids should be obtained in double quantity. Drug should be grounded well in soft paste with no fibrous particles left in it'. [14] Ingredients were authenticated by Department of Dravyaguna Vijnana, Gampaha Wickramarachchi Ayurveda Institute, University of Kelaniya, Sri Lanka.

Fresh leaves of *Azadirachta indica* and Seeds of *Sesamum indicum* were collected from source plant were washed for 2-3 times with tap water and finally with distilled water, followed by ethanol wash and then allowed to dry at 30 °C and 50 °C for overnight respectively. Herbal ingredients were grounded well into soft paste while adding Bees' honey till no fibrous particle felt in it.

Sample D₁ which finely grounded paste, sample D₂ which squeezed extract of paste were tested for Antibacterial Sensitivity Test.

Microbiological screening

Antimicrobial activities of different extracts were evaluated by the Agar Well Diffusion method [15] modified by Olurinola, 1996 [16] and Minimum Inhibitory Concentration (MIC) [17]

Media Preparation and Its Sterilization

For agar well diffusion method (Murray et al., 1995 later modified by Olurinola, 1996) antimicrobial susceptibility was tested on solid (Agar) media in petri plates. For bacterial assay nutrient agar (NA) (38.16 gm/L) was used for developing surface colony

growth. The minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC) were determined by serial micro dilution assay.

The suspension culture, for bacterial cells growth was done by preparing 2% Nutrient Broth (w/v) taken for evaluation. All the media prepared was then sterilized by autoclaving the media at (121°C) for 15 min.

Agar Well Diffusion Method

Agar well-diffusion method was followed to determine the antimicrobial activity. Nutrient agar (NA) plates were swabbed (sterile cotton swabs) with 18 hour old - broth culture of respective bacteria and fungi. Wells (8mm diameter and about 2 cm a part) were made in each of these plates using sterile cork borer. About 50 µl of different concentrations of study drug solvent extracts were added sterile syringe into the wells and allowed to diffuse at room temperature for 2hrs.

Control experiments comprising inoculums without plant extract were set up. The plates were incubated at 37°C for 24 h for bacterial pathogens. The diameter of the inhibition zone (mm) was measured and the activity index was also calculated. Triplicates were maintained and the experiment was repeated thrice, for each replicates the readings were taken in three different fixed directions and the average values were recorded.

Preparation of Inoculum

The antibacterial assay was carried out by micro-dilution method in order to determine the antibacterial activity of compounds tested against the pathogenic bacteria. The bacterial suspensions were adjusted with peptone water to a concentration of 1.0×10^7 CFU/ml. The inocula were prepared and stored at 4 °C until use. Dilutions of the inocula were cultured on solid medium to verify the absence of contamination and to check the validity of the inoculum. All experiments were performed in duplicate and repeated three times. According to the turbidity standard method (0.5 McFarland standard), (-1) Dilution series was selected and put in to the Muller-Hinton agar plates.

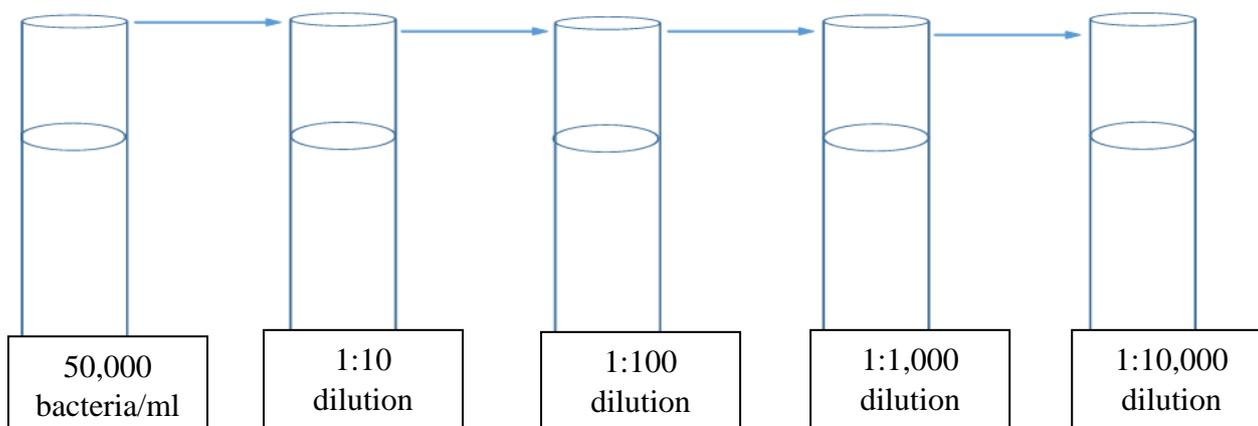


Figure 01: Dilution Series

Determination of MIC

The lowest concentrations without visible growth (at the binocular microscope) were defined as MICs. The lowest concentrations without visible growth (at the binocular microscope) were defined as MICs.

Determination of MBC

The MBCs were determined by serial sub-cultivation of 2 µl into plates containing 100 µl of broth per well and further incubation for 72 hours.

The lowest concentration with no visible growth was defined as the MBC, indicating 99.5% killing of the original inoculum and compared with the standards Amoxicillin (Table 01) for Bacteria (Hi-media) as the positive control.

All experiments were performed in duplicates (D₁ & D₂) and repeated three times.

Table 01: Standard Amoxicillin Sensitivity Chart

| Antibiotic (Antimicrobial agent) | Disc code | Resistance (µ) | Intermediate | Susceptible |
|----------------------------------|-----------|----------------|--------------|-------------|
| | | <or=mm | mm | =or>mm |
| Amoxicillin (Other) | AMC | <13 | 14-17 | >18 |
| Amoxicillin (Staph) | AMC | 19 | | 20 |

(Fall. 2011 – Jackie Reynolds, Richland College, BIOL 2421)

Results were compared with the standard Amoxicillin sensitivity chart and drug resistance were taken as $\mu \leq 19$ vs $\mu > 19$.

iii. RESULTS

Hypothetical assessment elaborates $H_0 \mu \leq 19$ vs $\mu > 19$

Table 02: One Sample T Test (Test of $\mu \leq 19$ vs $\mu > 19$)

| Variable | Sample size | Mean | Standard deviation | SE Mean | 95% lower bound | T value | P value |
|----------------|-------------|--------|--------------------|---------|-----------------|---------|---------|
| D ₁ | 3 | 24.33 | 2.08 | 1.2 | 20.82 | 4.44 | 0.024 |
| D ₂ | 3 | 20.667 | 1.528 | 0.082 | 18.091 | 1.89 | 0.100 |

Significant level was considered less than or equal 5%.

Table 03: Hypothetical Assessment

| Sample | T - Test | P - value | Conclusion |
|----------------|----------|-----------|--------------------------------|
| D ₁ | 4.44 | 0.024 | H ₀ is rejected |
| D ₂ | 1.89 | 0.100 | H ₀ is not rejected |



Figure 02: Inhibitory Zone Diameters

IV. DISCUSSION

Considering adverse effects and eco-friendly usage, search for antimicrobials from natural sources has achieved a time-honored attention and efforts have been put in to identify compounds that can act as suitable antimicrobials agent to replace antibiotics carrying adverse effects. [18, 19] Plants derived phytochemicals serve as a prototype to develop more effective medicines in controlling microbial infections. Among Ayurveda medicines, TNK is introduced as a wound disinfectant medicine in Ayurveda authentic text Susruta Samhita.

The current study was subjected to incipient screening for antibacterial activity against laboratory specimen of *Staphylococcus aureus*. The ABST elaborated mean inhibitory zone diameter of D₁ = 24 mm and D₂ = 21 mm. among both samples, finely grounded sample depicted most antibacterial sensitivity.

V. CONCLUSION

The present investigation elaborates that TNK contains potential antimicrobial components that may be of great use for the development of pharmaceutical industries as a therapy against infected wounds with the purpose of wound cleansing.

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Classroom Culture in EFL Classrooms in Kabul University

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Abstract- In this paper, the author describes and analysis the classroom culture in EFL classrooms in Kabul University in Afghanistan. He suggests some points on creating safe learning environment in his classrooms. He also discusses the influences of some of the internal and external factors on the life of his classrooms and subsequently on teaching and learning process. He then states the implications of classroom analysis for the teacher education. He believes thinking more carefully and analyzing classrooms can give him and his colleagues valuable opportunity to think about and reflect upon his/her teaching practices as teachers. This might help him and his colleagues find better alternatives for teaching practices and providing learning opportunities for learners.

Index Terms- Classroom culture, Kabul University, Safe learning environment, and Teacher Education

I. INTRODUCTION

II. This paper analyses classroom culture in EFL classrooms in Kabul University in Afghanistan. As teachers in this context, we usually complain about students do not come to classrooms on time, or do not participate in the lesson enough. We typically blame the students and external factors for this. We do not examine the real causes of these problems to devise solutions and make our classrooms better learning and teaching environment. I will first describe a typical EFL classroom in this context to see how the internal aspects of classrooms life e.g. use of time, space, students' engagement and participation in the learning process are managed and what influences they have on our classroom learning atmosphere. I will discuss some issues for creating a safe learning environment in our classrooms. I will also discuss the external factors which influence our classrooms and finally I will write their implications for teacher education.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

1. Classrooms at Kabul University Context

I am an EFL teacher in the English language department at Kabul University in Afghanistan. This department has two English language teaching programs – for students of the English language department itself who take a

four-year English course to become EFL teachers at secondary and high schools, and the university wide program in which students take two years English lessons as a subject as part of their course requirements. I teach at both programs of the department, usually at the former one in which students are trained to teach English language learners, aged 12 to 18 years. They take different kinds of courses such as phonology, morphology, grammar, syntax, literature, speaking, reading, writing, methodology and so on. What follows is a description of a typical class.

1.1 The EFL Classroom in Kabul University

Table 1: A Grammar Lesson

It is 8:20am and a teacher enters the classroom (the lesson starts at 8:00 am). There are 45 students, aged 19 - 27 in the register but still only about 35 of them are present in the classroom. The chairs are arranged in six rows and there is a little space in the middle of the class dividing the rows into two parts. The teacher greets the students and waits for the rest of them to arrive. After the arrival of a few more students, but not all, which takes about 10 minutes, the teacher sitting on his chair at the front-stage of the classroom, asks students to open their books. He asks them which page they study today. The students tell the page and he says: "ok today we study the full sentence patterns". Students tell him they had three exercises as homework and would like to go through them to check if they have done them correctly. The teacher, now standing in front of the board and holding his handout, says: "good, they are ok. There is no need to go through them". He then reads instruction of the new exercise and writes a sentence '*The man whom I met yesterday drives his car fast.*' on the board. He asks the students to identify full pattern of the sentence. After a few minutes of silence in class, one student sitting in front row says "*sir fast is an adjective*". The teacher laughs and says: no, that is not right. Students also laugh loudly. The teacher tells other students to identify the full pattern of the sentence but students do not answer, especially those sitting at the back of the classroom and talking with each other as the teacher usually cannot see or do not pay attention to them. He then explains the sentence himself and tells students to copy it in their notebooks. He tells the student sitting in the front row near him to read the first sentence of the exercise. The student tries, but she cannot answer so the teacher asks the next student to do it and the lesson continues like this till they finish three or four exercises. He then says it is enough for today and if you have questions, you can ask now. Only a few students ask questions. He stops the lesson and starts talking with students, sitting in front of him, about daily affairs (usually in Dari – the official language of the country) for about 10 minutes. He then leaves the class 10 minutes early.

1.2 Use of Time, Space and Students' engagement and Participation

Though the description in this classroom is not a transcript, I believe it indicates how teachers and students use the time and space - the two important elements of classroom life which as Wright (2005: 16) states, define the basis of formal education. It also shows students' engagement and participation during the lessons. I will first analyze this classroom in terms of time use because I believe as Wright (2005: 71) points out, that the way teachers allocate time for different classroom learning and teaching tasks is one of the temporal factors to consider in understanding classroom life.

1.2.1 Use of Classroom Time

Table 2: The use of time in this classroom

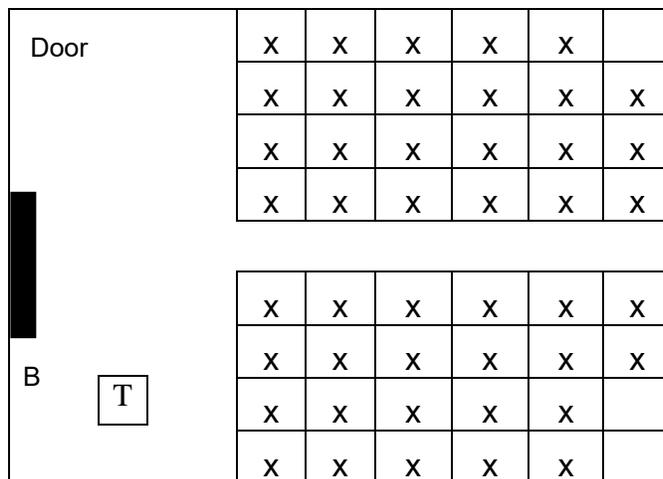
The teacher and students both use the time. For example:

- The teacher enters the class at 8: 20 a.m. (though the lesson starts at 8:00 a.m.) and waits for students to arrive;
- He explains the lesson for a while and asks students to copy it;
- He spends some time marking students in the register and talking about daily affairs (in Dari) and then leaves the class 10 minutes early;
- The students also use the classroom time by reminding the teacher about their homework, answering his questions and also asking their own questions;
- They also use the time to do the exercises.

There seems to be no purposeful use of time in this classroom e. g. teacher’s coming late, talking about daily affairs in L1 and leaving the classroom earlier indicate that the teacher might not have a lesson plan in which time is effectively allocated to each learning and teaching activity. We see that though Wright (2005: 11) in his description of the classrooms says that there is a purposive sequence of activity through time in the lessons and of progression from one type of activity to another and students and teachers are busy doing various things, it seems that in the Afghan classroom this important quality is missing.

1. 2. 2 Use of Classroom Space

The very common type of use of classroom space (seating arrangement) is in six rows where there is a little space in the middle of the classroom separating the rows from each other. This can be illustrated as follows:



Key: T = Teacher x = Student B = Board

As this arrangement shows the teacher sits or stands at the front-stage of the classroom because from here he can easily access the board and face students. Students who usually work hard sit in the front rows to receive more teacher's attention and others prefer sitting in the rows at the back of the classroom, perhaps to escape teacher's attention and questions.

These uses of classroom space as Shamim (1996a: 125) states, show that the teacher usually manages his class from the center of the front of the room where he has easy access to the board. He can face students sitting in the front rows, but can also keep an eye on students sitting in the two wings on the left-and right-hand side in the front two or three rows. It might, however, be impossible for him to see the students sitting at the back of the classroom. The teacher usually remains in the front position, he asks students in the front rows to do the exercises and he talks with them. Thus, the front of the class as Shamim (1996a: 125, 128) states, lies within the surveillance zone of teacher and the back is outside his attention zone. Most of the students sitting at the back-stage of the class as Wright (2005: 313) points out are either ignored or receive very little teacher's attention.

1. 2. 3 Students' engagement

Table 3: Teacher's activity and its effects

The teacher plays different activities in this classroom and engages students in them. He, for instance:

- greets with students;
- explains the new lesson;
- laughs at students' answers;
- talks with students about daily affairs.

We see that these activities might have different effects on the teaching and learning process and on students in the classroom. I discuss some of their effects below.

Some of these activities or events such as greeting and talking about daily affairs might show closeness of teacher-students' relationship while others as teacher's laughing at students' error might indicate the distance in their relationship rather than closeness. However, whether these events show close or distant relationship between the teacher and students might not be as important as their possible positive and negative influences on teaching and learning process. For example, *the teacher and students' laughing at one of the students' answer* indicates that there might not be a friendly and safe learning environment in the class whereas *teacher's talking about daily*

affairs with students might show a close relationship between the teacher and students. They may experience positive or negative emotions which might influence their engagement in the teaching and learning process.

1. 2. 4 Students' participation

Teachers and students create and contribute to classroom learning community by participating or not participating Wright (2005: 18). We see in the Afghan classroom that they both participate in the class interaction, though their level of participation is not equal. The teacher asks students about a new grammar structure. One of the students answers teacher's question. The answer is not right so the teacher himself explains the lesson. The teacher and students are also busy doing the exercises. It seems as Wright (2005: 11-12) states that the classroom is not a silent place and there is some talking of different types, although it appears that the teacher speaks most of the time. Young (1992: 80) states that reports show that the teacher talk constitutes about 75 % of the total talk or part of the interaction in most classrooms.

The other common type of interaction in our classrooms besides IRF is the lecture based – didactic model of teaching. In order to explore this model in our classrooms further let us look at another classroom and see how the interaction is going on.

Table 4: A Lesson on Morphology

A teacher, in his late forties, enters the classroom. Students stand up to show their respect to him. The teacher after a short greeting with students tells them to open their books. He writes title of the lesson "*Morpheme - Free and Bound Morphemes*" and some notes on the board. He talks and explains it for 20 - 25 minutes and then reads the information from book and explains it a little more for students who are sitting and listening to him. He then tells the students that now you can ask your questions. One student raises his hand for permission and the teacher lets him ask his question. He asks his question and the teacher answers. Two or three (out of 40) more students also ask questions and the teacher answers them and the rest of them keep silent. The teacher says the lesson is over and he starts marking students in the register. He then says goodbye and leaves the classroom. Students again stand up to show their respect to the teacher while he is leaving the classroom.

The example classroom demonstrates that the teacher starts the interaction by writing the title of the lesson on the board and gives a lecture on it in a didactic way. As van Lier (1996: 178) states, there is a delivery of information or directives from the teacher to students, in a one-way, long monologic format. Though Wright (2005: 369) states that teacher's talking (teacher monologue) in L2 is an important source of input in contexts where L2 is not heard frequently outside the classroom, we see that it affects students' participation and minimizes their talking time a great deal.

2. Creating a Safe Learning Environment

As we see in the Afghan EFL classrooms there seems to be less productive use of class time and space and students' engagement and participation in the lesson. Thus to change the current situation in our classrooms it would be better to pay careful attention to these key elements of classroom life and create effective and safe learning environment for the teaching and learning process.

2.1 Use of Classroom Time and Space

In my context, I believe, in order to make our classrooms effective and safe learning places and provide more learning opportunities for students we need to pay attention to more efficient and purposeful use of class time and space because as Wright (2005: 55) states, management of time and space affects both classroom relationships and learning opportunity. Wright (2005: 61-2) also asserts that space and learning are linked and the configuration and use of classroom space has a strong influence on the quality of classroom activity and changing configuration can aid different teaching strategies.

2.2 Students' engagement

The events in our classrooms indicate students' engagement in the learning process and their relationship with teacher. It, however, seems that the focus of their engagement might not be on effective teaching and learning. It also appears that there may not be a safe learning environment in the classroom e.g. *the teacher and students' laughing at the error that one of the students made*. I think as teachers we need to engage students in learning activities effectively and create safe learning environment for them because Whitaker (1995) suggests that students need to be trusted, listened to, noticed, encouraged, develop, challenged intellectually, valued, informed and supported.

2.3 Students' participation

The teacher and students take part in the class interaction in our classrooms. However, we see that it is the teacher who has a dominant role in the interaction and takes most of the class talk because as Breen (2001: 310) asserts the teacher initiates, learners respond and the teacher follow up their responses by repetition, reformulation or evaluation. He (ibid: 311) further points out that teacher appears to have two-thirds of class talk than all the learners together have. van Lier (1996: 184) states that while this (IRF) may have advantages of control and efficiency the consequences are that students' level of participation and talking time are very limited.

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Examining Colleges of Education Mathematics Tutors' Conceptions in Teaching Completing the Square in Ghana

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Abstract- The objective of the study is to understand colleges of education tutors' conceptions in teaching completing the square in an effort to design an innovative teaching strategy that could impact positively on their knowledge, skills and practices in teaching completing the square. It was conducted among a conveniently sampled 46 tutors from twenty three (23) colleges of education in Ghana under a mixed method design, combining both quantitative and qualitative approaches in the data collection and analysis. Tutors were presented with a questionnaire made up of 46 items presented in three parts. Based on the analysis it can be concluded that colleges of education tutors conception of teaching completing the square is very weakly grounded in procedural knowledge (i.e. use of rules), but failed to demonstrate conceptual understanding of the rules and processes of completing the square. It is recommended that a refresher course be organised to equip colleges of education tutors with innovative and practical ways of teaching completing the square in ways that are efficient and practical to facilitate their conceptual understanding of the rules and processes.

Index Terms- quadratics, procedural fluency, conceptual understanding, colleges of education, completing the square

I. INTRODUCTION

Mathematics education researches show that students' performance in quadratic equations in most cases is very low and does not increase to a noticeable degree even after teaching (Chaysuwan, 1996; Vaiyavutjamai et al., 2005). This notion could partially be due to the fact that, tutors pedagogical content knowledge is not sufficient to select and use innovative teaching strategies to offer students desired learning experiences that could impact positively on learning outcomes. The concept of quadratics cannot be over emphasised as it lays the foundation for higher order polynomials (Sağlam & Alacacı, 2012). In spite of the merits of quadratics in senior high school, colleges of education and prescribed mathematics contents, the studies on colleges of education tutors conceptions in teaching completing the square in literature is limited, since a few studies on the teaching and learning quadratics have been conducted (Kieran, 2007; Vaiyavutjamai & Clements, 2006; Didiş et al., 2011; Didiş & Erbaş, 2015). Teaching mathematics in most colleges is often

centred on the use of rules and formulas to develop pre-service teachers' procedural fluency rather than teaching them for conceptual understanding (Sarwadi & Shahrill, 2014). Other tutors often teach quadratics using rigorous algebraic method, where pre-service teachers are taught how to complete a given square, without necessarily knowing why such procedures work. It is for this reason that a study has to be conducted among colleges of education tutors to understand their conceptions in teaching completing the square which to a large extent could be influencing the outcomes of those that they teach, or perhaps they are simply passing on to their students what was taught to them by the universities that train them.

Pre-service teachers who are taught effectively are expected to demonstrate both conceptual understanding and procedural fluency. Conceptual understanding is the kind of understanding that is influenced by logical and foundational thought upon which a concept is developed. Conceptual understanding brings to bare inherent relationship, or provides justification for actions taken in an attempt to solve a problem. Such understanding is described as that which is interconnected through relationships upon a careful observation of commonalities (Confrey, 1990). Conceptual understanding is much desired in the learning of mathematics than procedural fluency, even though a clear cut cause and effect relationship has not been established. It is important for pre-service teachers to develop their conceptual understanding, as the absence of it could result in wrong processes and products (Center for Develop Enterprise, 2007).

Zemelman, Daniels, and Hyde (1998), stated that improper grabs of concepts has the potential of hampering the learning of other concepts. Pre-service teachers who are grounded in conceptual understanding are motivated to succeed in acquiring further skills in learning mathematics. Tutors are expected to show demonstrable knowledge of their students' mathematical thoughts to be able to choose and organise their teaching to meet the learning styles of their students. This is hampered if the tutors are deficient in conceptual understanding. These tutors are forced to pass on ideas to their students, hock, line and sinker without convincing explanation. The students view about concepts is influenced by how their cognitive structures were developed previously by their teachers (Battista, 2001). When pre-service teachers have weaker cognitive structures, they approach learning from a narrow sense and may fail to demonstrate acceptable competences. It is therefore important that tutors are

grounded in conceptual understanding so that pre-service teachers under their tutelage could be taught in ways that are rich in relationships and can be extended to solve novel problems. Conceptual understanding forms the basis of procedural fluency. Tutors who are rich in conceptual understanding do not encourage rote learning, but insist on deep understanding which automatically translate into proper and justifiable procedures.

Procedural fluency is good at reinforcing understanding of mathematical concepts. Procedural fluency is the learners' ability to follow relevant procedures in solving mathematical problems in different situations (Kanyaliglu, Ipek, & Isik, 2003; Hiebert & Lefevre, 1986). Procedural knowledge is specific to problems and this implies that some procedures are not appropriate to solve other mathematical problems, which causes a serious deficit in pre-service teachers understanding of mathematical concepts. Pre-service teachers may demonstrate relevant procedures but sometimes gets stuck in solving mathematical problem (Siegler, 2003). Ndlovu and Brijall (2015), underscore the importance of conceptual understanding by stating that most students show weaknesses in mathematics because their learning is associated with a lack of conceptual understanding. Learners who lack procedural fluency will usually use inappropriate procedures which will often lead to systematic patterns of errors in executing completing the square. Accordingly, tutors should not only focus on developing procedural fluency as well as conceptual understanding. Failure to do so could jeopardise pre-service teachers' conceptual understanding.

Riccomini (2005) explains that instruction focused on the development of facts is problematic, as it often results in partial teaching of concepts, which defeats the role of tutors in the lecture rooms. Tutors are generally trained to teach mathematics in terms of general concepts, to position pre-service teachers to solve quadratic equations/expressions. Tutors who are well grounded in conceptual understanding are more susceptible to pick and choose teaching strategies that results in substantial gain in both conceptual understanding and procedural fluency among their students, but those with procedural fluency may only be showing demonstrable knowledge in procedural fluency but less in conceptual understanding, which will ultimately impede their competencies in teaching and could curtail learners' growth in conceptual understanding as well in mathematics achievement in general. Research on colleges of education tutors conceptions of completing the square is needed if we are to understand why students perform badly in completing the square. This calls for diagnosis of colleges of education tutors competences in teaching completing the square.

II. RESEARCH OBJECTIVE AND QUESTIONS

The objective of the study is to understand colleges of education tutors' conceptions in teaching completing the square in an effort to design an innovative teaching strategy that could impact positively on their knowledge, skills and practices in teaching completing the square. To do this a diagnostic test was conducted to understand the conceptions colleges of education tutors have in teaching completing the square in order to obtain data to answer five research questions:

1. What are the Tutors' conceptions with respect to their Knowledge, Skills and Practices in teaching completing the square?
2. How do colleges of education tutors teach completing the square?
3. How do colleges of education tutors explain why in completing the square ax^2+bx , a student has to make the coefficient of x^2 unit (thus 1)?
4. How do colleges of education tutors explain why in completing the square ax^2+bx , a student has to find one-half the coefficient of x , square the quotient, add and subtract same?
5. Is there any convergence between the quantitative results and the qualitative findings?

III. MATERIALS AND METHODS

The study used a questionnaire to collect data in order to understand the conceptions tutors have in teaching completing the square. It was conducted under a mixed method design, combining both quantitative and qualitative approaches in the data collection and analysis (Creswell & Tashakkori, 2007). This mixed method design gives opportunity to collect detailed and comprehensive qualitative data in order to support the quantitative data in response to the objectives of the study. Although there are various types of mixed method research designs, this study employed the explanatory model, which contains an initial quantitative data collection procedure through a questionnaire, followed by qualitative through an open ended test items. The objective of choosing this method was to obtain a deeper understanding from the quantitative data as well as use the qualitative data to support the quantitative findings. Creswell and Clark (2007) indicated that, the explanatory design is a bi-stage combination of quantitative and qualitative designs. The first begins with the collection and analysis of quantitative data and the second is the collection and analysis of qualitative data. This explanatory design is to offer the researcher an opportunity to further explain a quantitative data finding.

The current study examined Colleges of Education Tutors' Conceptions in Teaching Completing the Square. The study was conducted among a conveniently sampled 46 tutors from twenty three (23) colleges of education. Convenience sampling (also known as availability sampling) is one of the non-probability sampling method collects data from population/sample who are available and willing to participate in a study (Saunders, Lewis & Thornhill, 2012). This type of sampling procedure is particularly useful in exploring a research area in order to identify and address shortcomings as in the case of 'Examining Colleges of Education Mathematics Tutors' Conceptions in Teaching Completing the Square' so as to propose an efficient and innovative teaching strategy in the concept. Tutors were presented with a questionnaire made up of 46 items presented in three parts. The first six items collected their bio data, the second part made up 37 items on a three-point Likert Scale of which 15 items are on knowledge, 8 items on their skills and the 14 remaining items on practices in teaching completing the square. The tutors knowledge, skills and practices were in three levels: *Secured* was coded 1 and understood to mean what tutors already have and being used. *Emerging* was coded 2 and represent what

they want to consolidate/know more about. *Aspirational* was coded 3 and represented what they do not have, but want to acquire, as well as use in their practices. The third part was made up of three (3) questions and tutors were required to solve or give explanation in completing the square. For each of the three questions, a coding scheme was developed according to the extent to which colleges of education tutors were able to vividly provide a solution or offer an acceptable explanation or attempted to solve or explain the problem and assigned a numerical value as shown in Table 1.

Table 1: Student Response Code Point Values on a 5-point scale

| Student Response Code | Point Value |
|---|-------------|
| Solved successfully/explains very well | 5 |
| Correct and valid method, but wrong answer/starts explanation, but deviates | 4 |
| Partially solved/explained | 3 |
| Reconstruct the question in order to solve/explain | 2 |
| wrong method/explanation | 1 |
| Did not answer/explain | 0 |

Scoring the problems on a 5-point scale allowed me to find a group average score for each problem, as well as an average score for each tutor on the three problems. These are shown in Table 2.

Table 2: Tutors' conceptions in teaching completing the square

| Tutors' ID | If you were to teach your students how to complete the square of x^2+5x+7 . How will you do it? | In completing the square ax^2+bx , a student has to make the coefficient of x^2 unit (thus 1), why? | In completing the square ax^2+bx , a student has to find one-half the coefficient of x , square the quotient, add and subtract same. Why? | Average performance in the 3 items |
|------------|---|---|---|------------------------------------|
| 01 | 1 | 0 | 3 | 1 |
| 02 | 5 | 0 | 0 | 0 |
| 03 | 5 | 3 | 1 | 3 |
| 04 | 5 | 0 | 0 | 2 |
| 05 | 5 | 3 | 2 | 3 |
| 06 | 5 | 3 | 0 | 3 |
| 07 | 0 | 0 | 0 | 0 |
| 08 | 5 | 0 | 0 | 2 |
| 09 | 0 | 0 | 0 | 0 |

| | | | | |
|----------------------|----------|----------|----------|---|
| 10 | 5 | 0 | 0 | 2 |
| 11 | 0 | 0 | 0 | 0 |
| 12 | 2 | 0 | 0 | 1 |
| 13 | 0 | 0 | 0 | 0 |
| 14 | 5 | 0 | 0 | 2 |
| 15 | 0 | 0 | 0 | 0 |
| 16 | 1 | 0 | 0 | 0 |
| 17 | 0 | 0 | 0 | 0 |
| 18 | 0 | 0 | 0 | 0 |
| 19 | 0 | 0 | 0 | 0 |
| 20 | 1 | 0 | 0 | 0 |
| 21 | 1 | 0 | 0 | 0 |
| 22 | 5 | 0 | 0 | 2 |
| 23 | 5 | 0 | 0 | 2 |
| 24 | 5 | 0 | 3 | 3 |
| 25 | 5 | 0 | 0 | 2 |
| 26 | 5 | 0 | 0 | 2 |
| 27 | 0 | 3 | 3 | 2 |
| 28 | 5 | 0 | 0 | 2 |
| 29 | 4 | 0 | 0 | 1 |
| 30 | 0 | 0 | 0 | 0 |
| 31 | 0 | 0 | 0 | 0 |
| 32 | 1 | 0 | 0 | 0 |
| 33 | 5 | 5 | 3 | 4 |
| 34 | 5 | 0 | 3 | 3 |
| 35 | 1 | 0 | 3 | 1 |
| 36 | 4 | 0 | 0 | 1 |
| 37 | 1 | 0 | 0 | 0 |
| 38 | 5 | 0 | 3 | 3 |
| 39 | 0 | 0 | 0 | 0 |
| 40 | 0 | 0 | 0 | 0 |
| 41 | 5 | 3 | 0 | 3 |
| 42 | 5 | 3 | 0 | 3 |
| 43 | 5 | 0 | 0 | 2 |
| 44 | 2 | 0 | 0 | 1 |
| 45 | 0 | 0 | 0 | 0 |
| 46 | 0 | 0 | 0 | 0 |
| Group Average | 3 | 1 | 1 | |

Results and Discussion

The objective of the study is to understand colleges of education tutors conceptions in teaching completing the square in an effort to effort to design an innovative teaching strategy that could impact positively on their knowledge, skills and practices in teaching completing the square. The first part contains quantitative data were descriptive statistics is used to describe tutors' knowledge, skills and practices. The second part is organised to give an overview of the qualitative aspect on how tutors perform across the three problems. The third and final has to do with tutors' conceptions on how to teach completing the square as well as demonstrate their conceptual understanding on key stages in using the algebraic method in completing the square.

Tutors Knowledge, Skills and Practices

Table 3: Descriptive Statistics of Tutors Knowledge, Skills and Practices

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|-------------|---------|---------|------|----------------|
| Tutors' knowledge in teaching completing the square | 46 | 1 | 3 | 1.78 | .512 |
| Tutors' skill in teaching completing the square | 46 | 1 | 3 | 1.90 | .592 |
| Tutors' practices in teaching completing the square | 46 | 1 | 3 | 1.77 | .497 |
| Valid (listwise) | N 46 | | | | |

In order to efficiently describe tutors' knowledge, skills and practices, variables were computed for each of them and descriptive statistics ran. It can be seen from Table 3 that the mean for each of the three items is about 2, indicating that tutors knowledge, skills and practices were at the emerging level. This shows that for each of the constructs, tutors wanted to consolidate/know more about their knowledge, skills and practices in teaching completing the square. Their level of knowledge, skill and practices are not secured enough to effectively deal with the teaching of completing. This could be as a result of a limited knowledge of the various methods and materials available for teaching completing the square or simply not skilled enough to design and implement innovative teaching strategies for completing the square or their practices are only limited to the conventional and text book prescribed algebraic method of teaching completing the square. Tutors need to move away from the conventional text book strategies to innovative teaching strategies that offer opportunities to their students to learn according to students' mode of learning. By doing so students are able to learn according to their pace and could eventually lead to in depth learning. The findings suggest that colleges of education tutors conception in teaching completing the square is limited in knowledge, skill and practices. This explains why the average performance in each sub-scale is about 2 (i.e. emerging). A qualitative analysis was conducted to get a clearer understanding of the limited tutors' knowledge, skill and practices by presenting the three questions earlier mentioned in the methodology section to tutors to respond to. The outcome is presented in the next sections.

Tutors perform across the three problems

The average performance on the three (3) problems posed is 1 (i.e. wrong method/explanation) as indicated in Table 2. That means the group average tutor conception (i.e. knowledge, skill and practices) is to offer wrong method/explanation. This is particularly worrying as this group of tutors have a minimum of a

masters degree in mathematics (education or pure or applied). If those who are particularly recommended to possess content and pedagogy far in excess than what they need in practice are themselves having serious problems in the content and pedagogy of teaching completing the square, then one can understand why performance in mathematics across all sectors of our educational system in Ghana is in serious crises. This state of affairs could be attributable to the way we train our tutors. Sometimes, assumed knowledge is exaggerated. How come a tutor is able to execute a strategy but fail to explain why such a strategy works? It points to the insinuation that most of the teaching strategies used in presenting mathematical content to teacher educators end at a level of procedural fluency, but insufficient in fostering conceptual understanding. There is the need to restructure the content and scope of the training of our teacher education to include lifelong learning strategies so that tutors will persistently search for justifiable explanations to concepts that are basic, but yet challenging. Quadratics which is the basis and foundation of polynomials in higher level mathematics if weakly developed, then we can understand why performance and enrolment in mathematics and mathematics related courses are low and under subscribed in all levels of education in Ghana (Ministry of Education, 2017). The Ministry of Education Sector Analysis, (2018, page 74) on enrolment figures in STEM indicated that 'in 2015/16 academic year, across all tertiary institutions, 31% of students were enrolled in science subjects, while 69% were enrolled in the arts. When looking at just public universities and polytechnics/technical universities, these trends are quite similar, with approximately 40% enrolled in science and 60% in arts. These figures have remained more or less stagnant across a number of years, and are far from the target of having a 60:40 ratio of science to arts enrolment'.

Teacher training institutions need to relook at how mathematics educators are trained to ensure those turned out are well equipped in both content and pedagogy if we are to succeed in raising the quality of teaching and learning of mathematics across all levels of the educational ladder.

Tutors conceptions on how to teach completing the square

'If you were to teach your students how to complete the square (x^2+5x+7), how will you do it?' was used to identify tutors conceptions on how to teach completing the square. Out of the 46 respondents, 31 tutors attended to the task as indicated in Table 2. Of the number that attended to the task, 20 tutors (43.5%) successfully completed the task. Two (2) representing 4.3% used correct and valid method, but wrong answer, none partially solved, two (2) representing 4.3% reconstructed the question in order to solve, seven (7) representing 15.2% used wrong method and fifteen (15) 35.6% did not answer. For those who did not, their inability to attempt the question could stem from the fact that the methods used in teaching them how to complete a square, perhaps did not make sense or create an everlasting understanding on how to complete a given square and they have since forgotten the process. One interesting thing about the approach used by those who answered the question successfully was the use of the 'rigorous algebra' or verbal symbols is rich in the use and application rules/procedures. It is a very common method in text books and among the tutors. However, this rigorous algebraic method is weak in relationships,

fails to provide for conceptual understanding and may not be helpful in attending to non routine problems. Tutors who are good in this kind knowledge will in most cases fail to justify why such methods work or even offer convincing explanation on why they use such steps in arriving at correct answers. This suggests that once tutors have memorized and practiced procedures that they do not understand, they care less about the reasoning behind them. Such tutors demonstrate rote learning, and will fail to adopt teaching strategies that are rich in content, fail to offer pre-service teachers various modes of learning to meet their learning needs as well fail to provide for deeper understanding of concepts (relational understanding). It can be concluded that colleges of education tutors teach completing the square using rules and procedures that they cannot justify.

Tutors conception on why a student has to make the coefficient of x^2 a unit in completing the square

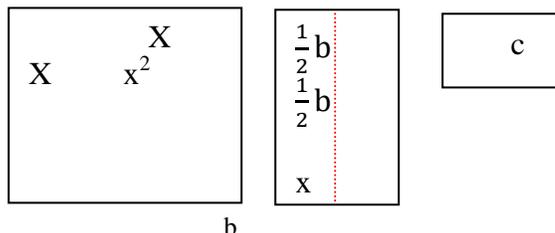
Table 2 shows that only six (6) tutors were able to partially explain the reason behind such a step. Such tutors only mention the reason as ‘to make it a perfect square (as in Figure 1), but failed to mention that, it is done to ensure *only one square is completed, and not squares or part of a square*’. Analysing these responses, it is evident that the tutors lacked a clear understanding of the meaning of the steps they executed. Others just said: to enable the process work, that is the principle and ‘it is also a requirement’ to complete a given square (see Figure 2a, 2b & 2c). These findings depict a big gap between Skemp’s (1976) proposed conceptual understanding and the tutors’ conceptions of teaching completing the square. The idea of providing a justification to the steps taken was not known to the tutors. They are just good at the procedural fluency level in completing the square. One tutor was able to provide a complete justification (see figure 3), but this could have been influenced by an informal interaction with myself and the tutor when the instrument was being developed. This finding shows a semblance of Vaiyavutjamai, Ellerton, and Clements, (2005) statement that secondary school mathematics teachers’ lack of pedagogical content knowledge in quadratics as well as Didis, Baş, and Erbaş (2011) conclusion that students are familiar with rules in solving quadratics, they applied these rules but failed to

justify why it is mathematically correct. It can be concluded Tutors conception on why a student has to make the coefficient of x^2 a unit in completing the square is only instrumental where they are able to execute a process, but fail to justify why such a step is important. Thus tutors’ knowledge, skill and practices are instrumental but deficient in conceptual understanding of the process.

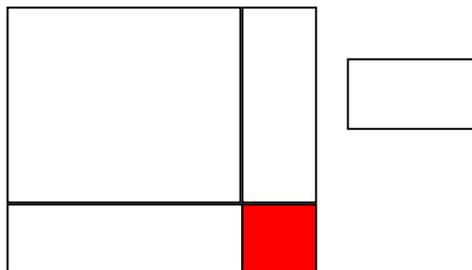
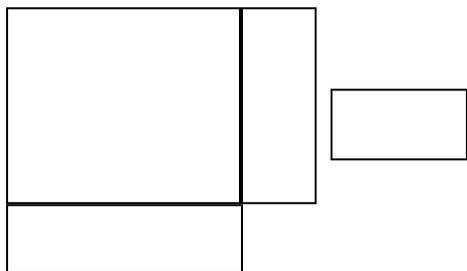
Hence it is important to equip tutors with innovative strategies that are practical, meaningful and rich in relationships so that instruction in this topic could be improved. Colleges of education tutors are not able explain why in completing the square ax^2+bx , a student has to make the coefficient of x^2 unit.

Tutors conception on why a student has to find one-half the coefficient of x , square the quotient, add and subtract same

This question appeared to be a difficult question to the tutors, even for those who were able complete the given square. For those who partially offered an explanation, the statement that cut across their explanation was ‘to make it a perfect square’ (see Figure 3). However it was expected that the complete explanation should be ‘to convert it into a perfect square without altering the area of the original quadratic equation/expression’. Geometrically, it gives an impression that some aspect of the quadratic is a square, the other is a rectangle and the remaining part has an area of the constant. This explanation is illustrated below using the expression $x^2 + bx + c$.



To convert into a perfect square, the red line divides the rectangle into two-equal halves which can be added to the existing square as illustrated below. But this does not give a perfect square yet until an additional square (red in colour) is added at right bottom corner.



This red square has an area of $\frac{b^2}{4}$ which increases the original area. To maintain the area it must be subtracted from the area of the perfect square $[(x + \frac{b}{2})^2 - \frac{b^2}{4} + c]$. This is simplified to $[(x + \frac{b}{2})^2 + \frac{4c-b^2}{4}]$. Hence, the explanation that: *to convert it into a perfect square without altering the area of the original quadratic equation/expression*. There seems to be agreement in

the study that tutors are using procedures without understanding and tutors have difficulties in justifying key components of the processes in completing the square. Again, this fits into Skemp’s (1976) categorization that tutors are only recollecting and applying rules they do not understand. Pre-service teachers who are trained by these tutors are only developing instrumental understanding while their relational understanding is curtailed.

This qualitative aspect was used to further gain insights into the procedure that was employed and whether they possess conceptual understanding of the process of completing the square as indicated by Shulman (1986) when he said teachers need efficient ways of demonstrating the meaning of concepts that are

taught. To this end, colleges of education tutors are not able explain why in completing the square ax^2+bx , a student has to find one-half the coefficient of x , square the quotient, add and subtract same. Some extracts of tutors responses and for some selected questionss are shown below.

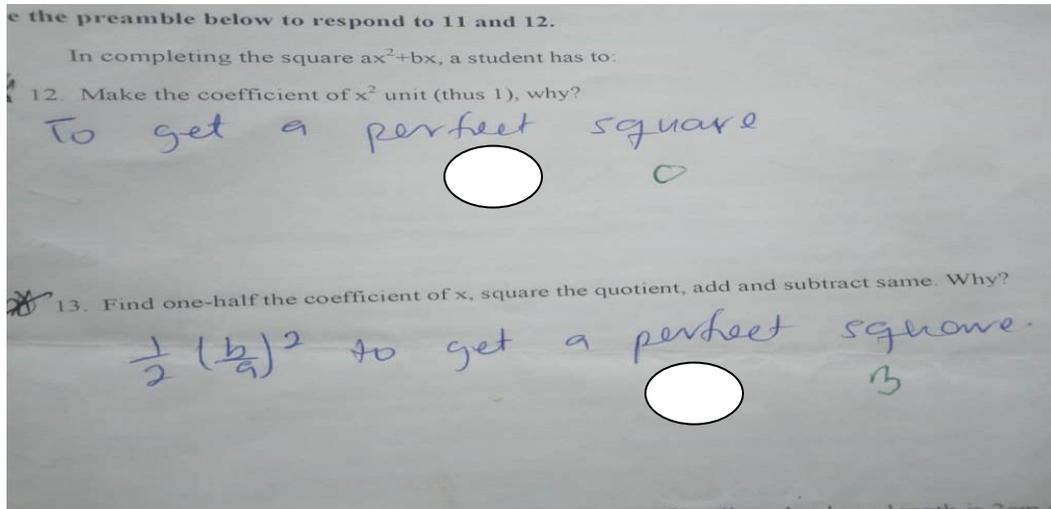


Figure 1

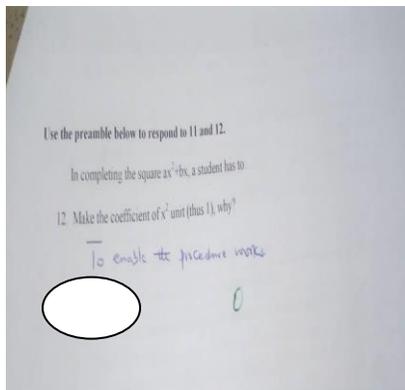


Figure 2 a

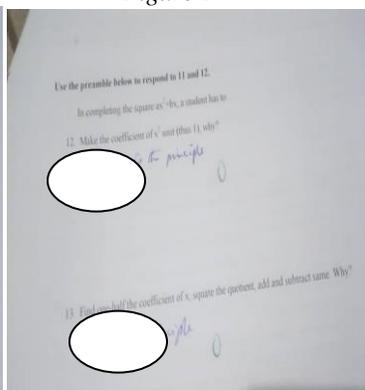


Figure 2b

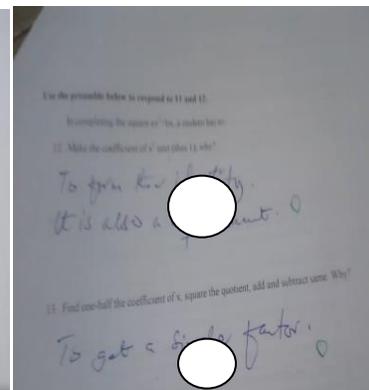


Figure 2c

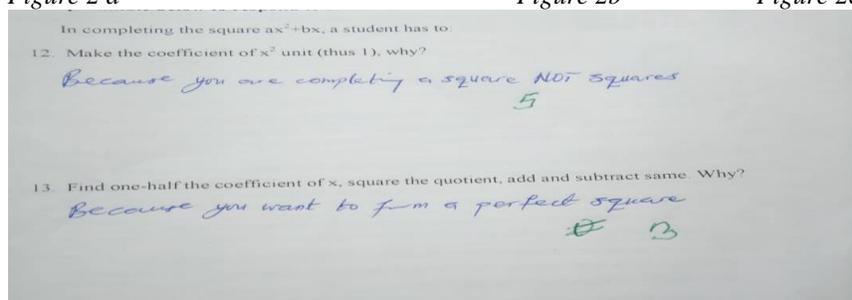


Figure 3

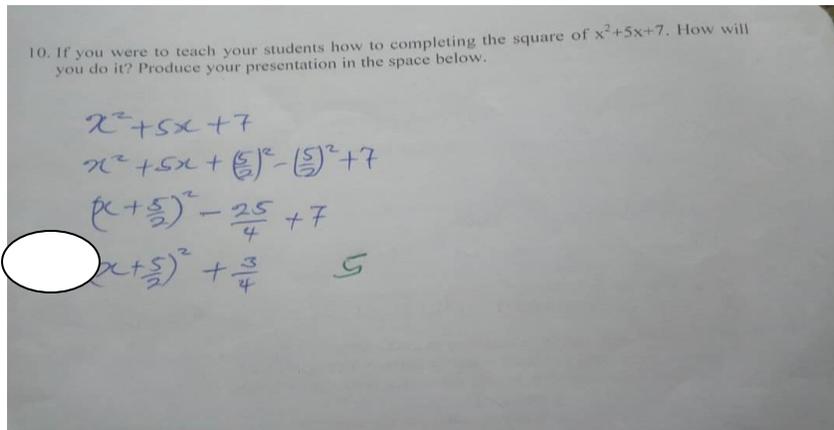


Figure 4

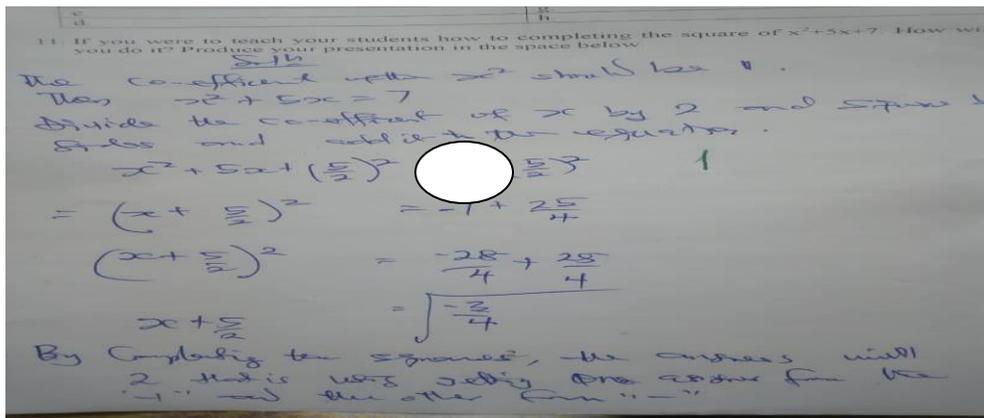


Figure 5

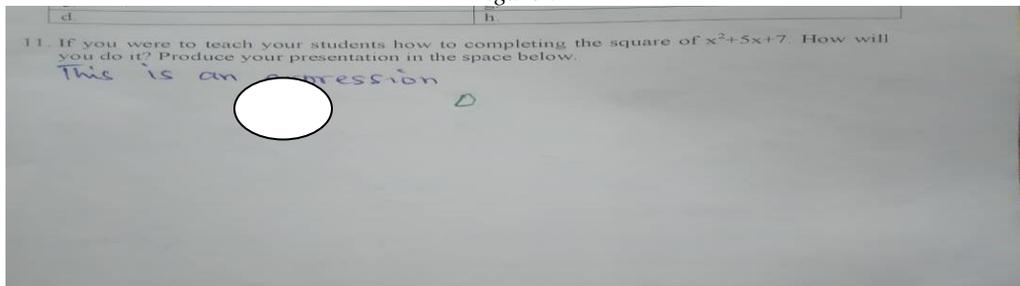


Figure 6

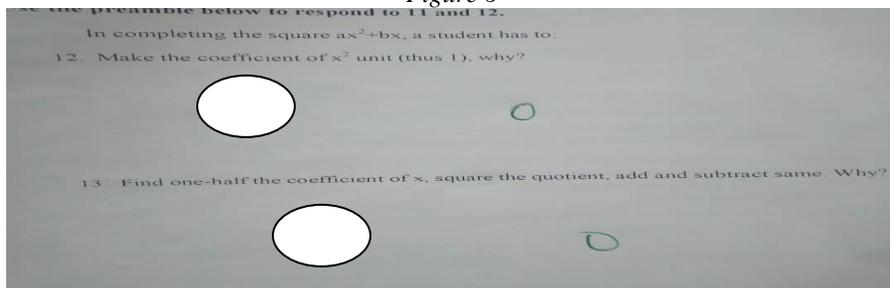


Figure 7

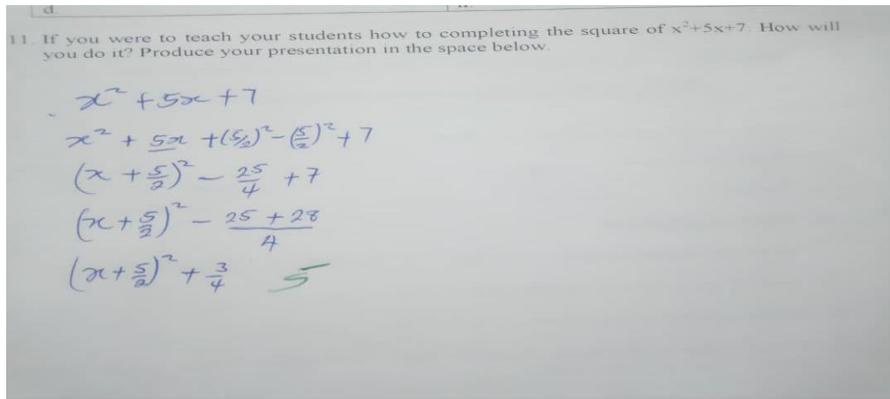


Figure 8

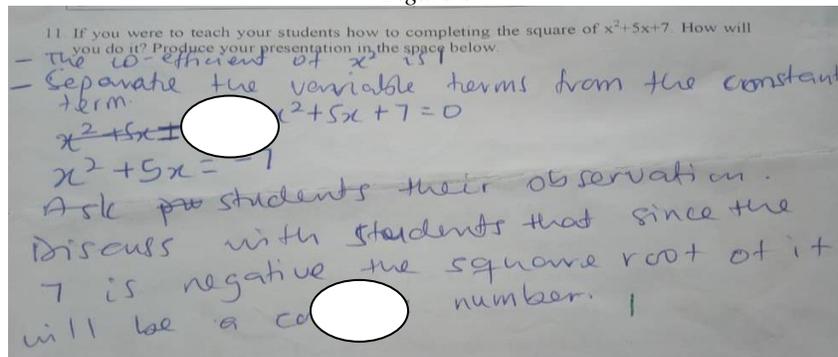


Figure 9

Comparison between the quantitative results and the qualitative findings

The quantitative analysis indicated that colleges of education tutors conception in teaching completing the square is only procedural and they have limited knowledge, skill and practices. The qualitative data leads to the conclusion that, colleges of education tutors conception in teaching completing the square is limited in knowledge, skill and practices. The qualitative analysis suggest that Tutors conception on why a student has to make the coefficient of x^2 a unit in completing the square is only instrumental where they are able to execute the process, but fail to justify why such a step is important, neither were they able to explain why in completing the square ax^2+bx , a student has to find one-half the coefficient of x , square the quotient, add and subtract same. Comparing both the quantitative and qualitative analyses, there is seeming resemblance in the outcomes that suggest tutors lack a clear understanding and demonstration of the meaning of the steps they execute. It stands to reason that tutors conception in teaching completing the square is procedural or instrumental, rather than conceptual or relational and that both analysis leads to similar conclusion.

IV. CONCLUSION

Based on the analysis it can be concluded that colleges of education tutors conception of teaching completing the square is very weakly grounded in procedural knowledge (i.e. use of rules), but failed to demonstrate conceptual understanding of the rules and processes of completing the square.

V. RECOMMENDATION

It is recommended that a refresher course be organised to equip colleges of education tutors with innovative and practical ways of teaching completing the square in ways that are efficient and practical to facilitate their conceptual understanding of the rules and processes.

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Ketamin - Dexmedetomidine Versus Ketamin - Propofol In Onset Of Action, Hemodynamic Effects And Recovery Time During Gastrointestinal Endoscopy

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ABSTRACT

Introduction: Gastrointestinal endoscopy causes discomfort and is a burdensome procedure for patients. Providing sedation to relieve patient anxiety and discomfort, improve examination results, and reduce patient memories about the incident. Effective sedation can be assessed by how the drug reaches the onset of rapid sedation, stable hemodynamics and fast recovery time.

Objective: This study aims to determine the comparison of the onset of action, hemodynamic effects and recovery time using a combination of intravenous dexmedetomidine ketamine and intravenous propofol ketamine during gastrointestinal endoscopy.

Methods: This study is a randomized clinical trial with a single blind. This research was conducted in December 2019 until January 2020. A total of 30 subjects who underwent gastrointestinal endoscopy were divided into 2 groups. The KD group (n = 15) was given 0.5 mg / KgBB intravenous sedation + 1mg / KgBB Dexmedetomidin / hour syringe pump, the KP group (n = 15) was given 0.5 mg / KgBB ketamine + 1 mg / KgBB propofol / hour syringe pump. The start of work is calculated from the entry of the drug until the Ramsay Sedation Scale (RSS) ≥ 4 is reached. Then the operator starts the endoscopy. Hemodynamics: Mean Arterial Pressure (MAP), Heart Rate, Respiratory Rate, and Oxygen Saturation (SpO₂) are measured when in the action room (T₀), 5 minutes the procedure starts (T₁), 10 minutes the procedure starts (T₂), and when endoscopy is complete (T₃). The recovery time is calculated from the endoscopy (T₃) until the patient reaches the Aldrete score ≥ 9 (T₄). Data were analyzed univariate, bivariate and multivariate. Bivariate data were analyzed by Chi-Square test, Independent T-Test and Mann-Whitney and multivariate data were analyzed by Friedman test.

Results: The onset of action for Ketamine-Propofol group (3.7 ± 1.5 minutes) was faster than the Ketamine-Dexmedetomidine group (6.2 ± 1.6 minutes) with a significant difference ($p < 0.05$). No significant differences in hemodynamics were found: MAP, heart rate, breath frequency and oxygen saturation between Ketamine-Dexmedetomidin and Ketamine-Propofol ($p > 0.05$). The recovery time of the Ketamine-Dexmedetomidine group ($11.4, \pm 2.1$ minutes) and in the Ketamine-Propofol group ($11.2, \pm 2.4$ minutes). No significant difference was found in recovery time in the two groups ($p > 0.05$). There were no undesirable effects on hemodynamic and respiratory changes in both groups.

Conclusion: Ketamine-Propofol starts faster than Ketamine-Dexmedetomidin. The combination of Ketamine-Dexmedetomidin can maintain haemodynamics during endoscopic procedures as well as the combination of Ketamine-Propofol.

Keyword : *Endoskopi gastrointestinal, Ketamin-Dexmedetomidin, Ketamin-Propofol*

I. INTRODUCTION

EGI is a diagnostic action that is commonly used to find out problems that occur in the upper digestive system, which includes the stomach, esophagus, and small intestine. This action is also known as upper gastrointestinal endoscopy. In the EGI procedure, the doctor uses an instrument called an endoscope or gastroscope to see problems in the upper digestive system.

EGI creates discomfort and is a burdensome procedure for patients. In general, topical anesthesia in the pharynx is safer as premedication in EGI procedures without sedation. However, patients may experience anxiety, discomfort and pain, and generally cannot tolerate this procedure with topical anesthesia in the pharynx alone. The clinical purpose of providing sedation for EGI is to relieve patient anxiety and discomfort, improve examination results, and reduce patient memories about the event¹.

Propofol is often used extensively in deep sedation. In the use of propofol as sedation hypotensive side effects are reported and especially is the increased risk of oxygen desaturation in moderate and deep sedation. In general, a single use of propofol or a combination with midazolam and / or fentanyl is one of the widely used regimens for sedation during the EGI procedure². However, the combination of the use of sedation and / or analgesia with propofol can cause some additional risks.

Ketamine maintains hemodynamic stability and sufficient sedation depth during EGI action. Giving ketamine prevents bradycardia, hypotension and achieves sufficient and prolonged sedation. Cardiac toxicity and episodes of psychosis in induction and prolonged recovery time are deficiencies of ketamine. The combination of ketamine and various other sedation drugs helps reduce its side effects³.

Dexmedetomidine has sedation, anti-anxiety, and analgesic effects that make cardiorespiratory stability at therapeutic doses. The use can be expanded as an intravenous drug in medical procedures⁴. The use of dexmedetomidine for sedation during gastrocopy is growing. More importantly, the use of dexmedetomidine as sedation in EGI procedures provides respiratory safety and hemodynamic stability².

II. METHODS

This study is a randomized clinical trial with a single blind carried out at Haji Adam Malik General Hospital. The subjects of this study were taken by using consecutive sampling technique which means until the sample size is met. In this study, the subjects were patients undergoing Endoscopic Gastrointestinal at the Integrated Diagnostic Installation. After obtaining approval from the Ethics Committee, Faculty of Medicine, University of North Sumatra, based on inclusion criteria (age 18-65 years, Willing to be a research subject, ASA 1-2) and exclusion criteria (Patients with allergies or contraindications to the drugs studied, patients with a history of heart, liver and kidney disease, who are pregnant and other severe illnesses, history of chronic alcohol use, history of abuse of narcotic or sedative analgesia, sufferers of severe psychological or neurological disorders). Drop out criteria if Emergency heart and lung occur in the form of: MAP <50, heart rate <60 or> 150 times per minute, respiratory rate <12 times per minute, oxygen saturation <92% and does not increase with oxygen administration. 30 samples were collected. All subjects were recorded for their identity after the patient arrives in the waiting room of the Integrated Diagnostic Installation (IDT), the patient is re-examined for diagnosis, action plans, infusion access smoothly before signing in and given education of sedation measures to be performed. The patient is taken to the action room, then a standard monitor is installed (blood pressure, heart rate, respiratory rate, oxygen saturation) and records are taken (T0). Both groups of patients were given Ringer Lactat 10cc / KgBB crystalloid preloading. Group A was given 0.5 mg / KgBW intravenous ketamine bolus and 1 mg / KgBW continuous Dexmedetomidine / hour syringe pump. Group B was given 0.5 mg / KgBW intravenous bolus and 1 mg / KgBW continuous propofol / hour syringe pump. Start of Work is the time from the administration of Ketamine to RSS \geq 4. Recording hemodynamic monitors (blood pressure, heart rate, respiratory rate, oxygen saturation) and recording T1 5 minutes since the procedure began, T2 10 minutes since the procedure began, T3 action is complete. The recovery time was recorded from the time the EGI procedure was completed until the patient regained consciousness with an Aldrete Score \geq 9 (T4). Fentanyl injection of 1 mcg / KgBB intravenously as resque analgesia. Giving ketamine or dexmedetomidine is stopped after the action is complete. The study was stopped when the research subjects refused to participate further and there were emergency life-threatening airway, heart, lung, brain.. All collected data is tabulated and analyzed statistically. The characteristics of subjects that consist of identity, duration of endoscopy, onset, recovery time and haemodynamic effects were statistically analyzed and presented in the table.

III. RESULTS

This study was attended by 30 subjects who met the inclusion criteria. The characteristics of this study were displayed based on age, sex, ASA and BMI classification.

Table 1 Demographic Data Table

| Characteristics | Treatment | | p-value |
|---------------------------|------------------|------------------|--------------------|
| | Grup A (n=15) | Grup B (n=15) | |
| Age (years), Mean (SD) | 50,2 (15,9) | 48 (14,6) | 0,884 ^a |
| Sex, n (%) | | | |
| Male | 5 (33,3) | 9 (60) | 0,143 ^b |
| Female | 10 (66,7) | 6 (40) | |
| ASA classification, n (%) | | | 0,705 ^b |

| | | | |
|----------------|------------|------------|--------------------|
| ASA-I | 6 (40) | 5 (33) | |
| ASA-II | 9 (60) | 10 (67) | |
| BMI, Mean (SD) | 23,8 (2,8) | 23,9 (3,3) | 0,940 ^c |
| Jumlah | 15 | 15 | |

a)Mann-Whitney Test, b)Chi-Square, c)Independent samples T-Test

Table 1, patients in group A was 50.2 years with an SD score of 15.9 and group B was 48 years with an SD value of 14.6 years. In group A, there were 5 males (33.3%) while females had 10 (66.7%). In group B, 9 male sex (60%) while female 6 (40%). Group A with ASA-I as many as 6 people (40%) and ASA-II as many as 9 people (60%). Group B with ASA-I of 5 people (33%) and ASA-II of 10 people (67%). The mean IMT of group A was 23.85 and Group B was 23.94.

Table 2 Long-standing endoscopic procedures, starting drug work during endoscopy and recovery time after endoscopy after administration of Ketamine-exmedetomidine (Group A) and Ketamine-Propofol (Group B).

| Duration | Treatment | | p-value |
|--|------------------|------------------|--------------------|
| | Grup A (n=15) | Grup B (n=15) | |
| Long endoscopy procedure, Median (Min-Max) | 15 (12-40) | 15 (14-30) | 0,255 ^a |
| Start working the drug during endoscopy, Mean (SD) | 6,2 (1,6) | 3,7 (1,5) | 0,001 ^b |
| Recovery time after endoscopy, Mean (SD) | 11,4 (2,1) | 11,2 (2,4) | 0,752 ^b |

a)Mann-Whitney Test, b)Independent samples T-Test

Table 2, the median value of the endoscopy procedure for group A was 15 minutes with a min-max value of 12-40 minutes while group B was 15 minutes with a min-max value of 14-30 minutes. The mean value of starting the drug at endoscope group A was 6.2 minutes with an SD value of 1.6 minutes while group B was 3.7 minutes with an SD value of 1.5 minutes. The mean recovery time after group A endoscopy was 11.4 minutes with an SD value of 2.1 minutes while group B was 11.2 minutes with an SD value of 2.4 minutes.

The statistical test results of group A endoscopy compared with group B obtained $p = 0.255$, which means that there is no significant relationship between endoscopic procedures between Ketamine-Dexmedetomidine and Ketamine-Propofol. Statistical results of starting drug work during group A endoscopy compared with group B $p = 0.001$, which means that there is a significant relationship between drug administration during endoscopy between Ketamine-Dexmedetomidine and Ketamine-Propofol. Statistical test results of recovery time after group A endoscopy compared with group B $p = 0.752$, which means that there is no significant association of recovery time after endoscopy between Ketamine-Dexmedetomidine and Ketamine-Propofol.

Table 3 Mean Arterial Pressure (MAP) before and after treatment

| Biomarker | Grup A (n=15) | | Grup B (n=15) | | p-value |
|-----------|---------------------|------------|--------------------|-----|--------------------|
| | Mean/Median | SD/Min-Max | Mean | SD | |
| MAP (T0) | 86 | 83-116 | 92,4 | 9,0 | 0,849 ^a |
| MAP (T1) | 88,4 | 9,6 | 92,3 | 6,2 | 0,197 ^b |
| MAP (T2) | 92,2 | 13,2 | 93,3 | 5,6 | 0,763 ^b |
| MAP (T3) | 93 | 69-126 | 92,5 | 5,5 | 0,672 ^a |
| p-value | 0,045 ^{*c} | | 0,904 ^d | | |

uji a)Mann-Whitney, b)Independent Samples T-Test, c)Friedman, d)ANOVA Repeated

Table 3, Statistical test results know the difference between group A and group B for MAP before the action, 5 minutes after the action, 10 minutes after the action and after the action each p-Value is obtained $p = 0.849$ (T0), $p = 0.197$ (T1), $p = 0.763$ (T2), $p = 0.672$ (T3) which means there is no relationship between the Ketamine-Dexmedetomidine group and the Ketamine-Propofol group against MAP.

Statistical test results to determine whether or not there is a decrease or increase in the average MAP of group A obtained $p = 0.045$, which means there is a significant decrease in MAP of group A over time. Statistical test results to determine whether there is a decrease or increase in the average MAP of group B obtained $p = 0.904$, which means there is no significant decrease MAP over time.

Table 4 Heart rate before and after treatment

| Biomarker | Ketamin-Dextomidine (n=15) | | Ketamin Propofol (n=15) | | p-value ^{a)} |
|----------------------|-------------------------------|------------|----------------------------|------------|-----------------------|
| | Mean/Median | SD/Min-Max | Mean/Median | SD/Min-Max | |
| Heart Rate (T0) | 87,0 | 5,9 | 88 | 68-93 | 0,730 ^b |
| Heart Rate (T1) | 85 | 69-92 | 86,4 | 6,0 | 0,900 ^a |
| Heart Rate (T2) | 81,4 | 8,1 | 85,2 | 5,9 | 0,269 ^b |
| Heart Rate (T3) | 86 | 66-92 | 86 | 61-93 | 0,602 ^a |
| p-value ^c | 0,019* | | 0,452 | | |

a)Mann-Whitney, b)Independent Samples T-Test, c)Friedman

Table 4, Statistical test results know the difference between group A and group B for heart rate before the action, 5 minutes after the action, 10 minutes after the action and after the action is obtained each p-value is $p = 0.730$ (T0), $p = 0.900$ (T1), $p = 0.269$ (T2), $p = 0.602$ (T3) which means there is no relationship between the Ketamine-Dextomidine group and the Ketamine-Propofol group to the heart rate.

Statistical test results to determine whether there is a decrease or increase in the average heart rate of group A obtained $p = 0.019$, which means there is a significant decrease in heart rate of group A over time. Statistical test results to determine whether there is a decrease or increase in the average heart rate of Group B $p = 0.452$, which means that there is no significant decrease in heart rate over time.

Table 5 Respiratory Rate before and after treatment

| Biomarker | Ketamin-Dextomidine (n=15) | | Ketamin Propofol (n=15) | | p-value |
|-----------------------|-------------------------------|------------|----------------------------|------------|--------------------|
| | Mean/Median | SD/Min-Max | Mean/Median | SD/Min-Max | |
| Respiratory Rate (T0) | 19,2 | 2,2 | 19,9 | 2,0 | 0,407 ^b |
| Respiratory Rate (T1) | 18 | 16-22 | 19,3 | 1,9 | 0,314 ^a |
| Respiratory Rate (T2) | 18,0 | 1,6 | 20 | 16-22 | 0,071 ^a |
| Respiratory Rate (T3) | 18,4 | 1,8 | 20 | 16-21 | 0,495 ^a |
| p-value ^c | 0,047* | | 0,067 | | |

a)Mann-Whitney, b)Independent Samples T-Test, c)Friedman

Table 5, Statistical test results know the difference between group A and group B for Respiratory Rate before the action, 5 minutes after the action, 10 minutes after the action and after the action each p-Value is obtained $p=0,407$ (T0), $p=0,314$ (T1), $p=0,071$ (T2), $p=0,495$ (T3) which means there is no relationship between the Ketamine-Dexmedetomidine group and the Ketamine-Propofol group against Respiratory Rate.

Statistical test results to determine whether or not there is a decrease or increase in the average MAP of group A obtained $p = 0.047$, which means there is a significant decrease in MAP of group A over time. Statistical test results to determine whether there is a decrease or increase in the average Respiratory Rate of group B obtained $p = 0.067$, which means there is no significant decrease Respiratory Rate over time.

Table 6 Oxygen Saturation (SpO2) before and after treatment

| Biomarker | Ketamin-Dextomidine (n=15) | | Ketamin Propofol (n=15) | | p-value ^a |
|-----------|-------------------------------|---------|----------------------------|---------|----------------------|
| | Median | Min-Max | Median | Min-Max | |
| SpO2 (T0) | 99 | 98-99 | 99 | 98-99 | 0,671 |

| | | | | | |
|----------------------|-------|-------|-------|-------|-------|
| SpO2 (T1) | 99 | 97-99 | 99 | 98-99 | 0,095 |
| SpO2 (T2) | 99 | 97-99 | 99 | 98-99 | 0,374 |
| SpO2 (T3) | 99 | 98-99 | 99 | 98-99 | 1,000 |
| p-value ^b | 0,439 | | 0,479 | | |

a)Mann-Whitney, b)Friedman

Table 6, Statistical test results know the difference between group A and group B for Respiratory Rate before the action, 5 minutes after the action, 10 minutes after the action and after the action each p-Value is obtained p=0,671 (T0), p=0,095 (T1), p=0,374 (T2), p=1,000 (T3) which means there is no relationship between the Ketamine-Dexmedetomidine group and the Ketamine-Propofol group against Oxygen Saturation.

Statistical test results to determine whether or not there is a decrease or increase in the average MAP of group A obtained p = 0.047, which means there is a significant decrease in MAP of group A over time. Statistical test results to determine whether there is a decrease or increase in the average Oxygen Saturation of group B obtained p = 0.067, which means there is no significant decrease Oxygen Saturation over time.

IV. CONCLUSIONS

From the results of this study conducted to see comparison of ketamin - dexmedetomidine intravena and ketamin - propofol intravena against working start, hemodynamic effects and recovery time during gastrointestinal endoscopy at Integrated Diagnostic Installation Haji Adam Malik General Hospital, Universitas Sumatera Utara Hospital, it can be concluded that:

1. The administration of Ketamine-Propofol starts faster than Ketamine-Dexmedetomidine
2. There is no difference in the haemodynamic effect between Ketamine-Dexmedetomidine and Ketamine-Propofol.
3. There is no difference in recovery time between Ketamine-Dexmedetomidine and Ketamine-Propofol.

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A Study on Graph Theory Properties of On-line Social Networks

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Abstract- This report attempts to provide a descriptive analysis of online social media networks of Facebook, Twitter and LinkedIn based on graph theory concepts. The first part of the study focuses on identifying various activities of the above networks and constructing a suitable graph model for each social media to represent respective activities. The next part of this study addresses the evaluation of the constructed models of each social media separately in order to identify the applicability of them to analyze behavioral patterns and characteristics of the users. Final part of this study focuses on proposing a method to provide relevant information on online social networks to outsiders, which will be helpful for competent decision making without violating the user privacy.

Index Terms- Behavioral patterns, graph theory, scatter plots, social media networks.

I. INTRODUCTION

Graph theory is a mathematical concept which is based on mathematical structures made up of nodes and edges, called 'graphs', which are used to model pair-wise relations between objects. An online social network (OSN); which is used by people to build social networks or social relations with other people can be represented by a graph with nodes and edges and analyzed in order to determine many graph theory properties associated with them.

It is certain that human behavior plays a vital role in many fields such as management, marketing, trading, politics etc. Along with the advancement of information and communication technology, predicting human behavior and their requirements has been a challenging task. As OSNs become the tools of choice for connecting people, sociologists expect that their structure will increasingly mirror real life society and relationships. This has been proven mainly by comparing the power-law distribution and small-world property of real-world social network with that of OSN. Therefore, Graph theory concepts provide an effective and efficient method to analyze and evaluate OSNs which will provide a strong base of information to determine and predict human behavior in the network.

Tons of social media sites are available throughout the world with millions of active users at present. According to many rankings Facebook, Twitter and LinkedIn possess a higher position among

them. They are specifically designed for the people to interact with one another. On the other hand, they are distinct in the way their ties are established and with regard to the casualty and professionalism of them. Therefore, on-line platforms of Facebook, Twitter and LinkedIn are evaluated in this analysis.

II. MATERIALS AND METHODS

A. Construction of graph models

There are several activities inherited to on-line platforms of Facebook, Twitter and LinkedIn. The users may create new bonds with other users, they may post their photos on on-line platform so that their friends can see them, or they may send messages to their friends etc. The way in which these activities are carried out may vary with one network to another. So, determining each activity in the three sites is essential in order to model the social network of each of the social media site. Model of a social network describes a graph with several types of nodes and edges with respect to each activity on the online platform. According to each model, many sub graphs can be extracted and analyzed in order to predict behavioral patterns of the users within the network. The constructed models of social networks of Facebook, Twitter and LinkedIn are as follows.

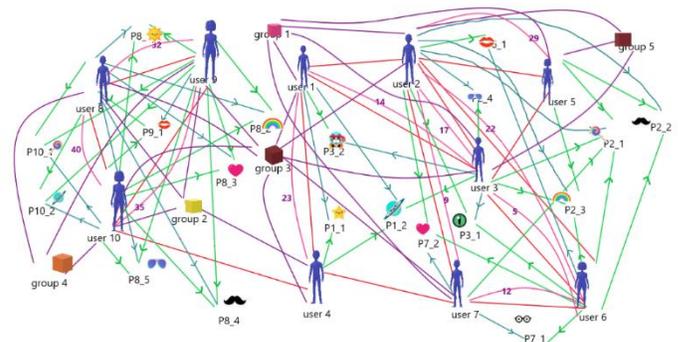


Figure 1-Facebook network model

In the Facebook network model, there are three types of nodes which are users, posts and groups. The links are friendship (red), reactions on posts (green), creation of posts (blue), messages (pink) and group membership (purple). Four sub graphs can be extracted from Facebook network model to analyze the user behavior of Facebook. They are; Friendship graph, Graph for reacting on posts, Groups graph, Messaging graph.

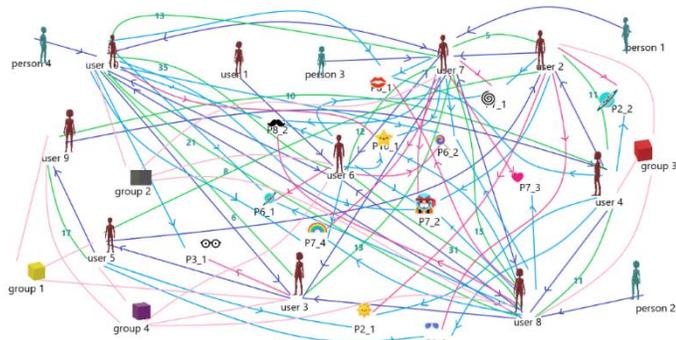


Figure 2-Twitter network model

In the Twitter network model, users, unregistered persons, posts and groups are the nodes. Links represent; following (dark blue), reactions on posts (light blue), creation of posts (dark pink), messages (green) and group membership (light pink).

This also has four subgraphs that can be extracted in which the characteristics may be different in some of the graphs from that of Facebook. The subgraphs of Twitter network model are; Followers graph, Graph for reacting on posts, Groups graph and Messaging graph.

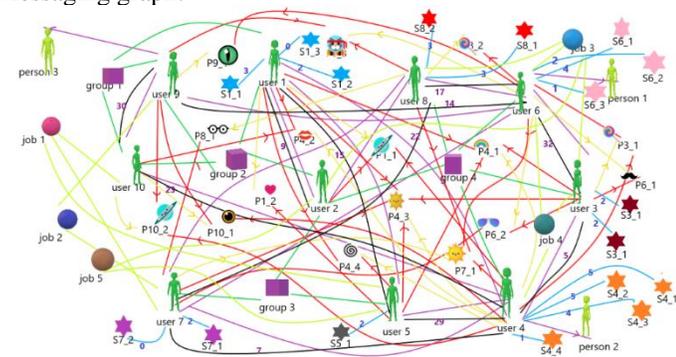


Figure 3-LinkedIn network model

In the LinkedIn network model users, unregistered persons, posts, groups, skills and jobs represent the nodes of the graph. Links and their representing colors are connections (purple), group membership (green), posting (gold), reactions on posts (red), messages (black), endorsement (blue), invitations (purple directed), recommending jobs (light green). There are six sub graphs that can be extracted from this network in order to predict meaningful results on the user behavior of LinkedIn. They are; Connections graph, Graph for reacting on posts, Groups graph, Messaging graph, Graph for endorsement of skills and Graph for recommending jobs.

B. Analysis of a sample

On-line social networks of samples of users of Facebook, Twitter and LinkedIn are generated by using the software, Gephi. The graphs are generated using Barabasi-Albert network construction method. It is a MATLAB code which produces an adjacency matrix to represent a network. Barabasi-Albert algorithm has been specifically written to generate scale-free networks. The produced adjacency matrix from this algorithm can be input to Gephi in order to develop respective graphs. Only one graph is constructed if there are common sub graphs in the three models of Facebook,

Twitter and LinkedIn. Then, graph theory properties of the constructed graphs are analyzed to determine behavioral patterns of the users within each of the social network. The generated graphs are illustrated below.

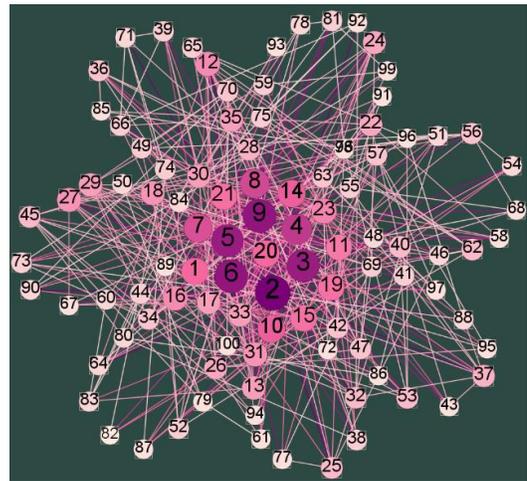


Figure 4-Fb friendship graph

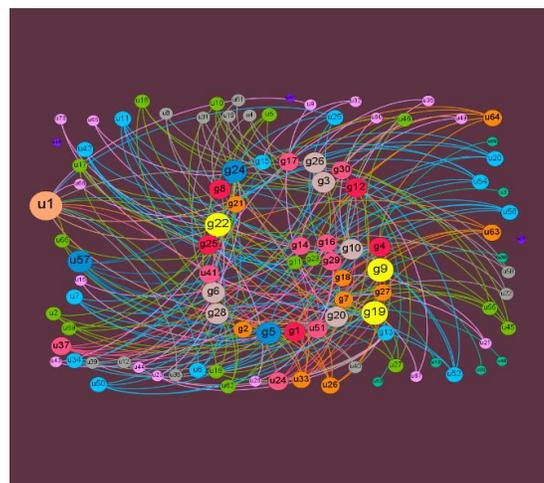


Figure 5-Groups' graph

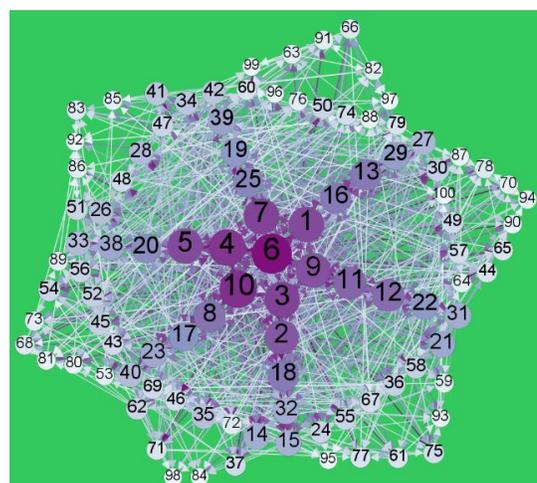


Figure 6-Twitter followers' graph

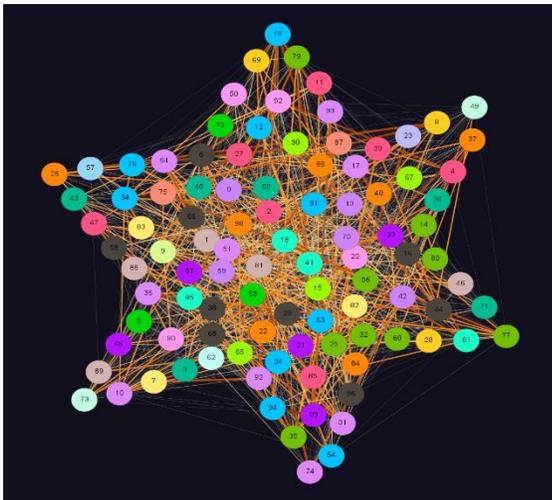


Figure 7-Messaging graph

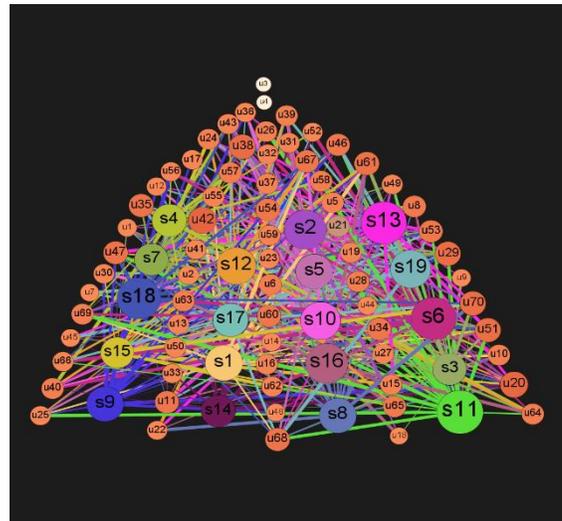


Figure 9-Graph for endorsement of skills in LinkedIn

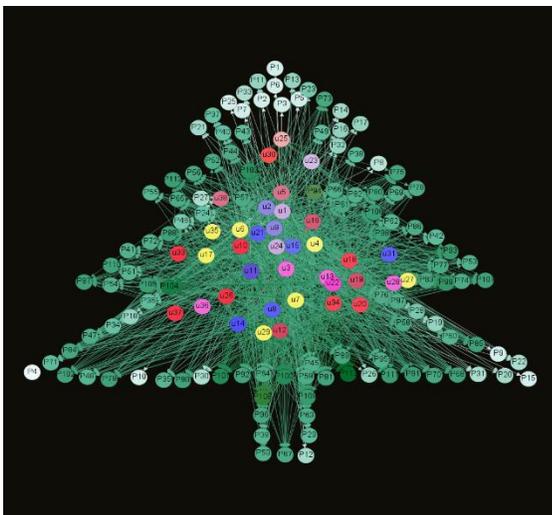


Figure 8-Graph for reacting on posts

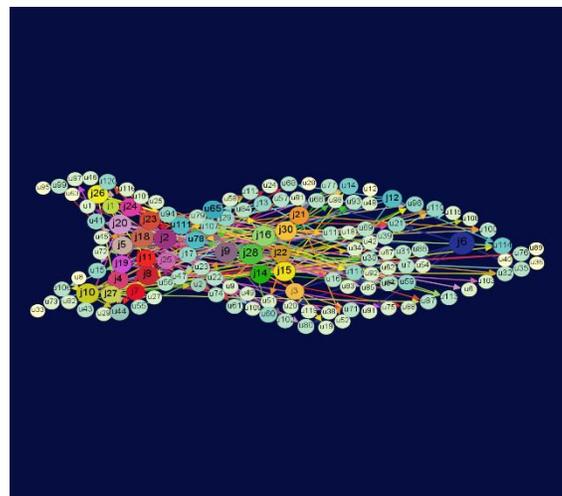


Figure 10-Graph for recommending jobs in LinkedIn

III. RESULTS AND DISCUSSION

This analysis is based on the results obtained from Gephi. Output for different graph theory properties are given as scatter plots where x-axis and y-axis represent the value of a particular property and number of users who have each value for the relevant property respectively.

A. Fb friendship graph

Graph density is 0.1. So, the general level of connectedness of this graph is much lower since it is very low than 1. Average path length is 2.257.

Figure 11 shows the power law distribution of degree of users in the network. In this network, average degree is 9.88. According to the above graph, most of the Fb users have degree 5. User 82 has the minimum degree which is 4. And user 2 has maximum degree which is 32. That is user 2 has the highest number of friends in the network thus having the greatest potential to influence other users within the network.

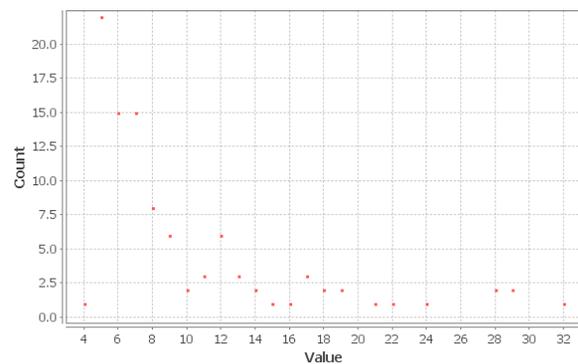


Figure 11-Degree distribution

According to Figure 12, every node has a different value for betweenness centrality since the count is 1 for each value. User 93 has the minimum betweenness centrality 3.323. And user 2 has the maximum betweenness centrality 446.906. Thus user 2 has the greatest control over the flow of information.

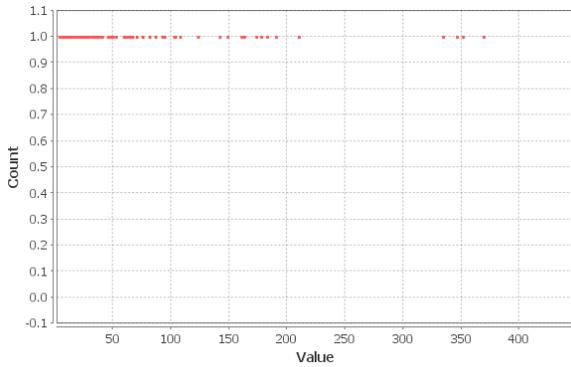


Figure 12-Betweenness centrality distribution

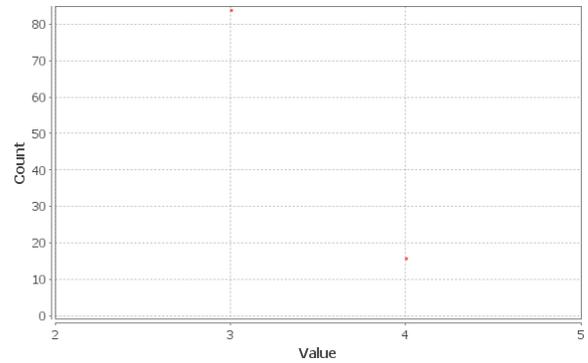


Figure 16-Eccentricity distribution

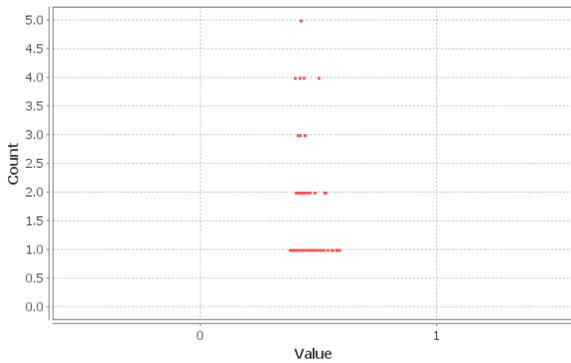


Figure 13-Closeness centrality distribution

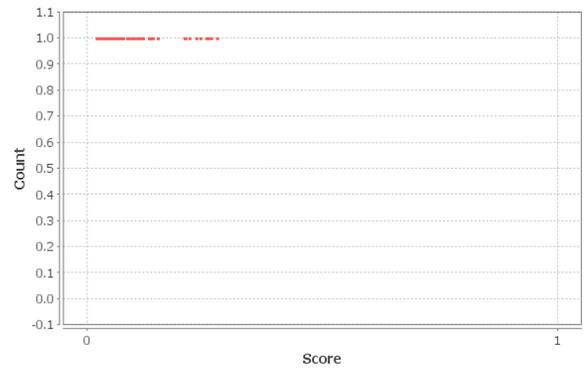


Figure 17-Authority distribution

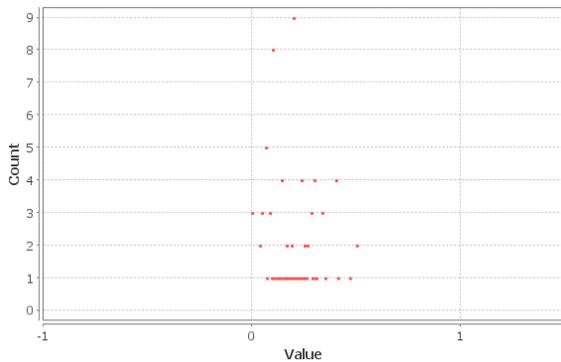


Figure 14-Clustering coefficient distribution

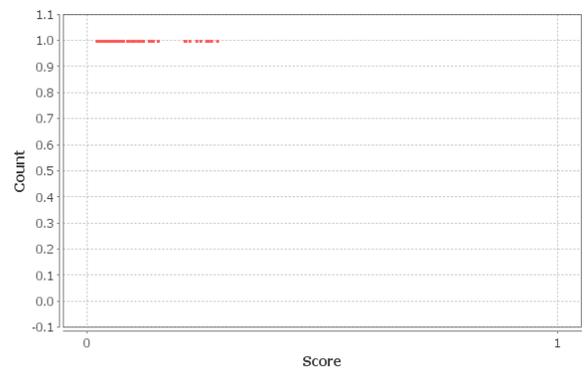


Figure 18-Hubs distribution

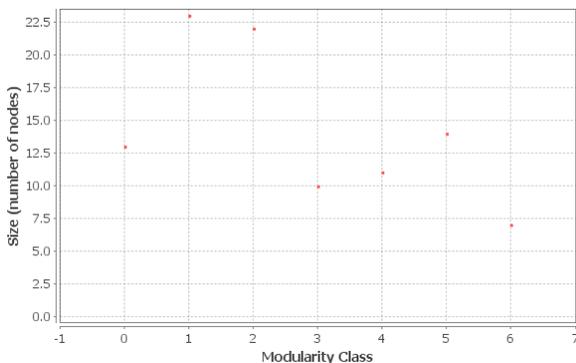


Figure 15-Size distribution

In Figure 13, five users have a closeness centrality of 0.423. Most of the users have different closeness centrality values so that they have different levels of access to information within the network. User 2 has the minimum closeness centrality of 0.586 and user 96 has the maximum closeness centrality of 0.378. Therefore, user 96 has the highest potential for independent communication.

As in Figure 14 all the friends have an eccentricity of either 3 or 4. Most of them have an eccentricity of 3. That is, the furthest user of most of the users in this network is 3 links away from them. As maximum eccentricity is 4, it is the diameter of the network and minimum eccentricity is 3, it is the radius of this network.

This friendship network has much less dense local neighborhood around each user since its average clustering coefficient is 0.196 which is a lower value as in Figure 15. There are 457 triangles in this network. Users 68, 72 and 96 have no triangles with their

friends. User 2 has the maximum number of triangles 101 with his friends. Thus, the probability that two friends of user 2 are also friends with each other, is the greatest compared to other users. This results the densest local neighborhood around user 2.

Figure 16 illustrates that different users have different authority values. That means they can drive action within the network in different levels. User 96 has the minimum authority value 0.01760381 and user 2 has the maximum authority value 0.27429184. Thus user 2 has the greatest strength to influence other users to drive action within this network.

Modularity of this network is 0.174 according to the Figure 17. Since this is a low value, users within each module of the network are less densely connected. There are 5 communities in this friendship graph. That is, the users are densely connected to each other and formed 5 communities within the network.

Since friendship network is an undirected graph, hubs distribution (Figure 18) is quite similar to authority distribution. In this network, user 96 has the minimum hub value 0.017603775 and user 2 has the maximum hub value 0.27429184. So, user 2 is pointed towards many highly authoritative users within the network. In other words, user 2 is mostly responsible for effective spreading of material on network.

LinkedIn connections graph is similar to Fb friendship graph since it is an undirected graph. It has LinkedIn users as the nodes and connections as the links. So, the analysis of LinkedIn connections graph would be very similar to the analysis of Fb friendship graph, but the results may vary with the user connections of the network.

B. Twitter followers' graph

Density of this network is 0.102. Like in Fb friendship graph, general level of connectedness of this network is much lower. Average path length is 2.373. That is one user in the network can communicate with any other user through approximately 2 steps on average.

As in Figure 19, in-degree defines a user being followed by other users in a network. Every user has the in-degree of either 9, 10, 11 or 12 according to this chart. Users 28, 8, 2 and 7 have the minimum in-degree of 9 and user 11 has the maximum in-degree of 12. So, user 11 has the maximum followers and he is the most popular within the network.

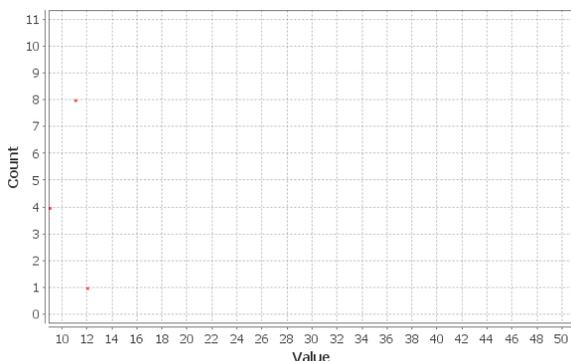


Figure 19-In-degree distribution

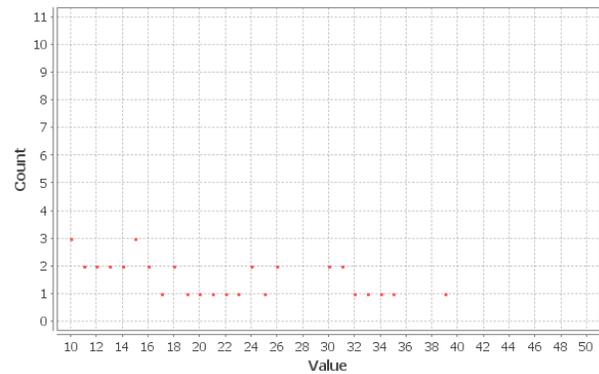


Figure 20-Out-degree distribution

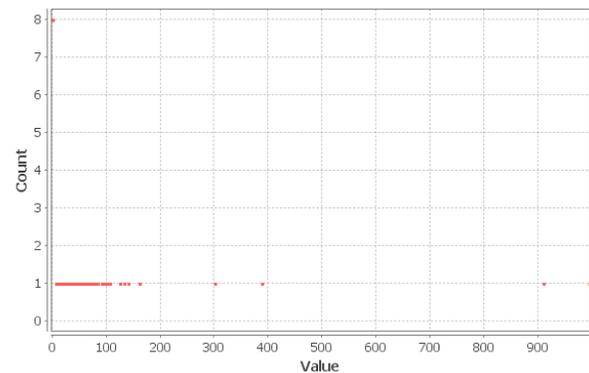


Figure 21-Betweenness centrality distribution

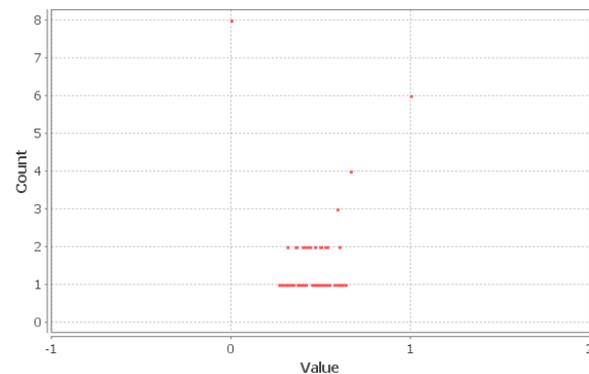


Figure 22-Closeness centrality distribution

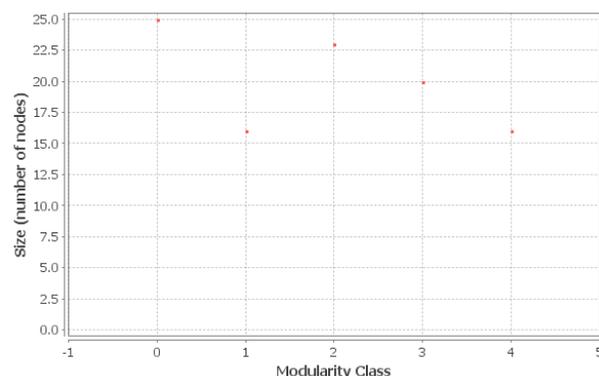


Figure 23-Size distribution

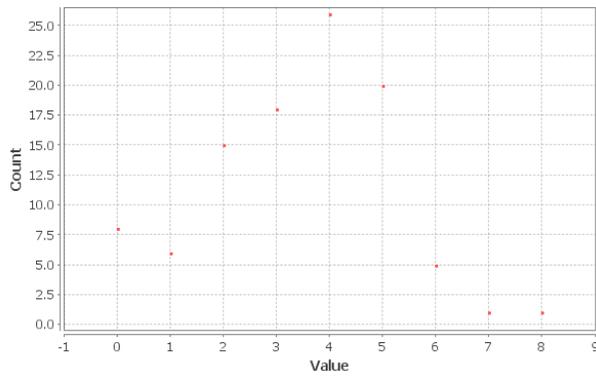


Figure 24-Eccentricity distribution

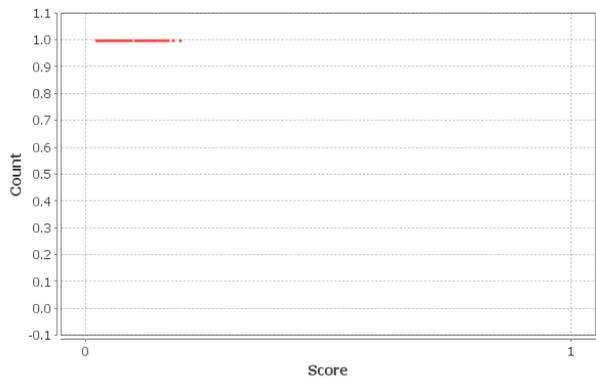


Figure 25-Authority distribution

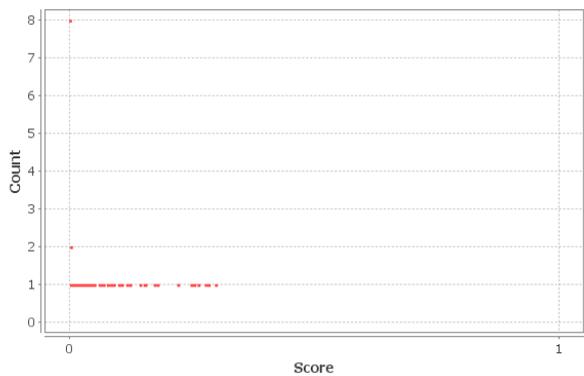


Figure 26-Hubs distribution

Out-degree (Figure 20) defines a user following other users in a network. Users 98, 96, 99, 100, 84, 92, 95 and 97 have the minimum out-degree of 0. That is, they do not like to follow others. And user 6 has the maximum out-degree of 39. So, he follows many of the other users within the network.

Figure 21 shows that users 92, 95 and 97 have the minimum betweenness centrality of 0. So, they have no control over the flow of information. And user 51 has the maximum betweenness centrality of 995.394. That is user 51 has the greatest impact over the communication throughout the network.

According to (Figure 22), some of the users in this network has no out-degree. They are users 98, 96, 99, 100, 84, 92, 95 and 97 who have the minimum closeness centrality of 0. Thus, they do not

have the potential for independent communication with other users resulting a zero-closeness centrality. And users 88, 93, 94, 91, 89 and 85 have the maximum closeness centrality of 1. So, they have the highest ability to communicate on their own throughout the network.

As average clustering coefficient of the network is 0.137, there is a less dense local neighborhood around each user within the network. User 94 has the minimum clustering coefficient of 0.036 and user 8 has the maximum clustering coefficient of 0.271. Thus user 8 has the greatest number of closed triplets among his links resulting a dense neighborhood.

Modularity (Figure 23) of this network is 0.174. Thus, users in each module are less densely connected with each other. There are 5 communities or modules in the network. That is users are grouped in 5 modules sharing their common interests.

As in Figure 24, users 98, 96, 99, 100, 84, 92, 95 and 97 have the minimum eccentricity of zero as they are not pointed towards any of the user within the network. So, network radius is zero. And user 59 has the maximum eccentricity of 8. That means the furthest away user from user 59 is 8 steps far from his position. Thus, network diameter is 8.

Different users have different levels of strength to drive others to act on particular information as they have different authority values (Figure 25). User 92 has the minimum authority of 0.021175425 and user 11 has the maximum authority of 0.19236776. Therefore, user 11 has greatest impact in driving action within the network.

Users 98, 96, 99, 100, 84, 92, 95 and 97 have the minimum hub value (Figure 26) of zero as they have zero out-degree. And user 6 has the maximum hub value of 0.2985324. So, user 6 is pointed towards many authoritative users in this network.

C. Graph for reacting on posts

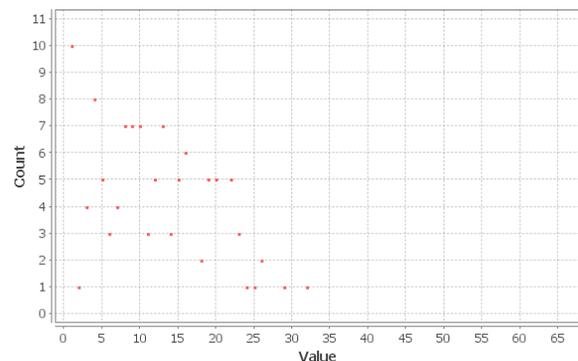


Figure 27-In-degree distribution

In-degree (Figure 27) defines the number of reactions on posts of different users. According to the results obtained by Gephi, post 4 has no reactions on it. And post 113 has the maximum reactions on it which is 32 reactions. So, post 113 can be considered as the popular post among the users of the network.

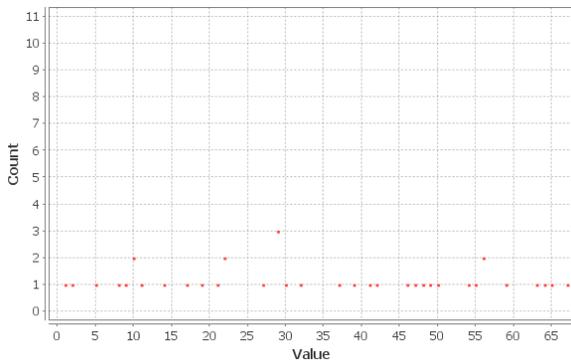


Figure 28-Out-degree distribution

As in Figure 28, out-degree is the number of reactions made by each user on posts within the network. User 38 has reacted on only 1 post which is the minimum number of reactions and user 4 has reacted on 67 posts which is the maximum number of reactions. Thus, user 4 is most active in reacting on posts of his friends.

D. Groups' graph

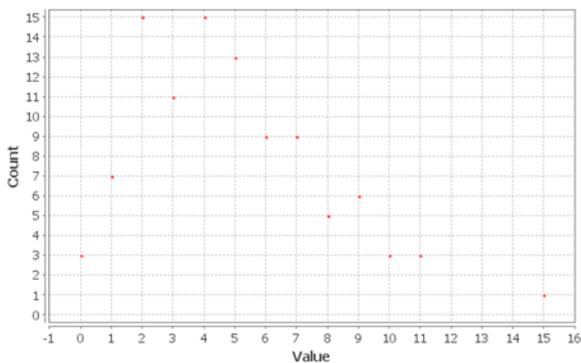


Figure 29-Degree distribution

Degree distribution defines either the number of members of a group or group memberships of a user. This chart shows that there are 15 users or posts with degree 2 or 4. That means most of the nodes in this network has a degree 2 or 4. It may be in terms of number of groups a user is attached to or group memberships of a particular group.

Users 14, 29 and 47 have no group membership of any of the groups and user 1 has the maximum number of group memberships which is 15. So, user 1 likes the most to share his common interests with other members in a group.

Group 11 has the minimum number of group members which is 4 and group 22 has the maximum number of group members which is 11. Therefore, group 22 is popular among the users within the network.

E. Messaging graph

Weighted degree distribution defines the number of messages shared by a particular user with his friends. According to this chart, weighted degree distribution lies in between 1000 and 8500. That means, the users share messages with each other within this range and different users share different number of messages as most of them have different weighted degree values. Average weighted degree is 3809.700.

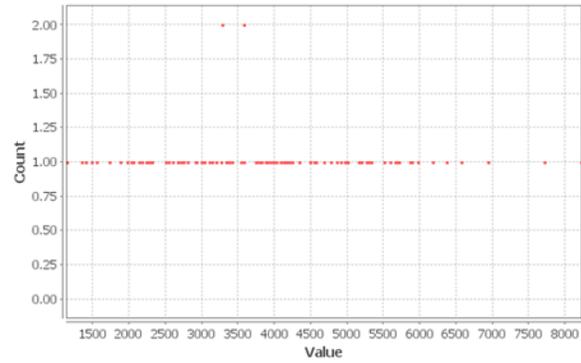


Figure 30-Weighted degree distribution

User 72 has the minimum weighted degree of 1150 and user 6 has the maximum weighted degree of 8221. So, user 6 is most active in sharing information through messages with his friends within the network.

Users 94 and 99 have shared the maximum number of messages in this network which is 985 messages. So, they communicate most frequently with each other through messages.

F. Graph for endorsement of skills in LinkedIn

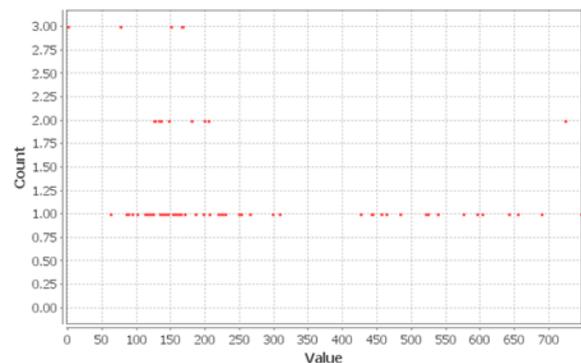


Figure 31-Weighted degree distribution

Weighted degree distribution defines the number of endorsements for skills of a user. Average weighted degree of the network is 239.244 in this network.

Users 3 and 4 have no skills endorsed. User 81 has the maximum weighted degree with endorsed skills. So, user 81 is the highly recommended person by his friends as the most skilled person in this network.

G. Graph for recommending jobs in LinkedIn

In-degree (Figure 32) is the number of jobs recommended to a particular user in this network. Users 8, 12, 28, 33, 36, 40, 63, 89, 95 have only one job recommended to them. User 94 has the maximum number of jobs which is 6, recommended to him. So, he can apply for 6 jobs if he likes.

Out-degree (Figure 33) defines the number of users a particular job has been recommended to. Job 1 is recommended to only one user. And job 6 is recommended to a maximum number of users in the network which is 11. So, the employer of job 6 may look forward towards receiving applications from 11 users.

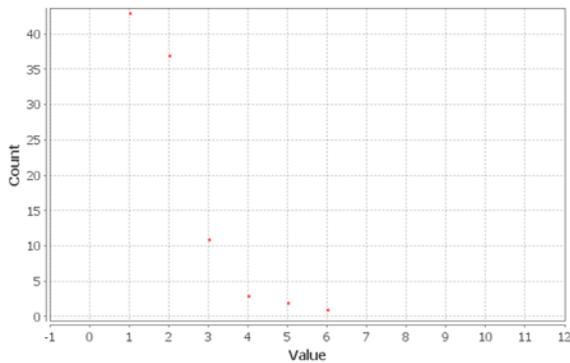


Figure 32-In-degree distribution

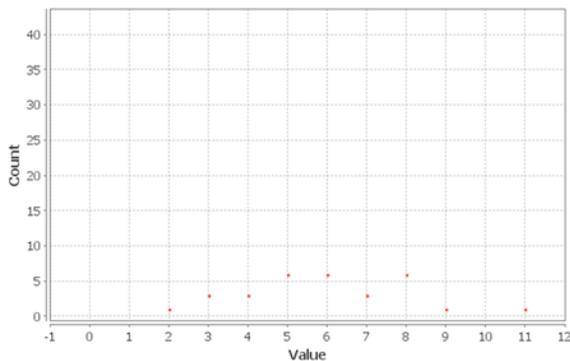


Figure 33-Out-degree distribution

IV. CONCLUSION

Various activities of Facebook, Twitter and LinkedIn can be identified and a suitable graph model for each social media to represent respective activities can be constructed. It is possible to evaluate graph theory properties of the constructed models of each social media separately in order to analyze behavioral patterns and characteristics of the users.

By evaluating graph theory properties of OSNs, valuable information on user behavior can be obtained which is beneficial for both the user himself and the company which is operating the on-line platform. The user can get his profile improved in order to increase his performance level within the network. On the other side, the operators can utilize relevant information to improve their respective on-line platforms and give away useful information to outside parties without disrupting the users' privacy.

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Petroleum Pump Price And Interest Rate On Food Prices In Nigeria: Ardl Approach

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Abstract

This study investigate the impact of petroleum pump price and interest rate on food prices in Nigeria using an autoregressive distributed lag (ARDL) model covering the period 1984 -2018. The results showed that petroleum pump price and lending interest rate have positive and significant impact on food prices in both the long-run and the short-run whereas imports of goods and services appeared to be negative and significant in explaining changes in food prices in the long-run but is insignificant in the short-run. The exchange rate is insignificant in explaining changes in food prices in both the long-run and the short-run periods. The VECM Granger causality results indicates that there is a long-run causality in the petroleum pump price equation and short-run causality in food prices, petroleum pump price, interest rate, imports and exchange rate equations. The variance decomposition result indicates that variations in food prices and exchange rate are explained by petroleum pump price, imports of goods and services, and official exchange rate. While variations in imports and interest rate are explained by exchange rate and food prices. Therefore, government should re-establish lower legislated PMS pump price and Central Bank of Nigeria should also reduce the interest rate at which it lend money to commercial banks and that will make the commercial banks to lower their lending interest rate all in the process of achieving stability in food prices.

Keywords: Petroleum pump price, Interest rate, food prices, Exchange Rate, ARDL Approach and VECM Granger Causality

1.0 Introduction

In various oil importing nations within the Sub-Saharan Africa, the price of refined products of petroleum in addition to the changes in the rate of exchange are the input fundamentals engineering prices of domestic goods. In another words, increasing in prices of oil and fall in the value of legal tender are the famous external forces increasing food prices (Kargbo, 2018). Nigeria is like other nations where the domestic price of oil has been on the rising side ever since 1970s. Confront in the downstream section of the nations' petroleum section is a severe concern to most persons in the state. The occurrence has shown that adjustment in premium motor spirit (PMS) pump price has been on the raise (upward trend) since 1970. Among 1970 and 1980 it augmented from 3 kobo to 15 kobo, in 1981, it increased from 20 kobo to 70 kobo in 1990; but in 1991 it also increased from 70 kobo and reaches up to ₦22 in the year 2000. Also, it was attuned upward in the year 2001 from ₦26 until it reaches ₦97 in 2013. Now from 2015 to 2019 it is stagnant at ₦145 per liter (Roland, 2016). The connection between oil price swings and general prices are well recognized in literature. Most

researchers found a positive correlation between oil price and inflation (Nwosu, 2009; Bombai, 2012; Umar and Lee, 2018; Orlu, 2017; Razmi et al, 2016; Mesagan and Olawale, 2016) while others found a negative association between oil prices and inflation (Alvalos, 2013; Dillon and Barrett, 2016; and Anthony, 2019; Umar and Muhammad, 2019; Aniekan et al, 2018) among others.

The key canal of transmission had been through prices of productive factors or inputs which in turn raises the cost of production. This is obvious as there is a reverse effect of oil price volatility for import dependent economy like Nigeria which suffers the effect of price increases that raises manufacture cost of foreign firms which is in turn transmitted to home prices. This leads to price adjustment on final goods as a result of alter in oil price. As an oil exporter, Nigeria earns enormous foreign exchange from crude oil export. Given the like between petroleum and foreign exchange earnings, the relationship between Nigeria and the rest of the world can easily be deduced. The petro-dollar accruing from crude export is usually monetized in the local currency which bloats the money stock. As a result, this affects money supply which has direct behavior on the inflationary force in the country Sikkam (1991) as cited in Anthony (2019). Inflationary weight in Nigeria has also been exacerbated by continual adjustments of domestic price of petroleum products.

Over the years, the extend between bank's deposit and lending rates remained unacceptably wide with adverse implications for savings mobilization and investment promotion. To achieve the preferred level of interest rate, the Central Bank of Nigeria (CBN) adopts various monetary policy apparatus and the key among which is the Monetary Policy Rate (MPR). The monetary policy rate before 2006 was known as the minimum Rediscount Rate (MRR) which implies the rate at which the Central Bank of Nigeria is eager to rediscount first class bills of exchange before its maturity (Onoh, 2007). He further stated that through increasing and decreasing the rate CBN is able to manipulate market price of funds. If the CBN increases or decreases the Monetary Policy Rate, banks' lending rates are projected to increase or decrease with it, showing a positive or negative relationships, in the history, the need to acquire certain group of assets as collateral safety to fine the CBN's discount window was dispensed because of global crisis Business Day (2009) as cited in Raymond (2014).

The significance of the study cannot be overemphasized. Firstly, the research will help to enlighten the decision makers on the nature of impact of domestic oil price and interest rate on increasing food prices in the oil exporting nation like Nigeria. Secondly, the study will serve as a contribution to the literature as well as to the methodology. Thirdly, the empirical result of the paper will be of huge significance to the government, to the private oil companies and the academy as a whole.

The objective of this investigate is to look at the impact of petroleum pump price and interest rate on food prices in Nigeria. Therefore, this explore intended to include to the literature on the impact of petroleum pump price and interest rate on food prices by employing an autoregressive distributed lag (ARDL) bound approach advanced by Pesaran, Shin and Smith (2001).

This research is prepared in sections. The first section is mainly centered on general introduction, the research problem, the significance of the study, the objective of the study and the organization of the paper. The second section contains the review of connected literature, which provides some proof from around the world and proof from Nigeria. The third section presents the data and the research methodology. The fourth section exposed the results and discussion of the findings. Finally, the fifth section discusses the summary, conclusions and the policy recommendations.

2.0 Empirical Literature Review

As mentioned earlier, studies on domestic oil price and food prices in Nigeria are very little. Therefore, the literature review is divided into impact of petroleum pump prices on food prices and the impact of interest rate on food prices.

2.1 Petroleum pump price and food prices

Nwosu (2009) look into the impact of fuel price on inflation in Nigeria using quarterly data series data spanning a time of 1995 to 2008 was analyzed. By means of Variance Autoregressive analysis to assess the relative contribution of fuel price on inflation, they results showed a positive connection between fuel price and inflation and therefore advocated that the policy of subsidizing fuel price should continue in Nigeria so as to help cushion the economy from the adverse effects of oil-price shock.

Bombai (2012) analyzed the association between petroleum prices and inflation in Nigeria. By paying attention to the impact of petroleum products prices increase on the Nigerian economy from the year 1990 to 2011. Employing the empirical econometric

analysis approach and using variables like inflation rate and petroleum prices, the outcome shows that positive relationship exists between PMS, AGO and inflation. It though found PMS to exert higher effect on inflation than AGO, while negative link exists between inflation and DPK. The general effect clearly indicates that increase in petroleum product price contributes considerably to the rate of inflation in Nigeria.

Eregha et al. (2016) studied petroleum products prices and inflationary changes in Nigeria for the period of 1994 to 2012. Using the Error Correction (ECM) Model to evaluate the secondary data, the results showed that there is high positive correlation between the prices of PMS and AGO and inflation in Nigeria. They advocate that government should put on hold that idea of removing subsidy on PMS for now and should center on deregulating the downstream sector to attract private investment with the aim of encouraging local refining of petroleum products instead of importing them

Arinze (2011) focused on the impact of oil price on the Nigerian economy. The study contends that growing adjustments of petroleum products prices have resulted in inflation, high cost of living, and inequitable income distribution in Nigeria between 1978 and 2007. It also found that the various Nigerian regimes increased fuel prices a total of 18 times within this period with most of the increase occurring between 1990 and 2007 where prices were adjusted, twice a year, sometimes. The study revealed that petroleum price spur inflation rate to increase also.

Umar and Muhammad (2019) examined the impact of oil price and exchange rate on food prices in Nigeria using secondary data spanning the period 1972 to 2016. Using Autoregressive Distributed Lag (ARDL) to analyze the data, the results showed that there is a long run association among the considered variables. The exchange rate is affecting food price more than the oil price counterpart since some of the food items are imported.

Okwanya et al (2015) examine the impact of fuel subsidy on consumer price index in Nigeria using secondary data from 1986 to 2014 on pump price of premium motor spirit and consumer price index. The Co-integration and Error Correction (ECM) Model were employed to analyze the data and the results found that the change in the fuel price does have short run impact on consumer price index. This implies that fuel subsidy reforms will not lower the real household income or increase poverty but could have permanent impact on the economy.

Ijeoma et al (2016) examines the effect of oil price on the volatility of food price in Nigeria. The time series data for the period of 2000 to 2013 were used. Using Co-integration test and VAR to analyze the data, the result for the co-integration test showed that there is no long run relationship between the variables where as the results from the VAR revealed a positive and significant short-run relationship between oil price and each of the selected food price volatility with the exception rice and wheat price.

2.2 Interest rate and food prices

Raymond (2014) examines the effect of changes in interest rate on inflation measured by CPI in Nigeria using both the descriptive and econometric methods. Set of data on money supply, interest rate, CPI, minimum rediscount rate, prime lending rate and treasury bills rate for the period of 1980 to 2010 were considered. The empirical results confirm that changes in interest rates and increase in the level of money supply were associated with rise in inflationary pressure. The study concludes that the relevant authority to correct abnormality in inflation rate through the introduction of appropriate interest rates from time to time.

Mbutor (2014) examine the relationship between inflation and money supply in Nigeria using Vector Error Correction (VECM) model to analyze the time series data on the variables spanning the periods of 1970 to 2012 on GDP, nominal exchange rate, maximum lending rate, inflation (i.e. CPI), broad money supply. The co-integration test results detected co-integration among the variables. The impulse response function showed a persistent positive relationship between inflation and money supply while variance decomposition of inflation shows that GDP was the strongest contributor to inflationary pressure in Nigeria, and that money supply accounts for up to 3.5 percent of aggregate price changes.

Using secondary data on inflation rate, interest rate, net deposit credit and transfer payments for the period of 1981-2014. Babalola *et al.*, (2015) determines the effect of inflation rate and interest rate on economic growth. The study adopted Ordinary least squares (OLS) method of analysis. Long run relationship between the variables was established using Johansen integration test. The direction of causality and trend analysis was also performed on the variables. The result shows that inflation and interest rate has negative effect on economic growth but neither the inflation nor the interest rate granger causes economic growth. They recommended that policy makers should focus on maintaining inflation at a low rate (single digit) and ensuring interest rate stability.

Ifionu and Ibe (2015) investigated the impact of Inflation, Interest rate and Real Gross Domestic Product on stock prices of quoted companies on the Nigerian Stock Exchange (NSE). Times series data was used covering the period 1985-2012. The Johansen Multivariate Co-integration test indicates the existence of long-run equilibrium relationship among the variables in the model. There are no causal relationships between the variables based on the Granger Causality test result. Good fit for the model result indicates that 96.8% of variations in the dependent variable were as a result of changes in the independent variables. The findings suggest that inflation was the most important variable influencing stock prices in Nigeria.

Alexander *et al.*, (2015) investigated the main determinants of inflation in Nigeria for the period of 1986-2011. The co-integration result reveals long run equilibrium relationship between the rate of inflation and its determinants. The Granger causality test revealed evidence of a feedback relationship between inflation and its determinants. The estimated VAR result showed that fiscal deficits, exchange rate, import of goods and services, money supply and agricultural output have a long run influence on inflation rate in Nigeria. Only lending rate influenced inflation in the short and long run horizon. The variance decomposition and impulse results shows that own-shock were significantly responsible for the variation and innovations in all the variables in the equation.

Amaefula (2016) examines whether long-run equilibrium relationship exist between interest rate and inflation in Nigeria. The data sets on interest rate and inflation covered the period 1995 to 2014. Johansen co-integration test was adopted to ascertain whether there is the existence of long run relationship between the two variables and vector error correction model (VECM) of granger causality was also employed to accommodate the long run and short run relationship and to find out whether the flow of relationship is bi-directional or unidirectional. The results show evidence of long-run equilibrium relationship between the two variables with strong evidence of unidirectional granger causality flow from interest rate to inflation rate at the long-run. The finding has empirical implication to monetary policy makers in areas of microeconomic planning in Nigeria.

Udoh and Isaiah (2018) estimate the dynamic model for inflation in Nigeria using quarterly data spanning 1995 to 2016. Four dynamic models: level lagged variables, differenced lagged variables, log-transformed lagged variables and differenced log-transformed lagged variables were considered. From the empirical results, the level form models performed better than the differenced form models. The level lagged model was the preferred model among the selected models. Predictions obtained from the model indicate that the model is stable as actual interest rate values, fall well within the computed 95% prediction interval. The study concludes that previous values of interest rate and money supply are significant in predicting future inflation rates in Nigeria.

Musa et al. (2019) estimate the impact of interest rate on inflation in Nigeria. The study make used of autoregressive distributed lag (ARDL) model on the time series data for the period 1970 to 2016. The ARDL results reveal that interest rate is inflationary in both the short run and the long run as it positively and significantly influencing inflation in the two periods.

Conclusively, all the relevant literature on Nigeria in this area generally focused on relating crude oil price and food price or economic growth, petroleum pump price and food prices, petroleum price, exchange rate and food price, interest rate and inflation. Nonetheless, interest rate specifically lending rate is expected to raise food prices. In line with this, this study seeks to fill this gap by testing the impact of petroleum pump price (particularly premium motor spirit) and interest rate on food prices.

3.0 Research Methodology and Data

The Nigeria's annual data employed by this study ranges from 1984 to 2018. The choice of the study period was based on the availability of data on the dependent and the independent variables. The data on interest rate, consumer price index, import of goods and services were sourced from World Development Indicators of World Bank while the petroleum pump price was obtained from Down Stream sector reports 2019.

This study employs Autoregressive Distributed Lag (ARDL) approach to co-integration profounded by Pesaran (1997) and further modified and developed by Pesaran, Shin and Smith (1999, 2000) and also by Narayan (2005). This study adopted ARDL approach

because of its comparative superiority over other approaches to co-integration this is because they require variables to be stationary at first difference, i.e. integrated of order I (1). However ARDL was developed to accommodate such circumstance. It can be used to analyses the data even if they are at different order of integration. Additionally it can also determine both the short run and long run co-integration among the variables of the study.

3.1 Model specification

It should be noted that this study involve a multi-variate analysis, that is involved four variables namely crude oil price, exchange rate, gross domestic products and oil revenue. Since the study is trying to examine the impact of crude oil price on exchange rate within the context of the Nigerian economy during the period under study, we have limit the number of variable to crude oil price, exchange rate, gross domestic products and oil revenue only, otherwise adding any variable may influence the result. To derive the model, it is known that based on the Quantity theory of money equation where demand for money is equated to the supply of money. Therefore, the equation can be written as: $MV = PT$

$$T = \frac{MV}{P} = f(MVP^{-1})$$

Where: T will served as a measure of food prices (i.e. CPI), M will be replaced with petroleum pump price (particular PMS price), V will be replaced with lending interest rate (INR), P^{-1} will be replaced with official exchange rate (EXR) and imports of goods and services (IMP) will be added in the model. Therefore, the model can be finally written as: $FPR = f(PMS, INR, EXR, IMP)$

Following the above derived model equation of the study, the econometric log form of the model can be written as follows:

$$\ln FPR_t + \alpha_0 + \alpha_1 \ln PMS_t + \alpha_2 \ln INR_t + \alpha_3 \ln IMP_t + \alpha_4 \ln EXR_t + \mu_t \tag{1}$$

Where: $\ln FPR_t$ is the natural log of food prices; $\ln PMS_t$ is the natural log of petroleum pump price; $\ln INR_t$ is the natural log of interest rate; $\ln EXR_t$ stand in for the natural log of exchange rate; $\ln IMP_t$ is the natural log of imports and μ_t is the error term.

3.1.1 ARDL model

$$\begin{aligned} \Delta \ln FPR_t = & \phi_0 + \sum_{i=1}^k \phi_{1i} \Delta FPR_{t-i} + \sum_{i=0}^k \phi_{2i} \Delta \ln PMS_{t-i} + \sum_{i=0}^k \phi_{3i} \Delta \ln INR_{t-i} + \sum_{i=0}^k \phi_{4i} \Delta \ln IMP_{t-i} + \sum_{i=0}^k \phi_{5i} \Delta \ln EXR_{t-i} \\ & + \alpha_1 \ln FPR_{t-i} + \alpha_2 \ln PMS_{t-i} + \alpha_3 \ln INR_{t-i} + \alpha_4 \ln IMP_{t-i} + \alpha_5 \ln EXR_{t-i} + \varepsilon_t \end{aligned} \tag{1}$$

The following ARDL model provided in equation 1 above for the impact of petroleum pump price and interest rate on food prices, the model is divided into four sub models. The first one is the co-integration model, the second is the long-run model, the third is the short-run model and the fourth model is the short-run and error correction model.

3.1.2 ARDL Co-integration model

To test for the existence of long run relationship between variables of interest in the model equation is specified and estimated using ARDL bound test for co-integration. The model was specified together with the null and alternative hypotheses which may be rejected or accepted. This stand a turning point when the null hypothesis of no co-integration or no long run relationship between variables of the model is accepted, then some methods which includes vector error correction model (VECM) among others can be efficiently applied. If on the other hand there is an existence of long- run relationship due to the rejection of the null hypothesis, then short-run coefficients can be estimated. Thus, the specified model for co-integration is given in the equation 2 below:

$$\Delta \ln FPR_t = \phi_0 + \sum_{i=1}^k \phi_{1i} \Delta \ln FPR_{t-i} + \sum_{i=0}^k \phi_{2i} \Delta \ln PMS_{t-i} + \sum_{i=0}^k \phi_{3i} \Delta \ln INR_{t-i} + \sum_{i=0}^k \phi_{4i} \Delta \ln IMP_{t-i} + \sum_{i=0}^k \phi_{5i} \Delta \ln EXR_{t-i} + \alpha_1 \ln FPR_{t-1} + \alpha_2 \ln PMS_{t-1} + \alpha_3 \ln INR_{t-1} + \alpha_4 \ln IMP_{t-1} + \alpha_5 \ln EXR_{t-1} + \varepsilon_t \tag{2}$$

$$H_0 : \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0 \text{ (No Co-integration)}$$

$$H_1 : \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq 0 \text{ (Co-integration exists)}$$

3.1.3 ARDL Long-run model

Having the existence of long-run relationship between the variables of interest in the model then the estimation of the long run coefficients becomes necessary. To obtain the estimated long run coefficients, equation 6 below is correctly specified and estimated to obtain these coefficients.

$$\ln FPR_t = \alpha_0 + \sum_{i=1}^k \alpha_{1i} \ln FPR_{t-i} + \sum_{i=0}^k \alpha_{2i} \ln PMS_{t-i} + \sum_{i=0}^k \alpha_{3i} \ln INR_{t-i} + \sum_{i=0}^k \alpha_{4i} \ln IMP_{t-i} + \sum_{i=0}^k \alpha_{5i} \ln EXR_{t-i} + \varepsilon_t \tag{3}$$

Where: $\alpha_1 - \alpha_4$ are the short-run coefficients, Δ is the short-run sign K is the maximum or optimum lag length and \sum is the summation or sigma and ε_t is the error term.

3.1.4 ARDL Short-run model

The equation 4 below is correctly specified and estimated in order to obtain the short-run coefficients of the variables.

$$\Delta \ln FPR_t = \phi_0 + \sum_{i=1}^k \phi_{1i} \Delta \ln FPR_{t-i} + \sum_{i=0}^k \phi_{2i} \Delta \ln PMS_{t-i} + \sum_{i=0}^k \phi_{3i} \Delta \ln INR_{t-i} + \sum_{i=0}^k \phi_{4i} \Delta \ln IMP_{t-i} + \sum_{i=0}^k \phi_{5i} \Delta \ln EXR_{t-i} + \varepsilon_t \tag{4}$$

Where: $\phi_1 - \phi_4$ are the short-run coefficients, Δ is the short-run sign K is the maximum or optimum lag length and \sum is the summation or sigma and ε_t is the error term.

3.1.5 ARDL short-run and error correction model:

To obtain the short-run coefficients and the coefficient of error correction term which measure the speed of adjustment or convergence back to the equilibrium position from disequilibrium position, the equation 5 below was also correctly specified and estimated.

$$\Delta \ln FPR_t = \phi_0 + \sum_{i=1}^k \phi_{1i} \Delta \ln FPR_{t-i} + \sum_{i=0}^k \phi_{2i} \Delta \ln PMS_{t-i} + \sum_{i=0}^k \phi_{3i} \Delta \ln INR_{t-i} + \sum_{i=0}^k \phi_{4i} \Delta \ln IMP_{t-i} + \sum_{i=0}^k \phi_{5i} \Delta \ln EXR_{t-i} + \theta ECT_{t-1} + \varepsilon_t \tag{5}$$

Where: $\phi_1 - \phi_4$ are the short-run coefficients, θ is the coefficient of error term, Δ is the short-run sign K is the maximum or optimum lag length and \sum is the summation or sigma.

Robustness Check Using Dynamic Ordinary Least Squares (DOLS) Fully Modified Ordinary Least Squares (FMOLS) and Canonical Co-integration Regression (CCR)

To gauge the long-run estimate, we apply Dynamic Ordinary Least Square (DOLS), Fully Modified Ordinary Least Square (FMOLS) and Canonical Co-integration Regression (CCR). DOLS and FMOLS have the power to deal with endogeneity problem, simultaneity bias and small sample bias. These estimators are good for robustness check of long-run ARDL estimates. DOLS and FMOLS have been advanced by Stock and Watson (1993) and Philip and Moon (1999), while CCR was advanced by Park (1992) respectively to address the problem of serial correlation and small sample bias that is applied to Ordinary Least Squares (OLS) estimator. The estimators can also be applied to mix order of integrated variables as far as there is an existence of long-run relationship between the variables of interest. Considering the powers of these analytical tools, their results will serve as robustness checks to ARDL long-run coefficients.

3.2 Vector Error Correction Model (VECM) Granger Causality

Having found long run relationship between variables, the direction of causality between the variables is also tested using Vector Error Correction Model. Sulaiman and Abdul-Rahim (2018) Maintained that VECM is considered to be efficient in testing the direction of the causality between the dependent and independent variables of interest when the variables moved together in the long run. Again, the methodology is considered the best for testing causality between variables of the same order of integration, that is, when they variables are stationary at first difference. Meaning they are I (1) variables. The Vector Error Correction Model (VECM) modeling equation within a system of Error Correction Model (ECM) for this study is given below:

$$\begin{aligned}
 \Delta \ln FP_t &= \alpha_0 + \sum_{i=1}^k \beta_{1i} \Delta \ln FP_{t-i} + \sum_{i=1}^k \beta_{2i} \Delta \ln PMS_{t-i} + \sum_{i=1}^k \beta_{3i} \Delta \ln INR_{t-i} + \sum_{i=1}^k \beta_{4i} \Delta \ln IMP_{t-i} + \sum_{i=1}^k \beta_{5i} \Delta \ln EXR_{t-i} + \chi_1 ECM_{t-1} + \mu_{1t} \\
 \Delta \ln PMS_t &= \alpha_1 + \sum_{i=1}^k \beta_{6i} \Delta \ln FPR_{t-i} + \sum_{i=1}^k \beta_{7i} \Delta \ln PMS_{t-i} + \sum_{i=1}^k \beta_{8i} \Delta \ln INR_{t-i} + \sum_{i=1}^k \beta_{9i} \Delta \ln IMP_{t-i} + \sum_{i=1}^k \beta_{10i} \Delta \ln EXR_{t-i} + \chi_2 ECM_{t-1} + \mu_{2t} \\
 \Delta \ln INR_t &= \alpha_2 + \sum_{i=1}^k \beta_{11i} \Delta \ln FPR_{t-i} + \sum_{i=1}^k \beta_{12i} \Delta \ln PMS_{t-i} + \sum_{i=1}^k \beta_{13i} \Delta \ln INR_{t-i} + \sum_{i=1}^k \beta_{14i} \Delta \ln IMP_{t-i} + \sum_{i=1}^k \beta_{15i} \Delta \ln EXR_{t-i} + \chi_3 ECM_{t-1} + \mu_{3t} \\
 \Delta \ln IMP_t &= \alpha_3 + \sum_{i=1}^k \beta_{16i} \Delta \ln FPR_{t-i} + \sum_{i=1}^k \beta_{17i} \Delta \ln PMS_{t-i} + \sum_{i=1}^k \beta_{18i} \Delta \ln INR_{t-i} + \sum_{i=1}^k \beta_{19i} \Delta \ln IMP_{t-i} + \sum_{i=1}^k \beta_{20i} \Delta \ln EXR_{t-i} + \chi_4 ECM_{t-1} + \mu_{4t} \\
 \Delta \ln EXR_t &= \alpha_4 + \sum_{i=1}^k \beta_{21i} \Delta \ln FPR_{t-i} + \sum_{i=1}^k \beta_{22i} \Delta \ln PMS_{t-i} + \sum_{i=1}^k \beta_{23i} \Delta \ln INR_{t-i} + \sum_{i=1}^k \beta_{24i} \Delta \ln IMP_{t-i} + \sum_{i=1}^k \beta_{25i} \Delta \ln EXR_{t-i} + \chi_5 ECM_{t-1} + \mu_{5t}
 \end{aligned}$$

(8)

Where the error correction term’s coefficients are represented by $\chi_{1t} - \chi_{5t}$, the homoscedastic disturbance terms are denoted by $\mu_{1t} - \mu_{5t}$, the error correction term is denoted by ECM_{t-1} . The ECM_{t-1} indicates both the long run causality and the speed of adjustment to long run equilibrium, while the Wald test statistic of the first-difference of the variables shows the short run causality and its direction.

4.0 Results and Discussions

This section presents the results of the estimation and discusses the findings of the study. The descriptive statistics are presented in **Table 1** with the correlation analysis of the variables used in the study. It is observed that from **Table 1** the average food prices, petroleum pump price and exchange rate are around 60.931, 46.729 and 96.075. While that of imports and interest rate are estimated to be around is 13.521 and 6.644 respectively. Three of the variables such as food prices, petroleum pump price and exchange rate are positively skewed as indicated by the positive skewed coefficients for the variables. Whereas imports and interest rate are negatively skewed. The study also tested for data normality using Jarque-Bera normality test. Four of the variables that include petroleum pump price, exchange rate, imports of goods and services and interest rate appear to be normally distributed as the P-values for Jarque-Bera test were greater than 0.05 for these variables. For the consumer price index variable, its P-value for the Jarque-Bera test was greater than 0.05 and it is therefore not normally distributed. Using correlation analysis, all the variables are in natural logarithm form. All the variables have positive correlation (i.e. between the independent variables and the dependent variables and even between the independent variables themselves) and the highest approximated value of correlation is between petroleum pump price and food prices. oil revenue and exchange rate which is 0.983, followed by exchange rate and food prices which is given as 0.963; the lowest approximated value of correlation is between interest rate and petroleum pump price which is found to be 0.689.

Table 1: Descriptive Statistics and Correlation Results.

| FPR | PMS | EXR | IMP | INR |
|-----|-----|-----|-----|-----|
|-----|-----|-----|-----|-----|

| | | | | | |
|--------------------|---------------|---------------|---------------|---------------|---------------|
| Mean | 60.931 | 46.729 | 96.075 | 13.521 | 6.644 |
| Median | 35.506 | 26.000 | 111.231 | 13.050 | 7.203 |
| Maximum | 240.142 | 145.000 | 306.083 | 22.811 | 11.064 |
| Minimum | 0.772 | 0.200 | 0.766 | 3.029 | 0.3166 |
| Skewness | 1.149 | 0.827 | 0.715 | -0.153 | -0.844 |
| Kurtosis | 3.399 | 2.345 | 2.910 | 2.605 | 3.301 |
| Jarque-Bera | 7.941 (0.018) | 4.622 (0.099) | 2.994 (0.223) | 0.364 (0.833) | 4.292 (0.116) |
| Observation | 35 | 35 | 35 | 35 | 35 |
| lnFPR _t | 1.000 | | | | |
| lnPMS _t | 0.983 | 1.000 | | | |
| lnEXR _t | 0.963 | 0.965 | 1.000 | | |
| lnIMP _t | 0.704 | 0.701 | 0.745 | 1.000 | |
| lnINR _t | 0.693 | 0.689 | 0.737 | 0.801 | 1.000 |

Sources: Authors Computation using EViews 9; Note: Values in parentheses are the P-values.

To inspect the property of the data before conducting the estimation of the log-run model, the next are necessary. In the first step, we check the non-stationarity or integration properties of the time series data, using the extensively used augmented Dickey-Fuller (ADF) and Philip-Perron (PP) unit root tests, in the second pace, given that the variables are non-stationary. **Table 2a** presents the results of unit root test; using the augmented Dickey-Fuller (ADF) unit root test all the variables are stationary at level form, therefore they are all I(0) variables. But coming down to Philip-Perron (PP) unit root test also in **Table 2a** only official exchange rate and imports of goods and services that are stationary at level while food prices (FPR), petroleum pump price (PMS) and interest rate (INR) were stationary at first difference. Therefore, since there is a mixture of order of integration of the variables in Philip-Perron (PP) unit root test i.e. two variable are I (0) and three variables are purely I (1), while in the augmented dickey fuller unit root test all the variables are on the same order of integration i.e. I (1), then Autoregressive Distributed lag (ARDL) model is more competent to be useful as an investigative tool for this study.

Table 2a: Augmented Dickey Fuller Unit Root Test Result (ADF).

| Variables | Level Values | | First Difference | | Order of Integration |
|--------------------|-------------------|-------------------|------------------|------------------|----------------------|
| | Constant | Constant & Trend | Constant | Constant & Trend | |
| lnFPR _t | -3.035** (0.044) | -4.498*** (0.006) | ----- | ----- | I (0) |
| lnPMS _t | -4.130*** (0.003) | -1.807 (0.678) | ----- | ----- | I (0) |
| lnEXR _t | -2.935* (0.051) | -2.281 (0.432) | ----- | ----- | I (0) |
| lnIMP _t | -3.030** (0.042) | -2.789 (0.210) | ----- | ----- | I (0) |
| lnINR _t | -5.115*** (0.000) | -4.139** (0.013) | ----- | ----- | I (0) |

Philip Perron Unit Root Test Result (PP).

| Variables | Constant | Constant & Trend | Constant | Constant & Trend | Order of Integration |
|--------------------|-------------------|------------------|-------------------|-------------------|----------------------|
| lnFPR _t | -2.461 (0.133) | -0.629 (0.970) | -2.653* (0.092) | -2.874 (0.183) | I (1) |
| lnPMS _t | -1.959 (0.302) | -1.292 (0.872) | -4.206*** (0.002) | -4.928*** (0.001) | I (1) |
| lnEXR _t | -3.753*** (0.007) | -2.285 (0.430) | ----- | ----- | I (0) |
| lnIMP _t | -5.317*** (0.000) | -2.929 (0.166) | ----- | ----- | I (0) |
| lnINR _t | -1.740 (0.402) | -2.064 (0.546) | -7.807*** (0.000) | -8.900*** (0.000) | I (1) |

Sources: Authors computation using EViews 9; Note: Values in parentheses are the P-values and ***. ** & * represents statistically significant at 1%, 5% & 10% levels.

However, at times, ADF and PP tests may not produce dependable estimates if there is a existence of structural break in the variables and as such they could produce a biased result. To keep away from such doubt, we have equally engaged Zivot -Andrews structural break trended unit root test. **Table 2b** shows the results of Zivot -Andrews unit root test, which disclose that three variables out of the five variables i.e. food prices (FPR), petroleum pump price (PMS) and interest rate (INR) are stationary at level, meaning they are I(1) variables. Whereas the imports of goods and services (IMP) and official exchange rate (EXR) were not stationary at level form, but become stationary after first differencing, that is they are said to be I(0) variables. In a nutshell, This results indicates the mixture of I(1) and I(0) variables. Hence, the result of the Zivot-Andrews unit root test too supports the use of ARDL approach.

Table 2b. Unit Root Test Results Based on Zivot-Andrews.

| Variables | Level | | | | First difference | | | | I(d) |
|-------------|---------------|-------------|------------------|-------------|------------------|-------------|------------------|-------------|------|
| | Constant | Break Point | Constant & trend | Break point | Constant | Break point | Constant & trend | Break point | |
| $\ln FPR_t$ | -5.724*** (3) | 1993 | -4.861*** (3) | 1996 | ----- | ----- | ----- | ----- | I(0) |
| $\ln PMS_t$ | -7.957*** (1) | 1992 | -3.645 (1) | 1994 | ----- | ----- | ----- | ----- | I(0) |
| $\ln EXR_t$ | -3.383 (0) | 1999 | -3.298 (0) | 2000 | -5.976*** (0) | 1990 | -6.077*** (0) | 1991 | I(1) |
| $\ln IMP_t$ | NA | NA | NA | NA | -5.137*** (2) | 1999 | -5.042*** (2) | 2005 | I(1) |
| $\ln INR_t$ | -4.563 (2) | 1992 | -5.242*** (2) | 1993 | ----- | ----- | ----- | ----- | I(0) |

Source: Eviews 9; Note: *** stands for 1% level of significance and values in brackets are the lag lengths, while I(d) stands for the interpretation of the results.

Figure 1 present the choice of best lags in autoregressive distributed lag (ARDL) model co-integration equation based on the statement that residuals are serially uncorrelated. The research used most recent ARDL method to decide the best model. The Akaike Information Criteria (AIC) was used to identify the number of lags necessary in the model that is free from autocorrelation dilemma. The assessment found that ARDL 1,2,0,2,0 are the best number of lags necessary in our model that is a more consistent model.

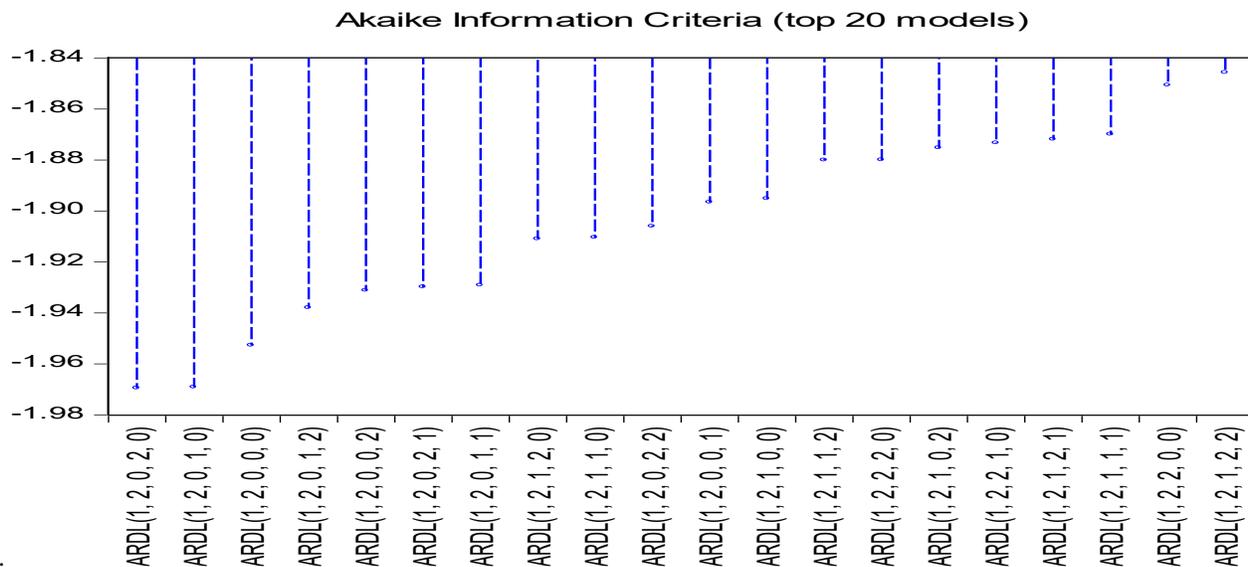


Figure 1: Optimum Lag Selection Criteria Graph

Co-integration Test

Having recognized the best lag length, the next pace was to estimate the long-run connection among the variables by using ARDL Bounds test. The null hypothesis of no co-integration ($H_0 : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$) was tested alongside the other hypothesis of the existence of a co-integration relationship ($H_a : \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq 0$). The outcome of this test presented in **Table 3** indicated that the null hypothesis of no co-integration relationship among the variables was rejected for the period under study (i.e. 1986 to 2018), at 1% level of significance which is more strong. The F-statistics value of 6.49 is higher than the lower bound value of 3.74 and the upper bound value of 5.06 of the critical values at the abovementioned level of significance. As such, a co-integration relationship exists in this respect. Meaning the variables are moving in the same direction or that they split an ordinary relationship in the long-run. This result corroborates the work of Umar and Muhammad (2019), Musa et al. (2019), Amaefula (2016) and Eregha et al. (2016) among others.

Table 3. Bounds Test Result

| Model | F-stat. | Lag | Bound test critical values | | |
|--|---------|-----|-------------------------------------|-------|-------|
| | | | [Unrestricted intercept & no trend] | | |
| | | | Level of significance | I (0) | I (1) |
| 1986 to 2018 | 6.49 | 2 | 1% | 3.74 | 5.06 |
| F(lnFPR _t /lnPMS _t ,lnEXR _t lnIMP _t lnINR _t) | | | 5% | 2.86 | 4.01 |
| K = 4 & n = 35 | | | 10% | 2.45 | 3.52 |

Source: Author's Data Analysis 2020 Using Eviews 9.

The Johansen Juselius test for co-integration using representation with Trace statistics and representation with Max-Eigen value established the existence of 5 co-integration equations in the trace statistics representation and 2 co-integration equations in the max-eigen statistic representation. Therefore, we bring to a close that there is a long-run association among the dependent and independent variables and that the variables moved collectively in the long-run. The Johansen Juselius test for co-integration result supported the outcome of ARDL bounds test for co-integration.

Table 4: Johansen Juselius Test for Co-integration

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Max-Eigen Statistic | 0.05 Critical Value |
|---------------------------|------------|--------------------|---------------------|---------------------|---------------------|
| C = 0 | 0.703951 | 104.117*** (0.000) | 69.81889 | 40.168*** (0.007) | 33.87687 |
| C ≤ 1 | 0.595797 | 63.949*** (0.000) | 47.85613 | 29.892** (0.024) | 27.58434 |
| C ≤ 2 | 0.403924 | 34.056** (0.015) | 29.79707 | 17.073 (0.168) | 21.13162 |
| C ≤ 3 | 0.274857 | 16.982** (0.029) | 15.49471 | 10.605 (0.175) | 14.26460 |
| C ≤ 4 | 0.175722 | 6.377** (0.011) | 3.841466 | 6.377** (0.011) | 3.841466 |

Sources: Authors Data Analysis 2020 Using EViews 9; Note: Values in parentheses are the P-values and *** & ** represent statistically significant at 1% and 5% levels of significance.

Following establishing a co-integration relationship between the variables, the long-run model in equation 3 and equation 4 were estimated to get the long-run and short run coefficients as offered in **Table 5**. The results revealed that PMS is positive and significant at 1 percent level of significance. Meaning that $\Delta \ln$ increase in PMS Price will lead to 0.731 percent increase in food prices in Nigeria and this is in line with the results of Bombai (2012), Nwosu (2009), Eregha *et al.*, (2016), Arinze (2011), Orlu, 2017, Mesagan and Olawale, 2016, but contradicts the findings of Okwanya *et al.* (2015), Aniekan *et al.*, 2018 and Anthony, 2019. Exchange rate of naira is positive but insignificant in explaining the changes in the food prices within the period under study. This contradicts the results of Umar and Muhammad (2019) and Alexender *et al.* (2015). Imports of goods and services have negative and significant relationship with foods prices. Precisely a percentage change in imports of goods and services is associated with 0.378 percent decrease in foods prices in Nigeria. While lending interest rate is positive and significant in explaining the changes in food prices in Nigeria. Meaning that 1 percent increase in the lending interest rate is associated with 0.498 percent increase in food prices in Nigeria. This supported the findings of Raymond (2014), Alexender *et al.* (2015), Udoh and Isaiah (2018) and Musa *et al.* (2019).

Coming down to the short run results also in the **Table 5**, the results showed that current short run PMS Price is positive and significant in explaining changes in food prices and is supported by the work of Eregha *et al.* (2016) but contradict that of Okwanya *et al.* (2015). But PMS lag 1 is negative in explaining changes in the current year food prices. The short run exchange rate and imports of goods and services are insignificant in explaining changes in the dependent variables in the short run period. But lending rate of interest is positive and significant in explaining changes in the dependent variable food prices in Nigeria. Meaning that 1 percent increase in lending interest rate is associated with 0.189 percent raise in food prices in the short run period.

The R-square value of 0.998 signifies that 99 percent variation in the dependent variable can be jointly explained by the independent variables and only 0.1 percent variation that is explained by the other factors that not captured in the model or that are explained by the error term. The DW value of 1.504 indicates that the model is free from first order serial auto correlation as the value is within the range of 1.50 to 2.50 values. The F-statistic which is the test for the overall significant of the model is with the value of 1537.793 which is highly significant at 1 percent level of significance. Meaning that the all the independent variables in the model are jointly significant in explaining the changes in the dependent variable. The error correction value of -0.37 satisfied the econometrics requirements of negative value, less than one and significant which means that the feedback or convergence rate to long-run equilibrium as 37 percent. Precisely, the error correction term value also indicates that the long-run deviation from the food prices is corrected by 37 percent every year.

Table 5. Estimated long run and short run coefficients.

| Dependent variable, $\ln FPR_t$ | Coefficients | T-ratio (p value) |
|--|--------------|-------------------|
| Regressors | | |
| $\ln PMS_t$ | 0.731 | 9.890*** (0.000) |
| $\ln EXR_t$ | 0.003 | 0.028 (0.977) |
| $\ln IMP_t$ | -0.378 | -1.993*** (0.058) |
| $\ln INR_t$ | 0.498 | 3.722*** (0.001) |
| Constant | 1.668 | 3.905*** (0.000) |
| Short – run estimation result | | |
| Dependent variable, $\Delta \ln CPI_t$ | | |
| $\Delta \ln PMS_t$ | 0.121 | 2.296** (0.031) |
| $\Delta \ln PMS_{t-1}$ | -0.132 | -2.242** (0.034) |
| $\Delta \ln EXR_t$ | 0.001 | 0.028 (0.977) |
| $\Delta \ln IMP_t$ | -0.014 | -0.230 (0.819) |

| | | |
|---|-------|-------------------|
| $\Delta \ln IMP_{t-1}$ | 0.077 | 1.202 (0.241) |
| $\Delta \ln INR_t$ | 0.189 | 4.518*** (0.000) |
| Constant | 1.668 | 3.905*** (0.000) |
| ECM (-1) | -0.37 | -5.631*** (0.000) |
| $ecm = \ln CPI_t - 0.731 \times \ln PMS_t - 0.003 \times \ln EXR_t + 0.378 \times \ln IMP_t - 0.498 \times \ln INR_t - 1.668$ | | |
| R ² : 0.998, DW-statistic: 1.504, F-stat: 1537.793*** (0.000) | | |

Sources: Authors Data Analysis 2020 Using EViews 9; Note. ECM = Error Correction Model. ***, **, and * are significant at 1% level.

To guarantee the consistency of the estimates, diagnostic tests of serial correlation, functional form, normality and the heteroskedasticity were conducted and reported in **Table 6**. The outcome showed that the null hypotheses for the serial correlation LM test, normality test and heteroskedasticity test could not be rejected with the exception of for the functional form or Ramsey Reset test for specification of the model.

Table 6. The Residuals of the Autoregressive Distributed Lag Diagnostic Tests.

| Test statistics | LM version | F-version |
|--------------------|-------------------------|----------------------------|
| Serial correlation | CHQ (2) = 1.213 [0.282] | F(1,22) = 1.724 [0.189] |
| Functional form | Not applicable | F(1, 22) = 7.512 [0.011]** |
| Normality | CHQ (2) = 0.297 [0.861] | Not applicable |
| Heteroscedascity | CHQ (9) = 8.369 [0.497] | F(9,23) = 0.868 [0.565] |

Note. The values in bracket are the probability values. LM = langrange multiplier test, CHQ = chi-square and ** represent 5% significance level.

As recommended by Pesaran and Pesaran (1997), CUSUM meaning cumulative sum and CUSUMSQ meaning cumulative sum of squares tests for firmness of the model along the study were conducted. The results revealed in **figures 2** shows that the residual is not within the 5 percent level of significance critical bound. **Figure 3** demonstrates that the there is slight deviation of the residual from the 5 percent level of significance critical bound. Therefore, the overall model is unstable along the study period as the residuals were not inside the critical bounds at 5 percent level of significance.

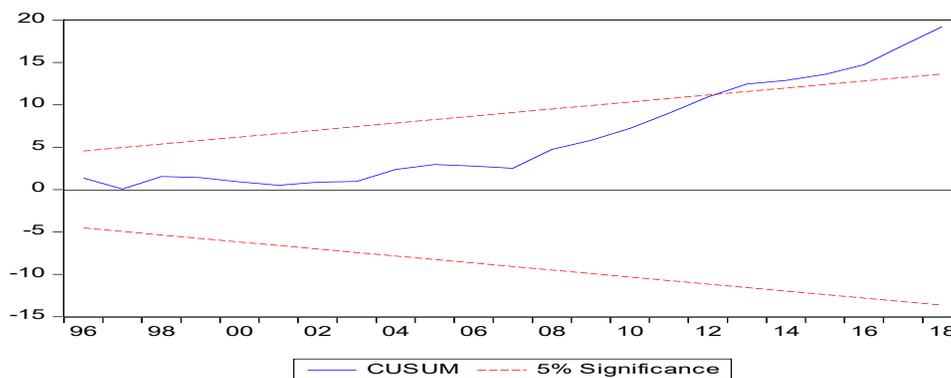


Figure 2. Plot of cumulative sum of residual for the model

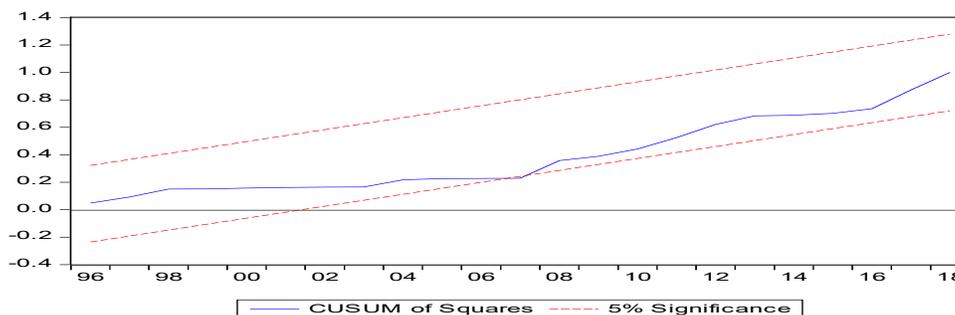


Figure 3. Plot of cumulative sum of squares for residual of the model.

As robustness proves to the ARDL results, we have engaged dynamic DOLS, FMOLS and CCR, and their estimated results are reported in **Table 8**. The results show that in all the three estimators petroleum pump price has a significant positive impact on food prices, whereas exchange rate of naira is not statistically significant in explaining the dependent variable in DOLS and FMOLS results but with exception of CCR result which shows that it is positive and significant in explaining changes in the dependent variable. The imports of goods and services appeared to be negative and significant in DOLS result but shows positive and significant results in both FMOLS and CCR estimators. Lending interest rate appeared to be positive and significant under DOLS result only. The main focus of the study, which are petroleum pump price and interest rate, have been revealed to impact positive and significant on food prices as shown by the long run ARDL results and proof by the DOLS, FMOLS and CCR results.

Table 7. The Estimated Results for the Impact of petroleum pump price on food prices Using DOLS, FMOL and CCR

| DV= $\ln FPR_t$: | DOLS | | FMOLS | | CCR | |
|------------------------------|---------------------|-------|---------------------|-------|---------------------|-------|
| | Coefficients | SE | Coefficients | SE | Coefficients | SE |
| Long-run coefficients | | | | | | |
| Petroleum Pump Price | 0.686*** (5.213) | 0.131 | 0.451*** (6.799) | 0.066 | 0.267** (2.802) | 0.095 |
| Exchange Rate | 0.142 (0.862) | 0.165 | -0.029 (-0.298) | 0.097 | 0.539*** (3.647) | 0.147 |
| Imports | -0.481* (-2.008) | 0.239 | 0.449*** (3.316) | 0.135 | 0.306** (2.142) | 0.142 |
| Interest Rate | 0.519* (2.192) | 0.236 | 0.038 (0.463) | 0.082 | -0.006 (-0.047) | 0.145 |
| Constant | 1.158* (2.037) | 0.568 | -0.333 (-1.158) | 0.287 | -0.264 (-0.918) | 0.288 |

Note. Numbers in brackets are the t-statistics. DV = Dependent variable, DOLS = dynamic ordinary least squares; FMOLS = fully modify ordinary least square; CCR = Canonical Co-integration Regression, OLS = Ordinary Least Square; SE = standard error. *** & ** indicates significant at 1% and 5% levels of significance respectively.

After the strength check of the long-run ARDL coefficients, then the causal relationship between the variables was examined by using Granger causality test of VECM in a vector autoregressive (VAR) system. The existence of co-integration as depicted by this study (refer to **Table 3** and **Table 4**) propose the existence of a causal relation in at least one way. The estimated long run and short run causality results are presented in **Table 8** and its summary in **Table 9**. The long run causality results reveal that ECT_{t-1} in petroleum pump price equation has satisfied the econometric requirements of negative, less than one in value and statistically significant at 1 percent level of significance. This suggests that there is a long run causality running from lending interest rate, imports of goods and services, exchange rate and food prices to petroleum pump price. In the equation with lending interest rate as a dependent variable, the ECT_{t-1} value is not negative even though it is less than one in value and significance, therefore we can conclude that there is no long run causality in any direction.

Beside the long run causality, the short run causality was also estimated. However, in the short run, there is bidirectional causality from running from imports of goods and services to food prices, from petroleum pump price to foods prices, from lending interest to petroleum pump price and from exchange rate to lending interest rate. The rest of the interpretations of the results is presented in **Table 8** below.

Table 8. The Results of Vector Error Correction Model Granger Causality

| | Direction of causality | |
|--|------------------------|----------|
| | Short – run | Long-run |

| Dependent Variables | $\sum \Delta \ln FPR_t$ | $\sum \Delta \ln PMS_t$ | $\sum \Delta \ln EXR_t$ | $\sum \Delta \ln IMP_t$ | $\sum \Delta \ln INR_t$ | ECT_{t-1} |
|---------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|----------------------|
| $\Delta \ln FPR_t$ | ---- | 20.798*** (0.000) | 1.316 (0.517) | 8.326** (0.015) | 1.651 (0.437) | 0.011 (0.614) |
| $\Delta \ln PMS_t$ | 19.299*** (0.000) | ---- | 3.175 (0.204) | 0.663 (0.717) | 6.663** (0.035) | -0.312*** (0.005) |
| $\Delta \ln EXR_t$ | 9.647*** (0.008) | 1.019 (0.600) | ---- | 2.003 (0.367) | 5.579* (0.061) | -0.164 (0.117) |
| $\Delta \ln IMP_t$ | 5.164* (0.075) | 5.589* (0.061) | 5.836* (0.054) | ---- | 7.682** (0.021) | -0.078 (0.415) |
| $\Delta \ln INR_t$ | 1.508 (0.470) | 4.625* (0.099) | 9.178** (0.010) | 5.650* (0.059) | ---- | 0.282** (0.010) |

Diagnostic tests: Akaike information criteria = -2.282, VEC residual serial correlation LM test = 32.527 (0.143), VEC White heteroscedasticity test = 343.441 (0.293), VEC Jarque Bera normality test = 0.948 (0.622)

Note. Values in parentheses are the P- values. LM = langrange multiplier; VEC = vector error correction ** indicates significant at 5% level.

The VECM diagnostic checks results are reported in the lower part of **Table 9** which revealed that the model is steady and dependable as all the null hypotheses of the tests were accepted, and therefore its estimates are satisfactory for statistical deduction.

Table 9. The Summary of the Results of the Vector Error Correction Model Granger Causality Approach

| Direction of causality | Short-run (F-statistics) | Long-run (ECT_{t-1}) |
|--------------------------------|------------------------------|-----------------------------|
| $\ln PMS_t$ causes $\ln FPR_t$ | At 1% level of significance | NO |
| $\ln EXR_t$ causes $\ln FPR_t$ | NO | NO |
| $\ln IMP_t$ causes $\ln FPR_t$ | At 5% level of significance | NO |
| $\ln INR_t$ causes $\ln FPR_t$ | NO | NO |
| $\ln FPR_t$ causes $\ln PMS_t$ | At 1% level of significance | At 1% level of significance |
| $\ln EXR_t$ causes $\ln PMS_t$ | NO | At 1% level of significance |
| $\ln IMP_t$ causes $\ln PMS_t$ | NO | At 1% level of significance |
| $\ln INR_t$ causes $\ln PMS_t$ | At 5% level of significance | At 1% level of significance |
| $\ln FPR_t$ causes $\ln EXR_t$ | At 1% level of significance | NO |
| $\ln PMS_t$ causes $\ln EXR_t$ | NO | NO |
| $\ln IMP_t$ causes $\ln EXR_t$ | NO | NO |
| $\ln INR_t$ causes $\ln EXR_t$ | At 10% level of significance | NO |
| $\ln FPR_t$ causes $\ln IMP_t$ | At 10% level of significance | NO |
| $\ln PMS_t$ causes $\ln IMP_t$ | At 10% level of significance | NO |
| $\ln EXR_t$ causes $\ln IMP_t$ | At 10% level of significance | NO |
| $\ln INR_t$ causes $\ln IMP_t$ | At 10% level of significance | NO |
| $\ln CPI_t$ causes $\ln INR_t$ | NO | NO |
| $\ln PMS_t$ causes $\ln INR_t$ | At 10% level of significance | NO |
| $\ln EXR_t$ causes $\ln INR_t$ | At 10% level of significance | NO |
| $\ln IMP_t$ causes $\ln INR_t$ | At 10% level of significance | NO |

Source: Author's Data Analysis 2020 using Eviews 9.

Variance Decomposition Test Results

The predict error variance decomposition was used to estimate the short-run dynamic property of each of the variable originating from the shock in the arrangement. It is the fraction of forecast error variance for each variable that attribute to its own originality and to innovations in the other endogenous variables. The ordering of the variables in the variance decomposition is stated in **Table 10a to d** below over the same forecasting perspective for the short run period of five years.

(i) Variance Decomposition of lnFPR

The variance decomposition for the natural log of consumer price index (lnCPI) shows that the elevated level of changes experienced by lnFPR is credited to its own shock at 100 percent in the first period and drop to 75.330 percent in the fifth period. The role of the other four variables is moderately marginal. The uppermost is by the natural log of imports (lnIMP), which start from 1.523 percent in the first period and continuation to increase up to 19.903 percent in the fifth period.

(ii) Variance Decomposition of lnPMS

The natural log of petroleum pump price (lnPMS) displayed a related pattern where its own shock accounts for an unequal share of the total changes. The contribution of its own shock is around 81.922 percent in period 1 and continues to decrease until it reaches 38.680 percent in the last period. The involvement of the other four variables is also minor starting with the natural log of food prices (lnFPR) accounting for about 18.077 percent, 33.808 percent and 31.751 percent in period 1, 2 and 3, but decreases in the last two periods.

(iii) Variance Decomposition of lnEXR

The variance decomposition of natural log exchange rate (lnEXR) has a similar pattern where by 93.147 percent variation in the exchange rate is explained by itself in the first period and it continue to decrease until it reaches 66.198 percent in the fifth period. Looking at the other four variables, the natural log of food prices (lnFPR) accounted for about 6.610 percent in the first period, but in the second period down to the fifth period, the natural log of petroleum pump price take the lead from natural log of consumer price index.

(iv) Variance Decomposition of lnINR

The natural log of interest rate (lnINR) also displayed a similar pattern where its own shock accounts for a uneven share of the total variation. The contribution of its own shock is 87.792 percent in the first period and falls to 47.189 percent in the fifth period. The contribution of the other three variables is also trivial with the natural log of exchange rate (lnEXR) accounting for about 1.336 percent variation in the first period and continue to increase until it reaches 37.526 percent in the fifth period.

Table 10a: Variance Decomposition of lnCPI

| Period | S.E. | lnFPR | lnPMS | lnEXR | lnIMP | lnINR |
|--------|----------|----------|----------|----------|----------|----------|
| 1 | 0.073975 | 100.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.142232 | 97.88246 | 0.236112 | 0.357323 | 1.523680 | 0.000421 |
| 3 | 0.211001 | 87.20022 | 2.477073 | 1.190459 | 9.106374 | 0.025873 |
| 4 | 0.276299 | 79.27800 | 3.471157 | 1.649071 | 15.54406 | 0.057714 |
| 5 | 0.323637 | 75.33002 | 2.614831 | 2.095752 | 19.90361 | 0.055786 |

Source: Author's Data Using Eviews 9.

Table 10b: Variance Decomposition of lnPMS

| Period | S.E. | lnFPR | lnPMS | lnEXR | lnIMP | lnINR |
|--------|----------|----------|----------|----------|----------|----------|
| 1 | 0.240155 | 18.07702 | 81.92298 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.373567 | 33.80862 | 61.78388 | 3.262244 | 1.126555 | 0.018704 |
| 3 | 0.461351 | 31.75143 | 52.80309 | 10.66964 | 1.294370 | 3.481459 |
| 4 | 0.526569 | 28.71136 | 48.62317 | 9.127696 | 2.167586 | 11.37018 |
| 5 | 0.590574 | 29.22795 | 38.68034 | 7.368544 | 2.093850 | 22.62932 |

Source: Authors Data Using Eviews 9.

Table 10c: Variance Decomposition of lnEXR

| Period | S.E. | lnFPR | lnPMS | lnEXR | lnIMP | lnINR |
|--------|----------|----------|----------|----------|----------|----------|
| 1 | 0.259518 | 6.610583 | 0.241833 | 93.14758 | 0.000000 | 0.000000 |

| | | | | | | |
|---|----------|----------|----------|----------|----------|----------|
| 2 | 0.369524 | 4.203364 | 8.550600 | 86.88541 | 0.004123 | 0.356499 |
| 3 | 0.482450 | 9.888859 | 12.26078 | 75.39690 | 2.167346 | 0.286108 |
| 4 | 0.602998 | 12.31696 | 13.14489 | 70.60217 | 2.878209 | 1.057767 |
| 5 | 0.753747 | 11.15979 | 19.31252 | 66.19854 | 2.169419 | 1.159732 |

Source: Authors Data Using Eviews 9.

Table 10d: Variance Decomposition of lnIMP

| Period | S.E. | lnFPR | lnPMS | lnEXR | lnIMP | lnINR |
|--------|----------|----------|----------|----------|----------|----------|
| 1 | 0.247140 | 0.915542 | 6.051715 | 1.257615 | 91.77513 | 0.000000 |
| 2 | 0.302194 | 0.613357 | 4.311631 | 1.045040 | 92.93316 | 1.096808 |
| 3 | 0.402050 | 0.645907 | 3.610228 | 11.89016 | 80.87874 | 2.974968 |
| 4 | 0.474927 | 0.939555 | 3.724941 | 12.49070 | 79.68249 | 3.162317 |
| 5 | 0.558967 | 0.678910 | 2.790801 | 12.91580 | 78.39202 | 5.222470 |

Source: Authors Data Using Eviews 9.

Table 10e: Variance Decomposition of lnINR

| Period | S.E. | lnFPR | lnPMS | lnEXR | lnIMP | lnINR |
|--------|----------|----------|----------|----------|----------|----------|
| 1 | 0.346746 | 8.937794 | 1.170893 | 1.336875 | 0.761771 | 87.79267 |
| 2 | 0.500647 | 5.919082 | 1.256387 | 18.21790 | 0.439178 | 74.16745 |
| 3 | 0.627842 | 4.351775 | 1.234933 | 25.60948 | 5.226283 | 63.57753 |
| 4 | 0.730675 | 3.234620 | 1.313995 | 31.96869 | 8.811184 | 54.67152 |
| 5 | 0.821233 | 2.700793 | 1.752181 | 37.52615 | 10.83139 | 47.18948 |

Source: Authors Data Using Eviews 9.

Impulse Response Function Analysis

The figure 4 illustrates the results of impulse response function analysis of natural log of food prices, natural log of petroleum pump price, natural log of lending interest rate and natural log of natural log of imports and natural log of exchange rate in the VAR system to one standard deviation shock. Given one standard deviation positive shocked to the natural log of food prices, the natural log of petroleum pump price response positively at a decreasing rate, natural log of exchange rate response negatively, natural log of imports responses positively and natural log of lending interest rate responses positively throughout the periods. Again given one standard deviation positive shock to the natural log of petroleum pump price, the natural log of food prices response negatively and afterward positively, the natural log of exchange rate response positively, the natural log of imports response negatively, the natural log of lending interest rate found to respond positively throughout the periods. Moreover given one standard deviation positive shocked to the natural log of exchange rate, the natural log of food prices response negatively from the start and positively at the end of the period and the same thing applies to natural log of petroleum pump price and natural log of imports, but the natural log of lending interest rate response positively throughout the periods. Furthermore given one standard deviation positive shocked to the natural log of imports, the natural log of food prices and natural log of exchange rate responses negatively and later positively for the rest of the periods, the natural log of petroleum pump price response by increasing at a decreasing rate, the natural log of lending interest rate response positively. Lastly, given one standard deviation positive shocked to the natural log of lending interest rate, the natural log of food prices and imports responses negatively, natural log of petroleum pump price and exchange rate response positively.

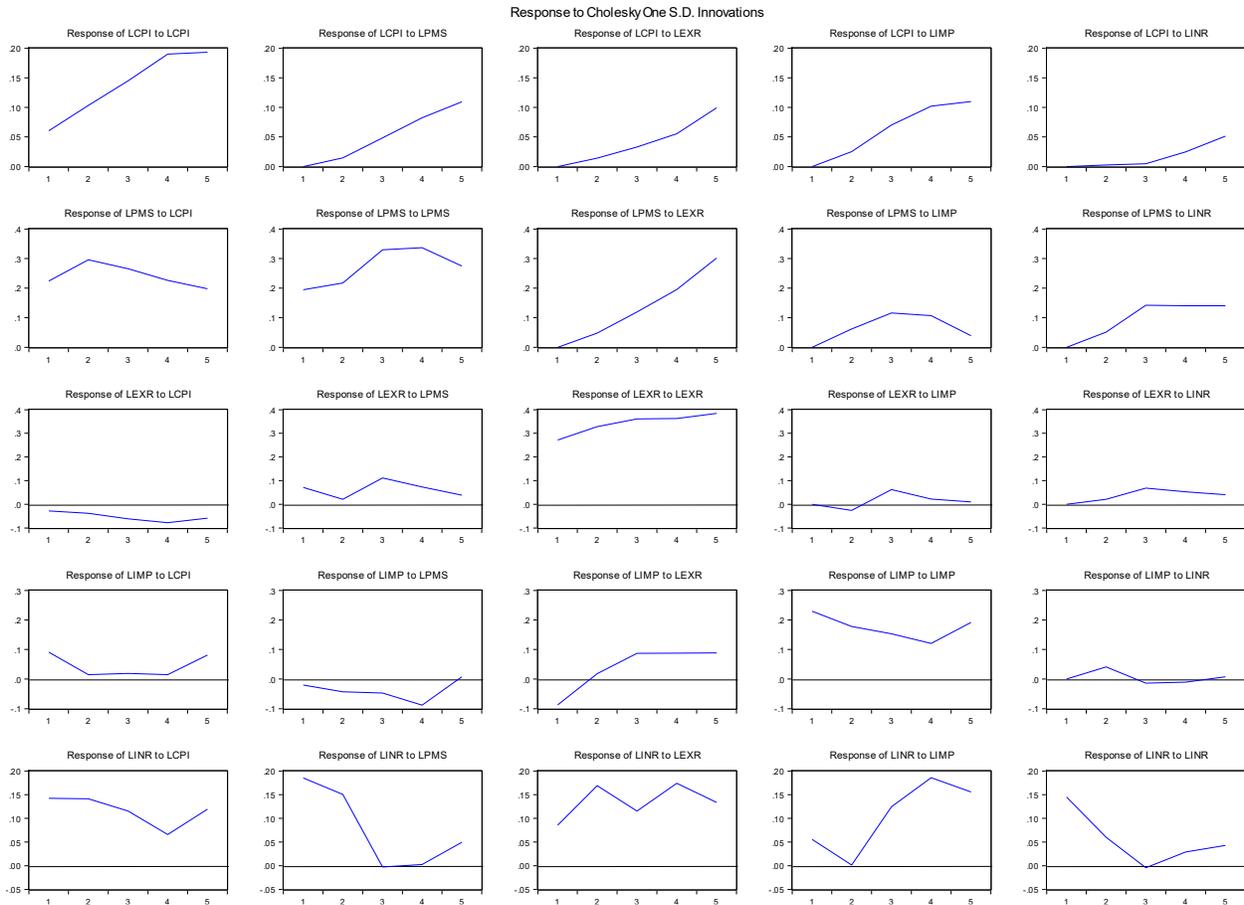


Figure: Impulse Response function Graphs

5.0 Conclusion and Recommendations

The study makes use of ARDL approach to co-integration to determine the impact of petroleum pump price and interest on inflation in Nigeria. The impact was tested based on the period of 1984 to 2018. The direction of causality was tested with the help of VECM Granger causality between the variables in both the short run and the long run periods. Firstly, the study tested for the existence of co-integration relationship after the optimum lag was identified and found that they variables were co-integrated. Following the co-integrated variables, the long-run model was also estimated and the results showed that petroleum pump price and lending interest rate are responsible for increase in food prices within the context of the study period. While imports of goods and services is found to be negatively related to food prices. Exchange rate is the only insignificant variable in explaining changes in food prices. Apart from the long-run estimation, the short-run model was also tested. The results showed that petroleum pump price and lending interest rate are significant in explaining changes in food prices in the short-run period while imports and exchange rate are not significant in explaining changes in food prices in the short-run. This implies that petroleum pump price and lending interest rate which are the focus of this research could influence food prices in both the long-run and the short-run periods. The reliability test were performed on the model and the outcome indicates that they model is good fit and have fulfilled nearly all the requirements for classical linear regression.

The checking for robustness was done using DOLS and FMOLS, and their outcomes corroborate the outcomes of long-run ARDL model. The VECM Granger causality was applied to test the direction of causality, which indicated a significant causality in the long-run in petroleum pump price model only, but in the short-run period, there was causality in food price, petroleum pump price, imports, exchange rate and lending interest rate models respectively.

The results from variance decomposition revealed that the main sources of variation in the natural log of food prices are largely due to its own shocks and innovation in natural log of imports of goods and services while the leading sources of variation in natural log of petroleum pump prices are largely due to its own shocks and innovations in natural log of food prices. Also, the predominant sources of variation in natural log of exchange rate are due to shocks and innovations in natural log of petroleum pump price. Similarly, the biggest sources of changes in natural log of imports are due largely to own shock and innovation in the natural log of exchange rate. Again, the biggest sources of changes in natural log of interest rate are basically due to its own shock and innovation in the natural log of exchange rate.

The main recommendation from this research is that to achieve stability in food prices, there should reduction in petroleum pump price and lending interest rate since they have positive and significant impact on food prices in both the short-run and the long-run periods. From the side of the petroleum pump price, government should either imposed lower legislated price and sale it at lower prices or should privatized the sector in order to create competition among the privates competitors and realize lower price for the product. Central Bank of Nigeria should also reduce the interest rate at which it lend money to commercial banks and by doing that will make the commercial banks to lower their lending interest rate to the general public.

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Mobile Application for Monitoring and Management of Out-Patients

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Abstract- The most important dependencies for life sustainability with the growth of same is Health Care. Mobile technologies offers a tremendous opportunity for health care system for developing countries through provision of remote medical consultations. The challenges in our health system serve as the motivation for this research. This research focused on the development of Mobile Application for Monitoring and Management of Out-Patients that can be used by health providers and patients to provide medical consultations remotely with instant feedback using android mobile phone. The features includes chatting between patients and the health providers. Agile Software development life Cycle is employed. The implementation was carried out using Extensible Mark-Up Language (XML), Java Programming language and Android Studio with Android 7.0 Nougat for the client-side while MySQL database with Django as the web framework and Anaconda as the interpreter at the server-side. Questionnaire method of data collection was employed, and Descriptive Statistics was used to analyze the data collected. The result of the evaluation shows that the application was rated positively and the average score from the users reached 95% Confidence Value.

Keywords- Mobile Application, Monitoring, Management, Remote Consultation, Out-patients, M-health. Android-Phone, Doctor-Patient Interaction.

I. INTRODUCTION

A. The invasion of mobile phones in the developing countries has been both great and remarkable due to fact that global mobile phone consumption is high, with nearly 7 billion cell phone subscriptions and an estimated 96% mobile penetration in the world in 2014 [1]. This is evident according to World Bank Group report [2], that mobile device have reached more people in many developing countries than power grids, road system, water works or fibre optic networks. Therefore, a technology which would allow doctors to patient's consultations remotely will therefore be of good use to the doctors and the patients. Remote consultation for outpatient defines the distant consultation for patient that is in a remote site. The remote site may be at the comfort of their house or

any available place in which the services are needed without being to the hospital [3].

A. Mobile Health

Mobile-Health (m-Health) is a subset of e-Health that focuses on the delivery of health care services via mobile communication devices [6]. M-Health broadly encompasses the use of mobile telecommunication technology within health care delivery systems. In WHO' report [7], m-Health was defined as medical and public health practice supported by mobile devices, including mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices. It focuses on the use of mobile phones (both simpler phones capable only of voice and text message communication and smartphones with many other capabilities, including access to websites and application software known as "apps" [8].

B. E-Health

E-Health (or electronic health) is broadly defined by the World Health Organization as the "use of information and communication technology for health" [9]. The main objective of e-Health programs is to use Information and Communication Technology (ICT) to improve healthcare service delivery and health outcomes through the strategic use of technologies such as:

- a. Computers
- b. Internet satellite receivers
- c. Mobile phones
- d. Personal Digital Assistants (PDA).

In addition the expansion and enhancement of wireless networks throughout low and middle income countries will increase access and capabilities of these technologies to healthcare providers and the general public in more remote geographical locations. The objective of this work is to develop a real-time mobile health system for monitoring and management of out-patient for remote consultations.

II. LITERATURE REVIEW

In 2009, the use of mobile telephone in reducing pre-natal maternal mortality for Abiye safe motherhood in Ondo State is presented. The motivation comes from the need to use mobile telephone to manage maternal mortalities resulting from childbirths. The objective was to reduce the maternal mortality rate by 75% by 2015. Short Messages Service (SMS) for push notification were used. The results shows that about 47% reduction of maternal mortality, an increase of 58% of registered patient and an increase of 96% of the number of live births in Ifedore and Idanre LGA were generated [9,10]. The limitation is that the timely delivery of notification messages was not considered.

In 2011 Dakoza mobile phone monitoring system for disease management was developed. The research was motivated by the need to improve communications between the different players in the health network and to improve the health status of patient. The objective of the research was the need to fast-track and improves critical services for HIV and TB patients. SMS/MMS based system was developed which includes auto-reminders of next appointments. The result shows an increase in patient compliance [11]. The limitation is that the system does not allow instant feedback.

A mobile phone intervention for the management of depression and Autism is proposed by Chen *et.al*. The research was motivated by the need to reduce adolescence psychiatry. The objective is to explore the utility of text message interventions. Text-messages were deployed. The result shows that daily messages constituted the perfect amount of contact and improved patient communication with providers [12]. The limitation of the system is that text messages should not be the only benchmark for intervention in adolescent psychiatry.

Ran Wei and Zhimin Yang (2012) developed a system on Doctor-Patient Interaction based on Android mobile technology was developed. The motivation arises from the need to have a convenient and urgent means of communication between doctors and patients. The objective was to develop a doctor to patient interaction system using Android mobile phones. The design implements an e-mail system on Android platform. Embedded database system (SQLite) was used [13]. The result shows that the need for protocol conversion was reduced but communication exists in non-real-time mode.

A research work on Android Mobile Application Platform for Remote Medical Monitoring System is developed by Ziyu *et. al* (2015). The research was motivated by the need to get more health care and doctor's professional advice when patients feel unwell. The objective is to build a remote medical monitoring system using Android mobile terminal for remote data acquisition, medical data analysis with push notifications. The research work employed development tools and application such as Google cloud messaging for push notification and Android platform on Bluetooth BLE technology, Java programming for the API, C++ for the library, and MySQL for the database. The result show that the system compared with traditional medical monitoring system, significantly reduced medical resource inputs, making health care more efficient and practical [14]. The push notification messages are delivered at will and not as instant messages

with no feedback. This research is therefore motivated by the need to overcome the stated limitations by developing a real-time mobile health system that can be used by health providers and patients to provide medical consultations remotely with instant feedback.

III. RESEARCH METHODOLOGY

The development of Mobile Application for Monitoring and management of Outs-Patients is divided into two: the Android Application Design and the Database Design. The application is developed using Android Studio 2.3.3.

IV. SYSTEM FEATURES

The development of real-time mobile health application for the monitoring and management of patients incorporates the following:

- Electronic Medical Records
- Chatting
- Video Recording
- Medical Images
- Drug- Prescription
- Data transmissions include files, images and videos.

C. Software Development Method

The Agile software development is a combination of iterative and incremental process model with focus on product adaptability and satisfaction. Agile software development life cycle for mobile applications was adopted. It comprises the planning, requirement analysis, design and Testing phase. Agile methods break the product into small incremental builds (Remote Clinical Consultations Users) which are provided in iterations for functional activities and it was developed with the view of some users. The build is divided into six stages of application package kit (.apk) as follows:

- Administration .apk
- Doctor .apk
- Nurse .apk
- Medical Scientist .apk
- Pharmacist .apk
- Patient .apk

At the end, the *apk* was merged as one, except the admin *apk*.

D. Database Design

The database model of the clinical consultation system is presented. The MySQL data model is adopted which is of the family RDBM. Data for the Remote Clinical Consultation Application is organized into table structures. It is composed of 12 relations. *Android Application with the Database in Real-Time*

The application is written in Java programming Language with XML for the interface, embedded in an android mobile phone. The real-time app resides as a tool in the Presentation Layer. When requested, it is downloaded on the client phone. Once loaded, it communicates with consultation server using the HTTP protocol. It establishes an HTTP connection and then posts HTTP requests to it. The HTTP requests are received and forwarded by the mobile phone layer to the

presentation layer. At the presentation layer, the request is processed and then an HTTP request is made to the application layer which fetches the required information from the database layers.

E. Consultations In the Remote Clinical System Application

The aim is to effectively utilize the available doctors. The consultation is based on set theory, and the modeling is to increase the patient satisfaction and effectively utilize the available doctors. The parameters for the remote consultations and the modeling are denoted as follows:

$$P = \{P_1, P_2, P_3, P_4, P_5, \dots P_n\} \quad (1)$$

where P is the set of Patients in the system, where $P_i \in P$ denote specific Patient P_i

$$D = \{D_1, D_2, D_3, D_4, D_5, \dots D_n\} \quad (2)$$

where D is the set of registered Doctors in the system to attend to Patient, where $D_j \in D$ denote specific Doctor D_j

$$A = \{AD_1, AD_2, AD_3, AD_4, AD_5, \dots AD_n\} \quad (3)$$

where A is the set of available Doctors, where $AD_j \in \{1,0\}$ is the availability of specific Doctor.

$$Q = \{QD_1, QD_2, QD_3, QD_4, QD_5, \dots QD_m\} \quad (4)$$

where Q is the set of patient waiting for a Doctor, where $QD_j \in Q$ denote the specific Doctor's queue that contains an assigned patient.

$$H = \{HD_1, HD_2, HD_3, HD_4, HD_5, \dots HD_m\} \quad (5)$$

where H is the set of average patient handling time of each Doctor, where $HD_j \in H$ denote specific Doctor's handling time.

V. SYSTEM ARCHITECTURE

The system operates based on the application being downloaded on the phone register and login then he/she can communicate with rest of the module such as Doctor, Nurse, SMS channel, Pharmacy, Lab Scientist, Chatting Channel and Database Server. All annals are shared with the HTTP (Hypertext Transfer Protocol). The system features chatting, medical images, health Tips, drug- prescription and registrations of patients all in real-time environment. The behaviour of the system when the patient wants to share information with the specific module (Doctor or Nurse) is that of an on-line chatting box. The web server interacts with the centralized database named as Relational Database Management System (RDBMS) via JAVA script, it also receive query, update, and execute the query. The client side is Android Device and server side is combination of MYSQL, PyCharm and Django web framework.

Patient is to access and input data to the system through the web browser from the Android Phone. Data transmissions include file, image and video transfers, and vital health statistics of patients. The characteristics of each of these data streams can differ greatly. The database tier is responsible for storage, retrieval, update, and integrity of the data. The connectivity of the application to the database is through the Java Script.

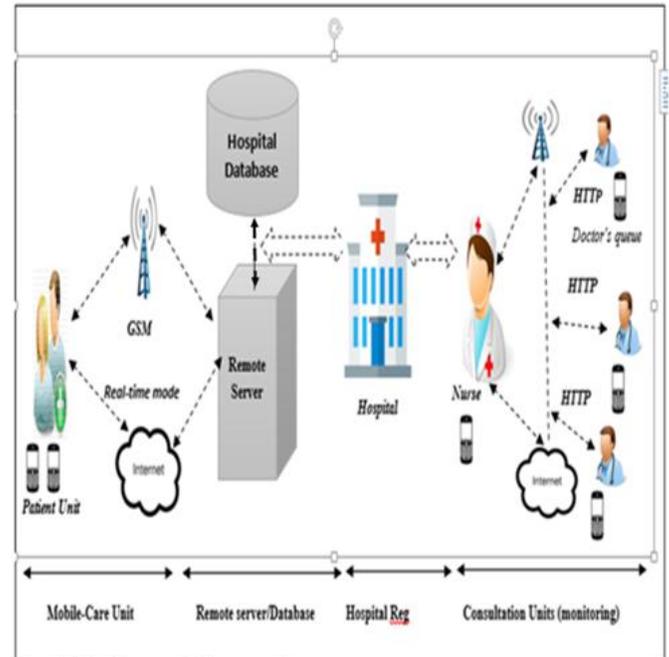


Figure 1: Architecture of the System

VI. COMPONENTS OF THE ARCHITECTURE

The components of the proposed system architecture are presented as follows:

- **Patient Mobile Unit:** An interface where online patients submit requests in a real time mode.
- **Remote Server:** A two-way communication link servicing the patient requests with the hospital database.
- **Hospital Database:** A repository containing the records of patients and various health providers.
- **Virtual Nurse:** An intermediary between the patients and the specific doctor in attendance for a first time user.
- **Doctors' List:** A list of doctors in attendance with different specialties.

VII. SYSTEM DESIGN REQUIREMENT

The system was implemented using the following minimum requirements:

Client Side:

- a. Xml (1.0)- Interface Design
- b. Android Studio 2.3.3 - Integrated Development environment for Android
- c. Android o/s version 7.0 – Naugat
- d. Java Runtime Environment
- e. SQLites- Login Details

Server Side:

- a. Pycharm (2017.2 Professional) - Integrated Development Environment (Django)
- b. Django 2.0.3 - Web Framework
- c. Anaconda(5.1.0) - Interpreter

d. MySQL database 2008 (5.7.21)

TABLE I THE SYSTEM FLOW ALGORITHM

VIII. RESULT AND DISCUSSIONS

The Clinical Consultation application was tested by some experts comprises Doctors, Nurses, Pharmacist and Laboratory Scientist. The total of Sixty-Five (65) questionnaires and sixteen (16) questions in each was administered. Evaluation was based on ease of use, acceptability and functionality. The users had the clinical consultation system installed on their mobile phones.

Questionnaire method of data collection was applied, the questionnaires are closed-ended which allow respondents with choices of options (Strongly Agreed, Agreed, Strongly Disagreed and Disagreed). The objective of the questionnaire approach is basically to evaluate the clinical consultation system.

Descriptive statistics is used to summarize the features of the information collected from the questionnaires. It measures the central tendency and variability. The average score from the users who consented from the hospital and from those outside of the hospital gave the overall user success for the clinical consultation system, which reached 95% Confidence Value. This is quite impressive taking into account that most users were acquainted with mobile phone usage. The usefulness of the application and the functionality were rated positively. Users were comfortable with using the system. Overall, users stated that they were enthusiastic about the potential of using such applications.

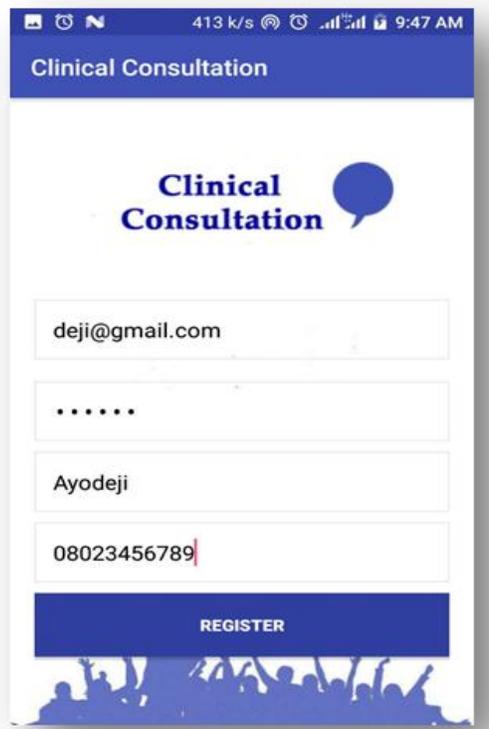


FIGURE 3: AYODEJI REGISTRATION

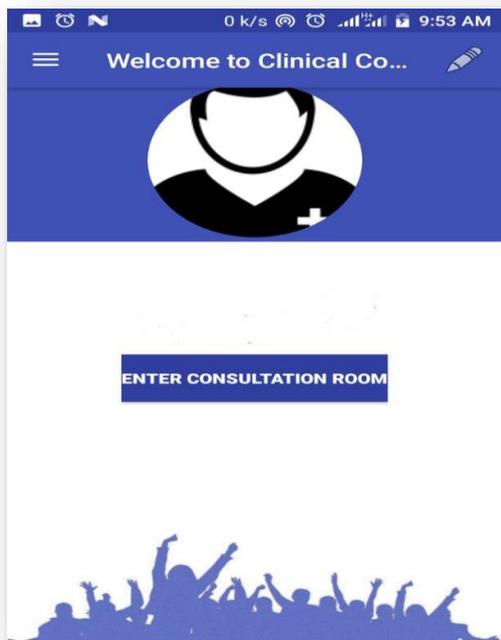


FIGURE 2: WELCOME PAGE OF THE APP

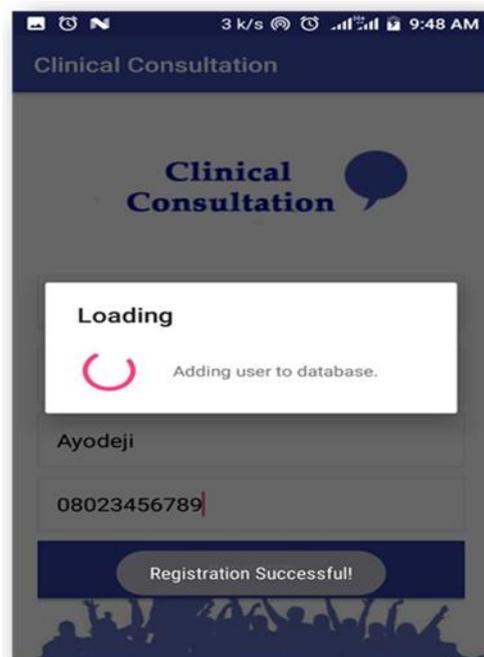


FIGURE 4: ADDING AYODEJI TO DATABASE



FIGURE 5: LIST OF PATIENTS (P) REGISTERED

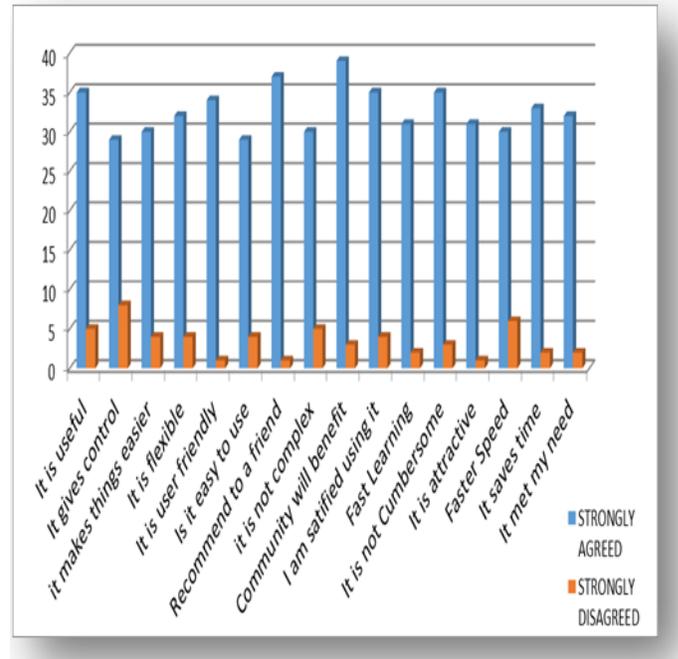


FIGURE 7: CHART OF STRONGLY AGREED AND STRONGLY DISAGREED

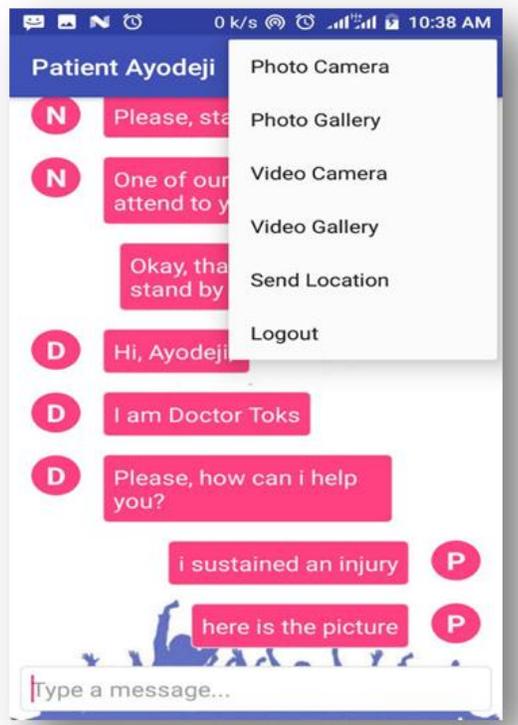


FIGURE 6: USERS CHATTING: DOCTOR (D), NURSE (N) AND PATIENT (P)

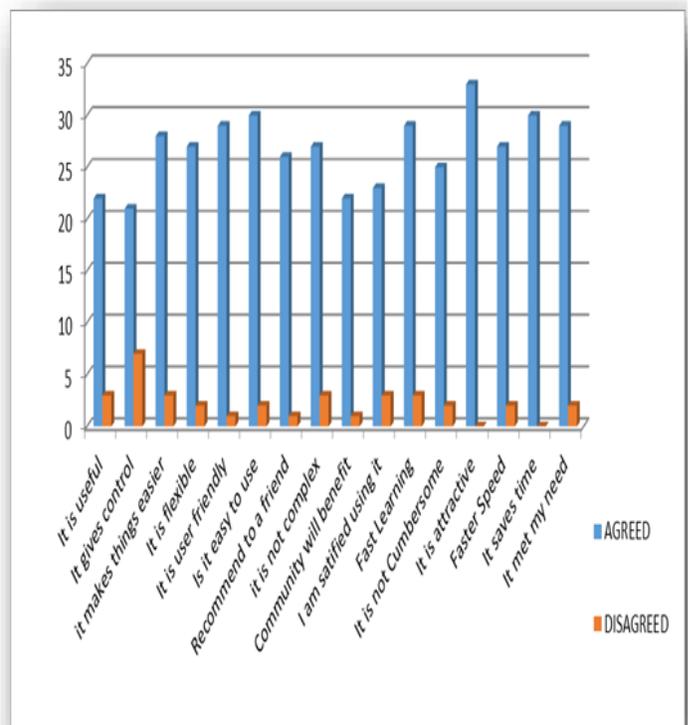


FIGURE 8: CHART OF AGREED AND DISAGREED

IX. CONCLUSION

In this research work, the need to develop Mobile APPLICATION FOR Monitoring and Management of Out-Patients been identified. A remote patient monitoring and management system for clinical consultation that increase the doctor to patient interaction using a Java-enabled mobile android phone was developed and the file size for Remote Clinical Consultation Application version (1.0) is 16.44MB. It is a multi-way communication care and management application, with real-time feedback. This research work is recommended to medical practitioners including doctors, nurses, medical laboratory scientist, pharmacist and medical patients to enhance real time medical interaction via mobile platform. Moreover, healthcare policy makers are encouraged to peruse the contributions of this research work in the use of mobile healthcare system.

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Banking Sector Reforms and Money Market Performance: Evidence from Nigeria

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Abstract- This paper examined the relationship subsisting between banking sector reforms and money market. Annual data collected from the Central Bank of Nigeria (CBN) statistical bulletin spanning the period 2004 – 2018 were analysed using the OLS model. The study adopted commercial paper as a proxy for money market performance, while banking reforms was proxied by credit to the private sector (CPS), broad money supply (M2) and total bank deposit (TD). Our findings revealed that an increase in the credit to the private sector (CPS) and total deposits (TD) will lead to a significant rise in the volume of commercial paper (CP) traded on the Nigerian Stock Exchange. While an increase in a rise in the total money supply in the economy will lead to a significant fall in the volume of commercial paper (CP) traded on the Nigerian Stock Exchange. To this tune, we recommend amongst others that the government continue to consolidate on existing reforms to improve deepening of the money market.

Index Terms- Banking sector, commercial paper, money market, money supply, credit

I. INTRODUCTION

Due to the substantial improvement of the financial infrastructure, the restructuring of the regulatory and supervisory framework to tackle the issues of low capitalization and the organized funding of low-cost credit for the real sector are the main reasons why banking reforms are underway. Weakness in the banking system, marked by chronic illiquidity, insolvency, under-capitalization, high level of non-performing loans and weak corporate governance, among others, may cause a banking crisis (Adebaju and Olokoyo, 2008). Monetary policy shocks can also weaken vulnerable banks'.

From 1956 to the present, various reforms have been carried out in the Nigerian banking industry; the essence of these reforms was to strengthen the banking system to meet current realities and changes in line with international best practices and to save depositor funds. This work would primarily concentrate on the CBN's July 6, 2004 banking sector reform, with a clear mandate to ensure stability and economic prosperity. In his words, Professor Charles Soludo, the then Governor of the Central Bank of Nigeria from June 2004 to June 2009, said the reforms were designed to create exchange rate and price stability, manage interest rates for stability and growth of macroeconomic coordination, follow vigorously the CBN's developmental functions, strengthen the payment system, diversify the financial

sector while issuing regulatory reforms and policies to incorporate the financial system of Nigeria into a regional and global financial system.

He also stressed his intention to concentrate on the restructuring of the banking sector. The restructuring of the banking system was to be the first stage of reforms aimed at securing a diverse, strong and confident banking sector that will secure capital for depositors, play an active development role in the Nigerian economy and be effective and successful players in the regional and global financial system in Africa. The move was to help the banks become strong players for good health, long live and positive economic contributors. Depositors had been supposed to have sweet dreams after this reform. The universal banking system introduced in 1999 turned banks into one-stop shops offering a range of financial services, insurance, mortgage, stock broking, investment, banking, etc. Unfortunately, following the observation that the banks were jeopardizing the funds of shareholders and not concentrating on their core areas of competence, the central bank of Nigeria announced on 15 March 2010 the phasing out of universal banking, which lasted 18 months. All these reforms have taken place but many people still have doubts about the benefits, especially as it relates to bank results. Several other banks have gone down the lane after the Soludo's bank recapitalisation. Examples include Oceanic Bank, Intercontinental Bank, Afri Bank and others. The recent wage of downsizing banks and cutting allowances for staff had been a crucial issue for the Nigerian economy.

In a simple reasoning, the banks are still not performing satisfactorily despite these reforms. Using various performance indicators such as asset return, equity return, net interest margin, and profitability index, and these ratios and other bank performance proxies had also been on the negative and falling numbers in several researches. These factors diminished trust in the banking market, and also undermined the confidence of investors. When banks do well, of course, it translates into healthy economic well-being because they will lend to the real sector, thereby solving the macroeconomic problems. The overall effect can be felt by the small to medium production scale. With these reforms in place the benefits relate to bank performance is still a doubt to many people. After the Soludo's bank recapitalization, several other banks had gone down the lane. Such as Oceanic bank, Intercontinental bank, Afri Bank and others. The recent wage of bank downsizing and staff reduction in allowances had been a crucial problem to the Nigerian economy.

Despite these reforms banks are still not performing satisfactorily within the country. However, using different performance indicators such as return on assets, return on equity, net interest margin, and profitability index. These ratios and others proxies of bank performance had also been on the negative and falling digits in several researches. These factors have reduced performance in the banking sector, while also eroded investors' confidence too. Of course, when banks do well, it translates to a healthy economic wellbeing; because they will lend to the real sector thereby solving the macroeconomic problems; as the overall effect may be felt by the small and medium scale enterprises in the country.

II. REVIEW OF LITERATURE

2.0.1 Theoretical Review

The theoretical foundation of this research is moored on the relationship that exists between financial intermediation and the financial system. The origin of the Finance and Growth relationship can be traced to the works of Schumpeter (1912) who argued that financial services are paramount in economic growth of the exchange economy. Literatures on the role of financial intermediation and the financial system in economic development were rekindled by Mckinnon (1973) and Shaw (1973). In their clarifications, they opined that functions of financial institutions in the savings-investment process were highlighted as being an effective conduit for the mobilisation and allocation of capital by equilibrating the supply of loanable funds with the demand for investment funds, (banking activities) and the transformation and distribution of risks.

They further add that 'financial liberalization' theory which they argued that government restrictions on the banking system restrain the quality and quantum of investment which is dependent on money supply (M_2), more so a theoretical relationship between financial policy reforms and money market operations.

Therefore, in the traditional Keynesian theory; the impact of monetary policy can be transmitted to the rest of the economy through the monetary system. Owing to the fact that the banking system provides transaction services and manage the nation's payments system; provides backup liquidity to grease the economy; and they are conduit through which monetary policy is been transmitted. Because of their special function in the economy, the government set up a safety net to protect the banking system from eminent collapse.

2.0.2 Empirical Review

Asekome and Abieyuwa (2014) appraised major banking sector reforms in Nigeria from 1958 to 2011, they observed that most of the banking sector reforms in Nigeria were reactive rather being proactive and directed towards particular issues that arose from time to time. They asserted that the approach of regulatory authorities should be holistic because most of the positive impacts of many of the reforms were short lived and unsustainable. They further recommended the need to strengthen and monitor the supervisory capacity of the apex authorities through effective training and capacity building for CBN and the NDIC to strengthen their effectiveness. They also suggested the need to transfer some of the functions of CBN to other apex agencies such as the NDIC as the CBN appears to be over saddled with many

responsibilities beyond its present capacity. Uduak and Udonwa (2015) investigated the performance of Commercial Banks in Nigeria before and after the Banking Sector Reforms from 1970-2012. The Error Correction Mechanism and Chow test were adopted to model the variables under consideration. The study found out that the reforms brought about changes in Commercial Banks Performance in Nigeria; as the level of profit (measured by NIM) improved above a single digit of 9.17 in 1996 to 16.18 in 2004 and peaked at 20.96 in 2011. Which translated into a mean profit of 2.40 recorded in the deregulated period as against 1.54 recorded in the regulated period.

Adolphus and Daerego (2013) examined the effects of banking sector reforms on bank management practices in Nigeria. Comparable data for the pre-reform period (1960-1985) and the post-reform period (1986-2008) were captured from the Central Bank of Nigeria (CBN) Statistical Bulletin. These data were analysed with the aid of descriptive and inferential statistical tools. The descriptive statistics indicated steeply rising lending rates and widening bank margins in the post-reform period. Their findings suggested that Critical bank management variables like bank liquidity ratio (BLR) and loan-to-deposit ratio (LTDR) fell outside prudential limits, portraying continuing compliance lapses in the post-reform period. Moreover, the liquidity and funding capabilities of banks did not improve significantly with falling savings rates and cash reserve ratio (CRR). In the pre-reform period, the banks adopted conservative lending policies as the prime lending rate (PLR) became more significant in determining their liquidity and funding profiles. In the post-reform period, bank management were aggressive in their lending policies as the loan-to-deposit ratio was more significantly sensitive to changes in the maximum lending rate (MLR). Both prudential and policy incentives made banks to expand funding to all sectors irrespective of their risk class. Marginal increases in the treasury certificate rate (TCR) and minimum rediscount rate (MRR) brought about a significant reduction in the cash reserve ratio (CRR), hence facilitating banking intermediation.

Umar (2019) appraised banking reforms in Nigeria and its impact on the economy. The findings of this study suggested that in Nigeria, most banks struggle with a low capital base, weak corporate governance, insolvency etc. which necessitated the introduction of the banking sector reform in Nigeria by 2004. However, through banking sector reforms, the government of Nigeria was able to move the economy forward by achieving sustainable economic growth and development. The author is of the opinion that the Nigerian banking sector reforms remained a reference point for the positive development in the Nigeria economy, African region and the world; as the new banking environment created by the reforms has enabled the delisting of Nigeria from the Financial Action Tax Forces (FATF) register of countries that are in breach of the global anti-money laundering and anti-corruption code. Olokoyo, (2013) evaluated the impact of bank reforms on the performance of banks in Nigeria. The author adopted a qualitative research style as data were obtained via questionnaires. However, data obtained were analysed using the Analysis of Variance (ANOVA) method. The findings suggested that the recapitalization and consolidation process had a significant effect on the manufacturing sector of the economy and thus on the Nigerian economy at large. However findings further

revealed that despite the reforms, post consolidation challenges like challenges of increased return on investment still existed.

Gidigbi (2017) assessed the impact of banking reforms on banks' performance and economic growth for the period 1981 to 2015; the ANOVA model was fit into a Stepwise Regression. Using dummy variables to isolate reform periods. The results showed that banking reforms contributed positively to economic growth, especially for the period 1999 to 2004. Furthermore, it was observed that banking reforms contributed negatively to banks' performance, following the 1993 reforms. The study confirmed that banking system reforms in Nigeria have dual impact on the economy and banks' performance. Thus, the study recommended that pre-crisis reforms testing by the apex bank be carried out frequently. Ifeanyi and Emmanuel (2017) examined the effect of banking reforms on economic development of Nigeria for the period 1986 – 2014. Data for the study were sourced from Central Bank of Nigeria Statistical Bulletins, publications of National Bureau of Statistics and Annual Reports of Deposit Money Banks. The Ordinary Least Square (OLS) regression was employed for the analysis. The study revealed that the Minimum Capital Base of banks has a positive and significant effect on Gross Domestic Product; while banks' minimum capital base has a negative and significant effect on Inflation. However, it was observed that banks' minimum capital base has a significant positive effect on unemployment. Thus, the study amongst others concluded that the monetary authorities should always take Minimum Capital Base of banks into consideration in banking reforms as it has the capacity to trigger economic development of Nigeria.

Umor and Austin (2014) accessed banking reforms from a financial management standpoint. Financial data drawn from CBN covering 23 years (1985-2008) were analysed using the OLS model. The study examined bank capital as a predictor variable in relation to aggregate private sector credit and gross domestic product as respective criterion variables. The findings established efficacy of bank capital as significant determinant of the dynamics of aggregate private sector credit and gross domestic product in Nigeria. Ikpefan, and Kazeem (2013) investigated the effectiveness of economic policy reforms in the Nigerian banking industry from 2000 to 2009; to detect whether bank mergers produced any performance gains in the banking industry. The panel data OLS was employed to investigate if any significant effect on the performance of banks from the pre to the post-merger periods exist. The results of the study suggests that merger created synergy is statistically significant with an increasing post-merger financial performance.

Tomola and Sola (2011) examined the implications of financial reform and interest rate behaviour on economic growth in Nigeria. The co integration and error correction model were used on time series data from 1970-2006. The results demonstrated that financial reform and interest rates have significant impact on economic growth in Nigeria. However, the authors recommended that government embark on growth enhancing financial reform and be sensitive to the behaviour of interest rates for overall economic growth in the country. Nathanael (2014) investigated the impact of the banking sector reforms on the Nigerian economy using the Ordinary Least Squares (OLS) technique in assessing the data on variables from 1980 to 2012. The result showed that the minimum capital base which is at the heart of the banking sector reform has a positive

and significant relationship with the level of economic growth. While high interest rate policy has been detrimental to the level of economic progress in Nigeria. The result further revealed that the expansionary monetary policy has been crucial and critical in the development process in Nigeria. They recommended amongst others that the monetary authorities should further increase the minimum capital base and there should be perpetuation of the expansionary monetary policy.

Pavtar and Agir (2016) investigated the nexus between money market and economic growth in Nigeria, using data from 1985-2014. The OLS method was adopted to analyse the data. The study found that Treasury bill, Treasury certificate, Commercial paper do not have any significant effect on the gross domestic product (GDP) of Nigeria while Certificate of deposits was found to significantly impact on the gross domestic product (GDP) of Nigeria. The study recommended amongst others the need for Government to create appropriate macroeconomic policies, legal framework and consolidate on existing reforms to improve and deepening the market; so as to spur economic growth.

2.0.3 Conceptual Framework Money Market instruments

The money market was developed with two main objectives in mind: to provide the public and private sectors with means to raise short-term money and invest cash and to serve as a conduit for the management of liquidity and money by the monetary authorities. One is therefore not surprised that the money market did not come into existence until the establishment of the CBN in 1959. The major nine institutions operating in the money market are the Treasury/Central Bank dealing in treasury bills, treasury certificates, government development stocks, (all Federal government borrowing instruments), the commercial banks, dealing mainly in bankers acceptances, certificates of deposits, and bankers unit funds and private companies dealing mainly in commercial papers.

Economists have come to disagree on the level of government intervention in economic and financial activities all over the world. While some believe that many regulations are necessary in order to protect the depositors' funds and confidence, others believe that banks are overregulated (Adam, 2005; Elumilade, 2010). For instance, the economic theory of regulation postulates that regulation result from the desire of government to eliminate or correct market failure. It seems that economic theory of regulation has gained more acceptance among economists as Llewellyn (1986) puts it. Regulation is necessary in the case of banks specifically to maintain safe and sound banking system that can meet its obligation without difficulty. Hence, a high solvency and liquidity level is expected of individual banks than they would ordinarily maintain.

Loss of public confidence in the banking system occurs when a bank or some banks in the system experience illiquidity or insolvency resulting in a situation where depositors fear the loss of their deposits and a consequent break down of contractual obligations that results in runs on the bank. While a bank is said to be illiquid when it could no longer meet its liabilities as they mature for payment, it is said to be insolvent when the value of its realizable assets is less than the total value of its liabilities (a case of "negative net worth"). The above is inconsistent with the work Lagunju (2014) that found significant relationship between

liquidity and commercial banks profitability, but he further adds that the success of deposit money bank is its ability to manage liquidity because excess liquidity and illiquidity are “Financial disease”. The uncertainty generated as a result of loss of confidence in banking institutions, if left unchecked, often raises real interest rates, creates higher costs of transactions and disrupts the payment mechanism with the attendant economic consequence (Okafor, 2012).

Chuke (2004) opines that the money market is one that creates opportunities for raising and investing short term funds. He further adds that short term funds are funds which are lent or borrowed for a period which might ranges from as short as overnight up to about one year and sometimes longer. Various financial instruments are exchanged in the money market. The money market instruments include Treasury bills, Treasury certificates, bill of exchange, commercial papers, certificate of deposit, and bankers’ acceptance.

III. METHODOLOGY

The study utilized annual time series data for the period 2004-2018, obtained from Central Bank of Nigeria (CBN)

statistical bulletin. The data used includes; commercial paper, total deposits, broad money supply and credit to the private sector. The model adopted for this study is thus specified below as;

$$CP_{i,t} = \beta_0 + \beta_1TD + \beta_2M2 + \beta_3CPS + \varepsilon_{i,t} \quad (1)$$

Where;

CP refers to Credit to the Private Sector

TD is Total Deposits in the banking system

M2 refers to Treasury certificates

CPS refers to Commercial deposit

IV. RESULTS AND DISCUSSION OF FINDINGS

4.0.1 Descriptive Statistics of Data

The analysis of descriptive statistics is hereby performed so as to find out the properties of the data. Table 1 shows the data characteristics including total number of observations, means, standard deviation, Jarque-Bera statistics and their respective minimum and maximum values of the respective variables from the period of 2004 to 2018.

Table 1: Descriptive Statistics

| | CP | CPS | M2 | TD |
|--------------------------------|----------|-----------|----------|----------|
| Mean | 173.6333 | 16.42267 | 12480.08 | 51927.71 |
| Median | 80.10000 | 18.60000 | 12172.49 | 3296.230 |
| Maximum | 822.7000 | 20.77000 | 25079.72 | 308851.8 |
| Minimum | 1.100000 | 7.990000 | 2131.820 | 19.72000 |
| Std. Dev. | 235.4932 | 4.873503 | 7391.454 | 88600.67 |
| Skewness | 1.612862 | -0.952921 | 0.144893 | 1.945479 |
| Kurtosis | 4.902697 | 2.192443 | 1.878764 | 5.879706 |
| Jarque-Bera Probability | 8.765966 | 2.677740 | 0.838217 | 14.64516 |
| | 0.012488 | 0.262142 | 0.657633 | 0.000660 |
| Sum | 2604.500 | 246.3400 | 187201.2 | 778915.7 |
| Sum Sq. Dev. | 776398.7 | 332.5145 | 7.65E+08 | 1.10E+11 |
| Observations | 15 | 15 | 15 | 15 |

From table 1 above, it was observed that the mean values of commercial paper (CP), credit to the private sector (CPS), money supply (M2) and total deposit (TD) were 173.6333, 16.42267, 12480.08 and 51927.71 respectively. The variability in the distributions as captured by the standard deviation, suggests that CP and TD were dispersed from their mean since its standard deviation value were above their mean value. Conversely, CPS and M2 were found not to be very volatile.

Furthermore, the skewness values of CP (1.612862), M2 (0.144893) and TD (1.945479) suggests that are positively skewed. Contrariwise, only CPS (0.952921) was negatively skewed. Finally, the Jarque-Bera statistics indicates that TD and CP were considered not to have a normal distribution since their p-values were less than 10% level. However, only CPS and M2 were considered normally distributed.

4.0.2 Correlation Analysis

Correlation is a statistical tool that describes the degree of linear association between two or more variables. From Table 2, a weak and negative association was noticed amongst the variables. However, only the association between CP and M2 was found to be significant at 5%.

Furthermore, according to Gujarati (2006) if the pair-wise correlation among the independent variables is greater than 80%, then multicollinearity is said to have occurred. From table 2 below, the result attested to the fact that pair-wise correlation for all variables are less than 80%. The highest percentage of pair-wise correlation was -50.73% between commercial paper (CP) and money supply (M2). Therefore, it can be concluded that multicollinearity does not exist in the model.

Table 2: Pearson Correlation Matrix

| Correlation Probability | CP | CPS | M2 | TD |
|-------------------------|-------------------------------------|------------------------------------|------------------------------------|-------------------|
| CP | 1.000000 ----- | | | |
| CPS | -0.126500 (0.6533) | 1.000000 ----- | | |
| M2 | -0.507365 (0.0535 ^b) | 0.765924 (0.0009 ^a) | 1.000000 ----- | |
| TD | -0.367054 (0.1784) | 0.153888 (0.5840) | 0.666040 (0.0067 ^a) | 1.000000 ----- |

p-values are in parenthesis ()
 a/b/c, indicates significance at 1%, 5% & 10% respectively
 Source: Authors Computation Using Eviews 10+

4.0.3 Unit Root Test

Stationarity implies that the mean, variance and covariance are constant across different periods. Existence of unit roots can lead to serious issues such as; spurious regressions and errant behaviour variables due to econometric assumptions for analysis not being valid. This study tested for the stationarity of all variables used by applying two different time-series unit root test namely; the Augmented Dickey Fuller (ADF) and Philips Perron (PP) tests. According to table 3 below, all variables were levels stationary; i.e. I(0).

Table 3 Unit Root Test Results

| Variables | ADF Test | Remarks | PP Test | Remarks |
|-----------|------------------------|---------|------------------------|---------|
| CP | -5.094867 ^a | I(0) | -5.112462 ^a | I(0) |
| CPS | -3.633633 ^b | I(0) | -3.243441 ^b | I(0) |
| M2 | -4.264593 ^a | I(0) | -4.351742 ^a | I(0) |
| TD | -4.347729 ^a | I(0) | -4.346211 ^a | I(0) |

a/b/c, indicates significance at 1%, 5% & 10% respectively.
 Source: Author’s Computation Using Eviews 10+

4.0.4 Estimated Result of Banking Sector Reform and Money Market Performance in Nigeria

From Table 4, our findings suggest that the estimated results from equation (1) indicated that credit to the private sector (CPS) and total deposits (TD) has a positive and significant effect on commercial paper (CP) in Nigeria at 1% and 10% significance level respectively. The positive relationship observed amongst the explanatory variables on the dependent variable (CP) suggests that

an increase in CPS and TD will lead to a rise in the volume of commercial paper (CP) traded on the Nigerian Stock Exchange. However, money supply (M2) was found to have a negative and significant relationship with CP at 1% level. This suggests that an increase in a rise in the total money supply in the economy will lead to a fall in the volume of commercial paper (CP) traded on the Nigerian Stock Exchange.

Table 4: Summary of the effect of Banking Sector Reform and Money Market Performance in Nigeria

Dependent Variable: CP
 Method: Least Squares
 Date: 02/04/20 Time: 13:56
 Sample: 2004 2018
 Included observations: 15

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|--------|
| C | -167.1946 | 208.5936 | -0.801532 | 0.4398 |

| | | | | |
|--------------------|-----------|-----------------------|-----------|---------------------|
| CPS | 63.49963 | 21.96638 | 2.890765 | 0.0147 ^a |
| M2 | -0.064976 | 0.019186 | -3.386726 | 0.0061 ^a |
| TD | 0.002097 | 0.001041 | 2.013782 | 0.0692 ^c |
| <hr/> | | | | |
| R-squared | 0.578870 | Mean dependent var | 173.6333 | |
| Adjusted R-squared | 0.464016 | S.D. dependent var | 235.4932 | |
| S.E. of regression | 172.4067 | Akaike info criterion | 13.36077 | |
| Sum squared resid | 326964.8 | Schwarz criterion | 13.54958 | |
| Log likelihood | -96.20576 | Hannan-Quinn criter. | 13.35876 | |
| F-statistic | 5.040067 | Durbin-Watson stat | 1.942945 | |
| Prob(F-statistic) | 0.019445 | | | |

a/b/c, indicates significance at 1%, 5% & 10% respectively

Source: Authors Computation Using Eviews 10+

Furthermore, the adjusted R² value suggests that 57.87% of the variation in the dependent variable; CP is explained by the independent variables (CPS, M2 and TD). The 42.13% variance in CP is explained by other factors not captured in this research. Also, the F-statistic of 5.040067 suggests that the model is significant at a 1% level. Finally, Durbin-Watson statistic of 1.942945 indicates absence of positive autocorrelation in the model.

V. CONCLUSION AND RECOMMENDATIONS

This study had set forth to provide an insightful understanding as to the relationship between banking sector reform and money market performance in Nigeria. The study utilized time series data spanning 2004 – 2018. The various unit root tests suggested that all variables were levels stationary.

The findings of the study indicated that an increase in the credit to the private sector (CPS) and total deposits (TD) will lead to a significant rise in the volume of commercial paper (CP) traded on the Nigerian Stock Exchange. While an increase in a rise in the total money supply in the economy will lead to a significant fall in the volume of commercial paper (CP) traded on the Nigerian Stock Exchange.

This study therefore recommends that;

1. That the government continue to consolidate on existing reforms to improve deepening of the money market.
2. A continued expansion of the monetary policy within the economy is necessary to boosting growth in the money market.

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Impact of Training on Non-Managerial Employee Performance in Star Rated Hotel Industry in Matale District

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Abstract Training is regarded as an important concept that leaders have to learn for greater performance of employees of any organization. The purpose of this study was to examine the impact of training on non-managerial employees' performance in hotel industry in Matale District. Therefore, this study could make important contribution to management field. The research model conceptualized a positive impact of independent variables (competencies, individual characteristic, trainers and work environment) on the dependent variable (employee performance). A total of 154 non managerial employees were selected from three hotels in Matale district. proportionate stratified random sampling method were used for selecting sample and included the sample 50% of employee in each level. A structured questionnaire was used to measure the dependent and independent variable and analyzed using the descriptive analysis, correlation analysis and regression analysis. Correlation analysis results revealed that there is positive relationship between independent variable (Competency, Individual characteristic, Trainers and work environment) and employee performance. The results of regression analysis, indicated there was positive and significant impact of competency on employee performance, significant positive impact of individual characteristic on employee performance, positive significant impact of trainers on employee performance and positive significant impact of work environment on employee performance. Furthermore, R^2 value indicated that 39% variance of employee performance was explained by independents variables (Competencies, individual characteristic, trainers and work environment).

Key Words- Employee Performance, Training,

1. INTRODUCTION

Employees are one of major resource that providing rare, inimitable value in order to gaining the competitive advantage for the organization. Thus, every organizations focus on enhancing and carrying better employee performance for ensuring the sustainable survival of the organization. Poor performance management led to the high turnover lower productivity and higher cost. (Omran, 2016) Duggan (2017) stated that after the revamps of performance management it has cut down voluntary employee turnover by 30%. It is clear that poor performance management can occur less motivation, turnover etc. Lack of ability to perform a given task for the employees caused to increase the level of turnover of the organizations. Further Sanyal and Hisam (2015) proved the above statement by clarifying less of capable employees are prefer to leave the job as employees are lack of ability to understand and have no proper idea how to perform the given task. Hijr and Haleem (2017) Pointed out that employee performance of the employees in Steel Factory in Saudi Arabia was in lower level due to the lack of knowledgeable workers. Also lower level performance led to lower productivity and high cost of the organization. Omran (2016) indicated that the construction industry in Libya is suffering from number of issues due to the lack of employee performance. Sanyal and Hisam (2015) Stated that there was major issue with the performance of the employees in the educational industry. Many of employees are with lack of competency and many of staff members don't have requisite knowledge and skill in the educational system. Ameerq and Hanif (2013) pointed out that even though there was growing hotel industry in Pakistan the performance is falling down. Hassan, Mugambi and Waiganjo (2015) indicated that hotel industry in Kenya showing declining results even there were highly increasing industry for the hotels. The author further stated that pay attention for the enhancing employee performance could be effective in relevant to overcome the obstacles. Zhang (2016) stated up to considerable time period the market growth rate of the United Kingdom had a favorable manner, with the global slum in 2008 – 2009 the growth rate in the hotel industry had no considerable improvements. Even in the Sri Lanka the employee performance in hotel industry faced many of issues in employee performance. Through the interviewed carried out by selected hotel managers shared information regarding employee performance problems. There were three managers for the interview from Matale district. One of manager shared experience that some employees are dealing with visitors in aggressive manner and many of complains arise from the visitors for the management due to the unpleasant behavior of the employees towards the visitors. Furthermore, out of seven employees three of employees were resigned in the hotels concluding the reason for leaving the hotel due to inability and lack of knowledge about performing job task. Daily Mirror (2015) mentioned Sri Lanka Was the sixth largest forex earner to the country at one time and but now it has declined to the third place preceded by only apparel industry and worker remittance. The article published by the Daily Mirror (2018) has reported that even Sri Lanka has reported high economic growth rate comparing with other south Asian countries, per capita income is relatively low. Therefore, it has

indicated that tourism and hospitality sector as one of major industry to drive Sri Lanka in an efficient way as Tourism sector is the fastest growing sector with annual economic growth rate 25% - 30% (Daily Mirror 2018) But still there are some major problem related to develop the tourism sector due to Labor shortage. (Daily Mirror 2018) which means employees who has no sufficient skill and abilities to perform the job well. Daily News (2010) reported that Lionel Wijesiri further mentioned that non market driven strategy as a key issue in the tourism industry which means unable to enhance the market value of the tourism industry. Daily Mirror (2017) reported that there is lack of professionally efficient work force and more consideration need to give for enhancing employee performance in order to developing the tourism industry in Sri Lanka. As a one of major sector focusing the uplifting economy of Sri Lanka more attention on enhancing employee performance is really essential. Hence within Sri Lankan context it is really important to focus on enhancing employee performance for the Organization development and ultimately country development

Problem Statement

Identifying the importance of training in recent years has influenced by the organizations where investment in employee development is considerably emphasized. (Hijr & Haleem, 2017) Training is need to ensure that the staff is technically and socially competent and capable of career development into specialist management positions. Hence, continuous staff development, training fulfils are important process. (Hijr & Haleem, 2017) Even though strong assumptions that work place training influenced employee out comes such as motivation, commitment, job knowledge, functional skill there is limited Studies in field settings addressing the issues empirically (Dysvik & Kuvaas, 2008) Also Burgard Gorlitz (2011) argued that non-monetary returns to training are less often examined in the empirical literature. Hence, above statements prove that how important is it to study the impact on training on competency, individual characteristic, trainers and work environment on employee performance. Training is not important only for particular organization, training is equally important to all the organizations in the economy. The hotel industry, one of important industry in the economy plays very significant role in the overall economic development, foreign exchange earner and development of the country. The researcher believes that the greater development of the hotel industry is the greater development of the country. A lot of researches has already been done on impact of training and development on employee performance (Ameeq & Hanif, 2013; Omran, 2016) But most of those research is based on banking sector or public sector. A study in hotel industry examine impact of training on employee performance in Sri Lankan context is a new thing. For this study the dimensions used in conceptual frame work is non-monetary factors including competency, individual characteristic, trainers and work environment. Hence, above statement also proves that a study regarding such dimensions are really importance now a day. This study will be immensely relevant not only for academic purpose, but also for the view of corporate implementation. Competence in employee's qualities which lead to the better performance will analyze.

Therefore, here contradictions on training and its impact on non-managerial employees' job performance in hotel industry in Matale district lead to the identification of a research problem that is worth to study. The problem statement addressed in the present study;

Do competency, individual characteristic, trainers and work environment contribute to non-managerial employees' job performance in hotel industry in Matale district?

2. LITERATURE REVIEW

2.1 Employee Performance

Afsana, Afrin , and Tarannum (2016) Defined employee performance as the attainment of specific tasks through the effort apply by employees of an organization. The most valuable asset in an organization is the workforce.. There are number of dimensions that can be used to measure employee performance either in organization context or employee context. According Ahuja (2006) productivity, efficiency, effectiveness, quality and profitability of organization are dimensions that can be taken to measure the performance. The working quality can be carried out through the employee maximum commitment to perform task, employee positive attitudes to meeting organization's expectation being understand personal performance objectives. (Zhangpeidi, 2016) According Aguinis (2006) dimension of performance explained as task dimension of performance and contextual dimensions of performance. Task dimension of employee performance include all activities that use or allow to complete the task of the job. Contextual dimension of performance is including all behaviors that make an employee act responsibility and helping to achieve organizational goals. Murphy (1989) stated that task performance, contextual performance and downtime behavior are dimensions of employee performance. Allworth and Hesketh (1999) pointed out that contextual performance, task performance and adoptive performance as dimensions of employee performance. Task performance, Contextual performance, Adaptive performance, counterproductive behavior as dimensions of employee performance. (Koopmans, Bernaards, Hildebrandt Schaufeli, Vet & Beek, 2011) Sinclair and Tucker (2006) indicated that contextual performance, task performance and adaptive performance has significant impact on employee performance. Kappagoda (2018) indicated that task performance and contextual performance of employees are very important for the organizational performance. Different researchers have identified various dimensions of employee performance. But for this study the researcher used task performance, contextual performance and adoptive performance (Koopmans, et al., 2011; Kappagoda, 2018; Sinclair & Tucker, 2006; Allworth & Hesketh, 1999) as the dimensions of employee performance

2.2 Training

Noe (2010) defined training as planned effort done by a company to facilitate employees' learning of knowledge, skill, behavior (competencies) related to the job, that are important to successful employee performance.. Motlokoa et al (2018) stated that training helped to sharpen the employees Knowledge, skill, capabilities in order to have better employee performance. Tahir, Yousafzi and Hashim (2014) indicated that training enhance employees' knowledge, skill, competency. Training helped to get skilled and capable employees to the organization than untrained employees. Orman (2016) stated that curricular of the training program, administrative and supervisory service, Ali (2011) indicated that the learner, learning process, content, learning environment are significant factors for successful learning while Kaur, Shiram and Kavichardran (2011) argued that people, structure, environment and resources are important for success training. Participants, trainers, training material, work environment has significant impact on effectiveness of the training according (Sharif & Bhauiyay, 2015) Work environment characteristics, participant's characteristics, training design are effect to the training. Accordiing Nassazi (2013) most of benefits derived from training when training is planned, which means organization, trainers and trainees are in adherence need to prepared. Thus it proved that competency (Tahir., et al 2014; Driskell, 2011; Punia & Kant, 2013; Motlokoa & Sekantsi, 2018) trainees' characteristics (Noe, 1986; Piezzi, 2002; Driskell, 2011; Ali, 2011; Shiram & Kavichardran 2011) trainers (Orman, 2016; Sharif & Bhauiyay, 2015; Nassazi, 2013) work environment (Yaqoot et al., 2017; Ali, 2011; Shiram & Kavichardran, 2011; Sharif & Bhauiyay, 2015; Tonhauser & Buker, 2016; Yaqoot et al., 2017) are important factors that affect to the training.

According parsimony concept simplicity is much important for implementing solutions for the problems in complex research rather than considering large number of factors. Having unmanageable factors are out of manager's control to change. Thus it is better to have limited or manageable number of factors that mangers cab be easily make implementation for better solution for particular problem. Hence for the study also it has selected number of factors that affect to the training in order to have better employee performance. competencies, trainees' characteristics, trainers, and work environment are the factors that used for the study (Sekaran, 2010)

2.3 Relationship between Training and Employee performance

Angela (2014) stated that training effects the performance of employee. The findings indicated that training enhance employee performance. Javeed, Ahmad and Iqbal (2014) indicated relationship between training and its impact on employee performance in telecommunication sector by using 150 employees for research.. The research findings of the Boateng (2011) showed that training has a significant impact on employee productivity. . Mohamud (2014) highlighted that training affect employee performance in public sector in Kenya.

2.3.1 Relationship Between Competencies and Employee Performance

Nyokabi (2014) stated that training play significant role in developing existing and new employees' competencies for effective performance. The findings highlighted that training provide significant impact on acquiring knowledge, skill, attitudes (competencies) which assist to improve employee performance by applying relevant training course based on organizational objectives. Tanveer (2015) stated the impact of training on employee performance in banking sector. The findings pointed out that training had positive impact on employee job knowledge, Skill, quality of work which are directly linked with employee performance.

2.3.2 Relationship Between Individual Characteristics and Employee Performance

According Gitongu, Kingi, and Uzel (2016) indicated that there was moderate and positive significant correlation between individual characteristics and employee performance. Cheong and Desa (2011) pointed out that positive influence of individual characteristic on employee performance. According Rehman, Ullah, and Haq (2015) employee character abilities including interpersonal ability, emotional skill and physical abilities have significant influence on employee performance.

2.3.3. Relationship Between Trainers and Employee Performance.

Driskell (2011) indicated that training content and trainers have significant impact in order to have better employee performance. Salah (2016) indicated that there is positive impact of training and trainers in order to improve employee performance. Manjula (2017) stated that expertise trainers have impact on effective training in order to have better employee performance.

2.3.4 Relationship Between Work Environment and Employee Performance

Zhang (2016) indicated the factors affecting employee performance in the UK hotels. The results pointed out that the greater working environment within organization helped employee to deliver higher quality service and better employee performance. (Gittell, Seidner & Wimbush, 2010) According Munisamy (2013) stated that work environment has strong positive relationship with job performance. Less encouragement from the management, uncomfortable working environment decrease employee performance and findings pointed out that working environment has significant impact on job performance.

Thus based on the research findings following hypothesis were developed for the study.

H: There is Positive impact of training on non managerial employee performance in hotel industry.

H1: There is a positive and significant impact of competency on non-managerial employee performance in hotel industry in Matala district.

H2: There is a positive and significant impact of individual characteristic on non-managerial employee performance in hotel industry in Matala district

H3: There is a positive and significant impact of trainers on non-managerial employee performance in hotel industry in Matala district

H4: There is a positive and significant impact of work environment on non-managerial employee performance in hotel industry in Matala district

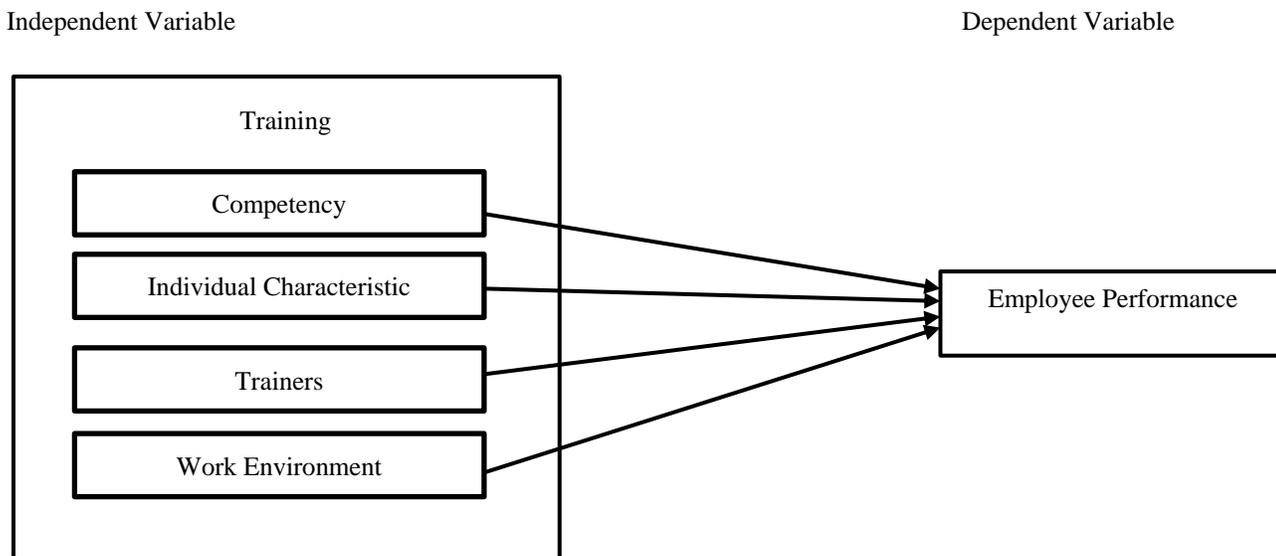
3. METHODOLOGY

The objective is to establish the impact of independent variables (training) on the dependent variable (employee performance). Therefore, the type of this study is regression and correlational rather than causal study. This study is conducted within the natural environment in the hotel sector under minimal interference within a non-contrived setting. Quantitative techniques were used for data collection and analysis. Data was collected by non-managerial employees in hotels in Matale district were considered as single respondent. Hence the unit of analysis of the study is individual. Population of the study were concerned with the non-managerial employees in the selected three hotels in Matale district. There were totally 311 non managerial employees in the selected hotel. Thus all 311 non managerial employees were the population of the study. Selected employees perform in different departments. Proportionate stratified random sampling method was used for selecting sample. Considering the time and convenience of the research requirements, sample size selected as 154. In here 50% of employees were in each level, included in this sample. Data was collected in using a structured questionnaire which consisted of 50 questions to identify the impact of independent variables on dependent variable. Descriptive statistic, correlation analysis and regression analysis were used to analyzed the data. And also, researcher used Cronbach's Alpha for test reliability of questionnaires. Cronbach's alpha is a reliability coefficient that point out how well the items in set are positively correlated to one another. (Sekaran, 2010).

Conceptual Framework

The figure 3:1 shown below, described relationship between training and employee performance. Based on the empirical evidences mentioned earlier the following conceptual frame work has developed. The purpose of the study is to examine the impact of training on employees' performance. Thus training considered as the independent variable and employee performance is the dependent variable.

Figure: 3:1 Conceptual Framework



Source: Developed by Researcher

4. RESULTS AND DISCUSSION

4.1 Reliability Analysis

Internal consistency of research variables is represented by the reliability test. Consistency explained how well the items measuring a concept hang together as a set (Sekaran, 2010) The value of the Cronbach's alpha was used to analyze the reliability of the instruments.

Table 4 1: Results of Reliability Analysis

| Variable | No: of Items | Cronbach's Alpha |
|----------------------------|--------------|------------------|
| Competency | 17 | 0.870 |
| Individual characteristics | 7 | 0.755 |
| Trainers | 6 | 0.763 |
| Work Environment | 5 | 0.824 |
| Employee Performance | 15 | 0.904 |

Source: Survey Data (2019)

Generally accepted minimum standard value for the for internal consistency was 0.7. According to the results mentioned by above table 4.1 competency has 0.870 Cronbach alpha value and 0.755 Value for the individual characteristics. 0.763 Cronbach value for the trainers and for work environment 0.824 Cronbach alpha value and for Employee performance 0.904 Cronbach value. Thus all the Cronbach value for the variables used for the study is greater than 0.7 It revealed that each item was positively correlated with one another and the internal consistency reliability was satisfactory.

4.2 Demographic Profile of the Respondents

Table 4 2: Demographic Profile of the Respondents

| Gender | % | Department | % |
|--------------------|------------|-------------------|------------|
| Male | 77 | Front Office | 15 |
| Female | 23 | Housekeeping | 27 |
| | 100 | Food and Beverage | 36 |
| Age | % | Account | 10 |
| Less than 30 | 47. | Maintenance | 12 |
| Between 30-50 | 43 | | 100 |
| More than 50 | 10 | Education Level | % |
| | 100 | Up to O/L | 19 |
| Experience (Years) | % | Passed O/L | 26 |
| Less than 10 | 63 | Passed A/L | 32 |
| Between 10-20 | 32 | Diploma | 17 |
| More than 20 | 5 | Other | 6 |
| | 100 | | 100 |

Source: Survey Data (2019)

4.3 Descriptive Analysis for Research Variables

Table 4 3 Descriptive Statistics

| Variables | Mean | Standard Deviation |
|---------------------------------|--------|--------------------|
| Competency | 3.8079 | .40696 |
| Individual Characteristics (IC) | 3.7462 | .44503 |
| Trainers | 3.4822 | .47251 |
| Work Environment (WE) | 3.6466 | .60857 |
| Employee Performance (EP) | 3.7819 | .48697 |

Source: Survey Data (2019)

Mean value for overall employee performance indicated 3.7819 and value of Standard deviation of the study for the selected variables reported less than 1 which indicates small deviations in responses given by respondents. Mean and SD was used to determine the extent of spread of the data.

4.4 Correlation Analysis

In this section examines the relationship between independent variables and dependent variable in order to test the hypothesis of the research. Therefore, Pearson correlation analysis was used and its results are represented in table 4.4

Table 4.4: Result of Pearson’s Correlation Analysis

| Variable | Correlation | Employee Performance |
|----------------------------|--|----------------------|
| Competency | Pearson Correlation Sig. (1-tailed) | .542** .000 |
| Individual Characteristics | Pearson Correlation Sig. (1-tailed) | .479** .000 |
| Trainers | Pearson Correlation Sig. (1-tailed) | .306** .001 |
| Work Environment | Pearson Correlation Sig. (1-tailed) | .409** .000 |
| Employee Performance | Pearson Correlation Sig. (1-tailed) | 1 |

Source: Survey Data (2019)

** . Correlation is significant at the 0.01 level (1-tailed).

* . Correlation is significant at the 0.05 level (1-tailed)

As shown in Table 4.4 correlation coefficient for competency is 0.542, IC is 0.479, Trainers is 0.306 and WE is 0.409 and all variables were significant at 0.01(p<0.01). Accordingly, it could be concluded that competency, IC, Trainers and WE has significant positive relationship between EP. This result support the hypothesis of the study.

4.5 Result of Regression Analysis

Table 4.5 Result of Regression Analysis

| R Square : 0.393 | | | F=15.893 | Sig. 0.000 | |
|------------------|-----------------------------|------------|---------------------------|------------|------|
| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | β | Std. Error | | | |
| 1 (constant) | 1.312 | | | | .001 |
| Competency | .649 | .100 | .542 | 6.483 | .000 |
| IC | .524 | .096 | .479 | 5.481 | .000 |
| Trainers | .316 | .098 | .306 | 3.234 | .002 |
| WE | .327 | .073 | .409 | 4.506 | .000 |

Source: Survey Data (2019)

Dependent Variable: Employee Performance

When considering table 4.5 the unstandardized coefficients for four variables it indicated that competency, IC, Trainers and WE are significantly influenced by employee performance. Furthermore, it explained that competency ($\beta = .649$; $p = 0.000$), IC ($\beta = .524$; $p = 0.000$), trainers ($\beta = 0.316$; $p = 0.002$), and WE ($\beta = 0.327$; $p = .000$) had a significant positive impact on employee performance. Regression model was fitted at sig value of 0.000 ($p < 0.05$) R^2 value as 0.393. It means model was strongly fitted to the data and 39% variance of employee performance was explained by those four independent variables (competency, individual characteristic, trainers and work environment).

These results are similar to the findings of previous researches on impact of training on employee performance (Raza, 2015; Hassan, 2015; Gitongu, 2016; Desa, 2011; Salah, 2016; Monosomy, 2013).

According to the results all the hypothesis developed for the study was accepted based on the results value of the simple regression and person's correlation analysis.

5. CONCLUSION AND RECOMMENDATION

This study investigated the impact of training on non-managerial employee performance in hotel industry. All four independent variables used for the study competency, individual characteristic, trainers and work environment had significant positive impact on employee performance. According to the findings all the hypotheses in the study were supported. This research also served as a guideline for all the researchers interested in studying this area. The findings of this study help to the hotels in planning and developing the strategies to enhance the employee performance. Recently the newly trend in Sri Lanka is building entrepreneurs in tourism industry. Thus the persons who are planning to newly enter to the hotel industry also will be important the findings of the study in order to enhance the employee performance through success training program and ultimately organizational performance. The output of regression analysis of the study concluded that positive impact of training on employee performance and 39% variance of employee performance was explained by four independent variables used for the study. (competency, individual characteristic, trainers and work environment). Among them competency has strong positive impact on employee performance. Thus, organizations must pay considerable attention to enhancing the employees' competencies in order to enhance the employee performance and identifying that what are the major skills and knowledge need to be improved and based on that align the training sessions. In order to develop the employee competencies employers must be lined with the new technology to gain the competitive advantage. Thus the organizations need to focusing on merging the training program with up to dated technology in order to deliver better training for achieving higher level of employee performance. Also results revealed that work environment also has positive impact on employee performance. providing proper work environment for the training helped to achieved success training program and ultimately greater employee performance. For the research social support (Supervisory support and peer support) were considered under work environment. Most of the respondents strongly agreed that positive supervisory and peer support helped for achieved success training. Thus providing feedback for the employees are one of major factor that can be satisfied the trainees. Also having strong social relationship with employees caused to increase the level of attending of the trainees for the training programs. providing feedback after the training is important in order to aware about the areas that employees need to be improved. Thus employers need to focus on building upon proper relationship between supervisor and subordinate, supervisory feedback and discussion in order to satisfy the employees regarding the training program and to have better attending and success for the training sessions.

This study had provided only a small portion of idea to identify the impact of training on non-managerial employee performance in hotel industry in Matale district. Hence, following suggestions are important for future research. For the study it had investigated the impact of training on employee performance in hotel industry. Hence it suggests for future researches to Expand the study into other sectors by examine the impact of training on employee performance in other private and public industries. Selected sample size for the research is small. It has elected 154 non managerial employees as the sample size. Thus it suggests for the future studies should be undertaken at the higher level with larger sample size than this study. For this study it had considered selected four dimensions only. According to the results disused earlier revealed that only 39% variance impact has for the training. Thus there are many dimensions that has not covered which are included for remaining 61%. Thus it suggests for the future research to select more dimension

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Development of Intervention Package among Main Care-givers of Pregnant Women and Its Effect on Continuum of Care: Study Protocol for Quasi-experimental Study in Rural Areas of Yangon Region, Myanmar

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Abstract- Evidence-based findings of completion of continuum of care among pregnant women can be proved to fulfill further activities for improving maternal health. It is aimed to develop intervention package for main care givers of pregnant women and to study its effect on continuum of care. Quasi-experimental study is done among 200 pregnant women and their main care givers from rural areas of Yangon region. To develop intervention package, Focus Group Discussions of pregnant women, main-care givers and midwives is done. Continuum of care among pregnant women and awareness of main care givers will be assessed by pretested questionnaire in both intervention and control cluster. Perceptions on continuum of care among main-care givers will be explored by In-depth Interview. Three Focus Group Discussions was conducted including pregnant women, main care-givers and midwives in separate session respectively. This qualitative analysis is ongoing for development of intervention package. Pretesting for quantitative data collection was done among 20 pregnant women and their main care-givers. The health education intervention for main care- givers of pregnant women will be done by trained midwives. Outcomes assessment are expected to be completed by June 2021 by mixed methods. By developing health education package for main care givers, important factors for health of pregnant women can be reached to family level within community and the results are hope to be helpful for current activities of maternal health promotion in Myanmar.

Index Term: Intervention Package, Main Care-givers, Pregnant Women, Continuum of Care, Myanmar

I.INTRODUCTION

Maternal health from pregnancy to post-natal period is inseparable for the needs for health care. The links between the home and the first level health care facility and improving health status of mothers can be strengthened by an effective continuum of care (CoC) [1,2]. An operational continuum of care with accessible, high quality care is essential before and during pregnancy, childbirth, and the postnatal period for preventing problems for mothers and babies. The dimensions of continuum of care by WHO guide to address continuous care from home to health center and hospital [3]. A systematic review suggested that continuous uptake of antenatal care, skilled birth attendance, and postnatal care is necessary to improve maternal health outcomes

in low- and middle-income countries [4]. The WHO ANC model highlighted to have first ANC contact during the first 12 weeks' gestation, followed by contacts at 20, 26, 30, 34, 36, 38 and 40 weeks' gestation. The number of ANC visits is recommended from four to a minimum of eight times [5]. Pregnancy related complication can be appropriately managed by the care of a health professional with midwifery skills because of early recognition of danger signs and an effective timely referral to a well-equipped facility [6]. The postnatal period following childbirth is a vulnerable phase in the lives of mothers [7]. Therefore, the WHO recommended mothers to receive postnatal care within the first 24 hours followed by postnatal check-up on the second or third day, and then on the seventh day after delivery [8]. Improved coverage of ANC, delivery attended by SBA and PNC as continuum of care among pregnant women have been regarded as keys to improve maternal health outcomes [1].

In Myanmar, MMR was 250 per 100,000 live births in 2017 which is higher compared to that of South East Asia region, 137 per 100,000 live births [9]. Completing continuum of care among Myanmar pregnant women is important to reduce MMR to 91 per 100,000 live births by 2030 [10, 11, 12]. However, there are some problems to fulfill continuum of care of pregnant women in Myanmar because of inadequate antenatal care, unawareness on importance of early antenatal visit, antenatal timing and minimum antenatal care frequency, unrecognition of 6 weeks post-natal periods and incomplete post-natal care [13,14,15]. Myanmar women from rural areas are not utilizing the ANC services adequately [16]. The ANC and delivery by skilled birth attendants, number of ANC visit in third trimester of pregnancy, receiving complete health education package were significantly associated with PNC utilization among mothers in hard to reach areas of Myanmar [17]. Antenatal care booking and post-natal utilization are related by social factors such as influenced of mother-in-law, relatives' advices, male involvement and misconceptions [18,19]. Therefore, the WHO recommended to involve men and mobilize community during pregnancy, childbirth and after birth, particularly in rural settings with low access to health services [20,21]. For maternal health improvement, the WHO also proposed interventions at the individuals, families and community level where the role of men and other influential of family are mentioned important for awareness raising. For interpersonal processes, social support and working together within families, health education intervention is highlighted as a broad perspective [22].

Evidence-based findings of completion of CoC among pregnant women can be proved to fulfill further activities for improving maternal health. However, there is still limited findings of interventions regarding CoC in research areas of Myanmar. Especially in the area of improving family and main care giver's role for promoting maternal health, intervention-based findings are limited and needed to be strengthened by conducting further researches. This study intends to develop new intervention package to provide health messages for main care givers of pregnant women and to study its effect on maternal health outcomes by receiving continuum of care. The results of the study is hoped to be useful in taking CoC among pregnant women by identifying role of main care-givers within the community.

II.METHODOLOGY

2.1 Study design

This is a community-based exploratory sequential mixed method design for two years in Taik Kyi township and Kyauktan township of Yangon region as intervention and control cluster. Qualitative data collection by Focus Group Discussions (FGD) among pregnant women, main-care givers and midwives was done in the intervention township to develop intervention package for main care-givers of pregnant women. Final outcomes of the research will be assessed by quantitative data collection in both clusters and In-depth Interview of main-care givers from intervention cluster.

2.2 Study population

For FGD, inclusion criteria are pregnant women with any gestational periods; main care- givers of any sex with the age between 18 years and 65 years and currently living with pregnant women under the same shelter; and midwives who are currently working at rural health centers (RHC) and subcenters. For In-depth Interview, criteria for main care-givers of pregnant women is similar to that of FGD. For quantitative study, pregnant women aged 18 years and above; and with pregnancy of not later than 20

weeks gestation are eligible. Inclusion criteria for main care-givers are husband or other person who are most available to give continuous care at any time for pregnant women; can give pregnancy related decision; living together with pregnant women under same shelter up to 6 weeks after delivery; and any sex with the age between 18 years and 65 years.

2.3 Sample size determination

Total minimum required sample is 200 including 100 pregnant women and their main care-givers for each group. The sample size is calculated with proportion of four and more ANC visits in control group, 0.59 [23], and assumed proportion in intervention group as 0.9. Alpha error is considered as 0.05 with 80% power, 10% attrition rate and design effect 2.

2.4 Sampling Procedure

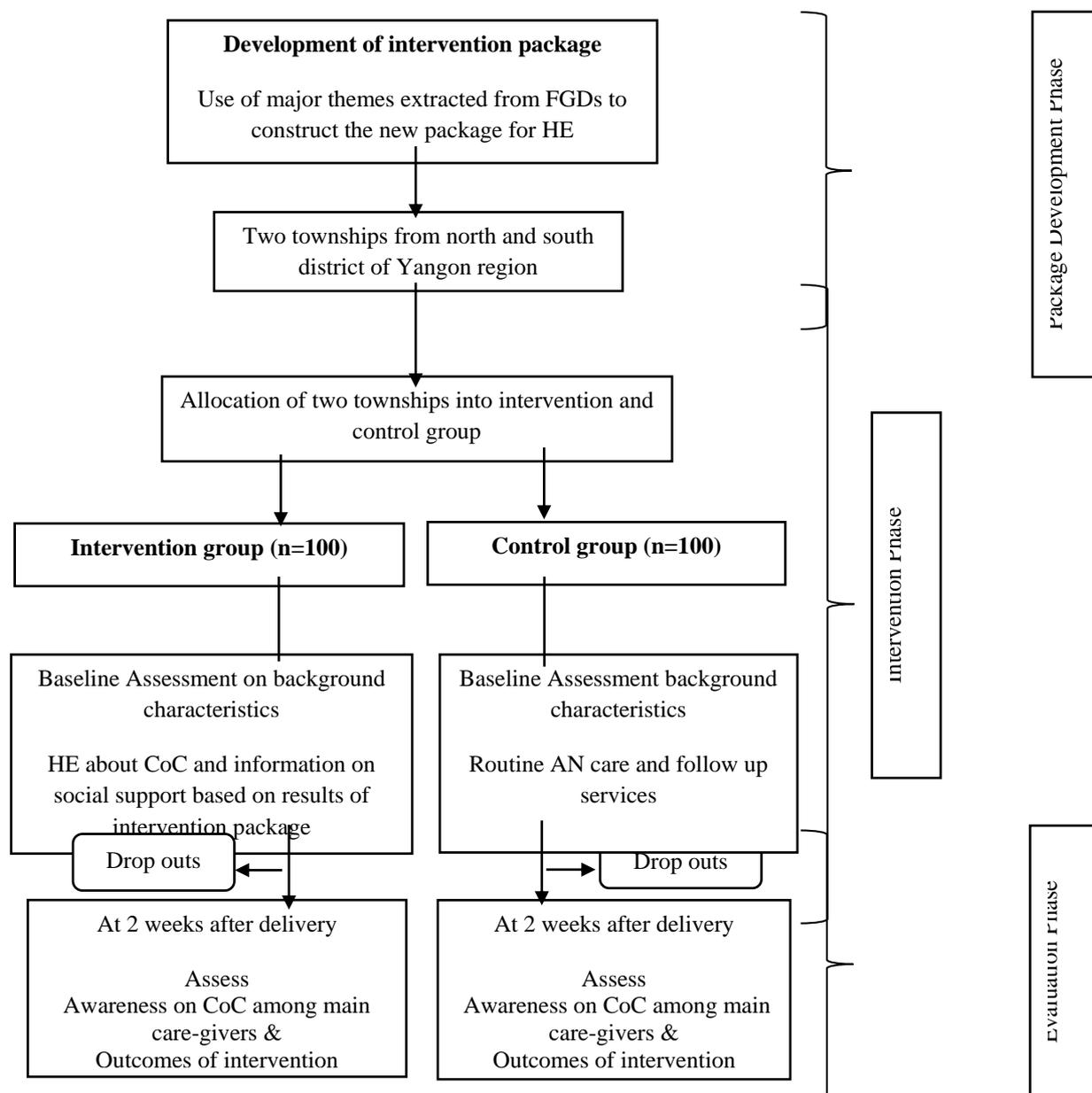


Figure 1: Study flow chart of intervention package development and sampling procedures

Figure 1 summarizes the study flow and sampling procedures. For qualitative method for intervention package development, purposive non probability sampling method is used and all pregnant women, their main care-givers; and all midwives of study area are invited by the help of local authority to participate in FGD. For quantitative method, firstly, north and south districts of Yangon region are purposely chosen for prevention of contamination. Kyauktan township and Taik Kyi where there is adequate rural setting and different classes of people are residing were selected among 8 and 10 townships in north and south districts of Yangon region. <http://dx.doi.org/10.29322/IJSRP.10.03.2020.p9934> www.ijsrp.org

south districts respectively. In both townships, there is more than 3000 pregnant women and rate of AN care for four and more times is less than 85%. From each cluster, two to three RHC villages are selected and all pregnant women and their main care-givers who meet inclusion criteria will be chosen through a consecutive sampling for calculated sample size. For end-line qualitative method, to explore the in-depth ideas of main care givers on continuum of care, In Depth Interview (IDI) will be done among purposively chosen 5 main care-givers of pregnant women who completed CoC and 5 main care-givers of pregnant women who does not complete CoC respectively. At least 8 antenatal visits, birth by skilled attendance and PNC within 24 hours after birth followed by two additional checks will be considered as criteria of CoC completion. No fulfillment of any one of these three criteria will be taken as incomplete CoC.

2.5 Data collection methods and tools

First Phase: Qualitative data collection for intervention package development

FGDs was conducted by guideline with 7 to 9 participants per session. Before data collection, objectives will be explained and written consent; and permission to record their insights are obtained. All FGDs are held at places with privacy without environmental disturbances. The researcher act as a moderator and note taking is be done by two trained note-takers. Before conclusion, information obtained are confirmed with the participants to ensure what they meant in the discussion.

Second Phase: Quantitative data collection

Pretesting was carried out among 20 pregnant women and their main care-givers residing apart from study areas. Questionnaire is prepared based on Myanmar MCH Hand Book [24] and Myanmar DHS (2015-16) [23]. Face to face interview will be applied for quantitative data collection. The survey questions comprised of socio-demographic factors of pregnant women and main care-givers and background obstetrics characteristics of pregnant women. Questionnaire on awareness of CoC is used to assess main care-givers from both clusters regarding ANC, danger signs, safe delivery and PNC. Questionnaire for assessing the outcome of intervention among pregnant women included continuum of care by ANC, safe delivery and PNC.

Recruitment and training of midwives

Midwives from two to three RHCs of both clusters will be recruited on the last day of a month in their respective township. The investigator will explain the trial procedures and their roles in the study. The midwives from intervention group will be trained by principal investigator and requested not to share the information got from training sessions to others apart from the participants in the intervention group up to the intervention period. In the training of midwives, the researcher will use the pamphlet in Myanmar language based on the finding of intervention package and MCH handbook [24] to give health education for main care-giver of pregnant women. The content of pamphlet will include importance of AN visit, care during pregnancy, safe delivery as first portion and danger signs during pregnancy, at birth and after delivery as the second portion.

Baseline data collection

In both intervention and control groups, baseline data will be collected at first AN visit of eligible pregnant women by midwives. For pregnant women who come alone for AN visit, main care-giver will be invited to be along with her at second AN visit.

Intervention package for intervention group

Intervention procedures will be done two weeks after the baseline data collection. Main care-givers of pregnant women will be educated by trained midwives about all component of health education pamphlet provided by principle investigator. Health education will take about 30 minutes after routine AN care procedure. After health education session, floor is opened for discussion and individual session will be given if it is requested. Trained midwives from intervention group will be monitored by a checklist and conducting health education will be confirmed by asking the main care-givers.

Comparison group

Timing and procedures of recruitment is similar to that of intervention group. All eligible pregnant women will be given routine AN care and follow-up care by midwives.

Third Phase: Awareness and outcome assessment

Awareness on continuum of care among main care-givers and completion of continuum of care among pregnant women in both groups will be assessed after 2 weeks puerperium period. The principle investigators and trained research assistants will collect end line quantitative data by face to face interview using pre-tested questionnaire.

End line qualitative data collection

After outcome assessment among pregnant women, In Depth Interview (IDI) will be done by principle investigator to explore perception of main care giver on continuum of care. Before conducting data collection, objectives will be explained and written informed consent will be obtained. All places for IDI will be considered for privacy and recordings will be done with permission. Information obtained from IDI will be confirmed with each and every participant to be ascertained what they mean in the interview.

2.6 Data management and analysis

First Phase: Qualitative data analysis for exploratory design by FGDs

The interviewed data will be analyzed manually and the interviews will be transcribed on the day of data collection. Reading and checking of the transcripts by listening of audio records will be done repeatedly by the researcher. Then data will be sorted and organized by themes focusing on perceptions, practices, preferred care, needs, barriers and role of main care givers regarding continuum of care of pregnant women. Content analysis will be performed; and contrasts and comparisons will be made.

Second Phase: Quantitative data analysis for explanatory design

SPSS version 16 and STATA version 15 will be used for analysis. Because of adopting a quasi-experimental design, propensity score will be used for matching of respondents to create a valid and counterfactual comparison group and to control confounding. Descriptive statistics will be shown by frequency and percentage for categorical variables and continuous variables will be summarized by mean and standard deviation. For post-intervention data analysis: awareness on CoC and outcomes variables: ANC visits, birth by skilled attendance and post-natal checks between intervention and comparison groups will be analyzed by χ^2 test. For effect of intervention: multiple logistic regression analysis will be applied to compare completion of CoC between two groups by adjusting possible confounders such as awareness of main care givers, education of pregnant women, frequency of ANC visits for current pregnancy and source of health information. The results of the model will be presented using adjusted odds ratios (OR) with 95% confidence interval (CI) and p value <0.05 will be set as level of statistical significance.

Third Phase: Qualitative data analysis

End line qualitative findings from IDIs will also be started from data collection to until it ended. The interviews will be transcribed on the day of data collection by listening audio records repeatedly. Initial analysis will be started by pre-categorizing themes. After that, main themes such as perceptions of main care-givers on continuum of care for pregnant women, their preferred methods, problems and difficulties will be explored by performing content analysis.

III.RESULTS

The proposal of this study was submitted to the board of studies and ethical approval has been received from the Institutional Review Board (IRB) of University of Public Health, Yangon. It is also registered by Preliminary Registration: PLRID-00568_V3 at Myanmar Health Research Registry, Department of Medical Research, Yangon, The Republic of the Union of Myanmar. Focus group discussions were done within second and third week of February 2020 in Tike Kyi township. Three FGDs included 7 pregnant women, 7 main care-givers of pregnant women and 9 midwives in each session respectively. First

qualitative data analysis is ongoing for development of intervention package. Pretesting among 20 pregnant women and their main care givers has been done and some areas of questionnaire are modified. After preparation of intervention package, midwives from intervention areas will be recruited and trained about health education for main care givers of pregnant women. Then baseline quantitative data collection will be conducted in both intervention and control areas. Follow-up data collections by both quantitative and qualitative are expected to be completed by June 2021. Final report will be submitted at the end of 2021.

IV.DISCUSSION

Being an intervention conducting among care-givers of pregnant women, results may be answered for some contradictions regarding the importance of men and families for maternal health according to previous studies [21,25,26,27,28]. The WHO IFC framework highlighted to conduct interventions to address the need for improving maternal health [22]. By conducting this study, we will have results about awareness on continuum of care among main care-givers, the completion of continuum of care among pregnant women and the perceptions on continuum of care among main care-givers. Therefore, this can point out the effect of health education intervention of main care-givers on completion of continuum of care. Better understanding of the gaps in seeking care and factors contributing to the gaps can be explored for successful program implementation. Moreover, the developed health education package is hoped to be disseminated to Township Medical Officer (TMO) and Basic Health Staffs (BHS) from control township if there is significant improvement on continuum of care among pregnant women by the intervention after the study.

One of the strengths of the study is intervention at community level and rural setting. Mixed methods by exploratory sequential design is applied to be strengthen the results of the study. Intervention package is developed based on the discussion of three groups with different experiences on continuum of care for maternal health. For main care-givers, health education is given by trained midwives who are conducting health services in the study areas and already familiar to antenatal, intra-natal and postnatal care of pregnant women. After intervention, not only continuum of care but also awareness and perception of main care givers will be explored. Data analysis is planned to reduce the effect of confounders by matching and multiple logistic regression. Moreover, this is the first interventional study among main care givers of pregnant women regarding continuum of care for maternal health.

There are some limitations of the study is that health education package is not reached to the control clustere. For awareness on continuum of care among main care givers, only post intervention assessment by assuming same background is done without preliminary survey. Health education is given only one time for main care givers of pregnant women from intervention cluster and therefore it is not ascertained to be memorized for long term. The continuous usage of pamphlets distributed as tool for health messages is not sure for through out of antenatal to postnatal periods of pregnant women.

V.CONCLUSION

By developing intervention package for health education among main care-givers, important factors for maternal health can be reached within close-groups who can give supports for pregnant women. For the continuum of care among pregnant women, needs and gaps to be fulfilled will be explored by this study and may be useful for further researches. Moreover, the results will help to determine whether it is applicable for current activities for maternal health promotion in Myanmar.

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A study to assess the computer related ergonomic practices and computer related health problems among the final year postgraduate nursing students in selected Colleges Of Nursing, Kolkata, West Bengal.

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Abstract- A non experimental, survey research design study was undertaken to assess the computer related ergonomic practices and computer related health problems, among the final year postgraduate nursing students in selected colleges of nursing. The main objective is to find out the computer related health problem and to find out the association between computer related ergonomic practices and computer related health problems. The theoretical framework of the study is based on health belief model. Total 60 final year post graduate nursing student was selected by convenient sampling technique.

The finding of the study revealed that 31.67% of the student had good computer related ergonomic practice and 65% of the student had moderate musculoskeletal problem 61.6% had eye problem and 96.67% had mild skin problem. Statistically significant associations were found between computer related health problem and type of computer device at 0.05 level of significance.

Index Terms- computer, ergonomics, health problems, students.

I. INTRODUCTION

The word ergonomics is derived from greek words, ergo and nomos meaning work and law. International association describes it as the engineering science dealing with various anatomical, physiological, psychological and engineering philosophies and their interaction with people.⁽¹⁾

Computers are an integral part of life and no longer need specialized training for use. dependence of computers is increasing and has led to health concern. In the absence of a good ergonomic design, extended work for prolonged periods and adversely affect not only vision, but also the muscles of neck, back, shoulders and arms, leading to visual and muscular fatigue and discomfort musculoskeletal condition.

Cartre et al. has reported the association between prolonged computer uses, poor postures at workstations is the main cause of musculoskeletal disorder.⁽²⁾ Globally the number of people suffering from musculoskeletal conditions has increased by 25% percent over the past decade and these conditions make 2% of the global disease burden.

Computers are man- made machine but today men are slaves of it. If we send 4-5 hours on computer we start fleeing tired, sleepy, neck aches, back aches, eye problems and what not.

India , the incidence rate shows that the computer related morbidity was resented in 93% of the study subjects. The visual problem were seen in 76% and musculoskeletal in 77.5% while 35% felt stressful symptoms.⁽³⁾ the post graduate nursing students are supposed to spend a considerable amount of time before computer such like preparing assignments, class presentations and the submission of research project which demand the use of computer a lot.

Objectives of the study

1. To identify the computer related ergonomics being practiced by the final year post graduate nursing student.
2. To find out the computer related health problems among the final year post graduate nursing students.
3. To examine the co-relation between computer related ergonomics practices and computer related health problems.
4. To find out the associations between the computer related ergonomics practices and the selected demographic variables
5. To find out association between computer related health problems and the selected demographic variables.

II. METHODOLOGY

A non-experimental, descriptive survey design . The study was conducted in CON, medical college and hospital; CON Nrs medical college and hospital and BM Birla college of nursing. the sample size is 60 and the sampling technique was adopted was non-**probability** convenience sampling.

Description of the tool

Three tools were used for data collection

1. Tool I a semi structured questionnaire schedule (Demographic data), it was collected by interviewing the samples and it consists of age, any computer course undertaken, duration of working days on computer per week, duration of working hours on computer per day,

whether heard about computer related physical health hazards, type of computer device used, placement of the computer, whether help from other personnel is sought for submitting the computerized assignment in time.

2. Tool II A semi structured questionnaire of 22 items to assess the computer related ergonomic practices, the minimum score is 0 and maximum is 22 was collected by questioning. An arbiter categorization was made for excellent practice with a score of more than 80% i.e. >18,

Good practice with score 71-80% i.e. 16-18, fair practice with score 61-71% i.e. 14-15, average practice with score 51-60% i.e. 11-13 and poor practice with score less than 50% i.e. <11.

3. Tool III A semi structured interview schedule of 22 items to assess the computer related health problems among the students, minimum score is 22 and maximum is 66 by interviewing. An arbiter categorization was made for mild i.e. 22-36, moderate i.e. 37-51, severe i.e. 57-66

III. RESULTS

Section I: Findings related to demographic variables

**Table 1: Frequency and percentage distribution of demographic variables
 n=60**

| Demographic variables | Frequency | Percentage |
|--|-----------|--------------|
| Age in years | | |
| 24-34 | 44 | 73.33 |
| 35-45 | 12 | 20 |
| 46-56 | 4 | 6.67 |
| Computer course undertaken | | |
| Yes | 10 | 16.67 |
| No | 50 | 83.33 |
| Whether heard about computer related physical health hazards | | |
| Yes | 53 | 88.33 |
| No | 7 | 11.67 |
| Average days per week spent in computer | | |
| <5 days per week | 21 | 35% |
| ≥5 days per week | 39 | 65% |

| Average hours per day spent in computer | | |
|---|----|---------------|
| 2-4 hrs | | |
| 5-7 hrs | 32 | 53.33% |
| 8-10 hrs | 21 | 35% |
| | 7 | 11.67% |

| Type of computer used | | |
|---------------------------|----|---------------|
| Laptop | | |
| Desktop | 47 | 78.33% |
| Both (laptop and desktop) | 8 | 13.33% |
| | 5 | 8.33% |

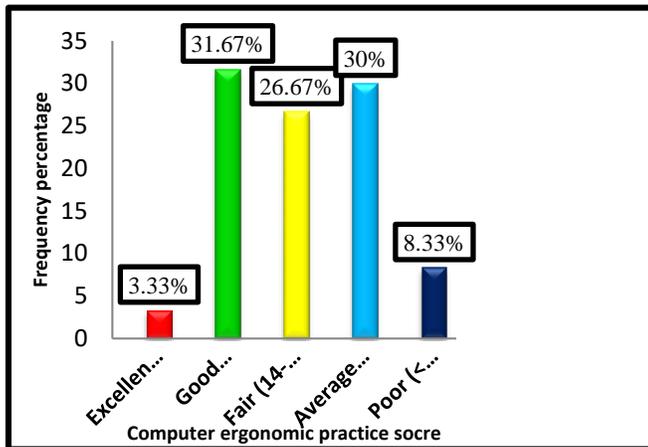
| Placing of computer while working | | |
|-----------------------------------|----|------------|
| Table | | |
| Bed | 36 | 60% |
| | 18 | 30% |

| Other place | | |
|---|----|-----------|
| Whether help from others personnel is sought for submitting the computerized Assignment in time | | |
| Yes | 15 | 25 |
| No | 45 | 75 |

The data presented in table 1 showed that majority of the students (44; 73.33%) belonged to the age group of 24-34 years, 50(83.33%) had not undergone an computer courses, 39(65%) used computer for more than 5 days per week, 32(53.33%) used computer for 2-4 hrs per day, 53(88.33%) heard about computer related hazards from other sources, 47(78.33%) were using laptop, 36(60%) were lacing computer on the table while working, 45(75%) had not sought for help from others for submitting the computerized assignment in time.

section II: findings related to the assessment of computer related ergonomic practices

n=60



Maximum possible score = 22; Minimum possible score = 0
Figure 1: Bar diagram showing distribution of sample according to the computer related ergonomic practice score

The data presented in figure 1 showed that (19;31.67%) of the students had “good” practice, 18(30%) had “average”, 16(26.67%) had “fair”, 5(8.33%) had “poor” and 2(3.33%) had “excellent” practice score of computer related ergonomic practice.

Table 2 mean median and standard deviation of computer related ergonomic practices among final year postgraduate nursing students
n=60

| | Mean | Median | Standard deviation |
|--------------------------------------|------|--------|--------------------|
| Computer related ergonomic practices | 14.4 | 15 | 2.59 |

Maximum possible: 22 Minimum possible : 0

Data presented in table 2 showed that the mean of computer related ergonomic practice score was 14.4, median 15 and standard deviation 2.59.

Section III findings related to assessment of computer related health problems among the final year postgraduate nursing students

Table 3 frequency and percentage distribution of final year postgraduate nursing students according to domain wise (musculoskeletal, skin, eye) computer related health problems
n=60

| Problem | Degree | Range | Maximum score: Minimum score: | Frequency | % |
|---------|--------|-------|----------------------------------|-----------|---|
| | | | | | |

| | | | | | |
|--------------------------|----------------------|-------------------------|----------|---------------|---------------------------|
| Musculoskeletal Q1 to 12 | Mild Moderate Severe | 12-20 21-28 29-36 | 36 12 | 19 39 2 | 31.67% 66.67% 3.33% |
| Skin Q13 to 14 | Mild Moderate | 2-4 5-6 | 6 2 | 58 2 | 96.67% 3.33% |
| Eye Q15 to 22 | Mild Moderate Severe | 8-13 14-19 20-25 | 24 12 | 19 37 4 | 31.67% 61.67% 6.67% |

Data presented in table 3 showed that majority 39(65%) had moderate musculoskeletal problem, 58(96.67%) had been affected with mild skin problem, 39(61.6%) had developed moderate eye problem

Table 4 Mean, median and standard deviation of computer related health problems scores among final year postgraduate nursing students
n=60

| Variable | Mean | Median | Standard deviation |
|----------------------------------|------|--------|--------------------|
| Computer related health problems | 39.3 | 39 | 5.47 |

Maximum possible 66 Minimum possible : 22

Data presented in table 4 showed that the mean of computer related health problem score among the students was 39.3 with a standard deviation of 5.47 and the median was 39.

Section IV: Correlation coefficients between computer related ergonomic practices and computer related health problem

Table 5 Correlation coefficient and its significance existing between computer related ergonomic practices and computer related health problem among the final year postgraduate nursing students
n=60

| Variable | Correlation (r) | t-score | Significant |
|--------------------------------------|-----------------|---------|-----------------|
| Computer related ergonomic practices | -0.14 | 1.11 | Not significant |
| Computer related health problems | | | |

Data presented in the table 5 could not explore statistically significant relationship between computer related ergonomic practices and computer related health problem among the students

at 0.05 level of significance as evident from the corresponding t-value.

It could be concluded from the above table that the health problems experienced by the students of the present study were not dependent upon the ergonomics practices.

Table 6 Correlation coefficient and its significance existing between computer related ergonomic practices and computer related health problem (domain wise) among the final year postgraduate nursing students n=60

| Computer related ergonomic practices | Correlation (r) | t-score | Significant |
|--------------------------------------|-----------------|---------|-------------|
| Musculoskeletal | -0.098 | 0.75 | NS |
| Skin | -0.14 | 1.16 | NS |
| Eye | -0.09 | 0.76 | NS |

Data resented in the table 6 could not explore statistically significant relationship between computer related ergonomic practices and domain wise computer related health problems among the students at 0.05 level of significance as evident from the corresponding t-value.

It could be concluded from the above table that the musculoskeletal, skin and eye problems experienced by the students of the resent study were not dependent upon the computer related ergonomics practices

Section V: Association between the computer related ergonomic practices and selected demographic variable among final year post graduate nursing students

Table 7 Chi-square test of association between computer related ergonomic practices and their age. n=60

| Age (in years) | Computer related ergonomic practice score | | | Chi-square value | Significance |
|----------------|---|----------|-------|------------------|--------------|
| | < Median | ≥ Median | Total | | |
| < 35 | 23 | 21 | 44 | 1.025 | NS |
| ≥ 35 | 6 | 10 | 16 | | |
| Total | 29 | 31 | 60 | | |

$\chi^2df(1) = 3.84; p < 0.05$

Data presented in table 7 showed that out of 44 students, with less than 35 years of age 23 scored below median and 21 scored at and above median of the total ergonomic practice score. Similarly, out of 16 students, with more than 35 years of age 6 scored below median and 10 scored at and above median of the total ergonomic practice score.

Chi square value was computed to see the association between the two variables which was found not to be statistically significant at 0.05 level of significance. So, it could be concluded that the computer related ergonomic practice among the students of the present study was independent of their age.

Table 8 Chi-square of association between computer related ergonomic practices and the type of computer device used by the final year postgraduate nursing students. n=60

| Type of computer device used | Computer ergonomic practice score | | | Chi square value | Significance |
|------------------------------|-----------------------------------|----------|-------|------------------|--------------|
| | < Median | ≥ Median | Total | | |
| Laptop | 22 | 25 | 45 | 2.74 | NS |
| Desktop | 3 | 5 | 8 | | |
| Both | 4 | 1 | 5 | | |
| Total | 29 | 31 | 60 | | |

Yate's correction considered
 $\chi^2df(2) = 5.99; p < 0.05$

Data presented in table 8 showed that out of 45 students, who used laptop, 22 had scored below median and 25 had score at and above median of the total ergonomic practice score. Again among 8 students, who used desktop, 3 scored below median and 5 scored at and above median of the total ergonomic practice score. Similarly, among 5 students, who used both (laptop & desktop), 4 had scored below median and 1 had scored at and above median of total ergonomic practice score.

Chi square value was computed to see the association between two variables which was found not to be significant at 0.05 level of significance. So, it can be concluded that the computer related ergonomic practice score among the nursing student of the present study was independent with their type of computer device used.

Section VI: Association between the computer related health problem and selected demographic variable among final year post-graduate nursing students

Table 9 Chi-square of association between computer related health problems and their age n=60

| Age (in years) | Computer related health problem score | | | Chi square value | Significance |
|----------------|---------------------------------------|----------|-------|------------------|-----------------|
| | < Median | ≥ Median | Total | | |
| <35 | 19 | 25 | 44 | 0.805 | Not significant |
| ≥35 | 9 | 7 | 16 | | |
| Total | 28 | 32 | 60 | | |

$\chi^2df(1) = 3.84; p < 0.05$

Data presented in table 9 showed that out of 44 students, with less than 35 years of age 19 scored below median and 25 scored at and above median of the total computer related health problems score. Similarly, out of 16 students, at or above 35 years of age, 9 scored below median and 7 scored at and above median of the total computer related health problems score.

Chi square value was computed to see the association between two variables which was found not to be significant at 0.05 level of significance. So it could be concluded that the computer related

health problem among the nursing student of the present study was independent of their age.

Table 10 Chi-square of association between computer related health problem and number of days in a week.
n=60

| Number of days per week | Computer related health problem score | | | Chi square value | Significance |
|-------------------------|---------------------------------------|---------|-------|------------------|-----------------|
| | <Median | ≥Median | Total | | |
| < 5 | 12 | 9 | 21 | 1.42 | Not significant |
| ≥5 | 16 | 23 | 39 | | |
| Total | 28 | 32 | 60 | | |

$\chi^2_{df(1)} = 3.84; p < 0.05$

Data presented in table 10 showed that out of 21 students, who used computer on less than 5 days per week, 12 had scored below median and 9 had score at and above median of the total computer related health problems score. Similarly, among 39 students, who were used to use computer on 5 days or more in a week, 16 scored below median and 23 scored at and above median of the total computer related health problems score.

Chi square value was computed to see the association between two variables which was found not to be significant at 0.05 level of significance. So, it could be concluded that computer related health problem score among the students of the present study were independent of the days they were spending on computers per week.

Table 11 Chi-square of association between computer related health problems and type of computer device used among the final year postgraduate nursing student.
n=60

| Type of computer device used | Computer related health problem score | | | Chi square value | Significance |
|------------------------------|---------------------------------------|---------|-------|------------------|--------------|
| | <median | ≥median | total | | |
| Laptop | 18 | 29 | 47 | 6.333 | S |
| Desktop | 6 | 2 | 8 | | |
| Both | 4 | 1 | 5 | | |
| Total | 28 | 32 | 60 | | |

Yate's correction considered
 $\chi^2_{df(2)} = 5.99; p < 0.05$

Data presented in table 11 showed that out of 47 students, who used laptop, 18 had scored below median and 29 had score at and

above median of the total computer related health problem score. Again among 8 students, who used desktop, 6 scored below median and 2 scored at and above median of the total computer related health problem score. Similarly, among 5 students, who used both (laptop & desktop), 4 had scored below median and 1 had scored at and above median of total computer related health problem score.

Chi square value was computed to see the association between two variables which was found to be significant at 0.05 level of significance. So, it could be concluded that computer related health problem among the nursing students of the present study was dependent with the type of the computer device used. It appears that relatively uses of laptop among the final year postgraduate nursing student is more than other computer device.

IV. CONCLUSION

1. From the study findings it can be concluded that majority of the students had good compliance with computer related ergonomic practices.
2. There were three main areas in the questionnaire to assess the occurrence of computer-related health problem viz. musculoskeletal, skin and eye problems. out of thee three areas, the problem related to musculoskeletal and eye was more than skin problems. The magnitude of the problems was moderate.
3. Computer related health problems were dependent on average total hours spent on computer per day and type of computer device used.

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Comparison of 500Hz Tonebursts and 500Hz octave Chirps for Cervical Vestibular Evoked Potentials.

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Abstract- The Cervical-Vestibular evoked Myogenic potential(c-VEMP) is a biphasic surface potential recorded from the belly of Sternocleidomastoid muscle (SCM) followed by presenting a short loud sound. Various studies have been done with different stimulus to obtain better VEMP responses. The present study is aimed at comparing the c-VEMP responses (amplitude and latencies) of 500 Hz tone burst with 500Hz octave chirp (360-720Hz). c-VEMP was administered on 60 ears from 30 subjects. After preparation, responses were recorded presenting 500Hz Tone bursts and 500Hz octave chirps. P1-N1 amplitude, P1 and N1 latencies for both stimuli were noted. The chirp was observed to produce significantly larger amplitude and early latencies than tone burst ($p<0.01$). This study was in search of a stimulus that will produce larger and better response to be used in clinics, Chirp qualifies to be one. Further studies on larger sample size and age groups are required to make generalizations.

Index Terms- Chirp, tone burst, c-VEMP

I. INTRODUCTION

The cervical-Vestibular Evoked Myogenic Potential(c-VEMP) is a biphasic surface potential recorded from the belly of Sternocleidomastoid muscle (SCM) followed by presenting a short loud sound. Vestibulo-colic reflex which is the basis for the recording of c-VEMP starts with the activation of Saccule through loud sound. This saccular activity is carried through inferior vestibular nerve and ends in the inhibition of the ipsilateral SCM. It is first described by Colebatch et al in 1994(1). Since then for almost 25 years, it has been extensively studied and clinically used in diagnosis of vestibular disorders.

There is not one best stimulus for c-VEMP yet. Colebatch used clicks to elicit c-VEMP and studies in upcoming years suggested tone bursts with various frequencies from 250 to 4000Hz with different rise/fall and plateau times. Saccule, one of two otolith organs has been found to have frequency tuning and responses have been better at frequencies at approximately 500-1000Hz(2). 500Hz tone bursts with many studies suggesting it, have become the commonly used stimulus in clinics. Studies done with various rise/fall and Plateau times to produce larger amplitudes suggest rise/fall time of 2ms(3)and plateau times of 2ms(4),

Chirp, comparatively new stimulus was developed to compensate for the travelling wave delay in cochlea and have been

studied since early 1990s. Much of its application was in recording a better auditory brainstem responses (ABR). In 2010, Elberling et al(5) developed octave band chirps to be used to elicit ABRs.

After 20 years since c-VEMP was first described, Wang et al(6) compared the c-VEMP responses using Chirps (200-10,000Hz), also called as CE-Chirps, Clicks and tone bursts. Özgür et al (Özgür et al., 2015) used narrowband chirps (500-4000Hz) and compared it with clicks and Tone bursts. Since saccule tuning is better at 500 Hz, Walther et al(8) designed a chirp (250-1000Hz) centered at 500Hz and compared with clicks and tone bursts.

The present study is aimed at comparing the c-VEMP responses (amplitude and latencies) of 500 Hz tone burst with 500Hz octave chirp (360-720Hz).

II. MATERIALS AND METHODS

Subjects

C-VEMP was administered on 60 ears from 30 subjects (M-15; F-15). The mean age of the subjects was 22 ± 2 years. No history of balance related issues were reported. All subjects underwent tympanometry and only those subjects who had normal tympanograms were included in this study. Written informed consent was obtained from all subjects.

C-VEMP administration

The subjects were asked to sit in supine position on a chair. Electrode sites - forehead, upper-half of SCM and sternum were cleaned with Nuprep gel and disc electrodes are placed with ten20 conductive paste and electrode were secured in place with Micro pore tape. They were instructed to turn opposite to the side of stimulation until lateral margin of SCM is visible to naked eye. The active, reference and ground electrodes were placed on upper-half of SCM, sternum and forehead respectively and stimulus was presented through ER3C-10 Ω . The C-VEMP was recorded using Neurosoft's Neuro-Audio instrument. Rarefaction 500Hz Tone bursts with 2-2-2 cycles and 500Hz octave chirp were delivered at 100dBnHL(124dB SPL) at rate of 5/sec. The filter was set between 30 and 2000Hz. The subjects were provided with visual cues via laptop monitor to maintain enough muscle stretch and were given rest between recordings. The two stimuli were altered randomly to avoid any fatigue related bias. Two recordings were made to check replicability. After completion of recording, P1 and N1 were marked. The study related data – P1-N1 amplitude, P1 and N1 latencies for both tone bursts and chirps were noted.

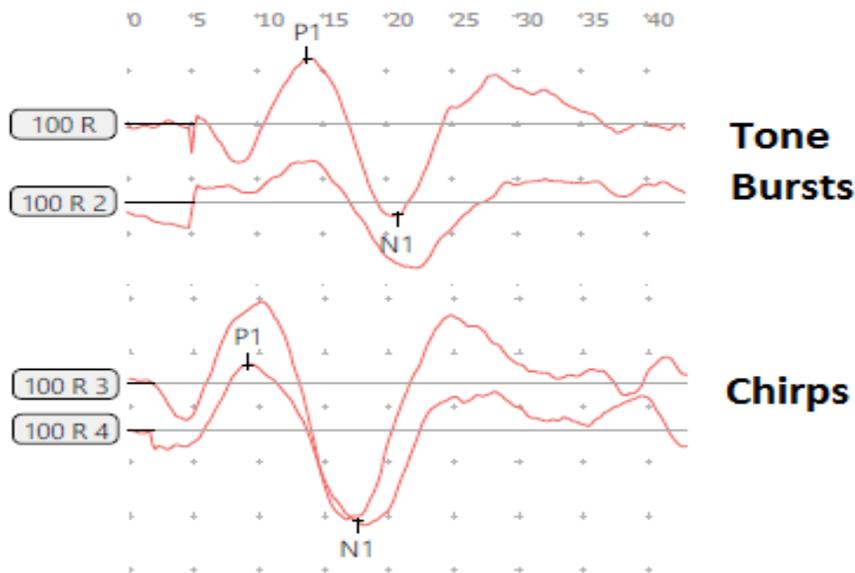


Figure 1: The c-VEMP responses for Tone bursts and Chirps.

III. STATISTICS

All statistical analyses were done using SPSS software for windows, version 20. Mean values and standard deviation (SD) were calculated. The distribution of the results was analyzed using the Shapiro–Wilk test. Normal distribution was observed. The test for stability of chirps and tone bursts evoked amplitudes was performed by means of correlation analysis (Pearson correlation coefficient). Paired t-test was done to test the significant differences between corresponding datasets which revealed a significance of 5%.

IV. RESULTS & DISCUSSION

A group of 30 healthy subjects (M-15; F-15) whose mean age was 22±2 years were involved in this study. No history of balance related issues were reported. c-VEMP was administered with two stimuli- 500Hz tone bursts and 500 Hz octave chirp (360-720Hz). The mean latencies and amplitudes for both stimuli are presented in Table 1.

| | P1 (ms) | N1 (ms) | Amplitude (µV) |
|--------------------|----------------|----------------|-----------------------|
| Tone Bursts | 16.4 ± 2.99 | 22.36 ± 3.28 | 68.45 ± 28.11 |
| Chirps | 12.61 ± 3.06 | 18.71 ± 2.78 | 70.15 ± 25.45 |

Table 1: The mean latencies and amplitudes for both stimuli .

The chirp stimulus has been observed to have larger amplitudes and early latencies than tone bursts. The mean amplitude of tone bursts and chirps are 68.45 ± 28.11µV and 70.15 ± 25.45µV respectively and is provided in Figure 2.

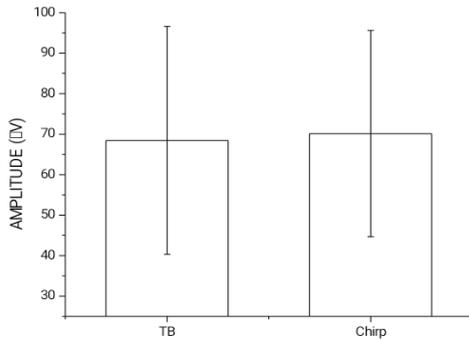


Figure 2: The mean amplitude of tone bursts and chirps

The mean P1 and N1 latencies for tone bursts are 16.4 ± 2.99 ms and 22.36 ± 3.28 ms respectively. The mean P1 and N1 latencies for chirps are 12.61 ± 3.06 ms and 18.71 ± 2.78 ms respectively and are provided in Figure 3. There is a mean difference of 3.8ms for P1 and 3.6ms for N1. Both Amplitude and latencies of VEMP for Chirps are significantly better ($p < 0.01$) than tone bursts.

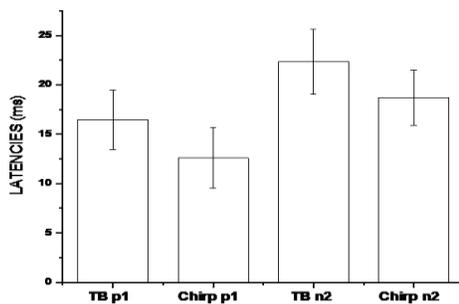


Figure 3: The mean P1 and N1 latencies for tone bursts and Chirps.

V. DISCUSSION

c-VEMP are non-invasive procedure administered to assess the function of saccule and inferior vestibular nerve. It is a sound evoked myogenic potential recorded from the SCM. Since it was first described, there have been many attempts and studies to find optimum parameters for c-VEMP recording. Starting from the sitting position, stimulus parameters and recording parameters have been modified and studied. Among the various stimulus parameters, the type of stimuli and its spectrum have been studied extensively, looking forward a stimulus that will produce larger amplitude, thus making the process of recording and diagnosis easier. The present study is one such effort to verify and support the findings of previous studies on chirp and document the better band of frequencies of chirp for c-VEMP testing.

The earlier studies have used chirps of different bands- 200-10,000Hz by Wang et al(6); 500-4000Hz by Özgür et al(7) and 250-1000Hz by Walther et al(8). All these studies compared the c-VEMP responses of chirp with clicks and 500 Hz tone bursts. Studies that have compared tone bursts of different octave frequencies concluded that 500Hz tone bursts produce larger waveforms. Hence, 500 HZ tone bursts are used extensively in

clinics. In this present study, we used 500 Hz tone bursts and 500 Hz octave Chirp (360-720Hz) and compared amplitudes and latencies of both.

We recorded significantly larger amplitudes for chirps than tone bursts of same intensity (100 dBnHL/124 dB SPL). This is in correlation with studies by wang et al(6) and walther et al(8). This difference in amplitude can be explained using the frequency content of the stimulus as one of the factors. Tone bursts are single frequency short stimulus, while chirps have frequencies of particular band.

The latencies of c-VEMP for chirp have been observed to be earlier than for tone bursts and these results are in accordance with previous studies on chirp. There was previously no study done to explain these early latencies. This early latencies and larger amplitudes cannot be explained using the travelling wave theory as in auditory brainstem response testing using chirps. Chirps are stimulus developed based on various travelling delay models and most appropriate one was designed by Elberling et al(5). zakaria et al(9) designed a chirp with no onset/offset temporal adjustment and compared its c-VEMP with tone bursts of 500Hz. He found no significant differences between the two and concluded that the early latencies are due to stimulus design and not related to any physiological factors as in cochlea.

VI. CONCLUSION

The study was an attempt to find a better stimulus than 500Hz Tone bursts widely used in clinics. The results of this study clearly show significant differences between the responses elicited by stimuli. The chirps have been observed to produce better and early responses than tone bursts. The results of this study supports the view of replacing the tone bursts currently used in clinics worldwide with frequency specific chirps for easy peak identification and better analysis. The samples involved in this study were less and further studies on larger sample size and age groups are required to make generalizations.

Ethics Committee Approval: The approval of local Institutional Review board has been obtained .

Informed Consent: Written informed consent has been obtained from all participants.

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A comparative analysis between laser machine & hand scrapping for inducing destroy effect on denim garment

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Abstract- The aim of this study was to assess the destroyed effect on denim garment by laser machine and by conventional hand scrapping technique. A local washing plant was used as the facility to prepare samples for both laser machine and hand scrapping. The result of this study gives us an understanding of the both procedures as well as comparison of the induced effect by both techniques. This study recommends the use of laser wash technique over manual hand scrapping technique as the former yields better design effect with user friendliness. Also the laser machine is more sustainable than manual hand scrapping technique.

Index Terms- Denim dry wash, Destroy effect, Hand scrapping, Laser wash.

I. INTRODUCTION

Denim is considered one of the most popular clothing among people of all ages and gender. The aesthetic appeal of denim surpasses any other clothing. Denim is a hard and durable ward faced 3/1 twill cotton fabric, woven with indigo dyed ward and white filling yarns, having weights of 14.5 ounces per square yard (R. Paul; Denim: Manufacture, Finishing and Application). Due to enhanced durability denim has been used for centuries especially by people of hard labor. But now it is not only considered a work wear but also fashionable apparel. As denim had been worn by people of hard labor after a prolonged time of day to day activities the garment used to become faded. This faded and worn out look has now become a trend. But in order to induce the faded look various wash techniques have been developed. The scope of denim wash process is very broad. Innovative denim products will be able to open up new markets and horizons for denim industry. Customers today have a wide range of choices and the one who produces the best quality at a high competitive will survive and prosper. Innovative and enhanced results are possible through application of various types of denim wash processes, which in turn would bring greater financial profits. When a wash technique is selected; sustainability of the process must be assessed because denim industry uses a large amount of water and chemicals.

II. DENIM WASHING TECHNIQUES

Denim garments can be washed in two ways: i) Dry process and ii) Wet process. The wash processes are ways to achieve color fading, enhanced handle property and unique looks. Dry process includes techniques that don't require use of chemicals and water whereas wet process involves use of various chemicals and large amount of water. Since sustainability has become a concern worldwide dry process or nearly water free techniques are becoming popular and recommended. Among the various dry wash techniques laser wash and hand scrapping are notable ones.

Laser wash technique

Application of laser in textile products dates back to the late 1990's. The laser beam induces various effects on garments. The energy provided by a laser beam has two effects on indigo dyed fabrics (Bosman, 2007). Laser beam does two operations on denim garment: it sublimates the indigo dye stuff and burns the colored yard revealing the undyed yarns.

Hand scrapping technique

This is a manual technique followed to impart worn out look on denim garments. In this process the area to be faded is identified at first and then a piece of emery paper is rubbed on the selected area to rub off the surface color. Precise control of hand movement is very crucial in this process otherwise regularity of the faded design might not be achieved. So skilled and experienced workers are required for this process.

III. METHODOLOGY

In order to carry out laser and hand scrapping technique two samples (100% cotton) of similar fabric construction (3/1 Z twill) and weight (14oz/yard) has been collected from local markets. Regular design effect has been taken. The washing processes have been carried out in a local washing factory named “Qupid Washing”. For laser wash following machine has been used:

| Brand Name | ARGES Laser System |
|--------------------------|---|
| Origin | Turkey |
| Laser Type | CO ₂ RF metal laser |
| Laser Power | 12KW |
| Working Area | 1500x3000 mm |
| Working Table | Conveyor mesh belt |
| Processing Speed | Adjustable |
| Positioning accuracy | ±0.1 mm |
| Motion System | Offline mode servo motor control system,5" LCD screen |
| Cooling System | Constant temperature water chiller |
| Power supply | 380 v 50 Hz 3 P N PE |
| Design Format Support | AJ, BMP, PLT, DXF, DST et |
| Standard collection | Projection system, integrated working table, auxiliary ladder, fixed top exhaust suction system |
| Working Room Temperature | Less than 60° c |
| Drivers | Panasonic Servo drivers |

Reasons for choosing ARGES Laser System:

- I. Simple processing
- II. Low sample rejection rate
- III. Environment friendly
- IV. Wide range of application

For hand scrapping process 400 number emery paper has been used.



Fig 1: Hand Scrapping technique

IV. RESULT & ANALYSIS

Design outlook

Laser machine produced a uniform design whereas the manual hand scrapping technique couldn't maintain uniformity.



Fig 2: Destroy effect by Laser



Fig 3: Destroy effect by Hand Scrapping

Advantages of Laser wash technique over hand scrapping

- I. Any design at any place can be created. Fading on seams, on metal buttons is possible.
- II. Faster process compared to the conventional processes.
- III. Suitable for wide range of material.
- IV. Comparatively less strength loss than other mechanical fading.
- V. Low hairiness compared to other mechanical fading.
- VI. Environment friendly.
- VII. Zero water waste.
- VIII. Requires no chemical.
- IX. Less manpower required.
- X. Rejection rate is 0% in Laser system whereas around 5% in Manual system.

V. CONCLUSION

This study showed that the laser system can provide a better design effect with comparatively less processing time and almost zero sample rejection rate. Also on sustainability front the laser machine is clearly ahead of manual technique. Although the initial investment cost for laser machine is much higher than manual processing techniques; the end result will be better than manual techniques. So this study suggests that for dry process on denim the use of laser machine is more favorable than manual hand scrapping technique.

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Zambia's Energy Consumption and Related Carbon Emissions

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Abstract- Clean safe and affordable energy is a necessity for every human being. Electricity, as an important modern energy, is a basic substance not only for national but individual and household development. In Zambia, only 40 percent of a population of about 17 million has access to electricity consisting of 67 and 4 percent urban and rural area access respectively. Since 1970 Zambia's electricity generation has largely been solely on the southerly located part of Zambezi as a major hydro power source. This predominant single energy electricity structure lead to high potential of social and economic risks. Lack of diversification and/or investments has left the majority of households relying on wood fuel and charcoal. And the process of traditional biofuel production and consumption are responsible for some energy-related carbon emissions. The growing population has outpaced the existing energy infrastructure which has resulted in long durations of service interruption. As a result of persistent annual electricity service disruptions only recently is energy mixing with solar, wind and others are being considered. Other than the already identified energy mixing, we further suggest, policy reforms that not only promote but also facilitate energy efficiency, public private partnerships with both indigenous and foreign private sector partners and technology transfer through schemes such as green technology bank.

Key Words- Carbon emissions, Electricity, Energy consumption, Hydroelectric Power (Hep), Urban and rural area.

I. INTRODUCTION

Globally, diverse energy forms exist and are used at various geographical scales; national and local level with the smallest unit being the village (rural area). The energy includes coal, hydroelectric power, oils, biofuels, natural gas and biomass. After three flat years, global energy-related carbon dioxide (CO₂) emissions rose by 1.6% in 2017 and the early data suggest continued growth in 2018, far from a trajectory consistent with climate goals [1]. Energy-related air pollution continues to result in millions of premature deaths each year. In recent times the world has seen a decrease in fossil fuel use with exceptions of China and the USA while generally, the use of renewable energy has increased. Carbon emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced at some point in the consumption

of solid, liquid, and gasoline fuels and gas flaring. Carbon dioxide (CO₂) is a naturally occurring gas fixed through photosynthesis into organic matter. A byproduct of fossil fuel combustion and biomass burning, it is additionally emitted from land-use modifications and other industrial processes. It is the primary anthropogenic greenhouse gas that influences the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and makes up the largest share of the greenhouse gases contributing to global warming and climate change [2, 3].

At the global scale, the key greenhouse gases emitted through human activities relating to energy production and consumption are Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O) and Fluorinated gases (F-gases). Fossil fuel use is the primary source of CO₂. CO₂ can also be emitted from direct human-induced impacts on forestry and other land use, such as through deforestation, land clearing for agriculture, and degradation of soils. Likewise, land can also remove CO₂ from the atmosphere through reforestation, improvement of soils, and other activities. [4, 5].

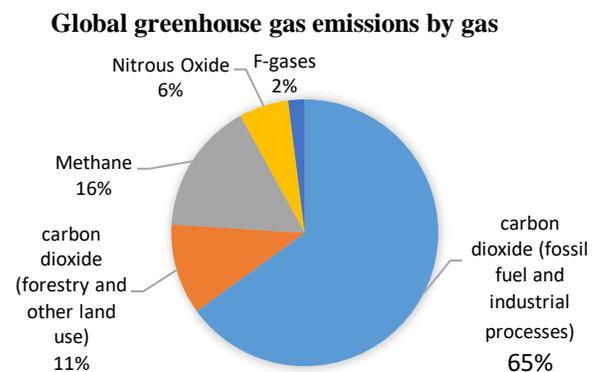


Figure 1: Global greenhouse gas emissions by gas
Source: Adapted from [5]

Various sectors of the economy are responsible for several emissions at global level. Among these economic sectors include, electricity and heat production, industry, agriculture, forestry, and other land use, buildings and other energy. According to EPA [5] Electricity and Heat Production through the burning of coal, natural gas, and oil for electricity and heat is the largest single source of global greenhouse gas (GHG) emissions. For instance,

25% of 2010 global greenhouse gas emissions were electricity and heat production related. Industry is another sector that emits large amounts of GHG after electricity and heat production. Greenhouse gas emissions from industries mainly involve fossil fuels burned on-site at services for energy. Other emissions come from chemical, metallurgical, and mineral transformation techniques not associated with electricity consumption and emissions from waste management activities. Transportation emissions come from fossil fuels burned for road, rail, air, and marine transportation. And almost all (95%) of the world's transportation energy comes from petroleum-based fuels, largely gasoline and diesel. Buildings emissions from this sector mainly arise from onsite energy generation and burning fuels for heat in buildings or cooking in homes.

Agriculture, Forestry, and Other Land Use Greenhouse gas emissions from this sector come mostly from agriculture (cultivation of crops and livestock) and deforestation. This estimate does not include the CO₂ that ecosystems remove from the atmosphere by sequestering carbon in biomass, dead organic matter, and soils, which offset approximately 20% of emissions from this sector [6].

Global greenhouse gas emissions by economic sector

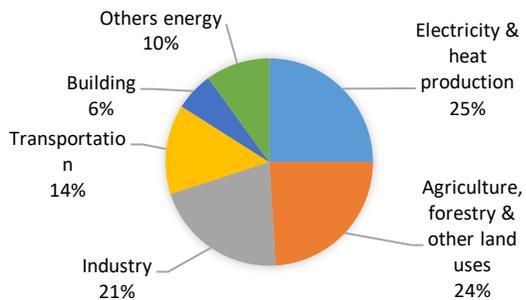


Figure 2: Global greenhouse gas emissions by economic sector
Source: Adapted from [5]

In 2018, Africa accounted for around 4% of the world's energy-related carbon dioxide (CO₂) emissions despite being home to around 17% of the population. The power sector was the largest emitting sector (480 Mt CO₂) followed by transport (355 Mt CO₂) and industry (150 Mt CO₂) [7]. The world atlas on environment [8] identifies Zambia along with other developing countries as been involved in unsustainable charcoal production practices. This because the practice triggers deforestation. Carbon a product of deforestation and/or charcoal production lies in the family of greenhouse gases which as well-known are contributors to global warming.

Figure 3 shows that global carbon emissions from fossil fuels have significantly increased since 1900. And that from 1970, the emissions had increased by about 90%, this can be attributed to emissions from fossil fuel combustion, industrial processes, agriculture, deforestation, and other land-use changes. This rising trend saw a tremendous increase between 1970 and 2011.

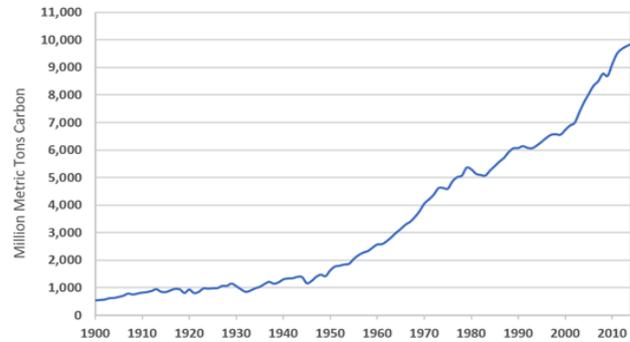


Figure 3: Global carbon emissions from fossil fuels, 1900 - 2014
Source: [9]

The trend at present may be moving downwards as recent data by the IEA[10] revealed that global energy-related CO₂ emissions flattened in 2019 at around 33 gigatonnes (Gt), following two years of increases. The assertion was that, this resulted mainly from a sharp decline in CO₂ emissions from the power sector in advanced economies and to the expanding role of renewable sources (mainly wind and solar PV), fuel switching from coal to natural gas, and higher nuclear power output. The IEA's analysis also revealed that Global CO₂ emissions from coal use declined by almost 200 million tonnes (Mt), or 1.3%, from 2018 levels, offsetting increases in emissions from oil and natural gas. A decline of about 3.2% representing over 370 Mt emissions decline was recorded for advanced economies and the power sector was responsible for 85% of the drop. It was further noted that milder weather in many large economies compared with 2018 had an important effect on the trends, reducing emissions by around 150 Mt. Weaker global economic growth also played a role, moderating the increase in emissions in major emerging economies such as India. The emissions trends for 2019 suggest the power sector has contributed significantly to the reduction and this may be attributed to ongoing global clean energy transitions.

The lack of clean, safe, affordable and environmentally friendly energy a paradigm coined as energy poverty is in part responsible for deforestation and carbon emissions (see [11, 12] for energy poverty definitions). According to the world environment organisation (WEO), it is estimated that about 1.3 billion people in the World in 2012 did not have access to electricity and 2.6 billion did not have access to clean cooking energies [13]. The 2.6 billion people with no access to electricity used biomass to meet their primary energy needs. 95% of those with no access to electricity live in Asia and sub-Saharan Africa. In terms of numbers Asia due to its population size has more people with no access, but the level of access is typically lower in sub-Saharan Africa. There are also areas without access to these services elsewhere, e.g. Latin America, the Middle East and North Africa. Furthermore, everywhere else (especially in developed countries) access is almost universal, except in remote, rural areas [14].

In 2017, for the first time, the number of people without access to electricity dipped below 1 billion, but trends on energy access likewise fall short of global goals [1]. At least 80% of the world population has access to electricity with most access being recorded in developed countries where the main challenge is affordability. Developing countries have the least access and it

remains the major challenge. As a global goal energy is to be affordable, clean and safe for all accessing it and the opposite of this is a dimension called energy poverty. Energy poverty can be described as “Lack of equitable access and safe utilization of energy, especially adequate, affordable, high quality, environment-friendly energy” [12]. Since the early 2000s, the developing countries have seen a steady change in access to clean cooking energy and access to electricity in general.

The IEA [15] gives a depiction of two scenarios (concerning the proportion of the population with access to electricity and clean fuels for cooking), the historical and ideal future of sustainable development goal 7 under Agenda 2030. It shows access to electricity and clean fuels for cooking, whereas the Middle East, Latin America, North Africa and developing Asia have had tremendous acceleration in improving access from the year 2000 to 2020 sub-Saharan Africa lags significantly and requires 60% change to meet the 2030 target. Similar sentiments can be attributed to cooking fuels although their 2030 attainment requires more effort. Sub Saharan Africa under which Zambia can be categorised has seen a leap from 10% to about 20% access to clean cooking and access to electricity from 20% to slightly above 40%. Energy access occupies a central position at the intersection of global energy, environment, and development policy, in the wake of discussions on the Sustainable Development Goals (SDGs) defined by the United Nations (2015): SDG No. 7 requires “ensuring access to affordable, reliable, sustainable and modern energy for all”. Similar to the other SDGs, energy access is defined both in terms of targets (access, rising share of renewables, energy efficiency, etc.) and indicators [16].

Zambia’s energy is mainly comprised of 7% crude oil, 3% refined oil products, 1% coal, 11% hydro and 78% biofuels and waste [17]. The oils have been imported products that are not entirely consumed by households, it is coal and hydropower that is consumed by households and others as electricity including biofuels and waste. Hydroelectric power has seen a reduction in generation in the recent past owing to climate change whereas biofuels and waste have been on the increase.

Energy-related carbon emissions in Zambia are mainly linked to biofuel use and extensive agriculture. Zambia carbon (Co₂) emissions have been on a rise, macro trends.net [2] using World Bank data reveals an upward trend from 2010 to 2016.

Electricity access has been staggering, statistics from USAID indicate that currently national access to electricity averages at 31% with 67% of the urban and 4% of the rural population having access to power and currently households without power are about 7.2 million [18]. Access to modern energy is a central pillar of efforts to reduce poverty and support economic growth in sub-Saharan Africa [7]. The IEA defines a household as having energy access when it has reliable and affordable access to both clean cooking facilities and electricity, which is enough to supply a basic bundle of energy services initially, and with the level of service capable of growing over time [19]. This basic bundle of electricity services should encompass, at a minimum, several light bulbs, phone charging, a radio and potentially a fan or television. Access to clean cooking amenities means access to (and primary use of) modern fuels and technologies, including natural gas, liquefied petroleum gas (LPG), electricity, bioethanol, and biogas, or improved biomass cookstoves which, compared with basic biomass cookstoves and three-stone fires traditionally

used in some developing countries deliver significant improvements. This definition of energy access serves as a benchmark to measure progress towards Sustainable Development Goal (SDG) 7.1 and as a benchmark for our forward-looking analysis [15].

Zambia demand for energy has been rising due to robust GDP growth of more than 6% per annum for the past decade in the country, specifically in the mining, manufacturing and agriculture sectors. According to the Zambia Development Agency (ZDA) [20], the demand for electricity in the country has been growing at an average of about 3%, or between 150 and 200 MW, annually. However, there has not been any major addition to the country’s generation capacity in the last 20-30 years despite a growing demand for power over the years and a rapid population increase. The CSO 2013 population and demographics projection report indicates that at the time of reporting the country’s total population is anticipated to grow from 13.7 million in 2011 to 17.9 million in 2020 and 26.9 million by 2035. The population in rural areas is expected to grow from 8.2 million in 2011 to 10.1 million in 2020 and 14.5 million by 2035, while the population in urban areas is expected to grow from 5.6 million in 2011 to 7.8 million in 2020 and 12.4 million by 2035 (see [21]).

Also worth noting is the aspect of Southern Africa Power Pool (SAPP) that subtracts immensely from the country’s capacity to meet growing demand. According to the SAPP [22] the pool consists of 12 countries with 280 Million people, its average electricity growth rate 2.5% p.a. and the energy consumption 400TWh/year. The pool, as at the end of January 2017 had capacity of 46,522 MW against a peak demand plus reserve of 53,036 MW giving a shortfall of 6,514 MW. The annual electricity consumption reaches 50,000 MW per year, with an installed capacity of 55,000MW. The annual growth rate of overall electric power consumption in the SAPP averages 5% per annum [20, 22].

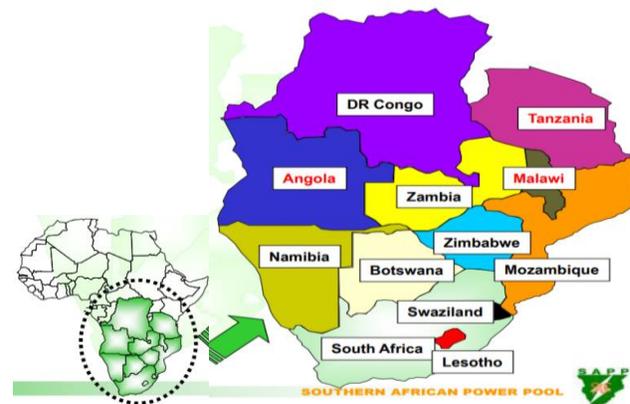


Figure 4: Southern African Power Pool
Source: [22]

Power pooling is about linking utility electricity production by facilitating the dispatch of excess capacity from one system to another. Thus the output from different power plants is pooled, scheduled according to increasing marginal cost, and dispatched on merit to meet demand. Some envisages benefits include: i) Increased security and reliability of supply (Provision of emergency support, Sharing spinning reserve capacity, and

Balancing generation mix i.e. 74% coal, 20% hydro, 4% nuclear, 2% gas/diesel ii) Improved sector investment environment (Aggregation of individual power markets, Improved access to creditworthy and Diversification) iii) Reduced operating costs (Balancing non-coincidental peak-loads and Optimization of generation resources) and iv) Reduced & deferred investment costs (Advantage of economies of scale, Reduced total reserve requirements (SAPP has managed from 20% to 10%) and Postponed investments in new peak power capacity). This aspect of pooling is managed through various agreements such as bilateral contracts and others. Zambia features as an operating member (OP) as Zesco, Independent Transmission Company (ITC) as Copperbelt Energy Corporation and Independent Power Producer (IPP) as Lunsemfwa Hydro Power Authority. This entails its contributions are enormous seen that its major electricity participants are affiliated to the pool.

This study is relevant for the evaluation of the current energy structure, its characteristics and shortfalls, and the relationship between energy consumption and related carbon emissions. The rationale is to bring to readers, policy, and decision-makers with a view of Zambia's energy consumption and related emissions with optimism that the information provided could be a reference for sound energy planning, production and consumption to ensure sustainable energy for all. Review of various literature has shown a clear correlation between unsustainable energy practices and carbon emissions, Zambia would be no exception provided the low electricity access rate and affordability. These two aspects are key contributors to and bear an explicit relationship with emissions.

II. ELECTRICITY STRUCTURE, ELECTRICITY GENERATION, CONSUMPTION AND CHARACTERISTICS

2.1 National energy structure

As mentioned earlier, Zambia's energy is mainly comprised of 7% crude oil, 3% refined oil products, 1% coal, 11% hydro and 78% biofuels and waste. Nationally, bioenergy contributes over 70% to total energy consumption. Households account for about 88% of wood fuel consumption out of which 60.9% of households use firewood for cooking and 24.3% used charcoal, Rural areas account for 87.7% of firewood use for cooking and 9.5% charcoal use [17]. Whereas, from the installed capacity of hydropower about 2878 MW of which 83% is hydro and non-hydro (Coal, Heavy Fuel Oil, others) at 405 MW. In terms of consumption, the mining sector accounts for over 50% of the generated electricity and 30% by the housing sector and the other is exported. This is according to the Ministry of Energy data.

There are five main electricity generation companies in Zambia, namely the state-owned Zambia Electricity Supply Corporation (ZESCO) Limited; Copperbelt Energy Corporation (CEC); North-Western Energy Corporation (NWEC); Lunsemfwa Hydro Power Company (LHPC); Zengamina Hydropower Company and Maamba Collieries Limited. Currently, parastatal ZESCO is the largest electricity company in the country, running and operating power stations, transmission lines, and distribution networks and is the only utility-scale off-taker of independent power producers

(IPPs). Zambia's installed capacity stands at 2,347 Megawatts (MW). The primary hydropower stations include Kariba North Bank Power Station, Kafue Gorge Power Station, Victoria Falls Power Station and, Itezhi Tezhi Hydro Power Station. There is one coal-fired plant, Maamba Collieries, commissioned in late 2016 and is currently generating 240 MW of power for ZESCO. Demand for power in the economy has grown rapidly in recent years and continues to grow, refer to <https://www.zambiainvest.com/energy>.

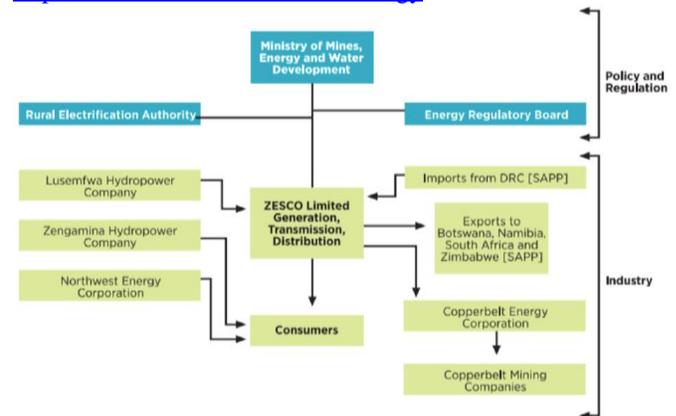


Figure 5: Zambia's power sector players
Source: Singh et al, 2013 in [23]

Its installed capacity is about 2878 MW of which 83% is hydro and non-hydro (Coal, Heavy Fuel Oil, others) at 405 MW. In terms of consumption, the mining sector accounts for over 50% of the generated electricity and 30% by the housing sector and the other is exported [17].

2.1.1 Beneficiaries of grid electricity

The main sectors of the economy that benefit from national grid electricity include; mining, households, commerce and industry, services and agriculture and industry.

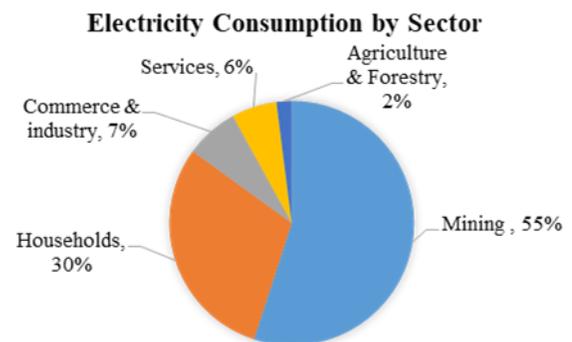


Figure 6: Electricity consumption by sector
Source: [24]

Mining at 55% derives more electricity service benefits because first and foremost it is the backbone of Zambia's economy. It has the highest contribution to the Gross Domestic Product (GDP). Commerce and industry and agriculture and forestry which have in recent years become active economic sectors put together with services do not consume less than the households. And despite the

households having the second highest value of consumption, only 4% benefits rural populations and the rest urban populations.

We can say that the low consumption rate by the economic sectors other than mining and households depicts a weak relationship between growth in the energy sector and other sectors.

2.1.2 Choice of energy options: comparison between rural and urban areas

According to the UNDP [25] globally, 1.4 billion people don't have access to electricity and about three billion people rely on traditional use of firewood, charcoal, agricultural residues or coal for cooking. The various forms of bioenergy differ in terms of sustainability. Bioenergy feedstocks include different products and by-products from the agriculture, forestry and waste sectors (e.g. wood, charcoal, sugarcane, palm oil, animal waste) and there are many ways to use them to produce energy (heat, electricity and fuels). In Africa, as well as developing Asia, solid biomass remains the largest source of energy used by households (in energy-equivalent terms) and is often traditionally burned as fuel in inefficient and polluting cookstoves, using very basic technologies often with no chimney or one that operates poorly. This so-called "traditional use" of solid biomass is not sustainable and is associated with a range of damaging impacts on health and well-being. The volumes concerned are generally excluded when presenting shares of energy from renewable sources. This depicts a scenario of limited energy options for rural areas where electricity is a scarce energy source. Figure 5 below shows a typical composition of rural energy options.

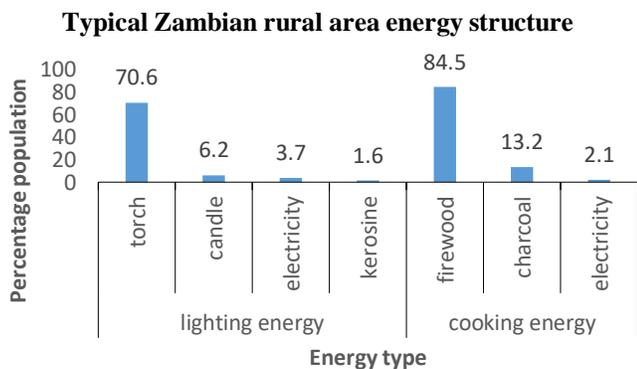


Figure 7: Percentage distribution of households by main source of energy for lighting and cooking in rural, Zambia.

Source: formulated based Living Conditions Monitoring Survey 2015 data ([26])

Electricity is a common energy feature in developed countries and most urban areas of developing countries. The IEA [7] indicates that more than two-thirds of people without access to electricity in the world today live in sub-Saharan Africa. North Africa reached almost universal access to electricity by 2018, but the electrification rate in sub-Saharan Africa was 45% in that year. Electrification levels in sub-Saharan Africa remain very low compared to the levels in other developing parts of the world, most notably the 94% rate reached on average across developing countries in Asia. Zambia exists as one of the African countries

with an extremely low electrification rate, its electricity is mainly concentrated along the line of rail which constitutes urban centers.

The lack of electricity as noted by IEA often obliges households, small businesses and community services that can afford it to use inefficient, polluting and expensive alternative solutions for essential services. It further stresses a challenge that the sub-Saharan region faces by highlighting the trends in population and electrification; "Despite the comparatively low access rate, sub-Saharan Africa has made progress with the pace of electrification accelerating over the past five years. The number of people gaining access to electricity for the first time more than doubled from 9 million a year between 2000 and 2013 to more than 20 million a year between 2014 and 2018, outpacing population growth for the first time. As a result, the number of people without access to electricity in sub-Saharan Africa peaked at 610 million in 2013, before slowly declining to around 595 million in 2018. The region now faces a dual challenge: how to provide access to the 600 million currently deprived while at the same time reaching the millions born every year in areas without access to electricity".

2.1.3 Characteristics of Zambia's electricity

Zambia's electricity is characterised by the following:

2.1.3.1 Hydroelectric power predominant

According to the Ministry of energy [7], Zambia has vast water resources. It contains 40% of the water resources in the Southern African Development Community (SADC), in terms of electricity generation there is about 6,000 MW unexploited hydropower potential, while only about 2,259 MW (37%) has been developed. In addition to water reserves, Zambia has abundant renewable and non-renewable energy resources, including industrial minerals such as coal, agricultural land to support bio-fuels, ample forest for biomass, abundant wind for wind energy, long and intense hours of annual sunlight to support solar energy generation.

2.1.3.2 Monopolised

Zesco Limited was formed in 1970 after the Zambia Electricity Supply Act was passed in Parliament. This Act brought together the electricity undertakings that were previously managed by the local authorities. The Corporation traces its origins to 1906 when a small thermal station was installed in Livingstone to serve a small section of the town. In 1994, the name of Zambia Electricity Supply Corporation Limited was changed to Zesco Limited. This was to reflect the government's recommitment as a sole shareholder to providing a high quality of customer service see, [27].

Since its inception, Zesco has remained a dominant force in the energy sector until the introduction of IPPs. The IPPs except zengamina limited that directly services consumers in Ikeleng'i district the others feed into the national grid with Zesco as an off-taker, see figure 3. This reinforces Zesco's monopoly and blinds it

to developing its infrastructure meant to enhance its service delivery.

2.1.3.3 Unsubsidised

Zambia for a long time had some of the lowest tariffs (non-cost reflective tariffs) in Africa, however, this has not translated into meaningful accessibility and affordability. The low tariff is a form of government subsidy. Cheelo [28], states that for a long time the Zambian Government ran a number of consumption and production subsidy programmes. These programmes came under considerable strain in 2015 when Zambia experienced a significant economic downturn. In that year, the real Gross Domestic Product (GDP) growth rate fell to 2.9%, from an impressive 7.7% over the ten years before (2005-2014). By the time the 2015 downturn had fully set in, the country was running a budget deficit of nearly 10% of GDP and had raked up a public debt stock of over 50% of GDP. Chaurey et. al., [29] states that two seemingly irreconcilable situations dominate the power sector scene in developing countries like India: the ill financial health of state-run power utilities and the existence of a vast unserved poor population with low paying capacity. Thus, while power sector reforms seek to recover losses and introduce competition in the sector, government-administered subsidies for rural electrification are still recognized as essential for increasing access to the poor. Subsidy removal by Zambian government although not explicitly stated took effect in 2016 following the pronouncement by the energy regulation board that based on the policy decision of 2014, to remove fuel subsidies, and in line with the then current policy direction to migrate to cost- reflective pricing of energy services and products, the ERB revised the pump price of petroleum products. See [28].

2.1.3.4 Urban area dominant

The presence of the national grid is mainly concentrated along the line of rail which is characterised by urban areas. These are areas according to Borruso [30] with existence of the CBD and other functional areas (or sectors) surrounding the city centre. These areas have social services and facilities that may be considered as necessary for meeting basic human needs such as good housing infrastructure, social protection (police stations), health (hospitals), education (schools), employment (industry), governance (administrative offices) good roads, and banking and so on. In these areas electricity is a means for development and is therefore ably provided, rural areas in most cases lack the necessary infrastructure and services to attract electricity presence. And as noted by Kirubi [31] access to electricity, in conjunction with complementary infrastructure such as markets, roads, and communications, can contribute to increased productivity in two key economic arenas of rural livelihoods: small and micro-enterprises (SMEs) and agriculture. However, one factor is the distance at which they lie from the main grid which makes it a costly adventure to connect to the grid. Recent interest in rural electrification has emphasised the importance of linking its development with productive uses for energy and poverty reduction. This has been viewed as necessary to increase the pace of rural electrification and reduce its concentration on a relatively

small number of developing countries. Despite this emphasis, progress in electrifying remote rural areas has been slow. In part, this has been attributed to the emphasis on cost recovery and a reliance on the private sector to deliver electricity widely [32]. On the other hand, the sparseness of the communities within rural areas makes it even more difficult to extend the service.

2.1.3.5 Lack of an energy efficiency policy

Having an energy efficiency policy is imperative at any societal level. Implementing energy efficiency policies to address market and behavioral failures can improve efficiency both in economy and energy use [33]. The existence of energy efficiency standards and labeling for household appliances and buildings play an important role in providing information and promoting energy efficiency to consumers and oblige producers to energy-efficient designs. A country without energy efficiency standards or certification system does not promote energy efficiency from the policy point of view and therefore deteriorate the existence of energy poverty, while a country with mandatory efficiency labeling and minimal efficiency requirements for new appliances and buildings provides information for consumers and promotes efficient products and consequently reduces energy consumption by improving efficiency in the building structure and inventory of household appliances[12, 34]. Some national policies and laws that exist in other countries are to do with the most used and energy-consuming household appliances (fridges, freezers, washing machines, dishwashers, tumble dryers, electric stoves and ovens, televisions, air conditioners, lamps and space heaters) and residential buildings according to [12].

2.1.4 Electricity generation and consumption per capita

2.1.4.1 Electricity access rate

As noted in the first chapter of the paper, Zambia's electricity access rate stands at almost 40 percent of the population. And of the 40 percent urban and rural area access represented at 67% and 4% respectively bear an agonising huge difference between the two.

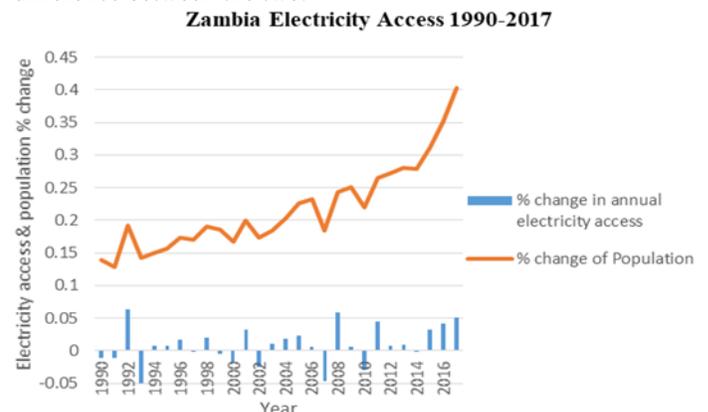


Figure 8: Zambia Electricity Access 1990 – 2017

Zambia's access rate as shown in figure 4 has not been an all positive increase trend but also had depressions. Notable

major depressions occurred in 1993 and 2007 where values access rate dropped to -0.05%. Upward trends are featured noted in 1992 which so a sharp increase to at least +0.05 before the following year's similar opposite trend. Generally, we can say that from 1990 to 2017 access had increased to about 40% of the population.

2.1.4.2 Electricity consumption per capita

Despite access not being remarkable, electricity consumption per capita has been on a steady increase.

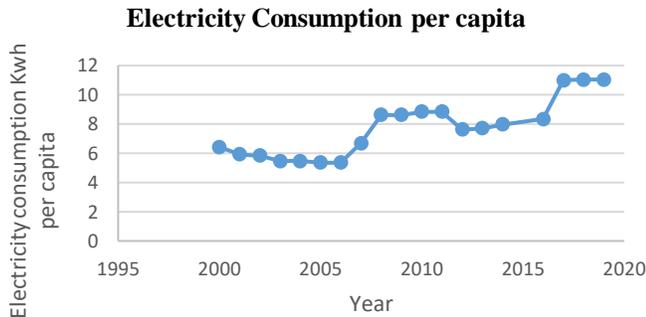


Figure 9: Electricity Consumption per capita 2000 to 2019
 Source: [35]

Between 2000 and 2007 there was a downward trend in the consumption of electricity from at least 6 to almost 5 billion kWh, this was overturned about 2009 with a sharp increase to 8 billion kWh. Another decline was recorded about 2012 and about 2016 a shift upwards and a steady trend. However, a close look at the trend shows a downward trend from 2017 to 2019. The year 2019 had been a difficult period for Zambia in terms of electricity consumption and this raised abnormally the service interruption duration. The national electricity service provider had to ration electricity among its beneficiaries and households were at the receiving end of the lowest and erratic supply.

2.2 Woes of predominant single energy structure

As stated earlier, 2019 was a year of extreme electricity service interruption. During the period of July and through to the year 2020, each day has been marred by not less than 8 hours of service interruption. The relevant authorities attributed this awkward phenomenon to climate change which is thought to be reducing water levels in the Kariba dam required to generate electricity.

2.2.1 Widening electricity access gap

The experience of power deficit continues to wedge the gap between the electricity 'have and have not's' population. As a result of deficit, efforts are mainly directed at improving supply to the haves. The haves who have suffered major service interruptions as noted in 2.1.4.2 reduced their consumption significantly as on most occasions electricity was available at awkward hours (late night) when they could not consume it

effectively. It is therefore clear that during such times the electricity need of the 'have not's' could not be well prioritised which implicitly tells us that the gap has been widening under such conditions.

2.2.2 Reduced affordability

Following the severe energy challenges that plagued the country, energy prices ranging from fuel pump prices and electricity tariffs have been on the rise. In a space of two (2) the energy regulation board approved applications from Zesco for upward change in electricity tariffs. Between 2017 and 2019 tariffs were increased by 75% and 200% respectively. The affordability reduces in light of a steady low growth gross domestic product, the low economic growth may not sustain the tariff increases for most of the population, see [36, 37] for statistical details.

2.2.3 Increased gender inequality issues

As noted by the WHO [38] even if now not fatal, the impact of respiratory illnesses reduces the human capital of household users as a consequence of ignored labour days and/ or missed schooling. This is especially the case amongst women and youth who are disproportionately affected by using indoor air pollution seeing that they are commonly responsible for domestic obligations. Lack of electricity results in inequality which spurs from household to other external levels where an opportunity level playing ground cannot be established.

2.3 Potential social and economic risks of electricity supply insecurity

Secure electricity may be considered as a safeguard of various factors including social and economic factors. In other words, it breeds potential social and economic factors. According to the European Commission as noted in Pedro & Luis [39] security of supply is considered as an important objective of energy policy in many countries around the world. Together with efficiency and sustainability. Thus, any sound energy policy would have security of energy supply as one of its main pillars. The consequences of power outages as noted by Pedro & Luis [39] are particularly important for most societies, very dependent on the availability of electricity, and may generate large economic and social costs.

2.3.1 Economic costs/risks

Economic costs may be described as financial loss as a result of electricity supply interruption and these have strong inclination to business and production. These cost may be classified into direct and indirect costs/risks. Where the former may include loss of production, restart costs, equipment damage and raw material spoilage. And the latter may include loss of market share, reduced profit margins, the cost of income being postponed and redundancy.

2.3.2 Social costs/risks

Social costs may be described as both tangible and intangible welfare loss as a result of electricity supply interruption. These

costs may include, reduced ability to meet basic needs, relationship loss, and loss of leisure time, health and safety risk and so on.

III. CARBON EMISSIONS

As noted in sections of this paper, carbon emissions are from various sources. In this section, we endeavour to delve into emissions from the most common energy type among majority Zambian households that is biofuels. Specifically, we highlight how the production and consumption of biofuels in the form of wood fuel and charcoal contribute to carbon emissions and the resultant adverse effect on electricity production.

3.1 Zambia's carbon emission trends

Over a period of 50 years (1960 - 2014) Zambia's carbon emissions (CO₂) were averaged at 0.45 metric tons per capita. Notable upward trends were recorded between 1960 and 1970 and between 2010 and 2014. During the years, 2011, 2012, 2013 and 2014 emissions amount records were 2,937.27, 3667.00, 3,956.69 and 4,503.08 tons respectively, see [17]. This translated into percentage changes of 9.13%, 24.84%, 7.9% and 13.81% from on preceding year to the other.

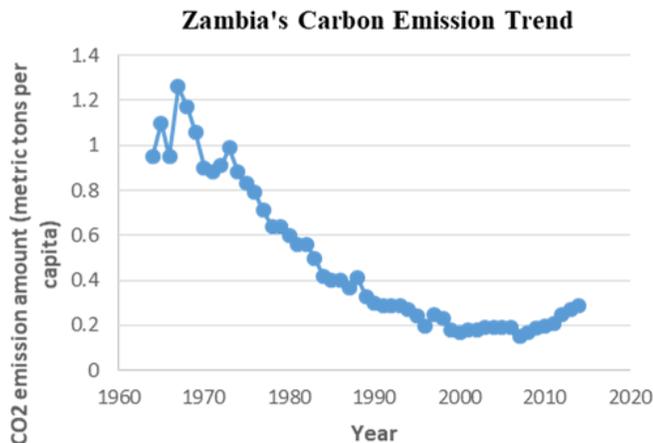


Figure 10: Zambia's Carbon Emission Trend 1960 to 2014

Source: Adapted from Index Mundi (refer to online citation, [40])

From the Index Mundi [40] data, it can be concluded that the amounts although still increasing, the increase is lesser than that of years before 2000. Between 1955 and 2000 Zambia's population increased gradually and reached 10.5 million in 2000, over the next decade it increased steadily to about 12.5 million in 2010, when last population census was conducted. A typical correlation analysis between emissions and population may suggest that population increase may have a corresponding result in emissions, which may be true in a year to year case analysis.

The overall depiction, in this case, may suggest a change in production and consumption practices or behaviours.

3.2 Energy a major source of carbon emissions in Zambia

Despite having cement manufacturing and coal and other industries which are globally noted as heavy carbon emitters on major Deforestation is an agent that contributes to carbon dioxide levels in the atmosphere. One major cause of deforestation is the ever-growing need for energy, especially among households. Indigenous trees are indiscriminately cut down for firewood and charcoal. These two sources of energy are available to both urban and rural areas but most common to the latter where electricity is often not a common feature. A large portion of stored carbon dioxide is released into the atmosphere when forests are cleared [41].

3.2.1 Notable effects of deforestation for energy on hydroelectric power production

Some deforestation occurring in Zambia is along major water bodies such as the Zambezi river basin. This river houses the Kariba dam (Kariba North, Kariba North Bank Extension) and Kafue Gorge upon which the nation grid relies. The river traversing through rural areas characterised by energy poverty experiences indiscriminate tree cutting along its river banks. A notable fact about the river is that the Zambezi River whose source is in Zambia flows through several countries before it empties into the Indian Ocean. Therefore the deforestation happening in Zambia could affect not only Zambia's rainfall but also that of the whole southern Africa region.

According to Banze [42], the Zambezi river basin is already experiencing drastic changes to its climate. In recent years the annual rainfall in the region decreased considerably and affected the annual flow levels. Over 128 million inhabitants that are part of the Zambezi River Basin are dependent on this river directly or indirectly as a source of food and water. In total, the countries along the Zambezi Basin have 2.17 million km² of agricultural land, of which only 202,900 km² is arable. But as a consequence of increased agricultural land, there is also an increased need for irrigation. The Intergovernmental Panel on Climate Change (IPCC) has categorized the Zambezi as the river basin exhibiting the "worst" potential effects of climate change among 11 major African basins. Over the next century, climate change is expected to increase this variability, and the vulnerability of the basin and its hydropower dams. The Zambezi River Basin has one of the most variable climates of any major river basin in the world and the runoff is highly sensitive to variations in climate, as small modifications in rainfall patterns produce large changes in runoff [43].

It is no strange science that rainfall reduction will ultimately result in water level reduction in the Kariba dam and consequently in electricity generation. The Zambezi River Authority (ZRA), the

body responsible for the operation and maintenance of Kariba Dam Complex, investigation and development of new dam sites on the Zambezi River and analysing and disseminating hydrological and environmental information on the Zambezi River and Lake Kariba revealed that water allocation for power generation at Kariba North and South would be reduced by almost 600 megawatts, from the current 1 476MW to 890MW. ZRA data on comparison of water intake across three (3) years of January months (when rainfall is expected to be normal) i.e. 2018 to 2020 had its highest water level at 50% (only in January of 2019) against a normal of 100%, see [44]. This not only reveals how adverse deforestation but also the downside of heavy reliance on one power source.

IV. ELECTRICITY REVIVAL PROSPECTS

4.1 Energy mix potential

The country has several prospective energy avenues that could be considered crucial to reviving electricity service.

Table 1: Energy revival - Mini grid prospects/potential

| Energy type | Capacity | Status |
|-------------|---|---|
| Biomass | 500 MW potential | Biomass and Food Security Assessment underway |
| Geothermal | 80 hot springs available in Zambia | 15MW to 90MW potential In Southern Province (Lochniver Park) |
| Hydro | At least 1000MW | Under exploitation |
| Solar | 6-8hrs/day, energy output of 5.5kwh/m ² /day | Solar resource measurement completed in 2017 Targeting on-grid 200 MW –Get Fit (supported by REFIT Strategy) and 600 MW -Scaling Solar Program |
| Wind | Average speed 7 -8.2 m/s at 80 meter height | 2 year wind resource assessment completed in December 2018 |

Source: Adapted from [24]

An energy mix is eminent especially with the introduction of IPPs. In terms of solar so far, two notable solar facilities that off-grid and servicing local communities are Muhanya solar Mpata hill which are private and state-run respectively. Hydropower generation potential is vast especially off grid based as a lot of river rapids that could support run off the river generation are located in rural and/or remote areas. One such remarkable IPP is Zengamina power limited which services the community of Ikeleng’i district. Refer to [45, 46]. Geothermal and wind energy although having been assessed have yet to be tapped into as useful energy resources. The same however cannot be said for biomass which is a common resource, especially in rural areas. Solid biomass can also be used for cooking and heating in more advanced, efficient and less polluting stoves. It can likewise be used as a fuel in combined heat and power plants or transformed

into processed solid biomass (pellets), liquid biofuels or biogas. These are classified as modern uses of bioenergy.

Bioenergy has the potential to contribute to the decarbonisation of the power, heat and transport sectors, bringing wider benefits in terms of rural development and diversification of energy supply. There are some potential concerns regarding sustainability that have to be considered when planning to use biomass, however, including deforestation, loss of biodiversity, lifecycle greenhouse gas (GHG) emissions, land-use changes and air pollution linked to combustion. Environmental impacts are also severe, with dependency on biomass being associated with significant global deforestation in addition to increases in carbon release through combustion [7, 47]. It is as a consequence essential that the attainable advantages of the use of bioenergy are balanced in opposition to the sustainability issues that are special to each bioenergy to provide chain application.

4.2 Rural electrification programme

The mother policy that supports the private sector participation in rural electrification is the rural electrification act of 2003. According to REA[48], through the Act the Rural Electrification Authority (REA) was established for purposes of i) mobilising, administering and managing the Rural Electrification Fund ii) financing project preparation studies for rural electrification and iii) recommending to government policies for the enhancement of rural electrification. In 2008 a Rural Electrification Master Plan (REMP) was formulated to plan for rural electrification and least cost technologies for rural electrification. The off-grid access rate through solar stands at 7.4%, this includes the 60 Kilo-watt peak (kWp) isolated solar mini-grid of Samfya District, Muhanya solar of Sinda district and/or others. The successes of the programme have included, 162 grid extension and 1,021 solar projects between 2006 and 2017. During the period 2006 to 2015, a total of 3524 households comprising 2803 households at schools, 358 at rural health centers, 42 at the chiefs’ palace and 321 at other public facilities were electrified. Further, 3853 private households comprising 813 households under the intensification programme in Chavuma, Mwansabombwe and Luangeni projects, 430 households under the Mpanta solar mini-grid project as well as 2610 households[49].

4.3 Government reforms

In its quest to increase enhance electricity access the government has put in place various incentives to support the growth of energy sector private players. This is especially to enhance their participation in rural areas where national grid presence is not available. Such measures have included; tax incentives on importation of energy-efficient and renewable energy equipment; promotion of improved biomass cookstoves and gas stoves; development and promotion of use of biofuels regulatory promotion of solar water heaters for households, SHS and Solar plants; Transmission and Distribution system rehabilitation to reduce losses and improve power quality and Time of use tariff (load shifting from peak to off-peak). Through the rural electrification authority (REA) programme (under 2008 Rural Electrification Master Plan) various technologies are being

promoted for the rural areas including; Grid Extension, Mini hydro (from 200kW to 10MW) Development, Solar mini-grids, Solar Home System Installations, Biomass and recently Biogas and Wind. Other incentives under REA to accelerate rural electrification include, Capital subsidies in line with the REA Act, Project feasibility studies to identify sites which could be offloaded to the private developer, Public Private Partnership Models (for instance, IAEREP (Lunga, Chunga and Chishi) and Kasanjiku), Scaling-up Renewable Energy utilization and Electricity Service Access Project – ESAP (Smart Subsidy and Off-grid Loan facility) [48, 50]. The 2008 Statutory Instrument (SI No.32 and SI No. 33) on importation and exemption of some renewable energy and energy efficiency products from VAT and/or import tariffs is another measure. However, there have been concerns over the same as it is not easy to categorise the products and thus their exemption requirements are unclear.

V. DISCUSSION

In the recent past and currently, several challenges have plagued the Zambian economy and power deficit being one major challenge. Zesco the national electricity service provider was established in 1994 with Kariba dam as the main generation site, at this point, Zambia's population was about 9 million and the majority of the citizenry resided in the rural area. For almost half a century the generation system remained without upgrade or additional facilities. This overtime has overburdened not only generation but also transmission and distribution. The growth in population inevitably has an equal if not more resultant demand on energy. Besides the lack of strategic planning of electricity infrastructure, lack of access to electricity and its high cost have in part contributed to the large scale deforestation that plagues some parts of the country.

We could say that the extensive vegetation clearing has contributed to erratic changes in local climate which can be witnessed by persistent droughts and flooding in some parts of the country. Unique to this local climate change is the decrease in water levels especially in the Zambezi River which is the source of national power generation. Indeed as noted by the relevant authorities including the Zambezi river authority, water levels at the three large hydropower plants which make up three quarters of the nation's total generation (Kariba North, Kariba North Bank Extension and Kafue Gorge) and meet domestic consumption demand had reduced significantly. However, seen that this trended for at least three consecutive years, climate change can no longer hold as the main factor behind reduced generation and supply of electricity other factors may be at play as well. The inadequate electricity generation and subsequent supply insecurity has had great economic and social costs on the country. The countrywide power rationing from which on average, consumers experienced not less than 10 hours of electricity interruption resulted in equipment damage, loss of production and raw materials, reduced income, redundancy and crime among others.

Being part of the power pool despite being an economic venture meant for the country's financial benefit, it deprives to an extent the meeting of both existing and growing electricity demand. In other words, it exacerbates the wideness of the electricity gap between those that have and do not have access and between rural and urban areas. Realistically, one would not default

on a power contract to avoid litigation thus would rather ration and tighten the power consumption belt internally.

The access rate has not been impressive so far after more than half a century of independence. Time and population increase have outpaced the development of electricity infrastructure. This occurrence time and again coupled with other factors are responsible for the low access rate. Between the year 2000 and 2010 national population increased only by 16 percent (2000 and 2010 population statistics were 10.53 and 12.53 million respectively see [21, 51]) we could speculate that the meager increase was not enough to compel energy sector reform. The major depressions in the two decades were caused by drought and lack of planning. For instance, despite current and past problems with energy security due to its heavy reliance on hydropower generation declined 30 percent during a drought in 1991 refer to, [52, 53]. In 2011 the Central Statistics Office [21] projected the country's total population to grow from 13.7 million in 2011 to 17.9 million in 2020 at which point only 40% i.e. 7.2 million people have access. This entails a much wider gap between urban and rural areas in access sense. Rural areas as a result of unavailability and inadequacy of electricity infrastructure and other factors find themselves in the predicament of paying more to access or using alternatives. Charcoal and firewood continue to be the predominant cooking fuels in many rural and peri-urban households. Although this may be an issue of ordinary practices tending to endure even when cleaner alternatives are available in some cases. IPPs which are supposed to boost electricity service provision have had a slow growth rate. The rate of connectivity to the IPP grids signals challenges, for instance, Muhanya solar has had only about 60 and Zengamina 850 connected households since their existence. This is an unimpressive statistic that implies private sector support in rural electrification (and incentives) is insufficient.

Electricity subsidy removal and subsequent electricity price increase which has left most electricity users anguished is hoped to improve electricity access and affordability. The effect of the tariff system (government intervention to ensure that people could afford) has been the inability of Zesco to raise the much needed capital for new investments that would improve its generation and supply.

Generally, energy efficiency policy may cut across three primary types namely, financial incentives, product labels and energy efficiency standards. Financial incentives on the whole grant subsidies for households on efficient energy or electricity products, sometimes also make investments on energy-efficiency technologies. Product labels are many times used to furnish energy effectivity statistics for shoppers with the aid of disclosure of electricity use and display of power famous person on products, which are proved of value to minimize strength consumption, especially for these high consumption households. With efficiency policy, any saving on energy consumption would indeed go a long way.

VI. CONCLUSION

The electricity challenges and related carbon emissions are as a result of dependence on a single energy source. This in itself could be sustaining but the lack of its maintenance and

strategic planning has got the country to where it is today. The failure to plan ahead and invest in infrastructure accordingly has failed to meet both population and economic growth. The systems put in place to advance to access most especially in rural areas have achieved not as much. This, therefore, speaks volumes of why IPPs need more support from the government to reduce the gap between the energy haves and have not's. Energy efficiency can be identified as one aspect that helps to improve the difficulties posed by the inadequacies of the old hydropower infrastructure.

IMPLICATIONS

i. Energy poverty, especially among rural populations, is a contributing factor to CO₂ emissions. Because of the lack of electricity access unsound means are used to bridge the gap between the energy need and best available alternative.

ii. Carbon emissions will soar high for as long as electricity access does not improve. Growing economic sectors will take up a lion's share in the name of development and downsizing the households' share.

iii. Rural electrification programme very critical is but so much an ineffective tool. Most rural electrification is done by the government through rural electrification authority this suggests that the playing field for IPPs is not well established for them to participate actively. Rural electrification to be effective requires adequate integration energy private sector players and allow them to tap benefits as per provision.

iv. The growth in IPPs seems stagnant with zengamina power limited and Muhanya solar being the most pronounced. Most upcoming energy players are strongly inclined to the provision of standalone solar home systems.

v. Policy reforms, especially on incentives, are key in the facilitation of the introduction of more IPPs in the generation of electricity

vi. Whereas the existence of incentives may be applauded their applicability have not yielded as much result as needed for improved accessibility especially in rural areas

vii. The energy mixing campaign has not yielded significant results especially at household level. it should instead be rolled out a vigorous energy mix campaign at all levels (from local to national level) with households being adequately sensitised on the importance of their role in the mix. Encourage them to adopt renewable energy technologies especially in cooking.

viii. Anthropogenic activities that seek to meet energy demand are a source of carbon emissions. Curbing energy-related anthropogenic drivers of deforestation and forest degradation through electrification key to emission reduction.

CONFLICT OF INTEREST STATEMENT

We declare that we have no financial and personal relationships with other people or organizations that can inappropriately influence our work, there is no professional or other personal interest of any nature or kind in any product, service

and/or company that could be construed as influencing the position presented in, or the review of, the manuscript.

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Effects of Strategic Direction on the Performance of Africa Inland Church Theological Training Institutions in Kenya

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Abstract- Christian organizations such as theological training institutions are started with the aim of achieving certain objectives. For example, one of the objectives of Africa Inland Church (A.I.C) theological training institutions is to equip men and women who have been called by God with the necessary biblical and leadership skills to minister in the church. This will result in the conversion of more people to Christ and the spread of the gospel in preparation for Jesus' second coming. However, previous research studies had indicated that majority of theological training institutions and especially in Africa had not been adequately preparing church leaders for this noble task. Some of the reasons for this failure has been inadequate curriculum, lack of financial support from donors, declining number of students who are joining theological training institutions and styles of leadership. This study was anchored on strategic direction which is an aspect of strategic leadership. Data was collected using both open and closed ended questionnaires from management members, employees and third year students of A.I.C theological training institutions in Kenya. The study established that strategic direction had a positive effect on the performance of A.I.C theological training institutions in Kenya with a correlation of $r = 0.465$, a β value of 0.465, a significance of $F = 25.349$ and that it explained 21.6 percent ($r^2 = .216$) of the variability of organizational performance. This study is necessary because the performance of theological training institutions is not known in the Kenyan context. The study recommends that top leaders of Africa Inland Church theological training institutions be strategic as they leading their organizations into the volatile business environment.

Index Terms- Strategic leadership, strategic direction, organizational performance.

I. INTRODUCTION

Christian organizations such as theological training institutions are started with the aim of achieving certain objectives. For example, one of the objectives of Africa Inland Church (A.I.C) theological training institutions is to equip men and women who have been called by God with the necessary biblical and leadership skills to minister in the church. This will result in the conversion of more people to Christ and the spread of the gospel in preparation for Jesus' second coming. However, previous research

studies had indicated that majority of theological training institutions and especially in Africa had not been adequately preparing church leaders for this noble task. Some of the reasons for this failure has been inadequate curriculum, lack of financial support from donors, declining number of students who are joining theological training institutions, and styles of leadership. This study was anchored on strategic direction which is an aspect of strategic leadership.

In order to ensure that organizations continue to perform in their area of expertise in this era in which change is the only constant, they need strategic leaders who are proactive in visualizing the future and putting in place proper mechanisms to achieve the planned objectives (Ng'ang'a, 2018). While emphasizing the important role of leadership in organizational success, Mwambazambi (2014) mentioned the issue of leadership as being a very important one because individual and social-political success depends on whether good or bad leadership is exercised. Furthermore, without effective leadership, everything that people do is likely to fail but with effective leadership, the future is constantly created a new for the people and community. Folarin (2013) explained visionary leadership which is an aspect of strategic leadership as one of the major and serious problems facing the African Continent in the 21st century. Further, organizational performance as a result of such factors as reducing number of students is a real challenge facing organizations such as Universities as evidenced by the recent call by the Cabinet Secretary for Education to merge some Universities and close others in Kenya (Omanga, 2019).

Organizational performance has been an area of concern for many years and especially due to the current turbulent business environment. In a previous study, Mutuku (2014) found out that many organizations were finding it difficult to achieve their set objectives in the current business environment characterized by uncertainty and economic instability. This is the reason therefore, why the concept of organizational performance has received substantial attention in the professional discourse as is evidenced by the quality and quantity of both the empirical and theoretical literature on the subject (Ng'ang'a, 2018). For Ivancevich, Konopake, and Matteson (2014), some of the factors that have been hindering organizations from achieving optimum performance are globalization, advancement in technology, styles of leadership and the speed of change and innovation. Similarly,

Mumo (1997), Nkonge (2013) and Naidoo (2015) explained that despite the vital role of leadership in organizational performance, previous studies indicated that in the past, some organizations had underperformed due to ineffective strategic leadership.

II. STATEMENT OF THE PROBLEM

The motivation behind carrying out of this study was the poor performance of organizations in Kenya as a result of various reasons. For example, the results of previous studies by Mumo (1997) and Nkonge (2013) in A.I.C and Anglican Church of Kenya (A.C.K) theological training institutions respectively showed that these institutions were facing performance problems. Specifically, the results of the two studies cited globalization, inadequate curriculum, dropping number of students joining theological training intuitions, lack of donor funding, poor utilization of resources, inadequately prepared graduates and styles of leadership as some of the problems facing theological training institutions belonging to the two denominations. With these challenges, A.I.C theological training institutions require leaders who are able to set the strategic direction of their organizations for them to survive in the current turbulent business environment where stakeholders are demanding value for their money and change being the only constant. However, previous research studies point out to the fact that strategic leaders have had a challenge when it comes to establishing the strategic direction of their organizations (Ng'ang'a, 2018).

Establishing the strategic direction of an organization is one of the real challenge facing strategic leaders. According to a United Nation-Habitant Annual Report (2016), ineffective strategic leadership has been exemplified by a general lack of organizational flexibility in the wake of operating environmental changes and poor communication on strategic direction across the organization. These sediments were echoed by Kabetu and Iravo (2018) when they wrote that strategic leadership does not come easy in most organizations. For instance, in their previous study, statistics showed that fewer than 10 percent of leaders exhibit strategic skills which is a woefully number considering the demands on organizations today. The need for leaders to establish strategic direction has been made necessary by the fact that organizations live into the future besides the many changes occurring in the world today that calls for leaders to have a strategic foresight. Thus it is from this standpoint and taking into consideration that organizations require different styles of leadership for effectiveness (Van Vart, 2014) that this study sought to explore how strategic direction approach can be a viable option for effective administration of A.I.C theological training institutions in Kenya for optimum performance.

III. STRATEGIC DIRECTION

One of the key responsibilities of strategic leaders entails setting the direction that an organization will take through the development of vision, mission, and core values (Ng'ang'a (2018). Bryson (2004) explained strategic direction as an aspect that help leaders in organizations to be orderly and strategic as they lead their organizations on a daily basis. Okibo and Masika (2012) opined that the role of strategic leaders does not end with the

setting of strategic direction because is also entails monitoring the process of implementing the set strategic plans. In the same way, strategic direction entails developing the vision, mission, strategic goals and objectives of an organization as alluded by Mutia (2015). The process further involves drawing a roadmap for the organization's future through a smooth development of a strategic plan. Szpakowski (2011) expounded that through the development of a strategic plan, a leader aligns the actions, beliefs, values of employees and management as well as stakeholders towards the organizational goal resulting in improved performance as explained by Oditia and Bello (2015). This therefore suggests that without a strategic direction, an organization will be like an airplane flying without a navigational compass. Some of the elements of strategic direction are vision, mission, values and objectives.

1.1 Vision

Vision can be defined as the mental picture of what does not exist now but will exist in the future. Ozdem (2011) pointed out that a good vision should capture where and what the firm wants to be in future and the level it wants to attain in terms of performance. Similarly, Thompson, Peterraf, Gamble, Stickland and Jain (2013) explained strategic vision as the top managements' perspective about the company's long-term direction and determines the type of customers and products that the organization will be targeting. Joachim (2010) defined vision as a mental picture of the state of an organization developed through creative imagination and foresightedness of its leaders. Essentially, a vision serves various purposes such as giving direction, acting as a point of reference, and indicating where the organization is going and probably why it is going there (Populova, 2014). An effective vision is challenging and stimulating for the organization, attracts commitment, energizes people, creates meaning in workers besides linking the present with the future aspirations of the organization (Ng'ang'a, 2018). A previous research study on private Universities in Kenya indicated that vision contributed positively to the performance of such Universities (Jonyo, Ouma & Mosoti, 2018). In order for A.I.C theological training institutions to continue achieving their objectives, they need to have leaders with a clear vision of where they are taking the institutions.

1.2 Mission

After formulating a vision, it is important for an organization to clearly stipulate its mission which in essence briefly explains how the vision will be achieved. As Ng'ang'a (2018) opined, mission is the context in which strategies are created by organizations and aligned to both its present and future directions. Agwu (2015) postulated that the purpose of a mission is to explain how to get where the organization want to be in future. Additionally, it describes the clients, major processes and informs the organization about the desired level of performance. A mission is an expression of what leaders in an organization perceive as the key objective of being in business (Kirk & Nolan, 2010). Previous research studies indicate that there was a positive correlation between mission and organizational performance (Jonyo, Ouma, & Mosoti, 2018). The future continual performance of A.I.C theological training institutions will to a

large extent depend on how well strategic leaders will be able to clearly articulate their mission.

1.3 Core Values

The purpose of core values is to link the vision and mission of an organization and further portrays the environment in which the latter will be implemented. Thompson, Peterraf, Gamble, Stickland and Jain (2013) defined core values as the beliefs, traits and behavioral norms that leaders in organizations determine should guide the pursuit of its vision and mission. Further, an organization is said to have strong value system when members share common values related to organization's strategic direction. While elaborating on the role of core values, Thompson, Peteraf, Gamble and Strickland (2012) wrote that the management use core values to guide the organization in pursuit of its vision and mission. A study by Kirkpatrick (2017) showed that core values played a critical role in the performance of organizations. On the contrary, results from previous studies indicated that some core values have been found to be associated with high organizational performance more than others because of their impact on employees' behavior.

1.4 Objectives

Without objectives, vision, mission, and core values are not enough by themselves to enable an organization to achieve positive results in the business it is undertaking. In this regard, Thompson, Peterraf, Gamble, Stickland and Jain (2013) explained that, "the managerial purpose of setting objectives is to convert the vision and mission into specific performance targets" (p. 31). These authors add that a firm's objectives focus efforts and align actions throughout the organization, serve as yardsticks for tracking a company's performance and progress and provide motivation and inspire employees to greater levels of effort. There is sufficient evidence that setting of objectives in an organization increases its performance. For instance, in their research study, Wheelen and Hunger (2012) discovered that the achievement of corporate objectives results in the fulfilment of a corporation's mission.

IV. ORGANIZATIONAL PERFORMANCE

Since organizations are started for the purpose of achieving specific objectives, the measurement of their performance becomes a critical factor. According to Gusmao, Christiananta and Ellitan (2018), organizational performance is the total performance results achieved by an organization in accordance with its mission. In fact, measuring performance involves determining whether an organization's inputs can be matched with its outputs. On their part, Ivanov and Avasilcai (2014) wrote that in recent years and because of the dynamism of the environment where organizations compete, more and more organizations have developed a considerable interest for performance measurement. They add that some of the performance methods that previous researchers have used are Malcolm Baldrige model, the Performance Prism, European Foundation for Quality Management model, and the Balanced Scorecard (BSC) that this study adopted.

The BSC that has its focus of four performance perspectives was developed by Kaplan and Norton (Kaplan & Norton (2007).

These perspectives are financial, customer, processes and learning and growth. According to Kairu, Wafula, Okaka and Akerele (2013), customer perspective measures the capability of the company to provide customers with quality services and products including efficiency of delivery and customer satisfaction. These authors further explained that it is the critical process to achieve both the financial and customer perspectives in an organization because it helps in identifying the key business processes in which the organization will achieve its objectives. [Massingham](#), [Massingham](#) and [Dumay](#) (2019) posited that learning and growth perspective focus on how employees can improve themselves and create more value to the organization. In their research study, Pandian and Narendran (2015) found a positive correlation between financial factors and profitability of textile industries in India while Suchanek and Kralova (2015) found a positive correlation between customer satisfaction and organizational performance. Results of a research study by Namin and Ebrahimpour (2015) showed that internal processes had a positive correlation on non-commercial performance at Imam Khomeini Committee in Iran. The results of a previous research study by Ankrah (2017) indicated that employee training, which an aspect of learning and growth has a positive impact on employee performance.

5.0 Strategic Direction and Organizational Performance

One of the key responsibilities of strategic leaders entails setting the direction that an organization will take through the development of vision, mission, core values and objectives/goals (Ng'ang'a, 2018; Mutia, 2015). The process further involves drawing a roadmap for the organization's future through a smooth development of a strategic plan. Strategic direction is an aspect that help leaders in organizations to be orderly and strategic as they lead their organizations on a daily basis (Bryson, 2004). Through the development of a strategic plan, a leader aligns the actions, beliefs, values of employees and management as well as stakeholders towards the organizational goal resulting in improved performance (Szpakowski, 2011; Odita & Bello, 2015). The role of strategic leaders does not end with the setting of strategic direction because it also entails monitoring the process of implementing the set strategic plans (Okibo & Masika, 2014). This therefore suggested that without a strategic direction, an organization will be like an airplane flying without a navigational compass.

The fact that determining the strategic direction of an organization is one of the key components of strategic leadership that impacts organizational performance had made scholars to study the relationship between the two variables. Majority of these studies had shown a positive correlation between vision, mission, core values and objectives on organizational performance. In a previous study targeting private Universities in Kenya, the results indicated that vision contributed positively to the performance (Jonyo, Ouma & Mosoti, 2018). These authors further asserted that there existed a positive correlation between mission and organizational performance. A study by Kirkpatrick (2017) showed that core values played a critical role in the performance of organizations. Kwenin, Muathe and Nzulwa (2013) investigated the influence of employee rewards, job satisfaction and human resource policies on employee retention in Vodafone Ghana Limited. The results indicated that job satisfaction and

favorable human resource policies significantly impacted employee retention and consequently organizational performance.

V. METHODOLOGY

This study employed the descriptive survey design. Data was collected from Management members, employees, and third year students of A.I.C theological training institutions in Kenya using both closed and open ended questionnaires. The three A.I.C theological training institutions were selected using purposeful sampling method while the Management members, employees and students were selected using stratified random sampling method. Out of a target population of 1221, 120 respondents were selected based on the 10 percent rule. Questionnaires were distributed using research assistants and hand delivery. Out the 120 questionnaires that were distributed, 94 questionnaires were returned representing a response rate of 78.3 percent. Once data was received from the field, it was cleaned, coded, and entered into a SPSS software before it was analysed and results presented.

VI. RESULTS

Various statements were presented to the respondents and requested to indicate to what extent they agreed with them based on the five Likert Scale where 1 is “Strongly Disagree” and 5 is “Strongly Agree” as shown in table 1 below. The results indicated that among the statements that were presented to respondents, the statement that “This institution had a clear mission” had the

highest mean as well as the highest standard deviation indicating that although majority of the respondents agreed with this statement, the responses were not concentrated around the midpoint. The statement that had the least mean as well as the least standard deviation was “This institution has clear values” which meant that majority of the responses were concentrated around the md point.

In table 2, the results of the correlation analysis between strategic direction and organizational performance indicated that indeed there existed a positive correlation between the two variables (0.465).

In table 3, 4 and 5 below, the regression analysis results indicated that the power as explained by the change of the dependent variable (organizational performance) and independent variable (strategic direction) was 0.216. This therefore meant that 21.6 percent of the organizational performance at A.I.C theological training institutions was explained by strategic direction with the remaining 78.4 percent being explained by other variables. In terms of the significant of the model, the F-value was found to be relatively significant at 25.349. Additionally, the results indicated that the correlation coefficient between strategic direction and organizational performance was positive at 0.465. Since p-value was less than 1.0, the hypothesis was rejected because the confidence level of the model was over 95 percent. In terms of the effects of strategic direction on organizational performance determined by beta, the results indicated a β value of .465 which is a positive effect. This therefore implied that an increase in strategic direction resulted in an increase in organizational performance.

Table 1: Descriptive analysis of strategic direction

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|----|---------|---------|------|----------------|
| This institution has a clear vision | 94 | 2 | 5 | 4.47 | .683 |
| This institution has a clear mission | 94 | 2 | 5 | 4.56 | .649 |
| This institution has clear core values | 94 | 1 | 5 | 4.45 | .757 |
| This institution has clear objectives/goals | 94 | 2 | 5 | 4.54 | .728 |
| Valid N (listwise) | 94 | | | | |

Source (Field Data)

Table 2: Correlation analysis - Strategic direction and organizational performance

| | | Strategic Direction | Organizational Performance |
|----------------------------|---------------------|---------------------|----------------------------|
| Strategic Direction | Pearson Correlation | 1 | .465** |
| | Sig. (2-tailed) | | .000 |
| | N | 94 | 94 |
| Organizational Performance | Pearson Correlation | .465** | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 94 | 94 |

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

Table 3: Model Summary – Strategic Direction and Organizational Performance

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .465 ^a | .216 | .207 | 7.288 |

a. Predictors: (Constant), Strategic Direction

Table 4: ANOVA^a

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|--------|-------------------|
| 1 | Regression | 1346.478 | 1 | 1346.478 | 25.349 | .000 ^b |
| | Residual | 4886.841 | 92 | 53.118 | | |
| | Total | 6233.319 | 93 | | | |

a. Dependent Variable: Organizational Performance

b. Predictors: (Constant), Strategic Direction

Table 5: Coefficients^a

| Model | | Unstandardized Coefficients | | Standardized | T | Sig. |
|-------|---------------------|-----------------------------|------------|--------------|-------|------|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 24.476 | 6.092 | | 4.017 | .000 |
| | Strategic Direction | 1.689 | .335 | .465 | 5.035 | .000 |

a. Dependent Variable: Organizational Performance

VII. CONCLUSION

The unpredictable business environment in which organizations are operating in today has made the setting of organizational strategic direction and the measurement of performance a necessity and not an option. Further, results of previous studies indicate that many organizations had been facing performance challenges in the hands of leaders who are unable to shape their future destiny. Some of the challenges are declining number of students, declining financial support from donors, and poor utilization of resources among others. These challenges calls for leaders who are able to set the strategic direction of their organizations in order to continue achieving their objectives. The four aspects of strategic direction are vision, mission, core values and objectives which have all been proven to have a positive effects of organizational performance in A.I.C theological training institutions. The results of this study confirms the results of previous studies that indeed strategic direction has a positive effect of organizational performance.

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Effects of Organizational Culture on the Performance of Africa Inland Church Theological Training Institutions in Kenya

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Abstract- The primary goal of missionaries at the time of coming to Africa was to spread the gospel and establish churches for those who were converting to Christianity. For Africa Inland Church (A.I.C), the first missionaries initially established mission stations in Machakos with other stations being opened soon after in Central Kenya and Rift Valley respectively. The rapid growth of the number of people who were converting to Christianity and the many churches that were being opened required leaders to run them. This made missionaries to start Ukamba Bible School as the first A.I.C theological training institution in Machakos with Moffat Bible School being opened soon after in Kijabe. However, despite the rapid growth of the theological training institutions, very little research studies had been carried out to determine the factors affecting their performance. The aim of this study was therefore to establish the effects of organizational culture on the performance of A.I.C theological training institutions in Kenya. The study employed a descriptive survey research design with closed and open ended questionnaires being used to collect data from 120 Management members, employees and third year students. The results indicated that organizational culture had a positive correlation with performance at 0.517 with 26.7 percent of organizational performance in A.I.C theological training institutions being explained by organizational culture with the remaining 73.3 percent being explained by other variables. The significance of the model between organizational culture and organizational performance was statistically significant with an F-value of 33.475. Both p-value and β value were 0.517 indicating that organizational culture has both significance and effect on organizational performance.

Index Terms- Strategic leadership, organizational culture, organizational performance.

I. INTRODUCTION

The first Africa Inland Mission (A.I.M) missionaries who came to Kenya mostly from America and European countries started theological training institutions in order to train adequate and qualified church leaders to cater for the growing congregation. Their first stations were in Ukambani where they also established the first Africa Inland Church (A.I.C) theological training institution. After they had established Ukamba Bible School in

Machakos, they there soon after started Moffat Bible Institute in Kijabe. However, despite the rapid growth of A.I.C theological training institutions, they were still faced with various challenges such as culture that Mumo (1997) mentioned as being not receptive of new development ideas. It is for this reason that his study sought to establish the effects of organizational culture on the performance of A.I.C theological training institutions in Kenya. The elements of organizational culture that were discussed in this study are organizational values, policies and procedures, workplace climate, employee engagement, reward system, and stakeholder engagement.

II. STATEMENT OF THE PROBLEM

Although on the onset, organizations are started for the purpose of achieving set objectives, previous research studies had pointed out that majority of them fell short of this expectation. According to Mumo (1997), Nkonge (2013), Naidoo (2015) and Ng'ang'a (2018), several organizations have been undergoing performance challenges for some time now due to various reasons. For example, after the opening of many A.I.C theological training institutions was done without proper planning since each Regional Church Council wanted to have one of its own (Mumo, 1997), many of them found themselves not able to attract the required number of students to financially sustain them besides of donor funding, poor utilization of resources, resistance to change and styles of leadership. Despite the performance challenges that have been facing A.I.C theological training institutions in Kenya, little research had been in the past to establish the same. In fact, majority of previous research on the effects of organizational culture on performance had mostly been done in secular organizations and mostly in developed countries (Ng'ang'a, 2018). This is the problem and gap that this research study sought to fill.

III. ORGANIZATIONAL CULTURE

Organizational culture is one of the aspects of strategic leadership that determine how successful or unsuccessful an organization will be. Volberda, Morgan, Reinmoeller, Hitt, Ireland and Hoskisson (2011) defined it as a complex set of ideologies,

symbols and core values that are shared throughout a firm and that influences how the firm conducts business it is involved in. Sudarsanam (2010) posited that organizational culture determines how a firm's stakeholders are treated resulting in some level of performance. On their part, Ivancevich, Konopake and Matteson (2014) explained organizational culture as what employees perceive and how this perception creates a pattern of beliefs, values and expectations. Additionally, Naidoo (2016) cited institutional culture as one of the most salient forces operating in higher education because it is a vehicle for implementing organizational and institutional change. The role of organizational culture is so important in the performance of organization such that without cultural nurturing, organizations will be unable to produce results that are sustainable and will lack a lasting competitive advantage (Ng'ang'a, 2018). Organizational culture can manifest itself in organizational values, policies and procedures, workplace climate, employee engagement, reward system, and stakeholder engagement.

1.1 Organizational Values

Cram (2012) defined organizational values as the specific dimensions that represent manifestations of the culture and beliefs of an organizational group. Distinct from the values associated with a national culture such as power distance, uncertainty avoidance, organizational values are directly associated with a specific organizational setting such as business unit or work group. Quenneville, Bentein and Simard (2010) cited organizational values are a relevant field of study because they influence various organizational dimensions including employee commitment, job satisfaction (Kumar, 2012), business ethics (Suar & Khuntia, 2010) and organizational culture among many others. In a previous research study, Joyce (2012) discovered that organizational purpose and values lead to employee loyalty and happiness which in turn translates to customer loyalty and profit.

1.2 Policies and Procedures

The success or failure of an organization is to a large extent determined by whether there are clearly laid down policies and procedures. Wolosz (2007) defined policies as clear statements of purpose that foster consistent observation of directives dictated from the board and senior management of an organization to all employees. Further, policies are generated based on the laws, regulations and industry best practices applicable to the business focus of a particular firm. Procedures are working instructions mapped to the firm's policies, tailored to cover unique requirements for a product, a country and legal entities. Memon, Panhwar, and Rohra (2010) defined policies as systems that codifies decisions established by an organization to support administrative personnel functions, performance, employee relations and resource planning. Moreover, policies provides generalized guidance on how issues should be dealt with while procedures spells out precisely what steps should be taken to deal with major issues such grievances, discipline, capability and redundancy (Armstrong & Taylor, 2014). Previous studies had pointed out to the fact there existed a positive correlation between policies and procedures and organizational performance (Kwenin, Muathe, and Nzulwa, 2013).

1.3 Workplace Climate

Work climate also known as work environment that is found in an organization is a reflection of its culture. It denotes the place that one works which means the social environment around a person (Gunaseelan, 2012). Further, it is the social and professional environment in which a person is supposed to interact with a number of people. Ozge and Altindag (2016) defined organizational climate as the whole of factors which are perceived by the individuals who constitute the organization and affect their behaviors. Again, it is the processes, systems, structures, tools or conditions in the workplace that impact favorably or unfavorably individual performance. Omolayo, Owolabi, Omole, and Ekundayo (2013) asserted that organizational climate is built up through years of certain type of leadership, a certain level of performance, a certain discipline, and possibly, many other factors in an organization. They define organizational climate as the characteristics that distinguish an organization from other organizations and that influence the behavior of people in the organization. Gitonga and Gachunga (2015) defined work environment which synonyms to work climate as being about creating conditions in which an employee can perform his or her duties comfortably. Previous studies had pointed out to the fact there existed a positive correlation between work climate and organizational performance (Ozge & Altindag, 2016).

1.4 Employee Engagement

The way leaders in organizations engage employees denote the culture of that organization and subsequently determines its performance. According to Harvard Business Review (2013), employee engagement has become a top business priority for senior executives since they are aware that a high-performing workforce is essential for growth and survival of organizations. Additionally, a high engaged workforce can increase innovation, productivity and bottom-line performance while reducing costs of hiring and retention in highly competitive talent markets. Patel (2014) defined employee engagement as the emotional connection an employee feels toward his or her employment organization which tends to influence his or her behaviors and level of effort in work related activities. Gikonyo (2018) explained that employee engagement is the opposite of burnout because whereas burnout is characterized by absence of energy and emotional disinterest, engagement is characterized by vigor, dedication and absorption. Employee engagement can therefore be explained as the level at which top leaders in organizations involve their employees in the decision making of the firm. A Harvard Business Review (2013) report that involved executives from all over the world indicated that 71 percent of the executives ranked employee engagement as very important to achieving overall organizational success. Besides, the study further found out that 72 percent of the executives ranked recognition given to high performers as having a significant impact on employee engagement.

1.5 Staff Reward

The way employees in an organization are rewarded for the efforts that they put in their work plays an important role in the success of such an organization. As an illustration, Prouska, Psychogios and Rechepi (2016) wrote that although reward strategies had traditionally been based on financial rewards, many businesses are now implementing a "total rewards" approach driven by the rapid cost increase in specific areas of benefits, the

recognition that employees are as much motivated by non-financial factors as by financial packages and by an increased diversification of the workforce. They define the concept of “total rewards” as an approach to employee rewards which incorporates financial rewards as well as other rewarding experiences such as the type of work, work environment, management and leadership style and opportunities for learning and development. Bussin and Thabethe (2018) defined employee rewards as the sum of financial (basic pay, variable pay and employee benefits) and non-financial compensations such as recognition, learning and development opportunities and increased job responsibility paid by the organization to employees in exchange of their services. Indeed, Bange (2013) postulated that reward scheme in an organization refers to all of the monetary, non-monetary and psychological payments that an organization provides for its employees. Previous studies by Kwenin, Muathe and Nzulwa (2013) on the influence of employee rewards, job satisfaction, and human resource policies on employee retention in Vodafone Ghana Limited indicated that job satisfaction and favorable human resource policies significantly impact employee retention and consequently organizational performance.

1.6 Stakeholder Engagement

While defining stakeholder engagement, Noe, Hollenbeck, Gerhart and Wright (2010) wrote that they include shareholders, the community, customers, employees and all the other parties that have an interest in seeing that the company succeeds. Additionally, they are the various interested groups who have relationships with, and consequently, whose interests are tied to the organization such as employees, suppliers, customers, shareholders and community. Ayuso, Rodriguez, and Garcia-Castro (2012) defined stakeholders as essential for the business itself to exist and have some kind of formal contract with the business such as owners/shareholders, employees, customers and suppliers. Kinyua (2016) defined stakeholder engagement as the process of effectively eliciting stakeholders’ views on their relationship with the organization, program, or project. Stakeholder engagement is so important for an organization because without them, it would be difficult such an organization to remain in business. Corner (2015) did a study on stakeholder engagement on organizational performance in New Mexico and Oklahoma and the results indicated that higher levels of collaboration are positively related to perceived improvements in direct substantive outcomes for Native American students.

IV. ORGANIZATIONAL PERFORMANCE

The ever changing business environment in which firms operate has made organizational performance an important factor to be considered by strategic organizational leaders. According to Gusmao, Christiananta, and Ellitan (2018), organizational performance is the total performance results achieved by an organization in accordance with its vision and mission. Equally important, Samad, Alghafis, and Al-Zuman (2018) defined organizational performance as a multidimensional concept that entails performance in business and organizational effectiveness both in public and private organizations. Likewise, organizational performance is about creating values for the primary beneficiaries of an organization which includes shareholders, employees and

the community around the organizations (Agwu, 2018). Kasera (2017) posited that organizational performance is a variable that is used to measure the degree in which an organization is achieving its objectives, efficiency and effectiveness in their goals. Moreover, organizational performance is an indicator to measure the efficiency of an organization to accomplish its objectives in terms of achieving organization market orientation and financial goals.

V. ORGANIZATIONAL CULTURE AND ORGANIZATIONAL PERFORMANCE

Quite a number of previous studies had been done to determine the effects of organizational culture on performance. For example, a study that was done in Slovenia, Gorenak and Kosir (2012) established a weak correlation between the two variables. Further, Amah and Ahiauzu (2014) did an empirical study to determine the effects of shared values on organizational effectiveness in Nigerian Banks and found a positive relationship between shared values and productivity in the banks studied. In Kenya, Otworu and Juma (2017) did a study to establish the effects of organizational values on employee performance in Urban Roads Authority with the results revealing that there was a significant positive effect of organizational values on employee performance in the organization. A study by Mumo (1997), found out that A.I.C church did not embrace changes and especially in the curriculum used in its theological training institutions.

Previous research studies have been conducted in the past from the global, regionally, and local contexts to determine the effects of work climate/environment on organizational performance. Results of a review of various studies on work climate and employee’s performance in Turkey by Ozge and Altindag (2016) found out that work climate that exhibit clear role clarity dimensions result in a higher satisfaction and performance of employees. Correspondingly, in a study conducted in Nigeria, Omolayo, Owolabi, Omole, and Ekundayo (2013) found out that job satisfaction and organization climate does not influence job performance because of the fact that employee’s performance on the job is affected by his or her ability and skill as well as a number of situational and environmental factors such as management’s leadership style and personnel policies. Additionally, results of a previous study on the influence of work environment on organizational performance in Government Ministries in Kenya, Gitonga and Gachunga (2015) found out that work environment as the most critical factor in keeping an employee satisfied in today’s business world.

Empirical studies point out to the fact that there exist a relationship between employee engagement and organizational performance. A systematic review of previous literature by Motyka (2018) discovered how scholars and practitioners had indicated low employee engagement at work as one of the current most alarming global economic problems in Poland with only 15 percent of workers being engaged in their work while 85 percent are not engaged or are actively disengaged. From Nigeria, Abugre (2010) found out that when workers realize that their supervisors are ready to share information with them, the workers will be willing to reciprocate this gesture with better performance in their jobs. In the same way, results of a research study by Aswani (2018) on the effects of performance measurement on employee

engagement in multinational corporations in Kenya found a strong positive correlations between the two variables.

In previous research studies, employee rewards have been proved to either have a positive or a negative effect on organizational performance. Globally, Aktar, Sachu, and Ali (2012) conducted an empirical study to establish the impact of rewards on employee performance in commercial banks of Bangladesh. The results indicated that there was a statistical significant relationship between employee rewards and organizational performance in the banks studied. In Africa and particularly in Nigeria, Chinyo, Suresh, Salisu (2018) in their study to determine the impacts of monetary rewards on public sector employees in construction companies, the results established that construction employees in Jigawa State’s public sector were motivated by salary, allowances, gratuity, and pension. In Kenya, Njanja, Maina, Kibet, and Njagi (2013) did a study on the effects of rewards on employee performance in Kenya Power and Lightning Company Limited in Nakuru. The results of this study indicated that cash bonus had no effect on employee performance because those who received cash bonuses and those who did not all agree that cash bonus affects their performance the same way.

Stakeholders’ engagement play a critical role in the success of organizations. In the African Continent, a study on stakeholder perceptions on the impact of reforms on the performance and sustainability of the cotton sector in Ghana and Burkina Faso by Bofo et al (2018) discovered that reforms in Ghana and Burkina Faso took different structural and policy directions and subsequently generated different outcomes to the six performance domains in the study. For example, stakeholders in Ghana perceived predominantly negative outcomes whereas Burkina Faso stakeholders perceived negative and positive outcomes. In a

study by on the effect of stakeholder engagement on effectiveness of public universities in Kenya by Kimutai and Kwambai (2018), the results indicated a significant positive relationship between stakeholder engagement and organizational effectiveness in the University of Eldoret due to the fact that stakeholders are involved in the decision making process within the university implementation programs and projects.

VI. METHODOLOGY

The study adopted descriptive survey research design. Data was collected using closed and open-ended questionnaires from the targeted population of 120 Management, employees and third year students from A.I.C theological training institutions in Kenya. Once collected, the data was cleaned, coded and entered into a SPSS software before it was analysed and results presented. The three A.I.C theological training institutions were selected using purposeful sampling while the Management members, employees and students were selected using stratified random sampling so that only respondents with rich information were included in the study.

VII. RESULTS

The results indicated that there existed a positive correlation between organizational culture and performance of A.I.C theological training institutions in Kenya at 0.517 as shown in table 1 below. This could imply that organizational performance increases in direct proportion with organizational culture.

Table 1: Correlation analysis - Organizational culture and organizational performance

| | | Organizational Culture | Organizational Performance |
|----------------------------|---------------------|------------------------|----------------------------|
| Organizational Culture | Pearson Correlation | 1 | .517** |
| | Sig. (2-tailed) | | .000 |
| | N | 94 | 94 |
| Organizational Performance | Pearson Correlation | .517** | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 94 | 94 |

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

Source (Field Data)

Table 4.66: Model summary – Organizational Culture and Organizational Performance

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .517 ^a | .267 | .259 | 7.048 |

a. Predictors: (Constant), Organizational Culture

Source (Field Data)

Table 4.67: ANOVA^a model - Organizational Culture and Organizational Performance

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|--------|-------------------|
| 1 | Regression | 1662.979 | 1 | 1662.979 | 33.475 | .000 ^b |
| | Residual | 4570.340 | 92 | 49.678 | | |
| | Total | 6233.319 | 93 | | | |

a. Dependent Variable: Organizational Performance

b. Predictors: (Constant), Organizational Culture
Source (Field Data)

Table 4.68: Coefficient table - Organizational Culture and Organizational Performance

| Model | Unstandardized Coefficients | | Standardized Coefficients Beta | t | Sig. |
|-------|-----------------------------|------------|-----------------------------------|-------|------|
| | B | Std. Error | | | |
| 1 | (Constant) | 27.996 | 4.709 | 5.945 | .000 |
| | Organizational Culture | 1.483 | .256 | .517 | .000 |

a. Dependent Variable: Organizational Performance
Source (Field Data)

The results indicated that the power as explained by the change of the dependent variable (organizational performance) and independent variable (organizational culture) was 0.267. This therefore meant that 26.7 percent of the organizational performance at the selected three A.I.C theological training institutions was explained by organizational culture with the remaining 73.3 percent being explained by other variables. In terms of the significant of the model, the F-value was found to be relatively significant at 33.475. Additionally, the results indicated that the correlation coefficient between organizational performance and organizational performance was positive at 0.517. In terms of the effects of organizational culture on organizational performance determined by beta, the results indicated a β value of .517 which is a positive effect. This therefore implied that an increase in organizational culture resulted in an increase in organizational performance.

VIII. CONCLUSION

The unpredictable business environment in which organizations are operating in today has made the measurement of performance a necessity and not an option. Further, results of previous studies indicate that many organizations had been facing performance challenges in the hands of leaders who were unable to shape their future and destiny of their organizations through the maintenance of a conducive corporate culture. Some of the aspects of organizational culture are organizational values, policies and procedures, workplace climate, employee engagement, reward system, and stakeholder engagement. And since the results of this study had indicated that organizational culture to a great extent affects performance, it is recommended that leaders take the culture of organizations with the seriousness it deserves.

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Impact of Increasing Pollution Rates on Public Health in Kazakhstan

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Abstract- The rising dilemma in Kazakhstan and its vicinity areas are regarding pollutant factors. The pollution burst has severed in the Caspian Sea and Aral Sea regions. The pollution has triggered deeply rooted effects like climate change, socio-demographic changes and economic changes. The Kazakhstan people has become susceptible to several illness related to heart, kidney, liver and other deformities. The women and infants are at the major risk of getting such ailment. This study has included secondary data to accomplish understanding of ecological changes in Kazakhstan. Both anthropologic and natural causes are underlying the stimulated changes in nature and natural resources. Major Biodiversity degradation is the prime concern in this region.

Index terms- Climate change, hydrocarbons, desiccation, poisonous pesticide, Kazakhstan

I. INTRODUCTION

Exposure of the population to significant ambient nature of Kazakhstan has caused severe imbalance in ecological factors. There are several factors that can cause ecological degradation in Kazakhstan areas especially at Caspian Sea and Aral Sea areas. The foremost dilemma among them is pollution due to oil extraction from mining and industrial activities. Transportation accidents and damage also pose several negative consequences on the marine population and adjacent biodiversity. The important ecological degradation in the Caspian and Aral areas due to anthropogenic or nature caused petroleum hydrocarbons has been demonstrated in threadbare. Health consequences and ecological consequences due to such drastic conditions have been discussed in this study.

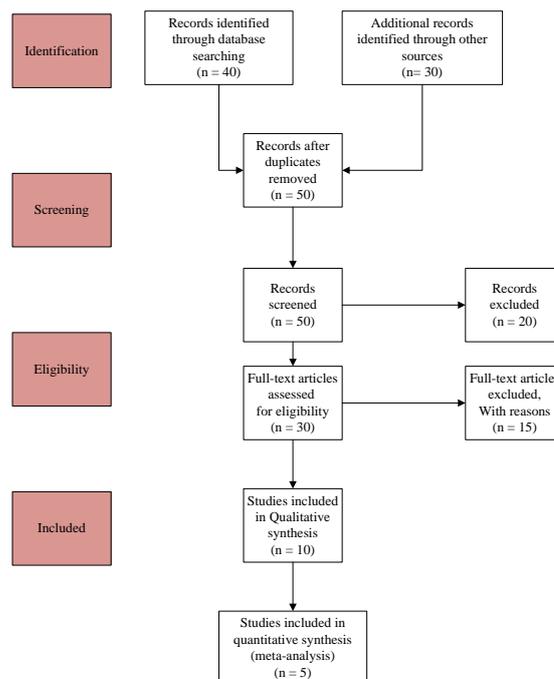
II. DATA COLLECTION AND IDENTIFICATION OF RESEARCH

The research study has applied analytical and documentary methods for obtaining relevant information about the ecological issues faced in Kazakhstan. For this purpose, research journals, government reports and ecosystem reservation information are assessed and analysed to develop a strategic understanding about potential threats of the ecosystem in Kazakhstan. The secondary analysis involved evaluation of 15 sources including articles, reports and government data that are collected from educational databases such as ProQuest, SCOPUS and Google

scholar, whereas the governmental repositories are scoured to access the reports provided by Kazakhstan government.

These articles critically highlighted the environmental issues present in the marine systems and land ecosystem, while highlighting the exploitation of petroleum extraction, oil gas exposure and other human activities. Strategy [16] commented that social development schemes, actions and implemented systems are also evaluated to support the progress environment protection activities with the concern of saving the present biodiversity of marine bodies in Kazakhstan.

Fig1: PRISMA framework



(Source: Created by author)

III. FINDINGS

3.1 Hydrobiology of Caspian Sea

Being the largest lake in Kazakhstan, it exhibits a large diversity of flora and fauna. Considering the phytoplankton, macro-benthos, zooplanktons and Ctenophore along with physicochemical parameters, Caspian Sea demonstrates high variation in the ecology. Nature [15] viewed that diversity in biotopes, abiotic and biotic conditions of Caspian Sea are highly vulnerable to the increasing changes in climate, human activities that endanger the ecological balance in this enclosed water body. The current environmental situation in Caspian Sea exhibits the loss of biodiversity due to the progress of Dead Zone creation and a drastic decline in natural ecological components. For instance, the trend of sturgeon catch is decreased by 37% with a mass loss of diversity of water bodies.

Fig 2: Caspian Sea



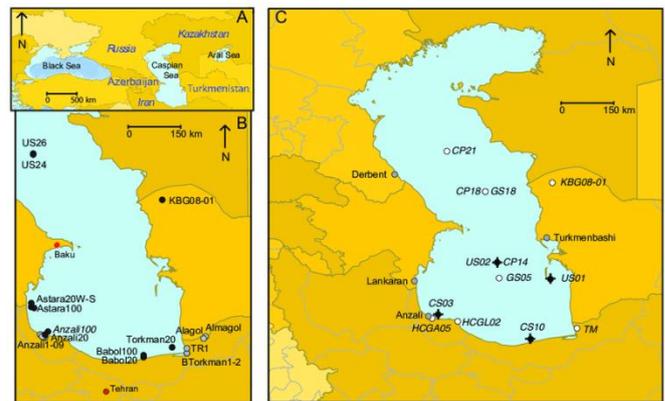
(Source: naturvernforbundet.no, 2020)

The natural resources of Caspian Sea include minerals, biological resources, balneological and agro-climatic components along with recreational elements. In addition to the valuable biological resources, oil resources and hydrocarbons are major elemental sources for Caspian Sea, which supports the ecological balance considering minerals and physical components of nature. However, Onyusheva [11] mentioned that the current environmental situation is under threat due to population burst and destruction of natural resources. Considering the river flow, wastewater disposal from onshore industries and municipalities, oil extraction and increase in sea level. Edu [3] showed that extensive air, water and land pollution created from intensive oil and gas development in Caspian region that have exhausted the natural resources and disturbed the ecosystem with a loss of 99% of its spawning ground and 80% of Caspian sturgeon.

The reasons behind the loss of biodiversity in Caspian Sea indicate obsolete production technology for oil production and extraction, inefficient treatment equipment, lack of technology to balance the use of renewable and non-renewable resources and the low quality of fuel. Krupa[6] stated that the experimental pilot plant “Aktau-1” for controlling and improving oil extraction failed due to technical difficulties that

increased technological needs and support for operating practices with the concern of environmental balance. The concern of increasing loss of biodiversity in Caspian Sea and severe implications of environmental issues on daily life, the water areas are reserved and protected in three National parks such as Astrakhan, Gizil-Agach and Khazar that protected diverse flora and fauna in the northern part and southeast coast.

Fig 3: Caspian Sea relief borders



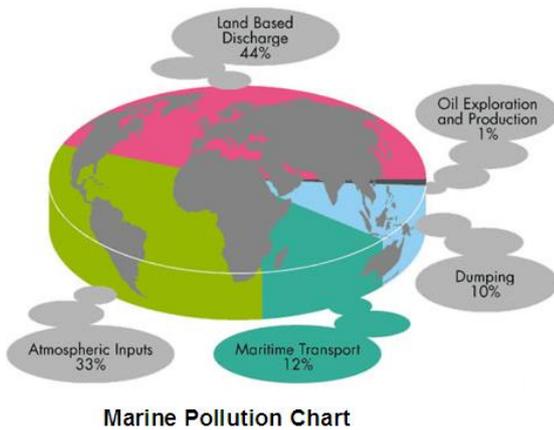
(Source: naturvernforbundet.no, 2020)

Caspian Sea region includes 1800-2000 diverse species which are threatened with oil and gas pollution, specifically at the shore of Absheron Peninsula. Moreover, Caspian Environment Program (CEP) reported sewage (169 million cubic meter of raw sewage and 240 million cubic meter of treated sewage) disposal in Caspian sea has negatively affected the water bodies by increasing biological and dissolved oxygen demand along with the creation of ecological condition for algal bloom and adversities such as high alkalinity for the growth of microbes in water bodies. Issanova[9] showed that National Caspian Action Plan (NCAP) and Ecoregion Conservation Plan for the Caucasus (ECPC) have been implemented to ensure the conservation of ecological balance in this region.

3.2 Marine environmental pollution due to petroleum hydrocarbons

Petroleum contamination in terrestrial and aquatic ecosystems is one of the leading conversions as they are effective in destroying the natural ecosystem and increase the potential of increasing risks of disasters. Karbetova[23] commented that typical toxicants in destroying the Caspian Sea ecosystem is categorised as the hydrocarbons with specific reference to petroleum. The issues with oil extraction, treatment of water bodies and waste disposal are effective in increasing the potential of damaging the ecosystem there. Other water bodies in Kazakhstan are chiefly polluted by agricultural and industrial runoff and in some cases it is radioactivity that destroys the natural habitation of water bodies’ ion including freshwater and marine water of Kazakhstan.

Fig 4: Marine Population Indices



(Source: columbia.edu, 2020)

The marine bodies of Kazakhstan mainly encompass the Aral Sea, Lake Balkhash, Caspian Sea and Dead Sea. Facts [4] opined marine environment protection is established in Kazakhstan to ensure the maintenance of marine ecology of these biologically diverse spots in the country. Limited technology in oil extraction in these regions has resulted in increased pollution with hydrocarbons, surfactants, and heavy metals. Igaliyeva [18] showed that chloral organic pesticides and phenol. Primarily, petroleum hydrocarbons are responsible for changing the morphological, physiological and biochemical structure of organisms and physical environment, which are irreversible and cause chronic pathological effects. Khalilova [13] stated, in the Northern region of Caspian Sea oil pollution is recorded to be ranging from 1 to 6 MPC, which can be reasoned with oil outflow from poor oil extraction processes from then offshore wells of Caspian Sea.

Oil spill and extraction processes from marine bodies are harmful to the ecosystem affecting the marine lives adversely. The chemical constituents of petroleum and exposure of organs can increase toxicity and poison the fauna and flora. In Kazakhstan, the marine water bodies are primarily contaminated with oil spills, illegal discharge of ballast, discharge of fish processing waste and bilge water. Moreover, Amanova[7] stated that petroleum by-products are similar in the effects of affecting the biodiversity of Caspian Sea, Aral Sea and other marine bodies. Kadyrbergenova [1] opined regional government corporations are initiated to ensure the preservation of marine bodies in Kazakhstan in controlling the pool extraction in a regulated manner and monitoring the treatment processes, which also impact the economic development and ecosystem management.

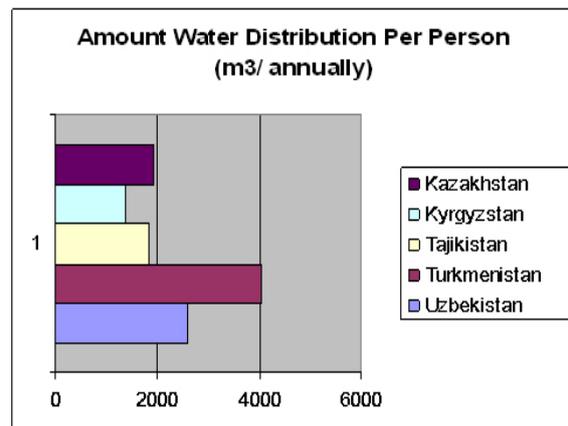
3.3 Nature-society linkage in the vicinity of Aral Sea

The Aral Sea has stranded the border by separating north-western Uzbekistan and Western Kazakhstan. In order to understand the pollution and its consequences, it is crucial to explore the transformation in the Aral Sea population. In the 1960s, the arrival of Soviet Union was the root behind the depletion of the Aral Sea water level. Bennett [12] stated the rerouting of rivers from respective sea due to execution of

agricultural projects had reduced the incoming of water. Cotton monoculture imposed by Soviet Union population diversified almost 100% of the waters of Darya, Amu and Syr Rivers before meeting the Aral Sea. Such drastic action has resulted in evaporation of water and given the depiction of polluted swathe.

The population of Kazakhstan around the Aral Sea areas rose exhilaratingly. Bayandinova [19] opined the number raised from 13.8 million to 33.2 million people enforcing increase in 2.0 to 5.1 million in Kazakhstan as well. After two consecutive decades of eventual rise in population, the mean growth rate has been diminished in the basin areas of the Aral Sea. Due to an increase in population, the demand for natural gas and water has also escalated rapidly. Issanova [10] stated, in Kazakhstan, the water requirement of recent years has counted to be 1943 m³/ per person/annually. The water supply is significantly utilised in Municipal economy (3.1 Km³/ year), power generation and industrial purposes (8.3 Km³/ year), agriculture (0.86 Km³/ year), fisheries (2.0 Km³/ year) and irrigated farming (114.0 Km³/ year).

Fig5: Water requisite in Aral Sea basin areas



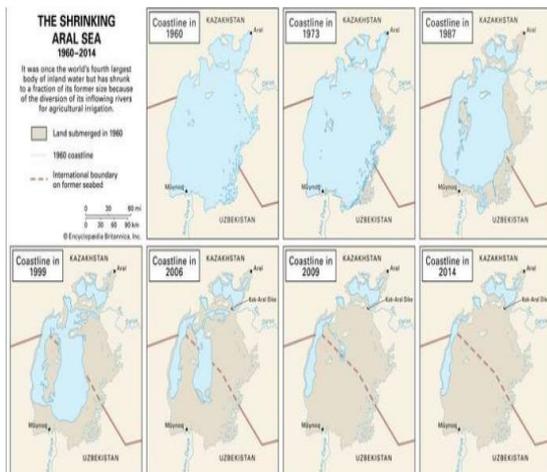
(Source: columbia.edu, 2020)

There is an intense demand for groundwater in the basin of the Aral Sea as it diversifies the load on the available water resources. The groundwater is reserved in the Amudaraya river surroundings and Aral region. The sea is being depleted largely and groundwater is the alternative source for the habitant people. The groundwater and river water are also utilised in the irrigated fields. Scientists have discovered that there is a seasonal alteration in the ground water quality. The oil pollutants tend to ooze in the groundwater and river water to destroy the drinkable and usable water resources. As per Mukhtarova [14], the rapid changes that have been observed due to higher degree of pollution are water and food shortages, changes in weather conditions. The temperature level rise has caused long lasting and frequent droughts in the Aral Sea belt regions. Intensive usage of water is primarily for land subsidence and vegetation purposes. Arystambekova [5] opines that, the salinity of Aral Sea water has been raised significantly and accounted to be almost 10 g/l. significant loss of water has caused Aral Sea desiccation and drop in sea water level up to 23 meter.

3.4 Ecological imbalance in trans-boundary river basins adjacent to Aral Sea

Climatic conditions of Aral Sea adjacent areas are also having aversive consequences due to evaporation of Aral Sea. The previous climate regulating Aral Sea has changed to offer colder and longer winters and shorter, dried summers. Precipitation level has reduced by 10 factors, humidity by 10%. Winter temperature has shown to decrease by almost +2 to 3°C and the similar degree rises in summer. Report [20] showed that changes in climatic conditions have halved the Pasteur ground productions. Another aggravating factor for pollution is the position of highways near the Aral Sea. Issanova [8] stated the higher air current from west to east region spreads the aerosol particles in the upper atmospheric layer. Penguins of Antarctic regions were also found to be contaminated with aerosols generated in the Aral Sea beds. Karimova [2] entails, Aral dust is being carried away to the far fields of Belorussia, Norway forests and Greenland glaciers as well. Economic disaster also arose due to the collapse of the fishery business. The rate of unemployment has risen to 60,000 as they were connected with the Aral Sea for living.

Fig6: Graphical representation of Aral Sea shrinking



(Source: naturvernforbundet.no, 2020)

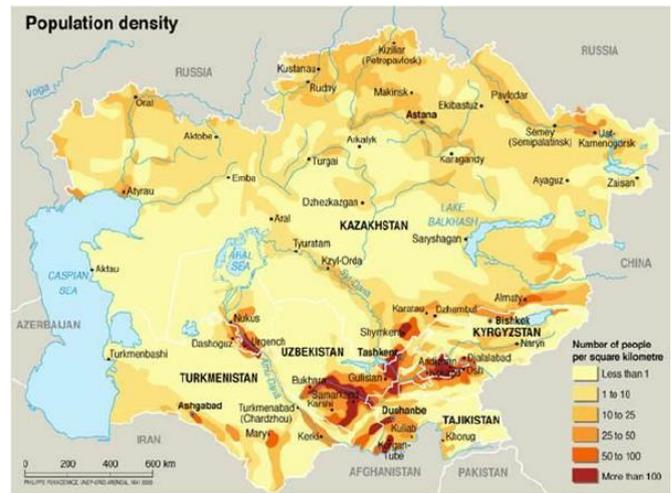
Aral Sea desiccation has put lethal consequences on mountain glacier degradation of Himalayas, Altai and Tien Shan. Igaliyeva [17] demonstrated, the rivers such as Amudarya, Syrdarya are fed through these glaciers and hence they are also being shrieked day by day. Glaciers are being melted due to an increase in toxic dust causing precipitation and mineralisation of glaciers. Severe threat has been imposed as Central Asia mountain glaciers are the prime source of atmospheric moisture and fresh water. Continuation of such sedimentation process will cause losing the efficacy of mountains to condense moisture. The river drainage will further decrease to cease due to the dramatic effect of sedimentation. The marine fishes were also contaminated with highly poisonous pesticides found in the Aral Rivers.

3.5 Ecological and health consequences of Aral Sea crisis

As per the reports of professionals of International medical health, the quality of life and health standards in the vicinity of Aral Sea is profoundly deteriorating and poor in nature. It was also found that, there is a direct association between the

ecological devastation and Aral Sea crisis. Further research suggests that, the prime cause behind such population degradation is enhanced mineralization and salinity of water supplies. Increase in ailment among the adolescents of this region is directly linked to the ecological health decline. The rate of infant mortality has reached up to 100 in every 1000 live births. The maternity deaths have risen to 120 women in every 10,000 births. Issanova [8] stated the increased amount of parasites, pesticides in air and dust storms has created such a dilemma. Ecological, socio-economic factors and significant breakdown in health care infrastructure is the reason behind poor health and Aral Sea sufferings. The ailments that are most common in these areas are liver disease, kidney deformation, tuberculosis and higher rates of anaemia.

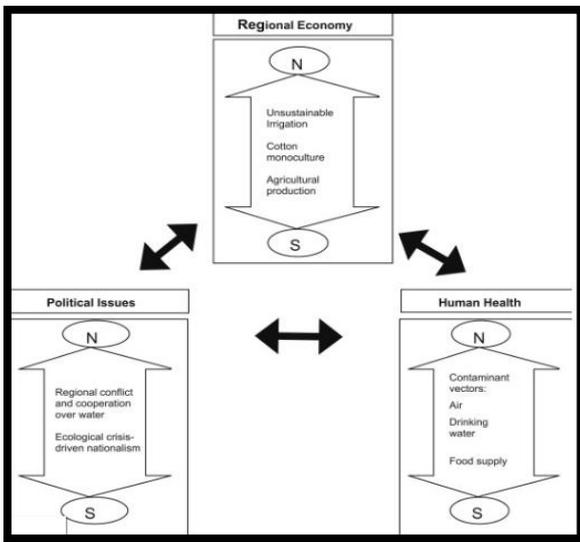
Fig 7: Population density of Kyzyl-Orda area



(Source: Report, 2020)

Average life expectancy of the Kyzyl-Orda area in Kazakhstan has been observed to decline up to 51 years from 64 years. Infants and women are mostly vulnerable to such diseases. 99% of pregnant females, 91% of non-pregnant females and 87% of teenagers suffer from anaemia. Females of Kazakhstan are suffering from reproductive pathologies such as birth complications, miscarriages and infertility for above 20 years. Abdugarimova [21] stated, pregnant women found to have excess levels of organochlorine pesticides such as pp-DDT, pp-DDE, HCE and HCB in their plasma. Significant changes in fetal development and reproduction. In addition to that, there are increased risk of soft tissue cancers, neurobehavioral changes, dermatological changes and liver function impairment. People are also susceptible to endocrine malfunctioning and immune-suppression. Respective pollution from the natural resources found in karakalpakstan has caused chronic exposure of chemicals for a longer period of time. The underlying causes that have been identified are imbalance of health nutrients such as iodine deficiency, higher water mineralisation and pesticides. The social and medical factors are also associating elements behind this disaster.

Fig 8: Political, economic and health consequences



(Source: Report, 2020)

The quality of water deteriorated from the previous 40 to 45 years due to mineral increase in the sea water. Both the water supplies and soil have been contaminated with almost 150,000 tons of hazardous chemicals since the previous 10 years. Most of the fauna and flora under sea water has been destroyed because of drastic alteration in water quality. Abdugarimova [22] opines both the mining industry and agro industry are responsible for the subsequent pollution in water, air and soil of Kazakhstan. The groundwater is severely contaminated with minerals and salts. As per WHO (World Health Organisation), the standardised TDS (Total dissolved salts) in water is 1.5 g/l which is safe for drinking and other utilisation. In the case of Kazakhstan areas, the ground water quality reflects a TDS of 4-6 g/l. Cotton monoculture in the adjacent areas is the primary reason behind agricultural soils and enhanced salinity.

IV. CONCLUSION

There are several factors ruling around the degradation ecology of Kazakhstan and the adjacent areas. Two major factors that have been discussed in this study are the desiccation of the Aral Sea and petroleum extraction from Caspian Sea. From the analysis, it can be concluded that anthropogenic causes have ruptured the harmony of nature. The higher amount of petroleum extraction and Soviet Union monoculture has destroyed the balance of nature and climate. The social, demographic, economic, environmental conditions have been shattered due to the wrath of nature. Effective support from the governmental and non-governmental bodies is required along with public awareness to make a positive step towards repletion of nature and natural sources.

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Study of Obsessive Compulsive Symptoms in Patients with Schizophrenia

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Abstract-

Schizophrenia is a chronic mental illness characterized by positive, negative and cognitive symptoms. Positive symptoms consist of hallucinations, delusions, disorganized behavior and disorganized speech. Negative symptoms consist of alogia, anhedonia, asociality, affective flattening and impaired attention and concentration. Cognitive symptoms consist of impairment in working memory and executive functioning. Schizophrenia presents in various symptom cluster other than typical of schizophrenia with positive and negative symptoms. Obsessive-compulsive symptoms also occur frequently in patients with schizophrenia but they are not considered essential elements of schizophrenia. The presence of obsessive-compulsive symptoms in patients with schizophrenia offers another subtyping strategy including phenomenologic, neurobiologic treatment response and outcome characteristics. They also cause significant distress and anxiety leading to impairment in the social, occupational and interpersonal functioning.

Material & Methods:

After obtaining the necessary approval the study was started with enrolling of 60 newly diagnosed cases of schizophrenia fulfilling the DSM-V criteria for the diagnosis of schizophrenia. The prevalence of obsessive-compulsive symptoms in the patients was assessed using the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) the severity of positive and negative symptoms was assessed using the Positive And Negative Syndrome Scale (PANSS).

Results:

The prevalence of obsessive-compulsive symptoms in patients with schizophrenia was found to be 35%. A significant correlation was found with PANSS Positive score, PANSS General score and composite score suggesting that patients of schizophrenia with OCS are more likely to have positive symptoms. The higher scores on Y-BOCS also had higher scores on PANSS suggesting that the severity of schizophrenia has direct relationship with presence of OCS.

Index Terms- OCD, Obsessive Compulsive Disorder, Schizophrenia

I. INTRODUCTION

Schizophrenia is a staggering issue which fits under the more extensive heading, psychosis, which is described by loss of contact with reality. Schizophrenia is a chronic severe mental illness that affects approximately 0.5% to 1.5% of total worldwide population, and the annual incidence rate averages between 0.5 and 5.0 per 10,000 people.¹ Studies suggest that the prevalence of schizophrenia is found higher in men compare to female. Schizophrenia additionally generally begins prior among men.² Schizophrenia includes positive symptoms like hallucinations (hearing seen or feeling things that not there), delusions (fixed false beliefs or suspicions that are firmly held even when there is evidence to contrary) & abnormal/disorganized behavior (strange appearance, self-neglect, incoherent speech, wandering aimlessly or mumbling or laughing to self).² It includes negative symptoms like alogia, anhedonia, affective flattening, asociality and impaired attention and concentration. Schizophrenia is the most puzzling and debilitating of all the psychiatric disorders and characterized by disordered cognition, including a "gain of function" in psychotic symptoms and loss of functions in specific cognitive functions such as working memory and declarative memory but without the progressive dementia that characterizes classical neurodegenerative disorders. It is perhaps the most dramatic and tragic manifestations of mental illness known to mankind. The consequences of the illness for the individual affected, his or her family, and society in general are devastating.³

Obsessive compulsive syndrome is a disorder of brain and behaviour which causes severe anxiety and distress in those who are affected. It involves both obsessions and compulsions that take a lot of time and causes significant impairment in functioning. These symptoms are clinically important for the management and prognosis. The obsessive compulsive symptoms can be of various kinds like contamination, sexual, religious, aggressive or somatic themes, with or without accompanying compulsions such as cleaning, checking, hoarding, repeating and arranging.

Obsessive compulsive symptoms in schizophrenia are well recognized and have been described in various forms as a part of schizophrenia but are a less-researched entity. There has also been a growing interest in finding more meaningful subtypes of schizophrenia than those described in both the classic and

modern nomenclatures which assumes that schizophrenia is a heterogeneous disorder with diverse underlying neurobiologic mechanisms. The presence of obsessive-compulsive symptoms within the schizophrenia spectrum may offer yet another subtyping strategy, with discrete phenomenologic, neurobiologic treatment response and outcome characteristics.

II. MATERIALS AND METHODS

Study Design:

Our study was an observational cross-sectional study to study the obsessive - compulsive symptoms in patients of schizophrenia.

Sample Size 60 newly diagnosed cases of schizophrenia were taken to get 30% mean improvement with 14.4 SD and absolute precision of 5 at 99% confidence.

Site of Study:

The study sample was obtained from clinical departments IPD and OPD based patients in Dhiraj General Hospital (DGH), Smt. B K Shah Medical Institute and Research Centre (SBKS MI&RC), Piparia. Dhiraj General Hospital covers major population of Piparia village, Vadodara and nearby districts of Gujarat and Madhya Pradesh.

INCLUSION CRITERIA

1. Patients ready to participate and give a written, informed consent.
2. Newly diagnosed cases of schizophrenia fulfilling the DSM-V criteria for diagnosis of schizophrenia.
3. Patients aged between 18-65 years of both gender.

EXCLUSION CRITERIA

1. Patients not willing to give written consent.
2. Patients with debilitating medical condition.
3. Patients with delirium or dementia.
4. Patients with intellectual disabilities.
5. Acutely agitated patients or patients not able to perform study related assessments.

METHODOLOGY

The study was aimed to study the prevalence of obsessive-compulsive symptoms in patients with schizophrenia and their co-relation with the positive and negative symptoms of schizophrenia. This was an observational study. Study was started after obtaining permissions from Sumandeep Vidyapeeth Institutional Ethics Committee (SVIEC). The study was started and the patients were enrolled after the approval of the Sumandeep Vidyapeeth Ethics Committee. The patients were explained about the interview and after they are willing to participate in the study, a written, informed consent was taken from the patient in the language of their choice. After the consent, the patients were assessed for inclusion in the study, using a structured clinical interview for diagnosis (SCID) of schizophrenia. All demographic details of the patient were recorded using the Case Report Form (CRF).

The prevalence of obsessive-compulsive symptoms will be assessed using the Yale- Brown Obsessive Compulsive Scale (Y-

BOCS). The severity of positive and negative symptoms will be assessed by Positive And Negative Syndrome Scale (PANSS).

III. RESULT AND OBSERVATON

The sample consisted of 60 patients of newly diagnosed cases of Schizophrenia. Various socio-demographic details were compared using appropriate statistical tools. Various tests like Chi Square test, independent t-test and Pearson's correlation coefficient has been used to find correlation between many variables.

Socio-demographic details:

In present study majority of the patients are of young age group and mean age of all enrolled patients were 32.10+/-10 years and similarly mean age of male patients was 31,50 +/- 9.37 years whereas mean age of female patient was 32.79+/-9.52 years.

In the study amongst 60 participants, 32 (53.33%) were male and 28 (46.67%) were female. Out of the 60 patients enrolled in the study, 31.7% belonged to the urban population and 68.3% belonged to the rural population. Out of all enrolled patients we have found that unemployment status was higher, i.e. 40.00% were unemployed followed by 33.33 % were employed, 3.33% were businessman and 23.33% were students. In present study it was noted that half of the patients were married, i.e. 53.33% followed by 33.33% were unmarried, 5.00% were widow & separated and 1.67% was widower & divorced respectively. In the study, 6.6% of population belonged to the upper class, 36.6% of population belonged to the upper middle class, 43.3% belonged to the lower middle class and 6.6% to the lower socio-economic class.

The co-relation of OCS with demographic variables like age, gender, residence, marital status, employment status and socio-economic status was assessed and the p-value was 0.074, 0.914, 0.051, 0.213, 0.078 and 0.491 respectively using Chi Square test and no significant correlation was found between the age, gender, residence, marital status, employment status, socio-economic status with the prevalence of OCS.

Table 1: Prevalence of Obsessive Compulsive symptoms in Study Participants

| Y-BOCS score | N (%) |
|------------------------------|-----------|
| Subclinical OCS (0-7) | 39 (65%) |
| Mild OCS (8-15) | 7 (11.7%) |
| Moderate OCS (16-23) | 4 (6.6%) |
| Severe OCS (24-31) | 7 (11.7%) |
| Extremely Severe OCS (32-40) | 3 (5.0%) |
| Prevalence of OCS | 21 (35%) |

A Y-BOCS score greater than 7 is considered as having OC symptoms. So, 35% of study population was found to be having OC symptoms. According to the present study, the prevalence of

OC symptoms in patients with schizophrenia is 35%. In this study it was observed that 11.7% participants were having mild OC symptoms, 6.6% were having moderate OC symptoms, 11.7% were having severe OC symptoms and 5% of participants were having extremely severe OC symptoms.

Table 2: Co-relation of Obsessive-Compulsive Symptoms with clinical variables of Study Participants

| | OCS | Mean | SD | t value | p value |
|-------------------------|-----|--------|--------|---------|---------|
| Age of onset of illness | Yes | 32.10 | 8.944 | 1.674 | .100 |
| | No | 27.92 | 9.345 | | |
| Duration of illness | Yes | 2.925 | 1.644 | 0.721 | .474 |
| | No | 2.581 | 1.809 | | |
| PANNS Positive | Yes | 18.29 | 4.849 | -1.986 | .048 |
| | No | 21.03 | 5.224 | | |
| PANNS Negative | Yes | 29.48 | 6.055 | 1.506 | .138 |
| | No | 25.74 | 10.427 | | |
| PANNS General | Yes | 48.48 | 11.860 | 2.620 | .011 |
| | No | 41.85 | 7.707 | | |
| Composite score | Yes | -11.19 | 6.969 | -2.164 | .035 |
| | No | -4.72 | 12.680 | | |
| PANNS Total | Yes | 96.24 | 17.660 | 1.632 | .108 |
| | No | 88.62 | 17.044 | | |

In the present study the co-relation of OCS with clinical variables like age of onset of illness, duration of illness, PANSS Positive score, PANSS Negative score, PANSS General score, Composite score and PANSS Total was assessed and the p-value was 0.100, 0.474, 0.048, 0.138, 0.011, 0.035, 0.108 respectively respectively using independent t-test and no significant correlation was found between age of onset of illness, duration of illness, PANSS Negative score, PANSS Total score with the prevalence of OCS. A significant correlation was found between PANSS Positive score, PANSS General score and Composite score and the prevalence of OCS.

Table 3: Co-relation of Y-BOCS with PANSS using Pearson's Correlation Coefficient

| | Correlation coefficient | p-value |
|---------------|-------------------------|---------|
| PANNS Total | 0.366 | 0.004 |
| PANNS General | 0.309 | 0.016 |

The Y-BOCS score is co-related with the PANSS Total score and PANSS General score using Pearson's correlation coefficient and the p-value was found to be 0.004 and 0.016, both of which are statistically significant. It was noted that the higher scores on Y-BOCS also had higher scores on PANSS Total score and PANSS General Score.

IV. DISCUSSION

In the present study total 60 patients of schizophrenia were enrolled ranging from 18 to 65 years, out of them 53.3% were male and 46.7% were female, 68.3% belonged to rural population and 31.7% belonged to urban population, 53.30% of

patients were married followed by 33.30% patients were single, 40.00% were unemployed followed by 31.33% were employed, 3.33% were businessman and 23.33% were students, 6.6% of population belonged to the upper class, 36.6% of population belonged to the upper middle class, 43.3% belonged to the lower middle class and 6.6% to the lower socio-economic class. The majority of the patients are of young age group and mean age of all enrolled patients were 32.10 +/- 10 years and similarly mean age of male patients was 31.50 +/-9.37 years whereas mean age of female patient was 32.79 +/-9.52 years.

Obsessive-compulsive symptoms (OCS) frequently occur in a substantial proportion of patients in schizophrenia though a wide variation in prevalence is noted. Worldwide prevalence of OCS is ranging from 1.1% to 50% where as in India prevalence of OCS is found in 10.57% to 24.0% of population.⁴ In the present study, the prevalence of OCS is 35% in patients with schizophrenia.

In this study we aimed at assessing the relationship of positive and negative symptoms with the obsessive-compulsive symptoms. The co-relation of positive and negative symptoms and OCS were calculated and it was found that the mean value of PANSS Positive score in patients with OCS was 18.29 with SD of 4.84 and without OCS was 21.03 with SD of 5.22 and using independent t-test the p-value was observed to be 0.048, the mean value of PANSS Negative score in patients with OCS was 29.48 with SD of 6.05 and without OCS was 29.74 with SD of 10.42 and the p-value was observed to be 0.138, the mean value of PANSS General score in patients with OCS was 48.48 with SD of 11.86 and in patients without OCS was 41.85 with SD of 7.70 and the p-value was observed to be 0.011 and the mean value of PANSS Total score in patients with OCS was 96.84 with SD of 17.66 and without OCS was 88.62 with SD of 17.04 and the p-value was observed to be 0.108. No significant co-relation of PANSS Negative score and PANSS Total score with OC symptoms were observed and significant co-relation was noted between PANSS Positive score and PANSS General score with OC symptoms.

The study concluded that patients of schizophrenia with obsessive-compulsive symptoms were more likely to have positive symptoms and more general psychopathology and no relationship has been observed between negative symptoms and obsessive-compulsive symptoms. Various other studies have been conducted to study the relationship of obsessive-compulsive symptoms and the positive and negative symptoms of schizophrenia. Various studies found differences in clinical characteristics of patients with schizophrenia and co-morbid OC symptoms compared to schizophrenia alone. The pattern of the study is highly variable. Some studies reported less severe positive and negative symptoms, others reported no differences and others more severe positive and negative symptoms in this population.

A study conducted by M. Byerly et al.⁵ found that the mean value of PANSS Positive score in patients with OCS was 16 with SD of 5.4 and without OCS was 15.3 with SD of 5.7 and using independent t-test the p-value was observed to be 0.62, the mean

value of PANSS Negative score in patients with OCS was 17.3 with SD of 5.9 and without OCS was 18.8 with SD of 6.5 and the p-value was observed to be 0.39, the mean value of PANSS General score in patients with OCS was 35.2 with SD of 7.8 and in patients without OCS was 34.8 with SD of 7.4 and the p-value was observed to be 0.82 and the mean value of PANSS Total score in patients with OCS was 68.6 with SD of 15.6 and without OCS was 68.9 with SD of 16 and the p-value was observed to be 0.96. No statistically significant difference were found for any of the symptoms in the study establishing that there is no relationship between obsessive-compulsive symptoms and the symptoms of schizophrenia.

Hermom et al⁶. also calculated the co-relation between positive and negative symptoms and obsessive-compulsive symptoms using the Spearman's Rho and no significant co-relation was observed between the symptoms of schizophrenia and obsessive-compulsive symptoms. Similar findings are reported by Berman et al. (1998) and Chakraborty et al. (2004). Lysaker et al. (2000) reported more positive symptoms in patients with obsessive-compulsive symptoms and Nechmand et al. (2003)⁷ reported more negative symptoms in schizophrenia with obsessive-compulsive symptoms.

Also, Fabisch et al.⁸ showed that patients with schizophrenia who had OCS were more likely to have negative symptoms.

Vast variety has been observed in the results establishing the relationship of obsessive-compulsive symptoms with the positive and negative symptoms of schizophrenia owing to the differences in the diagnostic criteria, method of evaluation, chronicity of the illness, in-patients versus outpatients, early versus chronic stage of illness, duration of illness, exacerbated versus continuous deteriorating course. So, further evaluation should be beneficial in concluding the relationship of obsessive-compulsive symptoms and the symptoms of schizophrenia.

In the present study, the Y-BOCS score is co-related with the PANSS Total score and PANSS General score using Pearson's correlation coefficient and the values are 0.366 and 0.309 and the p-value was found to be 0.004 and 0.016 respectively, both of which are statistically significant. It was noted that the higher scores on Y-BOCS also had higher scores on PANSS Total score and PANSS General score. Hence the findings suggest that the severity of schizophrenia has direct relationship with the presence of obsessive-compulsive symptoms. According to a study conducted by Bulent Kayahan et al.⁹, the Y-BOCS score was co-related with the PANSS Positive score, PANSS General score and PANSS Total score using Pearson's correlation coefficient and the values were 0.349, 0.404, 0.370 respectively and the p-value was less than 0.005 for all the scores which was statistically significantly. The study concluded that the obsessive-compulsive symptoms were found significantly correlated to total PANSS score, PANSS positive symptoms, PANSS General score and not significantly correlated to PANSS Negative symptoms. These findings are consistent with findings of the study conducted by Lysaker et al.³ The results support the hypothesis that obsessive-compulsive symptoms in schizophrenia reflect the presence of two co-morbidities which

may functionally augment and exacerbate one another. The difference between the studies maybe due to the difference in diagnostic criteria, method of evaluation, chronicity of the illness, in-patients versus outpatients, early versus chronic stage of illness, duration of illness, exacerbated versus continuous deteriorating course.

V.CONCLUSION

1. We may conclude that the existence of obsessive-compulsive symptoms is a relatively frequent finding in patients with schizophrenia. The prevalence of obsessive-compulsive symptoms is high in patients with schizophrenia.
2. Patients of schizophrenia with obsessive-compulsive symptoms had more severe positive symptoms and general psychopathology symptoms and no relationship with the negative symptoms.
3. Severity of schizophrenia has direct relationship with the presence of obsessive-compulsive symptoms.

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Seasonal climate variability and their impact on malaria prevalence in the health zone of Katana (DR Congo) from 2004 to 2013

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ABSTRACT:

Seasonal climate variability is a reality in Eastern DR Congo. Malaria is also a serious public health and socio-economic problem in this country in general and in the Katana Health Zone in particular. A retrospective documentary study was carried out between the period 2004 and 2013. This work aims to determine the impact of seasonal climate variability on malaria prevalence; to determine the factors influencing the prevalence of malaria and the most vulnerable age group of this pathology in the Katana Health Zone. All cases of simple and severe malaria have been collected from Health Information System (SNIS) data base of all health facilities in the Health Zone for the last ten years. Climate data (temperature and rainfall) were collected at the climatological station of the Centre de Recherche en Sciences Naturelles (CRSN/Lwiro) for the same decade. The results of the study showed that the prevalence of malaria varies from year to year and evolved in serrated with a higher peak in 2005, slightly in 2006 during the last three years of the study. Children under 5 years of age and pregnant women are the most vulnerable age group of malaria in these health facilities. The population of the Katana Health Zone suffers from malaria in both seasons but much more during the rainy season. The relationship between malaria prevalence and precipitation is no significant ($p > 0.05$), and is positively significant between malaria prevalence and temperature ($p < 0.01$). The reason is discussed in this paper.

Key Words: Climatic variability, Malaria, Health Zone of Katana, DR Congo.

INTRODUCTION

Seasonal climate variability is pointed at a possible health disaster; the most common allegations are the assumed responsibility for climate variability in creating favorable conditions for malaria (Mohammed, 2013). Inter-annual and inter-decadal climate variability may have a direct influence on the epidemiology of vector-borne diseases (Githeko et al., 2000). Rainfall influences the availability and quality of breeding sites. In all regions of the world where there is a long dry season anopheles are very scarce (Ndiaya et al.,

2001). In these areas, the rate and extent of precipitation are key factors determining the existing vector species and their abundance and the duration of their seasonal presence (Ndiaya et al., 2001; Magne, 2012).

According to the report of the Intergovernmental Panel on Climate Change (IPCC) 2001 estimates that by 2050, the Sahara and the semi-arid regions of southern Africa could heat up to 1.6 °C, while Equatorial countries may experience a warming of 1.4 °C (Githeko et al., 2000; Ndiaya et al., 2001). Temperature and precipitation are favorable for malaria in some areas of Europe and Africa, a threat of malaria transmission (Hackett, 2006). In Africa, it was estimated 1.6 and 5.4 malaria affected children; 500,000 cases of cerebral malaria are reported each year and 7 % of those children who survive have disabilities for the rest of their lives (Unicef, 2004).

Pregnant women are not spared from this pathology; in Africa, between 75,000 and 200,000 children are born to pregnant women on malaria with low birth weight (Hiid, 2006). Malaria in pregnant women is a major cause of maternal anemia and a major risk of low birth weight childbirth (Steketee and Nahlen, 2001). Malaria and pregnancy are two situations that aggravate each other, because malaria is more serious and frequent during pregnancy, causing significant maternal, fetal and perinatal morbidity and mortality (Tako, 2005).

Despite the efforts made by DR Congo, the numbers of malaria cases continue to increase; the new climate and environmental conditions contribute to the re-emergence of the disease; the province of South Kivu is not spared from this endemic. With regard to climate change, one can easily imagine the impact of even a small increase in temperature associated with an increase in rainfall on the vector ecosystem. In the Katana Health Zone, the vulnerability of the disease in the population still represents a major health challenge where malaria is the leading cause of consultation and hospitalization.

Many efforts are being made at the Central Office of the Health Zone in the implementation of insecticide-treated mosquito net distribution, intermittent preventive treatment for pregnant women and awareness raising on environmental management (Report Central Health Zone office/ Katana, 2012), but no changes in the endemicity of the diseases. This study aims to assess the extent of climate and seasonal variation in malaria in the Health Zone over the last decade to determine seasonal control strategies.

MATERIAL AND METHODS

Description of the study environment

Katana Health Zone is one of 34 Health Zones in South Kivu Province, and it is border with the Kalehe Health Zone, Miti-Murhesa and Bunyakira (Figure 1).



Figure 1. Map of the Health Zone of Katana

Health Zone of Katana is located about 52 Km North of the city of Bukavu, with an area of 400 Km² located between 028° 045' and 028° 85' E longitude; 02° 15' and 02° 30' S latitude (Bagalwa et al., 2014). It has 17 Health Center of which 2 are of reference Hospital Center (Ihimbi and Mugeru), and one General Hospital of Reference (HGR/FOMULAC). These health areas are: Ciranga, Katana/Nuru, Kabushwa, Kabamba, Kadjucu, Mabungu, Luhihi, Iko, Ibinja, Ishungu, Lugendo, Cishugi and Mushweshwe.

The Health Zone of Katana has a tropical climate, characterized by a heavy rainfall of over 1500 mm/year and a moderate temperature of 18° to 20°C. There are two seasons: a long rainy season from September to May and a short dry season from June to August. Its vegetation is a cultivated savanna that has replaced the forest with original *Albizia grandibracteata*. The relief is varied by hills, valleys, plateaus as well as the forest overlooking the Kahuzi Biega National Park (PNKB), with an altitude of about 1500m and 2000m towards the Kahuzi Biega Park (Bagalwa et al., 2014). This Health Zone was chosen because of its geographical location, favoring various larval sites (marshes, rivers, fish ponds, etc.), thus creating favorable conditions for malaria.

Data collection method.

All cases of confirmed simple and severe malaria were collected in all health facilities via the Central Office of the Health Zone from January 2004 to December 2013. All of these cases constituted the exhaustive sample of the study. To achieve this, we used the National Health Information System (SNIS) fact sheets that contain all the information on malaria. In addition the climatological data (rainfall, monthly temperature) of January 2004 to December 2013 were taken from the meteorological station of the “Centre de Recherche en Sciences Naturelles de Lwiro” (CRSN/LWIRO).

Statistical analysis

During the analysis of the collected data, it was a question of synthesizing all the information by exploiting the indicated statistical methods: frequency, mean, standard deviation and we checked our hypothesis of research by the comparison of the averages by using the test t of independent sample. The data are presented as tables and graphs using the Excel software and comparing the meteorological parameters (temperature and rainfall) and prevalence of malaria in the Katana Health Zone by Person correlation analysis. The materiality threshold was fixed at $p < 0.05$.

RESULTS

Prevalence of malaria in the Katana Health Zone

The annual prevalence of malaria in the Katana Health Zone during the last 10 years of the study is shown in Figure 2 (Figure 2).

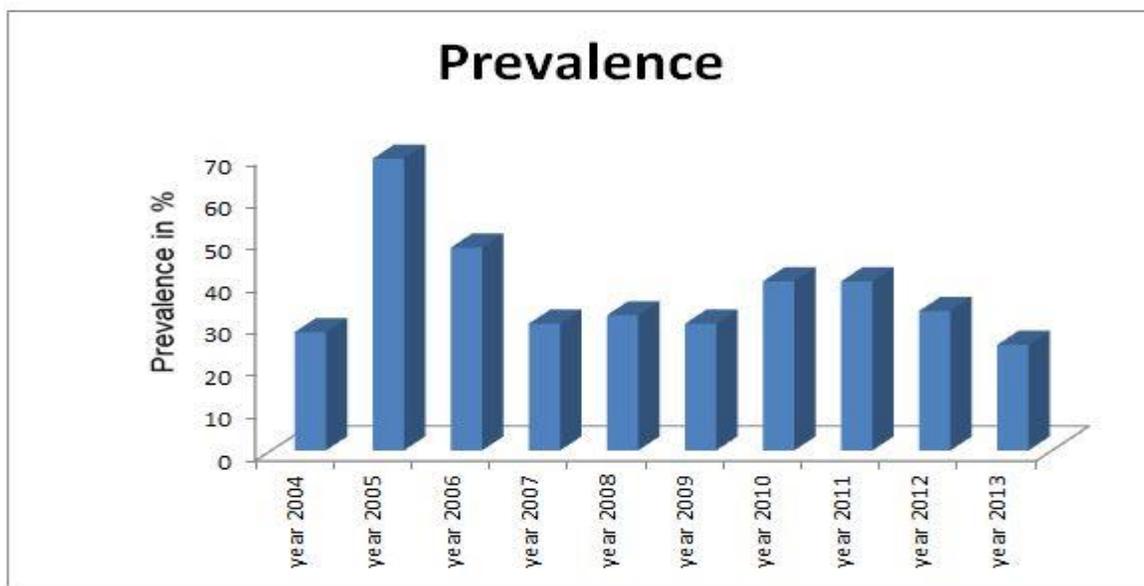


Figure 2. Prevalence of malaria in the Katana Health Zone during the last 10 years (2004 – 2013).

From this figure, it appears that the prevalence varies from one year to another. It was very high in 2005 and lower in 2004 and 2013. There is some consistency in other years with a slight increase in 2006, 2010 and 2011.

Identification of the most vulnerable group of malaria in the population of Katana Health Zone

Vulnerable group of malaria in the population of Katana Health Zone is present in Table 1.

Table 1. Positive case of malaria in most vulnerable group of population

| | Dry season (%) | Rainy season (%) |
|------------------------|----------------|------------------|
| Children under 5 years | 46 | 54 |
| Pregnant women | 44 | 56 |
| All population | 47 | 53 |

The table shows that the average percentage of children under 5 years old during the last ten years is reached over the rainy season with 54% than the dry season with 46%. The difference is not significant ($p > 0.05$) but the trend shows that the rainy season has more cases than the dry season. Pregnant women are also victims of malaria in the rainy season with 56% in the dry season with 44%. Population of the Katana Health Zone has suffered from malaria in different periods of the year with an average of 53% in the rainy season and 47% in the dry season. But the difference is not statistically significant ($p > 0.05$). For both vulnerable groups, the rainy season shows a high rate of malaria case as the dry season during the 2004-2013 period in the Katana Health Zone.

The average monthly change in positive malaria cases in the population of the Katana Health Zone over the past ten years is shown in Figure 3.

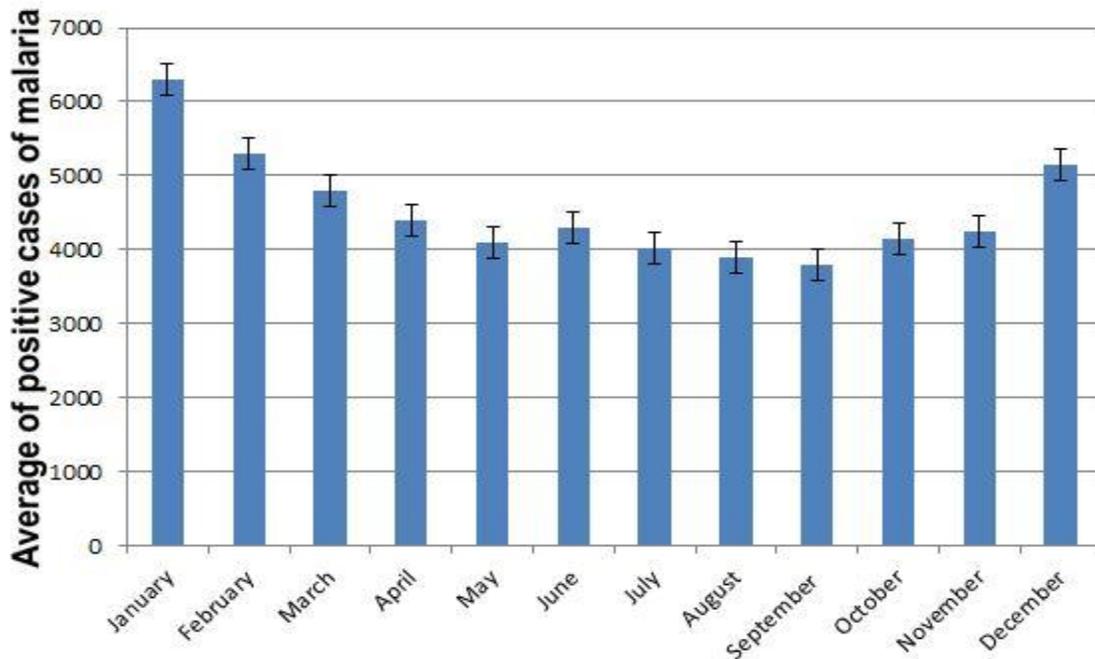


Figure 3. Monthly mean variation of positive cases of malaria (2004-2013)

This figure shows that during all the years cases of malaria are observed but the months of January to May and October to December the cases of malaria are higher than the month of June to August. It is during the rainy season that the rate of malaria is high.

Determination of the factors influencing the prevalence of malaria in the Katana Health Zone (precipitation, temperature).

The meteorological factors inferring the prevalence of malaria in the Health Zone of Katana evaluate in this work remains the rainfall and the drought. The monthly temperature change in the Katana Health Zone over the past 10 years is shown in Figure 4.

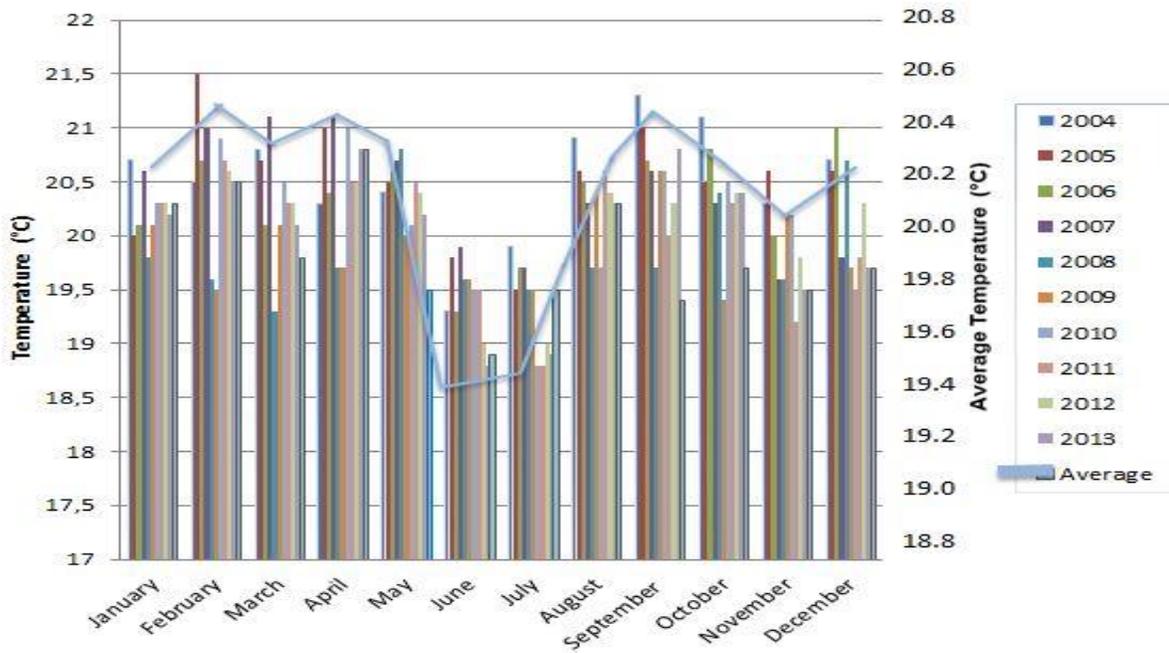


Figure 4. Temperature variation and monthly mean during 10 years.

This figure shows that the temperature in the Katana Health Zone fluctuates considerably from one year to the next. The temperature peaks are recorded in the rainy season. Low temperatures are recorded in the dry season.

As for precipitation in the Katana Health Zone, it also varies with the months of the year, the results are shown in Figure 5.

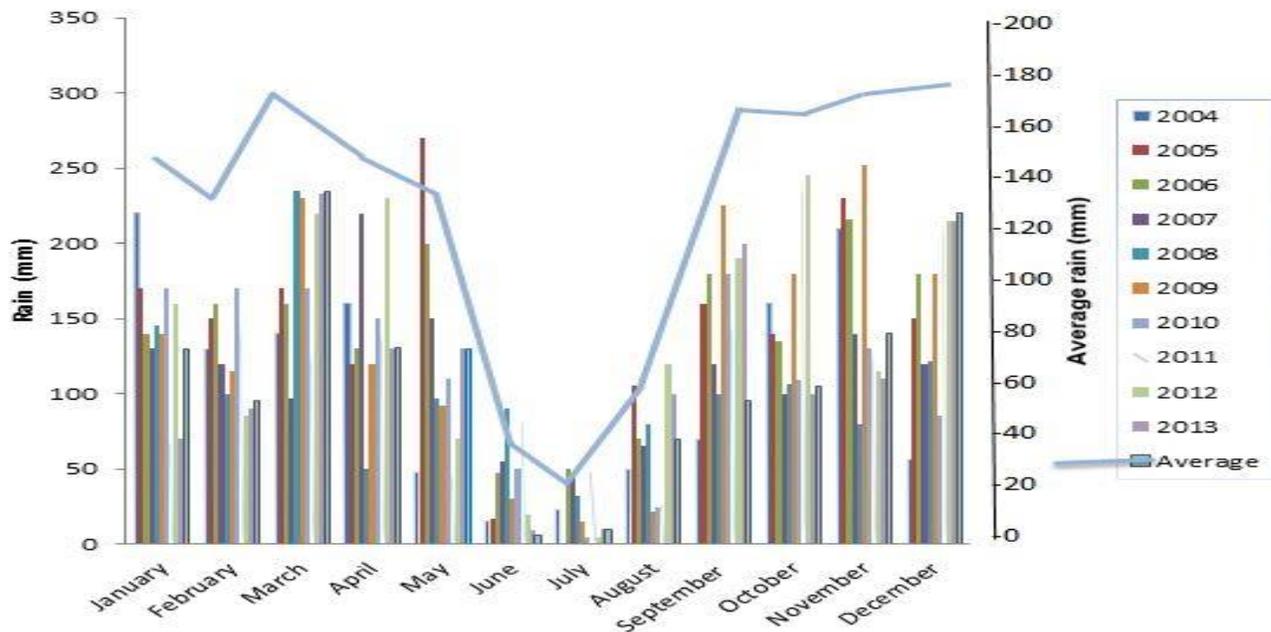


Figure 5. Precipitation variation and monthly mean during 10 years.

This figure 5 shows how rain varies by month in the Katana Health Zone during the last ten years. The same observations are also valid for the temperature. The months of June to August have a low rainfall compared to other months.

Determination of the relationship between malaria prevalence and rainfall

The relationship between the mean prevalence of malaria and the annual average rainfall in the Katana Health Zone during the last 10 year period of the year is shown in Figure 10 (Figure 10). It appears from this figure that during the last ten years the increase in malaria cases is conditioned by rain, however they are also present in the dry season but in a small proportion. Person correlation between malaria prevalence, temperature, and rainfall in the Katana Health Zone during the study period is presented in Table 2.

Table 2. Person correlation between malaria, temperature and precipitation in the Health Zone of Katana during the years 2004-2013.

| | Temperature | Precipitation | Malaria |
|---------------|-------------|---------------|---------|
| Temperature | 0 | | |
| Precipitation | -0.05 | 0 | |
| Malaria | 0.029 | 0.706 | 0 |

From table 2 it can be seen that in the Katana Health Zone the correlation is negative and significant between temperature and rainfall ($p = -0.05$). It is positive and significant between temperature and malaria ($p = 0.029$). But there is a non-significant positive correlation between malaria and precipitation ($p = 0.706$).

DISCUSSION

In the Katana Health Zone, the prevalence of malaria varies from year to year. It was very high in 2005, it has increased again in the last three years. This increase in the prevalence rate is probably due to the non-use of insecticide-treated mosquito nets as found by WHO / UNICEF, (2005). These results are also similar to those obtained by Rault and Martinez, (2011) on the prevalence of malaria in the Goa region in India. Pregnant women and children under 5 years were also victims of malaria as observed in the Katana Health Zone. High prevalence were recorded in the rainy season than in dry season. The number of positive cases of malaria was observed throughout the year with high prevalence in January to May and October to December. These results similar to those of the WHO report (2006) and Lukuku and Mulumbu (2006) in Kinshasa, which argues that the prevalence of malaria is high among pregnant women and children under 5 years old due to their high prevalence acquired immunity deficient in this period. The same situation has been observed in Uganda as shown by Mohammed (2013) and Gahouma and Kombila (1997) in his retrospective pediatric study of Owendo Hospital in Gabon. Another study by Tako (2005) in Cameroon confirms that malaria appears to be more common during pregnancy period. These results are similar to a descriptive surveys cited by Hommerich et al., (2007) in tropical Africa. These concordant studies demonstrate the consequences of the plasmodial infection during pregnancy.

Monthly temperature and precipitation variations are observed during the last ten years in the Katana Health Zone with low rainfall in June to August. In recent years, several studies confirm that the climate has changed dramatically on the globe as confirmed by Githeko et al., (2000) and that the temperature could increase to more than 1.6 °C during the 2050s and that in Africa the rains will be

abundant. Climatic variabilities are sources of variations of the prevalence rates of vector-borne diseases as the case in the Health Zone of Katana. Temperature and rainfall are favorable for malaria in some areas of Europe and Central Asia suggesting a threat of malaria transmission as reported by Hackett (2006). Confalonieri and Costa-Dias, (2000) also confirms that malaria has tended to return to endemic and epidemic levels in Brazil by the end of the year following El Niño.

Conclusion

This study determine the impact of seasonal climate variability on the prevalence of malaria in the Katana Health Zone during the last ten years of 2004-2013. Variation in the prevalence of malaria during this period of study reflects a reality and it's varied from year to year. Climate factors (rainfall and temperature) have varied also tremendously during the last ten years. Population of the Katana Health Zone in general has been a victim of malaria all the year, especially children under 5 years and pregnant women. This study has allowed us to better understand the correlation between climate, season and the prevalence of malaria in the environment. The rainy season is crucial period for the distribution of insecticide-treated mosquito nets to effectively prevent malaria in the population of the Katana Health Zone.

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The authors state that there are no competitions of interest in this work.

Contributions of the authors

Bagalwa and Bakulikira designed the study, followed field data collection and drafted the final manuscript. Mulumeoderhwa analyzed the data statistically.

Developing Writing Skills through Reading Culture at Secondary level

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Abstract- This article is about the reading culture which helps learners to enhance writing skills in English at secondary level. Reading is a lifelong process that plays an integral role of beginner learners. This is a narrative inquiry research design in which I have selected 5 English teachers from five community schools from Kathmandu district through purposive non-random sampling procedure as sample for this study. Narrative inquiry has been used as a tool to collect the data from the respondents. Qualitative research approach has been adopted to analyze and interpret the data in this study. Main findings of this study are: reading culture helps in improving vocabulary, cultivating writing skills, using of the subordinate clauses correctly, using of mechanics, graphology properly, and developing critical and creative thinking skills particularly, through the reading of short stories during free time. Culturally associated traditional stories help them to extend their horizon of knowledge through the reading culture.

Index Terms- reading culture, life long process, narrative inquiry, cultivating, and culturally associated

I. INTRODUCTION

Reading is the main source of internalizing facts, knowledge and information. It is known that the more students read the better they become at it. Eskey (1986) argues that reading can be developed by means of extensive and continual reading. Students can learn to read, and read better only by reading non-prescribed books extensively, such as short stories, poems, fairy tales, film stories etc. which can be finished in one single sitting. The reading materials should be monitored and censored by the mechanism of each public school to develop the culture of reading. The school administration should provide a mini library, book corner and box of books each class to promote reading habits of the students. The students can read any reading materials in leisure/spare period. Furthermore, the school can allocate an hour either before or after the school hour to create the atmosphere conducive to every student for reading. There would be virtuous and vicious circle groups in each class. The virtuous circle groups enjoy reading books as much as possible whereas vicious circle groups do not enjoy reading books due to the lack of accesses and sources. The virtuous circle groups outsmart the vicious circle groups in every aspect of reading. The vicious circle groups realize the difficulty to get good marks due to ignoring the reading. Reading is an interactive process consisting of inferring, knowing correct sounds and comprehension (Kamhi Catts, 2008).

Reading is a lifelong activity. It plays an integral role in education of individual, particularly in the life of children. In fact, it is an essential part of children which cannot be excluded from the early life of very young children. Reading is a basic life skill of them which is a cornerstone for success in school in their early lives. Without developing critical reading adequately, there is less opportunities of getting success in various walks of lives of children. Akindele (2012) argues that 'reading creates a good foundation and inspiration for the development and education of children. It awakens children's interests in books which help to cultivate a reading culture in them for a push to future an academic excellence. It nurtures human mind by rendering the information and insights of different subject matters and the world. Children require being proficient in reading for them to carry out their assigned task. Reading culture can promote a reading habit of the children to enhance their hidden potentialities. It boosts their power of thinking for new innovation and development of personal talents.

Children's psychological and cognitive development occur rapidly and incessantly in their puberty age so they need as much as motivating reading materials as they can. Massive reading input should be provided to the children to broaden their cognition. Young (1996, as cited in Akindele, 2012, p. 2) argues "research has shown half of a person's intelligence potential is developed by age four and early." Childhood interventions can have a lasting effect on intellectual capacity personality and social behavior. Cultivating reading culture should be initiated from birth of children and book can be considered as the third parent of a child (Akindele, 2012). If the books are thought to be the loving parents of children, the books will be essential elements of their life. Reading culture is based on the spirit of collaborative and cooperative learning. It is essential to know the world: both the real world and the fantasy world. Rosenberg (2002) adds that without the opportunity to read widely, what is taught in the classroom is not reinforced and the quality and performance of the benefit of education that are endangered. Reading culture accelerates the wide reading of the students in which they get an opportunity to bring quality on their academic learning performance. Without wide reading, students cannot develop skills of locating, selecting, organizing, manipulating, and analyzing, evaluating and processing information. Reading culture makes the students' self-motivated learners, automatization in learning; develop the self-reliant quality in learners. It is important to encourage a reading habit so that students grow up mentally to be able to fulfill their potentialities at every level. Krashen (1983) states that extensive

reading helps to develop a good writing style, and adequate vocabulary, advanced grammar, and become good spellers. The reading ability of the students will be enhanced if the teachers share their reading experiences with the students. The difficulty of reading in terms of language and content can be facilitated by the teachers if they continue the culture of reading (Comeyras & Mazile, 2011). There is very poor reading culture in the school of Nepal. Dlamini (2003) argues that main cause of poor reading culture is that students come from a non-reading culture both at home and at basic school. Marinho (2003, p. 8) states "problems of reading failures are unhealthy learning environment, excessive reliance on government, poor quality of educational input and unavailability of books reading widely and pleasure." Furthermore, there are some other causes of poor reading culture in school level, such as lack of electricity, poor reading materials and lack of motivation to the students by teachers and parents (Sisulu, 2004).

II. LITERATURE REVIEW

Extensive reading is generally involves reading of large quantities of materials for enough understanding. The extensive reading programme is supplementary class library scheme attached to an English course in which students are provided encouragement and materials to read pleurably at their own levels as many books as they can without the pressure of testing and marking. Carrel and Carson (1997) argue that extensive reading is a rapid reading of large quantities and longer reading for general understanding with focus on meaning of what is being read rather than the language. In extensive reading, the learners are given the sufficient time to read pleurably as many books as they can without caring the contents and grammar. The job of teachers is to provide the motivation and monitoring whether the learners have read the maximum number of books. There should be freedom of choices of any time of books to read for their entertainment and pleasure. Literary merit and grammatical accuracy are not given any priority while reading novels and short stories. The students can read not for knowing contents but it is for entertainment and additional knowledge and that could be supplementary for their course. Thus, teachers encourage and motivate to their learners to read other books and provide opportunities to use library and reading corner.

The nature of extensive reading will vary with students' motivation and institutional resources in which students can read a large quantity of materials either short stories or novels, newspaper and magazine articles or other professional reading. The habit of reading refers to students' engagement on reading individually and independently. One of the fundamental conditions of the successful extensive reading is that students should understand the reading materials comfortably and delightfully. Krashen's (1982) input hypothesis emphasizes on the right comprehensible reading materials to promote L2 acquisition. The fluent readers are good writers because they can internalize a large amount of vocabulary items, various syntactic structures, and content knowledge through reading a number of books, magazines, articles etc. The students do not pick up all of the information what is available in the book; however, they subconsciously internalize vocabulary, spelling, grammatical patterns and meaning what they need.

Therefore, the subject matter of reading materials should be highly interesting and relevancies to the readers. The interests and background knowledge of the readers play a vital role to comprehend at a reasonable rate and keep on involving them in the reading materials.

Flower and Hayes (1980) assert that good writers have sufficient tacit knowledge conventional or formal features of reader-based prose that they can call on more options that can be used to organize and express their ideas. Krashen (1982) states that writing skill is not learned, but can be acquired through extensive reading in which focus of readers is on the content or message. He says that all the required grammatical structures and discourse and rules for writing can spontaneously be offered to the writers in adequate quantity. Writing competence can be developed through extensive reading whereas practice on writing helps to develop writing performance. Coady (1997) argues that extensive reading helps the beginners to develop new vocabulary items in English. The graded readers can be able to read the authentic materials independently.

Extensive reading provides the readers with required input for good writing. These inputs should be contextual meaning and comprehensive so as to enable them in their writing skills. The reading inputs should be relevant and interesting to their everyday activities. Furthermore, extensive reading helps the L1 and L2 learners in developing reading, writing, vocabulary and speaking skills. According to Rao (2008), principles of extensive reading are improvement of writing, developing vocabulary, grammatical structure, coherent, and cohesion.

III. SHORT STORY

There are four forms of literature, such as poem, drama, fiction, and essay. The fiction consists of short story and novel. Short story is a fictional creative and narrative work of art which is written in prosaic form with reflection and criticism of human behaviors, social reflection and human ranging in length from about 500 words to 1500 words. Short story can be read in a single sitting with approximately less than half dozen of characters. There are two types of short stories, such as modern short stories and traditional short stories. According to Abrams (2000), there are six types of short stories under traditional short stories which are myths, legends, fables, parables, fairy tales and folk tales. Abrams argues that fairy tales are the sub-branches of folk tales which is a short narrative in prose of unknown authorship which has been transmitted orally from generation to generation. Abrams (2000, p.295) defines " a short story is a brief work of prose fiction, and most of the terms for analyzing the component elements, the types, and the narrative techniques of the novel are applicable to the short story as well." There is well organization of action, thought, and dialogue of its characters into the artful structure of a plot which is directed towards the effects on the readers.

Short fiction becomes very popular among the busy postmodern readers due to its striking contents narrated rhetorically. It is an artistic narration made up of tricky plan which differs from the long fiction/novel owing to its brevity, singleness of unity and simplicity. It has brevity in number of characters, dialogues, and selections of words. It contains very brief plot, setting, style, dialogue and character. There is unity of place, time and action in the short story. Simplicity is another special feature

of short story. Modern short story is very humorous, satirical, ironic, comic, and tragic reflects different aspects of human life and human society. Lazar (1993, p.14) argues that the main advantages of using short story in the language classroom for reading materials are as follows:

- It is very motivating.
- It is authentic materials.
- It has general educational value.
- It is found in many syllabuses.
- It helps students to understand another culture.
- It is a stimulus for language acquisition.
- It develops students' interpretative abilities.
- Students enjoy it and it is fun.
- It is highly valued and has a high status.
- It expands students' language awareness.
- It encourages students to talk about their opinions and feelings.

In facts, short story helps second language learners acquire English language interesting and lively. The learners can know the knowledge of social sciences, history, mythology, philosophy, culture, politics, and religion through the exposure of short stories like folk tales, fairy tales, Fables etc. Moreover, it helps the students develop critical thinking skills, creative thinking skills, and skills of argument,

IV. METHODOLOGY

This is a narrative inquiry research design in which I have selected 5 English teachers from Kathmandu district viz. Janasewa Secondary School, Mangal Secondary School, Shree Taudaha Rastriya Secondary School, Shree Neel Barahai Secondary School, and Jana Prabhat Secondary Schools through purposive non-random sampling procedure as sample for this study. Narrative inquiry was adopted as a tool to collect the data from the respondents. I have adopted qualitative research approach to analyze and interpret the data in this study. Instead of genuine names, I have given the pseudo ones to maintain the confidentiality of my study while collecting data from them. To share their experiences freely without any pressure and stress, I created conducive environment during the data collection. I have even ensured them that their information would not be misused and twisted for any other purposes beyond this study. I prepared the guideline questionnaire for employing narrative inquiry as tool to the teachers. I have transcribed the recorded interview into written text. To maintain the trustworthy and authenticity of the raw data member check was used (Cohen, Manion, & Morrison, 2007).

V. DISCUSSIONS AND RESULTS

Five English teachers from five schools were employed narrative inquiry as a tool to get data regarding their perceptions on the impact of reading culture in developing writing skills which are analyzed and interpreted descriptively. Reading of non-textual books, such as fairy tales fables, folk tales, parables etc. help the students to motivate towards reading. They are excited with the contents of the stories since the subject matter of short stories are

imaginative, tricky, humorous and laughter. The contents of traditional stories are full of pleasure and delightful.

VI. IMPROVE VOCABULARY THROUGH SHORT STORIES

Vocabulary is very essential aspect of second language learning. The learners were given a few numbers of the stories, such as Half the Reward, Birbal Betrays Himself, Birbal Denies Rumour, Birbal Indentifies the Thief, Birbal Outwits the Cheat, Birbal Returns Home, Birbal Shortens the Road, Birbal's Sweet Reply, Identify the Guest, Birbal's Daughter etc. which were selected from 100 Wise Tales of Akabar & Birbal. *One of the respondents T2 states that before starting reading of short stories, students cannot use appropriate vocabulary while speaking and writing. However, they began to use new vocabularies after a month of starting reading these short stories. When students were provided substantial number of books of Fairy Tales such as Hansel and Gretel, The Emperor's New Clothes, Little Red Riding Hood, Alice in Wonderland, The Pied Piper of Hamelin, Beauty and the Beast etc. they read them in their leisure time interestingly. He observed that some of the students began to come one hour earlier in school and started reading the aforementioned stories from fairy tales and folk tales. Some of the students used to read selected impressive and interesting stories from fairy tales and folk tales. They picked up some of the words from the stories and started using contextually with their friends. The learners even shared the vocabularies which they learnt from the stories and shared with their friends while playing. Coady (1997) argues that extensive reading helps the beginners to develop new vocabulary items in English. T3 argued that if they acquired more vocabularies they can communicate with each other even if they don't know the grammatical structures. They can use the vocabularies in similar situation like in the stories in their practical life. It can be inferred that learners can learn more vocabulary items from reading the traditional stories which are familiar to their culture. Krashen (1983) states that extensive reading helps them to develop a good writing style, and adequate vocabulary, advanced grammar, and become good spellers.*

VII. READING SHORT STORIES FOR PLEASURE

The young learners are guided by pleasure principle in their young age. They prefer reading of fantasy, magical, and ghost stories which are fascinating and humorous. *In this regard, T1 states that he has given them to read 100 Fascinating Tales of Aesop's Fables which have different fables, such as The Leopard and the Shepherds, The Ass and the Charger, The Old Man and Death, The Wolf and the Ass, The Fox and the Wolf etc. There are animated characters in fables which are very interesting and unreal and beyond the day to day life. The students were easily fascinated with these fables. Akindele (2012) argues that 'reading creates a good foundation and inspiration for the development and education of children. When the students were tired of doing ritual homework, and classwork, they can be excited and refreshed with these stories. Some of short stories are full of humor and laughter. They were really delighted with the subject matter and actions in the stores. They were very excited with the fables in which birds and animals are animated.*

VIII. ENHANCING WRITING SKILLS THROUGH READING FAIRY TALES, FOLK TALES AND FABLES

One of the respondents T2 argues that the learners were extremely motivated to read Aesop's Fables, Fairy Tales, and folk tales. They subconsciously grasped some of the knowledge of mechanics, such as comma, semi-colon, colon, single inverted comma, double inverted comma, full stop, hyphen etc. The using of mechanics or punctuation is a part of writing skills. Krashen (1982) states that writing skill is not learned, but can be acquired through extensive reading in which focus of readers is on the content or message. In this regard, T4 argues that most of the learners developed the proper use of punctuation through the reading rather than teaching in the classroom. The learners used correct use of tense, articles, preposition, parts of speech in course of reading these traditional stories. The T3 argues that generally the learners easily acquire the use of mechanics, graphology through the reading of short stories particularly fable, fairy tales, folk tales during free time. In fact, the traditional short stories are motivating and curious to the teenage learners so they read such stories interestingly. Writing skill can be acquired through the extensive reading. According to Rao (2008), principles of extensive reading are the improvement of writing, developing vocabulary, grammatical structure, coherent, and cohesion.

IX. DEVELOP CRITICAL THINKING SKILLS

Development of critical thinking is essential for the secondary level students to develop writing skills. When they read traditional stories, their faculty of imagination can be developed. Most of the content of fairy tales, folk tales, and fables are unreal and beyond the human society. One of respondents T5 strongly claims that students' abilities of arguments, logics, and imagination would be cultivated through reading of culturally embedded stories, such as Birbal the Wise, Birbal and Akbar's Ring, Birbal and the Thief, Birbal's, Ready Wit, Birbal and the Astrologer, Akbar's Meeting with Birbal, Flowers for Akbar, Akbar's Five Questions, Quick-Witted Birbal and so on. In this regard, T2 says that reading such culturally associated stories help them to extend their horizon of knowledge. The young learners can apply some of the abilities, witty techniques and intelligence applied by the main protagonists of the reader. Without wide reading, students cannot develop skills of locating, selecting, organizing, manipulating, and analyzing, evaluating and processing information (Rosenberg, 2002). Extensive reading culture helps the learners to extend their faculty of imagination. When learners read the different technique of solving the problems of the main protagonist in the story, they can apply these techniques in their daily lives as well. Intelligence of learners can be enhanced through the reading a large quantity of books beside their course books.

X. INCREASE MOTIVATION THROUGH SHORT STORIES

Traditional short stories are unique and typical type of contents which fascinate the most of the young learners. Young learners enjoy reading the short stories since reading short stories

are very funny, motivating, and full of enjoyment (Lazar, 1993). One of the respondents T3 argues that students of his class are very motivating and enthusiastic to read such traditionally embedded stories. They even gave up playing when they got stories to read. They used to share the main contents of those short stories with their friends interestingly. Reading fairy tales increase the motivation of the students in learning foreign language.

XI. FINDINGS

Main finding of this study are: reading culture helps in improving vocabulary, cultivating writing skills, using of the subordinate clauses correctly, using of mechanics and graphology properly, and developing critical and creative thinking skills particularly, through the reading of short stories during free time. Culturally associated traditional stories help them to extend their horizon of knowledge through the reading culture. Furthermore, students' faculty of imagination has been developed through extensive reading of fairy tales, folk tales and fables.

XII. CONCLUSION

The vocabulary, grammar, and writing styles of the students would be developed through the reading of traditional short stories in their leisure period at school. Most of the culturally embedded contents of fairy tales, folk tales, and fables are unreal and beyond the human society so their cognition, metacognition along with language skills could be enhanced through such study. The students' abilities of arguments, logics, and imaginative would be increased through reading of culturally embedded folk tales. As a result, their writing skills would be developed.

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Mitral Balloon Valvuloplasty via Transapical Access: an Option in Extreme Situations

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Abstract - Mitral balloon valvuloplasty was first described in 1984 by Inoue. The procedure is routinely performed through femoral vein puncture and the mitral valve catheterization is through a transeptal puncture. We report a challenging situation where it has been performed a mitral balloon valvuloplasty using the transapical access in reason of patient's contra-indication to mitral valve surgery associated to technical difficulties to perform mitral balloon valvuloplasty via transeptal access.

Index Terms – Mitral valve; Rheumatic Heart Disease; Mitral Valve Stenosis

Mitral stenosis (MS) consists in the resistance to transmittal blood flow due to thickening and immobility of the valvular leaflets, essentially as result of rheumatic fever sequelae and the choice between mitral valve surgery (MVS) or mitral balloon valvuloplasty (MBV) depends of patient's clinical status, valvular anatomy and the expertise of the interventional team.¹ This case report describes a challenging situation where it has been performed a MBV using the transapical access in reason of patient's contra-indication to MVS associated to technical difficulties to perform MBV via transeptal access.

Case Report

A 68-year-old female patient with MS and a prior surgery (mitral commissurotomy 25 years ago) has been admitted in New York Heart Association (NYHA) Functional Class II/III. Her medical historic includes: systemic arterial hypertension, type 2 diabetes under oral drugs control, dyslipidemia, current every day smoker, grade III obesity (Body Mass Index 39kg/m²), permanent atrial fibrillation (AF) over anticoagulation regimen with warfarin and a massive abdominal epigastric hernia (already in follow up together the general surgery team). She has remained asymptomatic until three years ago when she presented orthopnea and she correlated the symptoms with increased protrusion of the hernia during dorsal decubitus.

Transthoracic echodopplercardiogram (TTE) revealed a left atrium diameter of 57mm, left ventricular dimensions of 58x41mm and a preserved left ventricular function (left ventricular ejection fraction of 55%). The systolic excursion of the lateral tricuspid valve annulus measured by M mode was estimated at 14mm. TTE demonstrated a severe mitral stenosis with a mean gradient of 8.0mmHg and mitral valve area estimated at 0.9 cm² (Figure 1) with Wilkins score 9 (thickening: 2, calcification: 2, mobility: 3, subvalvar apparatus: 2), major grade tricuspid regurgitation and pulmonary arterial systolic pressure of 40mmHg. Patient presented bradycardia and worsening of symptoms with dyspnea at rest (NYHA functional class IV). Electrocardiogram showed an AF rhythm and a total atrioventricular block. After clinical adjustments, a permanent ventricular pacemaker implantation was performed without concerns. Coronary angiography was performed without obstructive lesions.

Despite the unfavorable anatomy a MBV was indicated in reason of the high surgical risk. A transesophageal echodopplercardiogram (TEE) was made in an attempt to perform mitral balloon valvuloplasty and confirmed the previous findings of MS without presence of left atrial thrombus and absence of moderate / major mitral insufficiency. The procedure was tried through a transeptal puncture and left atrial catheterization, and manometry was performed. An attempt was made to go through the interatrial septum with Inoue balloon without success, even after several maneuvers. The dilatation of the interatrial septum with balloon was performed and a new attempt was made to go through the interatrial septum with the Inoue balloon, once unsuccessful. Patient returned to the intensive care unit and remained in functional class IV dyspnea.

The Heart Team joined and it has proposed to perform the MBV via transapical access, since there was failure of clinical treatment, anatomic and technical impossibility to perform via transeptal access and high surgical risk. A 40mm left anterolateral thoracotomy was performed for the procedure (MBV via transapical access). An Inoue 24 mm balloon and 28mm balloon were used for dilatation of the valve (Figure 2), without concerns. The mitral area measured by 3-dimensional TEE increased to 1.5 cm² with trivial mitral regurgitation. The patient presented with significant improvement of signs and symptoms of heart failure and was transferred to a general surgery outpatient clinic to schedule hernia repair.

Discussion

Mitral balloon valvuloplasty was first described in 1984 by Inoue², with low perioperative morbimortality and good postoperative improvements in the mean transmitral gradients and the left atrium pressure. The procedure is routinely performed through femoral vein puncture and the mitral valve catheterization is through a transeptal puncture and ballooning of the stenotic valve. The rate of complications (stroke, cardiac tamponade and moderate to severe mitral regurgitation) is less than 1%, depending on the experience of the interventional cardiologist¹.

MBV is recommended for symptomatic patients with severe MS (mitral valve area \leq 1.5 cm²) and favorable valve morphology in the absence of left atrial thrombus or moderate-to-severe mitral regurgitation³. The outcomes from MBV are variable and highly dependent on the valve morphology and a careful evaluation of the anatomy of the mitral valve is essential to determine the feasibility and safety of the procedure⁴.

Kar et al⁵ described the first MBV via transapical route as “bridge” to a left ventricular assist device (LVAD) implantation in a high surgical risk decompensated patient with end-stage ischemic cardiomyopathy, severe peripheral arterial disease, porcelain aorta, and severe mitral and aortic disease.

Our patient had a prior MVS and presented several comorbidities, poor NYHA functional class, a high surgical risk and unfavorable mitral valve anatomy to MBV. However, after the *Heart Team* discussion, MBV was performed with a good clinical result. In agreement with ACC/AHA Guidelines³, MBV may be considered for severely symptomatic patients (NYHA class III-IV) with severe MS who have a suboptimal valve anatomy and who are not candidates for surgery or at high risk for surgery.

The procedure was carried out in view of the refractoriness of the clinical treatment and the technical unfeasibility to perform the MBV through transeptal route, in addition to a high surgical postoperative risk due to comorbidities and bulky abdominal hernia. The description of the procedure aims to implement a new surgical technique that can be used in cases with contraindications to conventional procedures already proposed.

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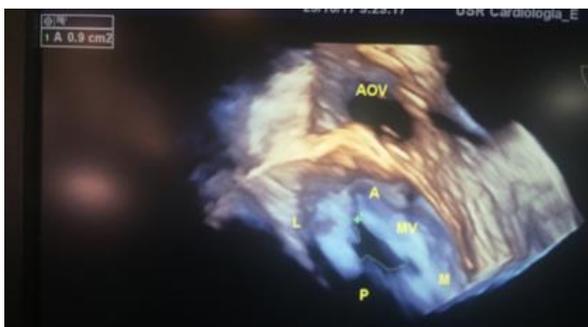


Figure 1. A 3-dimensional transesophageal echodopplercardiogram showing the mitral valve stenosis (planimetry mitral valve area of 0.9cm²).



Figure 2. The intraoperative radioscropy view of the Inoue 28 Balloon via transapical access just in time of mitral valve dilatation.

Relationship between Teachers' Classroom Management Styles and Pupils' Discipline in Public Primary Schools in Anambra State, Nigeria

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Abstract

This study determined the relationship between teachers' classroom management styles and pupils' discipline in public primary schools in Anambra state. To this end, the study was guided by 3 research questions and three null hypotheses where tested at 0.05 level of significance. A population of 74,947, consisting 645 teachers and 74,302 primary 6 pupils in 3 educational zones which comprised Awka, Nnewi and Onitsha Education zones. A sample of 303 primary school teachers and 3,715 pupils were chosen for the study through proportionate stratified random sampling technique. Data were collected using two instruments titled Teachers' Classroom Management Styles Questionnaire (TCMSQ) and Pupils Discipline questionnaire (PDQ). The instruments were validated by three experts. Internal consistency reliability index of 0.75 and 0.71 were obtained for TCMSQ and PDQ using Cronbach's alpha method. Data analysis was done using Pearson's correlation analysis. The findings revealed that there is a moderate positive and significant relationship between democratic classroom management style of teachers and pupil' discipline. A low positive and significant relationship exists between autocratic classroom management and laissez-faire classroom management style of teachers and pupils' discipline.

Key Words: Classroom, Classroom Management, Management Styles, Discipline, Pupils' Discipline

Introduction

Globally, education is considered very important for personal and societal development. Nigeria regards education as an instrument for the promotion of national development as well as affecting desirable social change (Federal Republic of Nigeria, 2013). In the Nigerian context, the journey towards the acquisition of formal education begins with the basic education. Basic education is the education given to children, adults, and out-of-school youths. It consists of early childhood, primary education and junior secondary education. Although basic education begins with early childhood education, the Federal Government of Nigeria still see primary education as the "the foundation of the entire education system" (FRN, 2009, p.11). This is because it is aimed at, among other things, providing the Nigerian children with permanent literacy, numeracy and ability to communicate effectively; solid foundation for scientific and critical thinking; opportunities for developing manipulative skills, right morals and values with which to function effectively in the society. (FRN, 2009).

In order to accomplish these aims, schools are set up to actualize these objectives through their teaching and learning process and activities. Schools are, therefore, planned social institutions which act as an instrument of the society for teaching and learning

(Balogun in Ikediugwu, 2005). For effective teaching and learning activities, children are further grouped into different primary levels with teachers assigned to each level. In each level, there are classrooms.

The school is an open system with a classroom as subsystem consisting of the teacher, the pupils and the curriculum interacting within the physical environment. It is through quality interaction between the teacher and the pupils on one hand, and the interaction among pupils on the other hand that positive classroom environment is created and effective teaching and learning achieved. Thus, positive learning environment cannot be achieved without pupils' discipline.

Pupils' discipline is necessary and vital for conducive classroom climate needed for learning to occur. In line with this view, Njoroge and Nyabuto (2014), observed that discipline at school plays a vital role in the achievement of expectations and goals. Discipline is defined as readiness or ability to respect authority and observe conventional or established laws of the society or of any organization (Charles, 2009). Nakpodia (2010) perceives discipline as a training that develops self-control, character, orderliness and efficiency. In the view of Oboegbulem (2004) discipline means conduct of an individual which is exhibited through training in self-control and in habit to socially approved standards of thoughts and action. In relation to the view of Oboegbulem, discipline is therefore the ability of pupils to respect authority and observe conventions and established rules and regulations that govern the class or the school. This translates to pupils showing respect for teachers, being attentive in the class, peaceful class interaction, engaging in learning activities, among other things.

In a disciplined classroom, instructional time is utilized effectively and all opportunities for learning are maximized. The teacher is held accountable for all these levels of interactions within the classroom in order to achieve the discipline necessary for academic activities to take place. This is because the teacher is at the center of the implementation of the curriculum. Owodunnia (2010), corroborated this view when he noted that it is the responsibility of a teacher to build up desirable behaviour in pupils and also help pupils to establish a code of conduct for themselves. This is achieved through his/her classroom management style.

Classroom management has been viewed differently by many scholars. Savage and Savage (2010) see classroom management as involving the establishment and maintenance of the classroom environment so that educational goals can be accomplished. According to Sarahlyne (2013), classroom management is the process of governing a classroom through procedures, rules and policies. She added that it involves controlling and disciplining pupils to ensure effective teaching and learning. Nwankwo (2014) had a more expanded notion of classroom management as the methods, techniques, actions or plans that teachers bring into the classroom to ensure a positive learning environment and the best behaviour from pupils. The definition of classroom management proffered by Nwankwo shows that teachers should make use of different techniques, methods or styles for managing the classroom to ensure positive learning environment and to elicit appropriate behaviour from pupils.

According to Burden (2000), classroom management style is the technique teachers use to maintain control in the classroom. Literature is replete with different classroom management styles. Teachers have different classroom management styles at their disposal. For instance, Falodan (2003) identified three classroom management styles, namely; autocratic, democratic and *laissez-faire* while Dunbar (2004) enumerated four styles, namely; authoritative, authoritarian, indifferent and *laissez-faire*. More recently, Ali (2014) identified four styles, namely; traditional, democratic, autocratic and leisurely classroom management styles. Democratic style of management is characterized by more pupil participation was perceived to be positive style, while leisurely and *laissez-faire* is known for giving too much freedom to pupils. This may perhaps be detrimental where the pupils are not matured. The use of autocratic classroom management style is characterized by teacher exerting strong teachers' control over pupils and making decisions

while the pupils are mostly passive. While this approach was considered beneficial for short term quantitative task accomplishment, it is detrimental to quality and long term performance (Ali, 2014).

The classroom management style adopted by the classroom teacher often determines how the pupils behave. As observed by Onyali (2014), effective classroom managers create orderly life, safe environments where pupils feel valued and comfortable, thus, setting the stage for teaching and learning. As observed by Kolak (2010), teachers' classroom management styles influence other determinants of learning process like pupils discipline. Indeed, ineffective classroom management style can lead to serious conditions of indiscipline with resultant negative effect on classroom learning environment.

Although there are a number of classroom management styles, some classroom teachers reported experiencing difficulty in choosing the right style to create positive classroom climate for learning (Good, 2015). This may be one of the reasons for the increase in the cases of indiscipline among pupils. In consonant to the view, Ali (2012, p.46) noted that "discipline in schools is passing through extended eclipse". The author noted that indiscipline has the potential for affecting pupils' concentration, academic performance and on the long run, national development. Ajayi and Ayodele (2010) are of the view that indiscipline in school exposes it to social vices such as stealing, armed robbery, vandalism, cultism, prostitution, examination malpractices, dishonesty, disobedience, drug trafficking amongst others.

Writing from the perspective of Anambra State, Obi (cited in Nweke, 2014), observed that indiscipline in the classroom and school settings manifest in the forms of lateness to class, cheating, bullying, insolence, failure to do class assignments, insubordination, aggression, eating in class, sleeping in class, damage to school materials and facilities, noise making, failure to obey prefects, untidy dressing habits and any other act capable of disrupting class activities. Indiscipline in schools and classrooms can be partly associated with teacher-related factors. Some scholars identified teachers' modeling of misbehaviors and poor instructional management in the class as the root cause of pupil's indiscipline (Ali, 2012; Iwu & Iwu, 2013), others associated pupils' indiscipline with teachers' use of inappropriate classroom management style (Ben 2006). Ben states that effective classroom management styles contribute significantly to pupils discipline while ineffective style leads to indiscipline" (Ben, 2006,p.54).

In view of the growing cases of indiscipline and the negative consequences of indiscipline, there is the need to ascertain how much the classroom management styles of primary school teachers are related to pupils' discipline in primary schools in Anambra State.

Statement of the Problem

Teaching and learning can only take place in a conducive classroom climate. Teachers' use of appropriate classroom management styles is expected to ensure that this type of environment is realized. However, there appear to be a significant deterioration in the behavior of pupils in the primary schools. In Anambra State, disciplinary problems appear in the classroom and interruptions of class teaching continue to increase. These include talking when not to talk, throwing things during the lesson period, staring out of the windows and waving to others, among others. The more publicized incidents of disruptions are those which involve violent behaviours, especially when this includes the use of offensive weapons, secret cult activities, as well as personal attacks on teachers. Some of these offences took their roots from the classroom indiscipline behaviours. Cases of indiscipline affect pupils, teachers, parents and other stakeholders in education and if it is not checked can perhaps lead to lawlessness in the school and society at large. Considering this fact, the researchers deemed it necessary to carry out a study on the relationship between classroom management styles of teachers and pupils discipline.

Purpose of the Study

The study ascertained the relationship between classroom management styles and pupils' discipline in primary schools in Anambra State.

Specifically, this study ascertained:

1. The nature of relationship between democratic classroom management style of teachers and pupils' discipline.
2. The nature of relationship between autocratic classroom management style of teachers and pupils' discipline.
3. The nature of relationship between Laissez-faire classroom management style of teachers and pupils' discipline.

Research Questions

The following research questions guided the study:

1. What is the nature of relationship between democratic management style of teachers and pupils' discipline?
2. What is the nature of relationship between autocratic management style of teachers and pupils' discipline?
3. What is the nature of relationship between Laissez-faire management style of teachers and pupils' discipline?

Hypotheses

1. There is no significant relationship between democratic management style of teachers and pupils' discipline?
2. There is no significant relationship between autocratic management style of teachers and pupils' discipline?
3. There is no significant relationship between Laissez-faire management style of teachers and pupils' discipline?

Method

The correlational survey research design was adopted for the study. The study was guided by three research questions and three null hypotheses were tested at 0.05 level of significance. The study was carried out in Anambra state on a population of 74,947 consisting 645 teachers and 74,302 primary 6 pupils in 3 educational zones which comprises Awka, Nnewi and Onitsha Education zones. A sample of 303 primary school teachers and 3,715 pupils were chosen for the study through proportionate stratified random sampling technique. Two sets of instruments developed by the researchers and titled Teachers' Classroom Management Styles Questionnaire (TCMSQ) and Pupils Discipline questionnaire (PDQ) were used to collect data for the study. The instruments were validated by three experts. A reliability coefficient of 0.75 and 0.71 were obtained for TCMSQ and PDQ using Cronbach's Alpha method. Data collected for the study were analyzed using Pearson's Product Moment Correlation.

Results

Table 1. Pearson's Correlation between democratic classroom management style of teachers and pupils' discipline

| Source of Variation | N | r | p-value | Remark |
|---------------------|-----|-------|---------|--|
| Democratic Style | 292 | 0.424 | 0.00 | Moderate positive significant relationship |
| Pupils' Discipline | | | | |

The above table shows that the Pearson's correlation coefficient $r(292) = 0.424$. $P\text{-value} = .000$. This shows that there is a moderate positive and significant relationship between democratic classroom management style of teachers and pupil' discipline.

Table 2. Pearson's Correlation between autocratic classroom management style of teachers and pupils' discipline

| Source of Variation | N | r | p-value | Remark |
|---------------------|-----|-------|---------|---------------------------------------|
| Autocratic Style | 292 | 0.356 | 0.00 | Low positive significant relationship |
| Pupils' Discipline | | | | |

As shown in table 2, the Pearson's correlation coefficient, r . (292) = 0.356. P-value=.000. This indicates that a low positive and significant relationship exists between autocratic classroom management style of teachers and pupil' discipline.

Table 3. Pearson's Correlation between laissez-faire classroom management style of teachers and pupils' discipline

| Source of Variation | N | r | p-value | Remark |
|---------------------|-----|-------|---------|---------------------------------------|
| Laissez-faire Style | 292 | 0.381 | 0.00 | Low positive significant relationship |
| Pupils' Discipline | | | | |

As shown in table 3, there is a low positive and significant relationship between laissez-faire classroom management style of teachers and pupils' discipline. This is shown by the size of the Pearson's Correlation Coefficient, r which is 0.381. P-value=.000.

Discussion of Findings

The findings of the study shows that there is a moderate positive and significant relationship between democratic classroom management style of teachers and pupils' discipline. While a low positive relationship exist between autocratic and laissez-fair classroom management styles of teachers and pupils' discipline. These suggest that an increase in teachers' use of democratic classroom management style will result to a moderate improvement in pupils' discipline. While an increase in teachers' use of autocratic and laissez-fair classroom management style will result to a low increase in pupils' discipline.

The findings of this study in line with that of Onyinloye (2010), which showed a positive significant relationship between classroom management style of primary school teachers and pupils' activities. Also, the finding Ngwangwa (2012) is in line with the findings of the present study. His study showed that teachers adopt various management styles in order to achieve students' discipline in schools which include: democratic, autocratic and laissez-faire styles of management. He further stated that democratic management style was mostly used by teachers in managing their classrooms. The finding of this study is consistent with that of Al-Shami (1989), Ann (2010), Ngwangwa (2012) and Okwori, Owodunni and Balogun (2015). These researchers found that that teachers adopt democratic classroom management style in order to achieve students' discipline in schools. The findings of the study also agree with Obiejemba (2008). He found that disciplinary problems are more prevalent in schools and classrooms where the teachers adopt lassies fair classroom management style.

However, the finding of this study is not consistent with that of Yflmaza (2009). His finding indicated that there is a moderate, positive and significant correlation between the authoritarian classroom management style and classroom control.

Conclusion

Based on the results of the study, the researchers concluded that there is a moderate positive and significant relationship between democratic classroom management style of teachers and pupils' discipline. A low positive relationship exist between autocratic and laissez-fair classroom management style of teachers and pupils' discipline.

Recommendations

From the findings of the study the following recommendations were made:

1. Anambra State Ministry of Education and the State Post Primary School Services Commission (PPSSC) should from time to time organize workshops and seminars aimed at improving teachers' classroom management. This will better equip teachers to manage students' disciplinary problems.
2. The researchers also recommended that teachers should adopt more of democratic management style in addressing pupils' disciplinary problems. They should also ensure that they make use of teaching methods that cater for all categories of learners. This will help in the attainment of disciplined classes.
3. The State Government should ensure that schools are well facilitated in terms of teaching and learning materials. This will enable the teachers successfully plan their teaching and learning environment to attract students' attention.

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Implementation of Car Tracking System using GSM/GPS

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Abstract- A vehicle tracking system is an electronic device installed on a vehicle so as that it'd be track by its owner or a third-party for its position. Most of today's vehicle tracking system uses Global Positioning System (GPS) to urge an accurate reading of the vehicle position. Communication components like cellular phone (GSM) and GPS will be employing to transmit the vehicle's position to remote user. Vehicle's location and mobilization status information are often viewed by employing a software application on a computer system or on a cell phone. Vehicle tracking systems are commonly employed by fleet operators for fleet management functions like routing, dispatch, on-board information and security. Other applications include monitoring driving behavior, such as an employer of an employee, or a parent with a teenager driver.

Index Terms- car security system, GMS/GPS Module, Tracker, vehicle.

I. INTRODUCTION

In city life, transportation is common and of great importance to facilitate movement. A lot of security bridge do occur on the road every day. Therefore, the need to secure and monitor our vehicles arises. To secure and monitor vehicles remotely, a system using GPS and GSM technologies with google map will be developed in this research work. Various problems that necessitate this research work are:

1. In a situation when vehicle is stolen/hijack one is confused what to do
2. If one has something expensive and he wants to check it regularly
3. To locate the shortest path to the vehicle

All these problems will be overcome in this research work.

This device has Global Positioning System (GPS) which will get the coordinates from the satellites among other basic data. tracking device has a significant in current world. This can be helpful in military monitoring, as anti-theft in cars and many other different applications. The device is microcontroller based that comprises of a global positioning system (GPS) and global system for mobile communication (GSM). This research utilizes just a single GPS gadget and a two way correspondence process is accomplished utilizing a GSM modem. GSM modem, furnished with a SIM card utilizes a similar correspondence process as we are utilizing in customary telephone.

This device is easy to use, effectively installable, effectively open and can be utilized for different purposes. After installation the device can locate object no matter the location or weather condition. Google map is use to view the location of the target anytime and anywhere in any weather conditions.

A. Objective of this Project

The main aim of the project is to design and develop a vehicle mobilizer and demobilize system within the real time environment. The user can send a command from his cellphone to the GSM module and gets the module check for the user's authentication and if found to be valid, it'll immediately send the details of the locations just like the latitude and therefore the longitude using GPS module. So the user can get to know the exact location of vehicle pointed out on the google maps. A user can as well send a command to demobilized or mobilized the vehicle.

B. Scope of the Study

The scope of this research is to study and design the GPS/GSM Vehicle Tracking system that can give an output of the information such as time, position, and speed from the GPS receiver. The users will also be able to send command to the GPS receiver using the GSM technology.

C. Vehicle Tracking System

A car tracking device installed in a vehicle or fleet of vehicles with computer design software at one operational base to enable car owner or third party to track vehicle's location by collecting the coordinate data from the field and send it the base operation, Nowadays, trackers generally use GPS or GLONASS innovation for finding the vehicle, yet different sorts of programmed vehicle area innovation can likewise be utilized. Vehicle information can be seen on electronic maps through the Internet or specific programming.

Vehicle tracking devices are also installed as a vehicle prevention and recovery systems from theft. Police can basically trace the vehicle via map application to locate a stolen vehicle. This device serves as either an additional or replacement for a traditional Car alarm. This tracking device make it possible to remotely control vehicle's lock and engine if there should arise

emergency that will warrant that. Vehicle tracking device can be used to reduce the insurance policy cost.



Fig.1.0: Tracking system overview

1. Anti-Hijack and Vehicle Security System

Both purchaser and vehicles used for mass transportation can be furnished with GPS Tracking framework. A vehicle that is equipped with tracking system is easier for the police to recoup when stolen by following its movement. Some tracking enable automatic car lock and oil/fuel cutoff in an emergency situation. They may likewise trigger a robotized email or message to a telephone if caution is set off or the vehicle is moved without the approval.

2. Tracking your Possessions and Near Ones

GPS Tracking System helps you to keep a track of your car, luggage, valuable possessions, pets and even loved ones. They can be located easily keeping you free of stress and worries. GPS Tracker can also help you in locating where your child is going late at night

3. Adventure / Traveling

GPS Locator or tracker helps the hikers or campers to find their home base.

The home base or starting point can be stored in the GPS Tracker and it will lead you back to the same place in case you lose the way.

Finding people who are lost on nature trails or avalanches can also be done through GPS Tracking Systems

II. IMPLEMENTATION METHODOLOGY

The method of implementation of the research work will be done by segmenting the circuit into bit or unit and a study on how the various unit works like the study on how GPS works will be conduct to understand its operation and command set (NMEA) that will be used. The PIC Microcontroller is also an important device to understand as it is to control the operation of the GPS receiver. The microcontroller will be program using C language. The second part will be the GPS-Microcontroller and the GSM integration. The study on GSM technology will be conduct in this phase. It is important in order to transmit the data from the GPS receiver to the computer using the GSM technology. The correct GSM command set will be essential to make sure the data is on the right path and transmitted correctly.

Below are the following units of the design:

- The Power supply unit
- The GSM/GPS Module unit
- The Controller unit
- The Fuel Line Control Unit

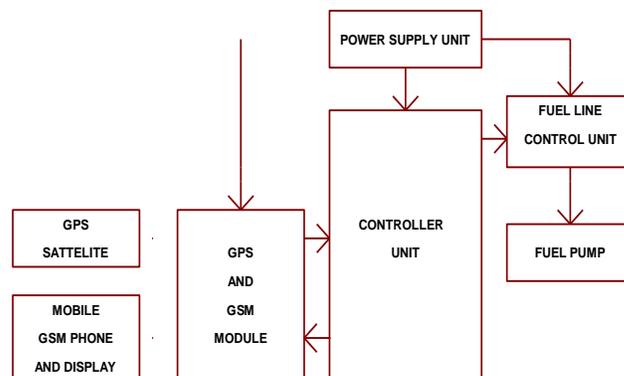


Fig. 2. Block schematic for vehicle tracking system.

A. The Power Supply Unit

The power supply unit comprises of a 12 volts battery (vehicle battery) and a voltage regulator IC (IC₁) which is used to regulate the 12V to 5volts power supplied to the GSM/GPS module, Microcontroller and the fuel line control unit.

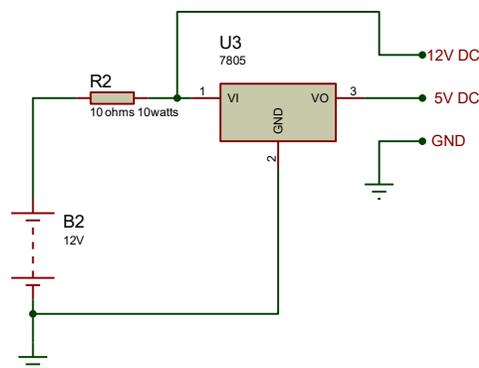


Fig. 3: The Power Supply Unit to the Circuit

B. The Fuel Line Control Unit

This unit is the interface between the controller unit and the FUEL PUMP. It enables the microcontroller to effectively control the operation of the Fuel Pump, i.e. enabling the controller to ON and OFF the Fuel Pump. it was implemented with the following components:

- Relay (12V 30A DC).
- 1K Resistor.
- NPN transistor (BC547).

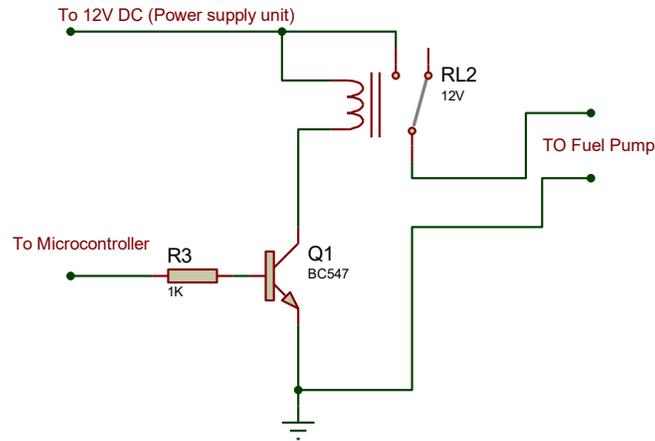


Fig. 4: The Fuel Line Control Circuit

C. The GSM/GPS Module Unit

This unit enables the system to receive SMS commands from the users and also lets the system obtain the latitude and longitude coordinates needed to locate the vehicle.

The SIM900A GSM/GPS Module from SIMCOMM Group was selected. Below are the features of the module.

- The Power requirement is 5V DC, 0.5mA
- It can send/receive SMS
- It can fix the GPS Satellite in seconds
- It uses AT Command SET. Very compatible for communications with controllers.
- It is readily available and cost effective.

The module is connected directly to the microcontroller unit. Below is the circuit interface between the controller and the GSM/GPS Module.

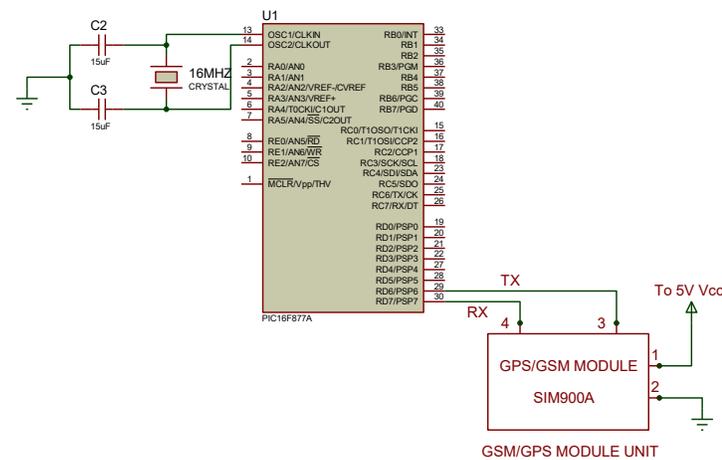


Fig 5: Circuit Interface between the Microcontroller and the GSM/GPS Module

At Commands Used By The Controller And The GPS/GSM Module

```
Send("\r\nAT+IPR=9600"); send("\r\n");
// used to set baud rate
Send("\r\nAT+CREG=2"); send("\r\n");
// used to register network
Send("\r\nAT+CGPSPWR=1"); send("\r\n");
```

```
// used to power ON the GPS
Send("\r\nAT+CMGS="); // used to send SMS
Send("\r\nAT+CMGR="); // used to Read SMS
Send("\r\nAT+CGPSINF?"); send("\r\n");
// used to get Lat. and Long. Coordinates.
```

See Appendix A, for complete code

Below is a brief flow of the execution of the microcontroller

- Wait for SMS based command from the user.
- if command received is “LOCK”, OFF Fuel Pump
- if command received is “UNLOCK”, ON Fuel Pump
- if command received is “MAP”, get latitude and longitude coordinates from GSM/GPS Module, parse it into Google map URL/Link, send back to the user.

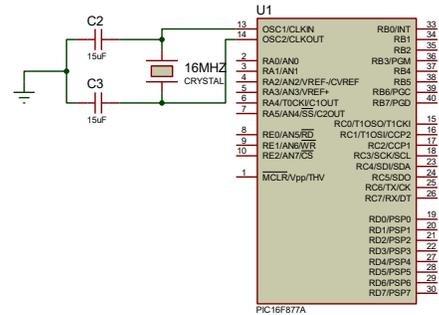


Fig 6: Circuit of the Microcontroller and the Crystal oscillator

D. Software Design

The software design is divided into three stages. These are algorithm Generation, flow chat representation and coding.

1. Algorithm Generation

An algorithm is a statement of the procedure adopted in solving a problem.

The sequence of the system operation is stated below,

1. Initialize the system on start.
2. Wait for SMS Command from the User.
3. Read command into working memory.
4. Compare the received command with the SET standard commands.
5. If UNLOCK, activate the fuel pump. If LOCK, deactivate the fuel pump. If MAP, get location coordinates, parse Google map link and send to user.
6. End process.

2. Flow Chart

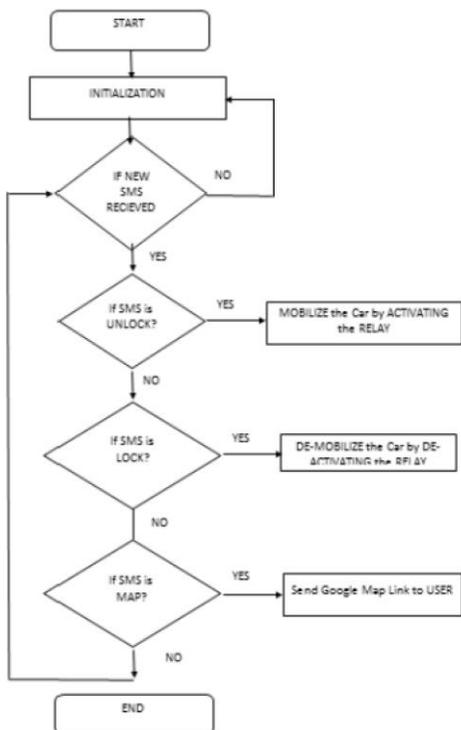


Fig. 7: flow chart

3. Coding

The coding is done in MPLAB C-Language language. The code Contains the instruction of program that runs in the microcontrollers.

4. Circuit Diagram

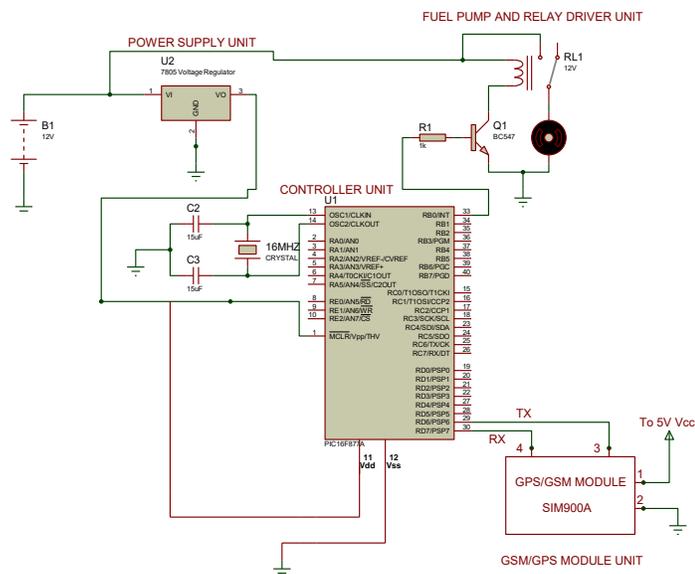


Fig. 8: Operational Circuit Diagram

Circuit Operation

The circuit is powered from the car 12V DC battery. The 12V is regulated to 5V by a fixed voltage regulator LM7805 which is required by the circuit to power the PIC16F877A microcontroller and SIM908.

When the switch is ON the circuit is initialized within two minutes and this is indicated by the LED. The initialization process is completed once the LED goes OFF showing the circuit is set. Once an SMS message is received, i.e. MAP, LOCK or UNLOCK can be sent by the owner's phone or any other cell phone that knows the SIM number of the GSM/GPS module to the module. If an SMS "LOCK" is sent to the microcontroller through the GSM module, the microcontroller will send a 5V signal to turn ON BC547 transistor which drives the DC relay to activate and also to cut off the fuel pump line.

Once the car has been LOCK, to UNLOCK the car, an SMS "UNLOCK" is sent which drives the transistor to cutoff state thereby deactivating the relays and the fuel pump line restored. A command, MAP causes the microcontroller to get longitude and latitude coordinates, parse it into Google map link, then sends to the user.

III. RESULT

During the testing it was confirmed that when a user send a text message 'map' the system respond by sending the location of the vehicle and also 'lock' and 'unlock' cut and restore the fuel line respectively. The location information contains the longitude and latitude of the spot the car is at the time of request.

ACKNOWLEDGMENT

I want to acknowledge my HOD and all the academic staffs of Electrical and Electronic Engineering Department, Petroleum Training Institute, for their support in achieving this research.

CONCLUSION

The research journal is all about tracking the location and controlling of a vehicle. The system is about making vehicle more secure by the use of GPS, GSM technology and a Google map web application. With this system user, can easily know the location and have control over the vehicle when it's hijack. The system was implemented following the methodology and was achieved.

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Enhancement of Primary and Secondary School Education Through School-Based Mentorship Program

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Abstract: In teaching and learning process, every system of education needs an instruction media as well as pedagogical input. These show off when a change in this instruction media get to change or poor teaching methods arise. It is in this context, the current study investigated the enhancement of primary and secondary school education through school-based mentorship program in Rwanda. The population consisted of 118 primary and secondary school teachers in Rwanda. Stratified random sampling was used to select 36 school-based mentors and 82 primary and secondary teachers. A questionnaire survey consisting of open and closed questions was administered to 82 teachers and 36 school-based mentors both from primary and secondary schools. Both quantitative and qualitative methods were used to analyze data where descriptive statistics such as frequencies and percentages and inferential statistics such as t-Test was used to check the mean difference among the respondents. As findings, we found that through the help of school-based mentors, teacher's English language of instruction have improved as 63 out of 82 (76.8%) who responded rated this program's benefit more than 50%. Teachers confirmed that they gained several skills such as developing teaching materials, teach in English instruction media confidently, and they were able to discuss their challenges during mentoring sessions in the classrooms which never existed before this program. The t-Test was used to check whether there was the mean difference among the respondents, the study found that there is no statistical significance difference between school-based mentors and teachers' responses. The study concluded that the mentorship program was crucial for the success, continuous strengthening the capacity of the ministry staff is key to sustaining and embedding program interventions. Therefore, it is recommended that the ministry of education concerned departments and school administrators to continuously support the mentorship program as it was appreciated by the beneficiaries.

Keywords: School-based mentors, English language, pedagogical skills, performance of education, Rwanda

Introduction

The Rwanda education system is viewed by many as an engine for economic growth. After the genocide the country needed to rebuild its education system that have been destroyed and failed to deliver the needed development. As reflected in different education policy documents, Rwanda needs to improve on its human capital index (World Bank, 2018). In the latest world bank report, Rwanda scored 0.37 in terms of the human capital index. This score is below the rest of the Eastern Africa countries. The country needs to improve the quality of teaching so as to achieve the economic growth the country is pursuing. Although teaching and learning in Rwanda was considered good before the genocide, the education system was prejudiced and underdeveloped. Furthermore, French and Kinyarwanda languages constituted the instruction media used in teaching and learning in Rwandan classrooms, the quality of education was an issue with highly unqualified teachers, lack of teaching materials and as well as pedagogical skills of teachers was seriously wanting. The need to rebuild the human capital after the genocide of 1994 was part of the Government strategy to recover the socio-economic development. The key pillar of Rwanda's vision 2020 highlights the importance of education and training to match the needs of the labour market. Also, as mirrored on Rwanda's vision 2020 policy documents, the quality improvements in classroom teaching and learning outcomes in basic education is equally important as illustrated in the ministry of education sector policy documents (MINEDUC, 2013). The same policy documents explain that the quality of basic education in Rwanda has been declining due to low caliber of skilled personnel/teachers. Additionally, the education sector established different education policy

programs in a bid to address the challenges of poor-quality education, while addressing the challenge of improving English proficiency and pedagogical skills of primary and secondary teachers has been considered as a priority for Rwandan education sector (MINEDUC, 2013).

Rwanda's position to join different economic blocks such as the East African Community and as well as joining Commonwealth countries necessitated the fundamental shift from French to English Language as instruction media across Primary, Secondary, and University education. However, the problem rises after the shift because few schoolteachers were fluent in English language. Teachers and students in Rwandan schools seemed to be better equipped and competent in their local language Kinyarwanda and French, however, different studies on language acquisition in Rwanda further revealed that teachers and students competencies especially in English was very poor, this situation was caused by the fact that primary and secondary teachers in Rwanda had a very poor languages proficiency skills (Sibomana, 2014).

Under this context, in 2014, the Rwandan Government hired 800 school-based mentors from Kenya, Uganda and Tanzania and were dispatched across the country. The aim of the school-based mentorship Program were to support and improve the quality of basic education in Rwandan schools, school-based mentors were responsible for improving Rwandan teachers' English language of instructional media following the shift from French to English Language as instruction media across primary and secondary education, school-based mentors were also responsible for creating teaching and learning instructional materials, work closely with schools on daily basis, observe classroom teaching practices, and provide teaching tips, which were considered beneficial to Rwandan teachers as indicated by Rwanda Education Board (REB). As reflected in the policy documents such as the Economic Development and Poverty Reduction Strategy (EDPRS) considers school-based mentorship Program as a priority in providing the quality of education in both primary and secondary schools, and to support schoolteacher's ability to teach in the English language in the classroom. The vision 2020 considers also training teachers as vital initiatives in upgrading in-service teachers' skills set (MINEDUC, 2007). The study conducted by VVOB and the University of Rwanda College of Education (2018) further revealed that school-based mentors and coaching were considered as valuable ways in raising the effectiveness of teacher professional development in ensuring that different practices are embedded and enhance the positive values of professional development within the Rwandan classrooms (VVOB, 2018). Previous decades have shown that school-based mentors and coaching have been widely used in many aspects of organizational structures to support the development of skills (Eda Vula, Berisha, & Saqipi, 2015). The quality improvement of any educational context, the quality of school teachers and students learning outcome is directly proportional to what goes into classrooms (Baghdady & Zaki, 2019). The shift from instruction media in primary and secondary schools has opened doors for schools to teach in the English language. This is a challenging situation in the view that few teachers in Rwandan schools were fluent in English language, their proficiency level, and pedagogical skills need to be addressed through mentorship program as a solution. This study aimed to investigate the enhancement of primary and secondary school education through school-based mentorship program in Rwanda.

Literature Review

In line with above, Kent Janikula (2017) explains that school-based mentorship program when well appropriately implemented in schools, teachers feel happy and enjoys their work. School teachers (mentees) are more effective in the classrooms, their positive impact is enormous, and this understanding of the teachers is reflected in the student's learning outcomes. School-based mentors supports teachers to develop skills to improve students' learning outcomes (Janikula, 2017). Moreover, School-based mentors serves as facilitators to their mentees as they reflect on their classroom experience to gain more knowledge and skills to support their teaching practices, and every mentor is supposed to use his/her theoretical knowledge during the mentoring session to guide mentees in applying effective teaching practices in the classrooms. School-based mentors are supposed to be experienced and knowledgeable of the subject matter in order to improve their teachers (Paulinah Mudzielwana, 2014). At the primary and secondary school level, the mentorship program played a significant role in improving the English proficiency and pedagogical skills of Rwandan teachers. Rwandan teachers benefited from this mentorship program, which helped teachers to improve their teaching practices in the classrooms (Mohammad, Javed & Mohammad, 2015). Research studies in teacher education context reveal that teachers who are exposed to consistent and organized mentorship program demonstrate improvement than those that are not.

A study by Rujuan, Beijaard and Verloop conducted in Israel on English as an instructional media during mentoring, teachers responded that they gained teaching experience from their mentors, and their personal development improved tremendously, teachers responded also to have deepened their English proficiency such as grammar which helped them to develop their subject skills while teaching in the classrooms (Delaney, 2012). Furthermore, a study by John and Chimhenga (2016) conducted in Zimbabwe has

revealed that teachers acknowledged their participation in the mentoring activities to have improved their professional teaching techniques in the classroom. The Ministry of Education hired school-based mentors to coach and to support primary and secondary school teachers to developing their conceptual skills during the period of mentoring activities in the classroom. In Rwanda, classroom teaching practice encompasses the teachers (mentees) teaching under the direct supervision of the school-based mentor (Mpofu & Chimhenga, 2016). Therefore, mentors have proven to be effective, providing knowledge and skills that their mentees need. There is a need for capable teachers who are well prepared to effectively deliver quality teaching in the classroom (Mukeredzi et al., 2015).

School-based mentors become more prominent because of their personal development traits and professional skills (Mohammad, Javed & Mohammad, 2015). For the case of Rwanda, the mentorship program is considered a solution for enhancing the performance of education. The benefits of mentorship program in the education context is evident, Porumb (2015) recalls that mentorship program have shown to be effective in developing teachers' conceptual skills. In fact, these two authors went on to report that there are positive results in terms of learning outcomes where mentorship program is implemented (Mathur, Gehrke, & Kim, 2013). Furthermore, an effective school-based mentor conveys different applicable pedagogical content understanding for his/her lesson delivery in the classroom (Hudson, 2013).

In teaching practices, pedagogical content understanding is crucial for teaching any particular subject matter in the classroom and schoolteacher's pedagogical skills can be illustrated into student's performance, therefore, teachers must have pedagogical understanding of the particular subject matter. According to Chad Majiros (2013), in the social exchange context, the knowledge which is composed of both explicit and tacit knowledge is exchanged or transferred between people during any social processes (Majiros, 2013). In recent studies in teaching and learning have revealed that mentorship programs may have a significant impact on positive teacher outcomes, in particular, the academic performance of students (Ismail, 2014). Furthermore, individuals within the organization or firms tend to make choices that provide them with the best possible outcomes for themselves and other opportunities accessible at their reach (Hamon & Bull, 2016). The fact that the need to develop a culturally sound and supportive mentorship program that fosters and builds competencies and skills development is critical for organizational performance. Despite the above, Janikula (2017) have found that compared to other sectors, the mentorship program is considered a key. However, there are has been limited research in this area to examine the extent to which mentorship program and classroom practices influences teacher's decision making. In this regard, more studies are needed in this area of mentorship program to know the perceptions, attitudes, and needs of teachers to make use of mentorship program more effective.

Research Methodology

A descriptive research design was used in this study. The target population was 118 primary and secondary teachers in which 36 of them were school-based mentors, while 82 were primary and secondary teachers in Rwanda. In total, 118 individuals were examined and hence formed the sample size of the current study. The target population was very conversant with the school-based mentorship program implemented in primary and secondary schools and were direct beneficiaries of this mentorship program. School-based mentors were assigned to schools and their primary responsibilities were train primary and secondary teachers on English language of instructional media and as well as improving Rwandan teachers' pedagogical skills in teaching, mentors were responsible for creating teaching and learning materials, and use of ICT to share different resources related to the subjects matter with Rwandan teachers.

Both quantitative and qualitative methods approaches were used in this study. Data collected was analyzed quantitatively and qualitatively where descriptive statistics such as frequencies and percentages were used to describe the data collected and inferential statistics such as t-Test was used to check whether there was the mean difference among the respondents. Questionnaires were used as a primary instrument for data collection. The questionnaires consisted of both open and closed questions and were designed to address the research objectives of this study. The questionnaires were addressed to schoolteachers and school-based mentors and the confidentiality of the provided responses were assured.

Quantitative data collected was summarized into MS Excel tables, and based on the responses from the respondents, the collected data was categorized as types to indicate the quantitative qualitative data where descriptive statistics such as frequencies and percentages and inferential statistics such as t-Test was used to check the mean difference among the respondents. The collected data was recorded and calculated into MS Excel data analysis tools, and the level of significant was set at 0.05. Furthermore, the validity of the data instruments for this study were checked for correct content and formatting of this study instruments to confirm with the theoretical framework.

Results and Findings

The research sought to analyze the teacher’s viewpoint on the role of the mentorship program for enhancing the performance of primary and secondary schools in Rwanda.

The role of school-based mentors for enhancing the performance of primary and secondary school teachers

The respondents had a consistent agreement on the role of school-based mentor program in their schools, also respondents had a satisfactory with the mentoring activities in schools. The background information on the respondents of this study show that 75% of schoolteachers strongly agree to the statement that school-based mentors’ role in their schools enhanced their performance. While, 48% agree with the statement that school-based mentors were helpful and cooperative with teachers during mentoring sessions. On developing teaching materials, only 26 out of 101 of total respondents representing 25% of the respondents strongly agree that school-based mentors helped them to develop teaching materials for their classroom. Also, in line with that, 60 out of 101 representing 59% of the respondents agree to the statement that school-based mentors were helpful in helping them to develop teaching materials in the classroom. Also, 36 respondents out of 108 respondents representing 33% strongly agree to the statement and rated school-based mentors in enhancing their English language of instruction in the classroom, most of the respondent’s English language of instruction have improved as they engaged with the school-based mentors on daily basis.

The study results show that teachers agree that the school-based mentors were flexible in dealing with them, teachers were more comfortable working with the mentors, and they felt comfortable discussing their problems with the school-based mentors. Only 50% agree while 10% disagreed with the statement that school-based mentors were flexible in dealing with teachers. In terms of ICT integration in education, only 57% of the respondents have agree with the statement that teachers use ICT in education, teachers were able to create teaching materials for their classrooms teaching using ICT with the help of school-based mentor. For the enhancing the school administration, only 33% of the respondents strongly agree that school-based mentors were helping school head teachers, director of studies and district education officers to identify priority areas of improvements such as pedagogical needs of teachers and model lessons preparations. The study results from the table 1 below indicate that that 47 out of 112 respondents representing 42% teachers strongly agree and rated school-based mentors highly to have cooperated with them and were helpful to them during mentoring sessions (see Table 1 below).

Table 1. Rate the role of school-based mentors for enhancement of primary and secondary school teachers.

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|--|-------------------|----------|---------|-------|----------------|
| Cooperative and helpful | 0 | 0 | 6 | 54 | 47 |
| Developing teaching materials | 1 | 1 | 13 | 60 | 26 |
| English language instruction | 1 | 5 | 16 | 50 | 36 |
| ICT integration in education | 6 | 6 | 15 | 57 | 15 |
| Pedagogical-content-knowledge | 0 | 4 | 9 | 62 | 33 |
| Helps DEO, SEO, HT, and DOS | 1 | 3 | 15 | 52 | 35 |
| Reporting on time problem and challenges | 2 | 8 | 19 | 50 | 33 |
| Flexible and discuss with me some challenges | 2 | 10 | 12 | 56 | 31 |
| Cooperative with parents | 6 | 9 | 31 | 52 | 12 |

Note: District Education Officers (DEO), Sector education Officer (SEO), Head Teacher (HT), and Director of Studies (DOS)

A t-Test was used to check whether there was the mean difference among the respondents. The study result is presented in table 2 below. The statistical analysis that p-value $0.43 > 0.05$ is greater than 0.05 indicating the difference between the school-based mentors (BSM) and teachers’ responses on the mentorship program role for enhancement of primary and secondary school education was not statistically significance of 0.05 level ($p=0.43$) when t Stat is (0.173). therefore, based on the analysis, the study found that there is no statistical significance difference between school-based mentors and teachers’ responses on mentorship role in schools.

Table 2. t-Test: Two-Sample Assuming Equal Variances

| | <i>Teachers</i> | <i>SBM</i> |
|------------------------------|-----------------|-------------|
| Mean | 2.039020568 | 2.004368262 |
| Variance | 0.122177186 | 0.038140441 |
| Observations | 4 | 4 |
| Pooled Variance | 0.080158814 | |
| Hypothesized Mean Difference | 0 | |
| df | 6 | |
| t Stat | 0.173089806 | |
| P(T<=t) one-tail | 0.434136201 | |
| t Critical one-tail | 1.943180281 | |
| P(T<=t) two-tail | 0.868272403 | |
| t Critical two-tail | 2.446911851 | |

School-based mentors (SBM)

Contributions of school-based mentors’ for enhancing the performance of primary and secondary schools

The question was to indicate whether school-based mentors contributed for enhancing the performance of primary and secondary education in Rwandan schools. As it is indicated in the figure 1 below, the researchers used rating to measure the significance of school-based mentor program in schools. As it is indicated in the study results, between the range of 0-25% the respondents representing (7%) of the total schoolteachers investigated of 82 believed that school-based mentors contribute in enhancing the performance of education in primary and secondary schools. Between the range of 25-50% of the respondents representing (17%) of the total schoolteachers investigated of 82 responded to the questionnaire believed that school-based mentors contribute in enhancing the performance of education in primary and secondary schools. Between the range of 50-75% of the respondents representing (51%) of the total schoolteachers investigated of 82 responded to the questionnaire believed school-based mentors contribute in enhancing the performance of education in primary and secondary schools. Between the range of 75-100% of the respondents representing (26%) of the total schoolteachers investigated of 82 responded to the questionnaire believed that school-based mentors contribute in enhancing the performance of education in Rwanda. On school-based mentor’s side, the study results show that between the range of 0-25% the school-based mentors representing (2%) of the total school-based mentors investigated believe that school-based mentor program contributes to the performance of education in primary and secondary schools. while between the range of 25-50% of the respondents representing (22%) of the total school-based mentors investigated believed that school-based mentors contribute in enhancing the performance of education in primary and secondary schools. Between the range of 50-75% of the school-based mentors investigate representing (41%) of the total school-based mentors investigated of 36 responded to the questionnaire believed school-based mentors contribute in enhancing the performance of education in primary and secondary schools. Between the range of 75-100% of the school-based mentors investigated representing (33%) believe that school-based mentor contributes in enhancing the performance of education in Rwanda. The research intent to establish the extent to which the both teachers and school-based mentors sought or think about the contributions of the mentorship program in primary and secondary education in Rwandan schools. the finding has shown that 11 out of 36 school-based mentors and 20 out of 82 schoolteachers rated mentorship program in primary and secondary education at higher than 75 percent. However, this does not make any statistically significance difference among the responses.

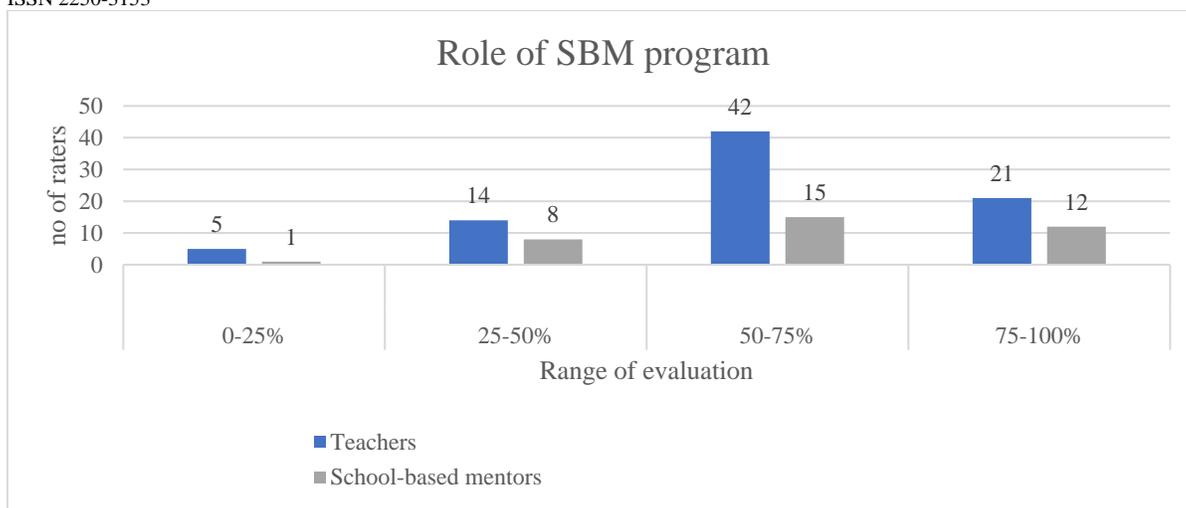


Figure 1. Respondents rates on contributions of school-based mentorship program

A t-Test was used to check whether there was the mean difference among the respondents. The study result is presented in table 2 below. The statistical analysis that p-value $0.43 > 0.05$ is greater than 0.05 indicating the difference between the school-based mentors (BSM) and teachers’ responses on the contribution of the mentorship program for enhancing primary and secondary school education was not statistically significance of 0.05 level ($p=0.43$) when t Stat is (0.173). Therefore, based on the analysis, the study found that there is no statistical significance difference between school-based mentors and teachers’ responses on contribution of the mentorship program for enhancing primary and secondary school education.

Table 3. t-Test: Two-Sample Assuming Equal Variances

| | <i>Teachers</i> | <i>SBM</i> |
|------------------------------|-----------------|------------|
| Mean | 2.959349593 | 2.898148 |
| Variance | 0.429054167 | 0.646473 |
| Observations | 82 | 36 |
| Pooled Variance | 0.494654575 | |
| Hypothesized Mean Difference | 0 | |
| df | 116 | |
| t Stat | 0.435239033 | |
| P(T<=t) one-tail | 0.332098831 | |
| t Critical one-tail | 1.658095744 | |
| P(T<=t) two-tail | 0.664197661 | |
| t Critical two-tail | 1.980626002 | |

Challenges in usage of resources sharing amongst school-based mentors and teachers

Usage of resource sharing amongst the school-based mentors and schoolteachers and the challenges faced while sharing resources using online portal. The respondents were asked to state how often they share resources with their colleagues using online portal. The ICT devices such as laptops and internet modems were given to school-based mentors for easy communication among the mentors across the country, these laptops and internet modems were supposed to be used by mentors to create teaching materials and by Rwandan teachers during mentoring session and peer learning with their school mentors. The study findings show that only 69 out 114 respondents representing (61%) agree to have shared their resources with their colleagues. While, 20 out 112 respondents representing (18%) stayed neutral to the statement, meaning that they do not use the portal or never used portal all. Still on the usage of resources and use of online portal among the school-based mentors and teachers, the study results show that online portal were used mostly by school-based mentors, since they were supposed to create teaching and learning resources to be used by Rwandan school teachers, on the side of school teachers the usage few were using online portal. However, the study findings show that there is no statistical significance difference between school-based mentors and schoolteachers according to how they use online portal to share their resources.

Discussion of findings

The study findings demonstrate that school-based mentorship program improved teachers' English language proficiency, teachers indicated that they were able to create classroom teaching materials for use in the classrooms and teach in English. Teachers investigated in this study strongly agree that school-based mentors' program in their schools were helpful to them, very supportive and were able learn how to develop their own teaching materials, teachers were able to perform and teach in English language as language of instructional in the classroom. To Helms-Lorenz, Slof and Van de Grift (2013) have indicated that mentorship programs in schools have influenced teachers' belief in teaching practices, teaching abilities, organization skills, and as well as intermingling with students (Lejonberg & Christophersen, 2015). For the role of school-based mentors, the study revealed that through the mentorship program, teachers are assisted extensively in developing teaching practices and approaches that foster reflection in their daily work practices. This mentorship program introduced new ways of addressing the issue of poor learning outcomes caused by the lack of teaching and learning materials, develop teachers' skills in developing classroom materials, and use of technologies, moreover, this mentorship program focused particularly on improving learning outcomes in basic education. School-based mentors were assigned to schools, work with teachers and school administration on daily basis. This result is consistent with the studies by Jo Shan Fu (2013) who underlined clearly that access to technology is considered effective and powerful for enhancing and contributing to educational reform (Fu, 2013). Furthermore, the respondents in the study pointed out the lack of necessary materials and other ICT tools such as computers and the internet in their schools. Teachers cited lack of enough time for the training and lack of teaching materials and other essentials and tools for them to keep practicing.

Social exchange theory provides an understanding into the way school-based mentor's and mentee's participatory behaviors are constructed on the perceived benefits and costs in the mentoring relationships environment. In the context, only 51% of the respondents in the study believed that school-based mentorship program contributed highly in enhancing the performance of primary and secondary education in Rwanda. Therefore, the mentorship program is useful for organization growth and development, which enhances human interactions and peer support that plays essential role for organizational development, and this, Indeed, schools are considered organizations of this type (Berziņa, 2011). On behalf of teachers, the study findings shows that there are 7% of schoolteachers did not think that school-based mentorship program contributed to the performance of primary and secondary education in Rwanda. The reason is that some schools did not have all the necessary equipment's such as computers, internet connection and other teaching aids available to teachers and school-based mentors to use them during mentoring sessions.

Additionally, school-based mentors used information and communication technology (ICT) to connect to each other. Challenges schoolteachers and mentors encountered while sharing resources, the study findings showed, schoolteachers complained that they did not have ICT tools such as laptops and internet modems to facilitate them in creating and sharing their resources with their colleagues. Researchers found out that 18% of the schoolteachers did not share their resources with colleagues meaning that they do not use the portal or never used portal all. It is evident from this study that teachers needed time to reflect on skills set gained during program implementation, and also to reflect on their teaching practices vis- a-vis best practices from their mentors to be replicated into the classroom practices.

Conclusion and Recommendations

This study aimed to investigate the enhancement of primary and secondary school education through school-based mentorship program in Rwanda. The school-based mentorship program is required and was highly appreciated by the beneficiaries. There has been an improvement in teachers' English language proficiency. Lack of teaching materials, administrative support was cited as an obstacle to the program's success teachers felt they are left alone and unsupported. It was also found that school-based mentorship program was not properly communicated to all stakeholders, and so, some of the schools did not embrace it. Limited usage of online portal for resource sharing among school-based mentors and schoolteachers is associated with the lack of training on the use of online portal.

The study recommends the following; firstly, increasing access to classroom teaching materials and learning resources in schools would enhance and improve teaching practices in the classrooms. Secondly, supporting the mentorship program is crucial for the success of the program, furthermore, continuous strengthening the capacity of the ministry of education concerned departments is key in the sustaining the interventions made by the program. The need for strengthening the stakeholders' engagement within the ministry of education and its affiliated agencies responsible for the program implementation is crucial. Finally, at the institution level, there is

an urgent need for scaling up school mentorship program to other schools and as well as establishing the mechanism to evaluate the impact of mentorship program in schools.

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Naming Compounds, Writing Formulas, Balancing Equations Abilities And It's Correlates

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Abstract. This study focused on the non-cognitive characteristics and their relationship to naming compounds, writing formulas, and balancing equations abilities of all Public Senior High School - Science, Technology, Engineering and Mathematics students in Baler, Aurora, Philippines.

Most of the respondents were 16 years old, more female, most fathers' educational attainments were college graduate while most mothers with units in college, with earnings of ten thousand to twenty thousand nine hundred ninety-nine pesos every month. Students were graduated in public science school and with special science curriculum. They were interest in science especially biology and chemistry.

The students were encountered difficulties in naming, writing, and balancing equations as revealed in low proficient and nearly proficient rating.

Naming compounds skilled was related to students' curriculum graduated while all non-cognitive characteristics were related to writing formulas, and only sex and age were related to balancing equations abilities.

Naming compounds, writing formulas, and balancing equations abilities were interrelated.

I. INTRODUCTION

The K-12 curriculum in the Philippines started during the school year 2012-2013. Science, Technology, Engineering and Mathematics (STEM) is one of the specific strands under the Academic Track program in Senior High School level. STEM strand gives hope for the prosperity and growth of economy, hence, students' who inspire to be part of it will expect to take specialized subjects like Chemistry 1 and Chemistry 2. Analyzing the system of K-12 system, teachers found the difficulties in teaching chemistry in spiral curriculum in Grade 7 to Grade 10. The study was found out that the focus is very minimal, lacks depth, and lacks concentration, which is not aligned with what spiral progression should be (Orbe et al., 2018). Hence, the study was formulated to find out if the non-cognitive characteristics of students such as sex, age, parents educational attainment, family monthly income, school and curriculum were they graduated, interest in science, and favorite science area, as well as, their self-efficacy in chemistry are factors related in naming compounds, writing formulas, and balancing equations. It seems that one of the most difficult elements in learning chemistry is writing and balancing equations of chemical reactions.

Into some research (Bilek et al., 2019, Schurmeier, et al., 2011, De, Dula 2018) it found out that there is a difficulty in junior high school and senior high school students in naming, writing, and balancing equations in chemistry. There are several reasons of difficulties in writing and balancing formula according to Bilek et al., (2019). The number of subsequent elementary activities in which students need to perform correctly to write and balance the chemical reaction equation. The second one are the hindrances that blocked the students to acquires abilities in writing and balacing chemical equations. It is supported by Schurmier et al., (2011) who explains that there are three topics found to be the reasons on difficulties of students in writing and balancing chemical equations. These are particulate matter, molecular image problem, and mole concept.

Chemical formula is defined as a combination of elemental symbols and subscript numbers that is used to show the composition of a compound. It is a shorthand method for representing a chemical compound. On the other hand, A chemical formula is consists of a collection of chemical symbols, telling the kinds and numbers of atoms present in the compound. Today the rules for writing chemical formulae are set by the Nomenclature Committee of the International Union of Pure and Applied Chemistry (IUPAC) and chemical formulae that follow the rules of this committee are said to follow IUPAC nomenclature.

The science curriculum under K-12 system of education is arranged spirally into four years from Grade 7 to Grade 10. One quarter per grade level is devoted to teaching chemistry instead of compressing all the chemistry lessons in one school year. Spiral curriculum created a great problem to the science teachers like the researcher that is why the study was realized. This study explored the relationship of different factors and chemistry self-efficacy to the most difficult elements for students in chemistry – naming, writing, and balancing equations of chemical reactions.

II. OBJECTIVES

The study aims to determine the non-cognitive characteristics related to naming compounds, writing formulas and balancing equations abilities. of Senior High School (SHS) Science and Technology, Engineering and Mathematics (STEM) students. Specifically, it sought to answer the following questions:

1. How may the non-cognitive characteristics of the respondents be described in terms of: sex, age, parents' educational attainment, family monthly income, junior high school graduated, high school curriculum graduated, interest in science subjects, and favorite science area?
2. How may the naming compounds, writing formulas and balancing equations abilities of the respondents be described?
3. Is there a significant relationship between non-cognitive characteristics and naming compounds, writing formulas and balancing equations abilities?
4. Is there a significant relationship among naming compounds, writing formulas and balancing equations abilities?

III. REVIEW OF RELATED LITERATURE

Non-cognitive Characteristics of the Students

Napoles (2018) revealed that there were more female respondents in Grade 12 than male, having age average of 18, their father and mother education were high school graduates and below and few attained college or higher educational degrees, and belonged to low family income.

There was a significant difference between the gender of student and performance in chemistry achievement test. Boys performed significantly higher than girls did except for the descriptive ability test. Girls need to be given special attention while being taught mathematical and spatial ability aspects of chemistry (Akala, 2010).

Ekber and Polat (2013) claimed that students' parents with higher education perform academically as compare to the uneducated parents.

Baah and Krueger (2012) concluded that students from less-endowed schools have much difficulty in writing chemical formula than students from well-endowed schools.

Dela Cruz (2012) reported that Filipino students sometimes top international science competitions, but usually they came from science high schools with special programs.

Tsabari and Yarden (2011) stated that girls increasingly interested in biology and boys more interested in physics and technology.

Overman, et al., (2014) claimed that one of the problems in chemistry is the lack of interest and application to "real world setting."

Naming Compounds, Writing Formulas and Balancing Equations Abilities

Bilek et al., (2019) identified the several reasons why students have problems in balancing equations: “the number of elementary steps with a typical double replacement reaction is too difficult for many students” and “difficult to make connections between what they observe in the world of particles, atoms and subatomic units.

Schurmeier et al., (2011) claimed that the roots of problem regarding ability to write and balance chemical reactions were the particulate nature of matter, molecular image problems, and mole concept.

De, Dula (2018) claimed that without mastery of the concepts in chemistry, it is difficult for the students to find higher levels of study in chemistry specially, the use of chemical symbols, formulae, writing chemical equations, and calculations involving moles.

Naah (2012) stated that chemistry students have difficulty interpreting the difference between subscripts and coefficients and struggle to understand the proper use of each of them.

The study of Hafsah et al., (2014) concluded the students need to have the conceptual understanding of the problem, give name to elements and compound, can translate the worded problems into a suitable chemical and mathematical equation, used the correct formula to calculate the mole, before they can solve the problem.

Baah and Krueger (2012) studied the difficulties in writing chemical formulae of inorganic compounds: Students do not understand the meaning of Roman numerals that are put in brackets of IUPAC names, problem with what valences and correct formula of radicals and ions, correct names.

IV. METHODOLOGY

The researchers utilized the correlational survey method, to assess the non-cognitive characteristics related to naming compounds, writing formulas and balancing equations abilities. The respondents were all Senior High School – Science, Technology, Engineering and Mathematics (SHS-STEM) students in Aurora State College of Technology and Aurora National Science High School, Baler, Aurora, Philippines during the School Year 2019-2020. The data gathered were organized classified, tabulated, analyzed and interpreted using the frequency distribution, percentage, weighted mean and test of correlation.

V. RESULTS

Table 1. Non-cognitive characteristics of the Respondents (N=147)

| NON-COGNITIVE CHARACTERISTICS | FREQUENCY | PERCENT |
|-------------------------------|-----------|---------|
| Sex | | |
| Male | 69 | 46.9 |
| Female | 78 | 53.1 |
| Age | | |
| 15 | 2 | 1.4 |
| 16 | 90 | 61.2 |
| 17 | 49 | 33.3 |
| 18 | 6 | 4.1 |
| Father Education | | |
| Elementary Units | 6 | 4.1 |
| Elementary Graduate | 2 | 1.4 |
| High School Units | 4 | 2.7 |
| High School Graduate | 33 | 22.4 |
| College Units | 24 | 16.3 |
| College Graduate | 61 | 41.5 |
| Post graduate | 17 | 11.6 |
| Mother Education | | |
| Elementary Units | 8 | 5.4 |

| | | |
|--------------------------------------|------------|------------|
| Elementary Graduate | 2 | 1.4 |
| High School Units | 17 | 11.6 |
| High School Graduate | 21 | 14.3 |
| College Units | 68 | 46.3 |
| College Graduate | 31 | 21.1 |
| Post graduate | 8 | 5.4 |
| Family Monthly Income | | |
| Below P10,000.00 | 25 | 17.0 |
| P10,000.00 – P20, 999.00 | 54 | 36.7 |
| P21,000.00 – P29, 999.00 | 26 | 17.7 |
| P31,000.00 - P39, 999.00 | 22 | 15.0 |
| P41,000.00 – P49, 999.00 | 3 | 2.0 |
| P50,000.00 above | 17 | 11.6 |
| Junior High School Graduated | | |
| Science HS | 93 | 63.3 |
| Regular Public HS | 42 | 28.6 |
| Integrated HS | 1 | .7 |
| Private HS | 11 | 7.5 |
| Junior High School Curriculum | | |
| Special Science Program | 102 | 69.39 |
| General HS Program | 45 | 30.61 |
| Interest in Science | | |
| Very Interested | 44 | 29.9 |
| Interested | 103 | 70.1 |
| Favorite Science Area | | |
| Biology | 55 | 37.4 |
| Chemistry | 42 | 28.6 |
| Physics | 20 | 13.6 |
| Earth Science | 30 | 20.4 |
| TOTAL | 147 | 100 |

Table 2. Naming Compounds, Writing Formulas and Balancing Equations Abilities

| NAMING COMPOUNDS ABILITY | FREQUENCY | PERCENT |
|------------------------------------|-----------|---------|
| Highly Proficient | 5 | 3.4 |
| Proficient | 1 | 0.7 |
| Nearly Proficient | 59 | 40.1 |
| Low Proficient | 68 | 46.3 |
| Not Proficient | 14 | 9.5 |
| Mean | 14.68 | |
| SD | 2.67 | |
| WRITING FORMULAS ABILITY | | |
| Highly Proficient | 2 | 1.4 |
| Proficient | 46 | 31.3 |
| Nearly Proficient | 58 | 39.5 |
| Low Proficient | 21 | 14.3 |
| Not Proficient | 20 | 13.6 |
| Mean | 11.05 | |
| SD | 4.36 | |
| BALANCING EQUATIONS ABILITY | | |
| Highly Proficient | 2 | 1.4 |

| | | |
|-------------------|------|------|
| Proficient | 17 | 11.6 |
| Nearly Proficient | 29 | 19.7 |
| Low Proficient | 99 | 67.3 |
| Mean | 7.95 | |
| SD | 3.04 | |

Table 3. Summary of the Relationship between Non-Cognitive Characteristics and Naming Compounds, Writing Formulas and Balancing Equations Abilities

| PROFILE | NAMING COMPOUNDS | | WRITING FORMULAS | | BALANCING EQUATIONS | |
|-----------------------|------------------|------|------------------|------|---------------------|------|
| | r | Sig. | r | Sig. | R | Sig. |
| Sex | -.103 | .214 | -.171* | .039 | -.192* | .020 |
| Age | .070 | .402 | .321* | .000 | .237* | .004 |
| Father Education | -.029 | .724 | -.317* | .000 | .058 | .485 |
| Mother Education | -.108 | .191 | -.456* | .000 | -.105 | .206 |
| Family Monthly Income | -.053 | .523 | -.247* | .003 | .117 | .162 |
| Junior HS Graduated | .075 | .369 | .175* | .034 | .008 | .922 |
| Curriculum Graduated | .169* | .041 | .367* | .000 | -.910 | .020 |
| Interest in Science | -.029 | .730 | .010* | .002 | .125 | .132 |
| Favorite Science Area | -.063 | .452 | .345* | .000 | -.014 | .863 |

Table 4. Relationships among Naming compounds, Writing Formulas and Balancing Equations Abilities

| ABILITIES | r | SIG. |
|--|-------|------|
| Naming Compounds and Writing Formulas | .441* | .000 |
| Naming Compounds and Balancing Equations | .169* | .041 |
| Writing Formulas and Balancing Equations | .168* | .041 |

VI. DISCUSSION

Non-cognitive characteristics of the Respondents

Table 1 shows the non-cognitive characteristics of the respondents. It shows that females outnumbered males, this finding supported the study of Napoles (2018). The age mean implies that students were on their right age to their grade level. More than 50% of the fathers were degree holders while 79 % of the mothers earned college units to elementary units. Results signified that more than half (53.7%) of the respondents were from below average family income based on 2018 survey of Philippine Statistics Authority (PSA) amounting to P24,474.00 pesos per month. More than half of the respondents were in their right track in choosing

Science, Technology, Engineering and Mathematics as their strands. Students graduated in the special science program in their Junior High School were willing to become scientists, technologists, engineers, and mathematicians evident that they enrolled in the STEM class in their senior high school. Respondents were interested in science that is why they enrolled in the STEM strand in senior high school. The respondents were interested in the study of plants and animals. The same findings obtained by Tsabari and Yarden (2011) that girls were interested in biology, hence female respondents outnumbered, while the boys were interested in physics.

Naming Compounds, Writing Formulas and Balancing Equations Abilities

Naming Compounds. The mean of 3.57 and SD of .810 signified that students obtained homogenously, nearly proficient rating. Correct names of some radicals are a problem to students resulting to difficulties in writing formulas. Baah and Krueger (2013). Students have difficulty interpreting the difference between subscripts and coefficients and struggle to understand the proper use of each of them. Naah (2012) (Table 2)

Writing Formulas. Results revealed that the respondents scores were “homogenously”, “nearly proficient”, and majority got low scores as evident by it’s mean and SD. This result implied that writing formulas was slight easily to remembered by the respondents. In contrary, Baah and Krueger (2012) found out that senior high school students encountered difficulties in writing chemical formulae of inorganic compounds.

Balancing Equations. More than half of the respondents (67.3%) have low proficient rating in balancing equations. The mean and SD implied that majority of the students homogeneously got low scores. The poor performance of the students in balancing equations were related to the low performance in terms of naming compounds. Students could not balance the equation unless he/she can name and write the formula of the compounds. Naah and Sanger (2012) identified student misconceptions in writing balanced equations for ionic compounds dissolved in water: simple student mistakes, memory lapses on the part of the student (incorrect charges for the ions).

Relationship between Non-Cognitive Characteristics and Naming Compounds, Writing Formulas and Balancing Equations Abilities

Students graduated in the science curriculum obtained higher scores in naming compounds than from general HS curriculum. Students graduated in science high school performed better in chemistry than those graduated in national high schools (Adamos, 2011).

In writing formulas, all the non-cognitive characteristics were significantly related. Students who obtained higher scores were female, older students, from lower the parents’ education and monthly income of the family, graduated in science school with Special Science curriculum, very much interested in science and whose favorite subjects are biology and chemistry.

Only sex and age found significantly related to proficiency in balancing equations. Male performed better than female in balancing equations. Males outperformed females on the stoichiometry questions. (Hudson, 2012). Old students can balance the equation well as compare to young students. The higher the age of the students’ they tend to be more observant and has the ability to conduct experiments procedurally and their level of science process ABILITIES in observing (Gal, 2018).

Relationships among Naming Compounds, Writing Formulas and Balancing Equations Abilities

There is significant relationship among naming compounds, writing formulas and balancing equation abilities. Students who obtained high scores in naming compounds, obtained also high scores in writing formulas compounds and balancing equations.

VII. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The non-cognitive characteristics of respondents are factors that can be considered to determine the pathways in achieving student’s abilities in naming compounds, writing formulas and balancing equations.

Students find difficulty in naming compounds, writing formulas, and balancing equations.

Naming compounds influence the students' curriculum graduated while all non-cognitive characteristics were related to writing formulas, and only sex, age and balancing equations were related.

There are interrelationships among naming compounds, writing formulas, and balancing equations abilities.

Recommendations

The school needs to address the non - cognitive characteristics of their students to encourage them to like chemistry subject. Career guidance may aid to assess career pathways of students to link in science related courses.

The teachers, instructor, and mentors need to strategize concept on chemical formulas and equations specifically in naming, writing, and balancing equations.

Since, this study found out that in some ways non – cognitive characteristics are not significantly related in balancing compounds only the age and sex found to be significant. Also, curriculum in which respondents graduated found to be significant in naming compound. On the other hand, all non-cognitive characteristics found to be significant in balancing equations. Hence, it is recommended a deep research in finding how non-cognitive characteristics of students may influence their abilities to deal in chemical formulas and equations.

In teaching chemistry, teachers should focus first in naming compounds and writing formulas before introducing the concepts of balancing equations. The use of different strategies in teaching naming compounds and writing formulas must be strengthened – like the use of the computers and programmes. Prerequisite knowledge (bonding and sharing of electrons, valence, use of periodic table, etc.) in writing and naming compounds be given emphasis and mastery in teaching chemistry.

Further studies are highly recommended: Relationship of naming compounds, writing formulas, and balancing equations in academic performance of students; Remediation on naming, writing, and balancing using traditional ways and computer assisted interaction; Innovation in teaching chemistry in junior and senior high school.

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Online Repositories in Peer Based Learning: A case study of teacher Competency - based curriculum training workshops in Marsabit County, Sololo Sub-County, Kenya.

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Abstract- This study sought to establish the role and impact of online repositories in peer-based learning and conducted a case study of the competency-based curriculum teacher training workshops. The specific objectives of the study were: to determine the challenges of traditional repositories in peer-based learning, determine the benefits of online repositories, establish factors affecting the adoption of online repositories, develop and validate an adoption framework for online management system in peer-based learning. The study adopted a descriptive research design and purposive sampling was used to collect data from thirty-two teachers who had successfully attended CBC training workshops using an online google questionnaire with open and closed-ended questions. Data was presented using tables, graphs and pie charts and analysed using frequencies. The findings from this study revealed that online repositories play a very crucial in the acquisition of information, knowledge, skills and professional growth in peer-based learning. The study also found out that peers are willing to adopt online repositories if ICT infrastructure is available.

Index Terms- adoption, ICT, CBC, online repositories, peers.

I. INTRODUCTION

This chapter briefly discusses ICT, online repositories and peer-based learning. In our current information age, Information Communication Technologies (ICT) has a vital role in the cognitive processes' transformations in the society. Holistically, ICT and its integration in education provides the much-needed foundation and anchorage to all the other spheres of life. ICT has revolutionised the creation, manipulation, storage, communication and dissemination of information in its various forms through the network of computers and other technological devices such as mobile phones and applications. It is this revolution of knowledge transmission that has transformed the traditional face-to-face teaching and learning activities through various technological channels and repository systems. Scherer and Valen (2019) define a repository as a 'dynamic service and tool.' Online repositories which are software archives are an enriched data location where multiple databases can be accessible to a user and form a valuable source of information to users. Online repositories in peer-based learning have transformed the traditional face-to-face teaching learning activities with peers engaging more in technologies that minimise the constraints of 'time, place and situational barriers.' Beach and Willows (2017). Traditionally, peer-based learning is a learning strategy employed by teachers as an instructional design where learners are encouraged to form groups and deliberate on provided topics to come up with their findings, become active participants and engage in group work. Moreover, traditional face-to-face teaching and learning activities have tended to have their repositories in

the traditional formats of note taking, records in worksheets, handouts, recitations and memorizations. These methods though adequate are cumbersome and may not essentially capture all the information learnt and fall short of an excellent repository. Turbill (2015) sees the transformation of traditional face-to-face teaching to the adoption of ICT technologies and online repositories for peers as having immense benefits such as collaborative learning and opportunities that try or apply new practices. NETP17 (2017) discusses that 'digital learning tools can offer more flexibility and learning supports than can traditional formats. Using mobile devices, laptops, and networked systems, educators are better able to personalize and customize learning experiences.'

With these advances in ICT, peers in teaching learning activities are embracing these benefits in their day to day quest for knowledge and skills enhancement.

Background to the Research

Globally, provision of cognitive, psychomotor and affective domain skills is a hallmark for development in developing countries. Governments endeavour to invest in their human capital by offering life-long learning to its citizens. This is in commitment to having literate and contemporary informed citizens in education, socioeconomics, socio-political and technological advancements. Kenya has made and continues to make immeasurable efforts in the investment of its human capital. This is in assertion with the UNESCO (2014, 2018) report which asserts that education should be recognized and promoted as a life-long right enabling individuals to continuously develop key competences to become active and informed members of a global society. Peer-based learning with its inclination to life-long learning necessitates this threshold for continued learning, skills acquisition and development of the human capital.

In the contemporary information age, the availability of information communication technology (ICT) and its surrounding technologies has seen tremendous improvements in teaching learning activities. Chen et al (2019) shows that studies have reported immense positive results in the quality, diversity and interaction awareness when online repositories are used in peer learning. This resonates well with what Beach and Willows (2017) discuss regarding teachers' (peers) cognitive processes during online professional learning that online learning is a favoured approach to professional development because it creates accessible opportunities, has positive effects on and even changes teachers' (peers) pedagogical and content knowledge, classroom practice and student outcomes. Sanchez-Garna et al (2018) quoting Pack (2003) assert that ICT can motivate learners and prepare them face new social challenges in ways that traditional methods have been evidenced to fail. This is agreement with the findings of Martin et al (2019) that ICT and its technologies do offer a holistic learning environment.

Cohen et al (2013) discuss that the implementation of a contextualized peer online repository as opposed to the global repository openly available online increases the use of learning materials in specific contexts such as schools. The research also found out that teachers (peers) in Israel often prefer to use local contextualized online repositories developed within their own contexts to suit their learning environments and specific needs which greatly enhance community collaborative learning.

Greenhow and Lewin (2015) confer that online repositories in American and Europe have and continue to play a crucial role in supporting peer learning. This they assert is realised when there is an embedment of various media technologies such as the incorporation of blogs and wikis; bookmarking tools, collaboration tools such VoiceThread and media that use video sharing. There are other examples such as LiveJournal which was created in 1999. LiveJournal continues to evolve and with time has included teaching (T-LJ) which is based on a blog technology where active professional topics are discussed daily.

Shonola et al (2016) report that in Nigeria, the use of emerging technologies in portable devices such as mobile phones are being used to support peers in blended learning (face-to-face and mobile apps). Shonola et al (2016) quoting Moses (2014) add that Nigeria is ranked among the largest mobile markets in Africa. The use of mobile technologies therefore has greatly aided peers in communication, data sharing and discussions anywhere and anytime thereby providing the much-needed scaffolding to peers.

The case study of the Competency-based curriculum teacher training workshops in Marsabit County, Sololo Sub-County, Kenya

The Kenya Institute of Curriculum Development (KICD) in its commitment to keep teachers abreast with the contemporary trends in education in collaboration with relevant teacher organisations affords teachers (peers) professional, personal enrichment and growth through workshops. When teachers attend a face-to-face training workshop, post workshop always requires that they integrate what has been learnt in their teaching activities. Teachers need time to reflect on what has been learnt and this calls for adequate time and support. Support can be enhanced within an online repository environment where teachers can engage in meaningful activities, collaborate with other peers, exchange ideas, provide feedback to their peers and get professional support from the experts (tutors). Online repositories can act as a post-workshop follow-up offering the much-needed scaffolding that teachers require professionally.

Statement of the problem

Peer learning with its tenet to life-long learning requires the adoption of ICT and its technologies as a means of offering teachers' professional development. In Kenya, emphasis has been put on digital repositories such as national, research and institutional. These digital repositories play a significant role in the dissemination of knowledge albeit do not meet the unique contextualisation of content that peer-based learning requires. This research therefore sought to find out the role and impact online repositories would have in peer-based learning and the research is guided by the questions:

- Which ICT infrastructure is available in peer-based learning?
- What hinders the adoption of online repositories?
- What measures can be taken to enhance the availability of online repositories?
- How can a framework be adopted to manage online repositories in peer-based learning?

Research Objectives

The objectives of the research are:

- i. To determine the challenges of traditional repositories in peer-based learning.
- ii. To determine the benefits of online repositories in peer-based learning.
- iii. To establish the factors affecting the adoption of online repositories in peer-based learning.
- iv. To develop and validate an adoption framework for online management system in peer-based learning.

Scope of the research

The research will focus on teacher training workshops in the competency-based curriculum conducted by the KICD in Marsabit County, Sololo Sub-County, Kenya. Tutors and tutees who have attended workshops will be invited through an online google questionnaire which will be sent via a google link and shared through a WhatsApp group, to share their experiences through an invite only attendance. The researcher will be the sole administrator of the WhatsApp group. The findings thereof can be used with other studies to generalize and recommend ICT solutions to peer-based learning.

Significance of the study

This research plays a crucial role in understanding the underpinnings of the big 4 agenda in Kenya whose aim is to enhance manufacturing, food security & nutrition, universal health coverage and affordable housing. These agendas are founded and supported by the premise that education and ICT with its surrounding technologies will help deliver these agendas. The Sustainable Development Goals in particular goal number 4 is articulate in its endeavour to ensure inclusive and equitable quality education and promotion of lifelong learning opportunities for all. This resonates well with the Mission statement of The Kenya Institute of Curriculum Development (KICD) which seeks to provide research-based curricula and curriculum support materials responsive to the needs of the society. Kenya Vision 2030 has a pledge through its 4 pillars in specific the social pillar to invest in the people of Kenya through the transformation of among the eight key social sectors education by committing to: establish education management information system (EMIS) centres, provision of laptops and the integration of ICT in teaching and learning. Africa in Agenda 2063 commits herself in Aspiration 1 to have well educated and skilled citizens in all spheres notably in science, technology and innovation by improving the ICT infrastructure.

The findings of this research will contribute immensely to the existing data available from other studies done in ICT and to future researchers. It will also help seek ICT solutions in peer-based learning.

II. LITERATURE REVIEW

This section looks at the literature review of information and communication technologies in peer-based learning.

Introduction to Literature Review

Peeters (2016) study of developing learner autonomy through Facebook: problem-solving dynamics in online peer collaboration found out that through online collaboration in a closed social network forum peers exercised control over content, were able to introduce new personal learning problems to the community of learners, peers provided solutions and were able to synthesize new information, shared personal learning experiences, took ownership of their learning and were able to construct an effective online support network.

Mwangi and Khatete (2017) research in Kenya shows that when it comes to teachers' ICT professional development needs, teachers need to interact with their peers to support each other and that even though there is a percentage of teachers who are already interacting with peers through blogs such as '*iLearn Technology, Emerging EdTec and Educational Technology Debate*' these come with the challenge of being hosted abroad and the content shared foreign which alienates the teachers. This finding is in line with the findings of Cohen et al (2013) which found out that teachers in Israel preferred to use their own contextualised online repositories for professional development. Mwangi and Khatete recommend that teachers be given opportunities to create professional learning networks for sustainable professional opportunities and growth and this trajectory can be enhanced online delimiting the constraints of cost, time and space seen in traditional repositories.

Mafa (2018) in researching on the adequacy of google classroom as a teaching and learning tool among higher education science training learners discusses the numerous advantages of google classrooms ranging from: it's a free web 2.0 tool based leaning management system that permits the formation of private classes and groups through an invite and welcome strategy which locks out interlopers guarantying protection to the group, it can be downloaded free on a mobile device. The research concluded that when learners are distant from everyone else, through utilization and help of the google classroom, they have their own opportunity to learn and comprehend ideas effortlessly without a push. The research further recommended that higher education institutions should give portable technology gadgets or potential mobile devices to their learners to explore this internet inclining tools since it encourages learning 24/7 beyond classroom contacts.

Adebayo (2019) in discussing teacher professional development and citing practices in other countries shows that internet and web-based communication technologies are being used to support teacher's on-going professional development for instance in the United Kingdom where Virtual Teacher Centre (<http://vtc.ngfl.gov.uk>) website provides a "Career Development" area which provides a variety of learning and teaching resources and links to support teachers continuing professional development. To add to this is the Teacher Net UK which is an independent professional association for teachers. These online repositories are used for blended learning (face-to-face and online).

From the reviewed literature review, it is evident that peer-based learning has experienced a paradigm shift and has embraced ICT and its surrounding technologies.

Theories that support the research

This research will be supported by the theories: social constructivism by Lev Semenovich Vygotsky and Technology Acceptance theory by Fred Davis. Social constructivism as advocated by Lev Semenovich Vygotsky (1896-1934) sees an interaction of cognitive processes and other people in the society. Palincsar (1998) in Woolfolk (2001:44) show that 'these social interactions are more than simple influences on cognitive development – they actually create our cognitive structures and thinking processes.' Vygotsky (1978:57) quoted by Woolfolk (2001:44) additionally note that functions in learner's cultural development usually appear twice: first on the social level and later on the individual level; first between people (inter-psychological) and then inside the learner (intra-psychological). Woolfolk (2001:44) emphasises that 'higher mental processes appear first between people as they are co-constructed during shared activities. Then the processes are internalized by the learner and become part of that learner's cognitive development.'

This theory is found applicable in this research as social constructivism theory demonstrates that learners internalize concepts through social interactions and being actively involved in various activities using linguistic capabilities and cultural tools in varied social contexts. The implications of Vygotsky's social constructivism theory in peer based learning are: peers need participatory learning and require learning tools to manipulate the learning process, the zone of proximal development necessitates the use of a more advanced and collaborative peer and scaffolding is realised by the regular and ongoing support necessary for learning and professional growth. ICT has become and is a cultural tool used to manipulate the learning environments and is extensively used in scaffolding. Álvarez and Cuesta (2012) quoting (Graesser et al.,2000; and Reiser, 2002), show that scaffolding is also seen as a primary strategy to support interaction and learning processes that includes the tools, strategies, and guides used by human and computer tutors, teachers, and animated pedagogical agents during learning.

Technology Acceptance Theory

Developed by Fred Davis in (1986), Technology Acceptance Theory discuss Allomary & Woollard (2015) is a 'predictive and explanatory model geared towards factorizing users' acceptance, rejection and integration of technology. Of prominence are the two key elements namely, perceived usefulness and perceived ease of use.' Li (2010) in says that 'Perceived usefulness is the degree to which a person believes that using a particular system would enhance his or her job performance.' Korpelainen (2011) asserts that these two behavioural beliefs; perceived usefulness and perceived ease of use usually lead to individual behaviour intention and actual behaviour and that perceived usefulness is the strongest predictor of an individual's intention to use an information technology.

This model gives an in-depth contribution to understanding ICT usage and acceptance behaviours in the adoption of different technologies. Allomary and Woollard (2015) assert that TAM provides a ‘robust model applicable across a broad range of end-user computing technologies’ especially so in the use of technology in learning environments.

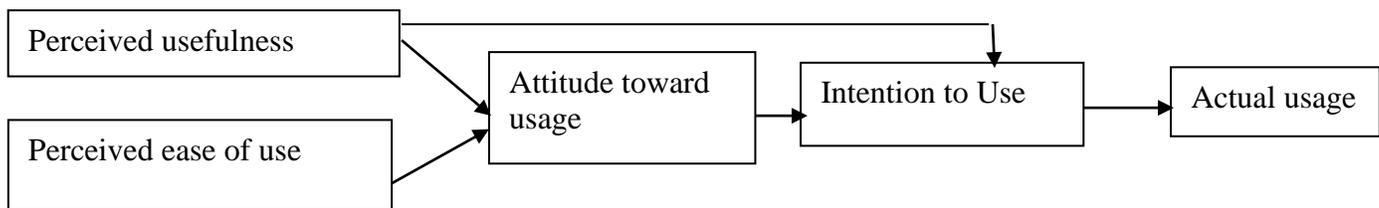


Fig 1. Technology Acceptance Model (TAM) Davis et al (1989)

Source: Allomary and Woollard (2015)

Traditional challenges of repositories in peer-based learning

Traditionally, repositories are in form of note taking, printouts, handouts, memorizations and recitations. These come with many challenges. Note taking and writing down learnt material consumes a lot of time in comparison to typing, audio recordings and video conferencing. This makes traditional repositories cumbersome in nature.

The availability of a printouts and handouts for information does not necessarily imply that all the content therein is required by a user. This bulkiness of printout can deter peers from using traditional repositories when compared to digital repositories where one sifts and accesses the information that they require at any given time and wherever they are limiting the constraints of time and space.

More often traditional repositories limit the access of information with many incidences of either loss or lack of the needed content.

When it comes to currency of content in traditional repositories, one of the challenges experienced is the lag in time to renew and upgrade content. This is because it takes time to deposit, verify, edit, print and physically distribute content using traditional mediums.

Memorization and recitation of content comes with the challenge of peer idiosyncrasies which can present the risk of misinformation, disinformation and unavailability of data.

Benefits of online repositories in peer-based learning

Online repositories offer peers the opportunities for collaborative learning in small manageable groups. It encourages sharing of knowledge and involves peers exchanging knowledge, ideas and experiences with each other and diffusing this learning in their day to day experiences.

Input of new knowledge through a variety of media makes online repositories beneficial to peers. This is made more attractive by technology that allows and provides opportunities to try and apply new practices.

Continued knowledge upload by peers’ contributions and questions raised thereof creates an avenue where peers can reflect on their own learning, take more initiative and control of their learning.

Online repositories offer a forum for peers to share knowledge and interact with each other without the constraints of space and time. Moreover, contextualisation of knowledge shared makes it easier for peers to make use of the shared knowledge.

Ongoing and regular support is essential to support peers learning and this can effectively and efficiently be facilitated through the use of ICT's.

Online repositories provide high quality and diversified content. This sets a premise for continued update and upgrade of content usually peer reviewed which make it a preferred knowledge currency repository.

Factors affecting adoption of online repositories in peer-based learning

The lack of and insufficient Information and Communication Technology infrastructure is seen as inhibiting the adoption of online repositories. Access to computers, updated software and hardware as well as all the periphery technologies is paramount in the adoption of ICT and when these key elements are lacking, adoption is crippled. Lack of internet connectivity, lack of electricity as well as frequent electricity interruptions negates this adoption. Waiti (2018) notes that inadequate funds, poor connectivity to electricity and inadequate ICT materials hamper the adoption of ICT in schools. Insufficiency is realised when there is a lack of technical support to continuously avail new technological trends as well as offer routine repairs of ICT infrastructure and give maintenance to the system. Technical support plays a crucial role because peers who may be deemed tech savvy may be grappling with issues of technological characteristics as discussed by Rogers (2003) such as; innovation attributes, relative advantage, compatibility, complexity, triability and observability which determine the rate of adoption by a peer.

Peers perceptions and attitudes towards ICT and its technologies greatly influence their acceptance to use it. To what extent a technology is useful in one's daily life and its ease of use determines its adoption. Davis (1986) asserts that it is the perceived usefulness and perceived ease of use of a technology that determines its acceptance, hence, it is very important to offer technical support to peers so that they can keep pace with technological advancements.

Osadebe and Ojukonsin (2018) discuss that lack of sufficient ICT sensitization can greatly affect the adoption of ICT and its technologies, notwithstanding, quoting the African Symposium (2011) shows that 'teachers need to be sufficiently competent to make personal use of computers, to make use of information and communication technology as a mind tool, to become master of a range of educational paradigms that use ICT and also to become sufficiently competent to make use of ICT as a tool of teaching learning activities.'

The cost of ICT and all its peripheral devices can deem expensive. Peers may find ICT devices such as smartphones, iPhones, laptops and tablets expensive to purchase and maintain. The continued daily purchase of internet bundles can prove too costly especially so when there is no common open and secure wi-fi network. Andae (2019) notes that the cost of internet in Kenya remains expensive with many citizens spending an estimated 3.1 percent of their average monthly earnings to purchase a one gigabyte (GB data) which is above the standard two percent; globally internet affordability is defined as 1GB mobile data costing no more than two percent of average monthly income. Overall, the high cost of acquisition and maintenance of ICT infrastructure is a challenge that constraints the adoption and implementation of ICT.

Online repositories require time and effort. This can pose as a challenge and as Harris and Sandor (2007) show ‘online repositories in peer-based learning may deem extremely demanding on the trainer or tutors time with limited reward or recognition for effort.’ This is partly because the repository nature may require time outside the structured formal learning time to deposit and engage in. Teachers are required to make a conscious effort to avail time outside the formal teaching hours to engage with their peers for professional development.

Policy plays a crucial role in the adoption of ICT. The Kenya Education Network (KENET) (2014) in discussing Kenya’s national ICT policy whose vision and mission is to have a prosperous ICT driven Kenyan society and improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services insists that there is need to update the ICT policy in tandem with the other undertakings and development goals that the government may have for example Kenya’s Vision 2030.

Other authors related works and findings

Cohen et al (2013) found out that peers often prefer to use contextualized online repositories as these meet and suit their learning environments and specific needs. The study further notes that although institutional repositories are availed for storage and access of teaching and learning materials, this does not adequately meet the specific peer community needs.

Liu and Chuang (2016) in a research conducted in Taiwan where google classroom was used in integration of peer tutor mechanism for 6th grade students found out that there was a high degree of positive perception regarding the use of google classroom for peer tutoring in and out of the classroom.

Chepkorir and Kandiri (2018) conclude that when it comes to teachers’ professional development, training through seminars/conferences during in-service courses does not give enough time for teachers to internalize well what has been learnt more so in ICT where professional teachers support is strongly advocated. The study further recommends that there is a need for teachers to have their personal initiatives towards the available digital learning tools so as to enhance the teaching learning process and their professional development.

Chen, Lei and Cheng (2019) quest to find out if peer facilitated online discussions had effects on the positive overall cognitive processes of peers and to what extent in terms of : characteristics, patterns and techniques, found out that in a peer facilitated online environment, learners demonstrated higher level cognitive presence in: triggering where learners explicitly express their feelings; exploration using brainstorming, information search and exchange of ideas; integration and synthetization of relationships; resolution where actuality of learned information is applied. This research shows that regardless of the content being learnt peers require support in their everyday learning and that peer facilitated online repositories play a crucial role in this support.

Research Gap

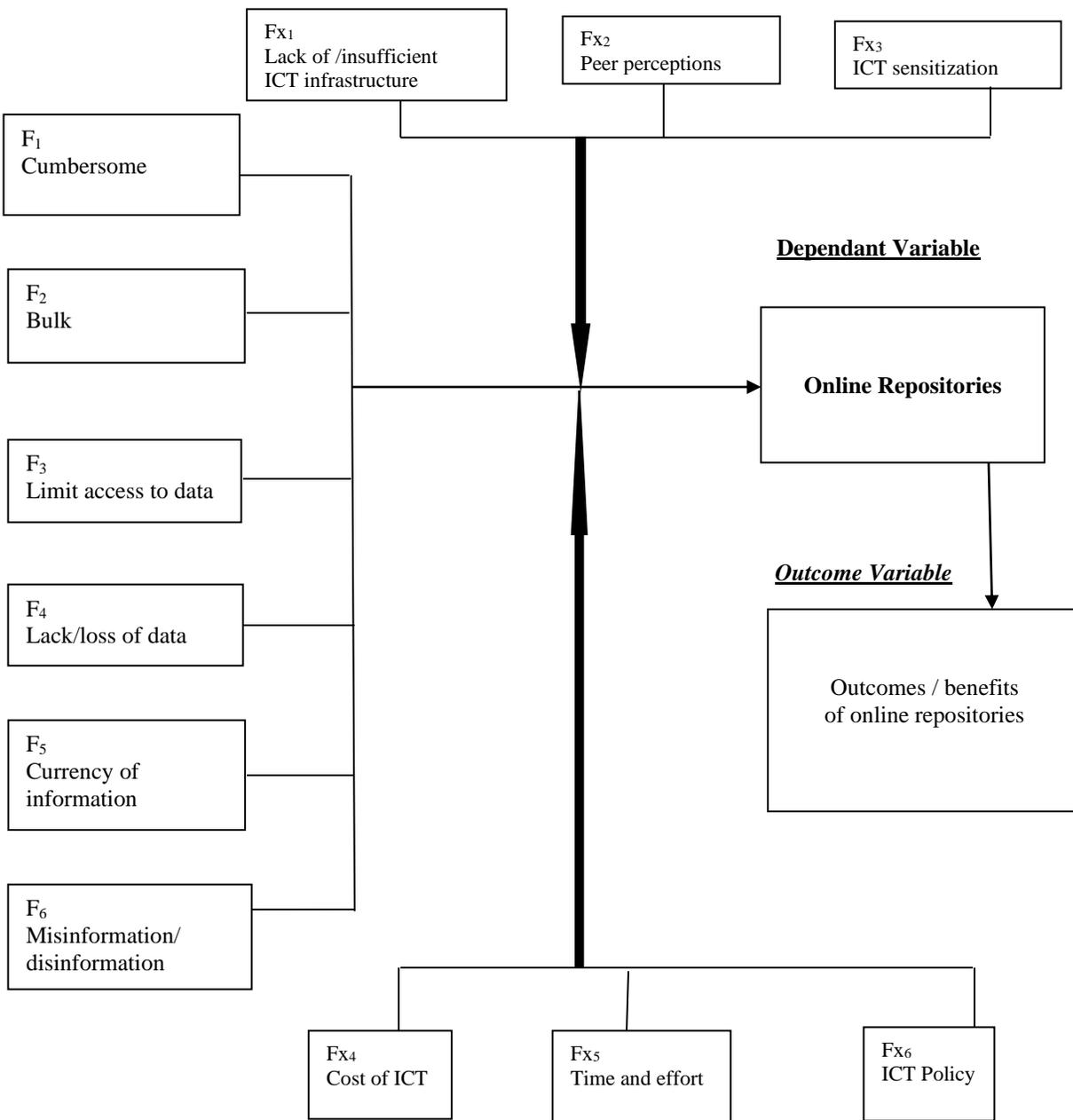
The challenges that peers have in repositories emanate from the traditional repository set ups which are not peer personalised, contextualized and with a degree of formality required for learning. These challenges can be mitigated through the use of ICT and its diverse technologies through online repositories to help peers’ access, store, upload, reflect and share information.

2.8.1 Conceptual Framework

A repository is a place where multiple databases or files are located and managed for distribution over a network. Emmytone et al (2018) quoting Bonilla-Calero (2013) discuss a repository as a set of services offered in order to manage, disseminate and facilitate access to documents. Maithya et al (2013) says that a conceptual framework is a ‘representation of a researcher’s conceptualization of the relationship between variables in the research which is shown diagrammatically.’ It is the description of concepts in a research and the mapping of the relationships among variables.

Challenges of traditional repositories
Independent Variable (F)

Adoption of online repositories
 Factors affecting (x)
Intervening variable



III. RESEARCH DESIGN AND METHODOLOGY

This section presents the research design, target population, the procedure followed in data collection and the techniques used in data analysis.

Research Design

The research will conduct a case study. Zainal (2007) says that case study research ‘allows the exploration and understanding of complex issues and can be considered a robust research method particularly when holistic, in-depth investigation is required. It enables a researcher to closely examine the data within a specific context.’

The research will also adopt a descriptive approach as it seeks to identify, determine, describe, explore relationships and articulate the objectives of the research. A descriptive research design involves collecting information from a sample of individuals by interviewing and administering a questionnaire whose findings allows generalizations. A questionnaire will be used in this research.

Target Population

Population refers to the group from which a sample is taken. The target population comprised of teachers who have attended competency-based curriculum (CBC) training workshops in Marsabit County, Sololo Sub-County, Kenya. These are peers whom the need for online repositories is central in teaching learning activities and outcomes in their everyday professional development.

Sampling Technique

Purposive sampling technique was adopted. Maithya (2019) notes that purposive sampling allows the researcher to use cases that have the required information with respect to the objectives under study. This is because the subjects are deemed informative and have the requisite characteristics.

Data collection procedure

The data were collected from 32 teachers who had successfully attended the competency-based curriculum workshops conducted in Marsabit County, Sololo Subcounty, Kenya using an online google questionnaire designed to investigate the role and impact of ICT in peer-based learning. This population (32 respondents) constitutes 66.6% of the total sample population (48 online questionnaires) that responded to the online questionnaire which according to Van Dalen (1979) is sufficiently above the 20% recommended for educational descriptive research. The questionnaire had 13 items. These items were both open and closed ended. To ensure that the questionnaire measured the intended constructs and met face and validity threshold, it was submitted to the study supervisor for evaluation in terms of content clarity, coherence and relevancy. His contributions and recommendations were used to improve the questionnaire prior to administering. The questionnaire was administered through a WhatsApp group forum where the invited participants opened the sent link to access the questionnaire. A single participation per invitee was allowed.

IV. RESULTS AND DISCUSSION

Table 1. Respondents Biodata

| <i>Age group (yrs.)</i> | <i>Gender</i> | | <i>frequency</i> | <i>Percentage</i> |
|-------------------------|------------------|------------------|------------------|--------------------|
| | <i>Male</i> | <i>Female</i> | | |
| 20-30 | 6 | 3 | 9 | 28.1% |
| 31-40 | 8 | 5 | 13 | 40.6% |
| 41-50 | 5 | 4 | 9 | 28.1% |
| 51 and above | 1 | 0 | 1 | 3.2% |
| <i>Totals</i> | <i>20</i> | <i>12</i> | <i>32</i> | <i>100%</i> |

Source: Questionnaire

From table 1 there were a total of 32 respondents (100%) of whom 20 (64.5%) were of the male gender and 12 (35.5%) were female. 9 (28.1%) were in the age bracket 20-30 years. 13 (40.6%) were in the age bracket 31-40 years. 9 (28.1%) respondents were in the age bracket 41-50 years and 1 respondent (3.2%) was 51 years and above. Majority of the respondents were in the age bracket 31-40 years (40.6%).

To answer research objective one that sought to determine the challenges of traditional repositories in peer-based learning the respondents were asked if they do receive post workshop support, a total of 29 respondents responded to the question as indicated in table 2.

Table 2. Post workshop professional support



Source: Questionnaire

21 (72.4%) of the respondents affirmed that they do receive post workshop professional support whilst 8 (27.6%) did not receive any post workshop professional support. Of the respondents who do receive post workshop professional support, the following as sources of support were cited: ‘Coordinators, Curriculum support officers (CSO), Sub-county education directors, WhatsApp groups, internet, peer teaching where teachers transfer skills to each other, and headteachers who avail teaching learning materials.’

When asked what challenges are faced in competency-based curriculum training workshops in terms of repositories, 30 respondents responded as observed in table 3.

Table 3. Challenges to traditional repositories

| <i>Item</i> | <i>N</i> | <i>%</i> |
|--|----------|----------|
| Bulk handouts and printouts | 18 | 60 |
| Loss of data post workshop | 15 | 50 |
| Lack of a forum to share professional experiences with peers | 12 | 40 |
| Lack of a forum to share information with peer’s post workshop | 13 | 43.3 |
| Lack of a forum to ask peers questions post workshop | 15 | 50 |
| Limited access to professional information and knowledge | 21 | 70 |

Source: Questionnaire

Table 3 infers that majority of the teachers 21 (70%) cited limited access to professional information and knowledge as one of the challenges that is faced with traditional repositories. This was followed by bulk handouts and printouts 18 (60%). 15 (50%) of the respondents noted that loss of data post workshop and a lack of a forum to ask peers questions post workshop was a challenge in

traditional repositories. This was followed by a lack of a forum to share information with peer’s post workshop at 13 (43.3%). And 12 (40%) observed that lack of a forum to share professional experiences with peers was a challenge in traditional repositories.

When asked what other challenges the respondents face, the responses given ranged as follows: ‘lack of teaching learning materials, loss of data, unreliable internet to browse and share with peers, short periods of training, lack of power and internet connectivity as well as computer illiteracy which makes it difficult to access and retrieve information online.’

Inferring from the above data, it is clear that majority of the respondents are youthful, and the respondents do receive post-workshop scaffolding albeit through the traditional repositories medium of whose challenge greatly limits access to professional information and knowledge.

Research objective two sought to find out the benefits of online repositories. The responses are as indicated in table 4. There was a total of 31 responses.

Table 4. Benefits of online repositories

| <i>Benefits of online repositories</i> | <i>N</i> | <i>%</i> |
|--|----------|----------|
| Exposure to current professional trends | 27 | 87.1 |
| Sharing experiences and knowledge with peers | 25 | 80.6 |
| Collaborative learning with peers | 25 | 80.6 |
| Professional support and opportunities | 22 | 71.0 |
| Diversified professional information | 20 | 64.5 |

Source: Questionnaire

Majority of the respondents 27 (87.1%) showed that exposure to current professional trends as a crucial online repositories benefit. 25 (80.6%) of the respondents affirmed that both sharing experiences and knowledge with peers and collaborative learning with peers is a very significant benefit accrued from online repositories. This was followed by 22 (71%) who noted professional support and opportunities as a benefit that can be drawn from online repositories. 20 (64.5%) respondents agreed that diversified professional information can be accrued from online repositories.

The respondents further indicated that they would expect the following benefits from online repositories: ‘availability of information online and offline, ability to use ICT in learning, meaningful professional socialization with colleagues from all over the country, acquisition of professional knowledge and information, being able to learn what’s outside the box i.e. the world, enhanced digital literacy in both theory and practice, and the ability to access the internet anytime.’

These findings are in agreement with the findings of Mwangi and Khatete (2017) who found out that teachers need to interact with their peers to support each other professionally and that they do need to be given opportunities through ICT forums to create these professional networks.

Objective three sought to find out what factors have affected the adoption of online repositories in peer-based learning. The research yielded the following results. There were 32 respondents.

Table 5. Factors affecting the adoption of online repositories

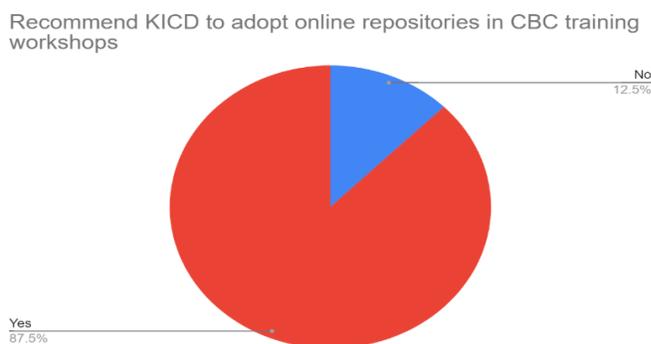
| <i>Factors affecting the adoption of online repositories</i> | <i>N</i> | <i>%</i> |
|--|----------|----------|
| Lack of computers | 20 | 62.5 |
| Lack of reliable internet | 24 | 75.0 |
| Lack of reliable electricity | 26 | 81.3 |
| Lack of ICT training | 26 | 81.3 |
| Lack of an online forum to interact with peers | 14 | 43.8 |
| Non contextualised digital forums | 15 | 46.9 |

Source: Questionnaire

Table 5 indicates that lack of reliable electricity and lack of ICT training as the major hindrances to the adoption of online repositories which stood at both 26 (81.3%). Lack of reliable internet was also highly rated at 24 (75%) whilst lack of computers stood at 20 (62.5%). Respondents 15 (46.9%) agreed that non contextualized digital forums do hinder the adoption of online repositories. Lack of an online forum to interact with peers stood at 14 (43.8%).

Respondents also noted the following as hindrances to the adoption of online repositories: ‘expensive internet bundles, lack of ICT knowledge and skills to keep pace with the technological advancements, regions in the county that lack mobile network coverage, lack of professional support from relevant personnel, low motivation.’

Table 6. Adoption of online repositories

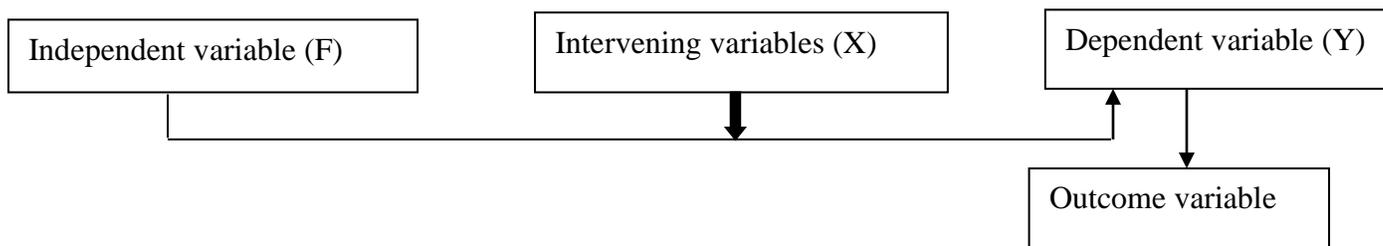


Source: Questionnaire

Respondents were asked if they would recommend KICD to adopt online repositories in their CBC teacher training workshops and responded as indicated in table 6. There were 32 respondents.

The respondents highly recommended the adoption of online repositories in training workshops as seen in table 6 with 28 (87.5%) affirming the need and only 4 (12.5%) negating the need of adopting online repositories quoting ‘lack of internet connectivity and lack of requisite ICT training in teachers to effectively adopt online repositories.’

Objective four sought to develop and validate an adoption framework for online management system in peer-based learning.



To achieve the objective four of this study the following function was used.

$$Y = F_{1...6}(X_{1...6})$$

Where:

Y is the dependent variable

F_1 = Cumbersome, F_2 = Bulk, F_3 = limit access to data, F_4 = lack/loss of data, F_5 = currency of information, F_6 = misinformation/disinformation

X_1 = Lack of sufficient ICT infrastructure, X_2 = Peer perceptions, X_3 = ICT sensitization, X_4 = Cost of ICT, X_5 = Time and effort, X_6 = ICT policy.

V. CONCLUSION

The findings of the study established that peers are aware of information communication technology and its relevance in their everyday quest for information, knowledge and professional growth. Lack of and insufficient ICT infrastructure is the biggest hindrance to peers adopting online repositories.

Recommendation

The Kenya Institute of Curriculum Development is recommended to avail ICT infrastructure in the competency-based curriculum workshops. Teachers should be given ICT skills alongside the CBC trainings as this will enable post workshop professional support using contextualised digital forums which is highly needed by the teachers.

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Potentiality of ecotourism in enhancing ethno-zoological values of elephant corridors for mitigating human-elephant conflict in Sri Lanka

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Abstract- Elephant corridors are paths of wild elephants that are used to move or migrate within or between habitats. The objective of the study is to identify the status of elephant corridors and the causes behind it and to explain the potentiality of ecotourism in enhancing the ethno-zoological values of elephant corridors. To achieve the objectives, a case study was conducted in the Manage Elephant Range, Hambantota based on key informants' interviews. The information revealed that, although the corridors have a vital role in conserving wild elephant and solving socio-economic issues, including human-elephant conflict (HEC), many of the elephant corridors in the southern wildlife region of Sri Lanka have been disturbed due to poor socio-economic, and environmental commitment of some people. Although many of the causes are related to the economy, if the ethno-zoological value of elephant corridors is enhanced through sustainable forms of ecotourism, the economy can solve HEC and contribute in conserving elephants.

Index Terms- conservation, corridors, ethno-zoological value, human-elephant conflict, ecotourism

I. INTRODUCTION

Elephants (*Elephas maximus*) are considered as one of the five charismatic species in the world and it (*Elephas maximus maximus*) is one of the flagship species in Sri Lanka. Ecological connectivity is an essential phenomenon for the survival of the beast in an ecosystem. Wild elephants and many other animals use corridors to move within a habitat or migrate between habitats. But unfortunately, the ecological connectivity of habitats through the corridors is under risk due to irresponsible human activities related to agriculture, urbanization, infrastructure development, etc. Thus, due to these human-mediated alterations to the landscape, wildlife habitats are being fragmented. The habitat fragmentation and wildlife corridor disturbances have caused subdivided populations and can profoundly alter both ecological and evolutionary dynamics of populations, species, and communities (Christie et al, 2015). Not only wild elephants and other wild animals but also people near wildlife habitats and their properties are also threatened.

Under such circumstances, biological corridors are the frequently proposed solution to connect those isolated patches of habitats and to solve human-elephant conflicts. According to Menon, et al.

(2017: p. 1), 'various strategies are being discussed and debated to manage and overcome the adverse effects of habitat fragmentation and loss. Wildlife corridors are an important mean of ensuring larger habitat availability to species, genetic exchange within and in between populations, and to minimize human-elephant conflict in altered habitats. These corridors have to be restored and secured on a priority basis'.

Biological corridors are the paths that facilitate animals on their daily or seasonal movements from one location to another. Wildlife corridors, habitat corridors and green paths are used as other terms to name biological corridors. In the research literature, there are many definitions regarding biological corridors (refer to Table 1). According to the definitions, an elephant corridor is a manmade or natural path, which secures elephants from dangers while moving/migrating from one habitat to another via human settlements or man-made structures such as roads, croplands, tanks, etc to achieve their needs. Therefore, elephant corridors are safety paths for the purpose of moving or migrating of wild elephants.

Elephant corridors (and any other wildlife corridors) can be grouped into two categories as natural corridors and manmade corridors. Natural corridors are the land/water areas that wild elephants usually used for migrating between habitats or moving within its native habitat while the manmade corridors are those created by humans in order to facilitate wild elephants to move or migrate within and between habitats.

The value of elephant corridors can be identified from two viewpoints: elephant conservation viewpoint, and human life and property protection viewpoint. The elephant corridors allow the exchanging of individuals between populations, which may help prevent the negative effects of inbreeding and reduction of genetic diversity (via genetic drift) that often occur within isolated populations. According to researchers and experts in elephant conservation, there are five basic needs of elephants: food, water, safety, shelter, and sex. Biologically, an elephant needs 300 kilograms of fodder and 100 liters of water per day. To achieve the above basic needs, a wild elephant moves about 30 km per day. In addition to that, the seasonal niche is another reason for wild elephants' migration. Naturally wild elephants use their traditional paths to move or migrate, if not they are disturbed, basically by people. On the one hand, if the elephant corridors are

disturbed, elephants migrate/move through the same corridor or via other areas while damaging human properties and creating life threats to humans. On the other hand, people also use different methods of protection from wild elephant attacks which would negatively affect wild elephants. Thus, elephant corridors can be considered as safety paths for wild elephants and crucial places for ensuring the security of human life and their property.

Table 1: Definitions for wildlife corridors

| Author/Institution | Definition |
|---|---|
| Soule and Gilpin (1991) | a linear two dimensional landscape element that connects two or more patches of wildlife (animal) habitat that have been connected in historic times; it is meant as a conduit for animals |
| Rosenberg et al. (1995) | a linear landscape element that provides for survivorship and movement but not natality (birthrate) between other habitats |
| Natural Resource Management Information Note | a wildlife corridor is a link of wildlife habitat, generally native vegetation, which joins two or more larger areas of similar wildlife habitat |
| Central American Commission for Environment and Development | a wildlife corridor is a geographically defined area which provides connectivity between landscapes, ecosystems and habitats, natural or modified and ensures the maintenance of biodiversity and ecological and evolutionary processes |
| Michael L. Morrison | a place where the population viability is enhanced when individuals of a subpopulation are able to move to another subpopulation |

Even though elephant corridors have been identified as a better solution for many ecological, biological and socio-economic issues in the areas where the elephant habitats are fragmented, it seems that the responsible agencies in Sri Lanka have not placed sufficient attention to maintain the natural corridors and to rehabilitate the disturbed corridors.

II. OBJECTIVES AND METHODOLOGY

The first objective of the study is to identify the status of elephant corridors and the causes behind the present status of the elephant corridors in Sri Lanka. Thereby the study focuses to identify the maintenance of the elephant corridor and rehabilitating commitments of state-centered agencies and local communities. To achieve the objective, the status of elephant corridors in the Managed Elephant Range in the southern wildlife region of Sri Lanka were studied (refer to Fig 1). The second objective of the study is to explain how the ethno-zoological value of elephant corridors can be enhanced through ecotourism. To achieve the objective, the influences and contribution of ecotourism of the Hurulu Eco Park (HEP) in the Palugaswewa divisional secretariat of Anuradhapura district are briefly illustrated (see Pathmasiri, 2019 for detail information regarding the HEP). The third objective of the study is to give recommendations in order to enhance the ethno-zoological value of elephant corridors in the southern wildlife region.

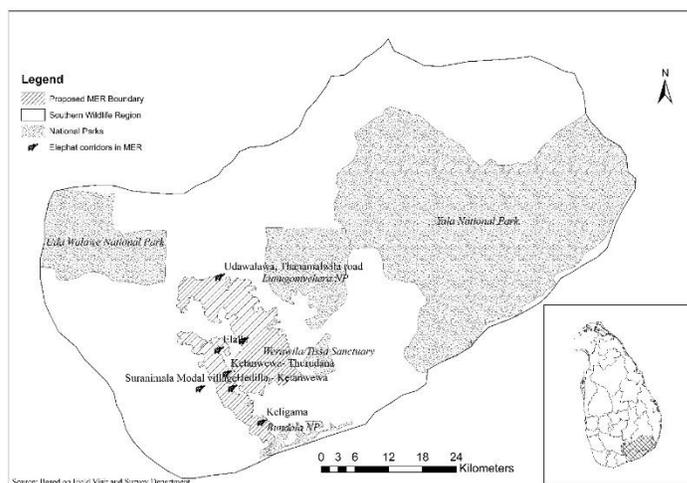


Fig 1. Location of the MER in the southern wild life region in Sri Lanka

Both primary and secondary data sources were employed to collect data to achieve the objectives of the study. Primary data was collected through key informant interviews and field observation. Primary data related to the elephant corridors in and around the Sooriyawewa area were collected in the months of September and October in 2019. Eighteen key informants from the villages in and around the MER were interviewed. Snowball and purposive sampling methods were employed to select the key informants, including Community Based Organization officials, political leaders (members of local governments), clergymen, farmers, fishermen, hunters, and businessmen.

The content analysis method was used in processing, summarizing and analyzing the key informant’s information. The results of the analysis are presented as figures with explanations.

III. BACKGROUND OF THE MANAGED ELEPHANT RANGE

A considerable portion of the MER belongs to the Sooriyawewa DSD. In the division, the total population had been about 46,449 in 2017 with a population density of 242 per km² (District Statistical Handbook, Hambantota, 2019, *Unpublished data*). Their main economic activities were related to agriculture, especially paddy farming, shifting cultivation (Chena), banana and other fruit cultivation, vegetable cultivation and cattle farming and related businesses. According to District Statistical Handbook Hambantota (2019), most of the agricultural lands (93.99%) are cultivated under large scale irrigation projects. A thorough observation of the years of settlement of the villagers reveals that the majority of the families were settled in the area for more than twenty years. The majority of the settlers possess a freehold or license for their paddy lands. If the land plot size is taken into consideration, 64.7% of the settlers have less than 2 acres, 31.8% of the settlers own 2-4 acres and 3.6% of land plots are larger than 4 acres.

Biophysically, the study area is located in the southeast dry zone of the island (annual precipitation is between 500 - 1000 mm) with low land topography and dry zone monsoon forests and grassland

vegetation (National Atlas of Sri Lanka, 2013). Most of the study area was a dense forest until the country was independent. This area was also a feeding ground of wild elephants. Several village developmental programs have been carried out in the area. However, the characteristics of the study area have been largely influenced by the rural economic enhancement projects as well as other projects that have been launched to integrate the peripheral areas to the national economy. Some of the key drivers of the transformation are as follows;

- The construction of the multifunctional Udawalawe reservoir was initiated in the 1960s and completed in 1967;
- During the 1980s, many new villages were established and simultaneously land encroachments have taken place especially for the seasonal agriculture (Chena cultivation);
- During the 1990s, Udawalawa left bank settlements initially started;
- In 1996, the first elephant drive took place intending to solve the HEC and clear the lands for development projects;
- The Walawe Left Bank Upgrading and Extension Project (WLBP) was designed during 1994/95 with the financial assistance of JICA and was implemented from 1996 to 2008 in order to maximize the utilization of available land and water resources;
- In 2005-6, the second elephant drive took place;
- After 2005, Greater Southern Development Project had started which brought a huge development resulting in deforestation over the area. Large scale development projects including harbor, stadium, airport, highways, solar panel projects (SAGA, LAUGFS, etc.) have been launched in the area;
- After 2015, model village programs have been launched in and around wildlife habitats (especially in the MER).

Under each stage of the development projects, it resulted in the human-elephant conflict which at the same time was intensified. The HEC is gradually becoming a severe issue in the area (refer to Table 2). As per the unpublished data of the Divisional Secretariat Office-Hambantota (2019), the year 2017 did not report a single case of human death owing to HEC. The number of death cases that have been reported in the years 2018 and 2019 are nine and eight respectively in the area. The number of property damage cases has also gradually increased within the last three years. In 2016, the total number of property damage cases reported to the district office were 2 and in 2019 it has increased to 125 cases. Also, during this period the Sri Lankan government has given compensations to the victims while bearing a cost of approximately LKR 20.35 million.

Not only that, between 2014 and 2018, around 25 elephants (LUPD, 2018, p. 4) died due to human activities. The main causes for the deaths of elephants in this area are as follows: power shocks due to the electric fences, gunshots and setting *Hakkapatas*. In addition to that, some elephants remain with injuries and wounds.

Table 2. The trends on human deaths, injuries, and property damages 2017-2019

| Theme | 2016 | 2017 | 2018 | 2019 |
|--------|------|------|------|------|
| Deaths | 0 | 0 | 9 | 8 |

| | | | | |
|---------------------------|---|-------|-------|-------|
| Injuries | 0 | 2 | 2 | 4 |
| Property damages | 2 | 60 | 86 | 125 |
| Compensation (Rs 100,000) | | 27.56 | 86.69 | 89.28 |

Source: Divisional Secretariat Office-Hambantota, 2019 (Unpublished data)

As mentioned above, the Sri Lanka government has conducted large scale drives to move hundreds of wild elephants into nearby national parks during major irrigation development projects such as Mahaweli, Walawe and Kirindi Oya (Fernando, *et al.* 2008). In the study area, the first and the second elephant drives took place in 1996 and 2005-6 respectively intending to solve the HEC and clear the lands for development projects. During the second elephant drive, for one and a half years, about 225 wild elephants were removed but over 400 were left behind in the area (Fernando, 2015). According to Santhiapillai (1998), during the period 1974 to 1993, between 950 to 975 elephants were driven from conflict areas into protected areas. Moreover, chasing elephants away from the Department of Wildlife Conservation areas such as the Nimalawa Sanctuary (close to Yala National Park) have been conducted in 2004 and Bundala National Park in 2006 (Fernando, 2015).

Managed Elephant Range (MER) is another measure proposed by researchers in order to overcome the HEC in the area (refer to Fig. 1). The state-centered stakeholders, such as the Department of Wildlife Conservation have also identified the value of the MER to conserve wild elephants and minimize the HEC in the area. The MER is a proposed land area to which the elephants' range in Hambantota is also included. Seven elephants in the area had been collared with GPS, satellite transmitters, under a collaborative work between the DWC and the Center for Conservation and Research (CCR) from whom the data was gathered in order to propose this particular area as the MER. These collars provided detailed information on the herd of the elephants and their regular movements which aided in demarcating this particular area.

Sri Lankan government has invested a huge amount in erecting electric fences around the elephant habitat to minimize HEC. According to the key informant interviews, average cost of the government for establishing elephant fence is about LKR 0.5 – LKR 1 million per kilometer. However, during field observation and key interviews, it was identified that many segments of the electric fences of the MER are malfunctioning due to various reasons and thus, failed to eradicate HEC in the study area.

The MER can be identified as a home as well as a corridor for many wild elephants. In the MER, there are more than 400 wild elephants. In addition to that, the MER is considered as the wild elephant habitat that can link other wild elephant habitats such as Udawalawa, Lunugamwehera, Bundala and Weerawila in the southern wildlife region (refer to Fig 1). Moreover, the area ensures the ecotourism value of small ecotourism sites in the SWR based on wild elephant viewing tourism and depend on migrating elephants.

Even though the area is proposed as the MER, on the one hand, it is visible that some of the patches are being utilized by some

villagers. The MER is largely fragmented due to various human interference, such as infrastructures, crop cultivations, settlements, etc. According to the Land Use Department, Hambantota (2019, unpublished data), the total land area in the MER is about 61,473 acres. But, the land use and land cover pattern in the MER depicts that a considerable land extent (27%) is still used for various human activities. Mainly, the land is used by humans in the area for Chena (14%), banana and paddy (4%), and seasonal crop cultivations (4%), airport (3%), and home gardens (2%) and roads.

The rest of the land (73%) can be considered as a wild elephant habitat. The mainland cover types visible in the area are scrublands (61%), tanks (7%) and open forests (3%). However, the dispersed distribution of lands which is utilized for the aforementioned human activities in the MER has led to fragment the wildlife habitat. Also, the land-use pattern in the area has seasonally changed. Thus, the available land area to the wild elephants in the MER is also fluctuating seasonally. Moreover, some forest patches and human croplands outside the MER are also used by elephants in order to achieve their needs. Thus, it is essential to identify and to manage the existing elephant corridors in the MER.

A. Wild elephant corridors in the MER

According to the wild elephant conservation perspective, the lands in the MER can be divided into two categories as elephant corridors and other areas. In the study, two types of elephant corridors were identified (refer to Fig 1): the corridors that link the MER to other wildlife habitats, and the corridors that connect the habitat patches in the MER.

Unatuwa, Koholangala, and Nikawewa (21 Kanuwa) elephant corridors link the MER to other wildlife habitats. In other words, those corridors can be named as inter-habitat connecting corridors.

The elephant corridors in Habaraddawala, Andigama-Burutankanda, Walsapugala-Wediwewa, Kurudana-Katanwewa (Handillawewa), Uda Mattala-Pahala Mattala, and paddy fields such as Neralugaswewa, Orukemgala, Pahala Mathtala, Elalla can be named as intra-habitat corridors. Some of the corridors, especially paddy fields are considered as seasonal corridors. Also, over the last decades, state-centered agencies have acquired, cleared and utilized some land in the area for various development activities, such as agriculture and irrigation, solar power plants, garbage disposal sites, airport, harbor, International Conference Hall, proposed Industrial Zone (BOI), Hambantota Administrative Complex and International Cricket Stadium. All these activities have led to fragment the wildlife habitat and led to new emerging corridors, such as land belt between Mattala Airport and Malala Ara. Some artificial corridors, such as in the Andarawewa area, have been built too.

B. Status of the elephant corridors in the MER

Many (if not all) of the elephant corridors in the MER have been disturbed by intentional and unintentional activities of local

communities, state-centered agencies, and others. As indicated in Fig 2, none of the key informants has identified an elephant corridor in the area as a well-functioning (year-round) corridor. But few elephant corridors are functioning well during off farming periods. These corridors are paddy fields, such as Neralugaswewa, Orukemgala, Matigathawewa that are cultivated by villagers under the protection of seasonal electric fences. Some non-governmental organizations, such as CCR have collaboratively worked with the paddy farmers for maintaining the aforementioned seasonal corridors, at least during the off farming season.

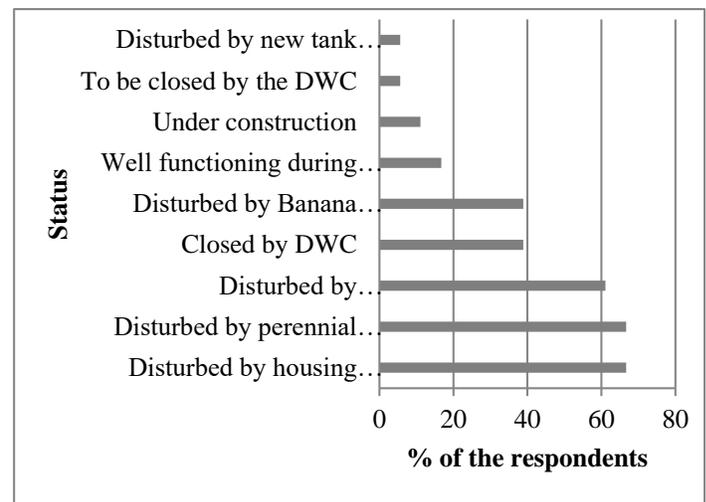


Fig 2. Status of elephant corridors in the MER

As indicated in Fig 2, not only some villagers but also the state-centered stakeholders have behaved irresponsibly in the elephant corridors. On the one hand, local people and the state agencies have ignored the nature conservational functions of elephant corridors and used the land for other purposes, such as subsistence and commercial agriculture, settlement, etc. On the other hand, DWC has closed or has planned to close some elephant corridors in the area. Thus, it is clear that they have less commitment to maintaining elephant corridors. Thereby many elephant corridors in the area have been disturbed by villagers, outsiders, and state-centered agencies.

C. Causes behind the status of elephant corridors in the MER

According to the key informant interviews of the study, as indicated in Fig. 3, the aforementioned elephant corridors have been seized by humans for various purposes, mainly for housing (72%), paddy farming (72%), perennial crop cultivation (61%), large-scale banana cultivation (56%), forest clearing (56%) and sifting cultivation - Chena (56%). In general, many of the causes are related to the economy. These causes can be categorized into three categories as causes related to agriculture, to development projects, and to HEC mitigation measures.

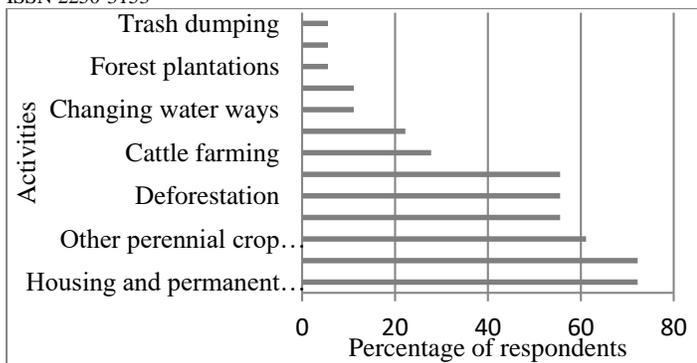


Fig 3. Human activities in elephant corridors (Source: key informant interviews, 2019)

- Causes related to agriculture

For the last 15 years, about half of the land in the Hambantota district owned by the Mahaweli Development Authority had been issued for clearing and developing (LUPD, 2018, p. 14). Thus, many of the nearby forest patches of the MER, such as Karambagasmulla Oushada forest (300 ha), Konkatiara forest (700 ha) are under the threat of deforestation. In addition to that, since 2013, MDA has taken efforts to issue its forest lands for development but the DWC has opposed to take legal action against unauthorized land acquisition, forest clearing, and land developments. According to LUPD (2018, p. 15), the main reason for such behavior is the sentence given by the Hambantota Court to an unauthorized land acquisition case (no 11795). The national environmental act (amended 1993) emphasizes the need for legal approval to clear and develop the land which is more than 2.5 acres (LUPD, 2018). Conducting EIA and getting legal approval is considered vital but this was not the case for banana and all newly developed perennial crop cultivations (coconut, cashew) of this area. Nevertheless, the Central Environmental Authority has also not fully committed to take legal actions against the aforementioned activities. Under such circumstances, villagers and outsiders have encroached lands in the elephant corridors and converted them into farmlands.

In the past, villagers had cultivated their paddy fields without electric fences or Elephant Thunder Crackers (ETC). They have to guard their paddy field and use elephant-friendly chasing methods to protect their farmlands; they had not cultivated in elephant corridors, because through lifelong experience, they had known the consequences of cultivating in elephant corridors. However, for few decades, especially since 2004, many of the elephant corridors have been fragmented and hindered by cultivating seasonal and perennial crops, establishing home gardens and settlements, building- permanent structures, and fencing with electric fences and walls.

In the past, wild elephants had migrated from Lunugamvehera Park to MER via Wilmassa and Adella area. However, after establishing an electric fence by the DWC to develop the Wilmassa-Adella paddy fields, the wild elephants lost the elephant corridor forever. Now wild elephants use the Koholangala elephant corridor to migrate from/to

Lunugamvehera Park and MER area. The corridor is very narrow; the width of the corridor is about 450 m. Also, one can notice the presence of a paddy field with a permanent electric fence in the corridor.

On the contrary, there are many large paddy fields in the MER. Some of the paddy fields have been excluded from the area enclosed by DWC’s electric fence (from the MER area); the Udamattala paddy field is an example of this fact. The paddy field is about 50 acres and it is separated from the MER by the DWC’s electric fence. During the off farming seasons, large herds of wild elephants enter the fields by breaking the electric fence. The story of Ketanwewa village and the paddy fields is also the same. Keligama paddy field is identified by researchers as a wild elephants’ feeding ground during the off farming seasons. The residuals of paddy are one of the main food items for wild elephants. So, at the end of the harvesting period, more than 100 wild elephants migrate to the paddy field. However, the DWC has separated the fields from the MER by an electric fence. Thus, the fence has led to fragment the wildlife habitat. Wild elephants have become familiar with breaking the fence to enter into the paddy fields and some of them enter into the village too.

The inclusion of paddy fields to the MER would reduce elephant attacks to electric fences, villagers’ lives and properties while safeguarding the elephants’ corridors. For instance, DWC has included the Galwewa paddy field (25 acres) to the MER. Hundreds of elephants use this paddy field as a corridor during the off-farm seasons.

Banana is the most favorable highland crop among the farmers in the area. For the last two years, a considerable extent of forest lands had been clandestinely cleared for banana cultivations. According to the villagers, around eight large scale farmers have encroached, cleared and cultivated banana in a land approximately of 2000 acres near Hamuduruwewa (in between Maha-Andarawewa and Pahala-Andarawewa). About 600 acres of Andarawewa-Usgala forest, 100 acres of Wawegama forest, 400 acres of Kuda-Indiwewa forest, 25 acres of Muththagal-Ara forest in Suruwirugama and 25 acres of Welu-Ara forest in Suruwirugama have been cleared for banana cultivations (Land Use Department, Hambantota, 2018). The villagers are not satisfied with the actions which are taken by the relevant authorities. The respondents accused the responsible governmental agencies of their failure to stop the forest clearing activities of large scale banana cultivators.

A considerable extent of the lands in the corridors of the MER has been encroached by villagers and outsiders to cultivate perennial crops such as coconut, mango, and cashew too. It was found that five acres of land in the *Burutankanda* elephant corridor has been encroached by people. According to some officials of the DWC and the villagers in the area, responsible authorities have also issued a permit to cultivate mango in this area. Considering the permit, the DWC has permitted to erect a permanent electric fence enclosing the land. Furthermore, another slot of land is utilized for cashew and mango cultivation (20 acres) in the Katanwewa-Turudana elephant corridor. Now the elephant corridors are disconnected by the perennial crop cultivation and the permanent

electric fences. Hence, it is obvious that the irresponsible behavior of the relevant authorities has led to HEC in the area.

- Causes related to rural development and infrastructure development projects

According to local respondents, in the past, the Madunagala forest was a well-known elephant resting site that was connected by a forest corridor to the MER. Although people had practiced Chena cultivation, no one had disturbed the elephant corridor. Many traditional villagers had known how to interact with wild elephants. Still, there are 15-20 elephants regularly moving from Madunagala forest to MER forest via the Kenhata Pansala forest. However, the human-elephant co-existence has been turned out into HEC due to the *Udawalawe Left Bank Development* Project. The project resulted in several changes in the Madunagala-MER elephant corridor (Andigama-Burutankanda elephant corridor). Several new tanks (about 16) known as 'Us-wewa' (high tanks) have been established under the *Uswewa* project of the Walawe Left Bank Development Project. A considerable extent of forest lands in the corridors and other areas (including the forest patches developed under Farmer's Woodlot Program) has been cleared for home gardens, paddy farming, and Chena cultivation. Now people have fenced their farmlands and properties with electric fences. People use ETCs, firecrackers and other traditional methods to chase away the elephants.

Irresponsible human activities against elephants paved way for HEC in an aggregative manner. Some of the measures are elephant drives – through intensive use of ETCs and elephant translocations. Eventually, some elephants become aggressive. Moreover, the outsiders who were settled in the corridors did not have adequate awareness regarding elephant behavior and traditional methods to handle elephants. The selected land area of the Andigama-Burutankanda elephant corridor has been utilized as a garbage disposal site of the Sooriyawewa Pradeshiya Sabha. Over the last 15 years, the disposal site has attracted many wild animals and has changed to a wild elephants' feeding site. Now, some wild elephants have got adapted to garbage.

The DWC has decided to convert the Madunagala forest patch into a 'wild elephant free forest'. Therefore, an electric fence had been erected around Madunagala by the DWC, Sooriyawewa Pradeshiya Sabha and divisional secretariat. After the failure of the fence, DWC has erected a permanent electric fence (around the MER) to separate the Madunagala forest patch from the MER. Thereby the elephant corridor has been disturbed further.

Mattala airport has been established by clearing approximately 2090 acres of forest land in Mattala forest. According to the villagers, the forest had many *Palu* trees (*Dipterocarpus zeylanicus*), which is considered as one of the favorite food items for wild elephants. In addition to that, the airport has led to fragment the wild elephant habitat and hinder the wild elephant corridors. According to the officials of the airport, wild elephants have attacked the electric fence, entered the airport and had damaged the properties of the airport. So, wild elephant attacks have become one of the main security issues to the international airport. At the beginning of the Mattala Airport Project, the

narrow land belt between Malalaara and Mattala airport was not identified as an elephant corridor by the responsible agencies. Subsequently, due to the efforts of elephant conservationists, a narrow land belt (corridor) was re-opened for wild elephants. According to the airport officials, it has contributed to reduce the wild elephant attack to the airport.

As mentioned earlier, there are several new infrastructures such as the airport, harbor, international stadium, etc. in Hambantota area and the places have been connected through a highway/road network. The highway development has created many negative influences on the natural environment. First, it resulted in the decrease of the wildlife habitat extent which has led to insufficient resource supply (fodder, shelter) to the wild elephants. In the MER, nearly 185.45 acres of land have been cleared for road construction.

Secondly, highway development has led to disintegrate wildlife habitats in the area. Also, the responsible agencies have not placed satisfactory attention on creating elephant corridors to link the fragmented patches of wildlife habitats, including forest patches, large paddy fields, etc. Under the highway project, a 900 m width underpass corridor has been created in the Andarawewa area. Though, there have been numerous incidents recorded where wild elephants including calves have attacked the electric fence, broken the fence and crossed to the other side from many places of the highway.

Thirdly, the highway and related road development projects have changed the directions of the water currents. The infrastructure development activities have negatively affected the traditional cascade system of tanks. According to villagers, Matigathawewa, which is located in the Koholangala elephant corridor, is a good example. During the last 6 years, the tank has not overflowed due to an insufficient amount of water supply. The stream system of the tank was blocked by the landfilling activities done under the road development project in Sooriyawewa area. Due to insufficient water flow to the tank, soil erosion in the area and sedimentation in the tank have led to eutrophication and rapid growth of *Japan Jabara*/Water Hyacinth (*Eichhornia crassipes*) in the tank. These activities and processes have led to reduce the availability of water to elephants in the Koholangala elephant corridor. Thus, villagers emphasized the need for re-opening the water streams to the tank.

There are many existing and abandoned quarries and land mining sites in the MER. The quarries are located in Mayurapura, Sinukkugala, Katanwewa, Ihala-Andarawewa, Kuda-Indiwewa, Galahitiya, and Gonnoruwa areas. The land extent covered by the quarries and the mining sites is about 316 acres. Large scale soil mining sites can be seen in Mayurapura and Nagarawewa areas. There are several tanks in the MER that have been excavated and soil or gravel is removed from the banks of the tanks to construct the highway. Pangwewa, Tammanawawewa, Galwewa, and Palugaswewa are some of the examples. In addition to that, some abandoned mining sites have not been renovated after mining. Some of such mining sites have become water stagnating spots and some of the craters are used as solid waste disposal sites. Matigathawewa area in the Koholangala elephant corridor is a

good example of the above fact where currently a huge file of concrete debris can be visible all over the place.

Similarly, many of the quarries and mining sites have very high cliff edges. The height of some cliffs is 15-20 feet. On the one hand, these cliff edges threaten the life of wild elephants. On the other hand, they have hindered the elephants' migration pattern and reduced the accessibility to resources such as water and fodder. Wild elephants use new paths to move to other areas in search of their ecological niches due to the facts that were stated earlier.

Last few years, a large extent of the wildlife habitat has been encroached, cleared and distributed among villagers to establish settlements. According to the DWC and researchers who were involved in planning and demarcating the boundary of the MER, they have provided much attention to exclude human settlements from the MER. Nevertheless, now there are many settlements including model villages in the MER. Some model villages have been established in elephant corridors; for instance, Sivarajagama Model village is located in the Katanwewa elephant corridor. Most of the human settlements have been enclosed by DWC's electric fences or/and private electric fences and then they often result in fragmented wildlife habitats.

- Causes related to HEC mitigation measures

Currently, state-centered agencies, NGOs, as well as local communities have adopted various measures to mitigate the human-elephant conflict. However, on the one hand, the weaknesses of the measures have led to disturbing the elephant corridors in the area.

The DWC has recklessly established a fence which has resulted in fragmenting or disintegrating the forest of the area and increased the threat of HEC. Negative influences of Nikawewa elephant corridors management is an example for the aforementioned data. Wild elephants in the MER and Udawalawa National Park regularly migrate through the Udawalawa-Tanamalwila road (Nikawewa, 21st milepost) elephant corridor. Thus, this area is considered as one of the main elephant corridors that link main wildlife habitats in the country. However, about 1 km away and parallel to the Udawalawa-Tanamalwila road, there is a permanent electric fence erected. After erecting the fence, few families have built houses along the road and have erected private electric fences around their houses. Although DWC has a plan to link MER to Udawalawa through the corridor, they have not taken sufficient efforts to maintain the natural elephant corridor.

Unatuwewa elephant corridor is another area which can be taken as an example. When the corridor was functioning, people didn't make any effort to use the particular space. However, after the DWC closed the corridor by establishing an electric fence, people started to develop the lands in the elephant corridor and trigger the HEC in the corridor.

Large sounds and flashlights are used to chase away elephants by the villagers as well as the DWC. According to the DWC's informants, annually, 7000 of ETCs are used in the area. Over the

last few years, the use of ETCs for chasing away wild elephants has gradually increased. In 2010, the total number of ETC distributed by the DWC in the Sooriyawewa DSD is about three thousand six hundred. In 2018, it has increased to six thousand (Land Use Planning Department-Hambantota, 2018, p. 4). As indicated in Fig. 4, about 55% of the key informants have mentioned that they use ETC for chasing wild elephants away from their lands (elephant corridors).

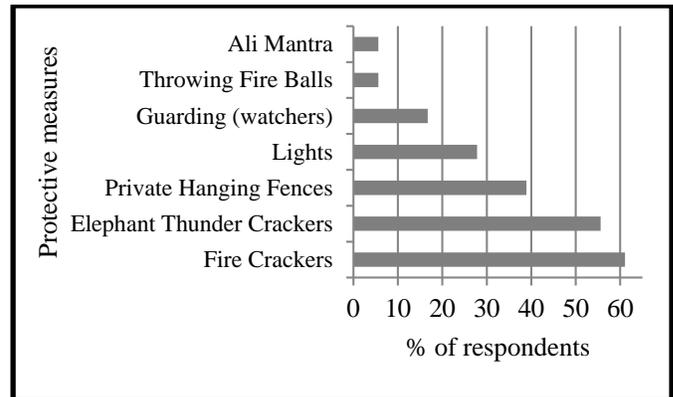


Fig 4. Protective measures taken to minimize human-elephant encounters and chasing elephants by the local communities in elephant corridors (Source: key informant interviews, 2019)
From the viewpoint of some villagers, the careless use of ETC has led to an increase in the intensity of the HEC. As per them, ETCs are provided not only for villagers but also for the farmers who have encroached the forest land and cultivated banana and other crops. The illegal farmers use ETCs in the forests (*Mahakale*), elephant corridors, and chase elephants away from the forest. As a result, elephants tend to attack the village farmlands. At that point, villagers also use ETC and other methods to chase away elephants from the villages (refer to Fig 4). Eventually, this kind of intensive use of ETCs and other harassments cause the elephants to be more aggressive.

IV. DISCUSSION

As per the findings of the study, it was identified that the elephant corridors in the MER have been disturbed by the intentional and unintentional activities of responsible agencies, outsiders, and the local communities. They can be summarized as follow;

- The state-centered stakeholders have acquired, cleared, developed, and used some lands in elephant corridors for settlement, infrastructure development, rural development, and agricultural purposes while some villagers have also encroached some lands for residential and economic purposes;
- The responsible agencies especially the DWC, have disturbed the elephant corridors by erecting electric fences for protecting human life, their property, habitat management purposes, etc. After closing the corridors, the land has been developed by villagers, outsiders, and state-centered agencies;
- The responsible agencies have not placed much attention on taking legal actions against those who disturbed the wild elephant corridors;
- The encroachers, settlers, and investors in the elephant corridors use various kinds of electric fences and various

chasing methods to protect their life and properties. The DWC has also provided ETC among villagers. Majority of the present protective measures harass the wild elephants. Thus, it seems that the responsible agencies have also indirectly supported to disconnect the elephant corridors.

Furthermore, it is important to note that villagers and responsible agencies have identified the land value of the elephant corridors while ignoring ecological values as well as the potential economic values of the corridors. Elephant corridors are the places which wild elephants often use for moving here and there. So, such places can be used as tourist attractions. Then that elephant viewing tourism can be used as a panacea for the socio-economic issues in the area, especially human-elephant conflict.

The tourism value of some elephant corridors has been identified and marketed by the state-centered agencies, notably the Forest Department and the Department of Wildlife Conservation. Hurulu Eco Park is an example (Pathmasiri, 2019). It is located in the Hurulu Man and Biosphere Reserve. Wild elephants use this land area for moving between Kaudulla, Minneriya, and Huruluwewa forest and tank areas. Thus, until 2006, villagers, as well as outsiders, had used the corridor for hunting elephants (for ivory and biological origin gemstones – *Gajamutu*) and catching elephant calves for trading. Some outsiders had used the corridor as an open access tourism destination where one can watch wild elephants. With the hope of controlling such irresponsible human activities and securing the life of elephants that use the corridor for migrating between habitats, Forest Department declared about 16,000 hectares of Huruluwewa forest as an ecotourism site and renamed the area as Hurulu Eco Park. In addition to that, Forest Department has introduced a safari tour package and recruited 12 people as tour guides.

From 2006 to 2016, annual total tourist arrival to the corridor has increased from 5,852 to 89,598. As indicated in Fig 5, the majority of the tourists are foreigners. During the period, Forest Department has earned LKR 238.7 million from tourism.

As identified by Pathmasiri (2019), ecotourism has contributed in several ways to the elephant corridor. First, due to the eyes of tourists, tour guides, and the officials of the Forest Department, some of the irresponsible activities such as elephant hunting and capturing calves have been controlled. Moreover, the direct financial contribution of tourists is also used for wildlife conservation activities, such as forest fire controlling, curing injured animals, removing invasive species, etc.

However, due to lack of socio-economic commitment of the state-centered stakeholders, the local community has not become the ecotourism facilitators and the guardian of the corridor; therefore, some villagers still engage in animal hunting for bush meats. In addition to that, due to poor ecotourism commitment of the state-centered agencies of the destination, safari drivers violate the basic principles of ecotourism (Pathmasiri, 2017 and 2019).

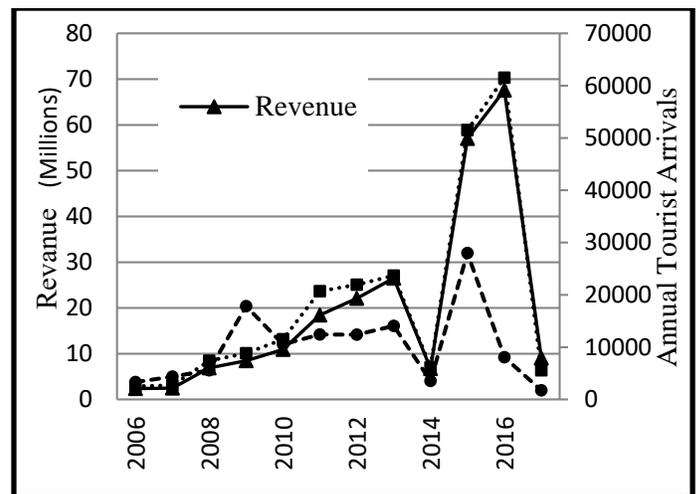


Fig. 5. Annual tourist arrivals and the tourism revenue of the Hurulu Eco Park (Source: Hurulu Eco Park office, 2019, Unpublished data)

Thus, it is obvious that, without getting local community participation and providing economic benefits to the local community, the sustainability of elephant corridors cannot be achieved. Therefore, when declaring the MER, the responsible agencies should place attention to identify the tourism values of the area, and to give ecotourism opportunities to the local communities, and thereby converting them to the guardian of the elephant corridor and facilitators of the tourists visit the elephant corridors. It would contribute to the sustainability of the elephant corridor and minimize the human-elephant conflict in and around the MER.

V. CONCLUSION AND RECOMMENDATIONS BA

The aforementioned information revealed that the responsible agencies have ignored and/or placed less attention on the biodiversity conservational and socio-economic functions of elephant corridors in the MER. It has led to the loss of human and elephant lives as well as villagers' properties. In addition to that, it has created a huge economic cost and loss. Therefore, maintenance of elephant corridors as safety paths for wild elephants and as crucial places that ensure the security of human life and their property is essential. To achieve this, it is essential to enhance the ethno-zoological values of elephant corridors. To do that, several activities can be recommended as follow;

- Identify, map out and declare elephant corridors as very sensitive sites for the security of wild elephants as well as human;
- Prohibit the use of the lands in elephant corridors for any purposes except wildlife conservational and recreational activities that do not disturb the elephant corridor and the wild animals that use the corridors;
- Remove (or manage properly) temporal or permanent obstacles (such as roads, electric fences, crop cultivations, buildings, etc.) that hinder the movement of elephants;
- Take legal actions against the sanction violators;

- Prohibit the use of harmful and noisy chasing methods in the elephant corridors;
- Take back the lands that are used for other purposes to widening the elephant corridors through discussions with responsible parties;
- Rehabilitate degraded lands in the corridors as suitable for wild elephants;
- Developing the MER as an eco-park and developing the elephant corridors in the area as ecotourism honey pots;
- Provide ecotourism opportunities to the nearby communities of the elephant corridors.

By adopting the aforementioned recommendations, wild elephant corridors can be maintained as a better solution for many environmental and socio-economic issues in the areas.

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Human Resource Management Practices and Employee Job Satisfaction In Ghana

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Abstract- This study was conducted among employees of CSIR-Food Research Institute (CSIR-FRI) in Accra, and sought to, firstly, establish the average job satisfaction level of all employees in the institute, and secondly, to elicit their views on the relationship between prevailing Human Resource Management (HRM) practices at the institution, and their job satisfaction. The motivation for this was the dearth of published research on the subject, and within the context of Ghanaian research institutions. The study adopted a quantitative survey approach in which questionnaire were distributed to sixty (60) employees who were recruited using a stratified and convenience sampling methods. Fifty-eight (58) responses were duly completed and returned. Response data were analysed descriptively using Microsoft Excel and IBM SPSS Statistics. Findings revealed that majority of CSIR-FRI employees are generally satisfied with their present jobs. Employees also agreed that standard HRM practices prevail in the institution, and that these are implemented effectively by management. More importantly, employees agreed that the HRM practices being implemented have contributed in improving their job satisfaction levels. Based on these findings, the study recommended that Management of CSIR-FRI should place more emphasis on creating a conducive work environment, and also on providing training and development opportunities for all categories of staff both within and outside the institution, as these have been determined to be the dominant factors contributing towards employee job satisfaction.

Index Terms- Human Resource Management Practice; Employee; Job Satisfaction; Ghana

I. INTRODUCTION

Employee job satisfaction and motivation are associated with the retention of personnel in organisations. Much of the interest of organisations in assessing and analysing employee satisfaction stems from a concern about possible on-the-job behavioural consequences (Wright & Cropanzano, 2000). Low levels of job satisfaction among employees have been shown to produce various undesirable behaviours, such as using the organisation's time to pursue personal tasks, psychological and practical withdrawal from the job, and behavioural changes that alter the workplace environment. Additional negative consequences associated with low levels of job satisfaction include attendance problems, higher rates of turnover, early

retirements, lack of active participation in job tasks, and psychological withdrawal from work (Hom & Kinicki, 2001).

Organisational growth is largely based on the workforce of the organisation and how the human resource is effectively put to use to ensure that the organisation's objectives are met. If organisations in Ghana are unable to achieve such growth, then the implication might be as a result of poor strategic mechanisms, poor employee commitment, lack of satisfaction and motivation, inadequate resources and limited revenue for the organisation. If the organisation achieves its target, then it would mean that there has been a positive impact as a result of employee commitment. As to whether or not employee job satisfaction will influence performance depends on the productive effort of the employees and their commitment. Lack of job satisfaction is a predictor of quitting a job (Hom & Kinicki, 2001). Sometimes workers may move from one organisation to the other because of the lack of satisfaction with the previous job. Satisfaction on a job might be motivated by the nature of the job, its pervasive social climate, the extent to which workers' peculiar needs are met and working conditions that are comparable to local and international standards (Oshagbemi, 2000). Other inclusions are the availability of power and status, pay satisfaction, promotion opportunities, and task clarity, according to Bolarin (2005). Employee job satisfaction is therefore largely a human resource issue, and it is with this understanding that the study sought to examine the relationship between human resource management practices and employee job satisfaction in a research institution in Ghana using CSIR-Food Research institute as case study.

II. LITERATURE REVIEW

Theoretical Framework

Resource-based theory

The resource-based view of Wright and Snell (2001) the emphasis is on gaining sustainable competitive advantage by means of effective and efficient utilisation of the resources of an organisation. Resource-based theory caused a change in strategic management thinking from an outside-in approach to an inside-out approach. In this 'new' stream of thought, internal resources form the starting point of determining organisational success, in contrast to the 'old' paradigm of outside-in thinking. Authors like Kamoche (2000), Boxall (2001) and Wright et al. (2001) specifically applied this theory to the field of human resource management and state that it is people that encompass the value, rareness, inimitability and non-substitution which, according to

Barney (1999), are the necessary conditions for organisational success. The choice of the resource-based view (RBV) for this study affords the researchers several advantages in investigating the strategic nature of HRM.

Human resource management practices

HRM is a strategic and coordinated approach to the management of people working in an organisation. It aims for the development of integrated HR policies and practices (bundling). It is aimed at gaining job satisfaction, organisation commitment, treating people as assets and the principal of mutuality. The line managers have a greater responsibility in performance and delivery of HRM (Ulrich & Lake, 2011). Collection of re-enforcing HR practices have begun to be referred to as a "bundle" and the task of HR managers is to identify and implement such systems (Armstrong, 2005). There is a "pick and mix" approach to the HR bundle (Wood, De Menezes, 2008). Some scholars have identified what they refer as best practices. Employment security, selective hiring, extensive training, learning and development, employee involvement, information sharing and worker voice, team working, compensation contingent on performance and reduction of staff differentials have been isolated as component of best practice (Pfeffer, 2002). Sophisticated selection and recruitment, sophisticated induction programmes, sophisticated training, coherent appraisal systems, flexibility of workforce skills, job variety, use of formal teams, frequent and comprehensive communication to workforce, use of quality improvement teams, harmonised terms and conditions, basic pay higher than competition and use of incentive schemes have also been identified as a bundle of best practices (Patterson, et. al., 2009). Guest (2014) identifies job design and employee ownership programmes as an important component of HRM best practices.

Job satisfaction

Job satisfaction has become one of the most widely focused areas of interest in organisational research due to the growing awareness of its relationship with employee behaviours such as absenteeism, intention to quit, and motivation. Early work on this subject laid the foundation for what has become a multi-disciplinary pursuit, including extensive work in human resources management, applied psychology, sociology and labour economics (Hoppock, 2014; Kerr, 2012). Job satisfaction is a pre-requisite for employee performance in any organisation. It is important for both the employee and the employer. For the employees, job satisfaction gives them a sense of security and fulfilment. In return, it leads to employee commitment, decreased absenteeism and reduced employee turnover. For the employer, employee job satisfaction ensures committed staff and stable workforce which reduce cost of recruitment and training. According to Stogdill (2009), successful organisations consider worker morale and job satisfaction an output just as important as productivity.

Locke (2006) defined job satisfaction as a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences. Schneider and Snyder (1999), on the other hand, defined job satisfaction as a personal evaluation of conditions present in the job, or outcomes that arise as a result of having a job. Job satisfaction thus, has to do with an individual's perception and evaluation of his job, and this perception is

influenced by the person's unique circumstances like needs, values and expectations. People will therefore evaluate their jobs on the basis of factors, which they regard as being important to them. Spector (2011) asserted that job satisfaction is the extent to which people like (satisfaction) or dislike (dissatisfaction) their jobs. Job satisfaction is a positive orientation of an individual towards the work role, which he is presently occupying. He further stated that variables related to job satisfaction include achievement, advancement, job enhancement, job enrichment and teamwork.

Relationship between HRM practices and employee job satisfaction

Variability in satisfaction rating has been observed and an attempt made to explain them. From a situational perspective, satisfaction varies because work conditions vary. From a dispositional perspective, satisfaction varies because affective dispositions vary. Herzberg's Two-Factor Theory (situation theory) proposes that job content factors ("motivators"), such as responsibility, recognition, the nature of work itself, achievement, growth and development are responsible for presence or absence of job satisfaction. Job Context factors ("hygiene factors") such as pay, working conditions, company policy, administration, supervision, status, job security and interpersonal Relations are responsible for the presence or absence of job dissatisfaction (Armstrong, 2005; Herzberg, 1968). Lawler's satisfaction model (Equity-based models) view satisfaction as a function of the extent to which the perceived amount of job rewards one receives matches the perceived deserved rewards (Mowday, 2010). Locke's Value theory proposes that satisfaction is a function of the extent to which one's job is perceived as fulfilling important values (Locke, 2001); do perceived job characteristics match desired characteristics? Satisfaction is determined by the discrepancy between preferred levels of job factors (pay, autonomy, etc.) and the actual level. Job enrichment has a positive effect on job satisfaction. Vroom (1964) proposed that job satisfaction is equal to the valence of the job; differences in valence of jobs are due in part to differences in properties of jobs. Positively valent outcomes: use of skills and abilities, control over pacing, decision authority. Satisfaction relates to the nature of the work itself, social relationships at work, and economic benefits of work (Dessler, 2003). Variables most strongly related to satisfaction include autonomy, perceived control, job complexity, pay level, coworker satisfaction, workload, and quality of interpersonal relationships.

III. RESEARCH METHODOLOGY

This study used the descriptive survey design because large amount of data was collected simultaneously for analysis. The population of this study was the entire staff of CSIR- Food Research Institute in the Greater Accra Region of Ghana. As at the time of the study, this number stood at one hundred and forty-one (141). The study adopted a multi-stage approach - stratified and convenience sampling by categorising the study population into the following four strata - Management, Senior Members, Senior Staff and Junior Staff - and then using a convenience sampling technique to obtain respective participants within each stratum. Categorising the population into the various strata ensured that all categories of staff were adequately represented in the sample.

Convenience sampling approach was then used to obtain the final sample because, as explained earlier, this approach enabled the researcher to quickly and easily locate staff members who were ready and willing to participate in the study.

Sample size for the study was obtained by first determining the optimum sample size for each stratum using the Raosoft Sample Size Calculator (<http://www.raosoft.com>). Setting a confidence level of 90% and a 5% margin of error for the population of each stratum, the system calculated an optimum sample size for each stratum. As shown in Table 1, a theoretical sample size of 88 was obtained. Due to time and logistical constraints however, the convenient sampling strategy adopted fell short of achieving the targeted sample size, as a final sample of 60 was obtained. This is discussed below as one limitation of the study.

| Category | Stratum size | Calculated Sample Size | Actual Sample Size |
|---------------|--------------|------------------------|--------------------|
| Management | 10 | 10 | 10 |
| Senior Member | 25 | 19 | 10 |
| Senior Staff | 72 | 36 | 27 |
| Junior Staff | 34 | 23 | 13 |
| Total | 141 | 88 | 60 |

Table 1: Data on stratified and convenience sampling
Source: Survey/Field data (2017)

Since the study adopted a descriptive survey design, and based on the general understanding that survey is the most popular research method for obtaining data on behaviours, interests and opinions shared by people (Engel & Schutt, 2005), survey questionnaire were deemed to be the most appropriate data collection instrument. This study thus adopted a paper-based questionnaire that comprised mainly closed-ended questions with restricted options. As no specific research model or framework was evolved or adapted to inform the research, questions in the questionnaire were arrived at based on the research questions, and a synthesis of some models and frameworks discussed in the literature review. A draft questionnaire comprising 20 questions was pre-tested with 10 employees who were deemed to be a representative sample of the study participants, and also with a seasoned researcher. Based on comments and feedback, these were revised to 8 questions. All questions required respondents to choose an answer, or set of answers, from a pre-defined set of options. One question comprised a set of Likert statements in which respondents were required to specify their level of disagreement or agreement on a symmetric disagree-agree scale (i.e. strongly disagree, disagree, neutral, agree and strongly agree, and scored, 1, 2, 3, 4,5 respectively). The purpose of this was to capture the intensity of respondents' feelings towards the respective items (Burns & Burns, 2008).

Abiding by the prescribed code of research ethics, the researcher presented a letter from Central University to the authorities of CSRI-Food Research Institute, Accra, requesting permission to administer the research questionnaire to employees. This was granted, and the researcher visited the institution in the first week of December 2017. Adopting the convenience sampling approach, the researcher visited employees, one at a time, in their offices, laboratories and workshops. On coming into contact with any employee, the researcher explained the purpose of the research and requested that they spend a few minutes to answer the questions in the questionnaire. Emphasis was placed on the fact that the responses were anonymous (hence there was no need to identify oneself in the questionnaire), and that the data was solely for academic purposes. Understandably, some employees were quite busy and thus indicated their inability to participate, whilst others willingly took copies and asked the researcher to return in a few minutes for collection. Such respondents were thus given time to answer the questions, and the researcher returned within an hour to collect all completed questionnaire.

In all, 60 questionnaires were administered. In retrieving the responses, whilst some employees completed the questionnaire the same day and returned them to the researcher, others asked for more time. These were thus retrieved after three more visits to the institute. At the end of the exercise, 58 fully completed questionnaire were retrieved representing a response rate of 96%. All completed questionnaire were first inspected for errors and/or omissions, and were all deemed to be clean enough for analysis. As there were no open-ended questions in the questionnaire, all responses to each of the questions were grouped numerically and analysed using simple descriptive statistics, in accordance with the research questions. Using Microsoft Excel, all data were inputted into pre-defined fields and columns. These were then sorted, grouped into appropriate categories and displayed in percentages and bar graphs for easy visualisation. Measures of central tendency (mean, median and mode), variability (standard deviation) and correlations were also performed on the data using International Business Machines - Statistical Package for the Social Sciences (IBM-SPSS), and these were interpreted descriptively to answer the research questions.

IV. RESULTS AND DISCUSSION

Demographic data of respondents

Questions in the research questionnaire requested respondents to provide their demographic data. The purpose was to establish how well the study sample represented the population. Table 2 shows a compilation of these data. As Table 2 shows, the various categories of staff considered for the study were all adequately represented in the sample. One thing worthy of note is that the male to female ratio in the sample perfectly mirrored the male to female ratio of staff at the CSIR-FRI which is 2:3. With regard to gender therefore, the sampling strategy adopted achieved the objective of ensuring a fair representation of the population in the sample.

CSIR-FRI has four main categories of full-time staff - Management, Senior Members, Senior Staff and Junior Staff. As the names suggest, Management are those in management positions - Directors, Deputy Directors, and Heads of Departments. Senior Members are high ranking professionals such

as administrators, engineers, scientists, technologists etc., who have been in their professional practice for a considerable period and risen through the ranks. Persons in the senior staff category are typically the middle level supervisors, technicians, administrative assistants etc. This is a broad category that encompasses persons who have worked for several years as well as freshly employed graduates from tertiary institutions. Junior Staff are the general support staff, including artisans, drivers, cleaners etc. Senior staff is the dominant category of staff in the institution, and this is again reflected in the sample where staff in that category comprised 47%. With regard to the length of service in the institution, majority of the participants (60%) indicated that they had worked in the institution for over 10 years. This is understandable, given that majority were in the Senior Staff category, and would have attained their positions by serving for considerable periods of time in the institution. In this regard, most of the study participants could be deemed to have experienced the various HRM practices that have been implemented in the institution over the past 10 years, and therefore their responses on the contribution of these practices to their job satisfaction levels could be considered worthy enough to generalise to the entire CSIR-FRI staff with some level of confidence.

| Participant Profile | Classification | Frequency | Percentage |
|---------------------|-----------------|-----------|------------|
| Gender | Male | 23 | 40 |
| | Female | 35 | 60 |
| Category of Staff | Management | 8 | 14 |
| | Senior Member | 11 | 19 |
| | Senior Staff | 27 | 46 |
| Length of Service | Junior Staff | 12 | 21 |
| | 5 years or less | 9 | 16 |
| | 6 - 10 years | 14 | 24 |
| | 11 - 15 years | 11 | 19 |
| | Over 16 years | 24 | 41 |

Table 2: Participant demographics

Source: Survey/Field data (2017)

Relationship between HRM Practices and Job Satisfaction at CSIR-FRI

The question in the survey therefore listed the HRM practices, and respondents were required to indicate on a 5-point Likert scale, their level of agreement with the suggestion that each of these practices contributed in improving their job satisfaction levels. These practices were:

- i. Adequate compensation (salary, incentives etc)
- ii. Assuring employees of their job security
- iii. Effective performance and appraisal systems
- iv. Training and capacity building opportunities
- v. Fair promotion policies and practices
- vi. Employee participation in decision making
- vii. Making detailed job descriptions available to employees
- viii. Standard selection and recruitment practices
- ix. Good working relationships with colleagues and superiors

Responses were coded as: Strongly Disagree (1), Disagree (2), Neutral/will not say (3), Agree (4), Strongly Agree (5). Table 3 shows the cumulative percentages of responses.

As Table 3 demonstrates, an overwhelming 71% of participants strongly agreed or agreed with all the statements to the effect that the various HRM practices prevailing in the institution contribute in improving job satisfaction of employees. Only 12% disagreed, whilst 17% chose the neutral option. This overview clearly points to an acceptance by majority of the employees that the various HRM practices are contributory factors towards improving employee job satisfaction, and so it can be concluded that there exists a positive relationship between HRM practices and employee job satisfaction at CSIR-Food Research Institute.

Being the first study of its kind involving staff of CSIR-FRI, this specific finding cannot be affirmed or disputed with literature evidence. However, empirical evidence abound in the literature (e.g. Petrescu & Simmons, 2008; Absar, et. al, 2010; Islam et. al. 2018) on the existence of significant positive relationships between HRM practices and employee job satisfaction in several sectors of the global economy.

Table 3: Relationship between HRM Practices and Job Satisfaction

| | Compensation | job security | Appraisal | Skill Dev | Fair promotion | Participation | Job description | Fair Recruitment | Relationships | Total | Cumulative Percentages |
|-------------------|--------------|--------------|-----------|-----------|----------------|---------------|-----------------|------------------|---------------|-------|------------------------|
| Strongly agree | 18 | 22 | 18 | 27 | 21 | 25 | 25 | 27 | 27 | 210 | 40% |
| Agree | 18 | 20 | 18 | 18 | 19 | 13 | 19 | 13 | 21 | 159 | 31% |
| Neutral | 9 | 10 | 15 | 7 | 14 | 10 | 8 | 12 | 6 | 91 | 17% |
| Disagree | 8 | 4 | 5 | 4 | 2 | 6 | 4 | 4 | 2 | 39 | 8% |
| Strongly disagree | 5 | 2 | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 23 | 4% |

Source: Survey/Field data (2017)

Having established that employees at the institution generally agreed that HRM practices contributed in improving their job satisfaction levels, the study went further to determine if individual employees who agreed that the various HRM practices contributed in improving their job satisfaction also indicated that they were satisfied with their current jobs. To achieve this, the mean values of each respondent's level of agreement with the statements on HRM practices were computed and, using IBM SPSS Statistics v.25.0, a Pearson correlation analysis was

conducted between these values and respondents' respective job satisfaction levels.

As the results in Table 4 show however, no significant correlation was established between the levels of agreement with almost all the statements linking HRM practices with job satisfaction, and the levels of job satisfaction. The interpretation of this is that, agreeing or disagreeing with statements that prevailing HRM practices contribute in improving job satisfaction has no relationship with how satisfied or dissatisfied the employees are with their respective jobs.

Table 4: Correlation matrix for agreement levels and job satisfaction
Source: Survey/Field data (2017)

| | | Job Satisfact ion | Job Security | Compe n-sation | Apprais al | Skills Dev | Promoti on | Participat ion | Job Descripti on | Recruitme nt | Relationshi ps |
|-------------------------|---|----------------------|--------------|-------------------|---------------|---------------|---------------|-------------------|---------------------|-----------------|-------------------|
| Job Satisfaction | Pearson Correlation Sig. (1-tailed) | 1 | | | | | | | | | |
| Job Security | Pearson Correlation Sig. (1-tailed) | -.034 | 1 | | | | | | | | |
| Compensation | Pearson Correlation Sig. (1-tailed) | -.126 | .005 | 1 | | | | | | | |
| Appraisal | Pearson Correlation Sig. (1-tailed) | -.245* | .503** | .108 | 1 | | | | | | |
| Skills Dev | Pearson Correlation Sig. (1-tailed) | -.002 | .537** | .135 | .500** | 1 | | | | | |
| Promotion | Pearson Correlation Sig. (1-tailed) | .094 | .394** | .147 | .418** | .516** | 1 | | | | |
| Participation | Pearson Correlation Sig. (1-tailed) | .101 | .139 | .052 | .398** | .398** | .388** | 1 | | | |
| Job Description | Pearson Correlation Sig. (1-tailed) | .131 | .487** | -.108 | .373** | .538** | .374** | .467** | 1 | | |
| Recruitment | Pearson Correlation Sig. (1-tailed) | -.038 | .354** | .069 | .402** | .341** | .222* | .386** | .621** | 1 | |
| Relationships | Pearson Correlation Sig. (1-tailed) | .006 | .317** | .083 | .203 | .312** | .252* | .356** | .549** | .730** | 1 |

*. Correlation is significant at the 0.05 level (1-tailed). **. Correlation is significant at the 0.01 level (1-tailed).

In answering the last research question therefore, one is right in saying that employees of CSIR-FRI generally accept that the HRM practices prevalent in the institution contribute in improving their levels of job satisfaction. This is in line with most

other studies (e.g. Petrescu & Simmons, 2008), however, this study has gone further to establish that an individual employee's job satisfaction level has nothing to do with whether that individual agrees or disagrees with statements that HRM practices

contribute in improving job satisfaction. In other words, an employee can be very satisfied with his/her job, and yet disagree with statements suggesting that it is the HRM practices that contributed in improving his/her satisfaction level. A reasonable argument in support of this scenario can be that such an employee is not deriving his/her job satisfaction from the HRM practices prevailing at the institution, but from other sources. The converse can also be said to be true, i.e. an employee can be very dissatisfied with his/her job, and yet fully agree with statements that HRM practices contribute in improving job satisfaction. For such an employee, one will not be wrong in arguing that the standard HRM practices are not being effectively implemented in the institution, hence the employee's dissatisfaction with his/her job. This is quite an interesting finding that is worth investigating further.

V. CONCLUSIONS

The issue of HRM practices such as human resource planning, job analysis and design, recruitment and selection, promotion, compensation, performance appraisal, training and development, and labour relations (Dessler, 2007), and how they relate to employee job satisfaction, and ultimately employee performance and output, has received considerable attention from employers, researchers and practitioners. There is therefore a growing body of literature that not only aim at providing guides to employers on how best to maximise the benefits of HRM practices in the workplace, but also point researchers to new avenues for further research aimed at improving the collective understanding of all stakeholders in this discipline. The findings point to the fact that all study objectives were satisfactorily achieved. In all, the fact that employees at the institution generally expressed satisfaction with their jobs was not surprising, likewise their general agreement with the fact that HRM practices contribute in improving job satisfaction levels. These findings are largely in conformity with what most studies in this field have reported in the literature, though not within the Ghanaian context. For instance, Islam et al. (2018) reported a significant positive relationship between HRM practices and job satisfaction among bank employees in Bangladesh. Petrescu and Simmons (2008) also determined that the implementation of several HRM practices tend to raise workers' overall job satisfaction among British employees.

VI. RECOMMENDATIONS

As a study that focused on employee views and perceptions, and the limitations therein notwithstanding, the findings of this study are largely in conformity with findings of similar studies. However, given that the study was conducted in an institution in which no similar study has as yet not been reported, the following recommendations are deemed relevant to the institution's stakeholders, and the academic community at large.

- i. Management of CSIR-FRI should place more emphasis on creating a conducive work environment, and also on providing training and development opportunities for all categories of staff both within and outside the institution, as these have been determined to be the dominant factors contributing towards employee job satisfaction.

- ii. Though the study revealed that majority of employees are satisfied with the jobs they presently hold, a good 12% of the workforce have expressed dissatisfaction, and a further 2%, extreme dissatisfaction with their jobs. This should be cause for concern, and Management needs to seek innovative ways to continually improve employee job satisfaction levels, especially as only 12% indicated that they are very satisfied with their jobs.
- iii. Employees of CSIR-FRI have affirmed the established understanding that standard HRM practices contribute towards improving job satisfaction. It therefore behooves Management, and to a larger extent, the government, to ensure that appropriate HRM polices are designed and implemented in ways that employees will perceive as favourable to their cause. This way, chances are that employees will report higher job satisfaction levels, and by implication, higher productivity levels.
- iv. Though not explicitly verified, this study has raised a pointer to the presence of other factors besides HRM practices that employees perceive to be contributing towards their job satisfaction. Management should therefore take steps to identify such factors, and if they are within their realm, address them appropriately.
- v. Further research works on employee job satisfaction should widen the scope beyond HRM practices as there is a possibility that such non-HRM practices can potentially impact job satisfaction, and ultimately, productivity.

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Novel Herbal lipstick formulations and their Quality control

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Abstract- Herbal technology is boosting the economy of India. Herbal lipstick is one of the important herbal products with increasing demand in the national and international markets. The lipstick has become vital cosmetic product that is used since the prehistoric period to make the lips more attractive and healthier. The synthetic lipsticks, even from the reputed commercial brands, are toxic, carcinogenic, and harmful to lips. The synthetic lipsticks mainly cause allergy, nausea, dermatitis, and even drying of lips. This underlined the need for herbal lipsticks. In the present investigation, six novel herbal lipstick formulations have been developed. The different herbal formulations were prepared by adding ingredients like herbal colorants, blending agents, gelling agents, herbal preservatives, and surfactants. All the six herbal lipstick formulations have been evaluated using the quality standards viz. colour, pH, skin irritation test, melting point, breaking point, the force of application, perfume stability, surface abnormalities, and solubility test. Two new parameters viz. Fluorescence analysis and microscopic examination were carried out along with generally used standard the parameters. The herbal lipstick formulation no. 2 was found the best based on all the parameters evaluated. The present investigation would lead to developing the herbal lipstick that is novel, beauty-enhancing, eco-friendly, cost-effective, and with minimal or no side effects.

Index Terms- Eco-friendly, Herbal cosmetics, Herbal lipstick, Quality standards, and Synthetic lipsticks.

I. INTRODUCTION

The idea of self-beautification is prehistoric [1-2]. The use of cosmetics in olden days was not only for developing an outwardly pleasant and attractive personality but towards achieving longevity with the good health care system. Recently the use of herbal cosmetics has increased. The market turnover of herbal cosmetics is more than 1 billion dollars, and still, there is tremendous scope for Indian herbal products. There is a growing demand in the world market and resurgence of herbal cosmetics [3]. The word 'herbal' is a symbol of safety and minimal side effects on human health. The herbal cosmetics viz. herbal shampoo, herbal sindur, and herbal lipstick have become popular among the consumers. Many consumers have reported the adverse effects of synthetic cosmetics [4-5].

The lipstick is one of the most widely used cosmetic products by women. It is a fact that cosmetic products are one of the least regulated product categories by the Food and Drug

Administration (FDA). A woman who applies synthetic lipstick is also ingesting some of it during its application period and ultimately adds 'lead (Pb)' into the bloodstream via the skin of her lips. The lead comes from the synthetic colorant used in the synthetic lipsticks. This lead is the neurotoxin, and a small amount of lead over time is significantly unsafe to human health. It adversely affects the nerves and can also cause brain damage, behavioral problems, hormonal imbalance, delays in puberty, and miscarriage. The petrochemicals in synthetic lipstick are harmful to human health. Many lipstick brands contain harmful ingredients viz. formaldehyde (preservative and carcinogen), mineral oil, and talc (blocks skin pores), parabens (preservative and carcinogen), and bismuth oxychloride (a carcinogen).

The ethnobotanical studies have revealed that the different plant materials have been used as an ingredient in the colouring of the lips. The patenting of 'Luvsticks' herbal lipstick by the National Botanical Research Institute (NBRI), Lucknow, underlines the importance of herbal lipsticks. The lipstick is often unintentionally eaten away by the women, and hence there is a need to use ingredients that are safe for human consumption. So the herbal lipsticks are made from plant extracts. Herbal colourants, herbal blending agents, essential oils, herbal preservatives, and aromas are the main ingredients of herbal lipsticks. The herbal lipstick not only adds beauty but a treat for the senses as well. The aromas used in these lipsticks can be mood alleviator, anti-depressant, anti-stress, and sensual arousal.

In the present investigation, the six novel herbal lipstick formulations have been developed.

These formulations have been evaluated based on the standard quality parameters viz. colour, pH, skin irritation test, melting point, breaking point, the force of application, perfume stability, surface abnormalities, solubility test, fluorescence analysis, and microscopic examination. The main aim of the present investigation is to develop a formulation that is beauty-enhancing, ecofriendly, and lips protective.

II. MATERIALS AND METHODS

The various botanicals (herbals) were selected based on the literature survey. The herbals required were collected from Nearby places of Pune and the Western Ghats (Tamhini, Pune).

Selection of herbs: The herbs used in the formulation of herbal lipsticks were selected on the basis of a literature survey [6].

Formulation of herbal lipstick: The standard method was followed [7]. In the present formulations of herbal lipstick blending agents (Sesame oil, almond oil, castor oil), Beeswax (glossiness), shikakai (surfactant), herbal colourant (turmeric powder, strawberry, Bixa seed colour, pomegranate, strawberry, coffee powder and Kesar), antioxidant (lemon juice) essence (vanilla, orange and rose) and gelling agent (agar and alginate) were used. All the ingredients are taken in definite ratio and six formulations [F1 to F6] and triplicates of each formulation were taken.

Quality control of herbal lipstick: It is very essential to maintain a uniform standard for herbal lipstick. So the herbal lipstick formulations were evaluated on the quality standards viz. melting point, breaking point, the force of application, surface anomalies, pH, etc. The fluorescence analysis was carried out at 254nm and 366nm wavelengths using the U.V. chamber. The microscopic examination of herbal lipstick was carried out for detecting surface abnormalities.

III. RESULTS AND DISCUSSION

Six formulations of herbal lipsticks were developed. The ingredients viz. blending agents, surfactants, colouring agents, preservatives, antioxidants, gelling agents and flavouring agents were mixed in definite proportions as tabulated in Table no.1

Table no.1 Formulation of herbal lipstick

| Ingredient | Importance of ingredients | F1 | F2 | F3 | F4 | F5 | F6 |
|-----------------|---------------------------|-----|-----|------|-----|-----|------|
| Castor oil | Blending agent | 4.0 | 3.0 | - | - | - | - |
| Sesame oil | Blending agent | - | - | 12.5 | - | - | 10.0 |
| Almond oil | Blending agent | - | - | - | 6.0 | 5.0 | - |
| Beeswax | Glossiness | 9.0 | 9.0 | 3.0 | 6.0 | 7.0 | 5.0 |
| Shikakai powder | Surfactant | 2.0 | - | 1.5 | 3.0 | 2.0 | 3.0 |
| Coffee powder | Colourant | - | - | - | - | - | 2.0 |
| Turmeric powder | Colourant | - | - | 2.0 | - | - | - |
| Pomegranate | Colourant | - | - | - | 5.0 | - | - |
| Bixa colour | Colourant | - | 7.0 | - | - | 6.0 | - |

| | | | | | | | |
|-----------------|-----------------|-----|-----|-----|-----|-----|-----|
| Kesar | Colourant | 2.0 | - | - | 1.0 | - | 1.0 |
| Beetroot | Colourant | 3.0 | - | - | - | - | - |
| Lemon juice | Antioxidant | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Vanilla essence | Preservative | * | * | * | * | * | * |
| Orange essence | Flavoring agent | - | - | 1.0 | - | 1.0 | - |
| Rose water | Essence | 1.0 | 1.0 | 2.0 | 1.0 | 1.0 | 1.0 |
| Agar | Gelling agent | 2.0 | - | - | - | - | - |
| Pectin (Guava) | Gelling agent | - | 2.0 | - | - | - | - |
| Alginate | Gelling agent | - | - | 2.0 | 2.0 | 2.0 | 2.0 |

*Vanilla essence is added 50ppm.

In the present investigation, the alginate, pectin, and agar used as gelling agents that originates from the plant materials and hardly have any side effects. These agents help to maintain the consistency of the herbal lipstick.

The evaluation of herbal cosmetics was carried out based on the quality standards tabulated in Table no.2.

Table no.2 Quality standards for herbal lipstick

| Parameter | Purpose | Test |
|----------------------|---|--|
| Colour | Know the exact colour shade | Match the colour of herbal lipstick with a standard colour chart. |
| pH meter | Know acidity or alkalinity of herbal lipstick | Use pH meter to test H ⁺ ion conc. |
| Skin irritation test | To test allergy | Apply herbal lipstick on the skin for 10 min. and note irritation, if any. |
| Melting point (M.P.) | To indicate the limit of safe storage. | Use capillary tube method. Record temperature when herbal lipstick completely melts. |

| | | |
|-----------------------|---|--|
| Breaking point | To determine the strength of lipstick. | Lipstick is held horizontally in a socket ½ inch away from the edge of support and weight is gradually increased by a (10 g) at interval of 30 seconds. Record the weight at which break occurs. |
| Force of application | To test the force to be applied for application | A piece of coarse brown paper is kept on a shadowgraph balance. The lipstick is applied at 45° angles to cover a 1sq.inch area until fully covered. Record the pressure. |
| Perfume stability | To know the retention of fragrance | Record the fragrance after 30 days. |
| Surface abnormalities | To detect uniformity of surface | Record the crystallization if it occurs and the growth of fungus. Microscopic examination also carried out |
| Solubility test | To test solubility | Record the solubility with different solvents. |

| | | | | | | |
|-----------------------|--------------|--------------|----------|----------|----------|----------|
| Perfume stability | + | +++ | + | + | ++ | + |
| Surface abnormalities | Not Detected | Not detected | Detected | Detected | Detected | Detected |
| Solubility test | | | | | | |
| Alcohol | + | + | + | + | + | + |
| Acetone | - | - | - | - | - | - |
| Chloroform | - | - | - | - | - | - |
| Water | ++ | ++ | ++ | ++ | ++ | ++ |

The fluorescence analysis were carried out for quality control. This can be used for the detection of any adulteration or change in the formulation of the herbal lipstick.

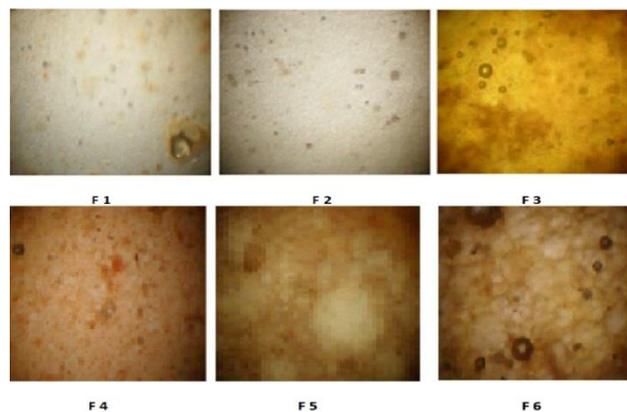


Figure 1 Formulations surface test (Seen under microscope X100)

Using the above standards, the formulations were tested, and testing was repeated three times. In Table no.3, all the results of the quality evaluation of all six formulations are shown.

Table no.3. Quality evaluation of herbal lipstick

| Quality parameter | F1 | F2 | F3 | F4 | F5 | F6 |
|----------------------|-------|--------|--------|------------|--------|-------|
| Colour | Brown | Orange | Yellow | Orange red | Orange | Brown |
| pH | 7.5 | 7.0 | 6.5 | 7.7 | 7.0 | 7.5 |
| Skin irritation test | No | No | No | No | No | No |
| Melting point | 62-63 | 60-62 | 65-67 | 64-66 | 60-62 | 64-66 |
| Breaking point | 24 | 22 | 25 | 26 | 24 | 23 |
| Force of application | Poor | Easy | Poor | Easy | Poor | Poor |

Table no.4 Fluorescence test for herbal formulations

| Sr no. | Formulations | 254nm | 366nm | Natural day light |
|--------|--------------|-------------------|-----------------|-------------------|
| 1 | F1 | Greenish glaucous | Pistachio green | Brown |
| 2 | F2 | Olivaceous buff | Primerose | Orange |
| 3 | F3 | Malachite green | Yellow green | Yellow |
| 4 | F4 | Isabellite | Dark vinaceous | Orange red |
| 5 | F5 | Herbage green | Dark green | Orange |
| 6 | F6 | Yellow green | Green | Brown |



Figure 2 F.1. to F2 Formulations

Many herbal agents used in herbal lipstick have been selected by the process of 'trial and error.' The prepared formulations (Table 1) were evaluated (Table 3). It was found that the F2 (Fig. 1) was the best among the six formulations. Hence, from the present investigation, it was concluded that F2 herbal lipstick formulation is the best option for women with minimal side effects. However, there is a need for performing detailed clinical trials. The base of herbal lipsticks that are made from beeswax and herbal oils can be used for skin problems like leukoderma. In all the six herbal lipstick formulations, paraffin wax has not been used. The earlier research workers have used paraffin as the ingredient [8]. In earlier, There is now growing scientific evidence that plants possess vast and complex active phytochemicals that not only smooth lips but actively re-store, heal, and protect the lips. The pH of the herbal colorant and solubility of lipstick are two critical factors for making health

lipsticks. A glitter composition that comprises of essential oils/aroma isolates is equally important in the herbal lipstick formulations. With some modification in the herbal lipsticks, the herbal lip-gloss and lip balm can be prepared.

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Kindergarten Teachers' Competence In ICT: Basis For Enhancement Program Development

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Abstract

The main purpose of the study was to determine the kindergarten teachers' competence in ICT: basis for enhancement program development.

Participants of the study includes 30 kindergarten teachers of East 1, 2 and 3 districts of Butuan City Division. The survey questionnaires made were validated by ICT coordinators who were experts on computer skills.

The results of the study revealed that majority of the teachers teaching Kindergarten are females (96.70%) which belong to the age range of 25-54 years old (93.30%). Moreover, participants are all permanent-regular teachers (100%), wherein the majority have Teacher I position (56.70) and a length of service ranging from 1 to 5 years (50%) in service. Also, it is evident that there is a moderately high to high level of manifestation of the ICT skills demonstrated by the teachers

It is recommended to have an enhancement program in a form of series of seminar-workshops, contests and IMs development workshops to improve their ICT skills in terms of photoshop, publisher and moviemaker applications.

Index Terms- ICT Skills, Kindergarten Teachers' Competence.

I. INTRODUCTION

Over the past years, technology is of great help in transforming societies and improve the quality of daily life. The usage of technology has come up to the general philosophy among educators and the general public that it should play a more integral role in students' education to maximize its advantages (Lazar, 2015; Blazer, 2008; Culp et al., 2005; Johnson, 2000).

Educational technology does not only describe computer applications. Educational technology is a term that technically can mean anything from a pen to laptops and interactive web technologies and applications (Wordu and Ogolo, 2020; Andrade, 2012). It involves other equipment and applications, such as videoconferencing and video chat, digital and smart television, electronic whiteboards, digital cameras, tablets, laptops and the like (Blazer, 2008; Jackson, 2008; McCampbell, 2002; Marshall, 2002). Technology used in the classrooms has contributed to students' overall development not just as a person but as a part of a society as a whole. Learning principles transcend specific technologies. However, when used to its maximum potential, technology can be the best aid in accelerating, amplifying, and expanding the impact of the principles of learning (Mcfarland et.al, 2017). With the widespread of online resources and references, technology can help improve the teaching and learning environment. Teachers can choose among the variety of educational apps or trusted online resources to further enhance and improve the traditional ways of teaching and to keep students more engaged in every learning experiences. Technology as well can help teachers save a lot time by making their work easy and fast. Thus, giving them ample time to work with students who are struggling.

By integrating technology in the classroom, both teachers and students can develop 21st century skills essential for lifelong learning. Moreover, students can gain the skills necessary to become successful in the future. Because students of today are considered as digital natives, they wanted to have collaboration and interactive learning delivery in the classroom.

For the past years, teachers are struggling to provide quality education to students with the aid of technology. Thus, teachers especially those who are assigned in far flung areas are still using the traditional technology (like visual aids and the like) just to arrest the interest of students and aid instruction. In the Philippines it is observed that most of the public schools do not have enough computers and internet connectivity especially in public elementary schools. There is a so called "technology gap" or the gap between new technology and a country that has yet to acquire that technology. On the other hand, because of the lack or insufficient technology found mostly in our schools, it is as well observed that majority of the teachers, especially those who are teaching in Kindergarten have difficulty as well in coping with the new technology to be used and applied to their respective classrooms. Moreover, as per observation utilization of ICT among Kindergarten teachers are rarely observed which will lead to possible problems in learning the 21st century skills which are the main focus of the K-12 Education Curriculum.

Knowing all these problems observed in the competence of both the teachers and the schools to provide the latest and most efficient technology to the learners- who are the center of the educative process, attracts the interests of the proponents to conduct a thorough study on this matter and to provide possible program which will help prevent the so called “technology gap” in the Philippine Educational System.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

Research Design and Methods

This study used the descriptive method of research because it seeks to determine Kindergarten teachers’ competence in ICT: Basis for enhancement program.

The respondents of this study were the Kindergarten teachers of the 22 elementary schools of East Butuan Districts 1,2 and 3. It has a population of 30 Kindergarten teachers. All the Kindergarten teachers in each school served as the respondents of the study.

The study used a validated questionnaire for each of the variables as the basis for acquiring the necessary data to make the study successful. The variables will be the Kindergarten teachers’ profile character (age, gender, educational attainment, specialization, length of service, teaching position, and trainings attended related to Kindergarten), the level of manifestation of teachers’ knowledge and skills (MS word, excel/spreadsheets, publisher, powerpoint presentation, photoshop, moviemaker, and internet surfing).

Validity and Reliability of the Research Instrument

The research instrument was validated by two experts in the field.

Data Gathering Procedure

Prior to the floating of questionnaires, permission was asked from the Schools Division Superintendent of Butuan City Division, to the District Supervisor of East Butuan Districts, and to the School Heads of the said schools. During the floating stage, the respondents were undergone an orientation on the scope and nature of the study for them to fully understand the focus of the study. After the orientation, the respondents were asked to answer each question honestly. After the floating stage, Focus Group Discussion (FGD) was facilitated to validate responses to the questionnaire.

III. WRITE DOWN YOUR STUDIES AND FINDINGS

This section discusses the results of the data collected from the participants, the kindergarten teachers. The data were processed with corresponding interpretation.

Problem 1. What is the demographic profile of kindergarten teachers in terms of: age, gender, educational attainment, specialization, length of service as kindergarten teacher, employment status, teaching position, trainings attended related to kindergarten?

Table 1. Age and gender of kindergarten teachers in East Butuan District

| | Frequency | Percentage |
|------------------------|-----------|------------|
| Age | | |
| 24 years old and below | 2 | 6.70 |
| 25 to 54 years old | 28 | 93.30 |
| Gender | | |
| Female | 29 | 96.70 |
| Male | 1 | 3.30 |

Table 1 presents the demographic profile of kindergarten teachers in terms of age and gender. The frequency results show that majority of the respondents are in 25 to 54 years old (93.3%) and the rest are 24 years and below (6.7%). As described also in the table above, evidence shows that female teachers (96.7%) are most engaged in teaching kindergarten than males (3.3%).

| | Frequency | Percentage |
|--------------------------|-----------|------------|
| Length of Service | | |
| Less than 1 year | 2 | 6.70 |
| 1 to 5 years | 15 | 50.0 |
| 6 to 10 years | 13 | 43.30 |
| Employment Status | | |
| Permanent | 30 | 100.00 |
| Teaching Position | | |
| Teacher 1 | 17 | 56.70 |
| Teacher 2 | 10 | 33.30 |
| Teacher 3 | 3 | 10.00 |

Table 2. Service record of Kindergarten Teachers in East Butuan District

Table 2 shows the length of service of all kindergarten teachers. Frequency shows that half of the kindergarten teachers have 1 to 5 years length of service (50%), around 43.3 percent of teachers have 6 to 10 years length of service, and the rest has less than one year (6.70%). Furthermore, all teachers are permanent (100%) and majority are teacher 1 (56.7%), teacher 2 (33.3%), and teacher 3 (10%).

Table 3. Educational background of kindergarten teachers in East Butuan District

| | Frequency | Percentage |
|----------------------------------|-----------|------------|
| Educational Attainment | | |
| College | 5 | 16.70 |
| With earned Master’s Degree Unit | 23 | 76.70 |
| Master’s Graduate | 2 | 6.70 |
| Specialization | | |
| General Education | 29 | 96.70 |
| ECCD | 1 | 3.30 |

Table 3 shows the educational background of kindergarten teachers wherein majority are Master’s Degree unit earner (76.6%), college graduate (16.7%), and Master’s graduate (6.7%). Besides, the table also shows that most teachers have specialization in General Education (96.7%) while the rest have ECCD specialization (3.3%). Since handling kindergarten gives priority to teachers with ECCD units, however, the lack of teachers with ECCD specialization allows many General Education teachers to take over the position.

Table 4. In-service trainings attended by Kindergarten Teachers in East Butuan District

| | Frequency | Percentage |
|-----------------------------------|-----------|------------|
| No. of Trainings Attended | | |
| More than 2 trainings | 30 | 100.00 |
| Scope of Training Attended | | |
| School-Based | 30 | 100.00 |
| District-Based | 30 | 100.00 |
| Division-Based | 25 | 83.30 |
| Regional-Based | 10 | 33.30 |

The table above shows that all of the kindergarten teachers attended more than two trainings. Specifically, 100 percent of the kindergarten teachers attended both school and district-based trainings, 83.3 percent attended division-based trainings, and 33.3 percent attended regional-based trainings. In this case, kindergarten teachers are properly handled by the authority to take various trainings in different bases for personal and professional growth. However, only few reached the regional-based training and none for the national.

Problem 2. What is the level of manifestations of kindergarten teachers’ knowledge and skills in terms of: Basic Command, MS word, excel/ spreadsheets, publisher, powerpoint presentation, photoshop, moviemaker, and internet surfing?

Table 5. Level of manifestation of the ICT Skills in terms of Basic Computer Command.

| Indicators | Mean | Verbal Description | Interpretation |
|--|------------|-----------------------|----------------|
| 1. I know how to turn on the use of a laptop/ desktop computer. | 4.9 | STRONGLY AGREE | High |
| 2. I am capable of changing the brightness of the computer screen. | 4.53 | STRONGLY AGREE | High |
| 3. I know how to change the background of my laptop/ desktop computer. | 4.4 | AGREE | High |
| 4. I know how to delete files that I don't need anymore. | 4.73 | STRONGLY AGREE | High |
| 5. I know how to arrange the icons on the computer screen. | 4.53 | STRONGLY AGREE | High |
| Overall Weighted Mean | 4.6 | STRONGLY AGREE | High |

1-1.80 = Very low; 1.81-2.60 = Low; 2.61-3.40 = Moderate; 3.41-4.20 = Moderately High; 4.21 – 5 = High

Table 5 presents the level of manifestation of Kindergarten Teachers in ICT skills in terms of Basic Computer Command. The result shows that only indicator 3 which has a mean of 4.4 is under the verbal description Agree while the rest indicators are Strongly Agree having means 4.9, 4.53, 4.73, and 4.53 respectively. Moreover, the overall weighted mean for table 5 is 4.6 which is Strongly Agree and interpreted as High.

Table 6. Level of manifestation of the ICT skills in terms of MS Word.

| Indicators | Mean | Verbal Description | Interpretation |
|--|------------|-----------------------|----------------|
| 1. I know how to locate the MS Word application in my laptop/desktop. | 4.93 | STRONGLY AGREE | High |
| 2. I know how to encode information and reports using the Ms Word application. | 4.87 | STRONGLY AGREE | High |
| 3. I know how to save my work in Ms Word. | 4.87 | STRONGLY AGREE | High |
| 4. I am capable of inserting tables using MS Word. | 4.63 | STRONGLY AGREE | High |
| 5. I know how to use word art in this application. | 4.37 | AGREE | High |
| Overall Weighted Mean | 4.7 | STRONGLY AGREE | High |

1-1.80 = Very low; 1.81-2.60 = Low; 2.61-3.40 = Moderate; 3.41-4.20 = Moderately High; 4.21 – 5 = High

Table 6 presents the level of manifestation of Kindergarten Teachers in ICT skills in terms of Microsoft Word. The result shows that 4 indicators are describe as Strongly Agree and interpreted as High with means 4.93, 4.87, 4.87, and 4.63 respectively. Moreover, the overall weighted mean for table 2 is 4.7 which is Strongly Agree and this implies that kindergarten teachers know the basic skill in using MS Word.

Table 7. Level of manifestation of the ICT skills in terms of Excel/ Spread sheets

| Indicators | Mean | Verbal Description | Interpretation |
|---|------------|------------------------|------------------------|
| 1. I know how to locate the Excel/Spread sheet application on my laptop/ desktop. | 4.8 | STRONGLY AGREE | High |
| 2. I know how to add information and reports using Excel/ Spread sheet application. | 4.4 | STRONGLY AGREE | High |
| 3. I know how to save my work in Excel/Spread sheet. | 4.6 | STRONGLY AGREE | High |
| 4. I know how to add formulas using excel/ spread sheet. | 3.03 | NEITHER AGREE/DISAGREE | Moderate |
| 5. I know how to use the basic excel/ spread sheet commands. | 3.27 | NEITHER AGREE/DISAGREE | Moderate |
| Overall Weighted Mean | 4.2 | STRONGLY AGREE | Moderately High |

1-1.80 = Very low; 1.81-2.60 = Low; 2.61-3.40 = Moderate; 3.41-4.20 = Moderately High; 4.21 – 5 = High

Table 7 presents the level of manifestation of Kindergarten Teachers in ICT skills in terms of Microsoft Excel. The result states that indicator 4 and 5 shows least level of manifestation that describes as Neither Agree/Diagree which has a means of 3.03 and 3.27 respectively. This implies that teachers are unsure on how to add formulas and use basic spreadsheet commands. However, the overall weighted mean is 4.2 and is described as Agree with Moderately High Interpretation.

Table 8. Level of manifestation of the ICT skills in terms of Publisher.

| Indicators | Mean | Verbal Description | Interpretation |
|---|-------------|--------------------|------------------------|
| 1. I know how to locate the publisher application in my laptop/desktop. | 4.7 | STRONGLY AGREE | High |
| 2. I know how to add/ encode information using publisher application. | 3.97 | AGREE | Moderately High |
| 3. I know how to save my work using publisher. | 3.97 | AGREE | Moderately High |
| 4. I know how to add pictures and other decorations to my work using publisher application. | 3.83 | AGREE | Moderately High |
| 5. I know how to use the basic commands in publisher application. | 4.09 | AGREE | Moderately High |
| Overall Weighted Mean | 4.11 | AGREE | Moderately High |

1-1.80 = Very low; 1.81-2.60 = Low; 2.61-3.40 = Moderate; 3.41-4.20 = Moderately High; 4.21 – 5 = High

Table 8 presents the level of manifestation of Kindergarten Teachers in ICT skills in terms of Microsft Publisher. The result shows that only indicator 1 is describe as Strongly Agree with a mean of 4.7 and interpreted as High. However, the rest indicators are described as Agree. The overall weighted mean is 4.1 which is describe as Agree and interpreted as Moderately High.

Table 9. Level of manifestation of the ICT skills in terms of Powerpoint.

| Indicators | Mean | Verbal Description | Interpretation |
|--|-------------|-----------------------|-----------------|
| 1. I know how to locate the power point presentation application in my laptop/desktop. | 4.93 | STRONGLY AGREE | High |
| 2. I know how to add/ encode information using power point presentation. | 4.8 | STRONGLY AGREE | High |
| 3. I know how to add pictures and other decorations to my presentation in power point application. | 4.6 | STRONGLY AGREE | High |
| 4. I know how to save my work in this application. | 4.83 | STRONGLY AGREE | High |
| 5. I know how to add background music and other animation in this application. | 3.93 | AGREE | Moderately High |
| Overall Weighted Mean | 4.61 | STRONGLY AGREE | High |

1-1.80 = Very low; 1.81-2.60 = Low; 2.61-3.40 = Moderate; 3.41-4.20 = Moderately High; 4.21 – 5 = High

Table 9 presents the level of manifestation of Kindergarten Teachers in ICT skills in terms of Microsoft PowerPoint. The result shows that only indicator 5 is describe as Agree with a mean of 3.93 and interpreted as Moderately High. However, the rest indicators are described as Strongly Agree. The overall weighted mean is 4.61 which is Strongly Agree.

Table 10. Level of manifestation of the ICT skills in terms of Photoshop.

| Indicators | Mean | Verbal Description | Interpretation |
|---|-------------|-----------------------------------|-----------------|
| 1. I know how to locate Photoshop application on my laptop/ desktop computer. | 3.27 | NEITHER AGREE/DISAGREE | Moderate |
| 2. I know how to use the basic commands in this application. | 2.5 | NEITHER AGREE/DISAGREE | Moderate |
| 3. I know how to add pictures using this application. | 2.53 | NEITHER AGREE/DISAGREE | Moderate |
| 4. I know how to layout tarpaulin using this application. | 2.27 | DISAGREE | Low |
| 5. I know how to save my work using Photoshop application. | 2.5 | NEITHER AGREE/DISAGREE | Moderate |
| Overall Weighted Mean | 2.61 | NEITHER AGREE/DISAGREE | Moderate |

1-1.80 = Very low; 1.81-2.60 = Low; 2.61-3.40 = Moderate; 3.41-4.20 = Moderately High; 4.21 – 5 = High

Table 10 presents the level of manifestation of Kindergarten Teachers in ICT skills in terms of Photoshop. The result states that all indicators have low means such as 3.27, 2.5, 2.53, 2.27, and 2.5 respectively which implies that kindergarten teachers are least knowledgeable in terms of photoshopping. The overall weighted mean of table 10 is 2.61 which describes as Neither Agree/Disagree and interpreted as Moderate.

Table 11. Level of manifestation of the ICT skills in terms of Moviemaker.

| Indicators | Mean | Verbal Description | Interpretation |
|---|-------------|---------------------------|-----------------|
| 1. I know how to locate Movie maker application on my laptop/desktop. | 3.9 | AGREE | Moderate |
| 2. I know how to insert video clips and pictures using this application. | 3 | NEITHER AGREE/DISAGREE | Moderate |
| 3. I know how to cut and connect different pictures and video clips using this application. | 2.93 | NEITHER AGREE/DISAGREE | Moderate |
| 4. I know how to add animations to my work using this application. | 2.77 | NEITHER AGREE/DISAGREE | Moderate |
| 5. I know how to save my work using this application. | 3.03 | NEITHER AGREE/DISAGREE | Moderate |
| Overall Weighted Mean | 3.12 | Agree | Moderate |

1-1.80 = Very low; 1.81-2.60 = Low; 2.61-3.40 = Moderate; 3.41-4.20 = Moderately High; 4.21 – 5 = High

Table 11 presents the level of manifestation of Kindergarten Teachers in ICT skills in terms of moviemaking. The result states that 4 indicators show a means of 3, 2.93, 2.77, and 3.03 respectively and describe as Neither Agree/Disagree. This implies that most of the kindergarten teacher do not know how to use moviemaker. The overall weighted mean 3.12 which describes as Agree and interpreted as Moderate.

Table 12. Level of manifestation of the ICT skills in terms of Internet Surfing.

| Indicators | Mean | Verbal Description | Interpretation |
|--|------|--------------------|----------------|
| 1. I know how to locate internet browser on my laptop/ desktop. | 4.77 | STRONGLY AGREE | High |
| 2. I know how to search information using any internet browser found on my laptop/ desktop computer. | 4.77 | STRONGLY AGREE | High |
| 3. I know how to search informational videos which can be used in my lessons. | 4.77 | STRONGLY AGREE | High |

| | | | |
|---|-------------|-----------------------|-------------|
| 4. I know how to upload pictures and videos using the internet. | 4.17 | STRONGLY AGREE | High |
| 5. I know how to download data, pictures and videos the internet. | 4.53 | STRONGLY AGREE | High |
| Overall Weighted Mean | 4.60 | STRONGLY AGREE | High |

1-1.80 = Very low; 1.81-2.60 = Low; 2.61-3.40 = Moderate; 3.41-4.20 = Moderately High; 4.21 – 5 = High

Table 12 presents the level of manifestation of Kindergarten Teachers in ICT skills in terms of internet surfing. The result shows that all indicators are describe as Strongly Agree and interpreted as High with means 4.77, 4.77, 4.77, 4.17 and 4.53 respectively. Moreover, the overall weighted mean for table 8 is 4.6 which is Strongly Agree and this implies that kindergarten teachers know how to surf the internet.

Problem 3. Is there a significant relationship between the profile of the kindergarten teachers and level of manifestations of their knowledge and skills in ICT?

Table 14. Correlation between the manifestation of ICT skills and Teaching position, Length of Service and Educational Attainment

| Dependent Variable | Independent Variable | Correlation Coefficient ^A | P-value ^B | Remarks ^C |
|--------------------|------------------------|--------------------------------------|----------------------|-------------------------------------|
| ICT Skills | Teaching Position | .484 | .007 | Significant Direct weak correlation |
| | Length of Service | .505 | .004 | Significant Direct weak correlation |
| | Educational Attainment | .093 | .626 | Not Significant |

^ASpearman Correlation ^BTested at 0.05 level of significance ^CQualitative interpretation of the absolute value of the correlation coefficient 0.00-0.20 (Very Weak), 0.21-0.40 (Weak), 0.41-0.60 (Moderate), 0.61-0.80 (Strong), and 0.81-1.00 (Very Strong)

Table 14 above presents the correlation among the manifestation of ICT skills and teaching position, length of service and educational attainment. It shows that, teaching position has a significant relationship to the manifestation of ICT skills. This implies that there is a positive linearity among these variables. The higher the teaching position of the Kindergarten teachers are, the more the manifestation of the ICT skills acquired by them. Meanwhile, the length of service is found to have a significant relationship to the manifestation of ICT skills. It is evident that the longer they stay in the teaching profession, the higher their manifestation of their acquired ICT skills. This implication is linked to what Barbara (2006) said that teachers who are in the service for 15 years or more are seeing their work and their classrooms transform as they improve their lessons and teaching using technology. On the other hand, the educational attainment is found to have no significant relationship to the ICT skills of the teachers. This implies further that teachers’ educational attainment doesn’t matter in learning the ICT skills necessary in teaching Kindergarten pupils.

IV. CONCLUSION

Based on the findings of the study, the researchers had come up with these conclusions:

Majority of the Kindergarten teachers are literate in using the different ICT applications used in the teaching-learning process. Thus, improving the learning environment for the pupils to be literate at this early stage of their lives.

Also, it is evident that there is a moderately high to high manifestation of teachers’ ICT skills used in teaching Kindergarten pupils. This implies that the teachers are working an extra mile to learn the necessary skills for the 21st century teachers. Also, with these skills pupils will be exposed at an early age to the global trend when it comes to the necessary skills to be developed by them.

It is also interesting to note that the teachers' profile has a significant relationship with the manifestation of their ICT skills; that is, the longer the teachers' length of service and the higher their teaching position, the higher their ICT skills manifestation. However, not all teachers' profile has significant correlation to the manifestation of their ICT skills which means there's a need to conduct enhancement program to increase the manifestation of the teachers' ICT skills.

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Attitudes of Special Education Teachers towards Early Intervention Programs for Disabled Children in White Nile State, Sudan

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Abstract- The study aimed to find out the attitudes of special education teachers towards early intervention programs in Disabled children. The study problem was formulated in the following main question: What were the attitudes of special education teachers towards early intervention programs for children in White Nile State? The study assumed a statistical significant relationship between teacher attitudes and early intervention programs in children. The study used the descriptive analytical method. The study used a randomly intended study of (48) teachers. The study reached that early intervention programs encourage parents to hone the capabilities of their handicapped child to become eligible. The study recommended that the state should pay attention to the early intervention program to support and meet children's needs.

Index Terms- Teacher Attitudes, Early Intervention, Special Education, White Nile State, Sudan.

I. INTRODUCTION

Early intervention programs in special education are appropriate to the developmental needs of children with disabilities, as they confirm that early detection of these cases is of paramount importance in order to start providing services early and not only for children with clear disabilities. Also includes children who they may experience slight development delay and early intervention programs are appropriate to the developmental needs of children with disabilities by designing individual programs to develop their own self-sufficiency in aspects: Physical, cognitive, linguistic, emotional and social [1]. In addition, early intervention programs in special education provide opportunities to engage parents and family members and prepare them to better deal with and meet their child's needs. Early intervention programs within this seek to contribute to the development of the national effort to develop and improve services early intervention and disability prevention. The study is an attempt to find out the trends of special education teachers about the suitability of early intervention programs in special education with the development needs of disabled children [2]. The importance of the study stems from the importance of the role that early intervention plays in special education from the importance of the topic of disability and its psychological, social and economic effects on the disabled and the family of the

disabled. The study assumes that there was a statistical significant relationship between teachers' attitudes towards the goals of early intervention programs and forms of motor development, and there was a statistical significant relationship between teachers' attitudes towards the basic elements of early intervention programs, there is a statistical significant relationship with teachers' attitudes towards what needs to be considered in the early intervention programs. The study aims to identify early intervention programs in special education and its role in providing services early for disabled children. The study will use the descriptive analytical methods, in addition to using the questionnaire and interview tools [1,2].

II. PREVIOUS STUDIES

Mahdia (2017) investigate to reveal the differences between ordinary teachers and special education teachers in both sexes towards the process of integrating the physically handicapped, and the title of the study was: The attitudes of teachers towards integrating children with motor disabilities in regular schools. The sample of the study consisted of 60 ordinary teachers and special education teachers (30) females, (30) males, by applying the questionnaire of teachers' direction towards academic integration. The study concluded that were differences between ordinary male and female teachers in the process of motor integration and also concluded that were differences between the special education teachers for the male handicapped.

Al-Qamish and Al-Jawaidah (2014) point out to identify early intervention and children at risk. The problem of the study is summarized in the following main question: What is the role of early intervention in protecting children at risk. The study used the historical, deductive and descriptive approaches. The study concluded that the intervention and early detection will have a positive impact on society and its safety.

Omar (2011) find out the nature of primary school teachers' attitudes towards integrating Autism children with their peers in public schools, as well as identifying the nature of these trends in light of some of the variables associated with Autism children. The study used a measure of teachers' attitudes towards integrating Autism children with their peers in public schools, where it was applied to a total sample of (60) teachers. Using the descriptive approach, the researcher concluded that 85% of the sample population has negative attitudes towards integrating Autism

children and that variables selected in this study did not affect these trends.

Early intervention programs

That all types of disabilities benefit from early intervention programs, because most early intervention programs are non-class, meaning that they were concerned with any child with a disability. In fact, early intervention programs include a set of basic processes and activities that work to develop the abilities and capabilities of young children with disabilities to the maximum extent possible, namely [3,2]:

Special Education: Developmental educational assessment, curriculum development, preparation of the individual educational plan, selection and adaptation of educational methods, and designing educational strategies [3].

Public health services: such as treatment, surgery, medical examinations, nutritional organization, accurate nursing and diagnostic services, as well as physical therapy and occupational therapy [3].

Psychological services: through psychological evaluation, therapy with play, psychological counseling and behavior modification.

Family services: such as home visits, family counseling, training and awareness-raising, in addition to language therapy and audio measurement

Social services: defending the rights of children with disabilities, case studies and support [3].

Early intervention team: The intervention is based on specialized scientific knowledge, scientific knowledge of children's development on the one hand, and the general characteristics of children with special needs on the other. It depends on the integration of medical, educational, psychological and social services in order to early detection of children who have early intervention with special needs and also to create the appropriate environment that works to facilitate their growth process. Qualified specialists work with this category work in the early intervention team, as professionals specializing in this field began in recent years, and institutes and universities began developing academic programs to prepare specialists. Work in this area also requires the availability of standardized measurement tools and the development of diagnostic measures and application approaches. There was no doubt that access to a distinguished and successful program for early intervention requires the provision of financial and human resources at a high cost, and it is always preferable for women to have the largest share in working with early intervention programs, as they are the most appropriate and closest to treating children of this age [4].

Early intervention programs and special education

Early intervention programs: It is intended to provide various medical, social, educational and psychological services for children under six years of age who suffer from a disability or developmental delay or who are susceptible to delay or disability, and early intervention programs focus on developing the skills of parents and their capabilities to help Their children to grow and learn [3,4].

Special Education: Special education means a set of programs, plans and strategies specifically designed to meet the special needs of extraordinary children, and includes teaching methods, tools, equipment and special equipment, in addition to support services. Associations for children with disabilities have

known early intervention as urgent intervention before difficulties arise in order to help children from People with special needs and their families, it is a system of educational, therapeutic and preventive services provided to children from the first days or weeks after their birth, especially for those who are at risk according to the scientific perspective that depends on family history, pregnancy path and the state of the child And beyond to determine that [5].

Concept of Early Intervention Programs

Early intervention programs in the simplest form is an integrated system of educational, treatment and preventive services provided to children from birth until the age of (6) years who have special developmental and educational needs and those at risk of early disability for multiple reasons. The concept also refers to those efforts made to detect children subject to developmental delay, disability, or disability from birth to the age of six years, and to provide integrated care for them and their families in early childhood. Early intervention includes children of age that starts from birth to school age, and because children in general depend on their parents to meet their needs, early intervention develops the skills of parents to help children grow and learn. Early intervention supports the family and is closely linked to discovering disability after it occurs, It depends on the developmental examination, environmental, health and genetic tests, factors related to the pregnant mother, the fetus, the pregnancy period, the birth period and beyond, and the children who suffer from rotations or the head is large, small, or the births of the child are weak or unable to control his muscles and there are several other indications that need early intervention where the child is slower than other children in movements, speech or walking [5].

Importance of Early Intervention Programs

Early intervention acquires its importance in the early stages of the child, as it is the first block in shaping the building of the child. Several studies conducted on handicapped children in their early years of life have shown that early intervention programs have great effectiveness in repairing possible developmental deviations they have, and being in stages The first age of their development, as the application of various treatment programs and linking them to educational programs immediately after the occurrence of disability gives impressive results, and this confirms the great importance of providing specialized educational programs for children before they reach the stage of primary education [6].

Objectives of early intervention programs

The programs aim to conduct immediate and preventive treatments aimed at developing the abilities of the child discovered in multiple areas such as (motor, social, linguistic, self-care, and others) of medical instructions and necessary laboratory tests, and witness that motor growth is considered to be the basis The basic means by which a child can acquire a set of skills. When a child can control his head, this helps him focus visual eye with a better eye, which helps develop his cognitive skills. Hence, it is preferable to start an early intervention program with motor development [7].

Forms of motor development and language skills

Control of the head, use of hands, sleep on the abdomen, support with hands, sitting with his help, crawling, standing, walking, going down stairs and going up. There is no doubt that the movement and mental retardation delay the child from acquiring the language skills, even though the stages that the mentally late child is going through are the same stages that any child goes through, so the late child must be assisted in visual communication in order to see things, narrate the movement of the lips, and encourage him to issue Voices and his training in imitation skills, linking what he does with verbal guidance. The family of a handicapped child faces a set of social and psychological problems; therefore the family's questions must be carefully listened to and answered in a realistic and non-exaggerated manner. The strengths and weaknesses of the family must be clarified, and the family must be involved in the tests and designs of the treatment program [6,7].

Benefits of early intervention programs: Early intervention has important effects on individuals and society in different areas, including: Brain growth: In the event that if the brain develops well, the ability to learn develops and the probability of failure in life and school decreases, because the first two years of age develop the brain structures that affect children to learn. Nutrition: That is, giving children more food in an organized way to be better and learn better [1,2,3].

Economic productivity: Through the quality of programs that support the physical and mental capabilities of young children in the age, these programs increase the likelihood that children who enroll in programs will enter school, increase their chances of staying longer in school, and their performance is better in school. The more physically, mentally, and socially prepared child does not have difficulty in moving from home to school, and their performance is better, so dropout and repetition rates decrease, and the need for corrective treatment programs decreases, which reduces expenses [1.4].

Health Care Expenditures: Early intervention programs in their entirety help the child's family to reduce other health care expenditures, which reduces the incidence of disease, accidents and social costs, as well as the percentage of absence from work, which is reduced when parents are reassured that their children receive appropriate care. By creating conditions for children who are less fortunate to have a fair start at school and at home. Studies show that girls become more willing to attend school and continue schooling, after increasing expectations for parents. Likewise, when programs are available for young brothers, the responsibility (caring for their siblings) eases, which opens the way for them to enroll in school by supporting the actions of parents and providing environments towards which children attach importance to values. Socially desirable [5,6,7].

Social Mobility: There is no doubt that political and social pressures prevent people from wanting to carry out activities that benefit them. Early education can act as an effective strategy for developing teamwork. Early childhood programs such as improving health, hygiene and nutrition benefit the parents by reducing the burden of childcare [5].

Stages of Early Intervention Programs: Identification: Any observation of the first signs or signs that indicate that the child is at risk of development or is in an abnormal progress. Discovery: It is done by examining the signs and through surveys

through analyzes vaccination campaigns, and some tests. Diagnosis: Diagnosis is the one that confirms a defect in one aspect of development and that the child is at risk and deserves intervention programs. Training: All direct goals for activities affecting the child and his environment that are designed to create better conditions for growth. These activities include alerting and developing growth areas, educational activities and specialist services. Advice: all forms of counseling available to parents and the family, providing information and Treatment and provision of services: This stage comes after confirming the child's need for curative services, according to a treatment plan that may be implemented by a multidisciplinary team working according to the child's condition [8].

Childhood and Early Intervention Programs

Childhood stages in terms of early intervention policies are divided into three phases: the first stage: the newborn and the embraced child and extends directly from birth until the end of the first year of life, and the child at this stage is called the infant child even if breastfeeding extends up to two years of age. In the first stage, the early intervention focused on providing children with disabilities with treatment services and activities aimed at providing them with sensory stimulation. The second stage: The nursery child stage, which extends from the end of the first year of birth until the beginning of early childhood, i.e. 36 months of birth. In the second stage, early intervention became concerned with the role of parents as adjunct therapists or as educators for their handicapped children. The third stage: It is the preschool child and runs from 3 to 5-6 years, and the child is then called a preschool child. In the third stage, all attention has focused on the family system as the largest social content that has an impact on the child's development. Supporting, training and guiding the family had become the most important goal [6,7,8].

Basic Elements of Early Intervention Programs

When choosing the appropriate program for the treatment group, focus on the following points: the child's special needs, the family's special needs, long-term goals, short-term goals, restrictions and difficulties, available materials, methods and methods of implementation, and planning for follow-up and evaluation. In addition to choosing the best practices currently applied in early intervention such as family-centered intervention and not the child with special needs, relying on the environmental and functional direction in determining the contents of the curriculum through analyzing the characteristics of the child's environments, moving away from rigid and highly organized methods in teaching, providing services In the natural environments of the child Generalizing the skill while teaching the child and helping him to acquire it, relying on the team model across the disciplines, planning the transitions and transitions, especially moving from hospital services to home or child care center, and from the child care center to pre-school services, and from pre-school services to school . The school is considered one of the most important environments that embrace ordinary and extraordinary children. The school is a social and educational institution that complements the role of other institutions for raising children, provides social services and earns them appropriate behaviors and modifies inappropriate behaviors, especially when children have special needs[9].

Early Intervention Programs

Home programs: It aims to train parents on how to deal with children with disabilities and teach them the necessary skills within the home environment, for example the Al Portage program. Centers' programs: These centers may be hospitals or special centers. Children in these centers spend (3-5) hours a day and are trained in various fields. Inclusion programs: It is meant to combine services that are provided in homes and provided at the centers in order to meet the needs of children and their families with more flexibility. Programs of intervention through the media: These are done through the use of print and audio media to train parents on how to deal with their young children. Early intervention services are based on the firm belief in the following convictions and principles: Every child is unique and unique in his characteristics and characteristics, regardless of the type of disability or disability conditions. Belief in the rights of the child, their preservation and protection. The family is the natural incubator for caring for the child and meeting his needs and a basic partner in providing the conditions for better growth. The optimal environment for the child's development and the development of patterns of behavior and mental health is the natural environment with the family and peers from all groups. Various social institutions (nurseries, care centers, regular schools) play a role Great for the importance in achieving the principle of equal opportunities for children. The integration of services and roles between institutions concerned with childhood is the basis for achieving the principle of equal opportunities for all. Services and facilities should be adapted according to the needs of children, and the principle of flexibility should prevail in all types of services provided. Early child service intervention increases the effectiveness of programs and services provided. The effectiveness of the programs and services provided to children increases as they are provided early. Developing the capabilities of childhood workers and developing their skills in a manner commensurate with the emerging trends to maintain the effectiveness of the programs and services provided. The program that seeks to serve the child should include a variety of services that are appropriate to the diversity of children's needs Designing intervention services so that they are an essential part of the daily activities of the child and his family Designing early intervention programs with the aim of protecting the child from developing future problems or disabilities [10].

Early Intervention Needs

There is a set of basic needs for early intervention that must be taken into consideration to ensure the success of an early intervention program and achieve its objectives. These requirements constitute the scientific and methodological foundations that must be adhered to: the education of the child as a whole and not part of it, that is, it does not focus on disability but rather views the child as an integrated unit. Meet the child's special needs. Arranging the educational units logically in a logical manner. Presenting the skills according to the child's abilities. Enhance the child's responses and attempts. Full participation of the family in the program. Support and improve the child's development. Prevention of secondary disability development. Reducing the chances of the child being enrolled in internal institutions for the disabled. Improve and increase the chances of

children enrolling in general education schools. Providing consulting services for the family and related institutions [9,10].

Family and Early Intervention Programs

The family is the natural incubator, which provides care and satisfy the emotional, social and biological needs of the child. Therefore, early intervention services are services that are directed to the family and the child together. The role of the family is not limited to receiving services but is also a major partner in the design and implementation of services provided to the child. The family of a child with special needs suffers from anxiety and psychological pressure and lacks the information and skills necessary to raise this child in the best way, the needs of this child often differ from the needs of his siblings and require new methods to meet them. Some of these needs require scientific knowledge of a specialized nature and therefore the intervention program A successful early childhood should work to build a continuous partnership with the family of the child and respect their needs and potentials at the same time as it provides assistance to this family to overcome any adaptive difficulties that it may face in dealing with the needs of its child. The aforementioned participation can only be achieved by working to raise the family's motivation level, its belief in the right and potential of its child to grow, enhance its perseverance to work with this child, and support the therapeutic and educational interventions provided to him by the early intervention program. Each stage has its own basic development tasks and requirements that failure to achieve will lead to a clear negative impact on growth in the next stage. The rate of growth varies from one age to another and from one developmental aspect to another. In general, the fastest growth rate is in the early stages of life. Therefore, the effectiveness of the early intervention program increases as the services are provided to the child early [10].

Factors of Early Intervention Programs

Scientific research has proven that early intervention helps children to mitigate the effects of disability and it achieves this faster than late intervention, but such a role and the extent of its impact depends on several factors, the most important of them are: the history of early detection of disability, the age of the handicapped child at the time of enrollment in the center, and the nature of the disability that he suffers from. The services provided to him, the competence of those who implement it, and the involvement of parents and family in implementing the program. The researchers, Binat and Juralink (1991), found that the overwhelming majority of children who were provided with early intervention services in the pre-school stage achieved a lasting improvement that prevented them from returning to special classes or their enrollment in special education programs in the future and left untreated effects on their achievement, attitudes, and values, and in their analysis of the results reached The scientific researches that tried to verify the effectiveness of the early intervention suggested that the programs be divided into categories as follows: Category of preventive programs aimed at children at risk for environmental reasons. Category of preventive programs directed at children at risk for biological reasons. And the category of curative-corrective programs directed towards children with developmental disabilities or with disabilities [10].

Preventive Measures for Disability

Preventive measures of disability are divided into three levels, which are the first level: preventing the occurrence of morbidity or injury and in which the following are done: Providing genetic medical consultations and genetic counseling services. Activating the level of primary health care and spreading public health awareness. Regular health monitoring of pregnant mothers and young children of the age. Vaccination against dangerous childhood diseases. Providing appropriate diets. Eliminating environmental risks. Conducting births in healthy conditions. Taking the necessary measures to maintain the safety of children and not subject to accidents, injuries and abuse. Educating mothers about the dangers of taking medications during pregnancy without consulting a doctor, smoking, x-rays, etc. Early detection of diseases in a pregnant mother and treating them as soon as possible. Encouraging community members to take precautionary measures before marriage and before pregnancy. Encouraging appropriate upbringing patterns. The second level: Preventing the deterioration of morbidity into a deficit in which the following is done: Early detection of diseases and disorders such as low blood sugar, etc. And implement appropriate compensatory measures such as hearing aids or corrective lenses and medical treatment, whether through medicines, surgery or nutrition. The third level: Preventing the development of disability into a disability and the following is done: Providing early intervention services. Providing guidance services and training programs. Providing physical therapy, occupational therapy, speech therapy, special education and rehabilitation services. And adjust the trends of society. And integrate persons with disabilities academically and socially [10].

Target Groups for Early Intervention Programs: They are children who have a permanent or total deficiency in their physical, sensory, mental, communicative, academic or psychological abilities to the extent that requires special education services. The special education literature classifies the target groups of children who need to provide early intervention services by disability to [11]:

Children who were at Risk: They are also called children with biological danger and they are children who have been exposed to at least three of the following environmental factors (the inappropriate age of the mother at birth, or children who have suffered injuries during pregnancy or during childbirth that may affect their normal development, use Dangerous drugs during pregnancy, drinking alcohol and drugs for a parent, social, material, and cultural conditions that are not suitable for the family: and children from broken families or families with special circumstances.

Children with Developmental Delay: They children who suffer from neurological disorders, and are born with birth defects, genetic characteristics, infectious diseases, or sensory disorders. They fall into the category of children at risk of standing.

Children with developmental delay: They children who suffer from a distinct deficiency and different from their ordinary peers in one of the areas of knowledge, motor, emotional, linguistic communication, and the field of self-care [2]. The inability to build satisfactory personal relationships with others and the inability to maintain these relationships, if any. Inappropriate behavior patterns appear in normal situations. A general mood of depression and sadness. Tendency to show

physical symptoms, pain, or concerns related to personal and school problems.

Children in Immediate Danger: that is, those who have been officially diagnosed and have a specific medical disorder, whose causes and symptoms are often known. This category does not require that they currently show developmental delay, but the probability of this occurring is not less than 65% [3].

Important groups Early Intervention Team

The Obstetrics and Gynecology Specialist [4]: It works to study the family's pathology and follow-up on any health problems suffered by the pregnant mother and genetic counseling, as well as early detection of problems or prevention.

Pediatrics specialist: Its role is to identify children who are most at risk, to prevent disabilities and to monitor their development and health periodically.

Ophthalmologist: Its role is to diagnose and treat eye diseases, diagnose visual impairment and prescribe necessary corrective lenses

Audiometry: Its work is to assess the hearing of the child so that they are provided with the necessary and appropriate auditory aids and also develop an appropriate audio training program for each child and follow up its implementation.

Psychology specialist: Its role or contribution is to assess cognitive development and emotional social skills on the one hand and to participate in the design and implementation of the appropriate individual educational program for a disabled child on the other hand.

Social worker: This specialist assists the child and his family in obtaining the necessary social services as well. It helps in assessing and analyzing family and economic conditions, identifying children at risk and also participating in evaluating the effectiveness of the services provided.

Specialist in language and speech disorders: It represents an important member of the multidisciplinary team that can develop therapeutic educational programs for the prevention, early detection and treatment of disability, since language plays a critical role in the overall development of all children and can set a special assessment of the verbal and linguistic skills of each Child, and compare it to the regular child, then develop a suitable treatment program for him

Physiotherapist: to treat and rehabilitate physically handicapped children in particular and children with disabilities in general. This specialist is concerned with correcting deformities, preventing deterioration in muscles and body conditions, and developing great motor skills for the child

Occupational Therapy Specialist: To develop the fine motor skills of children and train them in the areas of self-care, movement and the use of assistive, corrective or compensatory tools.

Female teachers: Kindergarten teachers can be used to present programs to them or to those suspected of having a developmental disability or delay and then converts them to appropriate treatment programs to stop the deterioration of the situation

Special Education Teachers [5.7]: They design and implement early intervention services, whether at the center or at home, and often act as coordinators of the team's work, and they have a responsibility to develop the individual and appropriate

training program and what it includes in terms of performance levels in different areas of growth and the identification of long-term goals and short-term goals And the appropriate methods and means to achieve these goals.

Nurses: Their role can be determined by providing great assistance to children, their families, and those interested in persons with disabilities in terms of their care, public health awareness, and routine and emergency medical care.

Parents

Parents can be active members of the team working with the child because they are familiar with him because of their proximity to the child, and also as volunteer members to provide the necessary education to other parents, and offer their experience to them and help them overcome difficulties. There must be a number of skills and capabilities in the early intervention work team such as The ability to know the symptoms of various disabilities, knowledge of stages and characteristics of natural and abnormal development in childhood, the ability to observe and record children's behavior, the ability to define long-term goals and short-term goals appropriate to the level of child development

and compatible with the learning pattern, weaknesses and Force had The ability to build a relationship based on trust with children through effective communication, the ability to understand and respect cultural differences, understand the philosophy behind the curriculum used, the ability to recruit and train technicians and work with them, and the ability to work effectively as a member of the multidisciplinary team [7,8].

Justifications for Early Intervention

The most important justifications for early intervention are: Preschool education easier and faster than education at any age. Late development children follow the same path natural development, although it is usually not at the level of functional performance. So that the families of children with disabilities have established rules on how to raise their children in order to avoid falling into future problems. Development delay in first 5 years may be among the main reasons for the potential for the emergence of lifelong negatives. The responsibility for planting principles and skills of all kinds rests with the parents [8].

III. RESULTS AND DISCUSSION

Table (1) chi-square test for the first hypothesis: Those teachers 'attitudes towards early intervention programs contribute to developing the capabilities of disabled children with disabilities.

| N o | Statement | Chi valu e | df | Chi - Pro b | Significan ce |
|--------|---|------------------|----|----------------------|------------------|
| 1 | It contributes to making immediate preventive treatments and developing the capabilities of the discovered child in the motor fields. | 69.5 | 2 | 0.00 | Significan ce |
| 2 | It helps in developing the abilities of the child discovered in the social fields. | 73.8 | 2 | 0.00 | Significan ce |
| 3 | It plays a role in developing the capabilities of the child discovered in linguistic and social welfare domains. | 79.5 | 2 | 0.00 | Significan ce |
| 4 | Contributes to developing the capabilities of the child discovered in the areas of (head control) and (sleeping on the stomach) | 84.8 | 2 | 0.00 | Significan ce |
| 5 | Lead to developing the abilities of the child discovered in the motor areas (hand support) | 64.6 | 2 | 0.00 | Significan ce |
| 6 | Causes the development of the abilities of the child discovered in the motor areas (sitting with his assistant) | 74.3 | 2 | 0.00 | Significan ce |
| 7 | It helps in developing the abilities of the child discovered in the motor areas (standing - walking). | 80.3 | 2 | 0.00 | Significan ce |

Source: Preparation by researcher's from field work data, 2020.

Table (1) should that early intervention programs contribute to conducting immediate preventive treatments and developing the abilities of the discovered child in the motor fields. It helps in developing the abilities of the child discovered in the social fields, it plays a role in developing the capabilities of the child discovered in linguistic and social welfare domains, It contributes to developing the abilities of the child discovered in the areas of (head control) and (stomach sleeping), it develops the capabilities of the child discovered in the kinematic fields (hands support), it improves the abilities of the child discovered in the motor areas (assistant sitting), Develop the capabilities of the child discovered in the areas of movement (head control), it contributes to developing the abilities of the child discovered (assistant sitting) and helps in developing the abilities of the child discovered in the motor areas (Standing ,walking). That means the teachers 'attitudes towards early intervention programs contribute to developing the abilities of children with disabilities, because the probability value (0.00) less than (0.05).

Table (2) chi-square test for the second hypothesis: The teachers' attitudes towards the early intervention programs provide the basic needs and goals for the handicapped children.

| No | Statement | Chi Square | df | Chi-Prob | Significance |
|----|---|------------|----|----------|--------------|
| 1 | Provides the special needs of the child and meets the special needs of the family. | 69.7 | 2 | 0.00 | Significance |
| 2 | Achieve short and long-term goals. | 73.6 | 2 | 0.00 | Significance |
| 3 | Eliminates restrictions and difficulties. | 79.7 | 2 | 0.00 | Significance |
| 4 | Exploits available materials, methods and methods of implementation. | 69.7 | 2 | 0.00 | Significance |
| 5 | Planning for follow-up and evaluation. | 54.5 | 2 | 0.00 | Significance |
| 6 | Family and not child-centered intervention and analysis of the characteristics of child environments. | 84.5 | 2 | 0.00 | Significance |
| 7 | Relying on a cross-disciplinary team model. | 90.7 | 2 | 0.00 | Significance |

Source: Preparation by researcher's from field work data, 2020.

Table (2) should that the teacher's attitudes towards early intervention programs provide the basic needs of the disabled child, provides special needs for the family, achieve short and long term goals, eliminates restrictions and difficulties, take advantage of the available materials, availability of methods and methods of implementation, assists with planning, monitoring and evaluation and the application of the business model in a team of disciplines. That means teachers' attitudes towards early intervention programs work to provide the basic needs and goals for children with disabilities, the probability value (0.00) less than (0.05).

Table (3) chi-square test for the third hypothesis: Teachers' attitudes toward early intervention programs help in the needs of early intervention in disabled children.

| N o | Statement | Chi | df | Chi | Significance |
|-----|--|------|----|------|--------------|
| 1 | Educating the child as a whole and meeting his or her specific needs | 58.6 | 2 | 0.00 | Significance |
| 2 | The arrangement of educational units logically in a logical manner | 58.6 | 2 | 0.00 | Significance |
| 3 | It develops skills according to the child's abilities and enhances his responses and attempts | 79.7 | 2 | 0.00 | Significance |
| 4 | Reducing the chances of the child being enrolled in internal institutions for the disabled | 69.7 | 2 | 0.00 | Significance |
| 5 | Full participation of the family in the program | 35.3 | 2 | 0.00 | Significance |
| 6 | Supporting and improving child development and increasing the chances of children enrolling in general education schools | 79.7 | 2 | 0.00 | Significance |
| 7 | Providing consulting services for the family and related institutions | 26.0 | 2 | 0.00 | Significance |

Source: Preparation by researcher's from field work data, 2020.

Table (3) should that the teachers' attitudes towards early intervention programs help in educating the child as a whole and not as part of it, help to meet the child's special needs. It contributes logically to the arrangement of educational units, It develops skills according to the child's abilities, It reduces the chances of the child being enrolled in internal institutions for the disabled, Supports and improves child development, Supports full family participation in the program, It improves and increases the chances of children enrolling in general education schools, It works to provide consulting services for the family and related institutions and leads to enhance the child's responses and

attempts, From the foregoing, the hypothesis is correct, that means teachers' attitudes toward early intervention programs help in the needs of early intervention in children with disabilities, because the probability value (0.00) less than (0.05).

IV. RESULTS

1. The Early intervention programs do not lead to immediate treatment of problems that led to his disability.
2. The early intervention programs achieved the development of capabilities of the discovered child in some motor

areas, such as sleeping on the abdomen, and this may be attributed to the weakness of the applied side in the programs.

3. The early intervention programs work to educate parents about the special needs of child and encourage them to hone capabilities of their handicapped child and convince them of the possibility of using these capabilities to produce a child to be produced.

4. The early intervention programs work to meet the special needs of the family and hold educational and guidance sessions and seminars for the mothers of the handicapped and the institutional bodies that take care of them in the areas where illiteracy prevails.

V. RECOMMENDATIONS

1. Providing psychological, moral and material support to the family of the handicapped child to help her in the best development.

2. Providing new methods to meet the special needs of children with disabilities.

3. Building a smart partnership with the child's family with the aim of providing help and assistance to meet the needs of her child.

4. Increase the family's motivation and support in the therapeutic and educational interventions provided for her disabled child.

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Management of Cataract with Ayurveda Treatment Modality; a Comparative Clinical Study

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Abstract- The comparative clinical study was designed to evaluate the effect of *Anjanavarti* in the management of Cataract in comparison with *Virecanakarma*. Thirty patients were selected, suffering from Cataract and randomly divided in to two groups as group A and B. For the group A *Anjanavarti* was applied after the *Virecana karma* for a period of thirty days. For the group B *Anjanavarti* was applied for a period of thirty days. After the *Anjanavarti* treatment in group A, visual acuity was tested by using Wilcoxon Signed Ranks test. It was significant (0.001) in 0.05 levels which can be concluded that there was considerable effect after the treatment of *Anjanavarti* followed by *Virecanakarma*. Group B also significant (0.001) in 0.05 level. Therefore, it was concluded that there was a therapeutic effect of *Anjanavarti* in individual application. While group A and B were compared using Mann-Whitney U test, which elaborated two groups were not identical to each other with respect to visual acuity at after the treatment. According to the mean rank and sum of ranks between two groups after treatments, it can be clearly identified that mean rank of group A is less than group B, which means that the treatment effect of Visual Acuity in group A is better than group B while considering the results after the *Virecana karma* p value of total cholesterol (0.132), LDL cholesterol (0.145), TGL cholesterol (0.147) and HDL cholesterol (Based on positive ranks) (0.176) were not significant in 0.05 level.

Index Terms- Cataract, *Anjanavarti*, *Virechana karma*, Cholesterol

I. INTRODUCTION

CT Cataract, defined by the World Health Organization (WHO) as a Visual Acuity (VA) of less than 3/60 in the better eye, is the leading cause of blindness in the world, while cataracts can be surgically detached, being a surgical process patients discourage in attending treatment procedure. Globally cataract is also a key root of low vision [1], as well a leading cause of visual impairment, other than uncorrected refractive errors and the greatest cause of preventable blindness globally [2]. Aging process is a key etiological factor of cataract [3]. Additionally cataract is much common in diabetes where superoxide in the mitochondria is elevated as a result of hyperglycemia [4]. Opacity over lens of eye is a direct result of oxidative stress. Global warming and ozone depletion also increase exposure to ultraviolet radiation which leads to a greater incidence of cataracts [5]. Some

medications likewise corticosteroids, Psoralens, Chlorpromazine and some glaucoma medications affect in cataract [6-7]. Addiction to alcohol or substance uses while pregnancy leads to infants born with cataract, as well as congenital cataract is common in 1:10,000 ratios [8].

In Sri Lanka, among 22 million populations around 200,000 people are believed to be blind as well 400,000 people are suffering from low vision. Majority of them have been affected with cataract [9]. Hence, introducing a cost effective treatment modality in spite of surgery to manage cataract is much advantageous in existing era.

Ancient Ayurveda literature elaborate that the cataract is almost equal to the '*kacha*' when premature cataract (*Timira*) leads to mature cataract (*kacha*) due to unavailability of treatments at the early stage. Furthermore, untreated *kacha* generates '*kapaja linganasha*' and cause blindness [10].

Instead surgical process, some treatment protocols for cataract has been instructed in authentic Ayurveda literature '*Susruta Samihita*'. Among several modalities, application of '*Anjana*' (collyrium) is mentioned there as an effective measure of correction [11]. Ola leave manuscripts inherited to Indigenous system of medicine in Sri Lanka consists with multiple time tested recipes with effective clinical experience among practitioners. Therefore, the current study was based on an indigenous recipe of *Anjana* referred from an ola leave manuscript.

Efficacy and effect of application *Anjanavarti* and application of *Anjanavarti* after the *Virechana karma* (therapeutic purgation) in the management of Cataract were evaluated in the study while the study prioritized in effect of *Virechana karma* on visual acuity, Total Cholesterol level (TCL), Triglycerides level (TGL), High Density Lipoprotein level (HDL) and Low Density Lipoprotein level (LDL).

The *Anjanavarti* is consisted with, dried fruit of *Terminalia chebula*, dried leaves of *Azadirachta indica*, dried legume of *Piper longum*, dried seeds of *Piper nigrum*, central part of the dried *Terminalia bellerica* nut, ash from purified conch (*Bhashma*) of *Turbinella rapa* and purified Bisulphate of arsenigrealar while powder of all the said ingredients should be ground with goats milk till reach to paste consistency. Thereafter the shape of the *varti* should be molded and let it to be dried up in sun light.

II. METHODOLOGY

For the comparative clinical study, the study population was comprised with the patients attending to the eye clinic at Ayurveda

Central Dispensary, Kumarakanda, Dodanduwa, Sri Lanka. Among them, thirty volunteer patients diagnosed with cataract (VA \leq 3/60 in better eye) were selected after obtaining written consent. These patients were randomly divided in to two groups consisting of 15 patients in each group.

Inclusive Criteria

1. Both gender, age between 50 – 70 yrs
2. Visual Acuity \leq 3/60 in better eye

Exclusive Criteria

1. Age below 50 yrs and above 70 yrs
2. Visual Acuity \geq 3/60 in better eye
3. Having medicine for chronic disorders

Method of Investigation

1. Visual Acuity (VA) was determined using Snellen’s chart (in better eye)
2. Blood glucose level was determined by FBS test followed 12 hours fasting period (By automated chemistry analyzer)
3. WBC/DC (By automated chemistry analyzer)
4. Lipid profile followed 12 hours fasting period (By automated chemistry analyzer)

All the investigations were done before the treatment (BT) as well after the treatment (AT).

Method of Treatment

Group A: application of *Anjanavarti* for 30 days followed by *Virechana Karma*

Group B: application of *Anjanavarti* for 30 days

Sesame seed size amount of *Anjanavarti* was applied over middle part of the conjunctiva of lower eye lid once a day mixed with water between 09.00 am to 12.00 noon daily. While the treatment period, all the cases were instructed to continue recommended wholesome diets and behaviors.

Table 01: Treatment Protocol of Group A

| Day | Treatment |
|----------|--|
| 1 to 5 | 240 ml of <i>Dhanyapanchaka</i> Decoction + 2.5 g <i>Manibadra Choorna</i> twice daily |
| 6 to 12 | (Ghee) <i>Achchapana Wardhamana Snehana</i> |
| 13 | <i>Sarvanga Swedana</i> |
| 14 | Pitta <i>Virechana</i> using <i>Thriphala</i> decoction |
| 15 | Resting Day |
| 16 | Day of serum investigations and Visual acuity check up |
| 17 to 46 | <i>Anjanavarti</i> |

Table 02: Treatment Protocol of Group B

| Day | Treatment |
|---------|--------------------|
| 1 to 30 | <i>Anjanavarti</i> |

Follow up: visit the clinic fortnightly up to 01 month period.

Data Analysis: IBM SPSS version 22 was used.

III. RESULTS AND DISCUSSION

Majority of the sample represents with female patients as 70% rest of 30% represented by male patients. Referring age of participants, 53.33% of the respondents were included in 66-70 years of age while 23.33% were belongs to 61-65 years age, 6.67% of them were belongs to age range of 56-60 years and 16.67% were represented 50-55 years age group.

Hypothesis testing was performed to identify the effect and the efficacy of treatments. All the tests were carried out under 5% level of significance.

The Wilcoxon signed-rank test used when comparing two related samples, matched samples, or repeated measurements on a single sample to assess whether their population mean ranks differ (i.e. it is a paired difference test). Mann-Whitney U test has used to check whether the two groups (i.e. Group A and Group B) are identical to each other or not with respect to Visual Acuity (Better Eye).

Table 03: Comparative effect of treatments

| Investigation | Z | | Asymp. Sig. (2-tailed) | | Negative / Positive Rank | N | | Mean Rank | | Sum of Ranks | |
|-----------------|---------------------|---------------------|------------------------|---------|--------------------------|-----------------|---------|-----------|---------|--------------|---------|
| | Group A | Group B | Group A | Group B | | Group A | Group B | Group A | Group B | Group A | Group B |
| TCL (AV) – (BV) | -1.457 ^a | -1.507 ^a | .147 | .132 | Negative | 4 ^a | | 7.12 | | 28.50 | |
| | | | | | Positive | 10 ^b | | 7.65 | | 76.50 | |
| | | | | | Ties | 1 ^c | | | | | |
| | | | | | Total | 15 | | | | | |
| TGL | -1.457 ^a | -1.507 ^a | .147 | .132 | Negative | 5 ^a | | 6.90 | | 34.50 | |

| | | | | | | | | | | | | |
|--|---------------------|---------------------|--|------|----------|-----------------|-----------------|-----------------|------|--------|--------|--------|
| (AV) – (BV) | | | | | Positive | 10 ^b | | 8.55 | | 85.50 | | |
| | | | | | Ties | 0 ^c | | | | | | |
| | | | | | Total | 15 | | | | | | |
| HDL (AV) – (BV) | -1.355 ^e | | | .176 | Negative | 9 ^a | | 8.22 | | 74.00 | | |
| | | | | | Positive | 5 ^b | | 6.20 | | 31.00 | | |
| | | | | | Ties | 1 ^c | | | | | | |
| | | | | | Total | 15 | | | | | | |
| LDL (AV) – (BV) | -1.481 ^d | | | .145 | Negative | 2 ^a | | 8.25 | | 16.50 | | |
| | | | | | Positive | 13 ^b | | 7.96 | | 103.50 | | |
| | | | | | Ties | 0 ^c | | | | | | |
| | | | | | Total | 15 | | | | | | |
| Visual Acuity (Better Eye) (AV) – (BV) | -2.889 ^e | | | .004 | Negative | 10 ^a | | 5.50 | | 55.00 | | |
| | | | | | Positive | 0 ^b | | .00 | | .00 | | |
| | | | | | Ties | 5 ^c | | | | | | |
| | | | | | Total | 15 | | | | | | |
| Visual Acuity (Better Eye) (AT) – (BT) | -3.332 ^e | -3.416 ^e | | .001 | .001 | Negative | 14 ^a | 14 ^a | 7.50 | 7.50 | 105.00 | 105.00 |
| | | | | | | Positive | 0 ^b | 0 ^b | .00 | .00 | .00 | .00 |
| | | | | | | Ties | 1 ^c | 1 ^c | | | | |
| | | | | | | Total | 15 | 15 | | | | |

- a. After < Before
- b. After > Before
- c. After = Before

- d. Negative Effect
 - e. Positive Effect
- AV – After Virechana

BV – Before Virechana

Comparisons of both Groups

Table 04: Mean rank and Sum of ranks between both groups

| Investigation | N | | | Mean Rank | | Sum of Ranks | |
|------------------------------------|---------|---------|-------|-----------|---------|--------------|---------|
| | Group A | Group B | Total | Group A | Group B | Group A | Group B |
| Visual Acuity (Better Eye) - BT | 15 | 15 | 30 | 15.20 | 15.80 | 228.00 | 237.00 |
| Visual Acuity (Better Eye) - AT | 15 | 15 | 30 | 13.03 | 17.97 | 195.50 | 269.50 |

Table 05: Significance values of Mann-Whitney U test before and after treatments

| | Visual Acuity (Better eye) BT | Visual Acuity (Better eye) AT |
|--------------------------------|-------------------------------|-------------------------------|
| Mann-Whitney U | 108.000 | 75.500 |
| Wicoxon W | 228.000 | 195.500 |
| Z | -.206 | -2.582 |
| Asymp. Sig. (2-tailed) | .837 | .014 |
| Exact Sig. [2*(1-tailed Sig.)] | .870 ^a | .026 ^a |

- a. Not corrected for ties
- b. Grouping Variable: Group

According to above statistics, since the significance value (0.837) is greater than 0.05, the null hypothesis was accepted under 5% level of significance; Therefore, before the treatment two groups are identical to each other with respect to visual acuity. Since the significance value (0.014) is lower than 0.05, the null hypothesis was rejected under 5% level of significance; Therefore, after the treatment two groups are not identical to each other with respect to visual acuity.

Even though, acceptance of null hypothesis under level of 5% significance, *Virechana karma* was not effective in reduction of TCL, TGL, LDL and increment of HDL, as well under level of 5% significance, *Virechana Karma* was effective on Visual Acuity while under level of 5% significance, *Anjanavarti* also effective in Visual Acuity referring both of group A and B.

According to the above 'Mean rank and Sum of ranks between two groups after treatments table which can be clearly identified that mean rank of Group A is less than Group B. Which means that the treatment effect of visual acuity in Group A is better than Group B since when scaling the visual acuity variable, the lower values have given to the better visual acuity.

Group A was treated using ghee for *Achchapana*, hence TCL, TGL, LDL levels were increased, while HDL level was decreased among them. Instead of saturated fatty substance like ghee, replacing an unsaturated fatty substance may vary the therapeutic effects of Group A with much efficacy.

IV. CONCLUSION

Before treatment both groups were observed with much similar visual acuity. After the treatment of *Anjanavarti* for thirty (30) days both the groups were observed with increased visual acuity, comparatively Group A shows highest efficacy. Referring obtained results, efficacy of *Anjanavarti* was comparatively high when followed by *Virecana karma*. After the *Virecana karma* visual acuity was increased. Therefore *Virecana* was effective on Visual Acuity. As well, *Anjanavarti* followed by *Virecana karma* is more effective than *Anjanavarti* alone on visual acuity.

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Effectiveness of The Teaching Materials Based on Argument Driven Inquiry Learning Model for Practicing Students Critical Thinking Skills

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Abstrak -This study aims to describe the effectiveness of the teaching materials based on argument driven inquiry model to train students critical thinking skills at SMAN 7 Surabaya, on the subject matter of reaction rate. The teaching materials was developed using the 4D model and the trial design used was One Group Pretest and Posttest Design. Data collection was carried out using validation techniques, critical thinking skills tests and questionnaires. The results of the teaching materials validation showed the following averages: Lesson plan (4), Student book (3), Student worksheet (3), and critical thinking skills test (4) which quite valid and very valid category. The results of critical thinking skills test showed the classical completeness of the students on class XI MIPA 6 was 74.71% with the n-gain score of 0.71 which was included in the high category. Students gave positive responses to the teaching materials developed by 89%. Based on the results of the study it can be concluded that the teaching materials based on argument driven inquiry learning model are declared effective in training students critical thinking skills.

Keyword: *Teaching materials, argument driven inquiry learning model, critical thinking skills, reaction rate*

I. INTRODUCTION

Learning activities is an educational process by providing opportunities for students to develop their potential is the ability of the progressively increasing

in attitudes, knowledge, and skills needed for life and society, nation, and contribute to the welfare of mankind today and in the future will come. The learning activities are expected to increase the student's third potential, especially potential students' skills.

Tony Wagner in his book "The Global Achievement Gap" states that there are seven major skills that are required students to master in order to survive and adapt to changes in the ability of critical thinking and problem solving, collaboration and leadership, agility and adaptability, initiative and spirited entrepreneur, able to communicate effectively either orally or in writing, is able to access and analyze the information, and have the curiosity and imagination. From the above seven skills, critical thinking skills are key skills required of the students. Critical thinking is an activity related to the use of reason to reach a logical conclusion. Learning to think critically means using cognitive processes such as attention, categorize, selection, assess, and decide (Fisher, 2008).

Michael Scriven and Richard Paul explains that critical thinking can be defined as the process as well as the ability, the ability to process and understand the concepts used separately, implement, analyze and evaluate the information obtained or generated information (Sudaryanto, 2007; Filsaime, 2008). The most important thing in teaching critical thinking is to create a spirit of critical thinking that encourages students to question what they hear and examine their own mind to ensure there is no logic to inconsistent or erroneous (Ibrahim and Nur, 2002).

But, in fact learning in school teachers rarely care about the potential of critical thinking skills of students, even in the era of the 21st century is still a lot of teachers use conventional learning where learning is more centered on the teacher, even though in this era of human beings underwent development of science in all fields, one of the most prominent is the field of technology and information. It seemed to make the world more cramped because of all the information from all over the world can be accessed instantly and quickly by anyone, anytime and anywhere, and of course it is so can be utilized teacher in the learning process by providing information that is interesting about the material that will be taught to encourage critical thinking skills of students.

Based on research of Hasung (2008), Argument Driven Inquiry (ADI) learning model is effective in improving critical thinking skills. The ADI learning model is a model of learning that focuses on learning through activities construction and validation of knowledge through the activities of inquiry (*inquiry*) driven by arguing activities. The argument can provide students opportunity to participate in learning and can encourage curiosity and responsibility for the accomplishment of the proper argument, with students as demanded to critically against the phenomenon that the teachers display is and then investigate the truth of the argument they ask. In the student learning model will develop a scientific approach to design and implement investigation, collect, analyze the data, develop arguments participate in the activities of argumentation and communicate discovery.

The ADI learning model is also suitable to be applied on the subjects of chemistry. According to Kumar (2004), in chemistry learning is expected to enhance the knowledge of students to understand themselves and their environment. Students not only gain knowledge of the principles and facts, but students should also be able to use these principles to understand their environment. Chemistry learning also demanding scientific attitude for students, such as honest, critical, objective, open, resilient, creative, and able to cooperate with others. Chemistry learning as well as a vehicle to foster thinking skills of students, so it is expected to be able to develop reasoning skills, critical thinking, and thinking is inductive and deductive analysis of the concepts and principles of chemistry.

The subject matter of reaction rate is suitable to be applied to the ADI learning model because in this subject matter students are required to be able to

analyze by way of experiment, as well as many hooks with everyday life. Based on research of Nikmah (2019), Argument Driven Inquiry (ADI) learning model is valid in chemistry study, which is in solution of both electrolyte and non-electrolyte materials, because it demands that learners be able to analyse by conducting experiments in the same way that the reaction rate material is. the Basic Competency in the syllabus. The reaction rate requires students to be able to analyzes the factors that influence the reaction rate and determine the order of the reaction is based on experimental results. The lawsuit applies not only to the students but also for teachers, where teachers should make learning so that these demands can be achieved and as attractive as possible so that students enjoy participating in lessons.

From the observation result in SMAN 7 Surabaya was found that daily test of reaction rate topic at the academic year 2018/2019 only 32% of students achieve the classical completeness so many students who take remedial. Moreover, from the results of a preliminary studies, it was found that 98% of SMAN 7 Surabaya students do not have the critical thinking skills. While it is known that the learning model that is often used is the teacher learning model directly with lectures, so that students master the concept correctly but just memorize. Of course it is a demand for teachers how to make students truly understand and interpret the concept. Sadiman (2008) stated that understanding or comprehension can be defined as something with the mind. Therefore, learning must be understood as meaning and philosophy, intent and implications as well as its applications, causing the students to understand the situation. This will be achieved if students have the critical thinking skills are high, so the teacher must be able to create a classroom atmosphere in ways that can stimulate the spirit of critical thinking in students that encourages students to question what they hear and what they see.

Based on the fact that the importance of practicing critical thinking skills for students, in this study we developed the teaching materials based on the ADI learning model at the reaction rate topic and we reported their effectiveness.

II. RESEARCH METHODS

The type of reasearch is the developmental research (Plomp,2010). Development of teaching materials refer to the 4D-model (Thiagarajan, *et al*, 1974). There are four teaching materials developed based on the ADI learning model to practice the

students critical thinking skills namely lesson plan, students book, students worksheed, and test of critical thinking skills. All teaching materials was validated by experts before implemented in chemistry learning. The teaching materials were tested to the students of XI MIPA 6 class at SMAN 7 Surabaya, by involving 36 students using the One Group Pretest-Posttest Design. Data collection methods used were validation, tests, and questionnaires. The research data were analyzed descriptively.

III. RESULT AND DISCUSSION

3.1 Validity of teaching materials

Linn and Gronlund (2013) stated that one of the quality of the teaching materials is validity. All teaching materials are validated by experts before they are used in chemistry learning. The results of the validation of the theaching materials based on the argument driven inquiry learning model could be presented at Table 1.

| No. | Type of Teaching Materials | Validity Score | Category |
|-----|-------------------------------|----------------|------------|
| 1. | Lesson Plan | 4 | Very Valid |
| 2. | Student Book | 3 | Valid |
| 3. | Student Worksheet | 3 | Valid |
| 4. | Critical Thinking Skills Test | 4 | Very Valid |

Table 1. Validation results of the teaching materials

Based on the data at the Table 1, the teaching materials based on argument driven inquiry learning models developed had a valid and very valid category. Therefore they could be used to train students critical thinking skills in chemistry learning for reaction rate topic.

3.2. Students critical thinking skills

The indicators of critical thinking skill measured were identify or define criteria for consideration of possible answers, presenting argument, identifying the reasons stated, identifying the reasons stated, give a simple explanation, the ability to give a reason, hypothesized, drawing conclusions from the results of the investigation, create and determine the outcome of the consideration

of the facts, and identifying and dealing with a deliberate untruth (Ennis, 2008).

The ADI learning model that is applied in the learning activity can allow students to interact directly with what they learn. Laboratory activities designed using the ADI learning model consist of eight stages or steps that require students in a collaborative group to develop a procedure or process to answer a given problem, which is followed by an initial opinion that states and justifies an explanation for the problem researched. The eight stages or steps of the ADI learning model include 1) identification of tasks, 2) generation of data, 3) production of tentative arguments, 4) argumentation sessions, 5) creation of a written investigation report 6) Double Blind Peer-Review, 7) Revision of the Investigation Report, and 8) explicit reflective discussion. In the following paragraphs, a presentation of activities covering the seven phases mentioned above and a breakdown of the activities of each phase in the ADI learning model will be given.(Walker, 2012; Kadayifci, 2016)

The relationship between the syntax and critical thinking skills could be seen at Table 2.

| No. | Syntax ADI | The Indicators of Critical Thinking Skills |
|-----|---|--|
| 1. | Fase 1: Identification of Task | 1. Identify or formulate criteria to consider possible answers 2. Keep the state of mind or stay focused on the problem. |
| 2. | Fase 2: Generation of Data | 1. Identify and formulating questions 2. Stating a hypothesis 3. Designing experiments 4. Draw conclusions from the investigation |
| 3. | Fase 3 Production of Tentatif Argument | 1. Presenting arguments 2. Identifying the stated reason 3. Identifying reasons not stated |
| 4. | Fase 4 Argumentation Session | 1. The ability to provide a simple explanation 2. The ability to reason |
| 5. | Fase 5 Creation of a Written Investigation Report | Make the results of considerations based on facts |

| No. | Syntax ADI | The Indicators of Critical Thinking Skills |
|-----|---|--|
| 6. | Fase 6 Double Blind Peer-Review | |
| 7. | Fase 7 Revision of the Investigation Report | Identifying and handling untruths on purpose |
| 8. | Fase 8: Explicit Reflective Discussion | |

Table 2. The Relationship of the ADI model to critical thinking skills

Based on the Table 2, students are expected to be able to use critical thinking skills in reasoning based on first hand experience.

Critical thinking skills tests are used to determine the effectiveness of the teaching materials developed in practicing the students critical thinking skills. The test is done before or called the pretest and the test after learning is posttest. Pretest is done before learning which aims to determine the students' initial ability in aspects of critical thinking skills while the posttest is done at the end of learning using argument driven inquiry models to train critical thinking skills that aim to find out the extent of students' final knowledge after teaching and learning activities are carried out. The results of the pretest and posttest scores are used to calculate the n-gain score (Hake, 1999). The N-gain score is used to determine the types of critical thinking skills categories between before and after learning by using the argument driven inquiry learning model.

Based on the results of this study, the value of students critical thinking skills increased with the implementation of argumen driven inquiry learning models. The value of students critical tinkng skills at the grade XI MIPA 6 class in the pretest activities of students obtained an average of 12.48 with incomplete criteria (IC). After learning activities using the argument driven inquiry learning model the results of the students posttest score increased by an average of 74.71 with the completion criteria (C) and the n-gain of the class average of 0.71 with high category. However there were six students who still incomplete. So they were given possible solutions in the form of remedial learning to achieve the completeness of critical thinking skills. The results of achieving

students critical thinking skills could be seen at Table 3.

| Aspect | Achievement of Pretest (%) | Achievement of Posttest (%) |
|--|----------------------------|-----------------------------|
| Identify or define criteria for consideration of possible answers | 13.19 | 56.25 |
| Presenting argument | 7.64 | 47.92 |
| Identifying the reasons stated | 26.39 | 74.92 |
| Identifying the reasons stated | 8.33 | 72.92 |
| Give a simple explanation | 0.69 | 79.17 |
| The ability to give a reason. | 23.61 | 76.39 |
| Hypothesized | 20.83 | 83,33 |
| Drawing conclusions from the results of the investigation | 18.06 | 86.81 |
| Create and determine the outcome of the consideration of the facts | 0.00 | 88.89 |
| Identifying and dealing with a deliberate untruth | 0.00 | 63.89 |

Table 3. Achievement of critical thinking skills of students of XI MIPA 6 class

Based on the data at Table 3, students were able to think critically so there was an increse of students scritical thinking skill from the pre test score to the post test score. The results of increasing students' critical thinking skills could be linked to constructivism which seen cognitive development as a process when children actively form meaningful systems and interpreted reality through their experiences and interactions (Arend, 2009). This results of study also were supported by Hasung (2008) which stated that application of argument driven inquiry learning models could improve the students critical thinking skills.

3.3. Student response

Student response data related to chemistry learning with reaction rate topic using the argument driven inquiry learning models to train students' critical thinking skills. Student responses to the teaching materials developed were seen from students'

interest in student book, student worksheets, subject matter of reaction rate, how teachers teach, the learning atmosphere, and the questions of critical thinking skills. The results obtained, the average student filled out by expressed interest with a percentage of 89%. The results stated that most students were interested in the teaching materials used by the teacher. From this interest the teacher was easier to take the attention of students so they were eager to carry out learning activities. Tafsir (2008) prove that interest was the key in teaching. If students were interested in learning activities, it could be ensured that the learning process would be better .

From this research, it can be seen the effectiveness of the use of argument driven inquiry models on learning tools to train critical thinking skills is very well. Researchers conduct research by examining in depth about library studies to determine the opportunities for effective use of argument driven inquiry learning models to practice critical thinking skills.

IV. CONCLUSION

Based on the research results obtained, the conclusion is that the teaching materials based on argument driven inquiry learning model at reaction rate topic are effective for training students critical thinking skills.

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A Translabyrinthine vs Retrosigmoid approach to acoustic schwannoma excision: Experience at our Institute

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Abstract- Context: The translabyrinthine and retrosigmoid remain significant approaches in the surgical excision of acoustic schwannoma. The neurosurgical as well as otologic component of the tumour begs for a standardized protocol for its management and surgical approach.

Aims and Objectives: A detailed look into the presentation, investigation and management of symptomatic or enlarging acoustic schwannomas that have been encountered at our institute in a period of 5 years that have been operated by the translabyrinthine and retrosigmoid approaches and comparison between the two on the basis of operative results and post operative complications.

Materials and Methods: We conducted a retrospective study selecting 22 patients with radiologically proven acoustic schwannomas who came to Civil Hospital, Ahmedabad in the period from May 2013 to May 2018 and underwent surgical excision. Pre and post operative audiological and radiological examinations were done. Intra operative histological results were confirmed. All surgeries were performed in collaboration with the neurosurgical department.

Results and Observations: The male to female ratio for presentation of vestibular schwannomas in our study was 1:0.22. Most patients presented to us in their fifth decade of life (55%) and the mean age of presentation was 50 years. The mean tumour size as calculated by the MRI reports was 3.7cm. The most common presenting symptom was decreased hearing (95.4%) followed by tinnitus (77.3%).

7 patients were operated by the translabyrinthine approach and 15 by retrosigmoid. Post operative complication of facial nerve weakness was more common in the retrosigmoid approach (26.7%) as compared to translabyrinthine (14.3%).

2 patients (9%) had post operative CSF rhinorrhoea. All patients operated by the translabyrinthine approach had complete hearing loss after translabyrinthine surgery compared to none among those by the retrosigmoid. 33.3% patients had the same pre operative hearing status among those operated by retrosigmoid approach and only 13.3% had a hearing loss of unacceptable level. Minor amount of residual tumour tissue was left in 28.6% patients of the translabyrinthine approach and 26.7% patients of the

retrosigmoid approach. Recurrence of tumour was seen in only 1 patient (4.5%).

Conclusion: When hearing preservation is not a concern for the patient translabyrinthine approach showed fewer post op complications of facial weakness and CSF leak as compared to retrosigmoid. Recurrence is rare and was seen to be a concern in only cystic vestibular schwannomas in our study. Facial nerve preservation is of paramount importance during excision of vestibular schwannomas.

Index Terms- Vestibular schwannoma, Translabyrinthine approach, Retrosigmoid approach. C P Angle Tumor.

I. INTRODUCTION

Vestibular schwannomas (aka acoustic neuroma/ vestibular neurilemmoma) are benign tumours arising from abnormally proliferative schwann cells, which envelope the vestibulocochlear nerve. It is most commonly found in the 5th and 6th decade of life. It is the most common tumour of the cerebellopontine angle.

The cerebellopontine angle is a triangular space filled with CSF. Cranial nerves V to XI traverse through the CPA covered with central myelin provided by neuroglial cells. Transition to peripheral myelin made by schwann cells occurs at the medial opening of the IAC.

Vestibular schwannomas are benign, slow growing, well circumscribed, unencapsulated, tumours that arise from the schwann cells of the vestibular nerve. It originates from the internal auditory canal, enlarging the porus and slowly expands into the cerebellopontine angle, compressing the nerve of origin in its periphery.

It can be classified on the basis of size (Jackler's Classification) [1] or the anatomical extent (Koo's Classification)

The most common clinical presentation is gradually progressive unilateral hearing loss with tinnitus. Other presentations include vertigo, aural fullness and rarer symptoms like facial/corneal numbness, tongue or shoulder weakness, headache and diminished vision, or tremor, ataxia and gait disturbance.

Audiological assessment is done in the form of PTA, which most commonly shows asymmetric sensorineural hearing loss more for higher frequencies with poor speech discrimination: and BERA, which shows a retrocochlear pathology.

Gadolinium enhanced T1 weighted MRI is the gold standard investigation for its diagnosis [2]. It shows the VIIth and VIIIth cranial nerve in its entire course from brainstem to the end organ. Surgical excision is the mainstay of treatment but other modalities such as stereotactic radiosurgery and simple observation (for small non symptomatic tumours) can also be advocated for. The 2 most common surgical approaches for its excision is translabyrinthine [3] and retrosigmoid.

In the translabyrinthine approach the sigmoid sinus is kept as the posterior boundary of exposure. After a post aurial incision and periosteum elevation, a wide cortical mastoidectomy is done (Figure 1) followed by a bony labyrinthectomy (Figure 2). After skeletonisation of the cochlear aqueduct, the IAC is identified drilled out and tumour exposed which is then excised after resection of the dura (Figure 3).



Figure 1



Figure 2



Figure 3

In the retrosigmoid approach, a craniotomy is done keeping the sigmoid sinus as the anterior boundary. The visualized cerebellum is retracted (Figure 4) and the IAC is identified and drilled out (Figure 5). After this the dura is exposed (Figure 6) and the underlying tumour tissue is resected out (Figure 7).



Figure 4



Figure 5



Figure 6

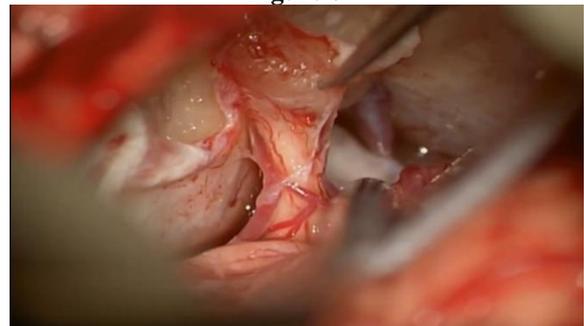


Figure 7

II. MATERIALS AND METHODS:

A retrospective interventional study was conducted at Civil Hospital, Ahmedabad in the time period from May 2013 to May 2018. A total of 22 patients operated for acoustic schwannoma excision were selected. All were selected on the basis of radiological reports suggestive of acoustic schwannoma. All patients were prepared pre operatively with routine blood

investigations. PTA and BERA were done for all patients for assessing pre operative hearing status in the audiological department of the institute. Gadolinium enhanced contrast MRI was done for all patients in the radiological department of our institute. Out of the total 22 patients 7 were operated by translabyrinthine Approach and 15 by the retrosigmoid approach. Post operatively patients were discharged after 7 days barring any complications. A close watch was kept for facial nerve weakness [4], CSF leak [5], hearing difficulties, etc. in the post operative period. Hearing loss was assessed on the basis of pure tone average and SDS score. In pts with small tumours, pure tone average of ≤ 30 dB and SDS $\geq 70\%$ were considered eligible for hearing preservation surgery [6]. Post operative PTA at 1 year showing a pure tone average of ≤ 40 dB or a speech discrimination score of $\geq 60\%$ was considered acceptable hearing levels post operatively in these pts [7]. Facial nerve function was assessed on the basis of the House Brackman staging. Any facial weakness of Grade II or more within 7 days of the surgery was considered to be a complication due to the surgery. Patients were assessed on post operative day 7 before discharge when fresh hearing assessment was done, MRI was taken to look for residual mass and facial nerve function was clinically assessed. They were followed up for a period of 1 year at which time all these investigations were done once again and results compared between the two approaches.

Inclusion and exclusion criteria:

Inclusion criteria:

- CP Angle tumour suggestive of acoustic schwannoma on radiology
- Tumour size minimum 20mm
- Excisional Biopsy proven to be acoustic schwannoma on histology
- Mentally sound patients who can be assessed by subjective audiological tests.

Exclusion criteria:

- Patients not willing for follow up
- Patients already suffering from facial weakness pre operatively
- CP Angle tumours operated thinking to be acoustic schwannoma but biopsy showing a different tumour
- Patients with bilateral profound hearing loss pre operatively

III. RESULTS AND OBSERVATIONS:

Demography:

No. of cases: 22

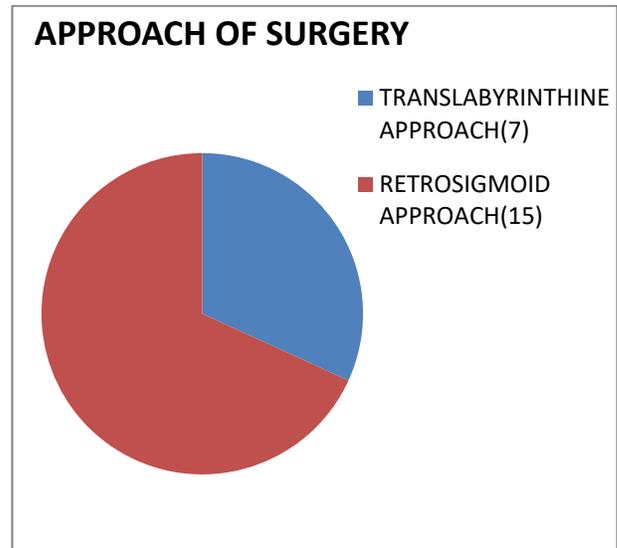


Chart 1

Age Distribution: patients from age group 20 to 60 were chosen. The mean age of presentation was 50. Maximum patients were from the 40 to 50 year age group.

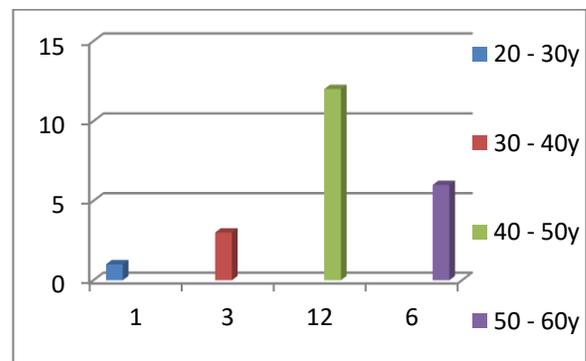


Chart 2

Presenting Symptoms: almost all patients presented with hearing loss and tinnitus followed by other rarer symptoms such as vertigo, headache and cerebellar signs. Patients who presented with severe headache almost always had obstructive hydrocephalous.

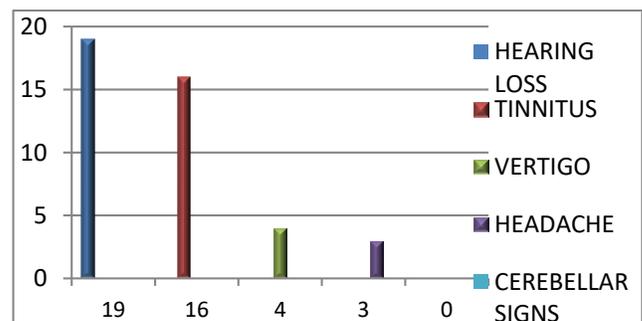


Chart 3

Complications:

Recurrence or residual tumor: A few patients showed a minimal residual tumour on the post op MRI [8]. Often times an

aggressive surgical plan can cause more harm by damaging the facial nerve and compromising its function. Due to its slow growing and benign nature, and its propensity in middle age, a small amount of remnant tumour tissue can be left in if removing it can damage the facial nerve. 1 patient who had a large cystic vestibular schwannoma showed an increase in size on the 1 year post operative MRI as compared to the immediate post operative scan. He was referred to the oncology department for radiotherapy or radiosurgery.

28.6% (2) patients operated by translabyrinthine approach and 26.7% (4) of the retrosigmoid patients still had small tumour load seen in the 1 year post op MRI.

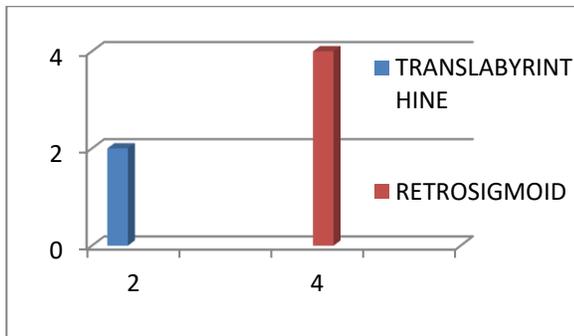


Chart 4

CSF Leak: CSF leak was present in 2 patients in the form of CSF rhinorrhoea [5]. No patient suffered from CSF otorrhoea or a wound site CSF fistula. Both the patients who developed CSF rhinorrhoea were operated by the retrosigmoid approach. Both were managed conservatively with oral acetazolamide, fluid restriction and head end elevation. No surgical intervention was needed

Facial nerve weakness: facial weakness of grade II or more were documented both in the immediate post operative period and on the 1 year follow up visit. Only 1 patient developed facial weakness among those operated by translabyrinthine approach in the immediate post op period. That too was resolved on the 1 year post op follow up. Out of those operated by retrosigmoid approach, 4 had immediate post op facial weakness and 3 remained even on the 1 year post op evaluation.

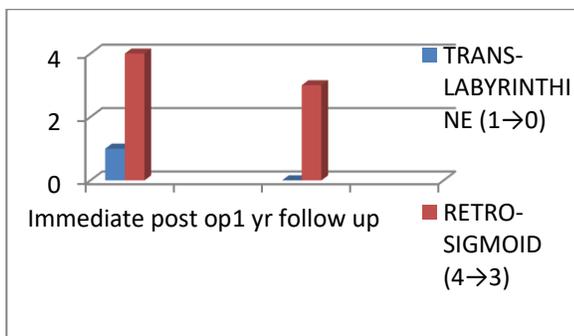


Chart 5

Post op hearing loss: translabyrinthine approach has the disadvantage of complete post operative hearing loss. Therefore it is done only in patients who already have hearing loss pre operatively. Hearing can be salvaged by the retrosigmoid

approach since the labyrinths are intact. Among those operated by retrosigmoid approach, 33.3% (5) patients had the same pre operative hearing levels and only 13.3% (2 patients) of them had a hearing loss of unacceptable level.

Table 1

| | Translabyrinthine | Retrosigmoid |
|---------------------------------------|-------------------|--------------|
| Hearing same as preoperative levels | 0 cases | 5 cases |
| Loss present but at acceptable levels | 0 cases | 8 cases |
| Loss present at unacceptable levels | 0 cases | 2 cases |
| Complete hearing loss | 5 cases | 0 cases |

IV. CONCLUSION:

Hearing status plays an important role in deciding the operative plan for a patient with acoustic schwannoma, or any CP Angle tumour for that matter. Patients in whom post operative hearing is not a concern, such as those who already have hearing loss in the operative ear, the trans labyrinthine approach can be preferred according to our study. In other patients where hearing preservation [9] was an objective, the retrosigmoid approach should be preferred.

If the choice to the surgeon is to give complete freedom from the tumour by aggressive resection, but at the cost of risk to facial nerve, it is always better to choose a less than total resection approach [10] and pay the price of leaving behind some tumour tissue. But this should not be too frightening to the patient if we could explain to them about the benign character and slow growing nature of the tumour. In the end, the treatment protocol should always be according to the surgeon’s choice as per their experience and expertise.

Post operative complications after resection depend on the single most important factor of the tumour size and extent

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The Management Of Higher Education Institutions In Uganda

A Perspective from Thomas Berkeley's Analytical Framework for Management

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Abstract- Managing Higher Education Institutions (HEIs) in Uganda is a game, in that despite the many theories and definition of management the reason as to how and why to achieving it, is still a controversy. In this article Thomas Berkeley's lenses of management are employed to understand management of HEIs in Uganda whether is a rational professional game, an exploitative game, magic/religious game or a political game, (Thomas, 2003). Through a qualitative and explanatory design, four objectives are generated questioning the nature of management that prevails in these Institutions basing on Thomas Berkeley's Analytical Framework for management. Findings from this study indicate that the management of these institutions are a continuum and fluid that swing along the four approaches though all these institutions are built on a rational perspective as a foundation of other approaches.

Index Terms- Management, Higher Education Institutions, Thomas Berkeley's Analytical Framework

I. INTRODUCTION

Management of Higher Education institutions is increasingly recognized as a serious issue, in developing countries and seems to be a game where various managers apply various approaches of for the success of these institutions. If not so the application of universal management skills and practices would not have resulted into evidenced crisis of management in these institutions. This inter play in the management approaches is a way of looking for solutions to challenges affecting HEIs, Eastman, (2007), asserts that the major challenge of these institutions globally is the reduction in their revenue, however there are other challenges; high competition, geographical location, inadequate skilled man power and the complexity of human behaviors etc. With the emergent of private HEIs and increase in the number of public institutions coupled with the bigger population and demand for service, the more management of HEIs has become fluid and complex. The management of HEIs particularly Universities in Uganda is characterized by captivating stories of crisis in management such as workers strikes, students trikes, in Makerere university, leadership and management crisis in Kyambogo university, leadership versus Board of directors

crisis in Uganda Pentecostal University, failure of students to graduate, embezzlement of University resources amidst the achievement of the institution goals. All these raises questions on the nature of management that deems fit for the management of institutions of higher education. The management of HEIs is becoming more complicated day by day, Harley et al., 2004 cited in (Decramer, Smolders, Vanderstraeten, Christiaens and Desmidt, 2012), attributed this complexity to the fact the freedom to set up their own priorities and goal as guided by their discipline rather than the needs of the employing organization. In Uganda the management of university and other tertiary institutions is very complex. According to Thomas's analytical framework of management, managing these institutions is either rational, exploitative, political or magic/religious (Thomas, 2003), from this analysis the question posed is which form of management is applied in the management of these institutions?; is the management approach applied corresponds to all this chaos?

Therefore, this article analyses the management approach applied in the management of institutions of higher education. Even although Decramer et al., (2012), who studied the external pressures affecting the adopting of performance management in HEIs, argues that the management of HEIs is based on three factors that's market mechanism, institutional mechanism and configuration of the organization. This study guided by four objectives; is the management HEIs a rational professional game? Is the management HEIs an exploitative game? Is the management HEIs a magic/religious game? Is the management HEIs a political game? Findings of this study are anticipated to add to the body of knowledge on the management of institutions of higher education in Uganda and also address the causes of these problems after knowing and internalizing varying management approaches adopted by institutions of higher education in Uganda. The proceeding sections of this article is in three sections covering the methodology, literature review, results and discussion and the conclusion on the subject matter.

II. METHODOLOGY

An explanatory research approach basing on reviewing of literature on the Alan Berkeley Thomas Analytical framework of

management is adopted. Through documentary review of literature on Thomas's analytical framework and other related literature on the management of HEIs in Uganda, data was collected. This is supplemented by information obtained from nonparticipant observation method through which various events on the management of these institutions is observed and recorded as this method facilitates an independent view, (Vander Stoep, 2008). Through content analysis, patterns and themes have been made that lead to the conclusions and recommendations of this article on the nature of management approaches practiced in the management HEIs.

III. LITERATURE REVIEW

According to Long's 1958, essay of an ecology game cited in, (Nisar, 2015) a game in an interaction between group of individuals or institutions based on set rules, the game provides participant with set of goals that they pursue using determined roles and calculable strategies and tactics. In this perspective management which has been widely defined as the process of get work done through others is linked to a game through which participants pursue various goals by different strategies and tactics. So, the management of HEIs is a game by which participants deploy rational, political, exploitative and magic/religious strategies and tactics for the success or failure of these organizations. As Long (1958), argues that institutions in a system play multiple games simultaneously the same applies to the managers of these institutions

IV. THOMAS BERKELEY'S ANALYTICAL FRAMEWORK FOR MANAGEMENT (2003)

According to Thomas's analytical frame work, management of organization is in four perspective; rational perspective, magic/region perspective, agency of capital (exploitative) and political. Adopting each of these perspectives will be determined by the intended outcome or ends which can either be unitary or sectional and this in return will influence the means, (Thomas, 2003). For instance a manager who aims at unitary objective, objectives that are embraced by all the stakeholders will adopt a rational approach whereas that one who is targeting sectional objectives, self-interested goals may adopt agency of capital approach. A rational approach will require to demonstrate the applicability of objectively scientific knowledge, procedure, techniques as means of achieving the intended outcome or ends, Brubaker (1984) cited in (Thomas, 2003). Therefore, a rational management of HEIs will require the applicability of scientific management, the classical theories of management can apply better here.

V. MANAGEMENT OF HIGHER EDUCATION INSTITUTIONS AS A RATIONAL PROFESSIONAL GAME

A rational professional administration and management of HEIs should be systematically designed in terms of policies, procedures and methods of achieving the common goals agreed upon by all the stakeholders, Turner & Keegan, 1999, Burnes, 2000, Jaaffee, 2001, cited in (Jamali, 2005). This kind of

managerial apparatus is influenced by institutional mechanism which Boselie, 2010 cited in (Decramer, 2012) says that these are pressures from legislations, protocols and procedure, habits, norms, routines and social culture pressures. Decramer, believes that HEIs should operate in such environment. These institutional pressures are scientifically designed, to guide calculated alternative means that can derive noncontroversial ends, (Thomas, 2003). Critically observing the objectives or the goals of most of these organization you realize that they are to serve the shared ends rather than sectional interests as well as the systematic objectively calculated procedures and methods all reflect a rational organization, (Scott, 2003). It is consensually believed that rational management is rooted from the works of classical theories such as that of Henri Fayol. So, for these institutions to be judged as rationally managed, it means these institutions are built or they operate purely on these principles such as forecasting, planning, organizing and coordinating which all have to be professionally thought of and scientific methods and procedures are adopted in the implementation. This kind of management that has existed over 200 years is often referred to as the traditional management paradigm, (Jamali, 2005). Unlike the political, exploitatively, and magical/ religiously managed organizations, HEIs under the rational approach will be structurally, and procedurally similar. For instance, if we take one activity like planning or forecasting, it is scientifically done depending on trends analysis of some of the courses offered that's why some Universities offer or have built niches on some course basing on these scientific analyses. Where HEIs are rationally managed, they wholly embrace the institutional framework in that coercive, normative, mimetic forces of institutions will shape the actions of day- to-day management of achieving organization goals, (Scott, 1995). According to Fayol, management as a professional activity in these institutions should be based on a body of knowledge or theory that should guide the daily practices of managers, which theories should be geared at delivering general or unitary goals, (Thomas, 2003). Therefore, the application of theories that does not promote unitary goals however rational it may be is not considered as rational professional management of institutions of higher education. Administrators of these institutions who seek selfish goals in the disguise of rational practices render management of these institutions not to be rationally managed for example using University properties like University vehicles, seal to gain reputation, support and business by administrators.

Success in rational management of these institution according Lynad Urwick 1943 cited in (Thomas, 2003) depends on the goals, objectives for which to be pursued by all those concerned in administration of each subgroup, is an objectively enlisting the interest of group as whole not section desires by certain individuals in that group or social groups. Therefore, when the management of Universities is dragged by the interests of individuals or sub groups such as worker's associations, student's association, this kind of management is not rational and the organization is abounding to fail the organization. The continuous strikes in these institutions are as a result of management being driven on subgroup or individual goals and objectives. Under rational professional management institutional interest should supersedes personal or class goals. Linking of the formalization and goal specificity within HEIs characterizes these organizations rational professionally managed, and therefore management under

the rational approach, attributes of rational organization such as specialization, departmentization, coordination are some of the pillars on which these institutions are built, (Jamali, 2005). These pillars make these institutions more efficient and accountable to the public, (Alexander, 2000), hence enhancing trust of management of these institutions as everything seem to be objective and for a common interest. The rational behavior of these institutions built on formalization and goal specificity is a precursor to bounded rationality of decision making which characterizes management of these institutions in Uganda where managers closely follow rules and take calculated moves, Kreitner, 2002, Robbins & Coulter, 2003, cited in (Jamali, 2005). Secondly, because these institutions are fighting for credible positions on the international ranking which is based on international standards, will definitely pursue a rational management approach that tends to make them uniform, (Engwall, 2007). Management in these institutions is a manager's rational analytical activity within structural arrangement conceived as tools to deliver efficient unitary goals, (Thomas, 2003). However much this management approach is good for the management of HEIs, it is criticized on curtailing manager's intellectual judgment and conforms to performance programs and intuitional controls that limit flexibility in performance hence slow growth, (Thomas, 2003). It is also believed that this management approach ignores social, cultural and technological context on structures and performance of organization as well little attention is paid on the actual behaviors of organization participant since much attention is on procedures, methods of achieving shared ends, (Thomas, 2003).

VI. MANAGEMENT OF HIGHER EDUCATION INSTITUTIONS AS AN EXPLOITATIVE GAME

Managing HEIs in a manner where a particular class of people owns the resources of production and are used to satisfy selfish interest at the cost of other members even though the technologies are efficiently applied is an exploitative approach, (Thomas, 2003). Exploitation has several meanings in the social science, it has been rebelled as the unfairly utilizing of resource for the benefits of the owner or illegally utilizing a resource for personal gain, (O'Hara, 2018). Thomas further opines that this kind of management owes its origin from the capitalist societies where the masses are systematically exploited to achieve section goals at a minimum cost, with such managers something like organizational goals is a myth in such a situation manager struggle to create a balance between implement efficacious techniques of production and compliance of isolated work force. Within almost all organization, there are four major types of exploitation of labour that are identified by, (O'Hara, 2018), these are neoclassical exploitation of labour in which labour is assumed to paid their marginal productivity, this more evidenced in the writings of Robinson 1933. Labour is assumed to be paid salary equivalent to the marginal product of the labour and managers will conclude that they are paid adequate remuneration according to the level of productivity but in actual sense there is no single instance where labour is paid as to their marginal productivity hence leading to exploitation, Robinson sites case of monopoly where firms make super normal profit, lack of competition in market, monopsony power over labour, also leads to abnormal

profit which is not commensurate to wages that goes to employees, (O'Hara, 2018). The second is the traditional or Marxist view of exploitation where the elite own the factors of production and the majoring the population are subjected to exploitation through surplus value where the capitalist pay wages to their labour but extend their productivity to what is paid hence producing a value which is sold hence profit or surplus, (O'Hara, 2018). These two are the most source of exploitation within HEIs either as a result of monopoly of these institutions accruing from their geographical location or owned by the elite, however other forms of exploitation are the social and cultural exploitation where surplus value is created through social knowledge and institutions, (O'Hara, 2004).

The argument that the management of HEIs is a rational professional practice where managers pursue shared interest a scientific application of management principles may not be totally accepted by other scholars. The first basis for the rejection of that argument is that from those whose perceive organizations, natural systems whose participants pursue multiple interest and composed of multiple stake holders, (Scott, 2003). So, managers like other members bring personal goals and sectional interests which they aim at in an official and informal means, (Thomas, 2003). Thomas further argues that managing institutions which are composed of multiple participant chasing diverse interest may require to relay on prior experience localized environment and manipulate the system to achieve the aims of the stakeholders. Secondly these institutions are also most thriving on a capitalistic social system where the notion of promoting interest for all has no room even although scientific and calculated decision are applied, (Thomas, 2003). As noted earlier by (Eastman, 2007), these institutions are resorting to cut costs as a way of surviving the challenge associated with reduction in revenue hence becoming labour exploitative. Another reason as to why these institutions are characterized as exploitative is the growing competition and for them to survive is to operate at low cost, (Leung, Lau, Zhang & Gu, 2015). The management of HEIs in Uganda seems to be more exploitative more especially when you examine what managers as agents do and why they do so as they pursue goals of the principal, considering the environment in which these institutions operate from and in which they are constructed, (Thomas, 2003). Thomas bases this analysis on Karl Max's view of social and economic organization and Braverman's Marxist theory that places these institutions in a capitalist society. Management of institutions operating in a closely capitalist conditioned society is where the essential factors of production belong to distinct social group and the employees own on their labour, and this management is geared towards maximizing profit and minimizing cost on labour which is a way of exploitation by maximally utilizing it, (Thomas, 2003). This maximum utilization of labour at low cost is obviously seen in the low wages salaries paid by these institutions, poor working conditions, overload in terms of course load and as a result of this situation industrial actions have become order of the day for example in Makerere University, (Dick & Nadin, 2011). According to the theory of surplus value, O'Hara, (2018), which is employed by the managers of these institutions labour receives just a small portion in return of its effort, (Thomas, 2003), what happens is that even this small portion is not paid and where it is paid, it is not paid in time; a case in point is the continuous strikes of lectures demand salary arrears and increased pay. Thomas

opines that extra returns on labour is expatriated for personal gains and capital investment, this is reflected in mushrooming infrastructural development going on while employees are striking for salary arrears and increment. The hostile relationship between employers and employees in these institutions is a characteristic of exploitative management that natures the spirit of "I don't care" among employees bleeding the habit of utilizing organization resources without care for individual goals, furthermore, these institutions are characterized by dehumanizing working conditions which are all intended to exploit labour, (Sara & Nadin, 2011). This puts quality of the student produced by these institutions at risk even though (Eastman, 2007), warns managers of HEIs to resist temptations that may circumvent bodies and structures on which academic capital is built and sustained.

Even although management does not own resources but are representatives of capitalist class that their sole function is to exploit labour power in the interest of the owner of capital, for the case of institutions of higher education this is reflected in private institutions where the management represent the board of director or the founder of these Universities, (Butcher & Clarke, 2001). So the management will work had to fulfill this cardinal role of maximizing wealth through exploitation of labour and other factors of production and where he/she is failing s/he stands chances of his contract not renewed as noted by Salaman, 1981 cited in (Thomas, 2003). This situation which is partly explained by the agency theory has resulted into wrangles between the founding bodies of these institutions and the management, (Engwall, 2007), the best example here is the conflict between the management of Uganda Pentecostal University Fort portal and the founding body that's the Pentecostal Church where its alleged that the management is taking over the owners of the University from the Church. It should be noted that management of these institutions in this regard is not simply coordinating and planning of shared goals but it is about maintaining systems and procedures through which labour is maximally exploited for the benefit of the owners of resources. With the development of large corporations where ownership is in the names of stakeholders and to avoid the challenges of agent – principal relation that exist in those corporations, managers have been given /have acquired shares in these corporations which serve to align their interest with those of the owners, (Thomas, 2003), this has made managers to lose their feelers or to turn a blind eye/ a deaf ear on the demands of their fellow line managers. This is witnessed on the number of occasion where manager have failed to come up and address the concerns of employees, only to threaten them with warning letters and sacking. Exploitative management is an authoritative management that give little room for employee participation, the management is in full control of worker as it takes the responsibility to decide what is to be done and how and the workers do the execution as they are told, (Thomas, 2003). Finally, there shouldn't be a surprise on the way management is done today more especially on how labour is treated since the elements of capitalist societies still live with us even in the postmodern era.

VII. MANAGEMENT OF INSTITUTIONS OF HIGHER EDUCATION AS A MAGIC-RELIGIOUS GAME

In situations where the management of HEIs is geared towards achieving common goal and the applicability of

objectively rational means is limited, managers are working in a complex changing environment where they may actually fail to adopt a particular method to a achieve the ends, (Thomas, 2003). Thomas urges that though these managers may appear to be objectively rational they rarely reach the ideal goal. Thomas calls this approach which is less scientific magic and religious. Managers will promote unitary ends and participate in rational rituals as way of realizing share goals though they are uncertain and the impression that they are pursuing shared goals will keep the organization unified as they cope with the uncertainties, (Thomas, 2003). The theme underlying magic-religious approach of management is rooted from the field social anthropology that's the study of understanding the culture of human societies where magic and religions were tied together, (Thomas, 2003). The conception of rational professional management of these institutions in Uganda though is vividly implied in the structures, but its applicability in the day-tot-day seems not to yield match. This is reinforced by Kotter's 1982 study on the work of 15 general managers which rejected the "professional manger" when he discovered that all the managers were depending upon the detailed knowledge of the business they are managing other than application of the theory and principals of management, (Thomas, 2003). Meaning that management of these institutions is based on what works for a particular situation that's contingent management and the fact that these are open system institutions; the rational professional approach may not withstand the contemporary needs. This partly explains the stagnation of these rigid traditional institutions that are now being overtaken by emerging institutions.

As noted earlier that the theme underlying magic-religious approach of management is rooted from the field of social anthropology that's the study of understanding the culture of human societies, more especially the pre-industrial societies where magic and religion were tired together, (Thomas, 2003). Thomas further asserts that one of the conception of social anthropology is that where human societies are faced with fundamental problem such as uncertainty of human life various practices will emerge as a way of coping with them either as a separate practice or a combination of practices hence the notion of equivalence. Therefore, from this background management practices of HEIs can either be magical or religious in character since it serves the similar ends in the contemporary society as magic and religion in the primitive ages. Magic according Beals and Hoijer, 1971 cited in (Thomas, 2003), is almost similar to western science, it is taken to be a set of techniques and methods for controlling the universe, based on assumption that if certain practices are correctly followed certain positives results are guaranteed. It is a way of achieving goals and reducing uncertainty, Cleverley, 1971, similar to magic, religion is about reducing uncertainty, it is asset of beliefs practices that provide overarching means to human existence, (Thomas, 2003). These two concepts are based on person's belief and they will contextually vary. Religion is believed to have both positive and negative connotations as far management of HEIs, (Ha, 2015), who study the role of religion in management of natural disasters points out that religion positively encourages individuals and organizations to behave morally and negatively when individuals and organizations behave immorally. So, in a positive way religious belief will motivate the managers and the employees work towards achieving share goals, spirit of unit and

on the contrary negative religious beliefs will make managers to pursue individualist goals.

Because of the ever-increasing change in managing HEIs has made manager also to believe that it takes magic or religious tactics to manage these institutions, in many intuitions take an example of Uganda Christian University morning devotions, compulsory pray hours and fasting are some of the religious practices that managers encourage with hope to solve organizational problems. The success of management practices in these institutions is based on the belief that a careful application of these practices will result into desired ends, like magic these practices may be having little direct bearing on the outcomes, (Thomas, 2003). For instance, the failure of a department to attain its monthly target can't be attributed to neglecting of morning devotions. However, as note that religion encourages positive acts managers in these institutions tend to exhibit a human face unlike in exploitative managed institutions as (Ha, 2015), opines that Christianity advocates the value of mercy and justice. The uncertainty of the future and anxiety of the outcomes forces the management of HEIs to be based on forecasting the future the way magicians forecast rain, for instance all institutions are managed on strategic plans which are forecast of the future to mitigate the uncertainty of the future like magic on most occasion these strategic plans have fallen short of the intended targets. Like religion which is characterized by a set of several symbols linked to the performance of rituals and ceremonies by believers and these symbols are regarded as sacred management in these institutions is also based practicing rituals, for instance the Buddhism perspective one of managing disaster is through a 49-day ritual which is popular in Korea, (Ha, 2015), orientation of employees and students in Universities.

VIII. MANAGEMENT OF HIGHER EDUCATION INSTITUTIONS AS A POLITICAL GAME

Managing HEIs can be termed as political in a situation where there is an agreed or overriding goals towards which the manager is steering the organization, and even manager's capacity to pursue selfish interest is limited, (Thomas, 2003). Though there are no neutral goals to pursue, managers are not agents of a single class of peoples as it is in an exploitative approach. Politics has been defined as a deliberate efforts by managers or group of individual to use power to pursue selfish goals, (Butcher & Clarke, 2001). Therefore, politicians who are seen as major actors in these institutions are more focused on symbolic value of their policies as they are aiming at re-election or appointment into offices, (Nisar, 2015), hence paying little attention to shared organizational interests. Management of these institutions is focusing on coping with the changing environment not about stability; organizations are built on networks not hierarchies, on shifting partnerships and alliances not on self-sufficiency, Carnall, 2003 cited in (Jamali, 2005). Thomas argues that property owners and shareholders are major interest groups in possession of resources which interact through a micro-political process to bring out organization ends, and therefore the managers are political players in multidimensional game, acting blindly with limited or no information about the intentions, resource and capability of the interested groups. Because of lack of clarity on organization goals or unitary goals manager also fail to devise appropriate means to

achieve them. Resources will be allocated to those goals that result from process of bargaining, conflict, lobbying and influence of influential parties and bounded rationality is key to the manager's decision. Because these institutions are prone to various sorts of crisis such as economic crisis, conflict, manmade accident, terrorism, personal crisis etc., (Boin, Hart, Stern AND Sundelius, 2005), managers found themselves employing political tactics to steer these institutions. According Cacciattolo, (2013), who study organization politics and their effect on workplace learning found out that the most political tactics employed by managers were similar to those identified by Mintzberg, 1985 and Allen, et al. 1979, Such as rival camps game, insurgency game, counter insurgency game impression management, ingratiation, attacking or blaming other among other. And in such situation the management approach is seen as political as Thomas noted this will to keep on shifting and structures hence rendering rational management impossible. Management of HEIs is believed to be political and almost similar to that in the Capitalist societies that's exploitative management, management here is built on the struggle within the ruling classes as to how and in his interest are the goals. The managers deploy the most effective and efficient means to achieve the goals of the ruling class, politics is at play in form of tactics of power and influence on the goals and means of achieving them, however, Cacciattolo, (2013), asserts that political behavior may result into both supportive and inhibitive result. The struggle for resource allocation during budgetary process, lobbying among the coalition groups to support divergent views are some of the manifestation of politics in management of these institution.

According to Reed 1989 cited in (Thomas, 2003), political management of these institutions is conceptualized as a situation of plurality of competing groups or coalitions that on several occasion disagree over decision concerning choice of goals, procedure, and these conflicts are resolved through exercise of power. This definition implies that management of HEIs is political in such way that most of the goals of these institutions are not fixed parameters established by the logic of the economic system but issues to be debated on, issue for choice. The existence of various interest groups or coalitions competing for different goals and struggling for resources is another sign of politics and symbolizes a political form of management where managers are ever involved in political process such as conflict dissolution, dialogue, bargaining to reach a common consensus of the means and ends. In line to these Kilmann and Thomas 1974 cited in (Cacciattolo, 2013), argues that political conflicts are better resolved through collaborative style within which the needs of the two groups are harmonized by the resolver so as to reach a paramount solution, this becomes more effective when it is accompanied by effective communication. Boin, (2005), argues that managers political situation which is also a crisis will have five tasks to manage the situation and that's sense making, decision making, meaning making, termination, and learning all these implemented to gain control of the organization. Such processes are driven by the dominant group with authority and high influence and control the resources. Management of HEIs political as managers are embroiled in the web of uncertainty resulting from the inability to decide whether to promote the wellbeing of all or the interest of the owning class, (Thomas, 2003). This makes the institutions to be result of political

negotiations, the rampant corruption cases in these institutions are result of political negotiations, coalitions trying to exert influence on those who holds authority. In addition to this, Boin, (2005), says that management in HEIs is also characterized of political and bureaucratic blame games where actors are protecting their selfish interests against the shared goals. Managers tend to occupy two positions in these institutions where they occupy their formal authority positions in which they use to influence and also belonging to certain coalitions which they use to lobby, bargaining for their positions. Unlike the rational professional management where standards are important in setting or pursuing shared goals, managers in these institutions is characterized as political one guided by the capacity to influence through coalitions and negotiation though structures may exist for formality. For instance, on several occasions members of the weak coalition have been heard saying “but the law/ rule says that...” as an indication that it is not the normative structure but power that determines the means and goals. Management in these institutions are done by the invisible hand and managers are puppets or conduits of the ruling coalition statements as power from above are common and on contentious issues managers can pronounce themselves of why a particular decision is taken, (Engwall, 2007), which is similar to the exploitative approach where they (managers) lose their feelers to the employees.

Within these politically managed institutions, bounded rationality is impossible as neither all the alternative course of action nor the consequences are known even the manager is uncertain of the utility value of the alternative, (Thomas, 2003). So, the manager will go for acceptable solution for the problem rather than the optimum solution, this makes problems recurring and this could be the reason as to why problems have persisted not being totally solved. Thomas concludes that management of HEIs which is entangled into politics is crippled by the dominant coalition and challenges bounded rationality which makes ends impossible to be consensually agreed on nor imposed by the owning class but established on shifting grounds as according to balance of forces within the organization. Rituals like accounting in managing these institutions is mainly intended to maintain morale in face of uncertainty in organizations, (Hofstede, Hofstede & Minkov, 2010), Hofstede points out that account practices are similar to religious practices which also serve to reduce uncertainty and these accounting practices have been regarded as the priests of business.

IX. RESULTS AND DISCUSSION

From the literature and the researcher’s observation, it is true to mention here that the mechanistic model of management call it the rational management is still dominating the management of HEIs in Uganda, as Jamali, 2005 affirms that this mechanistic management not only dominate HEIs in the past but even other business organization is still commonly encountered more especially in the developing countries. Because management of HEIs in the 21st century has become so complex due to human behaviors and the changing environment, Carnall, 2003, cited in (Jamali, 2005), opines that Management of these institutions is now focused to cope with the changing environment not about stability, organizations are built on networks not hierarchies, on shifting partnerships and alliances not on self-sufficiency. This has

made management of these institutions though look to be rational but mingled with politics for them to survive and sustain the networks and alliances. It is also observed that managers are engaged in different political games driven by yearning for reelection or appointment and also to meet the interest of various stakeholders, they tend to pay little attention to shared organization interests. It is observed that because of the higher unemployment rates in Uganda coupled with lower bargain power on the side of labour force, managers of these institutions are not bothered by ongoing industrial unrest typified by evidence of everyday workplace resistance of the employment conditions and unequal distribution of return on labour, (Dick & Nadin, 2011). This implies that the tendencies of exploitative nature of management within HEIs will continue to exist as long as there is labour surplus and ignorance among the work force. Because of the ever-increasing change in managing HEIs has made managers also to believe that it takes magic or religious tactics to manage these institutions, in many intuitions take an example of Uganda Christian University morning devotions, compulsory prayer hours and fasting are some of the religious practices that managers encourage with hope to solve organization problems. The success of management practices in the institutions is based on belief that a careful application of these practices will result into desired ends, like magic these practices may be having little direct bearing on the outcomes, (Thomas, 2003). similar to magic, religion is about reducing uncertainty, it is asset of beliefs practices that provide overarching means to human existence, (Thomas, 2003). These two concepts are based on person’s belief and they will contextually vary. Religion is believed to have both positive and negative connotations as far management of HEIs, (Ha, 2015), who study the role of religion in management of natural disasters points out that religion positively encourages individuals and organizations to behave morally and negatively when individuals and organizations behave immorally. So, in a positive way religious belief will motivate the managers and the employees work towards achieving share goals, spirit of unit and on the contrary negative religious beliefs will make managers to pursue individualist goals.

X. CONCLUSION

As the management of HEIs has entered the 21st century however much these institutions may like to maintain the rational professional management practices or the traditional paradigm of management, this mechanistic management is now interwoven with new management paradigm that borrows from political, exploitative and magic/ religious approaches. The new management paradigm that revolves around teamwork, improved communication participation and learning shared decision making, collaboration, closer interaction and partnering with customers, wide range of stakeholders, value creation innovation, teaming and agility, responsiveness and integration, (Jamali, 2005) may not be supported by neither one nor two management approaches but a combination of the four. Because of the fact that elements of capitalist economy still operate in these organizations which are either natural or open systems, exploitative and political elements of management manifests even in the new management paradigm.

XI. RECOMMENDATION

The 21st century managers of HEIs are expected to nurture a complex and diverse social and cultural, technical, functional skills and abilities for their success and the organization too. As management of HEIs continues to become more fluid rigid rational practices may not transform these institutions, the applicability of contingent or situation management practices is seen as the way forward.

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Clinical and immunologic features of HIV-infected children in South Kalimantan, Indonesia

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Background: Human Immunodeficiency Virus (HIV)-infected children is a global problem which should be addressed. The increasing prevalence of pediatric HIV become a burden for many countries.

Objective: To compare of clinical stage and degrees of immunology in children with HIV infection

Materials and Methods: This retrospective cross sectional study was conducted at two referral hospitals in Banjarmasin, South Borneo. Data collected from medical record of pediatric HIV infection patients diagnosed from January 2006 until January 2017. Diagnosis performed by three times serology test. Each variables was performed normality data test. Comparison test between variables were evaluated by Mann Whitney U test. Microsoft excel and SPSS 21 were used for data analysis.

Results: There were 40 patients with the median age was 6.9 years old. Male to female ratio was 1.2:1. Perinatal as risk factor of transmission occurred to 37 patients (92.5%). The most frequent clinical presentation and diagnosed condition were severe malnutrition in 62.5%, pulmonary tuberculosis (TB) in 50%, pneumonia in 25%, and oral candidiasis in 25%. Six (15%) children were asymptomatic. The median CD4 cell count at presentation was 431.94 cells/ μ L. Four (10%) children had advanced immunodeficiency and 18 (45%) children had severe immunodeficiency. Mortality rate at presentation was 30%. There were significantly differences of CD4 count between clinical stage I and II ($p=0.002$) and clinical stage II and III ($p=0.011$)

Conclusion: HIV-infected children had sex equal distribution. Most frequent risk factor of transmission was perinatal infection. Pulmonary TB was the most frequent co-infection condition. Most of HIV-infected children in this study were immune-suppressed. There were differences of CD4 count between each clinical stage.

Keywords: HIV-infected children, malnutrition, Pulmonary TB, immunodeficiency, perinatal infection.

Introduction

Human Immunodeficiency Virus (HIV) infection and Acquired Immunodeficiency Syndrome (AIDS) remain as global health problem challenges. HIV is an RNA virus, including to retroviruses which attack white blood cells especially CD4 lymphocyte cells. Patients with HIV infection require antiretroviral therapy to reduce the amount of virus in the body so as not to fall into AIDS. Patients with AIDS require antiretroviral therapy to avoid opportunistic infections which can lead to complications causing death.¹⁻³ HIV in children is a global problem which still needs to be addressed. According to WHO, in worldwide by 2015, an estimated 1.8 million (1.5-2 million) children under 15 years old live with HIV. There are 150,000 newly HIV-infected children each year. Every day there are 400 new cases of children with HIV. One hundred thousand children die each year from AIDS and related illnesses and 12 children died because of AIDS every hour. More than 90% of children get HIV infection through mother-to-child transmission. Of the total children with HIV, only 49% were receiving antiretroviral therapy (ART). Without ART, 26% of infected children at the postnatal and 52% of infected children at the perinatal died in the first year of infection. In Indonesia, the cumulative number of HIV patients from 1987 to September 2014 was 150,296 and for AIDS patients 55,799. There was an addition of 39% of new cases of HIV patients from September 2014 to June 2016 and 47.95% of new cases of AIDS patients. Six point two percent of them aged 0-19 years. Risk factor for AIDS were 2.7% from perinatal. In South Kalimantan, the total accumulative cases of HIV infection reported since 1987 to second quarter 2016 were 1,036 patients.³⁻⁸

Opportunistic infections (OIs) from HIV infection were the causes of mortality in HIV-infected children. CD4 count cell play role to the degree of immunity of HIV-infected children. This is in line with the OIs of HIV-infected children. Meta-analysis and systematic review in 2016 said that the highest incidence of OIs were both pulmonary TB and extra-pulmonary, oral and esophageal candidiasis, and cryptosporidium diarrhea. Platt L et al mentioned that hepatitis C infection was six times higher in patients with HIV infection. TB and bacterial infections were a major cause of HIV/AIDS patients hospitalized. The highest mortality among adult and pediatric HIV/AIDS patients were also caused by TB and bacterial infections. Co-trimoxazole administration as prophylaxis may decrease the incidence of IOs of HIV/AIDS patients⁹⁻¹³. HIV infection increases the risk of malnutrition in children. Metabolic changes and abnormal cytokine production also play a role in the incidence of malnutrition in HIV patients. Caloric requirement in HIV-infected children is higher than uninfected children. Children with HIV infection are usually thinner, lower in weight, and shorter than malnourished children without HIV infection.¹⁴⁻¹⁵

Methods

Subjects

This retrospective cross-sectional study was conducted in two referral hospitals that have VCT polyclinic facilities in South Kalimantan, which are Ulin General Hospital and Ansari Saleh General Hospital. It was approved by the Ethics Commission of the Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, South Kalimantan, Indonesia. The study was conducted from January to June 2017. Data taken from the medical records of pediatric patients diagnosed with HIV infection from January 2006 to January 2017. Diagnosis performed by serology three times and all of them were positive. The sampling method was total sampling.

Samples collection

Names, number of medical record, age and date of birth, gender, address, date of diagnosis, risk factors, start date of ART , type of antiretroviral drugs, opportunistic infections acquired, the weight, determination of nutritional status, CD4 cell count at diagnosis, and mortality status were recorded in this study. Determination of clinical and immunology stage of HIV infection were according to WHO criteria².

Statistical analysis

Data entered in tables in Microsoft Excel. Comparison test between clinical stage and immunologic stage were performed by Mann Whitney U test. Data analysis using SPSS for Windows version 21.

Results

There were 40 patients HIV-infected children in VCT polyclinic during January 2006 to January 2017. Twenty two (55%) patients were boys. Male to female ratio in this study were 1.2:1. There were 37 (92.5%) patients with perinatal risk factor.

Table 1. Baseline characteristic of children with HIV

| No. | Variables | n(%) | |
|-----|---------------------|---------------------|------------|
| 1. | Gender | Male | 22 (55) |
| | | Female | 18 (45) |
| 2. | Ages | < 2 years old | 4 (10) |
| | | 2-10 years old | 27 (67.5) |
| | | >10 -18 years old | 9 (22.5) |
| 3. | Nutritional status* | Well-nourished | 7 (15.79) |
| | | Malnourished | 3 (5.26) |
| | | Severe malnourished | 25 (71.42) |
| 4. | Risk factor | perinatal | 37 (92.5) |
| | | Blood transfusion | 2 (5) |
| | | Unknown | 1 (2.5) |
| 5. | ARV | on ARV | 24 (60) |
| | | not/yet | 13 (32.5) |
| | | Unknown | 3 (7.5) |
| 6. | Type of ARV | FDC for children | 17 (70.8) |
| | | AZT+3TC+NVP | 6 (25) |
| | | AZT+3TC+EFV | 1 (4) |
| 6. | Mortality | Male | 7 (17.5) |
| | | Female | 5 (12.5) |
| | | Total | 12 (30) |
| 7. | Alive | Male | 14 (35) |
| | | Female | 14 (35) |
| | | Total | 28 (70) |

*data were not complete due to loss of follow up patients.

FDC is the most widely used type of antiretroviral (60%) as an option for HIV therapy in children. The mortality rate of HIV-infected children in this study was 30%. Most of HIV-infected children (62.5%) were severe malnourished. Pulmonary TB is the most common type of clinical symptom and opportunistic infection (50%) in pediatric HIV patients and followed by pneumonia (25%). There was 2.5% HIV-infected children with Global Developmental Delayed (GDD). Fifteen percent of children with HIV were asymptomatic. The mean Hb in HIV-infected children was 11.99 g/dl. There was a two-time increasing of SGOT/AST in two patients

and a double increasing of SGPT/ALT in one patient. Twenty-two (50%) of pediatric patients are at advanced stage and severe immunodeficiency. There were significant difference in CD4 cell count between children with clinical stages one and three ($p = 0.002$), and in children with clinical stages two and three ($p = 0.011$).

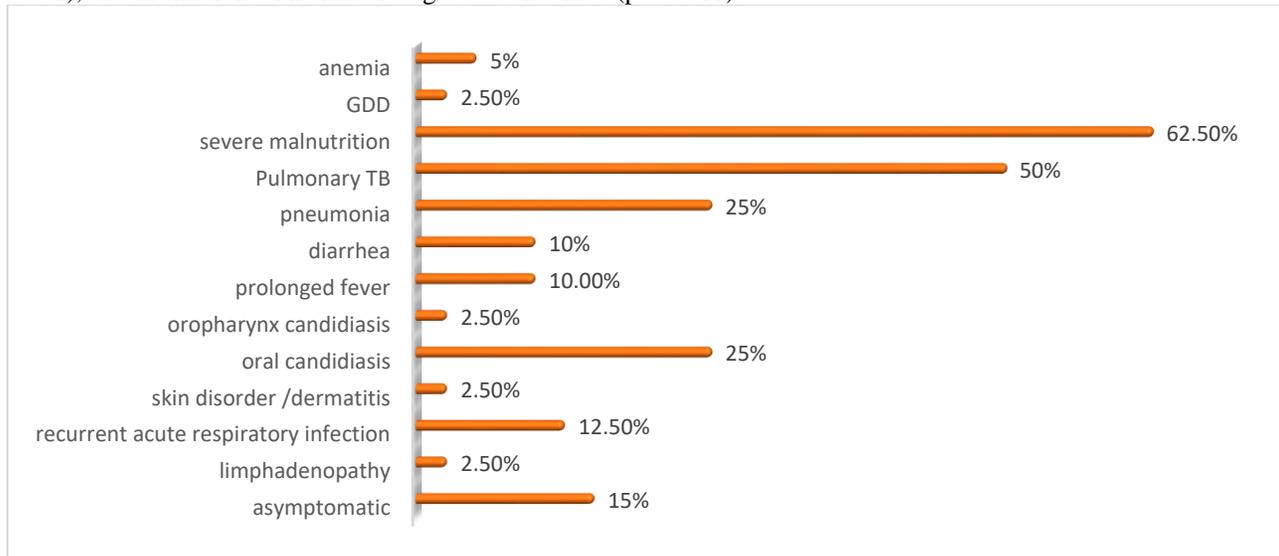


Figure 1. Clinical manifestation of children with HIV

Table 2. Mean of routine blood test and liver enzyme

| No | Variables | Mean | ± | SD |
|----|------------|-----------|---|----------|
| 1. | Hb | 11,99 | ± | 2,56 |
| 2. | Leucocytes | 7115,56 | ± | 1685,61 |
| 3. | Platelet | 327111,11 | ± | 148108,4 |
| 4. | SGOT/AST | 60 | ± | 42,82 |
| 5. | SGPT/ALT | 41,4 | ± | 36,26 |

Table 3. Comparison between immunologic parameter and WHO clinical stage in children with HIV

| Variables | n (%) | Median CD4 count* (min-max) | Immunodeficiency classification of WHO (%) | | | |
|----------------|----------|--------------------------------|--|-----------|-----------|------------|
| | | | NS | Mild | Advanced | Severe |
| Clinical stage | | | | | | |
| 1 | 9 (22.5) | 833,56 (127-2622) | 4 (44.44) | 2 (22.22) | 2 (22.22) | 1 (11.11) |
| 2 | 9 (22.5) | 436,78 (11-1068) | 2 (22.22) | 5 (55.55) | 0 (0) | 2 (22.22) |
| 3 | 16 (40) | 156,43 (9-730) | 1 (6.25) | 0 (0) | 2 (12.5) | 12 (85.71) |
| 4 | 5 (12.5) | 593,50 (6-2168) | 1 (20) | 0 (0) | 1 (20) | 3 (60) |

*baseline CD4 before ART. NS: non-specified ($CD4 >500/mm^2$), Mild: $CD4 350-499/mm^2$, Advanced: $CD4 200-349/mm^2$, severe: $<200/mm^2$ atau $< 15\%$.¹⁶

Table 4. Comparison between CD4 count and clinical stage

| no. | Variables | p-value* |
|-----|--------------------------------------|----------|
| 1. | CD4 | |
| | Clinical stage 1 Clinical stage 2 | 0,489 |
| | Clinical stage 1 Clinical stage 3 | 0,002 |
| | Clinical stage 1 Clinical stage 4 | 0,199 |
| | Clinical stage 2 Clinical stage 3 | 0,011 |
| | Clinical stage 2 Clinical stage 4 | 0,414 |

*Mann Whitney U test was performed

Discussion

This study demonstrated basic characteristics, clinical presentation features, laboratory features, and clinical stage in pediatric HIV-infected patients in two referral hospitals with VCT polyclinic facilities in Banjarmasin. This study showed that 55% of patients with HIV were male. Research conducted in Iran in 2015 showed a number that did not differ much, as 56% in male patients¹⁷. Similar findings were made in research conducted in Nigeria and Zimbabwe, 54.4% and 53% respectively.¹⁸⁻¹⁹

A study by TREAT conducted in five countries in Southeast Asia, Cambodia, Indonesia, India, Thailand, and Vietnam showed that the risk of exposure to HIV during childhood at perinatal was 94.1%²⁰. This was not much different from the results of this study which was 92.5% of children with HIV were acquired through perinatal infection.

Mortality rate of HIV in children in the Cohort study in Nigeria was 18.2%¹⁹. In this study, mortality rate was 30%. The Differences can be caused by the research method undertaken. In this study, a retrospective method was conducted by collecting data since 2006. Therefore, mortality rates were higher due to long periods of time. While in study in Nigeria was a prospective study which only followed the patient for the last six months.

The most common clinical features of children with HIV were cough, weight loss, and hepatomegaly¹⁹. In Ferrand et al study found 59% of children diagnosed with HIV infection and pulmonary TB infection¹⁸. There were 100% weight loss children at the time of HIV diagnosis in a study conducted in Iran¹⁷. Research in India mentioned that the most common clinical features were fever and chronic diarrhea. There were 18.6% of HIV-infected children with pulmonary TB²¹. Clinical symptoms of cough can be caused by TB co-infection or pneumocystis carinii pneumonia (PCP) infection. The diagnosis of pulmonary TB in 50% of patients in this study based on thorax X-rays and TB scores. Several existing studies did not mention the comorbid diagnosis obtained in children with HIV. The low rate of pulmonary tuberculosis infection in the Indian study compared to this study, since the majority of patients were found in clinical stages one and two with a mean CD4% greater than 15%.²¹

The mean Hb concentration in this study was 11.99 g/dl with a standard deviation of 2.56. The TREAT study conducted in Asia Pacific showed the mean Hb was 10.4 g / dl²⁰. A study in Uganda showed a median Hb value was 10.5 g/dl. The lowest Hb was 4.3 g / dl²². The lowest Hb in this study was 7.4 g/dl. Low levels of hemoglobin or anemia in children with HIV are caused by many factors. Poor nutrition in patients can lead to micronutrient deficiency resulting in anemia. Chronic infection, autoimmune hemolysis, drug side effects, and persistent B19 parvovirus infection can cause anemia in HIV infection. Zidovudine (AZT) administration can have side effects of bone marrow suppression that may cause anemia²³.

A study conducted by Agarwal et al in 2007 showed a significant difference in CD4% between clinical stages. The decrease in CD4 cell count may lead to a decrease in the immune system resulting in opportunistic infections²¹. WHO clinical stage is a degree of clinical features in HIV patients demonstrated by the accumulation of symptoms including the number of opportunistic infections acquired. The more opportunistic infections acquired, the higher the clinical stage¹⁶. In this study, there were only significant differences in CD4 counts between clinical stages one and two, and clinical stages two and three.

Weakness of study

This study could not be analyzed by Kruskal Wallis test because the data did not meet the criteria.

Conclusion

In conclusion, HIV-infected children had sex equal distribution. Most frequent risk factor of transmission was perinatal infection. Pulmonary TB was the most frequent co-infection condition. Most of HIV-infected children in this study were immune-suppressed. There were differences of CD4 count between each clinical stage

Conflict of interest

We declare that we have no conflict of interest.

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Different factors influencing fertilizers adoption in agricultural production in Rwanda

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Abstract

Rwanda is facing low agriculture growth rate and this low agricultural growth rate could be attributed to low level of productivity due to various factors of production including land and access to agricultural inputs. The decline of land productivity is caused by over cultivation of the same piece of land continuously without giving it a chance to regenerate its fertility. The use of intensive farming methods to improve yields has gained support from the government. The government of Rwanda has taken various measures to promote fertilizer use like discounting its price, opening up the market to private sector, supporting policies and laws. Despite efforts to promote fertilizer use, adoption of fertilizer by the farmers is remaining low. Our study was to find out the factors that influence adoption of fertilizers, identify the socio-economic characteristics of farmers, and the challenges that farmers face in adoption of fertilizers. A survey was conducted in the eastern part of Rwanda in the year 2018 to investigate the different factors influencing fertilizer adoption by farmers. A sample of 80 people was selected. Where 10 people were face to face interviewed and for 70 people questionnaire-interview was used to collect data. A sample was selected randomly and a statistical software SPSS was used to analyze data. The study has shown that fertilizer adoption is influenced by gender, educational level and age of the farmer, land size, land ownership marital status and socio-economic features of the farmers. Extension service was the main factor to influence adoption of fertilizer by the farmers.

Key words: adoption, agriculture, factors, fertilizers, Rwanda

I. INTRODUCTION

Since the mid-1960s, 50-75% of the crop yield increases in non-African developing countries have been attributed to fertilizers (Viyas, 1983). Fertilizer also complements other major inputs and practices e.g.: improved seeds, better water control, proper agricultural practices that have had the greatest impact on yield. Soil nutrient depletion is a common consequence of most African agriculture (Tomislav Hengl, 2017). The government of Rwanda has put food security among its major national priorities (World Bank, 2016). In this country's context, agricultural intensification must be the main stay of any sustainable agricultural policy. Security of land for large-scale farming; very high demographic growth, persistent food shortages since the 1980s and low level in income generated by other sectors of the national economy make it imperative to use intensive methods for agriculture. This intensification must be aimed at boosting production, productivity and producers' incomes (Cantore, 2010). Fertilizers constitute one of the most important inputs for the agricultural sector (World Bank, 2013). The ministry of Agriculture, Livestock Resources attaches primordial importance to the use of agricultural inputs in general, with a special emphasis on fertilizer. In Rwanda, the use of fertilizers falls far short of the norm for East Africa (MINAGRI, JOURNAL, 2009). In a context of an increasing population, seriously diminishing soil fertility, and limited contributions from manure and other organic sources, the solution must be to increase chemical-fertilizer inputs to Rwanda agriculture. To ensure this increase, bottlenecks must be removed all along the marketing and production chain for fertilizer- from importing and marketing to agricultural extension. From 1990s, the Rwanda government removed import taxes on fertilizer imports and gave responsibility for fertilizer marketing to the private sector; and, starting in 2000, a World Bank financed project began promoting fertilizer imports and marketing. In addition, an important report documenting the profitability of fertilizer use by region and crop has appeared (MINAGRI, JOURNAL, 2009). The Government of Rwanda (GOR) has proposed the following actions and policies aimed at enhancing the use of improved farm inputs: 1. Identify the potential for fertilizer use by agro-ecological zones (the most fertilizer responsive crops and varieties and the most effective types of fertilizer for each zone). 2. Promote an increased supply (imports) of fertilizer progressively from the current annual average of 4,000 tons to 10,000 tons within five years. 3. Reinforce farmers' technical capacity to use fertilizers through extension programs. 4. Reinforce farmers' interest in and access to fertilizers (by improving the credit system, improving markets for high value crops, etc.). 5. Create an environment which encourages private sector fertilizer marketing (importation, distribution, etc.) through the reduction of import and sales taxes and improvement in

the physical infrastructure (roads, stores, etc.) to make the business profitable. Agriculture shall be a priority for government budgeting in order to achieve food security and using agriculture for growth and poverty reduction (world bank;2008).the agriculture sector can provide a substitute for welfare system in those countries unable to provide unemployment insurance or other types of social services for retiring workers and employees who lose their jobs during structural change or income shocks .the agricultural sector embodies many activities in which majority of the population can be employed .agriculture gives up the processing ,storing selling, transporting and financing prices giving way to a more complex specialized and integrated process (Davis and Golbeg ;1957; Newman ;1989;Holt and pryor ;1989;FAO; 1997). There is low use of fertilizers, pesticides and other agricultural inputs .this contributes little to long term fertility management .the consumption of fertilizer in Rwanda was estimated at the level of 10.9 kg/ha in 2016 which is lower compared to 19.7 kg/ha 2015 (a reduction of 44.91%) (knoema, 2016) and is lower than that in the region . it has been estimated that the average fertilizer application in sub Saharan Africa is a mere 7kg/ha compared to levels of 200kg of N/ha in most OECD countries.(MINAGRI ;2009).For Rwanda, the average of fertilizer application is 10tons of manure at the second ploughing time, add 250kg of NPK 17, 17, 17 per hectare or 100kg of DAP 18,46,0 at the time of sowing or after emergence, 45 days after sowing, 50 -100kg of urea is applied .in the acidic soil, apply 2.5 tons of lime per hectare (Agenda Agricole, 2010).

II. METHODOLOGY

This study was designed in the form of survey targeting farmers and was about to assess what factors affecting fertilizer adoption in agriculture production .We used a combination of simple random and purposive sampling methods.The study was carried in Nyagatare district, Eastern province, its annual rainfall is around 827mm/an, and Elevation of 1414m, its latitude is: 1°18'0.00"S, 30°19'30.00"E, Longitude is: 30.3250m.

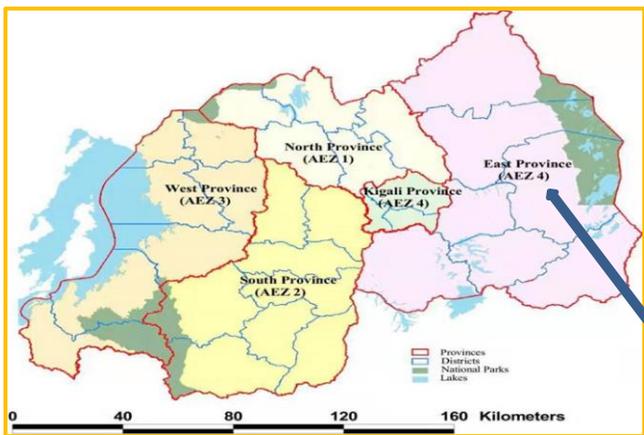


Figure1.Subdivision of the major agro ecological zone in Rwanda (FAO)

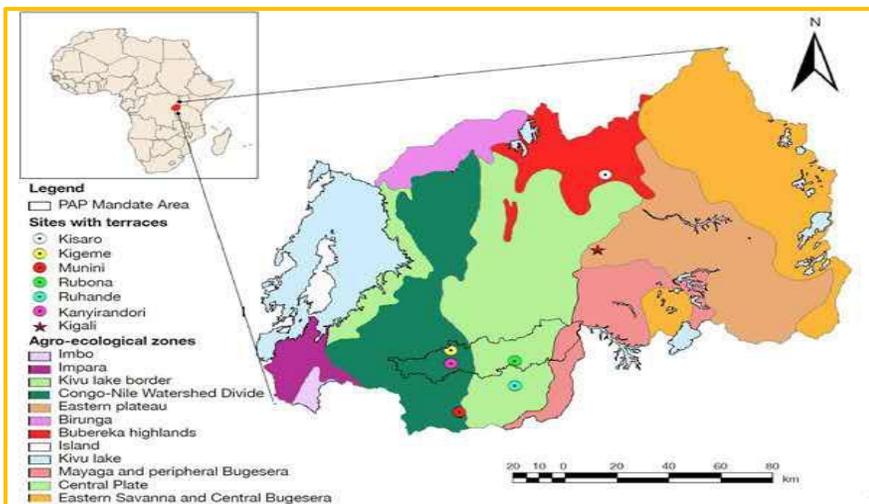


Figure 2. Location of Rwanda within Africa (pascal N.rushemuka, 2013)

A questionnaire was prepared and distributed to the interviewers where 10 among 80 individuals of the sample were face to face interviewed, and then we used a statistical package for social sciences (SPSS) to analyze. The targeted population in this research was made up with various crops producers. The profiles of the respondent are qualitatively and quantitatively analyzed in the sense that both qualitative and quantitative data are analyzed given that the questionnaire itself comprised both objective and subjective sections. As such objective responses are analyzed quantitatively while descriptive (subjectively) data are analyzed thematically. However, both types of data, because they are corroborative and are responding to the same question, are therefore treated simultaneously.

III. RESULTS

3.1. GENDER OF THE FARMERS

Agricultural activities in Rwanda are performed by both male and female but the degree of involvement varies across crops depending on whether they are cash crops or food crops (Chantal Ingabire, 2018). Our study found that the majority of growers was female and counts 60.0% and male counts 40%. The fertilizer use is higher adopted by male than female and this contribute to the low productivity because the big number of farmers (female) doesn't use fertilizers. The survey has shown that the percentage of male growers who use fertilizer is 27.5% while for female growers is 22.5%. A chi-square was used to test a difference in proportion of fertilizer use across male and female farmers. Findings showed that the difference was significant at 5% level of significance.

Table 1. farmers division by their gender (survey 2018)

Gender of respondent

| | Frequency | % |
|--------------|-----------|-------|
| Male | 32 | 40.0 |
| Valid Female | 48 | 60.0 |
| Total | 80 | 100.0 |

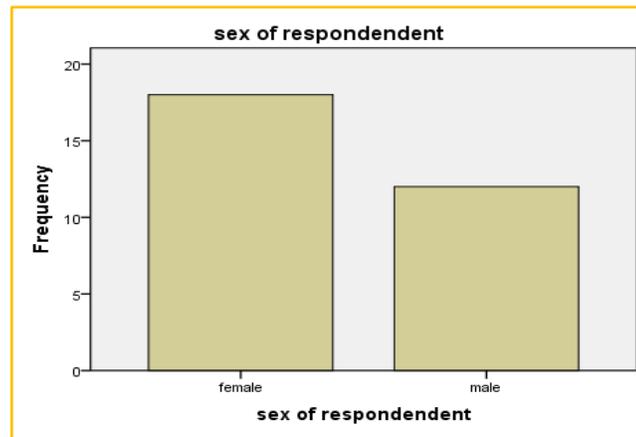


Table 2. relationship between gender and fertilizer use by the farmers (survey 2018)

Gender of respondent and fertilizer use

| | Fertilizer use | | Total | Chi-square test |
|--------|----------------|-----------|----------|-----------------|
| | Yes | No | | |
| male | 22(27.5%) | 10(12.5%) | 32(40%) | 0.005 |
| female | 18(22.5%) | 30(37.5%) | 48(60%) | |
| Total | 40 | 40 | 80(100%) | |

3.2.AGE GROUP OF THE FARMERS

The age group of the respondents has an important implication on the performance of farming activities by a given family. This is because it influences decisions that a farmer makes in carrying out various operations .it has been documented that young people are more likely to take risks associated with innovation compared to older farmers (Rogers, 1983; Alavalapati etal, 1995; (RA Corner Thomas, 2015).

Table 3.farmers division per age group(survey 2018)

Age group of respondent

| | Frequency | % |
|--------------------|-----------|-------|
| 20-29 years | 18 | 22.5 |
| 30-39 years | 16 | 20 |
| Valid 40-49 years | 35 | 43.75 |
| 50 years and above | 11 | 13.75 |
| Total | 80 | 100.0 |

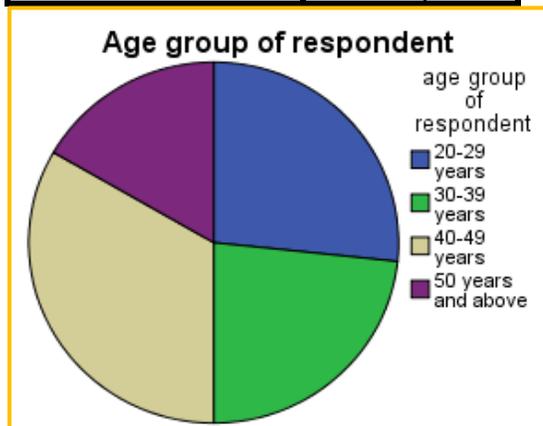


Figure 4.pie chart of farmers division by their age group(survey 2018)

From this study, farmers were categorized into four (4) major age groups of ten years of interval each group; 20-29, 30-39, 40-49 and 50 and above. Youngest growers 20-29, youthful growers 30-39, 40-49 and old farmers 50 and above. Findings have shown that the largest number of respondents fell into the age group of 40-49 that makes up 43.75% of the respondents. It is followed by age group of 20-29 which makes 22.55%, 30-39 makes up 20% and the smallest group is lying between 50 and above which makes 13.75% of the total respondents. A chi-square test was used to test the difference in proportions of fertilizer use across age of respondents have shown that the difference was significant at 5% level of significance.

Table 4.relationship between age group of farmers and fertilizer use (survey 2018)

Age group of respondent and fertilizer use

| | Fertilizer use | | Total | Chi-square test |
|--|----------------|----|-------|-----------------|
| | Yes | No | | |
| | | | | |

| | | | | |
|--------------------|------------|----------|------------|-------|
| 20-29 years | 11(13.75%) | 8(10%) | 19(23.75%) | 0.005 |
| 30-39 years | 9(11.25%) | 7(8.75%) | 16(20%) | |
| 40-49 years | 13(16.25%) | 20(25%) | 33(41.25%) | |
| 50 years and above | 5(6.25%) | 7(8.75%) | 12(15%) | |
| Total | 37 | 43 | 80(100%) | |

3.3.MARTIAL STATUS OF THE FARMERS AND FERTILIZER USE

As shown from the representation below the largest number of respondents is married that makes up 63.75% of the total respondents, 15% of respondents are single, 13.75% widowed and 7.5% are separated .The results indicated that the majority (63.75%) of the growers are married. This means that married people who may engage in the practice of farming for the needs of their families are more than others and are likely to use more fertilizer than widowed, single and separated as it is shown; it makes up 28.75% of the total respondents. A chi-square test was used to test the difference in proportions of fertilizer use across marital status of the respondents. Findings showed that the difference was not significant at 5% level of significance.

Table 5.marital status and fertilizer use by farmers (survey 2018)

marital status of the respondent and fertilizer use

| | Frequency | Yes/% | No/% | % |
|---------------|-----------|-------------|----------|-------|
| Single | 12 | 7(8.75%) | 5(6.25%) | 15 |
| Married | 51 | 23(28.75 %) | 28(35%) | 63.75 |
| Valid widowed | 11 | 4(5%) | 7(8.75%) | 13.75 |
| separated | 6 | 2(2.5%) | 4(5%) | 7.5 |
| Total | 80 | 36(45%) | 44(55%) | 100 |

3.4.EDUCATIONAL LEVEL OF THE FARMERS AND FERTILIZER USE

Educational level of the farmers plays a great role in influencing the level of crop management. Education or literacy enables farmers to seek, obtain and process information on the improved crop management practices or technologies (RA Corner Thomas, 2015).The results showed that 50% of the respondents have a primary level of education .26.25% secondary level of education, 17.5% never attended any formal education program and only 6.25% of the respondents have a university level of education and they all use fertilizers. The level of literacy of farmers in nigeria highly affects agriculture practice (Okpachu, 2014)The higher education level the higher influence on agriculture production (increase local food availability ,farmer income and sustainability of agricultural practice (world, 2010) unfortunately their level of participation is low. Knowledge about agriculture focused on women is very crucial (Gwivaha, 2015) The findings indicate that most of respondents have learnt and this means that farmers have capability to utilize extension advisory information from the government, NGOs or the fellow farmers on the use of improved technologies. A chi-square test was used to test the difference in proportion across level of education of respondent. Findings showed that the difference was not significant at 5% percent level of significance.

Table 6.relationship between education level and fertilizer use by farmers (survey 2018)

Educational level of respondent

| | Frequency | yes | no | % |
|----------------|-----------|-----------|-----------|-------|
| never attended | 14 | 5(6.25%) | 9(11.25%) | 17.5 |
| Valid Primary | 40 | 18(22.5%) | 22(27.5%) | 50 |
| Secondary | 21 | 12(15%) | 9(11.25%) | 26.25 |
| University | 5 | 5(6.25%) | 0 | 6.25 |
| Total | 80 | 38 | 42 | 100 |

3.5.SOCIO-ECONOMIC CHARACTERISTIC OF FARMERS

Socio-economic characteristics of the farmers are the major factors that can influence the level of agricultural practices, yield and total income of the farmers.

3.5.1.FARM SIZE

The total amount of agricultural inputs and the cost can depend on farm size.our study showed that most of the farmers who use fertilizer are those who have big farms and those who have the smaller land use fertilizer at low level.We have grouped the size of land of the farmers into three groups; less than 0.5 ha, 0.5-1ha and 1-2ha .from the findings farmers with land size of 0.5-1ha highly use fertilizers and count 50%, farmers with land size of 0.5-1ha count 31.25 % and farmers with land size less than 0.5ha count 18.75%. in china approximately 0.1 ha for each parcel is directly associated to the overuse of agricultural chemicals (Yiyun Wu, 2018) A chi-square test was used to test the difference in proportion of fertilizer use across land size of the respondent. Findings showed that the difference was significant at 5% level of significance.the size of farms should not have been a problem on production if farmers had intensive access on agricultural inputs like fertilizers (Carr, 2015).

Table 7.relationship between land size and fertilizer use by farmers (survey 2018)

| | Fertilizer use | | Total | Chi-square test |
|--------------------|----------------|-----------|------------|-----------------|
| | Yes | No | | |
| land size < 0.5 ha | 6(7.5%) | 9(11.25%) | 15(18.75%) | 0.001 |
| 0.5-1ha | 18(22.5%) | 22(27.5%) | 40(50%) | |
| 1-2ha | 18(22.5%) | 7(8.75%) | 25(31.25%) | |
| Total | 42(52.5%) | 38(47.5%) | 80(100%) | |

3.5.2.LAND OWNERSHIP

From the findings it has been shown that people who own their lands are those who use fertilizer and count 46.25% of respondents whereas those hire or rent the land are less to use fertilizer and count 10% of the respondents anyone to invest in a part of land wants to make sure that will benefit from the all kinds of efforts and sacrifices, investments of labor, capital ,materials on that land will bring benefit (Lawry, 2015) .A chi-square test was used to test the difference in proportion of fertilizer use across land ownership of respondent. Findings showed that the difference was not significant at 5% level of significance.it is not only the shortage of land that can affect the output of agriculture but the land tenure, lack of proper land ownership and lack of improved agricultural technology can influence as it has revealed in Ethiopia,Namibia,Bangladesh and other sub-Saharan Africa and south Asian countries (Shimelles Tenaw, 2009).

Table 8.relationship between land ownership and fertilizer use by farmers (survey 2018)

Land ownership and fertilizer use

| | | Fertilizer use | | Total | Chi-square test |
|----------------|-----|----------------|------------|----------|-----------------|
| | | Yes | No | | |
| Land ownership | yes | 37(46.25%) | 15(18.75%) | 52(65%) | 0.295 |
| | No | 8(10%) | 20(25%) | 28(35%) | |
| Total | | 45(56.25%) | 35(43.75%) | 80(100%) | |

3.5.3.SOIL FERTILITY

The fertile soil has many properties such as rich in nutrient necessary for basic plant nutrition, including N, P, and K also contain sufficient minerals element for plant nutrition including sulfur, zinc, boron manganese etc. and also contain soil organic matter improves soil structure and soil moisture retention. Because of over cultivation of piece of land, soil erosion, growth of plant can cause a decline of nutrient, minerals, and soil organic matter within the soil. So in order to retain the fertility of soil, the advises are available for farmers like conservation, tillage, crop rotation and use of legumes, soil cover , crop residues, organic fertilizers like manure and compost, and inorganic fertilizer application (FAO 2006) .The findings showed that 83.75% of the farmers at survey area confirmed that their soils are not enough fertile to sustain high crop productivity while 16.25 % confirmed that their soil is fertile as it is shown in the table above.

Table 9.distribution of respondent views on soil fertility(survey2018)

Soil fertility

| | | yes | no | Total (%) |
|-------|----------------|------------|------------|-----------|
| Valid | Soil fertility | 13(16.25%) | 67(83.75%) | 80(100) |

3.5.4.LOSS OF SOIL FERTILITY

The knowledge of the causes of soil fertility decline is a big step towards formulation of solutions for alleviating the problem. Farmers in this survey area were asked to state ways through which their soils loose fertility. Findings showed in the table 10 below that 46.25% of the respondent answered that the soil lose its fertility because land has been continuously ploughed,35% because of soil erosion while 15% respondents that there are some other different factors lead to loss of soil fertility growing crops,soil erosion and leaching are the main factors of soil nutrients decline.organic matter can mainly lost from the soil through continuous cropping with crop debris removal or burning and frequent tillage (government, 2017) . Most agriculture activities on sloping landscapes increase the potential for soil erosion and it requires long time to recover the eroded land (Al-Kaisi, 2002).According to this survey, fertilizer application has to be taken into consideration as one way to regenerate soil fertility.

Table 10.respondents view on the ways through which soil fertility declines

Loss of soil fertility

| | | frequency | % |
|-------|-----------------------|-----------|-------|
| Valid | continuously ploughed | 37 | 46.25 |

| | | | |
|--|--------------|----|-------|
| | | 28 | |
| | Soil erosion | | 35 |
| | Others | 15 | 18.75 |

3.5.5.MEASURES TO IMPROVE SOIL FERTILITY

Different measures can be taken to regain the fertility of the soil; some of them are use of different fertilizer (organic and inorganic fertilizer), crop rotation and others. In this survey farmers were asked about what measure they use to improve their soil fertility. Findings showed that 47.5% of the respondents do not use farm yard manure to improve soil fertility, 13.75% of the respondent use crop rotation, 17.5% of the respondent don't use any method and the smallest number of respondent which count 8.75% use chemical fertilizers.measures like crop rotation,choice of adapted crop varieties,legume cover crops,tillage,weed control can improve soil fertility but additional of other inputs like fertilizers is also needed (Martens, 2004).

Table 10.respondents view on the ways through which soil fertility declines

Measures taken to improve soil fertility

| | Frequency | % | Total % |
|-------------------------------|-----------|-------|---------|
| Valid use of farm yard manure | 38 | 47.5 | |
| crop rotation | 11 | 13.75 | |
| use of chemical fertilizer | 7 | 8.75 | |
| None | 14 | 17.5 | |
| Total | 80 | | 100.0 |

3.5.6.FERTILIZER ACCESSIBILITY

Fertilizer accessibility is the major factor in fertilizer application. Many farmers do not use fertilizer because is difficulty for them to access on it.

Findings presented in the table 12 above showed that the majority of farmers do not access on fertilizer easily and count 83.3% of the total respondent while 16.7% of respondent are only ones who responded that it is easy for them to access on fertilizer.

Table 12.respondents view on fertilizers accessibility (survey 2018)

Fertilizer accessibility by respondent

| | Frequency | % | Cumulative % |
|------------|-----------|------|--------------|
| Valid easy | 23 | 16.7 | |
| difficult | 57 | 83.3 | |
| neutral | 80 | | 100.0 |

3.5.7.WAYS TO OBTAIN FERTILIZERS

The government of Rwanda has developed a policy to give a loan of fertilizer to the farmers in order to ease them to access on fertilizer and to attract farmers to adopt chemical fertilizer use because the fertilizer that we use are imported but remain of high price. The farmers are supposed to pay back fertilizers after selling what they harvested. The government is encouraging farmers to make cooperatives where access on fertilizer may be easy for them. (MINAGRI2005). The size of Rwanda's fertilizer market is now more attractive to the private sector to ensure the efficiency accessibility (reduced capital, delivery ,storage and lower the cost to the

smallholder farmers) the government also developed programs to increase awareness and credit for farmers in partnership with private sector players and donors then it can as importer and distributor (Minagri, 2012). Findings shown in the table 13 above showed that the majority of the respondents which make 43.75% do not have any way to obtain fertilizer (do not use fertilizer), 13.75% of respondents obtain fertilizer through purchasing and 16.25% of the respondents obtain fertilizer by loan from government. This shows that the fertilizer adoption is still low.

Table 13. distribution of respondent views on ways to obtain fertilizer (survey 2018).

| | Frequency | % | Cumulative % |
|------------|-----------|-------|--------------|
| purchase | 11 | 13.75 | 13.75 |
| Loan | 34 | 16.25 | 16.25 |
| Valid None | 35 | 43.75 | 43.75 |
| Total | 80 | | 100.0 |

3.5.8. EXTENSION SERVICE

Extension services are the flow of information from the extension agent to the farmers . The ministry of agriculture is the major source of agricultural information (extension services). Therefore it is hypothesized that contact with extension workers will increase farmer’s likelihood of adopting new technologies like fertilizer application. Good extension programs and contacts with producers are the key aspect in technology dissemination and adoption (Danso-Abbeam G. , 2018). During our survey, the farmers were asked to state the number of times they receive or they meet with extension agent in a given period. Findings were presented in table 14 above and showed that the majority of farmers who received the extension services use fertilizers and count 27.5% and those who do not receive extension services their level of fertilizer use is low and count 15%. 16.25% they don’t receive extension services but they can use fertilizer while the big number 57.5% of the farmers don’t get extension services and doesn’t use fertilizers. A chi-square test was used to test the difference in proportion of fertilizer use across extension services. Findings showed that the difference was not significant at 5% level of significance.

Table 14. relationship between extension service and fertilizer application (survey 2018)

Extension services and fertilizer use

| | | Fertilizer use | | Total | Chi-square test |
|--------------------|-----|----------------|------------|-----------|-----------------|
| | | yes | no | | |
| Extension services | yes | 22(27.5%) | 12(15%) | 34(42.5%) | 0.002 |
| | no | 13(16.25%) | 33(41.25%) | 46(57.5%) | |
| Total | | 35(43.75%) | 45(56.25%) | 80(100%) | |

3.6. MAJOR CHALLENGES TO THE FERTILIZER USE BY FARMERS

Many of the respondents said that fertilizer is very expensive that is why they do not use fertilizers and those are counting 46.25% of the total respondents, 30% represent those who said that they do not use fertilizer because of limited knowledge on fertilizer use and application and 23.75% of respondents said that they do not use fertilizer because fertilizer is not readily available. High cost of investment ,inadequate physical infrastructure,insufficiency storage facilities,limited funding by the government and private sectors low income of farmers to purchase agricultural inputs and lack of awareness by farmers on better farming methods are the major challenges to the agriculture in africa and rwanda (Ipar, 2009).

Table 15. Major challenges in fertilizer use by farmers(survey 2018)

the major challenges in fertilizer use by farmers

| | Frequency | % |
|-----------------------|-----------|-------|
| very expensive | 37 | 46.25 |
| limited knowledge | 24 | 30 |
| not readily available | 19 | 23.75 |
| Total | 80 | 100.0 |

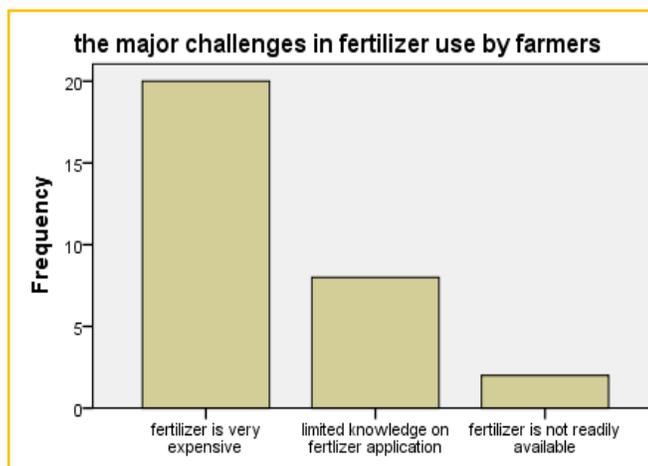


Figure 2. major challenges in fertilizer use by farmers (survey 2018)

IV. CONCLUSION, DISCUSSION AND RECOMMENDATION

4.1. CONCLUSION AND DISCUSSION

Findings showed that factors such as age, farm size, educational level, marital status were not significant at 5% level of significance. Gender (sex), extension services and farm size were significant at 5% level of significance. Extension services were shown to be an important source of knowledge for farmers that significantly influenced adoption of fertilizer application through teaching farmers. (Tilley, 2018) Without fertilizers nature struggles to replenish the nutrients in the soil (Amy Quinton, 2018) currently there is no short cut for substantial increases in production without using either organic or inorganic fertilizers. Gender was shown a great contribution in fertilizer adoption by farmers. male farmers are the ones with high adoption rate while females are late adopters. the fact that a big number of farmers is female is still a challenge for fertilizer adoption. it has revealed that men are highly mobile and dominate some public spaces where they can access knowledge and information easier than women who use to stay at home. (Netsayi N. Mudege, 2017) There is a scarcity in cultivated land in survey area and this was shown a great influence in fertilizer adoption. farmers with big land are those who use fertilizer and those with smallest land (less than 0.5ha) use less fertilizer. The factor that most of the farmers have small land was still a challenge for adoption of fertilizer. The effect of farm size has been variously found to be positive (Mc Namara, Wetzstein, and Douce, 1991; Abara and Singh, 1993; Feder, Just and Zilberman, 1985; Fernandez-Cornejo, 1996; Kasenge, 1998), negative (Yaron, D. Dinar, A and Voet, H., 1992) or even neutral to adoption (Mugisa-Mutetikka, M., A. F. Opio., M. A. Ugen., P. Tukamuhabwa., B. S. Kayiwa, C. Niringiye and E. Kikoba., 2000). Farm size affect adoption cost, risks perceptions, human capital, credit constraints, labor requirements, tenure arrangement and more. (Yu Sheng, 2016) With small farms, it has been argued that large fixed cost become a constraint to technology adoption, (Abara and Singh, 1993) especially if the technology requires substantial amount of initial set up cost, so-called "lumpy technology". In relation to lumpy technology, Feder, Just and Zilberman, 1985). further noted that only larger farms will adopt these innovations. With some technologies the speed of adoption is different for small and large scale farmers.

4.1.1. COST OF TECHNOLOGY

The decision to adopt is often an investment decision. And as Caswell et al, (2001) note, this decision presents a shift in farmers' investment options. Therefore adoption can be expected to be dependent on cost of a technology and on whether farmers possess the required resources. Technologies that are capital intensive are only affordable by wealthier farmers (El Oster and Morehart; 1999) and hence the adoption of such technologies is limited to larger farmers who have the wealth (Khanna, 2001). In addition, changes that cost little are adopted more quickly than those requiring large expenditures hence both extent and rate of adoption may be dependent on the cost of a technology. Economic theory suggests that a reduction in price of a good or services can result in more of being demanded.

4.1.2.AGE OF ADOPTER

Age is another factor thought to affect adoption the possibility of fertilizer adoption is decreasing as the age of farmers increases where young farmers are more likely to adopt new technologies than elder ones (Berihun Kassa Hailu, 2014) .age is said to be a primary latent characteristic in adoption decisions. However there is contention on direction of the effect of age on adoption .age was found to positively influence adoption of sorghum in Burkina Faso (Adesiina,Akinwumi A.and Jojo Baidu-Forson, 1995).The effect is thought to stem from accumulated knowledge and experience of farming systems obtained from years of observation and experimenting with various technologies .in addition ,since adoption pay –offs occur over a long period of time while costs occur in the earlier phases ,age of the farmer can have a profound effect on technology adoption .Older farmers, perhaps because of investing several years in a particular practice may not want to jeopardize it by trying out a completely new method.In addition, farmers perception that technology development and the subsequent benefits, require a lot of time to realize cab reduce their interest in the new technology because of farmers' advanced age and the possibility of not living long enough to enjoy it (Cawell et al., 2001; Khanna, 2001).Furthermore, elderly farmers often have different goals other than income maximization; in which case, they will not be expected to adopt a technology do so at a slow pace because of their tendency to adapt less quickly to a new phenomenon (Tjornhom, 1995).

4.1.3.EDUCATION LEVEL

Studies that have sought to establish the effect of education on adoption in most cases relate it to years of formal schooling (Tjornhom, 1995, Feder and Slade, 1984). Generally education is thought to create a favorable mental attitude for the acceptance of new practices especially of information intensive and management intensive practices (Waller et al .1998; Caswell et al., 2001).educated farmers are believed to acquire ,analyze and evaluate information on different agricultural inputs and markets (Berihun Kassa Hailu, 2014).

4.1.4.GENDER CONCERNS

Gender issues in agricultural production and technology adoption have been investigated for a long time .most show mixed evidence regarding the different roles men and women play in technology adoption.in the most recent studies (Doss,Cheryl R.Michael L.Morris, 2001)in their study on factors influencing improved bean technology adoption in Ghana, and over field and Fleming 2001.Study in Nigeria showed that the most farmers who adopted cassava processing technology where male and married (Udensi, 2017).Since adoption of a practice is guided by the utility expected from it, the effort put into adopting it is reflective of this anticipated utility. It might then be expected that the relative roles women and men play in both “effort and adoption are similar, hence suggesting that males and females adopt practices equally.

4.2.RECOMMENDATION

Factors such age, sex, family size, educational level, farm size and extension services may enhance or limit the adoption and diffusion process of the new technologies. To develop a realistic adoption of agricultural technologies in the area as well as the whole country, these factors have to be taken into consideration. Especially extension services should be increased. The children must attend schools that teach the courses of agriculture in order to top up the extension officers who will be in charge of delivering services about agricultural technologies. Furthermore extension unit of the state ministry of agriculture should be strengthened to educate farmers more about fertilizer usage. There is no way found to increase land size but arable land can be increased through proper habitation (Imidugudu), land consolidation for land use efficiency and soil erosion control. In survey area individual farmers were asked and it has shown that their level of fertilizer adoption was low. Therefore farmers should work in groups (cooperatives) because the information flow is easy for people in group rather than individual person. Further research is needed to assess if the contribution of culture and religious aspects on how farmers consider chemical fertilizers and other advanced agricultural inputs.

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Comparative Study On Self-Compassion And Rumination Among Working And Non-Working Diabetic Women

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Abstract- Diabetes that frequently impairs the physical ability and psychological difficulties among diabetic patients which accompanied by increased sufferings and compromised quality of life. The present research study describes how self-compassion offer supplementary framework for the improved management of diabetes among working and non-working women by providing protection against rumination and its downstream effects. Self-compassion suppresses the role of rumination and alleviates depression. Survey research design was adopted for this present study. Sample of (N=218) 109 Working and 109 non-working women with Purposive sampling method was used for this research. Data was collected using Self-Compassion Scale (SCS) developed by Kristen Neff and Ruminative Responses Scale (RRS) developed by Treynor, Gonzalez and Nolen- Hoeksema (2003). The data obtained were calculated by using Descriptive statistics 't'-test and Pearson's correlation of co-efficient method. Results shows that there was a strong negative correlation between rumination and self-compassion among working and non-working diabetic women and no significant difference between working and non-working diabetic women on self-compassion and rumination.

Index Terms- Diabetes, Rumination, Self-Compassion and working women

I. INTRODUCTION

The Prevalence of diabetes rise is alarming and many research studies ascribe mostly of the increasing lifestyle diseases. One such is Diabetes mellitus. Diabetes Miletus is a metabolic disorder that is characterized by high blood sugar level over a prolonged period of time. Working more hours makes women more prone to chronic stress, inflammation and hormonal changes that leads to diabetes. Individuals who work more hours may have less time to take care of themselves on diet intake and physical activity. These individuals are more stressed and have fewer sleeping hours; this might lead to develop diabetes. Individuals who work more than 40 hours a week experience higher level of stress and disrupt sleep cycle and lead to serious mental health, this in turn changes in weight and insulin levels and contributes to diabetes.

Research studies shows various cognitive coping strategies on diabetes, which includes negative mechanism of blaming oneself for their own experience, blaming others for one's own

experiences and thinking all the time about negative events (rumination). It is defined as the repetitive thoughts to cope with self-discrepancy that are directed only towards the content of self-referent but not towards on immediate goal- directed. Several research studies show that the higher levels of rumination are associated with an impaired quality of life. Rumination leads to think about situations with negativity and feel worse. Women ruminate, brood often and more vulnerable to depression. Breaking rumination habit will ease own stress level and improve the ability to cope with challenges. Compassionate approach will lead to greater awareness of health, more resilience to deal health related setbacks and nurturing mental response to distressing thoughts and events.

Diabetes is a complex disease which requires evaluation of behavior- feeling compassion about oneself which is essential to self-management. Research shown that people who treat themselves with compassion have extreme psychological well-being. Self-compassionate individual tends to have fewer extreme reactions to problem. Compassionate approach will lead to greater awareness on health, nurturing mental responses to distressing thoughts and events.

Self-compassion can be helpful in many ways when living with chronic condition of diabetes. It's about having the resilience to deal day-to-day conflicts in a more positive and empowering way. Diabetes affects mentally, physically, socially and emotionally. Stress of living with diabetes can lead to anxiety, depression and poor diet control. Self-compassion will improve emotional resilience to face these difficulties. By treating with compassion that surrounds with a blanket of acceptance rather than judgement.

Mohamad and Warda (2018) the study aimed to assess the correlation between socio demographic factors and ruminations of thought among type 2 diabetic women. The study carried out using descriptive research design. The results of the study show that negative rumination is high in diabetic women and rumination thought of the study group strongly negatively correlated with socio demographic factors.

Friss (2015) the study explains that high level of self-compassion is associated with mental and physical health benefits. 110 diabetic women were completed questioners' self-compassion, diabetic distress and depression. They concluded that self-compassion might buffer patients from the negative metabolisms' consequences of diabetic distress.

Many clinical studies were done related to diabetics among women. The present study was a modest attempt to fill up the research lacuna to some extent. There was a gap in analysis of the relationship between self-compassion and rumination. So, the present study carried to overcome the limitations of the past studies while also incorporating suggestions given by past studies, wherever feasible.

II. RESEARCH ELABORATIONS

Aim

- To find the relationship between Rumination and Self-Compassion among working and non-working diabetic women.
- To find the difference between Rumination and Self-Compassion among working and non-working diabetic women.

Objective

- To find out the relationship between Rumination and Self-Compassion among diabetic women.
- To find out the difference between working and non-working diabetic women on Rumination.
- To find out the difference between working and non-working diabetic women on Self Compassion.

Hypotheses

- There is no significant relationship between Rumination and Self-Compassion among diabetic women.
- There is no significant difference between working and non-working diabetic women on Rumination.
- There is no significant difference between working and non-working diabetic women on Self Compassion.

Survey research design was adopted for the study. The sample for the present study was 218(109 working and 109 non-working) diabetic women. The sample includes diabetic women of age between 35-45. Purposive sampling method was used. Rumination Scale- short developed by Treynot et al., (2003) it consists of 22 items with 4-point Likert's scale and Self-Compassion scale developed by Dr. Kristen Neff. (2003) consists of 12 items with 5-point scale. All participants were given a brief detail about the research and its purpose. They signed the consent form and then completed questionnaires. Then the collected data analyzed using Pearson's correlation method and student t test. The statistical analysis was done with the help SPSS version 16.

III. RESULTS

Table I shows the correlation between Rumination and Self compassion among diabetic women.

| Variables | Rumination |
|-----------------|----------------|
| Self-compassion | -0.80** |

** Correlation is significant at 0.01 level.

The result of Pearson's correlation shows that there is a strong negative correlation between rumination and self-compassion

among diabetic women. The calculated 'r' value is greater than that of the table value at .01 level of significance. Thus, the null hypothesis is rejected.

Table II shows the difference between Rumination and self-compassion between working and non-working diabetic women.

| Variables | Sample | Mean | SD | T |
|------------------------|---------------------------|-------|------|------------|
| Rumination | Working diabetic women | 68.54 | 6.72 | 0.49 NS |
| | Nonworking diabetic women | 67.90 | 6.85 | |
| Self-compassion | Working diabetic women | 20.27 | 5.81 | 0.40 NS |
| | Nonworking diabetic women | 20.94 | 6.03 | |

NS- not significant

The t-test result shows that there is no significant difference between diabetic women on self-compassion and rumination. Thus, the null hypothesis is accepted.

IV. CONCLUSION

Past empirical research study examined the link between self-compassion and rumination. Results of this study showed negative correlation between Rumination and Perceived Self compassion among diabetic women. Rumination is common among working and non-working diabetic women. New studies should be conducted in order to enhance the quality of diabetic women. Further it should be specifying how these self-compassion techniques can be implemented in treating rumination among diabetic women. Research study can be done on different variables and population with large sample. Early managements of ruminative thoughts to avoid negative thoughts, stress, depression and psychosocial problems. Effective Psycho education, workshop on diabetes and the complications of the disease should be periodically conducted on both urban and rural areas. Early detection of psychosocial problems and referral should be done. Furthermore, future research work should focus on measuring clinician's role in promoting diabetes-specific self-compassion in the context of establishing towards treatment goals.

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The Meat Processing Industry in Mongolia

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Abstract- Mongolian meat processing industry needs to focus on future development trends, make full use of Mongolian rich meat resources, and grasp the opportunities for international competitiveness. Therefore, the Mongolian government attaches great importance to the production capacity, development trends and policies of increasing export output of the meat processing industry. This research analyzes the current market situation and development trend of Mongolia's meat processing industry and uses the traditional model of industrial organization theory as the SCP model to study the market structure, market behavior and market performance of Mongolian meat processing industry. The development trend of the industry and put forward development suggestions.

The SCP model of industrial organization theory is a research model that combines a certain market structure, market behavior, and market performance scope.

Key words- Meat Processing Industry, Mongolian Meat Industry, Industry Organization, SCP analyses

I. DEVELOPMENT HISTORY OF MONGOLIAN MEAT PROCESSING INDUSTRY

Mongolians have relied on grassland animal husbandry to provide livestock products. Mongolian ecology and traditional grazing methods have a significant impact on the development of animal husbandry. Looking at the development of Mongolian meat processing industry:

The Mongolians traditionally engage in animal husbandry and use meat as food. Since 1921, Mongolia's slaughter of livestock and processed meat industries have been established. In 1924, small meat processing enterprises were built in 9 provinces and supplied products to Russia. In 1924, the capacity of the Ulaanbaatar slaughterhouse increased by circles and semi-finished products per year. In 1930, livestock breeding camp slaughterhouses were established in many provinces. In 1946, Mongolian largest meat processing factory was established in the capital of Mongolia and increased the production and export of meat and meat products, improve animal slaughter technology. After that, in 1971 increase the productions capacity of their factory. In population density areas organize simple seasonal livestock slaughterhouses. With the help of German technology and economy from 1987 to 1989, it has been updated with German technology. After the democratic revolution in 1990, Mongolia's meat processing industry began to develop faster than before. Since 1996, the number of small and medium-sized meat enterprises has increased.

II. CURRENT SITUATION OF MONGOLIAN MEAT PROCESSING

A significant feature of the Mongolian livestock husbandry is that it relies on traditional nomadic pastures and four seasons of water migration. The animal husbandry industry is mainly natural pasture. The cost of no land and feed is low, and the production cost is very cheap. This is a very good production function. The abundance of livestock materials is affected by weather and seasonal stress. In other words, for grassland animal husbandry, economic factors are more important than climatic factors. If increases exports of value-added meat products, it can get more profits than the mining industry.

In 2018, the total number of livestock animals in Mongolia reached 66.4 million. Mongolia produced 0.42 million tons of meat in 2017, providing domestic demand for its own production. In recent years, Mongolian economic development and living standards have increased the demand for meat products. Mongolian per capita meat consumption has reached 16.4 kg. The volume of pork produced in 2017 was 0.8 tons, and the sales volume was 700 tons. Poultry meat was 1.48 tons, and sales volume was 14.4 tons. Mongolian meat exports are increasing, with total exports of 55.0 thousand tons in 2018, a year on year increase of 1.9%. Revenue from meat exports was 146.5 million dollar. Mongolia horses are mainly concentrated in external markets and 90% of total exports. Mongolia's geographical location provides good market entry opportunities for China and Russia. Mongolia mostly, exports meat to two neighbors Russia, China and also working to find new markets in Japan and the Middle East, with Iran a particular target as producers hope to benefit from higher halal meat prices.

Mongolia has three main sources of meat supply. First, meat dealers buy live livestock, and after paying the slaughter fee at a slaughterhouse near Ulaanbaatar, they bring meat to the food market channels. The second is the channel for meat processing enterprises. Meat processing entrepreneurs collect livestock from herders and give them to the meat processing slaughterhouse. Meat processing companies provide processed meat products to food markets and retail stores in the capital. Third, herders distribute meat directly to consumers.

III. ORGANIZATIONAL ANALYSIS OF MONGOLIAN MEAT PROCESSING INDUSTRY

A. Market Structure Analysis of Mongolian Meat Processing Industry

1) Concentration

The Mongolian government attaches more and more importance to the development and policy of Mongolian meat processing industry. In 2010, there were 70 meat and meat processing plants, including 50 in Ulaanbaatar. In 2018, there were 123 slaughtering and meat processing plants across the country. In terms of the number of enterprises, according to the statistics of the Mongolian Meat Association in 2017, the regional distribution of Mongolian meat industry enterprises shows that there are more meat processing plants in the capital and in the central region, with 79 other 44 Countryside. Mongolia's meat processing industry has a high market concentration and lacks competitiveness. This means that it is a powerful oligopoly. The Meat Impex is the largest of all meat processing companies in Mongolia. In 2017, the number of meat companies is gradually increasing, and the degree of centralization is accelerating.

2) Brand differentiation

At present, there are many new meat processing enterprises in Mongolia, but head manufacturers are likely to maintain a leading position for a long time. For example, Meat Impex establishes a high-end brand image and produces more than 100 four types of products. For 70 years, the company has been providing meat and meat products to residents of the capital, and has accumulated rich experience in exporting meat and meat products to Asian and European countries, has played a special role in pushing Mongolian beef to the world. Many years experiences continue to win the trust of consumers and build lasting brand life. For other large high-income companies, they provide meat and meat products to foreign markets. In the domestic market they has their own chain stores and shops, as well as department stores and supermarkets. Small and medium-sized enterprises need to build the core competitiveness of their brands to avoid the crisis and maintain their core advantage.

3) Barriers to entry

From the perspective of entry barriers, the biggest barriers for Mongolian meat processing industry to enter new enterprises are funding and modern technological issues. The processing of meat products requires good equipment based on modern technology and specific product technologies and product processes. In the past eight years, Mongolia's meat and meat processing enterprises have increased. At present, Mongolian large meat companies use German technology and advanced meat products. Due to the lack of funds and human resources, newly-entered enterprises in the Mongolian meat market are unable to reach the technologies and patents owned by large meat products enterprises, resulting in technical and patent barriers. New entrants also have accumulated experience. Mongolian large-scale meat products companies have 73 years of experience and have formed a relatively complete industrial chain. Another barrier is the sales channel for meat products companies. The interior and equipment costs of the sales channel are a bit of a barrier to new entry.

B. Market Behavior Analysis of Mongolian Meat Processing Industry

1) Price strategy

According to the law of supply and demand, meat is cheaper and consumers demand more. The supply of meat on Mongolian domestic market is shrinking, and price increases depend on many factors. These include seasonal prices, exchange rates, fuel costs,

weak livestock and meat production systems, funding sources for meat reserves, and the impact of timely meat exports. As far as seasonal prices are concerned, Mongolia's meat prices change a lot in the market every quarter. Herdsmen's behavior is mostly sold in the fall and winter to prevent winter and large numbers of livestock. In spring or during the breeding season, the number of livestock is insufficient to increase the number of livestock. In terms of monthly meat prices, meat prices have risen from November to June and July of the following year, and may decline to November thereafter. Slaughter companies and traders slaughter and stock livestock in November, then supply the frozen meat market in winter and spring. Meat prices have increased due to the low meat supply in the Mongolian market in July and August. The risk of seasonal changes in meat demand and prices poses considerable obstacles to meat trade.

(2) Advertising strategy

Advertising is a method of non-price competition often used by companies in the market. Because advertising has a great impact on consumers' subjective and enhances brand and reputation. TV commercials have become the most important promotional tool for strong Mongolian meat processing companies. For Mongolia's largest meat processing company, the sales and marketing expenses of Meat Impex were 2.8 thousand dollar in 2016 and 29.9 thousand dollar in 2018. This means that the company's sales and marketing expenses have increased year by year. But some small and medium-sized meat processing enterprises are out of reach. This has a great impact on their competitiveness. At present, the consumption of the Internet is also growing, so each company uses the Internet to introduce their products to consumers.

C. Market Performance Analysis of Mongolian Meat Processing Industry

Technology and Product Innovation

Mongolian animal husbandry provides high-quality meat, which is the characteristic and benefit of Mongolian meat products. However, when Mongolia introduced original high-quality meat to foreign markets, it mainly used modern technology and equipment. In order to produce safe meat products, it is necessary to continue the continuous chain connection between the meat processing stage and even the consumer refrigerator, and the meat products more prominently their respective energy properties, emphasizing nutrition and health, and the packaging and quality are closer to and adapted to various consumer. At present, Mongolia's animal husbandry is rich in resources, and a wide range of technical and infrastructure issues has limited Mongolia's export capabilities, including lack of infrastructure and high-quality scientific laboratories. A large number of small and medium-sized meat products enterprises need technical funds. Today, large meat processing companies in Mongolia use modern German technology.

IV. CONCLUSION AND RECOMMENDATION

Mongolia has more than 70 million livestock, but 90% of all meat is slaughtered by the herders and not in professional monitored operations. This is a problem of lack of security. Mongolian meat industry needs to use sufficient resources to strengthen competition and encourage new and old business support. Despite increased production, most factories are located in the central part of the city. Proper distribution of production across regions will strengthen production activities, which will have a positive impact

on food security and meat prices. Increasing the capacity of existing companies and building new meat factories are the main factors that promote the development of the meat industry. As a result, 90% of the meat processed by traditional manual herders or manual methods is reduced and the production and processing of meat are increased.

According to the market structure, calculating industry concentration shows that Mongolia's meat product processing industry market concentration is oligopoly type 2. Mongolia's meat product processing industry has a high market concentration, and monopoly concentration has increased, it is easy for head manufacturers to stay ahead in the long run. Among all the meat processing companies in Mongolia, Meat Impex is the largest company and has established a high-end brand image. The company's years of experience continue to win consumer trust and build lasting brand life. Small and medium-sized enterprises need to build the core competitiveness of their brands to avoid the crisis and maintain their core advantage. The biggest barriers to market entry and exit for an enterprise are funding and modern technology issues. The higher the level of technology, the higher the production and competitiveness of enterprises. According to the market behavior, Mongolian domestic meat supply is shrinking, and price increases depend on many factors. These include seasonal prices, exchange rates, fuel costs, weak livestock and meat production systems, funding sources for meat reserves, and the impact of timely meat exports. There is a monopoly situation in advertising behavior. As large enterprises have abundant funds, their marketing budgets are also high. Therefore, the TV commercials in Meat Market are relatively large. In terms of market performance, Mongolia's large meat processing companies currently use modern German technology. The biggest barrier to entry for Mongolian meat processing industries and entry into new enterprises is the issue of modern technology. The processing of meat products requires good equipment based on modern technology and specific product technologies and product processes.

The development situation, market structure, behavior, and market performance of Mongolian meat processing industry, the following policy recommendations are proposed strengthen the scale and management of market order in the meat processing industry, need to use sufficient resources to strengthen competition and encourage new and old business support.

In addition, pay attention to the zoning and development of Mongolian meat production and increase the capacity of existing companies and build new meat plants, ensure the quality and safety of meat products, and research that needed to increase the development of meat production.

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Prevalence of *Candida* species isolated from positive blood culture, and its Antifungal susceptibility patterns

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Introduction:

Blood infection due to *Candida* species are major cause of morbidity and mortality in hospitalized patients¹. The increased care of *Candida* infection in blood was raised more frequently as pathogens due to risk factors such as excessive consumption of a broad spectrum antibiotics, organ transplant and prolonged hospital stay.

Objective:

To find out the prevalence of *Candida* infections in positive blood culture isolated in Microbiology department at Princess Iman Center, and find out the susceptibility pattern of antifungal drugs.

Materials and Methods:

Retrospective study was done in microbiology laboratory at Princess Iman Center in the period of Jan.2017 till June.2019. All blood bottle cultures were incubated in Bact/Alert incubators from BioMerieux system and Bactec incubator from BD system. The bottles that gave positive alarm after incubation were observed on wet mount preparation and stained Gram stain, and then the suspected result for *Candida* in wet mount and Gram stain are cultured on Sabouraud agar. A total number of 6300 positive blood culture collected and cultured for *Candida* were identified by Vitek2 test protocol (BioMerieux) a suspension of (1.8-2.2) McFarland used for identification and susceptibility test. An YST card specific for *Candida* species identification used, and for susceptibility AST-YS06 card used.

Results:

From the 6300 positive blood culture, a 244 isolates (3.9%) were identified as *Candida*. Out of 244 *Candida* isolates, 76 (31.1%) were *Candida albicans*, followed by *Candida parapsilosis* 54 (22.1%), *Candida tropicalis*

36 (14.8%), *Candida famata* 21 (8.6%), and 57 isolates (23.4%) were confirmed with non significant pathogenic species or environmental contamination.

| Candida isolates | Number of Isolates | Percentage |
|-----------------------------|---------------------------|-------------------|
| <i>Candida albicans</i> | 76 | 31.1% |
| <i>Candida parapsilosis</i> | 54 | 22.1% |
| <i>Candida tropicalis</i> | 36 | 14.8% |
| <i>Candida famata</i> | 21 | 8.6% |
| Non pathogenic species | 57 | 23.4% |

The susceptibility test was done for these antifungal patterns; Amphotericin B, Flucytosin, Fluconazole, Caspofungin, Micafungin, Voriconazole. Out of 244 isolates, 207 showed sensitive for Amphotericin B, 205 isolates were sensitive for Voriconazole, and 197 isolates were sensitive for Micafungin, and 196 isolates were sensitive for Caspofungin.

Conclusion:

The prevalence of *Candida* species infection from blood culture in this study was slightly increased which may represent the 4th or 5th common causes for blood stream infection, which is a medical concern must be aware from it.

The antifungal which shows good response were Amphotericin B, Voriconazole, Micafungin Caspofungin, therapy must be ordered by a physician according to patient status and route of administration.

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The effect of pH in the Removal of PAH by using Sodium Persulphate to remediate petroleum products contaminated Ground Water

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Abstract- A study to determine the effect of pH on the removal of polycyclic aromatic hydrocarbon (PAH) from ground water contaminated with petroleum product samples was undertaken. This study enabled the use of chemical oxidants to remediate PAH in contaminated ground water.

Observation showed that the rate of contaminant removal was highest in alkaline environment.

High pH values favoured higher contaminant removal as transformer oil had 91.3 diesels, 86.7 and crude oil, 83.10 percentage removal efficiencies respectively. The trend of the results obtained in this study revealed that the rate of degradation increased with increase in pH values.

Index Terms- Groundwater, Polycyclic aromatic hydrocarbon(PAH), Petroleum Products, Alkalinity and chemical oxidation.

I. INTRODUCTION

PH of a solution is a measure of the concentration of hydrogen ions or a measure of alkalinity in the solution. It is the negative logarithm of the hydrogen ion concentration to the base 10. ($\text{pH} = -\log [\text{H}^+]$)⁵

Acidity and alkalinity of substances are measured using a scale of numbers from 0 to 14 and this is called the pH scale. Any solution with a pH value of 7 is said to be neutral while that with a pH value less than 7 is acidic. A solution with a pH value more than 7 is alkaline.⁹

Acidity increases with decreasing pH value while alkalinity increases with increasing pH values. At neutrality the pH value is 7.^{8, 16}

Indicators are weak organic acids or bases which will produce different colours in solution according to the hydrogen ion (H^+) concentration in that solution. The instrument used to measure pH is called the pH meter. It consists of two electrodes, a glass electrode and a reference electrode which measures the voltage difference between two electrodes and gives a pH reading. The meter is usually connected to a strip-chart recorder.

Concentration of hydroxide ions [OH^-] is inversely proportional to the hydrogen ions [H^+] concentration. A pH measurement of both indicates alkalinity and acidity of a solution.

Other methods of measuring pH values include series of successive colour changes in an indicator and comparing the colour obtained with that of the standards given. The pH of a solution is only measured accurately by using a pH meter. Strong acids and strong alkalis have pH values at the extremes of pH scale while weak acids and alkalis have pH values close to 7.

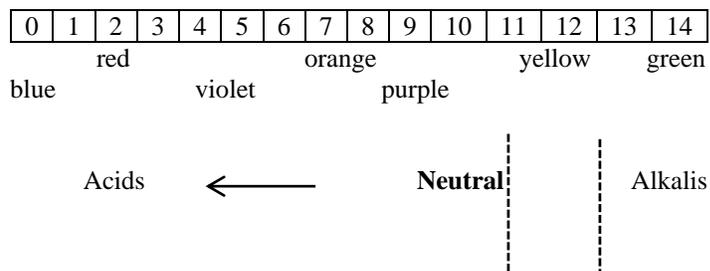


Fig 2. pH scale showing range and colour changes of indicators.^{15, 17}

The progress of many chemical reactions is often dependent on the pH of the solution in which they take place. It is therefore necessary to note or control the pH of the reaction medium.^{13, 12}

Ground water is universally the main source of portable water and also very important for both agricultural and industrial purposes.³

It is very imperative that ground water must be properly maintained and preserved for general use.^{4, 5}

Pollution of this vital natural resource poses a great danger to man and the environment as it affects useful lands sites and negatively affects the ecosystem causing the destruction of fauna and flora.^{8, 17}

Taking in contaminated groundwater can result in serious health risks such as dysentery, cancer hepatitis and cholera food poisoning and general epidemics. Other long term effects could be infertility in man, animals and soil. Petroleum products, if not properly handled could leak into the environment from various storage tanks which may eventually lead to pollution of the ground water.¹¹ Wrong use of manures and chemical fertilizers could also cause percolation and eventual seepage into the soil. Salts and chemicals from effluents could find their ways through the soil into ground water. Some of them have immediate effects while others have long time hazardous effects.^{3, 17 and 12}

This study is therefore aimed at destroying or reducing perceived contaminants to less harmful substances.^{13,14}

II. METHODOLOGY

This study involved setting up laboratory tests to determine the effect of pH on the removal of (PAH) using sodium persulphate from petroleum products contaminated ground water.

The population of study is contaminated ground water contaminated with diesel, transformer oil and crude oil. All faced the same treatment with the oxidant. They were a homogenous population. Contaminated ground water was simulated in the laboratory in order to monitor the efficiency of the oxidant to degrade the perceived contaminant.

III. SODIUM PERSULPHATE PREPARATION

0.34g, 1.98g, 8.57g, 19.7g, 30.68g, of solid sodium persulphate were prepared and added to 100ml of double de-ionized water. This has been demonstrated by Tsai *et al.*, (2009).

3.1 Sample collection and treatment

Contaminated water samples were prepared by adding hydrocarbon products (transformer oil obtained from Nigeco Nig Ltd, diesel and crude oil obtained from the Port Harcourt Refinery) into double deionized water in 4-litre plastic buckets. The mixtures were vigorously shaken for 30minutes. Ameliorating solution Di-Chloro Methane (DCM) of 5.0ml was also added to 30ml of each of the saturated samples in Erlenmayer flask. They were shaken vigorously after an initial pH readings of 7.2 was taken.

3.2. Analysis for pH effect

pH of the contaminated water were adjusted to values of 3.0, 4.5, 6.0, 7.5, 8.0, 9.5, 11.0 and 12.5 using 0.1m HCl and 0.1m NaOH reagents. Exactly 10ml of the oxidants each were added. The mixture was thoroughly shaken for 1hr (60mins) at 29°C. The mixture was then separated using separating funnel and the concentration of PAH was determined using GC –FID.

IV. RESULTS

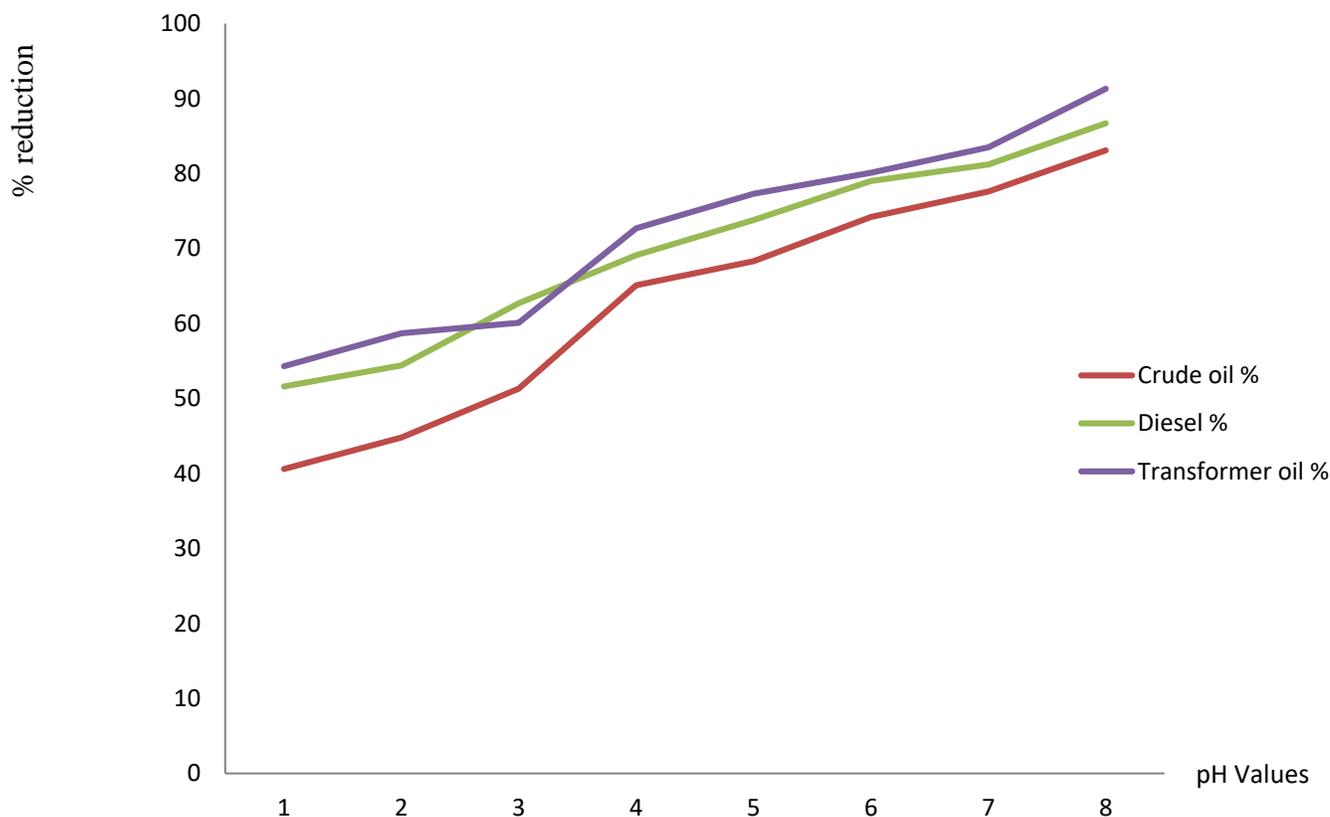


Fig. 1. % removal of PAH from contaminated ground water using sodium persulphate.

V. DISCUSSIONS

The high pH of 12.5 recorded higher degradation of PAH in all the petroleum products. Percentage removal stood at crude oil, 83.10%, diesel 86.70% and transformer 91.30%. At pH of 7.5 which could be regarded as neutrality, percentage degradation of

crude oil was 65.10%, diesel 69.10% and transformer oil 72.70%. Degradation in the acidic medium recorded very low values of 40.60% for crude oil, diesel 51.60% transformer oil 54.30%. The smallest value of degradation was obtained at acidic pH level of 3.0. Reason for above results is not farfetched as crude oil contains all the parts of petroleum unrefined. Much of the

pollutants were found in crude oil and less diesel and transformer oil respectively.

VI. CONCLUSION

From results obtained in this study, it is evident that the alkaline environment is a better medium for the remediation of contaminants from ground water contaminated with petroleum products. Alkalinity favours easy removal of contaminants from the environment than the neutral and acidic type. This is followed by the neutral environment in which degradation of the petroleum products were at 65%, for crude oil, 69% for diesel and 72% for transformer oil. The study showed that acidic environment posed resistance to degradation when sodium persulphate is used as oxidant. In all cases, the three petroleum products had low percentage degradation values of 40 for crude oil, 51.6 for diesel and 54.3 for transformer oil respectively. It is therefore deduced from this study that, with pH being acidic as in most contaminated ground water, chemical oxidation using persulphate oxidants is not a favourable option for remediating impacted sites, except pH of the site is made highly alkaline.

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Proactive Environmental Strategy and Environmental Performance: A Resource-based Perspective

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Abstract- This paper reviews the relationship between proactive environmental strategy and environmental performance from the resource-based perspective by providing the recent findings on this relationship. The benefits and meaning of proactive environmental strategy and environmental performance are discussed in this article. We find that the resource-based view theory is important to define the relationship between proactive environmental strategy and environmental performance.

Index Terms- proactive environmental strategy, environmental strategy, environmental performance, resource-based view theory

I. INTRODUCTION

Recently, environmental problems like greenhouse gas emissions, climate change, biodiversity destruction, global warming, toxic waste, and ozone depletion have increased globally (Aragón-Correa, Hurtado-Torres, Sharma, & García-Morales, 2008; Solovida & Latan, 2017). These problems require organizations and societies to reduce their influence and impact on the environment and find solutions to these effects and improve their environmental performance (EP) (Aragón-Correa et al., 2008; Shrivastava, 1995; Solovida & Latan, 2017). The EP of the organization is a set of measures that describe an organization's success in reducing and minimizing its environmental impacts (Klassen & McLaughlin, 1996).

The main advantages of EP adoption are the reduction of new resources use through recycling, minimizing energy consumption in the production processes, and decreasing the amount of production residues that might contain dangerous materials (Rae, Sands, & Gadenne, 2015). In addition to that, both small and large organizations face growing pressures to improve their EP as part of meeting their obligations towards environmental issues (Roy, Boiral, & Paillé, 2013). Organizations are concerned about their EP to show their responsibility towards environmental issues because of pressures from society. Organizations fear that their performance might decrease if they do not engage in activities related to environmental issues (Winter & May, 2001). Accordingly, organizations have been setting up environmental strategies to demonstrate their commitment to local communities and environmental issues (Fraj-Andrés, Martínez-Salinas, & Matute-Vallejo, 2009; Solovida & Latan, 2017). The environmental issues are essential for the organization, and they implement environmental strategies to reduce the effects of their activities on the environment (Wijethilake, 2017). By doing that,

organizations can gain several benefits, such as increasing their environmental performance, improving the organization's image, and increasing profitability. Furthermore, adopting environmental strategies allows an organization to compete in an existing market, access new markets, and increase customer and employee satisfaction, which, in turn, contributes positively to the overall economy of the country (Dias-Sardinha & Reijnders, 2005).

Because of their advantages, organizations have incorporated environmental plans into their strategies (Gunarathne & Lee, 2015; Ko & Liu, 2017; Pondeville, Swaen, & De Rongé, 2013). The primary purposes of environmental strategies are to improve the environmental performance of an organization and decrease the impact of organizational activities on the environment as well as to manage these activities and to maintain a positive relationship between an organization and its natural environment (Aragón-Correa, 1998; Fraj-Andrés et al., 2009). An environmental strategy helps an organization to become more aware of environmental issues and improve the organization's performance (Henri & Journeault, 2010).

In this regard, the environmental strategies of organizations may be classified as reactive and proactive strategies. On the one hand, a reactive environmental strategy is concerned with meeting legal requirements and regulations and responding to stakeholder pressures. On the other hand, a proactive environmental strategy (PES) provides actions and activities beyond regulations to reduce the environmental harm caused that an organization may cause (Aragón-Correa & Sharma, 2003; Kang & Lee, 2016; Murillo-Luna et al., 2011; Sharma, 2000). PES is identified as systematic procedures for voluntary activities by an organization that goes beyond the legal and regulatory requirements (Aragón-Correa & Rubio-Lopez, 2007).

PES is designed to deal with an organization's environmental impacts voluntarily to avoid harming the environment (Aragón-Correa, 1998; Sharma, 2000; Sharma & Vredenburg, 1998). Additionally, PES is vital in reducing organizational activities that could harm the environment (Garcés-Ayerbe, Scarpellini, Valero-Gil, & Rivera-Torres, 2016). Such a strategy also helps an organization to forecast future regulations regarding environmental issues and designing or changing the operations, process, and product to reduce negative environmental impacts (Hart, 1995; Sharma & Vredenburg, 1998; Tsai & Liao, 2017).

In addition, as part of the competition among firms to increase both financial and environmental performance, various organizations adopt a PES to reduce pollution in their activities.

They do so by producing environmentally friendly products and showing their commitment to environmental issues (Klassen & Whybark, 1999; Sharma & Vredenburg, 1998; Wijethilake, 2017).

These organizations develop their PES voluntarily and invest their resources to achieve their objectives and goals related to gaining a competitive advantage (Tsai & Liao, 2017). Accordingly, a PES is considered as to be related to organizational capabilities that decrease an organization's impact on the environment and increase its competitive advantages (Christmann, 2000; Garcés-Ayerbe et al., 2016; Hart, 1995; Judge & Douglas, 1998; Li et al., 2016; Ryszko, 2016; Sharma & Vredenburg, 1998). In this regard, the resource-based view theory (RBV) posits that an organization's capabilities and resources play major roles in gaining sustainable competitive advantages (Barney, 1991). Thus, PES is an organizational capability that will increase an organization's EP if appropriately implemented (Kang & Lee, 2016).

In summary, PES is a strategy that goes beyond the law and regulations to reduce the impact of organizations on the environment and improve their EP. This strategy is considered a resource that enhances organizational performance aligns with the resource-based view theory. Accordingly, this study reviews the relationship between PES and EP from the perspective of resource-based view theory and how this theory helps to explain this relationship.

The remainder of this paper is organized as follows. The first section presents the definitions and benefits of environmental performance. Then, the second section presents the definitions and benefits of a proactive environmental strategy. Section three discusses the resources based-view theory followed by section

II. ENVIRONMENTAL PERFORMANCE

Klassen and McLaughlin (1996) described an organization's EP as a set of measures that describes how successful organizations are in reducing and minimizing their impacts on the environment. In other words, EP refers to an organization's efficiency in meeting and go beyond social expectations concerning the natural environment Chan (2005). It also indicates the capabilities of organizations to establish consistent relationships with different stakeholders who concerned about environmental issues (Henri & Journeault, 2006).

EP focuses on the consequences of an organization's strategic activities that manage its influence on the natural environment (Walls, Berrone, & Phan, 2012). AboelMaged and Ahmed (2015) described EP as the environmental effect that a company's actions had on the natural environment. More specifically, EP refers to the abilities of organizations to integrate environmental factors into their production systems to reduce pollution and increase the quality of the product (Song, Fisher, Wang, & Cui, 2016). However, Tam and Fernando (2018) emphasized that EP

III. PROACTIVE ENVIRONMENTAL STRATEGY

Now According to Aragón-Correa and Rubio-Lopez (2007), scholars and consultants have demonstrated the importance of PES to organizations since 1990. PES is described as a statement of processes actions of an organization that goes beyond basic

is a measurement that is being used to quantify the environmental impacts that pollution activities cause.

The main advantages of the adoption of an EP are the reduction of the utilization of new resources through recycling, minimizing the energy consumption in production processes, and decreasing the amount of production residues that might contain dangerous materials (Rae, Sands, & Gadenne, 2015). In addition to that, both small and large organizations face growing pressures to improve their EP as part of their obligations towards environmental issues (Roy, Boiral, & Paillé, 2013). Organizations utilize EP to demonstrate their responsibility to environmental issues because of pressures from society to engage in these issues. Organizations fear that their financial performance might decrease if they do not engage in activities related to environmental issues (Winter & May, 2001).

The improvement of an organization's EP is among the fundamental sources for achieving a competitive advantage through implementing an excellent environmental strategy that reduces costs and improves production processes (Horváthová, 2010; Solovida & Latan, 2017). Organizations are encouraged to control, measure, and disclose information about their EP (Henri & Journeault, 2008). What is more, Mensah (2014) emphasized that stakeholders are the main drivers of the EP improvement among organizations to explain more.

Among the potential benefits of an EP are an increase organizational performance and productivity (Galdeano-Gomez, Céspedes-Lorente, & Martínez-del-Río, 2008; Schaltegger & Lüdeke-Freund, 2013), a reduction in the costs of production by decreasing obligated additional costs to organization products like clean up expenditures and fines (Dasgupta, Hong, Laplante, & Mamingi, 2006; Sharfman & Fernando, 2008), supporting relationships with stakeholders, boosting an organization's reputation and legitimacy by producing environmentally friendly products and reducing pollution. (Bansal, 2005; Darnall, Henriques, & Sadorsky, 2008; Melo & Garrido-Morgado, 2012; Perrini & Tencati, 2006; Van Reenen, 2011), enhancing product quality, increasing product sales which boosts market value (Chen, Tang, Jin, Li, & Paillé, 2015; Darnall et al., 2008) (Dasgupta et al., 2006; Schaltegger & Lüdeke-Freund, 2013), and influencing the environmental involvement of employees (Chen et al., 2015).

An EP valuable in all organizations and sectors whether they are industrial or service related (Allet, 2011; Carmona-Moreno, Céspedes-Lorente, & De Burgos-Jiménez, 2004; França, Silva, & Marques Júnior, 2003). According to Rosenblum, Horvath, and Hendrickson (2000), organizations can reduce their impacts on the environment in various ways. These include influencing suppliers to provide environmentally products and services that do not harm the environment, decreasing resource inputs in their operations by implementing efficiency programs, educating their customers about environmental issues and their product offered, and decreasing resources usage by of customers by providing more beneficial environmentally activities or services

compliance with regulations and laws (Ateş, Bloemhof, Van Raaij, & Wynstra, 2012). Menguc, Auh, and Ozanne (2010) described PES as the strategy that is intended to reduce pollution and emissions through continuous learning and planning by an

organization. Furthermore, Sharma (2000) explained PES as a consistent set of actions that an organization takes to reduce the environmental impacts of its operations and activities not just to fulfill environmental regulations but to go beyond that. Under this strategy, the top management is responsible for compliance with the laws and regulations regarding environmental issues (Aragón-Correa et al., 2008). In addition to this, the PES had been mainly viewed from an internal and competitive perspective (Menguc et al., 2010).

Consistent with RBV theory, several studies have identified PES in terms of an organization's capabilities (Christmann, 2000; Garcés-Ayerbe et al., 2016; Hart, 1995; Judge & Douglas, 1998; Li, Jayaraman, Paulraj, & Shang, 2016). Past studies have shown that the link between PES and organizational capabilities allows organizations to bring together all human resources, raw materials, and technologies to decrease their negative impacts on the environment and, at the same time, increase organizational performance (Galdeano-Gómez & Céspedes-Lorente, 2004; Garcés-Ayerbe et al., 2016). In addition, proactive organizations can improve their internal and external environmental reporting (Henriques & Sadosky, 1999; Sharma & Vredenburg, 1998).

An organization that is committed to engaging in a PES and going beyond regular requirements is more likely to earn additional profits and meet the social expectation than an organization that does not demonstrate such a commitment (Barnett, Darnall, & Husted, 2015; Fraj, Matute, & Melero, 2015). In organizations that adopt a PES, the top management seeks to fulfill its responsibilities to environmental issues. These responsibilities include addressing environmental issues, supporting environmental programs and policies, giving the employees rewards that reduce and improve environmental impacts, and allocating organizational resources to environmental issues and initiatives (Berry & Rondinelli, 1998). Improving organizational performance, as well as recognizing the urgent need to use its capabilities in a better way, is vital for an organization to enhance its reputation. These capabilities include a shared vision, organizational learning, continuous innovation, and stakeholder management, which are considered as essential pre-requisites for the adoption and successful implementation of a PES (Hart, 1995). Employee participation and understanding are also crucial for the development and improvement of these internal capabilities (Russo & Fouts, 1997; Winn & Angell, 2000).

Moreover, PES provides many benefits to the organizations like improving the EP through the effective use of resources, boosting customers preferences, promoting and generating innovative capabilities for an organization that has implemented this strategy (Banerjee, 2001; Bhupendra & Sangle, 2015; Christmann, 2000; Judge & Douglas, 1998; Klassen & Whybark, 1999; Sharma & Vredenburg, 1998; Wijethilake, 2017). An organization that has adopted a PES has recognized environmental issues and gained new opportunities to enter new markets and produce new products. Such organizations demonstrate concern to their communities and public about the importance of environmental issues, integrate environmental issues into their activities and functions, and provide benefits to their stakeholders directly (Gonzalez-Benito, 2008; Klassen & Angell, 1998; Tsoutsoura, 2004). It also enhances economic

performance and organizational profitability (Porter & Van der Linde, 1995; Stefan & Paul, 2008).

According to Sangle (2010), a PES goes beyond regulatory and legal requirements by enhancing the establishment of environmental policies and goals, improving employee skills through training, helping an organization to disclose about its environmental activities and making these reports available to public, reducing organizational environmental impacts and setting environmental standards for an organization's suppliers. These benefits are achieved by preventing pollution and the development of an organization's products by using resources efficiently (Klassen & Whybark, 1999). In recent years, many managers have attempted to implement some practices and activities of proactive environmental strategies (Aragón-Correa & Rubio-Lopez, 2007). And some of the largest organizations like 3M and Du Pont have changed their environmental strategies from reactive to proactive (Judge & Douglas, 1998). Also, organizations that have adopted a PES have an increased opportunity to internationalize their work and transactions (Chen, Ong, & Hsu, 2016).

Traditional wisdom suggests that organizations that have adopted and implemented environmental strategies recoup the associated costs and increase their competitive advantages (Friedman, 2007). Thus, a PES encourages organizations to innovate environmental products that reduce costs and gain cost-saving advantages (Christmann, 2000).

IV. RESOURCE-BASED VIEW THEORY

In the strategic management area, the RBV theory is widely used as a theoretical perspective (Barney & Arkan, 2001) and is recognized as an underpinning theory in strategic management (Liang, You, & Liu, 2010). Wernerfelt (1984) developed this theory, which explains the relationship between organizational resources and capabilities and their competitive advantages and performance (Barney, 1991).

As Wernerfelt (1984) stated, "a firm's resources at a given time could be defined as those tangible and intangible assets which are tied semi-permanently to the firm. Examples of resources are brand names, in-house knowledge of technology, employment of skilled personnel, trade contracts, machinery, efficient procedures, and capital" (172). The importance of organizational resources and capabilities are highlighted in RBV theory because of the support that they provide an organization in developing and surviving and achieving overall effectiveness and success (Barney, 1991).

This theory explains the outcome of the development of an organization's valuable resources and capabilities that are linked to a sustained competitive advantage. These capabilities, such as continuous innovation, stakeholder integration, and organizational learning, are associated with a PES (Sharma & Vredenburg, 1998). Hart (1995) argues that the prerequisite capabilities of an organization to implement a PES are organizational learning, a shared vision, continuous innovation, and stakeholder management.

An organization utilizes either tangible or intangible resources to build a competitive advantage (Brulhart, Gherra, & Marais, 2017). Various scholars have classified the differences between tangible and intangible resources differently. For example, Grant (1991) classified tangible resources as fixed assets, production

equipment, inventories, and financial resources, while intangible resources were classified as reputation, technology, human resources, employee training, employee loyalty, employee experience, and employee commitment. Teece, Pisano, and Shuen (1997) included different resources such as knowledge, media, structure (governance), network, market, and institution resources. Whatever the case, an organization generates economic benefits by combining and exploiting both tangible and intangible resources (Barney, 1991).

One focus of RBV theory is on the resources of an organization that are not easily transferable and difficult to reproduce. The RBV theory argues an organization's internal capabilities and resources that are valuable, inimitable, rare, non-changeable, and have high costs to copy and provide an organization with a sustainable competitive advantage, and let them compete favorably in their environment (Barney, 1991; Barney & Mackey, 2005). The fundamental argument of RBV theory is that the resources that an organization owns influence its performance, and an organization with more valuable resources is more likely to maintain a sustainable competitive advantage than an organization with fewer valuable resources (Liang et al., 2010). One argument of this theory derives from the capabilities and resources of an organization. The logic is that competitors would find capabilities and resources difficult either to copy or replace. Such resources include physical assets, financial assets, employee skills, or organization procedures (Clarkson, Li, Richardson, & Vasvari, 2011).

Based on Barney (1991), the RBV theory identified and categorized three different resources of an organization. These resources are physical, organizational, and human resources. Physical resources typically include the tangible assets of the organization like a plant, equipment, raw materials, geographical location, information technology of the organization, and financial instruments. Organizational resources include management system, planning, coordination, controlling, and formal reporting structure. Human resources of the organization include employee experience and their judgment, social relationships, and insights.

According to Barney (1991), the resources of an organization that create sustained competitive advantages should have the following attributes. First, they should be valuable, which refers to the resources that can support an organization in implementing its strategies that improve both the efficiency and effectiveness of the organization. Second, they should be non-substitutable, which means that the valuable resources of the organization cannot easily be replaced or changed. Third, they should be rare, which refers to the valuable resources of an organization that many competitors cannot easily possess. Last, they should be imperfectly imitable, which means that the valuable resources of an organization are difficult, if not impossible, to duplicate.

Moreover, Buysse and Verbeke (2003) divided the natural components of an organization into five categories. These are conventional factors, human resources, procedural, strategic planning, and organizational resources. Conventional resources refer to physical resources that are used to produce more environmentally friendly products like technology, plants, raw materials, and equipment. Human resources refer to the participation of employees in the natural environment and their experience, qualification, and training. Procedures resources

refer to standards and formal procedures that are related to environmental issues and reporting systems. Strategic planning refers to the environmental strategies that clearly define the objectives, plans, and budget of an organization's commitment to the natural environment. Lastly, organizational resources refer to environmental concerns as components of corporate structure, such as degree of centralization, allocation of mission, responsibilities, coordination, and hierarchical structure that are related to environmental development and improvement.

V. DISCUSSION AND THE RELATIONSHIP BETWEEN PROACTIVE ENVIRONMENTAL STRATEGY AND ENVIRONMENTAL PERFORMANCE FROM RESOURCE BASED-VIEW THEORY

A PES requires the aggregation of skills, resources such as human resources, technologies, and assets to be implemented by an organization (Aragón-Correa, 1998; Russo & Fouts, 1997; Sharma & Vredenburg, 1998). Additionally, the PES allows an organization to organize and use all of its resources, such as human resources, raw materials, and organizational technologies, to reduce its impacts on the environment (Galdeano-Gómez & Céspedes-Lorente, 2004; Garcés-Ayerbe et al., 2016).

In literature, many past studies have shown a positive relationship among environmental strategy, PES and EP (Alt, Díez-de-Castro, & Lloréns-Montes, 2015; Ateş et al., 2012; Bae, 2017; Hoffmann, Kuss, & Delmas, 2011; Kim, 2018; Solovida & Latan, 2017; Wijethilake, 2017). For example, in a study of two primary longitudinal databases among 490 organizations in the United States in two periods between 1991 and 2010, Kim (2018) found that PES practices positively led to improvements of EP. Accordingly, in a study among 68 Indonesian organizations that have an ISO14001 certification and listed on the Indonesia stock exchange, Solovida and Latan (2017) found a significant and positive relationship between environmental strategy and environmental performance. The study also found that environmental management accounting directly mediates this relationship. Bae (2017) had similar findings in a study of 219 organizations that were members of the Korea International Trade Associations. Hart (1995) and Rodrigue, Magnan, and Boulianne (2013) showed the importance of the PES processes for the improvement of EP.

In a survey of 175 managers in multinational and local organizations in Sri Lanka, Wijethilake (2017) found a positive relationship between PES and EP. Previously, Alt et al. (2015) used a cross-country and multi-industry sample of 170 firms. They found that the proactive environmental strategies of firms translated employee stakeholder integration into an environmental performance.

In a survey of 96 manufacturing organizations in Turkey, Ateş et al. (2012) investigated the impact of PES on the EP with the mediating effect of environmental investments. The results revealed a positive relationship between PES and EP through the mediating effect of environmental investments. This finding suggests that environmental investments encourage cooperation with suppliers, both internally and externally.

Kang and Lee (2016) conducted a meta-analysis to provide an overview of the environmental strategy of organizations in the management and business literature. The authors reviewed

19,839 papers that were published between 1990 to 2003 in management journals. Their study concluded that most studies investigating environmental strategy focused on one country, and most of them had used data from the United States. Most of these studies had used an RBV theory to examine the relationship among environmental strategy, EP, and financial performance while other studies used stakeholders theory and institutional theory to examine the variables that encourage or barriers the organizations to adopt the environmental strategy. Finally, the study shows a lack of studies conducted between environmental strategy and management research.

VI. CONCLUSION

This paper reviewed the relationship between proactive environmental strategy and environmental performance from the resource-based view perspective. The paper demonstrated that previous studies found a positive relationship between proactive environmental strategy and environmental performance, and the resource-based view theory is important in defining the relationship between proactive environmental strategy and environmental performance.

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Contextualized Learning Material (CLM) in Developing Conceptual Understanding of Grade 7 Mathematics

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Abstract: The primary objective of the study is to design a contextualized learning material in developing the conceptual understanding of Grade 7 students in Mathematics as a teacher support material in mastering the math concept “sets”. The study is considered developmental and quasi-experimental or one group pre-test and posttest since it underwent three phases namely: planning, development, validation, and utilization. In the planning stage, the least learned skill (LLS) was identified based on the item analysis of the first grading quarterly test. From the LLS obtained, the researcher made one Contextualized Learning Material (CLM). The content experts rated the developed SIMs “very satisfactory” which means that they viewed the materials suitable and appropriate for students to master the competency. The usability experts on the other hand, rated the developed CLM “very satisfactory” which implied that they considered the CLM as teacher support material that can be used to master the Math 7 competency “sets”. The result on the comparison using paired t-test between the students’ pre-test and posttest scores which was tested at 0.05 level of significance indicated $p=0.000$ which means that the null hypothesis is rejected. Thus, there is significant difference between the pre-test and posttest scores of the grade 7 students. Thus, CLM is effective in developing the conceptual understanding of the students on the competency “sets”. It is then recommended that teachers may also develop more contextualized learning materials for other topics in Mathematics and for other subject areas to address the students’ least learned skills.

Index Terms: Contextualized Learning Material, conceptual understanding, development, validation, utilization

1. INTRODUCTION

Mathematics is an essential part in our daily living. It is an academic subject that focuses on problems which includes analytical, computational and other mental process skills. Mathematics is one of the compulsory core subjects in primary and secondary levels of education. This is intended to improve the mathematical literacy, and steer the country towards economic growth and development (Tella, 2008).

It is universally acknowledged that math is tough, incomprehensible, and of little interest to some people. However, it is also the primary avenue for improving student’s logical thinking and higher-order thinking skills.

Generally, it is an alarming observation among Filipino students that they are weak in mathematics according to the result of the Third International Mathematics and Science Study-Repeat (TIMSS-R, 2011). Thus, student’s errors in mathematics education are not simply a consequence of ignorance, lack of knowledge and situational accidents most student’s mistakes are not due to unsureness, carelessness, or unique situational conditions, as was assumed at the beginning of the behavioristic theory of education. Rather, student errors are the outcome or the product of previous experience in the mathematics classroom. Hence, the extensive remark that numerous children execute poorly in school mathematics put much effort for the necessity of improved instruction. Also, according to Diaz (2016) student’s taking up higher mathematics lack the prerequisite knowledge and skills. More specifically, they lack conceptual knowledge in Mathematics.

This is in accordance with the statement of Killpatrick et al. (2001) who posited that conceptual understanding is needed by the students for learning mathematics successfully because it enables them to learn new ideas by connecting those ideas to what they already know. This connection helps them to remember, use, and reconstruct those ideas when they need them. Further, Killpatrick et al. (2001) added that students need conceptual understanding to support the mathematical concepts as a foundation in solving mathematical problem.

Nowadays, learning mathematics has been given the major focus of teachers’ efforts. Different strategies and techniques are highlighted for the students to be mathematically proficient. The National Research Council (2001) stated that to be mathematically proficient, a student must have conceptual understanding that understands mathematical concepts, processes, and relations. Conceptual understanding allows a student to apply and perhaps adapt some acquired mathematical ideas to new situations such classroom setting.

At present, in the Philippine educational system, learning materials are highly regarded as tools for the improvement of students’ achievement. Thus, Dahar (2011) stresses that the use of appropriate learning material has a strong relationship to the academic performance of secondary students. Barlis (2015) added that instructional materials play an important role in improving student’s Mathematics achievement.

Contextualized Learning Material or CLM refers to a teaching support material introduced into the teaching methods to stimulate the activity of the students and thereby increased their level of understanding (Dy in Cubillas, 2018). It is deliberately planned, prepared and developed for teaching remediation for low achievers in the subject. It is commonly given after the regular classroom instruction to students who failed to understand the concepts of the subject matter of the day.

Hence, this study primarily aims to develop and validate a Contextualized Learning Material, and utilize it in the grade 7 classroom to ascertain its effectiveness in developing the conceptual understanding of the students in Mathematics 7. This is done since it is essential for students to master the Mathematics 7 competencies for them to further proceed to a higher grade level competencies as such concept is the focal feature of the K-12 curriculum called the spiral progression.

It is indeed important for Math teachers to focus on improving the students' achievement in Math in secondary schools for it creates an influential effect on their performance in college and their future careers.

2. LITERATURE

Centuries ago, there were a lot of students who have achieved mathematical knowledge— whether the basics of arithmetic computation or the difficulties of geometric theorems—with less understanding of the math content. In which it merely provides much effect on the student learning foundation on their approaching mathematics development that can hardly result to a fear of mathematics or known as mathematics anxiety. As explained by Beilock et al., (2010), mathematics anxiety has an influence on student's mathematics success. He added that math anxiety in early age may cause a snowball effect that employs a cumulative price on math achievement by altering students' attitude and level of motivation towards math, increasing math avoidance, and eventually plummeting math competence.

Meanwhile, many students tried to create any kind of wisdom they could use as a method for the procedures such as adding common fractions or multiplying decimals. It is said that, attitudes toward mathematics are important due to the common relationship between attitudes towards mathematics and achievement in mathematics (Evans, 2007). No doubt many students observed underlying balances in the computations they were asked to accomplish. But frequently students' learning in Mathematics has often been more a matter of remembering than of understanding.

The extensive remark that numerous children execute poorly in school mathematics put much effort for the necessity of improved instruction. According to Killpatrick et al. (2001), conceptual understanding are needed by the students for learning mathematics successfully because it enables them to learn new ideas by connecting those ideas to what they already know. This connection helps them to remember, use, and reconstruct those ideas when they need them. They added that students need conceptual understanding to support the mathematical concepts as a foundation in solving mathematical problem.

Research endeavors persistently point out that early mathematical knowledge is linked with advanced proficiency achievement in mathematics, (Volume 46, Issue 5, of *Developmental Psychology*; Eccles, 2010) and may even be concomitant to the concerns of secondary graduation.

However, according to Szucs et al. (2016), most of the students have a mathematics anxiety and adults with math anxiety have problems with basic numerical processing (number sense), indicating that their performance was impaired at a very early stage. Mathematics anxiety is similarly distinct as a state of worry that occurs in facing with math-related circumstances (Zettle & Raines, 2002). It is an irrational unwillingness from mathematics often roots to the avoidance of the subject (Bursal & Paznokas, 2006). It has consistently been proven to weakening mathematics achievement (Peston, 2008). Initial math concepts such as knowledge of numbers and ordinality were the most dominant predictors of later learning, as being indicated by Romano et al. (2010).

Wang (2003) explained that the mastery of mathematics corresponds directly to each student's future and life, be it in the work force, college, or the military He added that mastery of basic mathematics skill better prepares one for higher level mathematics, which in turn develop students who are in college and career ready upon graduation of high school.

In addition, according to Brown & Quinn (2007), students who fail to master the foundation of conceptual understanding are often and able to conceptualize higher mathematics and commonly exhibit error patterns when learning higher mathematics.

Gathier, et.al (2004) emphasized that junior years are important time of transition and growth in students' mathematical thinking. Junior students begin to investigate increasingly complex ideas, building their capacity to deal with more formal concept. Early mathematical skill predicts not only later mathematical achievement but also success in other domains. They recommend that providing children with prospects to play, discover by exploring, and encounter mathematical patterns and structures as they engage with mathematics in different ways will help them to develop and acquire certain foundation of mathematical understandings (Sarama & Clements, 2009).

Indeed, students' mathematical achievement in secondary schools has an influential effect on their performance in college and their future careers. Possessing a good foundation in mathematics aids students to develop sophisticated perceptions and offers more future career opportunities. The significance of mathematical learning has frequently been highlighted by the educators and politicians (Wilkins & Ma, 2002). Mathematical knowledge is vital to educational and economic feats in modern society and is now gaining prominence in secondary student's mathematics achievement which forecasts tertiary admission and graduation, early career, income, and income's growth (National Mathematics Advisory Panel or INMAP, 2008).

According to Pink (2005) author of *A Whole New Mind*, people now live in the conceptual age which requires individuals to be able to critically think, solve problem, and adapt to new environment by utilizing transfer of ideas. In acquiring conceptual

understanding, the content must be taught and clearly illustrated in mathematical education in which the students would understand the concept rather than the procedure.

Moreover, the teacher's attitude towards mathematics and his/her approach in teaching mathematics is said to have an effect in student's learning, particularly in developing the conceptual understanding of the students. As stated by Evans (2007) attitudes towards mathematics are important since there is a reciprocal relationship between achievement in mathematics and attitudes towards the subject. Also, negative teacher attitudes toward mathematics often cause to avoidance of teaching strong mathematical content and influence students' attitudes and behaviors (Evans, 2011).

Hence, the teacher plays a vital role in enhancing the conceptual knowledge of the students by the pedagogical method of teaching that is applicable on the development of the child. Teachers should design instructional materials which will aid in the understanding of conceptual knowledge of students. It was viewed that instructional materials play a very important role in the teaching and learning-process. It enhances the memory level of the students. At this point in time that education has become prominent globally, oral teaching cannot just be the venue towards successful instruction, therefore the teacher has to be resourceful by utilizing learning materials to make teaching and learning process effective and fascinating (NIC hulls, 2003;Raw 2006)

Ibeneme (2000) described teaching materials as those used for sensible reasons such as demonstration in the class situation by the teachers and students. Oluwagbohunmi & Abdu-Raheen (2014) explained that teaching materials are used in order to help simplify explanations and make learning of subject matter comprehensible to students. In addition, (Ajayi & Ayodele, 2001) emphasized the significance of the availability of instructional materials in attaining effectiveness in the teaching and learning process and supervision in the school system.

Educators and policy makers are employing an increased emphasis on teaching the concepts and origin of problem-solving procedures (National Council of Teachers of Mathematics or NCTM, 2000), in expectations that increasing conceptual understanding will lead to better students' achievement particularly in Math.

At times, mathematics education scholars have used a more constrained description. Star (2005) noted that the term 'conceptual knowledge' has derived to incorporate not only what is known (knowledge of concepts) but also one way that concepts can be known (e.g. deeply and with rich connections). In which it shows that student's conceptual understanding affects the processes they use. Scholars made use of logic and proof to explain mathematical task and concepts and to design, defend, and evaluate arguments and solutions. Consequently, by engaging students into concepts, students learn mathematics by doing mathematics (NCTM, 2000)

According to Baroody, Feil, & Johnson (2007), conceptual knowledge must be distinct as 'knowledge about facts, generalizations, and principles, without requiring that the knowledge be richly connected. Empirical provision for this concept comes from research on conceptual change which demonstrates that beginners' conceptual knowledge is frequently fragmented and desires to be integrated over the progression of learning and specialists' conceptual knowledge continues to increase and become better systematized (diSessa, Gillespie, & Esterly, 2004; Schneider & Stern, 2009).

At present, in the educational system of the Philippines, instructional materials are considered as tools for the low achievers to cope up with their peers. An example of IM is a Strategic Intervention Material or SIM which refers to a teaching aid introduced in the class to encourage the students to learn or master the skill they failed to learn in regular class. The use of IM for remediation may increase students' level of understanding (Dy in Cubillas, 2018). IM is strategically prepared and designed for teaching remediation for the least learned skills.

Teacher support materials like Strategic Intervention Materials (SIM) and Contextualized Learning Materials (CIM) is an instructional material suggested by the Department of Education to improve student's performance. Since it plays a very important role in the teaching-learning process, it enhances the memory level of the students and makes the teaching-learning process interesting (Nicholls, 2000; Raw, 2003).

According to Bunagan (2012) learning materials are meant to re-teach the least-mastered concepts and skills. These materials are given to students to help them master competency which they were not able to develop during a regular classroom setting.

The new pedagogical approaches can be difficult to implement. Many teachers are not experts in learning strategies, and many have not immersed themselves in the extensive literature in teaching and learning; teachers are experts in their disciplines, and many teach using traditional methods that reflect how students learn. However, alternatives like contextualization may provide more learning gains.

As stated by Nowotny (2001) contextualization is a way to promote socially and powerful knowledge, it provides a conceptual dimension to contextualization. Moltz (2010) explained that contextualization can be seen as a form of "deep learning" that comes about through linking ideas and concepts across courses. It is a teaching skills with direct reference to real world events and practices (Berns & Erickson, 2005)

By that, it is being concluded by Home-Start International (2002) that if students understood fully the concept of mathematics and developed conceptual knowledge in their secondary year then, there is a great possibility that their performance and achievement in mathematics will increase later on. Students' experiences in high school have a profound impact on their later social, emotional and cognitive development.

Hence, it is essential for students to learn and master the competencies in the early grade particularly in Math for one skill may be a pre-requisite to another. Thus, Math teachers should not just be equipped with teaching strategies and techniques but also they should be armed with appropriate instructional materials such as Contextualized Learning Materials which was given highlight in this study.

3. THEORETICAL FRAMEWORK

This study is framed based on Piaget's Constructivist Theory, Concept-First Theories and Vygotsky's Zone of Proximal Development.

Constructivism is a popular learning theory with a unique attention placed on the mental processes that construct meaning. The constructivism principles are grounded mainly on Piaget's assimilation and accommodation processes. The two processes are tools through which learning is achieved. It believes that learner's conceptual understanding affects the processes they use. Such copious theories of knowledge acquisition propose that procedure generation is founded on conceptual understanding (Gelman & Williams, 1997; Halford, 1993). Children are supposed to use their conceptual understanding to constrain procedure discovery and to adapt their current procedures to unique tasks (Gelman, et al., 1994).

Piaget explained that when students find difficulty with a certain concept, it is due to a very fast passage from the qualitative structure of the topic at hand (by simple logical reasoning) to the quantitative formulation (in the sense of weight, numbers, etc.); situations that can help the student in his or her pursuit for understanding is the source of active methods that permit him or her to discover instinctively and require that "new truths" be learned, re-explored or at least reconstructed by the student not simply told to him or her by the teacher (Piaget, 1968).

Another theory in which this study is anchored on is the Concept-First Theories Accordingly, in Concept-First Theories, students innately develop conceptual understanding in a domain and then use this conceptual knowledge to generate and select procedures for solving problems in that domain (Geary, 1994; Gelman & Williams, 1993). Evidence consistent with the developmental precedence of conceptual knowledge has been found in mathematical domains ranging from simple arithmetic to proportional reasoning (Byrnes et. al., 1992). This theory and evidence have been used to justify reforms in mathematics education that focus on inculcating conceptual knowledge before teaching procedural knowledge (National Council of Teachers of Mathematics {NCTM}, 1989; Putnam, Heaton, Pre-wat, & Remillard, 1992).

On the other hand, Vygotsky's Zone of Proximal Development or ZPD which states that students are particularly dependent on teacher's or peer's support. Scaffolding is the term given to describe the giving of appropriate help to a student in order for him or her to accomplish what by himself or herself would have been too difficult. Scaffolding is a back-up material that includes words and illustrations that can be seen and heard. It is an excellent way to provide comprehensible input to learners so that not only will they learn the essential subject content but also they will make progress in their acquisition of knowledge of the subject. This means that in designing learning materials, students should be able to see an image of what the teacher is describing or see the key words that the teacher is talking about for this not only aids in making the topic more comprehensible, but serves to remove the affective filter which brought about by the frustration, fear or boredom due to understanding very poorly in class (Cubillas, 2018).

Hence, theorists and researchers agree that in teaching Mathematics, teachers should develop in students conceptual understanding first prior to teaching procedural knowledge as implied in Concept-First Theories and Piaget's Constructivism theory and that they should design instructional materials which will aid to the enhancement of students' understanding towards the lesson as reflected in Vygotsky's ZPD.

4. Objectives of the Study

The main focus of this investigation is to develop and validate a Contextualized Learning Material (CLM) and ascertain its effectiveness. Specifically, the study aimed to:

1. identify the least-learned skill of the Grade 7 students in the first grading quarterly test;
2. determine the conceptualized learning material (CLM) which may be developed to master the least-learned skill;
3. evaluate the developed CLM in terms of its content and usability; and
4. compare the performance of the students in the pre-test (before CLM) and posttest (after CLM).

5. METHODOLOGY

A quasi-experimental one group pre-test and post-test design was administered to identify the development of conceptual understanding of Grade 7 Mathematics students. The design was employed mainly because of its strength which lies in the fact that advantages of each approach complements those of the other making a stronger research design that yields more valid and reliable findings (Opie 2004). The paired t-test (pre-test/posttest), was the main instrument used to ascertain the effectiveness of the developed and validated Contextualized Learning Material which was designed to help teachers provide the students appropriate aid to master the Mathematics competency.

For the development of the CLM, the researcher utilized the data as provided in the item analysis results by which the least learned skill was derived. While for the validation, both content and usability experts used the questionnaires adopted from study of Cubillas (2018) which consists of 20 items. Another researcher-made instrument was used in determining the effectiveness of the CLM which was validated by the three teacher-experts. It consists of 15 items about sets, its operations and its representation in Venn diagram. It underwent the reliability testing which resulted to 0.953 (Cronbach's alpha) which means that the instrument is highly reliable. After the pre-test and posttest, the paired t-test was used to compare the students' performance. The t-test for dependent samples was used to determine if there is a significant difference between percentage scores in the pre-test and posttest of the group.

The study involved 64 students (32 female and 32 male) of Taligaman National High School who are enrolled in the School Year 2017-2018.

The developed and validated Contextualized Learning Material (CLM) contained five parts: the guide card, activity card, assessment card, enrichment card and reference card. The guide card stimulated the students' interest on the topic discussed and gave a preview of what they would learn. Activity card, assessment card, and enrichment card are series of activities with different level of difficulties to excite the students' interest as they answer the CLM. The reference card provides the students the list of sources of information which served as bases of the researcher in crafting the material.

6. RESULTS AND ANALYSES

1. The Least Learned Skill of the Grade 7 students in the First Grading Quarterly Test in Math

Viewed in Appendix A is the result of the item analysis in the first grading quarterly test of the grade 7 students in Mathematics. Item number 19 ranked the lowest with only 8 out of 32 or only 27 % of students answered the item correctly. This means that the students did far from the passing percentage of 75%. This further indicates that they failed to master the competency. Item no. 19 was about "set". The least learned skill then of the students in the first grading test is about "set". Hence, the result served as baseline of the researcher to develop a Contextualized Learning Material or CLM.

2. The Development of the Contextualized Learning Material (CLM)

The Contextualized Learning Material was developed based on the least- learned skill in the first grading quarterly test in Mathematics 7. It was framed based on Piaget's Theory of Constructivism, Concept-First Theories and by Vygotsky's Scaffolding Theory

The CLM was named *Fun with Sets* was designed using the Strategic Intervention Material (SIM) format which contain four parts called cards. The guide cards which stimulate the students' interest on the topic discussed and give a preview of what they would learn. The activity cards and the assessment cards which contain series of activities with different level of difficulties to excite the students' interest as they answer the CLM. Last is the reference card which provides the students the list of sources of information where they can source out ideas about sets.

In each card of the CLM, activities were designed in such a way that students will be able to understand the competency with or without the presence or assistance of the teacher. They were designed in progression in which the difficulty is gradually raised so that students will not bore or frustrate themselves in answering the material which may be due to material which is too easy or too hard for grade 7 students. Furthermore, each activity in the CLM was contextualized which means that the examples, tasks, items found in the material is relatable to the students.

3. The Validation of the Contextualized Learning Material

Viewed in the table is the mean distribution of the ratings given by the content experts.

Table 1. Content Validation of CLM

| INDICATORS | Mean | INTERPRETATION |
|----------------------------|------|-------------------|
| I. Objectives | 4.70 | Very Satisfactory |
| II. Technical Quality | 4.85 | Very Satisfactory |
| III. Instructional Quality | 4.75 | Very Satisfactory |
| IV. Organization | 4.77 | Very Satisfactory |
| V. Language Arts Content | 4.74 | Very Satisfactory |
| VI. Alignment | 4.95 | Very Satisfactory |
| GRAND MEAN | 4.79 | Very Satisfactory |

As presented in Table 1, the alignment got 4.95, the highest mean rating given by the content experts which is interpreted as very satisfactory. The rating implies that the CLM has texts/words which are printed clearly, legibly, and written in size that is suitable for the students, its instructions are integrated with the students' prior knowledge or schema, its parts provide varied activities for the learners, its activity cards include in the lessons are congruent to the objectives listed in the guide card ,it is a useful resource in preparing students to meet the requirements of the curriculum standards and its activities have purpose, and are aligned to a skill or concept of the grade level. The lowest mean rating of the content experts is 4.70 under the indicator objectives which is interpreted as very satisfactory. The grand mean presented in Table 1 was 4.79 which is interpreted as very satisfactory. This result indicates that the CLM is suitable and appropriate for students to master the competency.

Table 2 presents the mean distribution of the ratings given by the usability experts. As presented, the highest mean rating given by the usability experts was 4.73 which was interpreted as very satisfactory for the ease of administration The result suggests that the instructions in every activity in the material are understandable. Another is that the answer keys for the activities in each material are provided. Also, the answers in each activity in the material are objective.

The lowest mean rating of the content experts was the time in answering the activities with a mean 4.50 which was interpreted as very satisfactory. This means that the students need enough time to accomplish the tasks in the CLM.

The grand mean presented in Table 2 was 4.61 which means that the CLM was viewed by the usability experts as very satisfactory. This result also indicates that the CLM as teacher support material can be used as a tool to master the Math 7 competency “sets”.

Table 2. Usability Validation of CLM

| INDICATORS | Mean | INTERPRETATION |
|---------------------------|------|-------------------|
| I. Ease of Administration | 4.73 | Very Satisfactory |
| II. Ease of Scoring | 4.70 | Very Satisfactory |
| III. Expenses | 4.55 | Very Satisfactory |
| IV. Time | 4.50 | Very Satisfactory |
| V. Other Factors | 4.59 | Very Satisfactory |
| Grand Mean | 4.61 | Very Satisfactory |

4. The Significant Difference between the Pre-test and Posttest Scores of the Grade 7 Math Students

Presented in Table 5 is the result of the paired T-test of the scores of the students in pre-test (Before CLM) and scores in the posttest (After CLM)

Table 5. Comparison of Means between the Pre-test and Post-test

| | Mean Score | P-value ^{A,B} | Remark |
|-----------|------------|------------------------|-------------|
| Pre-test | 5.70 | | |
| Post-test | 9.70 | 0.000 | Significant |

^Atested at 0.05 level of significance ^Btested using Paired T-Test

Table 3 shows the comparison of means between the pre-test and post-test scores of the students. It indicates the $p=0.000$ which means that the null hypothesis is rejected meaning there is a significant difference between the pre-test and post-test scores of the students. The result further manifests that there is an improvement of the students’ performance after they were introduced with the CLM.

Soberano (2010) mentioned in his experimental study that appropriate instructional materials are effective in mastering the competency based on the mean gain scores in post-test. He found out that there was a positive transfer of learning in experimental groups. Thus, an instructional material such as CLM helps improve the student’s performance.

6. CONCLUSIONS

The study primarily aimed to develop and validate a Contextualized Learning Material or CLM and to determine its effectiveness in mastering the least learned skill. The CLM was designed based on Piaget’s Theory of Constructivism, Concept-First Theories, and Vygotsky’s Scaffolding Theory of the ZPD or Zone of Proximal Development. The least learned skill of the grade 7 students in Mathematics is about “sets”. This skill was used as the baseline in the development of the Contextualized Learning Material or CLM. The developed learning material contains five parts or cards. The guide card stimulates students’ interest in accomplishing the tasks in the CLM and gives an overview of what are to be learned in the material. The activity and assessment cards which consist of series of activities with different level of difficulties to excite the students’ interest as they answer the CLM and the reference card which provides the students the list of sources of information where they can source out ideas about sets.

The content experts considered the developed Contextualized Learning Material (CLM) as suitable and appropriate for the grade 7 students which aid them to master the least-learned competency in the first grading quarterly test. Also, the usability experts considered the developed CLM as a material that can be used as grade 7 teacher support material which are easy to administer and score.

In addition, the developed and validated CLM helps to improve the grade 7 students’ scores. Thus, CLM is indeed an effective material which can be used by students to improve their performance in Mathematics.

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Prosopis Juliflora In Asals Of Kenya: A Friend Or A Foe Plant?

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Abstract- *Prosopis juliflora*, popularly known as Mathenge in Kenya, is an invasive short shrub spread in drylands of Africa, Asia, Australia and in other parts of the world. The shrub was introduced in Kenya in the 1970s with an aim of afforesting the arid and semi-arid areas to curb desertification. In the formative stages, the results were positive but this did not last for long. It spread so rapidly becoming a menace to ASAL pastoralists prompting its declaration as a harmful weed in Kenya under the Suppression of Noxious Weeds Act (CAP 325) in 2008. Well, in some parts of the world, the shrub is cultivated. The study sought to examine the usefulness of *P. juliflora* (referred to as *Prosopis* in this study) in Kenyan ASALs and to determine whether it is a friend or a foe plant? Interviews were conducted to fifty (50) pastoralist respondents who were selected using simple random sampling method from Garissa Sub County. Secondary sources were also reviewed. The study established that the economy of ASALs revolves around livestock rearing, which in turn depends on the water and pasture. *Prosopis* had colonized the grazing land reducing the carrying capacity of the ASAL rangelands. Cases of ulceration of livestock teeth and mouth, serious injuries on both livestock and humans associated with *Prosopis* thorns, and loss of livestock were reported. On the other hand, various uses of *Prosopis* were identified and included: provision of fuelwood and charcoal, keeping of bees, control of soil erosion by wind and water. In addition, *Prosopis* was used in formulation of livestock fodder, making of drinking juices and cakes, production of biomass energy in Kenya. Negative attitude towards *Prosopis* by the pastoralists was identified as a hindrance to its use. The study established that with suitable management, capacity building and attitude change of the pastoralists on utilization of the shrub, *Prosopis* can be harnessed as a useful resource in the ASALs.

Index Terms- *Prosopis juliflora*, noxious weed, resource, pastoralism, ASALs

I. INTRODUCTION

Prosopis has different local names depending on its geographical location. In Kenya, it is known as Mathenge. In English it is known as ironwood, honey mesquite, mesquite and mesquite bean; kikwajukwaju in Swahili and Aligarooob in Somali language [1]. It is an evergreen short shrub

with very sharp thorns and grows to a height of 5-10m. It produces non-scent pods with hard, dark brown oval seeds [2]. It is a hardy and invasive species with the ability to tolerate droughts, waterlogged soils, low nutrient and saline or alkaline soils [3]. Thus, it is highly invasive and once established it is hard to control [4].

P. juliflora-pallida is found across a wide geographical region. In America, it covers regions between latitudes 22-25 degrees north and 18-20 degrees south. In Africa, the *Prosopis* species is said to have been introduced in Senegal, South Africa, and Egypt in the early to late 19th century. Records show that *Prosopis* species were introduced in Kenya in 1973 in coastal regions for the rehabilitation of quarries. Later in 1980s, it was later introduced to Baringo, Tana River and Turkana districts (now counties) largely for curbing desertification and overexploitation of the existing natural vegetation [5]. Today, these counties have the largest biomass of *Prosopis* in Kenya. *Prosopis* is also found in other counties such as Wajir, Kajiado, Samburu, Isiolo, Taveta, Malindi, Migori, Mandera and Marsabit [6]. To a large extent, the inhabitants of these counties call *Prosopis* an evil plant. According [7] this is attributed to the negative effect they have on the ecosystem, rangelands and animal and human health. Actually, in 2008 the perceived negative effects made *Prosopis* declared as a noxious weed under the Suppression of Noxious Weeds Act (CAP 325) [8]. However, [5] observe that the usefulness or adversity of *Prosopis* as perceived by the community depends on three factors: whether and how the species meet their economic needs; income levels and main livelihood occupations; and how destructive the species is to property and natural ecosystems. Other factors that influence the people's perception of *Prosopis* include the opinions of elite in the society, the costs of managing the species, how media portrays the species and whether or not the species is physically appealing.

II. THE OBJECTIVE OF THE STUDY

The general objective of the study was to examine the extent of usefulness or adversity of *Prosopis* as perceived by the inhabitants of Garissa County. Hence establish whether it is a friend or a foe plant to the inhabitants.

III. STUDY AREA AND METHODOLOGY

The study was carried out in Garissa County that lies between latitude 1° 58'N and 2° 1' S and longitude 38° 34'E and 41° 32'E covering an area of 43,259 km². The County lies in the arid and semiarid lands (ASALs) of Northern Kenya that is characterized by low, erratic and unreliable rainfall averaging at 275 mm per year and temperature ranging from 20°C to 38°C with the average of 36°C [9]. The main economic activity is pastoralism which is a source of livelihood to 90% of the inhabitants. The rangelands of the county are largely cover with *Prosopis*. A study by [10] shows that between 2000 and 2006 about 440 km² of the rangelands were newly colonized by *Prosopis*. This was a rate of 73 km² per year. Garissa County had a population of about 849,457 in 2017 of whom the majority are of ethnic Somalis

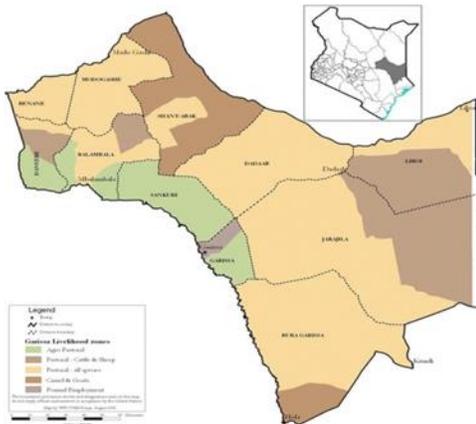


Figure 1: Map and location of Garissa County

Whereas data for the study was largely from secondary sources, fifty (50) pastoralist respondents from Garissa Sub County were randomly selected and interviewed. Selection of the respondents was carried out during the Garissa animal market day which serves Garissa County and other neighbouring counties. This was to ensure that pastoralists arriving from the whole Sub-county. The sample comprised of 40 men and 10 women. Interview schedules were used in data collection.

IV. RESULTS AND DISCUSSION

Prosopis juliflora in Garissa County

Aligarroob, a Somali name for *Prosopis juliflora* is a common name not only in Garissa County but in entire Northern Kenya. Pastoralists claimed that *Prosopis* shrub emerged in the County in 1980's after it was introduced by the government. It was introduced as a forestry tree majorly to rehabilitate the degraded environment, ensure self-sufficiency in fuelwood and conservation of the existing natural plants against human destruction. It was obvious from the respondents' answers that the extent of rangeland colonization by the species was increasing. This was attributed to animal feeding on seeds and dispersing them as they graze. [11] observes that *Prosopis* is spread through its seeds where a mature plant produces between 630,000 and 980,000 seeds in a year. The seeds are highly productive and are dispersed by animals feeding on the pods. As [10] observes animals, and particularly goats, plays a key role in spreading of

Prosopis (what he calls the goat factor). The goats eat mature seed pods which are later dropped together with the faeces away from the parent plants. This way the volume of *Prosopis* in Garissa Sub County had increased due to assembly of livestock during the main livestock market located in Garissa town. In addition to spreading by animals, river flows and floods were identified as other methods in which *Prosopis* have spread. Essentially, dense thickets of *Prosopis* were found along the roads and migration pathways, rivers or watering points, irrigation schemes and near settlements with relatively low volumes in open grasslands.

Uses of *P. juliflora* in Garissa County

During the introduction of *Prosopis* in the 1980 and early 1990s, pastoralists embraced the shrub because of its perceived benefits. These included reduced desertification, provision of shade for animals and provision of fuelwood. This assertion confirms [5] observation that the perception of the people on *Prosopis* depended on whether the species meet their needs.

Production of Biomass Electricity and Gas

The large amount of biomass produced by *Prosopis* makes is a valuable resource for electricity generation. Although no working electricity generating plant using *Prosopis* in Kenya, efforts to establish one has been put in Baringo County by Cummins Cogeneration Kenya Ltd. Garissa County Government had also entered into partnership with Sweden-based VR Holding AB, and Finnish company WOIMA Ecosystem with an aim of using *Prosopis* with the purpose of generating electricity and gas [12]. In India, between 30 and 40 projects in Andra Pradesh, Tamil Nadu and Gujarat have been authorized to generate electricity using *Prosopis* [13]

Ethnomedicine

The use of *Prosopis* as a form of medicine was reported by the respondents. Although not a common practice, *Prosopis* leaves were used to treat ailments such as cuts, scratches etc. *Prosopis* fresh green leaves are rubbed against the scratches or squeezed on cuts. [14] notes that *Prosopis* has been used in healing wounds and other ailments such as cold, flu, diarrhoea, dysentery, excrescences, inflammation, measles and sore throat. On livestock, *Prosopis* pods were used as a dewormer. Free-ranging livestock that fed on *Prosopis* pods were not dewormed routinely. Although the use of *Prosopis* processed livestock feeds was not common in Garissa County, a study by [15] revealed that feeds fortified with *Prosopis* or non-fortified *Prosopis* feeds controlled gastro-intestinal nematode parasites and gut nematodes respectively.

Livestock feeds

There were two methods in which *Prosopis* pods were used as livestock in Garissa County. The most common method was direct feeding of livestock with the pods during drought. Free-ranging animals eat the pods directly from the shrubs or the pods are collected and fed to animals. During drought, the *Prosopis* pods are sold as livestock feeds in the markets in Garissa County (Figure 2).



Figure 2: Harvested *Prosopis* pods ready for market in Garissa Town

The second method involved the use of *Prosopis* pods as raw material for processing livestock feeds. Concentrate of *Prosopis* pods has been used in feed production. For instance, Peru, Chile, Argentina and Uruguay concentrate rations have of 40-60% have been used for dairy cows. In Brazil, studies have shown that up to 60% of wheat flour in rations for lactating cows could be replaced with *Prosopis* pods. In Mexico, the live weight in sheep increased up to 45% after sorghum flour was replaced with *Prosopis* pod flour [16]

Source of Fuelwood

Prosopis was the main source of fuelwood in Garissa County. In rural areas, it was the only source since it was readily available and at no cost except harvesting labour which was provided by women and children. Although charcoal from *Prosopis* shrub was unpopular, to a large extent the species was used in the production of charcoal for domestic use.

Source of Construction Materials

Construction materials obtained from *Prosopis* included building and fencing poles, rafters and twigs. They are mostly used in the construction of temporary houses which are very common in rural, peri-urban and urban areas of Garissa County. These structures and houses were made of *Prosopis* poles and twigs (Figure 3 and 4).



Figure 3: Construction poles from *Prosopis*



Figure 4: A makeshift houses made from *Prosopis* poles in Garissa County

The reasons for the semi-permanent houses were threefold: the transhumance way of life of the pastoralists, their cultural buildings and also for controlling the high day and night temperatures. The *Prosopis* poles and twigs were preferred because they were resistant to termites and also they were locally available and affordable. The best quality poles and twigs were obtained from Bangale Division since the area had the oldest *Prosopis* shrubs. The old *Prosopis* were resistant to termites and seasoning from harsh weather. Sale of *Prosopis* poles and twigs earned traders some income.

Negative effects of *Prosopis* in Garissa County

The perceived benefits of *Prosopis* during the initial years of its introduction in the county made the pastoralists embraced the shrub. However, this did not last for long after the perceived benefits were dwarfed by unexpected threats caused by *Prosopis*. This scenario was not unique in Garissa County only but in many other parts of the country and elsewhere in the world over. A similar case, for instance, was reported in the Indian province of Rajasthan where people adopted the species but their perception changed after the negative effects of the invasion [11]. Pastoralists indicated that of all plants in the Sub County, *Prosopis* has become the most unpopular because of its negative effects on both physical and human environments. Pastoralists regarded it as the evil plant.

Whereas some of its uses were acknowledged, the negative effects outweighed its usefulness. Some of major threats associated directly with increase and the spread of *Prosopis* in the County were: loss of pasture, injuries to humans and livestock, poor livestock health due to consumption of *Prosopis* and blocked main pathways and migration routes.

Loss of pasture

Typically, the main livestock feed resource in Garissa County are browse, natural grasses and palatable shrubs and trees. Observations from the pastoralists that the rapid spread of and colonization by *Prosopis* has greatly reduced pasture and browse in the County agree with [5] assertion on the effects of the species on pasture. Although, in their understanding, pastoralists argued that *Prosopis* "eat grass", research points out reduction in native pasture results from its ability to outcompete for moisture from pasture land, denying grass enough light for photosynthesis due to shade created by its canopy and the allelopathic effects on other surrounding vegetation [11].

Poor Health on Humans and Livestock

The common direct effect of *Prosopis* on human health was injuries caused by thorns. Respondents argued that the injuries cause severe inflammation that lasts for several days. If left untreated, it has on several occasions led to severe infection that result in amputation of limbs. Several cases of leg amputations alleged to have been caused by injuries from the *Prosopis* thorns were cited. Two indirect causes identified included: (i) increased in malaria diseases, and (ii) poor nutrition due to strained livelihoods. The dense *Prosopis* thickets provided favourable habitat for mosquitoes. A large number of mosquitoes invading household has been attributed to close proximity of the thickets near the homesteads resulting in high malaria prevalence. Poor nutrition was associated with suppression of pasture near the homesteads suitable for the core herd usually left behind to provide the food to the family after the larger herd migrates. Suppressed pasture resulted in low livestock production which in turn caused food shortage.

Just like in humans, cases of injuries from *Prosopis* thorns were common. The most notable conditions associated with such injuries included body scratches, wounded and limping animals and eye cataracts in pricked eyes. Cases of the disfiguration of goats' jaws and teeth decay were reported. The disfiguration of goats' jaws was caused by the inflammation emanating from the hard *Prosopis* seeds lodging in between the gums and the teeth. The decay of teeth was caused by consumption of unripe *Prosopis* pods which has high sugar content.

Blocked migration routes

Prosopis seeds are largely dispersed through animal dropping. As large herds of livestock migrate, huge thickets develop along the migratory routes due to the enormous amount of livestock droppings. Over time, some important migratory routes have been completely blocked compelling pastoralists to use longer or unsafe routes to get to desired destinations. In Baringo County, for

example, migration that used to take two hours to Loruk now takes up to eight hours Mwangi and Swallow, 2005).

So, What Do We Do with *Prosopis*?

The double-edged nature of *Prosopis*, being useful and harmful at the same time, makes [11] argue of uncertainty on the role of *Prosopis* in community development. So, is *Prosopis* a friend or a foe plant? Whereas *Prosopis* has some benefits, they are far much overshadowed by miseries it causes. Thus, from the lens of a pastoralist in Garissa County, *Prosopis* is a menace that should be eradicated. On the other hand, researchers argue that *Prosopis* is a gem in ASALs. Taking cognizant that *Prosopis* has already colonized the rangelands of Garissa County and other ASALs in the country and it cannot be eradicated [7], the only viable option is to make good use of it. [17] argue that *Prosopis* can only be controlled turning the weed into a valuable resource through utilization of tree products and by improved management.

From the literature reviewed, the study established that the potential for *Prosopis* is largely not exploited. Uses such as making sweets from sweet gum on the trunk, production of refreshing drink and beer (if fermented) from powdered pods, raw material for production of paper, paperboard and hardboard and commercial production of medicine remains untapped in Kenya. Well! If these uses remain untapped, *Prosopis* will continue being a foe but if tapped, it will be a friend and an important resource in ASALs. This can be achieved through (i) conducting adequate research on *Prosopis*, (ii) investing in production of *Prosopis* products, (iii) proper management of the existing *Prosopis*. The outcome of actualizing these three activities will be a change in pastoralists' perceptions and attitudes towards *Prosopis* which will result in acceptance and adoption of species.

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Plagiarism Detection Systems

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Abstract- Plagiarism is an inappropriate practice in which a person makes use of the words and ideas of another person without fully acknowledging the person. Presently, most tertiary institutions' student's project work in Nigeria is stored on shelves which can make it impossible to compare one or more projects to determine if plagiarism has been committed. When manually done, this is inefficient and tedious for any individual to be picking files one by one and comparing against other files to determine the occurrence of plagiarism. The developed system when subjected to a test of plagiarism indicates a 40% successful match of words in the body of the thesis. JAVA Programming Language is used for software development. To accomplish this task using this language the following tools was used, the JAVA development kit 1.7, Netbeans source code editor 7.4, MySQL database management 5.0 for back end support, fireworks graphics editor for the graphics. The benefits of implementing this system are that it could save time for academic staff trying to detect plagiarism in student's project and mitigate plagiarism within the institution.

I. INTRODUCTION

It is hard to define plagiarism in a way that is simple and has a wide acceptance this is because different fields and organizations may have diverse ethics as well as what might be considered 'widely accepted', thus does not need referencing by an expert in a given subject. On the other hand, there is a mutual understanding that plagiarism happens when someone else's thoughts, ideas and work is passed off as that of another person's effort whether deliberately or unintentionally, without germane acknowledgement. It is noteworthy to recognize that plagiarism does not just apply to written work – be it essays, reports, dissertations or laboratory results- but can also apply to plans, projects, designs, music, presentations or other work presented for assessment (Ranal, 2009). To detect textual plagiarism, there are some standalone tools that are valuable they are as follows:

II. LITERATURE REVIEW

A conceptual framework speaks to the scientist's amalgamation of writing on the best way to clarify a wonder. It maps out the activities required throughout the investigation-given his past learning of other scientists' perspective and his perceptions regarding the matter of research.

As McGaghie et al. (2001) put it: The conceptual framework "sets the stage" for the presentation of the particular research question that drives the investigation being reported based on the problem statement. The issue proclamation of a proposition shows

the specific situation and the issues that made the specialist lead the examination.

Plagiarism as a word to most people may sound strange. Everyone has committed plagiarism in one way or the other during their life time without attaching any meaning to it as it is understood today. As indicated by Shiva (2006), the word plagiarism is gotten from the Latin word *plagiare*, which means to grab or steal. The word started being used in the English language at some point during the 1600s. While it initially meant to kidnap somebody, it bit by bit came to mean to pass off, in part of entire, another person's work as your own. Further, Merriam-Webster dictionary is of the supposition that plagiarism could mean any of the following: taking others' subjects, innovation, thoughts or words and report either verbally or recorded as a hard copy as one's own. Expansion of idea or product from an established source with credibility; theft in writing and expressions; and without giving required credits or acquiring consent before the utilization of others' creation.

For example a larger piece of religious writings have no author and was duplicated and integrated into later works. The word scholarship means to substantiate mastery of the ancient greats. There was a detectable change in this pattern precisely during the renaissance when novelty in scholarship began commanding respect and individual accomplishments are compensated in many more disciplines than it has ever been previously. This began when painters started marking their works. By the mid-1600s, allegations of copyright infringement and taking thoughts were regular in each imaginative field including technical studies. The main English copyright law was passed in the year 1709 and It has more to do with protecting the privileges of authors against book theft as it did with securing the writer's rights against corrupt printers, however, the advancement of the writer's privilege is speedy. James Boswell, otherwise called Samuel Johnson's biographer, was a legal advisor who contended one of the significant cases over to what extent copyrights went on for a creator and his or her beneficiaries (Hygeia, 2011). By the start of the nineteenth century, the idea and the law were fundamentally the same as what they are today. Indeed, even references were being utilized in a structure fundamentally the same as what they are today. What has changed from that point forward has been the issue of authorizing copyrights crosswise over fringes. Most European nations finished up understandings to forestall book robbery. The United States was the odd man out and would not give any security to foreign authors and publishers until 1891 and didn't sign on to the Berne Convention until 1988 Vinod et al. (2011).

Some outstanding characters have in one way or the other committed plagiarism. As indicated by Stephen (2005), Shakespeare stole the vast majority of his chronicled plots

straightforwardly from Holinshed. Laurence Sterne and Samuel Taylor Coleridge were both blamed for written falsification. The degree of Coleridge's copyright infringement has been battered by researchers since Thomas de Quincey, himself a practiced borrower, distributed a report in Tait's Magazine two or three weeks after Coleridge's passing. Oscar Wilde was blamed for written falsification: consequently the commended trade with Whistler: "I wish I'd said that, James." Furthermore, Stephen (2005) is of the view that students who are lazy and mendacious are not by any means the only individuals who plagiarize. For example, Martin Luther King counterfeited some portion of a part of his doctoral thesis. Expressed that George Harrison was effectively sued for stealing the Chiffons' He's So Fine for My Sweet Lord. Stephen (2005) indicates that Alex Haley duplicated huge entries of his novel Roots from The African by Harold Courlander. Princess Michael was blamed for literary theft over her book on illustrious ladies. Jayson Blair, at that point a journalist for the New York Times, plagiarized numerous articles and faked quotes. In 1997, under a half year after winning the Booker prize, Graham Swift's Last Orders was at the focal point of allegations that the writer had gone too far among motivation and copyright infringement by "legitimately mirroring" a prior work, the 1930 novel As I Lay Dying by William Faulkner. Gone up against the allegations, Swift said his book was a "reverberation" of Faulkner's.

Innovation has made a difference a lot over the most recent 200 years, however, the significance we append to it might decay. As observed by McKay (2009) this "started to change during the renaissance when unique grant turned out to be increasingly regarded and singular achievement was perceived in a lot more fields than it had been already (for instance, this is when painters started marking their works). The point here is that, by the mid-1600s, allegations of stealing and plagiarism were common in every innovative field including the science. An allegation of taking another person's words or thoughts and passing them off as your very own was one of the most exceedingly awful affronts believable and reason for claims and legal actions".

Object-oriented Programming (OOP) : As per Kwanzulnatal (2007), Object-oriented Programming speaks to an endeavor to make programs all the more closely model how individuals consider and manage the world. In the more established styles of programming, a software engineer who is confronted with some issue must distinguish a processing task that should be performed to tackle the issue. It is a lot of instruments and strategies that empower programming specialists to manufacture dependable, easy to use, and viable, very much archived, reusable programming frameworks that satisfy the necessities of its clients. It is asserted that object-direction gives programming engineers new personality apparatuses to use in taking care of a wide assortment of issues. Item direction gives another perspective on calculation. A product framework is viewed as a network of items that collaborate by passing messages in taking care of an issue. Instances of Object-oriented Programming Languages are Java, Python, Ruby, C++, and Smalltalk.

III. RELATED WORKS

Skyline. Inc. developed standalone plagiarism-detector anti plagiarism software, which detects plagiarized text. It is an

autonomous Microsoft Windows-based computer desktop application made with Visual C#.Net. It follows the exact substrings detection method and it is used in the academic environment. At any rate, it has its shortcomings which is that it runs just on windows operating system, it raises a huge amount of false positives (it flags a sentence as plagiarized even though it is not). It also lacks plagiarism prevention mechanism because there is no module or subsystem in place to deter or discourage plagiarism.

Sherlock: As demonstrated by Shahabi (2012), Sherlock, is a program used to recognize copyright encroachment for essays, computer source codes files and other kinds of textual documents in digital form. Sherlock works by converting text it receives into digital signatures to measure the similarity between the documents. A digital signature is a number formed by changing several words (3 by default) in the input into a series of bits and joining those bits into a number. Sherlock is developed with C programming language and it requires compilation before being installed either on Unix/Linux or Windows. It doesn't have a GUI as it is a command-line program. When a "sherlock *.txt" command is issued sherlock will compare all the text files in the current directory and produce a list of file pairs together with a similarity percentage. Research has shown that 100% similarity index does not suggest that the files are identical because Sherlock actually throws away some data randomly in the process in order to simplify and speed up the match (Shahabi 2012). In addition, sherlock requires recompilation each time it is to be used in other platforms apart from windows. The nature of sherlock as a command line tool makes it not to be user friendly as users have to remember all the relevant commands. As observed by Martins, *et al.* (2010), It allows for control over the threshold which conceals the percentage with lower values, the number of words per digital signature and the granularity of the comparison by use of the respective arguments: - t, - n and - z. It supports natural language. Sherlock is a fascinating case as its outcomes are a rundown of sentences in a "Document 1 and File 2: Match%" group. This configuration does not enable the client to locate the most noteworthy matches, it essentially makes the outcomes simpler to post-process. Results were created with every one of the blends of the settings from - n 1 to 4 and - z 0 to 5, Sherlock was created utilizing the C language.

Ferret: It was developed at the University of Hertfordshire it is a freely available standalone plagiarism detection software. It runs on windows environment and very easy to install as well. It can process files with the following extensions .txt, .rtf, .doc and .pdf. Ferret's algorithm was written in C++. Ferret takes a set of documents, converts each text into reference numbers and set of characteristic trigrams. When documents are fed to Ferret it converts those documents into reference numbers-set of characteristic trigrams. In order evaluate the writings it got it checks the quantity of one of a kind trigrams and afterward depends on its findings to create a rundown as record sets with its accompanying likeness score that generally ranks from the most comparable pair to the least comparable pair. This count is used to count the resemblance measure, as the number of similar trigrams in a pair of documents, divided by the total number of different trigrams in the pair. Ferret manifests the scores of similarity precisely, such as 0.90991. The system allows user to select any pair of texts and do further investigation as they will be displayed

side by side with similar paragraphs highlighted for instance similar parts in blue and different parts in black. Since it is developed with C++ language it implies that it can only run on windows platform and not on any other platform. C++ being a poor string manipulator makes Ferrets detection ability slow (Shahabi, 2012).

Extant literature suggest that, there is no significant work done to address these shortcomings.

iThenticate: According to Asim *et al.* (2013) iThenticate compares a given document against the document sources available on the World Wide Web. It also compares the given document against proprietary databases of published works (including ABI/Inform, Periodical Abstracts, Business Dateline), as well as numerous electronic books and produces originality reports. The originality reports provide the amounts of materials copied (in percentages) to determine the extent of plagiarism, was developed using PHP and supported by an MSQl back end database.

IV. METHODOLOGY ADOPTED

Structured System Analysis and Design Methodology (SSADM) is a collection well thought out standards used for analyzing systems and application design. It uses a formal methodical approach to the analysis and design of information system. It was explicitly adopted because there is the need to interact with the supervisors and other stake holders who will be using it as to the require features needed to be present on it and also the need to inquire about the current system of storing students projects and how it is utilized to combat plagiarism. The advantage of utilizing this technique is that firstly when used it's many stages form a beneficial set of real-world prescriptions that consider real challenges and conditions. This empowers the creators to practically consider the suggested data framework. We must recall that Key phases of SSADM incorporate feasibility study, where the designer should establish if the recommended system is attainable and the study current system demands that systems are reviewed. This guarantees all suggested changes are valuable and essential.

Source Code

```
import java.awt.Component;
import java.awt.FlowLayout;
import java.awt.PopupMenu;
import java.awt.event.ActionEvent;
import java.io.FileInputStream;
/**
 *
 * @author franc
 */
public class ProofRead extends javax.swing.JFrame {
    private BufferedImage img2;
    private JButton b;
    private JTextField tx;
    private JLabel jp1;
    private JLabel tx1;
    private JLabel jp1;
```

```
private void
jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    File file = null;
    File oldfile = null;
    ResultSets = null;

    Connection con = null;
    FileInputStream oldfis = null;
    PDDocument extractor = null;
    PDDocument oldextractor = null;

    PDDocument olddocument = null;
    try {
        file = new File(jTextField7.getText());
        Properties prop = new Properties();
        prop.setProperty("user", "root");

        prop.setProperty("password", "");
        con =
        DriverManager.getConnection("jdbc:mysql://localhost/proofread
        ",prop);
        if(con != null )
        System.out.println("CONNECTION SUCCESSFUL");
        PreparedStatement st = null;
        FileInputStream fis =
        new
        FileInputStream(file.getAbsolutePath());
        // document = new XWPFDocument(fis);
        // extractor = new XWPFWordExtractor(document);
        //String fileData = extractor.getText();
        // String[] filed = fileData.split("\n");

        document = PDDocument.load(fis);
        if (!document.isEncrypted() ) {
        PDFTextStripper stripper = new PDFTextStripper();
        String fileData = stripper.getText(document);
        filed = fileData.split("\n");
        }
        st = con.prepareStatement("select project from registration");
        rs = st.executeQuery();
        List<String> result = new ArrayList<String>();

        while(rs.next()){
            result.add(rs.getString("project"));
        }

        while(ii < result.size()){
            System.out.print(ii);
            oldfile = new File(result.get(ii));
            oldfis = new FileInputStream(oldfile.getAbsolutePath());
            olddocument = PDDocument.load(oldfis);
            PDFTextStripper stripper2 = new PDFTextStripper();
            String fileDataold = stripper2.getText(olddocument);
            String[] filedo = fileDataold.split("\n");

            for(int i = 0; i<= filedo.length; i++)
            try {
                if(filedo[i] != null && filed[i] != null)
                if(filedo[i].equals(filedo[i]) && filed[i] != ""){
```


| | | | |
|---|-----------------|------------------------|-----------|
| 4 | Proposed System | Tested with 100MB file | 10seconds |
| 5 | Manual System | 120 page booklet | 4hours |

The Manual System: The manual system of detecting plagiarism is tedious as it requires the user to flip through multiple hard copy files and reading through page by page to determine if plagiarism has occurred.

As a result of the tediousness of the manual system, users are reluctant to indulge in it thereby losing interest in plagiarism detection.

There is virtually no plagiarism deterrence in this system as project topics that have been treated before can still be reassign to students because there is no electronic means of storing project topics treated before so as to avoid reassignment or awarded to a student if he promises improvement on the existing one.

Benefits of the proposed system

It is user friendly as it made use of graphical user interfaces and very intuitive.

It runs on every platform as it is developed with the Java program.

It does not raise false positives as Java is an efficient string manipulation language in other words it is accurate and precise. Since it is a standalone desktop application it is reliable in the context of its purpose as it does not rely on internet service availability to function.

It features a plagiarism deterrence system as it spots a module to assist supervisors to check for already taken project topics so as to assign project topics that will yield the needed impact and encourage originality of ideas thereby reducing the tendency to plagiarize.

VI. CONCLUSION

Based on the findings of the study the following conclusions are drawn.

1. Plagiarism detection systems developed with PHP, C, C# or C++ lack speed due to the poor string manipulation capabilities of these languages.
2. Plagiarism detection tools developed with C or PHP has a very high possibility of throwing false positive alarm that is flagging a sentence or a sequence of words as plagiarized whereas in the real sense it is not.
3. Plagiarism tools developed with C, C++, C# run only on the Windows operating system denying users the ease to

use the tools across all platforms be it Linux, Ubuntu, Macintosh and so on.

4. Virtually all standalone plagiarism detection system lacks a plagiarism deterrence module to try and discourage plagiarism.

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Artificial Intelligence and Humans

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Abstract- Over 23 million software developers in 2018, this number is expected to reach 26.4 million by the end of 2019 and 27.7 million by 2023 according to Evans Data Corporation. The number of programmers continues to grow to this day as technology is the Forthcoming, especially in the AI field. Where there are 300,000 “AI researchers and practitioners” in the world, but the market demand is for millions of roles, so many people Siding to this field. Nowadays, most people learn the programming field as inquisitiveness but for their interest, however, they delve deeper into this field, which enhances their passion for and leaves their work to practice programming as occupation due to the availability of jobs and the most request for it. Over time, new languages have emerged, it has evolved to meet human needs in the form of programming languages. You can instruct the computer in the human-readable form where programming will enable you to learn the significance of clarity of expression, many determinations can be achieved, importantly, relationships, semantics, and grammar can be defined.

Index Terms- Artificial Intelligence (AI), Technology, Machine Learning, Computer Vision, Software developers, Programming, IoT development.

I. INTRODUCTION

AI is an interdisciplinary discipline with many approaches. In almost every field of the technology industry, developments for machining and deep learning produce a paradigm shift. Artificial Intelligence is the main branch of computer science branches which concerned about making the computer or robot behave and flexible as humans. Artificial intelligence (AI) helps computers to learn and adapt for new inputs and human performance tasks. Most of the AI examples, from computers playing chess to driving automobiles—rely heavily on deep learning and the processing of natural languages. Computers can be trained to perform specific tasks with the use of these techniques by processing vast volumes of data and identifying data patterns.

AI Research's core part is software engineering. Only if machines have plenty of relating to the world can often act and react like people. To implement knowledge engineering, Artificial Intelligence must have admission to substances, categories, property, and relationships of all. It is a difficult and tedious task to initiate sense, thoughtfulness and solving problems in machines and also the core part of AI is machine learning, too. Appropriate supervision involves learning that requires the capacity to identify patterns in input streams; classification and numerical regressions require learning, where

Artificial Intelligence is powered by innovations in machine learning and deep learning.

II. Artificial Intelligence History

The notion of inanimate objects that come to life as intelligent beings has long been around. The ancient Greeks had theories about robots and automatons were created by Chinese and Egyptian engineers. Aristotle's invention of syllogism and the use of deductive reasoning was a crucial moment in the humanity's pursuit of understanding his mind. The history of the artificial intelligentsia, as we think today, covers less than a century, though the roots are long and deep.

Early AI research studied issues such as problem-solving and symbolic methods in the 1950s. In the 1960s this type of work was taken into account by the United States Defense and Computers Department were trained to imitate basic human reasoning. For instance, in the 1970s, DARPA completed road mapping projects. The DARPA is the defense agency for advanced research projects. Household names were long before Siri, Alexa, or Cortana, DARPA made smart personal assistants in 2003. The following are the most important and common events in AI.

IN 1943 Warren McCullough and Walter Pitts publish "A Logical Calculus of Ideas Immanent in Nervous Activity." The paper proposed the first mathematic model for building a neural network.

IN 1950 Alan Turing publishes "Computing Machinery and Intelligence, proposing what is now known as the Turing Test, a method for determining if a machine is intelligent. Harvard undergraduates Marvin Minsky and Dean Edmonds build SNARC, the first neural network computer. Claude Shannon publishes the paper "Programming a Computer for Playing Chess." Isaac Asimov publishes the "Three Laws of Robotics."

IN 1952 Arthur Samuel develops a self-learning program to play checkers.

IN 1954 The Georgetown-IBM machine translation experiment automatically translates 60 carefully selected Russian sentences into English.

IN 1956 The phrase artificial intelligence is coined at the "Dartmouth Summer Research Project on Artificial Intelligence." Led by John McCarthy, the conference, which defined the scope and goals of AI, is widely considered to be the birth of artificial intelligence as we know it today.

Allen Newell and Herbert Simon demonstrate Logic Theorist (LT), the first reasoning program.

IN 1958 John McCarthy develops the AI programming language Lisp and publishes the paper "Programs with Common Sense." The paper proposed the hypothetical Advice Taker, a complete AI system with the ability to learn from experience as effectively as humans do.

IN 1959 Allen Newell, Herbert Simon and J.C. Shaw develop the General Problem Solver (GPS), a program designed to imitate human problem-solving.

Herbert Gelernter develops the Geometry Theorem Prover program.

Arthur Samuel coins the term machine learning while at IBM. John McCarthy and Marvin Minsky found the MIT Artificial Intelligence Project.

IN 1963 John McCarthy starts the AI Lab at Stanford.

IN 1966 The Automatic Language Processing Advisory Committee (ALPAC) report by the U.S. government details the lack of progress in machine translation research, a major Cold War initiative with the promise of automatic and instantaneous translation of Russian. The ALPAC report leads to the cancellation of all government-funded MT projects.

IN 1969 The first successful expert systems are developed in DENDRAL, a XX program, and MYCIN, designed to diagnose blood infections, are created at Stanford.

IN 1972 The logic programming language PROLOG is created.

IN 1973 The "Lighthill Report," detailing the disappointments in AI research, is released by the British government and leads to severe cuts in funding for artificial intelligence projects.

IN 1974-1980 Frustration with the progress of AI development leads to major DARPA cutbacks in academic grants. Combined with the earlier ALPAC report and the previous year's "Lighthill Report," artificial intelligence funding dries up and research stalls. This period is known as the "First AI Winter."

IN 1980 Digital Equipment Corporation develops RI (also known as XCON), the first successful commercial expert system. Designed to configure orders for new computer systems, RI kicks off an investment boom in expert systems that will last for much of the decade, effectively ending the first "AI Winter."

IN 1982 Japan's Ministry of International Trade and Industry launches the ambitious Fifth Generation Computer Systems project. The goal of FGCS is to develop supercomputer-like performance and a platform for AI development.

IN 1983 In response to Japan's FGCS, the U.S. government launches the Strategic Computing Initiative to provide DARPA funded research in advanced computing and artificial intelligence.

IN 1985 Companies are spending more than a billion dollars a year on expert systems and an entire industry known as the Lisp machine market springs up to support them. Companies like Symbolics and Lisp Machines Inc. build specialized computers to run on the AI programming language Lisp.

IN 1987-1993 As computing technology improved, cheaper alternatives emerged and the Lisp machine market collapsed in 1987, ushering in the "Second AI Winter." During this period, expert systems proved too expensive to maintain and update, eventually falling out of favor.

Japan terminates the FGCS project in 1992, citing failure in meeting the ambitious goals outlined a decade earlier.

DARPA ends the Strategic Computing Initiative in 1993 after spending nearly \$1 billion and falling far short of expectations.

IN 1991 U.S. forces deploy DART, an automated logistics planning and scheduling tool, during the Gulf War.

IN 1997 IBM's Deep Blue beats world chess champion, Gary Kasparov.

IN 2005 STANLEY, a self-driving car wins the DARPA Grand Challenge. The U.S.

military begins investing in autonomous robots like Boston Dynamic's "Big Dog" and iRobot's "PackBot."

IN 2008 Google makes breakthroughs in speech recognition and introduces the feature in its iPhone app.

IN 2011 IBM's Watson trounces the competition on Jeopardy.

IN 2012 Andrew Ng, founder of the Google Brain Deep Learning project, feeds a neural network using deep learning algorithms 10 million YouTube videos as a training set. The neural network learned to recognize a cat without being told what a cat is, ushering in a breakthrough era for neural networks and deep learning funding.

IN 2014 Google makes the first self-driving car to pass a state driving test.

IN 2016 Google DeepMind's AlphaGo defeats world champion Go player Lee Sedol. The complexity of the ancient Chinese game was seen as a major hurdle to clear in AI.

III. How does Artificial Intelligence Work?

Building an AI system is a careful reverse engineering process that reverses human characteristics and capabilities in a machine. A diverse set of components can be built into artificial intelligence and work as a mixture of Philosophy, Mathematics,

Economics, Neuroscience, Psychology, Computer Engineering, Control Theory and Cybernetics, and Linguistics.

I. Philosophy

The aim of philosophy for human beings is to help us understand our actions and how we can decide better. The different philosophic approaches used to enable these systems to make the right decisions, reflecting how an ideal person would think and behave, can build modern intelligent systems. These machines could think and understand the nature of knowledge itself by philosophy. It would also help them link knowledge to action through goal-based analysis to achieve desired results.

II. Mathematics

Mathematics is the world's language and it needs to be proficient in systems designed to solve universal problems. Machines are necessary for understanding logic, calculation, and probability.

The earlier algorithms were simply mathematical paths that facilitated calculations, followed soon by theorems, hypotheses, and other things, which all followed a predetermined logic to reach a computer output. The third math application, probability, provides for precise predictions of the future results based on artificial intelligence algorithms.

III. Economics

Economics is the study of how people choose their preferred results. This isn't just money, although money is manifested in the real world by the medium of people's preferences. Economical concepts, such as design theory, operational research, and decision-making processes at Markov, are many important. All of them have helped to understand 'rational agents' and laws of thinking through mathematics that shows how these decisions and their collective results are taken on a large scale. These types of decision-making technology help to build smart systems.

IV. Neuroscience

Since neuroscience is trying to replicate the brain and Artificial Intelligence, there is a clear overlap here. The major difference between human brains and machines is that computers are millions of times faster than the human brain, but in terms of storage capacity and linkages the human brain still has the most advantage. The advantage of using computer hardware and more advanced software is slowly coming to an end, but there is yet a great challenge to overcome because we don't know yet how to use computer resources to achieve the intelligence level in the brain.

V. Psychology

The middle point between neuroscience and philosophy can be regarded as psychology. It tries to understand how our

specially designed and developed brain reacts to stimuli and answers its environment, which is important for the development of a smart system. Cognitive psychology considers the brain as a processing device for information, operating based on beliefs and objectives and beliefs. Several theories of cognition were already codified to create algorithms that drive today's chatbots.

VI. Computer Engineering

The most obvious application here, but we have finished it so you can understand the basics of all this computer engineering. Computer engineering transforms all of our theories and concepts into a machine-readable language to produce a result that we can understand. Even more powerful artificial intelligence systems based on modern operating systems, programming languages, information management systems, tools, and cutting-edge hardware have been opened up to every step forward in computer engineering.

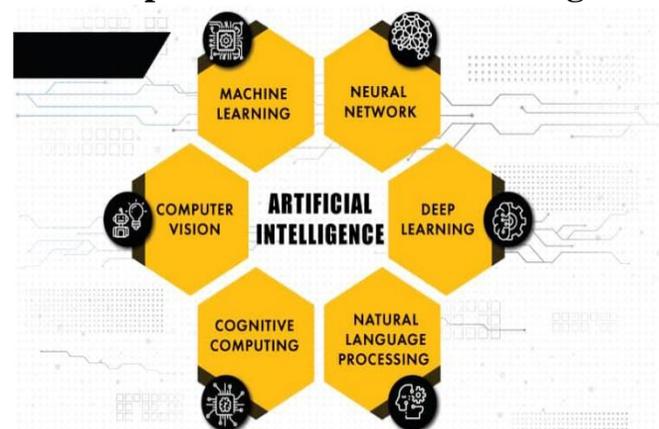
VII. Control Theory and Cybernetics

A system must be able to control and modify its actions to produce the desired output to be truly intelligent. This desired result is defined as an objective function towards which the system will continue to change its actions, using the mathematical calculations and the logic to measure and maximize its behaviors based on changes in its environment.

VIII. Linguistics

All thought is based on some language and represents thoughts most comprehensibly. Linguistics has resulted in the development of natural language processing that helps machines to understand our syntactic language and to produce output in ways that almost everyone can understand. Understanding a language requires knowledge of the subject matter and the context and has created the knowledge representation branch of linguistics, rather than just learning how sentences are structured

IV. Components of Artificial Intelligence



I. Machine Learning

The AI app for Machine Learning (ML) allows computer systems to learn and improve experience automatically without explicit programming. ML is concerned with developing algorithms capable of analyzing and predicting data. In addition to predicting what Netflix movies are like or the best way forward for your Uber, machine training applies for the healthcare, pharmaceuticals, and life sciences sectors to help diagnosis, interpretation of medical images and to accelerate the development of drugs.

II. Deep Learning

Deep learning is an artificial neural networking subsection of machine learning that uses information processing. Neural artificial network imitates the human brain's biological neural networks. Many layers of artificial neural networks are coordinated to govern a single output from many inputs, for instance, to identify a face from a tile mosaic. The machines learn by strengthening the tasks they carry out positively and negatively, which requires constant processing and strengthening.

III. Neural Network

Neural networks enable in-depth study. Neural networks are computer systems that are modeled on brain neural connections. A human neuron's artificial equivalent is a perception. Just as neural bundles build neural networks in the brain, perception stacks generate artificial neural networks in computer systems.

Training examples will enable the neural networks to learn. The best examples are large data sets such as a series of 1,000 cat photographs. The machine can generate a single output by handing out the many metaphors (inputs), answering to the question, "Is the picture a cat?"

This process analyzes data several times to identify associations and to make previously undefined information meaningful. The machine is taught that the object has been successfully identified through various learning models, such as positive strengthening.

IV. Cognitive Computing

Another essential component of AI is cognitive computing. It aims to imitate and improve human-machine interaction. In this case, cognitive computing tries to recreate the human thinking process by sympathetic human language and the connotation of the pictures in a computer model.

V. Natural Language Processing (NLP)

Natural Language Processing or NLP enables computers to interpret, detect and produce human speech and language.

NLP's ultimate aim is to allow the machineries we use every day to interact with each other by teaching systems to understand the human language and provide logical answers.

VI. Computer Vision

Computer hallucination is a technique that provides a thorough understanding and pattern of the image content; the graphs, tables, and pictures are included in PDF documents and the rest of the videos and texts. Computer vision is a comprehensive AI field for computers to recognize, progression and interpret visual information.

V. Effect of AI on the Human

There are many developments at the moment, especially in Technology filed, and with this broad growth, which has grown amazingly and led to the inclination of many people to be attracted to it, particularly after artificial intelligence appeared. After its widespread use, where its uses are multiplied in all different fields of life such as industry, education, Retail, and Health Care, etc., which led many to think that in the future it could be a reason threatening the human race after what they were able to establish in the first robot based on artificial intelligence. It has become widely used in all areas of life, for example, manufacturing, education, and so forth. Despite its advantages, it has led many to believe that humanity may in the future face a threat of extinction particularly when they can create the first AI-based robot for a world like a human.

Nowadays, many people think that AI will Control in humans. The topic started to spread due to the wrong thought through movies, fiction, and scientific research that are widely spread, as the idea of most of these films revolves around the fact that artificial intelligence and robots invade the planet and eliminate the human race. Where we find that in these films the focus is on negatives and not looking at the Positives. Artificial intelligence isn't at this point to change us. It increases our skills and improves our performance. Because AI algorithms learn differently from humans, they look differently at things. You can see relationships and models fleeing us. This partnership with human beings offers numerous chances.

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How a Restricting Humanitarian Policy Framework Compromises the Well-being of Persons with Disability in Disasters Situations in Kisumu County, Kenya

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Abstract: This paper explores how PWD's well-being is realized in disaster situations in Kisumu County of Kenya. Statistics from the National Council for People with Disability indicates that a significant population of 15,760 people are disabled across Kisumu County. Their well-being is protected by the UN Conventions on the Rights of Disabled People (UNCRRD) and UN Charter on Inclusion of Persons with Disability during disasters. At the national level, the well-being of persons with disability is taken care of in the Disability Act, 2003 and the National Disability Policy. Despite existence of a humanitarian policy framework, the well-being of the disabled is compromised in disaster situations within Kisumu County because of lack enforcement mechanisms and implementation structures in the policy. The humanitarian policy framework limits humanitarian action to response which compromises the well-being of PWD. For example, during the 2007/2008 Post-Election Violence persons with disability struggled to find food and health services. Some suffered as a result of floods in Nyando since they were unable to escape from floods in 2015. The disabled escaped from floods by being carried on peoples or cattle backs at a fee since better evacuation means were non-existent. Therefore, humanitarian policy framework is yet to adequately pay attention to the disabled in disaster situations. This means that persons with disability are much more vulnerable in disaster situation than the able-bodied. Kisumu County suffers from both man-made and natural disasters and as a result the number of PWD has increased due to vulnerability to disasters. The study employed semi-structured questionnaire instruments to gather information on humanitarian policies applicable to PWD in disaster context. It was used with humanitarian officers-98 and government officers-98. Further, the researcher adopted semi-structured interviews with open-ended questions which were employed as one of the methods for data collection to provide qualitative data and were complemented by the quantitative data. The researcher used interviews with the regional director of Kenya Red Cross Society, regional directors of UN agencies, the Kisumu County special programs officer, managers of DPOs and director of National Council for People with Disabilities. Secondary data was collected from a variety of sources which included library books, information from journals and other government documents on contributions of humanitarian organizations to the well-being of persons with disability in disaster context. These documents include the national Policy in PWD, Kenya constitution, 2010, UN conventions on PWD. The variables of the study were subjected to descriptive statistics. The qualitative data was analyzed by consolidating emerging themes from the key informant interviews, topic analysis, and cut and paste methods on the focus group discussion transcripts. Quantitative data was analyzed using descriptive statistics such as frequencies and percentages. The researcher presented data findings in form of frequency tables, pie charts, bar graphs and narratives. From the key findings, the study concludes that the international humanitarian policies, as well as national humanitarian policies are restrictive in nature since they limit how PWD are supposed to be protected in disasters. The reason is that they lack enforcement and implementation mechanisms to support the wellbeing of persons with disability in disasters. The study recommends that international humanitarian policies such as the UN Convention on Inclusion of Persons with Disability and UN Convention on the Rights of persons with Disability be reviewed to clearly capture mechanisms or structures on how to protect persons with disability in humanitarian action. The international humanitarian policy need to broaden its consideration on situation of risk. In its current form, they are too restrictive and thus limit humanitarian agencies operations. The national humanitarian policy such as the National Disability Policy and Disability Act need to be reviewed to indicate clearly what is considered as humanitarian situation. The national humanitarian policy is restrictive in the sense that they do not indicate type of disasters which affect PWD.

Key Words: Policy, Humanitarian Policy, Persons with Disability, Convention, restrictive and Disabled

Introduction

In disaster situations, the UN Charter on Inclusion of Persons with Disability expects member states to protect the rights of persons with disability (UN, 2016). It therefore provides a humanitarian framework to access to services and inclusion of Persons with disabilities in all aspects of life. The charter purposes equalize opportunities by way of prohibiting discrimination in employment, education and health. Kenya as a member state has ratified the International Convention on the Rights of Persons with Disability and the UN Charter on Inclusion of Persons with Disability. This policy expects that persons with disability be part of humanitarian action but a close scrutiny of it fails to propose exactly how to implement these provisions. On the other hand, the Kenya national humanitarian policy indicates that persons with disability need to be protected in disaster context but does not specify nature of disasters. The conclusion here is that humanitarian policy framework is restricts how to protect well-being of person with disability in disasters.

Nationally, the rights of persons with disability are stipulated in the Disability Act, 2003 and the National Disability Policy. Disability Act of 2003 provides a legislative framework to access services (Government of Kenya, 2003). It is evident that the Act does not refer to the rights of persons with disability in disaster situations. On the other hand, National Disability Policy (2009) in Article 11 addresses circumstances of risk of persons of disability during disasters. Despite these provisions, Janzen *et al.*, (2012), on the contrary, argues that the rights of person with disabilities are yet to be mainstreamed in humanitarian action. For example, Abonyo (2015) argues that in 2007 Post Election Violence humanitarian organizations found it difficult to deal with person with disabilities. The gap in these studies is that they fail to propose how persons with disability can participate in entire humanitarian action cycle.

Statistics from the National Council for People with Disability show a significant population of 15,760 people are disabled across Kisumu County. As already noted, the humanitarian policy framework limits humanitarian action to response which means that protection of PWD is compromised from pre-disaster stages. A case in point is the 2007/2008 Post-Election Violence where PWD struggled to locate food and health services (Abonyo, 2015). In Nyando, PWD escaped from foods by being carried on peoples or cattle back at a fee due to lack of better evacuation means (Supriya *et al.*, .2018).

It is evident that the humanitarian policy in its current state is inadequate to protect PWD in disaster situations. This is occasioned by policy weakness on how exactly they are supposed to be protected at different points of humanitarian action. It can be concluded that humanitarian policy framework is insufficient since it restricts protection of PWD. Additionally, measures on mitigating these challenges are not captured from persons with disability's perspective.

Materials and Methods

Kisumu County totals 2085.9 km² and its neighbouring counties are Siaya, Vihiga, Nandi and Kericho Counties. It has an annual relief rainfall that ranges between 1200 mm and 1300 mm annually. The climate of Kisumu County makes it vulnerable to floods in some areas such as Nyando. The population of PWD in Kisumu county is about 15, 760 (National Council for People with disability, 2019). Thus, a section of this population was affected by post-election violence in 2007/2008 (Abonyo, 2015). Nyakundi (2010) agrees that during the post-election violence 20% of PWD faced challenge of getting food as a result of protracted Post-Election violence. Due to floods, political unrest and tribal clashes, PWD were carried to safety on someone's back or transported in a cart for a fee. The study used semi-structured questionnaire instruments to get information on humanitarian policies applicable to PWD in disaster situations. They were used with humanitarian officers-98 and government officers-98. The researcher developed semi-structured interviews with open-ended questions as one of the ways for data collection to gather qualitative data. Interviews were used with the regional director of Kenya Red Cross Society (1), regional directors of UN agencies (2), the Kisumu County special programs officer-1, managers of DPOs (3) and director of National Council for People with Disabilities-1. Desk research was done by combing through documents which had issues to do with humanitarian policy. These documents include the national Policy in PWD, Kenya constitution, 2010, UN conventions on PWD. The research instruments were trial tested in Kakamega County. The second instrument was the questionnaire which contained open and closed questions. Questionnaires allow time for respondents to give well thought answers and time to respond to the items. Data was analyzed by way of descriptive statistics. On the other hand, qualitative data was analyzed by fusing emerging themes from the key informant interviews. Quantitative data was analyzed using descriptive statistics such as frequencies and percentages. Data was presented in form of frequency tables, pie charts, bar graphs and narratives. Some limitations in this research were difficulties in allocating PWD due to discrimination. The researcher used snowballing to overcome this challenge.

Findings and Discussions

On this first objective with regard to humanitarian policy, the researcher requested humanitarian and government officers to state which inclusive aspects UN Charter and National Disability policy safeguard the well-being of PWD. The number of respondents were 196. Three questionnaires were not returned. The following table is a summary of the inclusivity indicators:

Table: Humanitarian Inclusivity Aspects for PWD

| Inclusion Aspects | Frequency | Percentage (%) |
|--|-----------|----------------|
| Socio-economic inclusion | 39 | 20.2 |
| Participation in disaster risk reduction | 20 | 10.4 |
| PWD in Humanitarian Agencies | 96 | 49.7 |

Source: Field Data, 2019

The table shows that 96(49.7%) and 39(20.2%) of the respondents agreed that engaging PWD in humanitarian agencies and promoting their socio-economic well-being are aspects of inclusion respectively. 20(10.4%) agreed to their inclusion into disaster risk reduction processes. PWD inclusion into humanitarian agencies would enable their participation in humanitarian participation from planning for disasters. It is at the planning stage that they are excluded from humanitarian action. UN (2016) indicates that persons with disabilities be fully included humanitarian action. It stipulates that signatories of this Charter reaffirm their determination to make humanitarian action inclusive of persons with disabilities. The international humanitarian policy recognizes the need of state parties to include persons with disability in all types of disasters ranging from natural to man-made disasters. As much as the policy is clear on protection of persons with disability in situations on risk as a result of disasters, it is not categorical on the extent of inclusivity. A critical analysis of the Charter on Inclusion of Persons with disability specifically states there should be no discrimination in humanitarian process with regard to persons with disability. It charter condemns and eliminate all forms of discrimination against persons with disabilities in humanitarian programming and policy, including by guaranteeing protection and equal access to assistance for all persons with disabilities.

On the aspect of participation and inclusion of PWD into humanitarian programs, humanitarian policies are not formulated in such a way that person with disability participate actively at all stages of humanitarian response. This means that the voice of PWD does not inform practices of humanitarian agencies that need to protect them in disaster situations. In an FDG interview, a PWD argued:

The voice of persons with disability is not heard due to being left out in humanitarian action. But there is leadership challenge since PWD in institutions do not necessarily represent interests of all persons with disability (FDG interview held on 30th May, 2019 at Nyando)

This assertion indicates they are not consulted on how to be included into humanitarian action particularly at pre-humanitarian response stages. The capacity to address issues of disability is not available and if it was then the general support from the people in leadership has not really conceptualised the issues around disability and the importance of including them in various programming. Surpriya *et al* (2018) argue that disability component form part of the response team for some humanitarian organizations like KRCS. The issue is that DPO participation is limited in humanitarian action which makes it difficult to reach PWD and understand their specific needs as it were.

The well-being of PWD can be safeguarded when awareness about disability is promoted in the community and how to handle this group of persons. Inclusivity at this stage is captured in the UN Charter on Inclusion which directs states to develop, endorse and implement policies and guidelines based on existing frameworks and standards, supporting humanitarian actors to improve inclusion

of persons with disabilities in emergency preparedness and responses. For example, early warning systems accessible for people with disabilities especially people who are deaf and deaf blind is critical.

But inclusivity of PWD is affected by other related factors of socio-economic in nature. For example, participation of PWD at planning stage of humanitarian response in disaster context is directly affected by the three aspects of recognition, distribution and representation. The national humanitarian policy has aspects of inclusion of PWD into humanitarian action. For example, Kenya has enacted the National Persons with Disabilities Act 2003 and the established the 'National Council of Persons with Disabilities' (NCPWD). The National Council of Persons with Disability is responsible for the registration of PWD, administering financial support and entitlements and generally mainstreaming disability issues 'in all aspects of socio-cultural, economic and political development.

The inclusion aspect in the national humanitarian policy restricts it to disaster-free situations. The policy does not spell out how PWD would be included in humanitarian action process in disaster situations. It only concentrates on humanitarian response stage and thus it considers persons with disability as needy. Therefore, the capacity of persons with disability to contribute to humanitarian action is undermined in the national humanitarian policy. On the other hand, the Kisumu County Bill has aspects of inclusion of PWD into humanitarian action from the planning stage. This is taken care of by the Kisumu County Persons living with Disabilities Bill (Kisumu County, 2014). The Bill calls for representation of PWD in committees all levels on issue of disasters.

Further, there is an identity problem for PWD. A head of household argued that there is an assumption that by nominating someone with disability to a committee or institution then everyone disabled person is represented. Supriya *et al.*, (2018) argue that humanitarian response consider the types of disability to cater for specific needs of persons with disability in Kisumu County. This not true from the findings since representation is more of group identity and not individual needs pegged on nature of disability. Therefore, representation of disabled persons needs to be inclusive based on the nature of disability. In an FDG interview, a PWD lamented:

We are grouped together with women, the youth as marginalized persons. This is too misleading because PWD have special needs that are incomparable with those other groups. Also, the nature of disability determines the needs and thus this needs to be put into consideration (Interview held on 24th May, 2019 in Nyando)

This assertion confirms that persons with disability are not identified as standalone special groups in the national humanitarian policy. Thus, this group of person's unique needs is not easily considered as stated in the 2010 Kenyan Constitution. Moreover, PWD capacity and skills were not considered in humanitarian preparedness and response mechanisms. A head of household argued that persons with disabilities are rarely included in committees and associations, or consulted in community decision-making processes. The researcher observed that Disabled Persons Organizations (DPOs) were increasingly present in county and national government committees. This provides an avenue for consultation with persons with disabilities on their needs and ideas. In many contexts, however, these groups did not represent the diversity of persons with disabilities. There is need to consider diversity in disability so that representation in various organization captures the disability aspect.

Marginalization into humanitarian action compromises PWD well-being in disasters. The researcher asked humanitarian and government officers whether the aspect of marginalization is addressed in both international and national humanitarian policy with regard to during humanitarian relief distribution. The total number of respondents was 196. Three questionnaires were not returned. The following figure indicates summary of findings on marginalization of PWD with regard to humanitarian relief distribution.

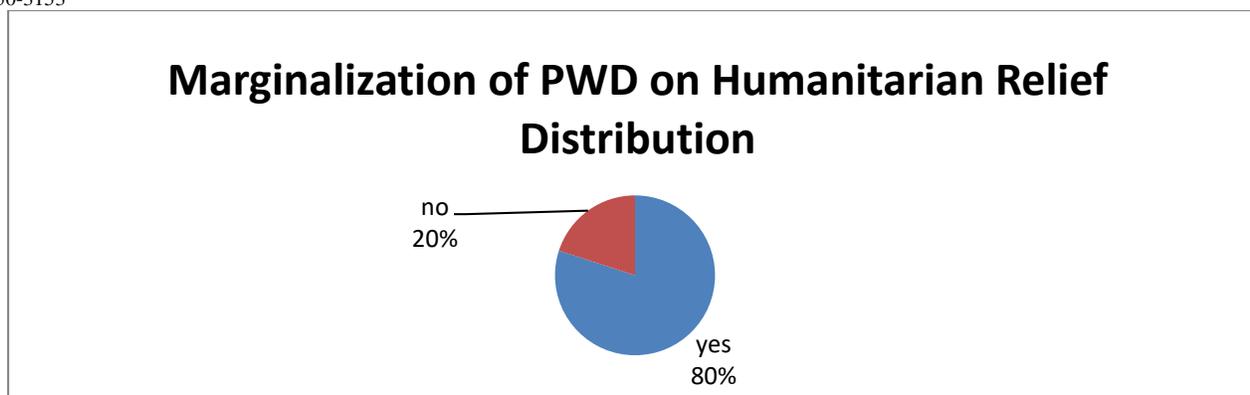


Figure: Marginalization of PWD in Humanitarian Relief Distribution

Source: Field Data, 2019

The figure above indicates that (80%) of the respondents agreed that persons with disability are marginalized in disaster situations while (20%) disagreed. This data indicates that PWD are marginalized when relief is distributed. This means that they miss out on critical relief items after disasters have struck and therefore they are not protected as envisaged in the international and national humanitarian policy framework.

The international humanitarian policy such as the UN (2006) stipulates that partner states ensure that PWD needs is taken care of during emergencies. This not the case in Kisumu County as data indicates. On the other hand, the National Disability Policy (Republic of Kenya, 2009) stipulates that in situations of risk and humanitarian emergencies, the government takes into account the special needs for the persons with disabilities by facilitating the provision of emergency aid and supplies to them in camps and host communities. The Act indicates the desire to take care of the well-being of PWD by providing them with food, non-food items and medical supplies. The policy is silent on how PWD are supposed to access humanitarian relief even in post disaster period. However, greater marginalization is encountered when the environment is not altered to accommodate their needs in a socio-economic way.

Therefore, PWD do not access basic facilities and thus suffer and do not get services that touch on their overall wellbeing. In an interview, a head of household argued that allocation of resources end up with those deemed as able bodied who are mostly involved in these activities. The main reason for such occurrences was lack of realization on the part of humanitarian actors that some vulnerable groups like PWDs have special needs that require targeted relief distribution in disaster situations.

In both the international and national humanitarian policy framework, there is lack of structures on how PWD can access basic relief. Due to this, they become more marginalized and forgotten groups during disasters. However, the CRPD provides the most detailed set of international standards pertaining to the rights of people with disabilities in international law. It is a comprehensive convention consisting of 50 articles, which provide coverage of a full range of civil, political, economic, social, and cultural rights applicable to people with disabilities (UNCRPD, 2006). Although humanitarian policy framework stipulates that persons with disability should not be marginalized in any way, Abonyo (2015) found that during the PEV situation they experienced multiple layers of discrimination in Kisumu County. This included being disabled more with ethnicity, gender and sexual discrimination. As a result of these discriminative and stigmatizing factors, the able bodied persons were reluctant in according the disabled persons appropriate support and care which could assist them to cope during and after the conflict

During disasters the well-being of PWD is affected by inadequate structures such that shelters may not be accessible to wheelchair users, and hearing-based early warning systems exclude people who are deaf. Furthermore, sexual abuse against women and girls with disabilities increases in disasters and other crisis. Twigg *et al* (2018) observed that marginalization is a cross cutting theme across humanitarian action cycle. During humanitarian response times, they are unlikely to receive specialized attention as required. An example is where PWD stand on the queue to access relief supplies and have to sometimes compete for supplies with rest regardless

of their extra vulnerability. Supriya *et al.*, (2018), however, found that an organization such as KRCS caters for the welfare of PWD separately while distributing relief. There is need to have clear guidelines on how to eliminate marginalization of PWD during humanitarian relief distribution in the humanitarian policy framework.

On this first objective with regard to humanitarian policy, the researcher requested humanitarian and government officers to state which form of barriers compromise the well-being of PWD. The number of respondents were 196. The following table is a summary of findings on barriers to inclusivity into humanitarian action for PWD:

Table: Forms of Barriers to Inclusivity of PWD in Humanitarian Action

| Forms of barriers | Frequency | Percentage (%) |
|----------------------|-----------|----------------|
| Physical | 95 | 49.2 |
| Attitudinal | 78 | 40.4 |
| Institutional | 39 | 20.2 |

Source: Field Data, 2019

The above table indicate that 95(49.2%) of the respondents agreed that persons with disability face physical barriers in disaster situation which makes it impossible for them to fully participate and benefit from humanitarian activities. On the other hand, 78(40.4%) agreed that societal attitudinal barrier hinders persons with disability from most humanitarian actions while 39(20.2%) agreed to institutional barriers. These barriers disadvantage PWD in disaster situations which in turn affect their well-being.

The international humanitarian policy such as the UN Charter on Inclusion of PWD (2016) stipulates that persons with disabilities are disproportionately affected in situations of risk and humanitarian emergencies, and face multiple barriers in accessing protection and humanitarian assistance, including relief and recovery support. The UN Charter indicates that barriers can exclude PWD from humanitarian assistance in periods of emergencies or disasters. The Charter is clear that PWD need to be included in humanitarian planning before disasters hit. However, the policy does not identify specific barriers and provide away of eliminating them. In an FDG interview, a member argued:

Humanitarian organizations/government services are located in urban centres and rarely connect with PWD in rural areas. Most meeting of this organizations are held in accessible places for persons with disability (Interview held on 3rd June in Manyatta, Kisumu City)

This statement indicates that persons with disability cannot access services provided by humanitarian agencies. The organizations are stationed in urban centres which in itself is a physical barrier since accessibility to services becomes difficult. In an interview a humanitarian officer argued that in as much as they are located in urban centre most of their activities take place in remote areas of Kisumu County. The national humanitarian policy such as Disability Act (2003) indicates that persons with disabilities are entitled to have a barrier free environment to enable them to have access to buildings, road and other social amenities and assistive devices and other equipment to promote their mobility. Section 22(1) requires that buildings be adapted to suit persons with disabilities (Government of Kenya, 2003). The policy is general and does not address the same element in periods of disasters and therefore restrictive with regard to protection of PWD in disaster situations.

Secondly, attitudinal barriers emanate from socio-cultural beliefs. For example, some cultural beliefs make some families to keep their family members with disabilities at home. These negative attitudes are caused by a misconception about disability. Therefore, attitudinal barrier can prevent persons with disability accessing humanitarian services. In an FDG interview, a DPO member lamented:

Some parents hide a child with a disability at home because they think that disability is a source of shame or witchcraft (Interview held on 22nd of May, 2019 in Nyando area of Kisumu County)

This assertion indicates attitudinal barrier that exist in society makes it difficult for PWD to benefit from humanitarian services that touch on their well-being. It was noted that cultural beliefs among residents of Kisumu County.

Lastly, institutional barriers include laws, policies and procedures which can prevent persons with disability from being protected in disaster situations. Such barriers segregate people with disabilities from being employment in humanitarian or government organizations. However, CBM (2018) findings indicate that some humanitarian organizations have drafted inclusive humanitarian programs for persons with disability. The study indicates that the KRCS humanitarian response team had persons with disability. The researcher sought to know factors that contribute to barriers that jeopardize the well-being of person with disability in disaster situation.

Conclusion

This paper concludes that the international humanitarian policies, as well as national humanitarian policies are restrictive in nature since they limit how PWD are supposed to be protected in disasters and thus exclude PWD into humanitarian action. The reason is that they lack implementation or enforcement mechanisms to support the wellbeing of persons with disability in disasters. Moreover, the international humanitarian policy does not recognize some small scale disasters such as political violence as situations of risk. The national humanitarian policy, on the other hand, does not specify situations of risk.

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Financial Leverage and Financial Performance of the Energy and Petroleum Sector Companies Listed in The Nairobi Securities Exchange

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Abstract- The main objective of a firm is maximization of shareholders wealth. In attempt to achieve this objective the shareholders appoint management board to oversee the firm's operations. The management board then utilizes the firm's capital components of debt and equity at their disposal to achieve this objective. The puzzle of financial managers is the optimal capital structure mix of debt and equity that will ensure the main objective of maximization of shareholders wealth is achieved. One of the key indicators of a firm that is achieving this objective is improved financial performance. In attempt to improve the financial performance of a firm the financial managers may have to increase the company's debt component. This use of debt by a firm to finance and increase its operation to improve financial performance of the firm is referred to as financial leverage. This means that financial leverage is a form borrowing (debt) or a loan that is given to a firm to finance its operations. The proceeds of debt/borrowings are usually reinvested to earn a greater return as compared to the cost of debt financing/interest. This research was directed towards assisting the financial managers in determining whether financial leverage affects financial performance. Financial leverage measurement includes use of debt ratio, debt-equity ratio and interest coverage ratio which are vital since they directly affect the financial performance of firms. This study was anchored on the following research objectives; to establish the effect of debt ratio, debt -equity ratio and interest coverage ratio on financial performance of energy and petroleum sector companies listed in the Nairobi Securities Exchange. The study was anchored on the following theories; Modigliani-Miller theorem, the Pecking Order Theorem and the Trade-off Theorem. The study utilized census since the population size is small. All the five companies from the energy and petroleum sector listed in the Nairobi Securities Exchange. were studied. Energy and petroleum sector is a key sector and player in industrialization of any nation and a key support sector of all other sectors in any economy. The study utilized secondary data that was mainly collected from the published financial statements of these companies. Explanatory research design was used. Quantitative secondary data was collected and analyzed using statistical package for the social sciences. This data was also represented using measures of central tendency such as mean, frequencies, percentages and measures of dispersion such as standard deviation. The study ran a multiple regression equation to determine the relationship between the variables in the study and

to estimate the models for the study. Descriptive statistics was used to analyze data. In order to draw a conclusion and make recommendations, the analyzed data was further presented in tables, charts and graphs. On the effect of debt ratio on return on assets the study indicated that as the debt ratio increased the return on assets decreased. On the effect of debt equity ratio on return on assets the study indicated that as debt equity ratio increased the return on assets decreased. In summary the results indicated that there is a negative relationship between financial leverage and financial performance of petroleum and energy sector firms listed in the Nairobi Securities Exchange.

Index Terms- Debt Equity Ratio, Debt Equity Ratio, Interest Coverage Ratio, Return on Assets, Return on Equity, Return on Investment

I. INTRODUCTION

Firms use either debt/ financial leverage or owners' capital to finance a firm. Financial leverage refers to application of debt financing and borrowed capital in an attempt to increase firm's operations and profitability. Financial leverage is majorly measured through expressing long term liabilities to equity of a firm. A firm is considered leveraged when the firm is partially financed by both debt and equity. Most firms survive with a significant liquidity level which is mainly achievable through use of debt. Many companies use debt to leverage their profits and capital. This means companies are likely to use debt/leverage to increase assets which in turn increase production and profits. Debt bears a fixed cost. This means that when a firm increases debt level, the financial leverage level increases. Leverage is the use of borrowed funds for investment purposes (Gatsi, Gadzo & Akoto, 2013). When firm's management increases the firms profit by using debt element it is an indication of quality corporate governance (Singapurwoko & El-Wahid, 2011). Firm's investments can be finance by use of either debt or equity. When a firm uses fixed-charged funds especially preference capital and debt along with the shareholder's equity this is referred to as financial leverage or gearing (Moses and Steve, 2010). When a company's capital structure is made of only shareholders / owners' equity only it's said to be unlevered firm whereas when a firm's capital structure is made of both debt and owners' equity it is said to be levered (Olweny and Mamba, 2011). Financial leverage can

be informed of a loan or inform of debt (other borrowing). Financial leverage proceeds are reinvested to earn a greater return more than interest expense and cost incurred due to debt acquisition. (Chengand Tzeng, 2010). This means that if a company's marginal rate of return on asset is higher than the company's marginal rate of interest expense payable on the debt, then the company should increase the debt level since it will also increase return on equity. Contrary, when the company's return on asset is lower than the interest rate payable on debt/loan acquisition, the firm should not borrow since borrowing will reduce the firms return on equity, (Athanasoglou, Brissimis and Delis, 2006).

Leverage gives room for increased returns to the investor if available, however it can lead to greater potential loss especially when the investment becomes worthless and the borrowed amount have to be paid with the interest, (Andy et al., 2002). This leads to potential financial risk that may lead to financial loss, (Pandey; 2008). The degree of this potential financial risk is associated to the company's capital structure.

A firm's financial structure in most instances consist of preferred stock, common equity and the long term and short-term liabilities. This means that the means and ways in which a company finances its assets then constitutes to the company's financial structure. Consequently, if the company's short-term liabilities are excluded from the company's financial structure we obtain the company's capital structure. In other words, the company's long-term liabilities consisting of preferred stock, common equity, and long-term debt/loan is referred as capital structure (Banice Olive, 2012). Therefore, the main objective of financial management in a company is structuring the company's capital structure components in a manner that ensure maximization of shareholders wealth as the key measure of management's performance. This study will therefore analyze the effects of financial leverage on financial performance which is an indicator of shareholders wealth maximization, (Molyneux and Thornton, 1992).

II. LITERATURE REVIEW

2.1 EMPIRICAL LITERATURE REVIEW

Debt ratio is financial ratio used to measure the extent to which a firm has financed its assets using debt/borrowings. Debt ratio is expressed by taking short-term debt and long-term debt divided by total assets of a firm. The higher the debt ratio the higher a firm is leverage thus the higher the financial risk and vice versa however it is important to note that leverage is an important tool for a firm to grow, (Mungai, 2010). This ratio varies greatly across firms in different industries due to difference in capital intensive requirements of these industries, (Akhtar, et al (2012)

Ezeamama (2010) defines **debt ratio** as financial leverage ratio that measures the total creditors' funds in relation to total assets held by the firm. Computation of debt ratio is done by taking total liabilities of a company and dividing them with total assets of that company.

Mahnour (2010) did a study on impact of financial leverage on firms' performance in Fuel and Energy sector in Iraq. The study applied debt ratio (DR) as a proxy to measure financial leverage. Return on equity (ROE) and Return on asset (ROA) / were used as proxies to measure firms' performance. Through application of

least squares method, the study results showed that debt ratio and firms return on assets have a significant positive relationship.

Mahmoudi (2014) did a study on effects of leverage on financial performance of firms listed in Tehran Stock exchange between the years 2008 to 2011. In the study he measured leverage using debt ratio (DR) which was statistically tested for a relationship with return on equity and return on assets. In the study Mahmoudi also studied part of the energy sector companies in Tehran stock exchange. The study showed that debt ratio statistically and significantly had a negative relationship with both return on asset ratio and return on equity ratio.

Mustafa Zuthimalim et al (2015) studied effect of financial leverage on financial performance of fuel and energy sector companies in Algeria. Using both primary and secondary data Mustafa found out that debt ratio (DR) had insignificant negative relationship with return on assets (ROA).

Amenophis Hanbal (2015) did a study on the relationship between financial leverage and financial performance of petroleum and mining sectors firms in Egypt. Using data from both listed and non-listed companies in Egypt It was established that statistically return on equity and return on assets had no existing significant relationship.

Zulaika (2016) did a study on the effect of financial leverage on financial performance fuel and petroleum sector firms in Angola. In his study he analyzed the financial statements of these firms from the year 2011-2015. The study results showed debt ratio (DR) has a negative relationship with return on asset ratio (ROA).

2.2 THEORETICAL LITERATURE REVIEW

2.2.1 Modigliani-Miller Theorem

Modigliani-Miller (1958) argues that the firm's value is measured assets associated risk and revenue generation capacity of the assets. This theorem further argues that the firm's market value is not affected by investment financing decisions or dividend distribution decisions. A firm can decide to finance its investments through issuance of shares, borrowed capital or retained earnings/reinvesting profits. This theory assumes that in an imperfect market the choice between use of equity or debt to finance firm's investment make no difference. This theorem states that value of any firm is not associated or depended with the financing decision made or capital. Therefore, the firm's capital structure is an irrelevant proxy in determining the firm's Value. Therefore, whether a firm is highly levered or lowly levered, the capital structure mix has no significant effect on the firm's value, (Modigliani & Miller, 1963).

Modigliani and Miller also argue that future growth prospect of a firm affect market value of the firm while investment risk does not affect market value of the firm. This means that when a firm company has high future growth prospects, the market value of the firm will be higher, and its stock prices will be higher. This means that investors will be more attracted by firms that have high growth prospects as compared to those with low growth prospects, (Miller, 1977). This theory assumes that under no tax regime, the capital structure component does not affect the value of the firm. It also argues that both equity holders and debt holders in a firm have the same interest and priority in the firm, that is, they both should have equal share of earnings. The proponent also argues that debt holders of a firm have an upper hand in claiming the

earning of a firm hence increasing cost of debt which increases expenses and reduces earnings before interest and tax (EBIT) which is associated with the third variable of this study: ICR.

In summary, the main argument of this theorem is that: Under a perfect market, value of the firm is not affected by the capital structure mix of debt and equity. This argument is associated with the first and second variable of this study (debt ratio and debt equity ratio). This theory also argues that the financial leverage / debt level of a firm is in directly proportional to the firm's cost of equity.

Therefore, an increase in debt level implies higher risks to equity shareholders which in turn results to increase in cost of equity. This argument is also associated with the first and second variable of this study (debt ratio and debt equity ratio).

2.2.2 Pecking Order Theory

The first proponent of this theory is Donaldson (1961). This theory was also modified by Myers and Majluf (1984). The proponents argue that when a firm wants to invest, it has to make a decision on whether to source funds internally or externally. It further argues that a firm will prefer to utilize its internal financing in place of external financing.

The preference on internal sources of finance is because internal sources of finance have no fixed cost attached to them as compared to external financing. The internal source of finance includes retained earnings, internal borrowing and trade payables while external financing may include debt, debentures and loan. He further argues that a firm prefers to use internal financing first, when these finances are depleted, the firm will then issue debt. Equity financing should only be issued after a firm has exhausted its debt financing option.

This theory further states that a firm has three financing option: debt, retained earnings and equity, (Myers 1984) A firm would first prefer to use retained earnings since they have no interest of cost attached to them, that is, no adverse selection problem. Both debt financing and equity financing have adverse selection problem though equity has the more serious adverse selection problem than debt. This means that issuance of equity is riskier than issuance of debt hence any external investor will expect higher returns on equity as compared to debt.

Any firm would prefer to fund all its projects by utilizing retained earnings, hence retained earnings is the best source of finance compared to both debt and equity, while debt is a better source of finance as compared to equity. (Harris & Raviv, 2003). A firm should issue securities with low informational cost before issuing securities with high informational cost; hence a firm should therefore utilize short term debt to exhaustion before issuance of long term debt, (Baskin, 2002).

This theory argues that a firm does not first consider optimal capital structure mix but instead considers internal financing over external financing

The pecking order theory assumes that optimal capital structure is not the starting point of making sound financing decisions. Firms sound financing and investment decisions start with considering the available internal finances before considering the external finances. It is when internal finances are inadequate that a firm will decide to acquire external funds. Firms decide which external sources of finance to use by weighing cost of information and benefit of financing source, (Akerlof, 1970).

External investors consider the risk of failure of a firm in the market due to financing options hence resulting to the pecking order of firms financing as follows: Utilization of internal financing then followed by low risk debt finance and as a measure of last resort equity financing.

An external rational investor usually discounts firm's stock prices especially when the firm issues equity instead of issuing debt. For a firm to evade these discounts, the firm should avoid issuing equity as much as possible. Most firms tend to follow the pecking order of firms financing when an investment opportunity arises. When no investment opportunity is available to the firm the firm will retain more earnings hence building up a slack that will avoid raising external source of finance in future, Myers and Majluf model (1984). This theory assumes that a firm will have no optimal capital structure mix due to adverse selection and the fact that firms prefer internal financing to external financing.

This theory is relevant to this study since it majorly talks about internal sources of finance and external sources of finance which are basically debt and equity components of a firm, hence its associated with the first and second variable of this study (debt ratio and debt equity ratio).

2.2.3 Trade-Off Theory

This theory was proposed by Myers (1984). The trade-off theorem of capital structure argues that a firm's choice of debt and equity use in the capital structure is arrived at by balancing the costs of financing and the benefits of financing. In other words, optimal capital structure is only possible when there is a trade-off between financing benefits and financing costs. The cost of financing should be offset against the benefits of financing.

Some researchers have used the term trade-off to describe several related theories. A rational decision maker or investor weighs the benefits against cost of any action or plan and the same case applies when it comes to sourcing of finances. Therefore, firms must ensure a balance and trade-off between marginal benefits of financing and marginal costs of financing.

The trade-off theory was developed from a debate on the Modigliani-Miller theorem. MM theorem argued that when corporate tax is added to a firm it creates a debt benefit since debt increases financing costs which reduce earnings hence reducing taxes. Where a firm's objective is linear function cost of debt cannot be offset hence debt financing is 100%.

This theory acknowledges that firms can only be financed either through debt or equity or both, (Kraus & Litzenger, 1973). The trade-off theorem further argues that firm's capital structure is based on two key concepts, that is, financial distress cost and agency cost. Debt financing is advantageous because of tax benefits associated with debt. Debt financing costs includes financial distress: both bankruptcy and non- bankruptcy cost, (Fama & French, 2002).

In summary the key argument of tradeoff theory is that, a firm decides on how much Debt level and Equity level to employ by striking a balance between financing cost and financing benefits.

This argument is associated with the first and second variable of this study (debt ratio and debt equity ratio).

III. RESEARCH METHODOLOGY AND MODEL SPECIFICATION

The study used descriptive research design. Explanatory research design is used to explain out what, where, when and how of a phenomenon, Cooper & Schindler (2003), Research design is good since it is able to observe & measures variables as they are and without influencing them. This design also enables generalization of findings to other firms. This design enables a researcher to carry out intense investigation on research variables hence enabling drawing of conclusion and recommendation from the study. The population for the study consisted of five firms that are currently listed with the NSE from the energy and petroleum sector in Kenya (NSE, 2015). These firms are Kenol Kobil, Kenya Power, Total Kenya Ltd, Umeme and KenGen.

Descriptive statistics were used to analyze quantitative data. Statistical package for social sciences (SPSS, version 22) was used to analyze and present data in terms of frequencies, means, percentages and standard deviations.

The data was also presented using graphs, bar charts and pie charts. Findings were tallied up and variation percentages computed as well as interpreting and describing data in line with study objectives and research questions..

The study also ran a multiple linear regression analysis to determine the relationship between the dependent and independent variables. The multiple regression equation was;

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \epsilon$$

Where;

Y = Financial performance of energy and petroleum firms listed with the NSE measured by ROA

B0 - intercept coefficient

ϵ_i – error term (extraneous variables)

X1 – Debt Ratio
X2 – Debt-Equity Ratio
X3 – Interest coverage ratio
 $\beta_1, \beta_2,$ and β_3 = regression coefficients

IV. PRESENTATION AND DISCUSSION OF RESULTS

4.1 Descriptive Statistics

Table 4.1

| | Minimum | Maximum |
|------------|---------|---------|
| DR | 0.47 | 0.8 |
| DER | 0.87 | 4.07 |
| ICR | -3.81 | 146.66 |
| ROA | -0.19 | 0.12 |

Source: Author, 2018

From the table 4.10, Debt Ratio (DR) measured registered a minimum of 0.47 with a maximum of 0.8, mean of 0.65 and standard deviation of 0.10. For Debt Equity Ratio (DER) , the minimum was 0.87 with a maximum of 4.07, mean of 2.11 and standard deviation of 0.93. Interest Coverage Ratio (ICR) posted a minimum of -3.81, maximum of 146.66, mean of 11.34 with standard deviation of 31.04. Return on Assets (ROA), posted a minimum of -0.19, maximum of 0.12, Mean of 0.03 and standard deviation 0.06.

4.2 Correlations

Table 4. 2:

| Pearson Correlation | DR | DER | ICR | ROA |
|---------------------|----------|---------|-------|-----|
| DR | 1 | | | |
| DER | 0.966** | 1 | | |
| ICR | -0.510** | -0.404* | 1 | |
| ROA | -0.349 | -0.458* | 0.169 | 1 |

The results of the correlation matrix showed that, there was a positive relationship between ICR and ROA as shown by 0.169 and a negative relationship between DR, DER and ROA as indicated by -0.349 and -0.458 respectively.

4.3 Regression Analysis.

Table 4.3:Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|---|----------|-------------------|----------------------------|
| | | | | |

| | | | | |
|---|-------------------|------|-------|---------|
| 1 | .617 ^a | 0.38 | 0.292 | 0.04655 |
|---|-------------------|------|-------|---------|

a. Predictors: (Constant), ICR, DER, DR

The results of the model summary in the above table 4.12 indicates that the R- square is 0.38, which means that the independent variables (DR, DER & ICR) explain 38% of the variation in the dependent variable (ROA). This implies that DR, DER and ICR account 38% of the changes or variations of ROA; the remaining 62% is explained by other independent variables not factored in the study.

Table 4.4:ANOVA: Analysis of Variance

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|------------|----------------|----|-------------|-------|-------------------|
| Regression | 0.028 | 3 | 0.009 | 4.294 | .016 ^b |
| Residual | 0.046 | 21 | 0.002 | | |
| Total | 0.073 | 24 | | | |

a. Dependent Variable: ROA

b. Predictors: (Constant), ICR, DER, DR

The table 4.13 indicates that there is significant relationship between the variables (DR, DER, ICR) and the dependent variable (ROA), This is indicated by the F value and the significance value of 0.016 which is less than 0.05.

Table 4.5:Coefficients

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|------------|-----------------------------|------------|---------------------------|--------|-------|
| | B | Std. Error | Beta | | |
| (Constant) | -0.359 | 0.19 | | -1.887 | 0.073 |
| DR | -1.012 | 0.422 | 1.857 | -2.402 | 0.026 |
| DER | -0.128 | 0.043 | -2.153 | -2.96 | 0.007 |
| ICR | 0 | 0 | 0.246 | 1.128 | 0.272 |

a. Dependent Variable: ROA

The study shows that there was significant negative association between ROA and DR as shown by $r = -1.012$ and significant negative association between ROA and DER as shown by $r = -0.128$. The study also showed that there was no association between ROA and ICR as shown by $r = 0$, this is also shown by the significance level of ICR being 0.272 (27.2%) which is more than 0.05 (5%). The findings also showed that DR and DER were significant variables in the study since their significance values are less than 0.05, that is, 0.026 & 0.007 respectively.

4.4 Summary of Findings

The study shows that there was significant negative association between ROA and DR as shown by $r = -1.012$ and significant negative association between ROA and DER as shown by $r = -0.128$. The study also showed that there was no association between ROA and ICR as shown by $r = 0$, this is also shown by the significance level of ICR being 0.272 (27.2%) which is more than 0.05 (5%). The findings also showed that DR and DER were significant variables in the study since their significance values are less than 0.05, that is, 0.026 & 0.007 respectively.

The findings also indicate that holding all the variables constant, ROA would be an autonomous value of -0.359. A unit increase in DR would lead to a unit decrease in ROA by -1.012, while a unit increase in DER would lead to a unit decrease in ROA by -0.128. A unit increase in ICR would not affect ROA. The finding also indicate that DR had the greater effect on ROA than DER while ICR had no effect on ROA.

The regression model drawn from table 4.14 above is presented as shown.

$Y = -0.359 - 1.012X_1 - 0.128X_2 + 0X_3 + \epsilon$ This can also be presented as follows

$Y = -0.359 - 1.012X_1 - 0.128X_2 + \epsilon$

Where;

Y = Financial performance of energy and petroleum firms listed with the NSE

ϵ_i – error term (extraneous variables)

X1 – Debt Ratio

X2 – Debt-Equity Ratio

X3 – Interest coverage ratio

V. CONCLUSIONS AND RECOMMENDATIONS

The research results showed that there is a negative relationship between financial leverage and financial performance of selected companies. Therefore, increase in debt financing by the firms means low profits. This could be explained by the assumptions that when firms use debt financing, they have more liabilities to pay hence lowering the firm profit.

The study showed that there is negative relationship between debt equity ratio, debt ratio and return on assets ratio. Therefore, if a firm wants to make more profits it has to reduce the amount of debt used in its capital structure. This also implies that when it comes to investment a firm should use retained earning first before it can shift focus to using debt. Its prudent to note that, a firm also needs to balance use of debt and equity since a firm with more equity δ will pay more dividends thus a firm should also employ use of external financing/debt so as to reduce dividend payouts. This implies that financial leverage and div The results of the study showed that there is a negative relationship between debt ratio, debt equity ratio and return on assets ration of the selected firms. The results showed that financial leverage of a firm negatively affects the financial performance of the firm. This means that as firms rely more on financial gearing/leverage, their profits and financial performance declines.

Based on the research findings the researcher recommends the following;

Firms should strike a balance between use debt financing and equity financing. Excessive use of debt financing would imply low profits and poor financial performance of a firm. Debt financing increases liabilities to creditors hence lowering profits. Excessive use of equity financing implies high dividend payouts hence reducing retaining earnings that would have been ploughed back to the business and earn revenue for the firm.

In line with a firm's main objective which is shareholders wealth maximization, a firm should aim at increasing shareholders wealth through increasing percentage of retained earnings as compared to percentage of dividends payout. The retained earnings would then be reinvested into the business hence increasing shareholders wealth. Use of retained earnings reduces the need for financial leverage which is associated with high risks. Therefore, a firm should strike a balance between dividend payments and retained earnings.

Firms should use debt financing especially when the funds will be used to increase asset utilization. That is, firms should only borrow funds if the funds will be used to increase utilization of existing assets. In summary firms should strike a balance between the borrowing need and asset utilization..

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Supplier Risk Management In Automobile Company To Mitigate Risk Down The Supply Chain

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Abstract- Many Automobile companies have witnessed lot of turbulence in recent 2-3 years due to IR issues, Fire incidents, Structural collapse incidents, power shortage in some areas, natural calamities at many locations.

Such issues have caused lot of damage including loss of production, very high cost of procurement of automobile components to run final manufacturing line.

Hence, in such scenario, there are various categories of risks identified which can predict and mitigate some issues caused because of geo- political risks, financial risks, market risks,, strategic risks, catastrophic risks etc.

As the current scenario is quite volatile, so supply chain of various automobile companies is experiencing all sorts of risks mentioned above. However since there is no structural approach to manage unpredictable risks, the situation is leading to more of reactive approach. On such risks, rather than reactive approach one should go for proactive approach.

I. INTRODUCTION

Automotive companies in today's world are embroiled in worldwide uncertainty, change and unprecedented risk. Nearly everything about the business is changing- the products, the services, and the challenges. At the center of this massive change is the automobile supply chain, which is most affected. For an automobile company, to emerge from this period of transition as healthy and vibrant businesses, depend largely on how its supply chain proactively adapt to change and respond to risks and keep clear visibilities.

The top challenges are:-

Minimized costs

Maximum delivery performance

Global Quality level

Agility, flexibility and responsiveness

First mover on latest cutting edge technology introduction and

Supplier risk management

II. OBJECTIVES OF SRM:-

Through this approach one has to work in direction through which pro-actively the risks associated with supply chain management are identified and accordingly actions are taken well in advance.

For this various types of risks have been categorized into different buckets.

The buckets are categorized as red, yellow and green based on severity of risk associated with the company. This is quite helpful approach in identifying the upcoming risks covering major parameters of company.

III. THEORY:-

Majorly SRM is categorized into two divisions.

- a) Component risk
- b) Commodity risk

Component risk can be explained as, Non supply of a particular component at required time and hence stopping the production.

This can happen due to various reasons like: like breakdown at supplier end, IR issues at supplier end, issue at Tier-2 and Tier-3 suppliers, less focus of top management, financial crises, safety risks etc.

Commodity risk can happen in some cases. Even if we have multiple sources for a product but if there are some catastrophic issues or there are some regulations or Norms change worldwide in that case there can be complete shortage of product again hampering production lines. Such cases can be handled by proactive approaches only.

The various risk buckets that have been defined are:-

- a) Management Risk Bucket
- b) Dependence on Tier-2/3 supplier Risk bucket
- c) Labor Risk Bucket
- d) Power Risk bucket
- e) Machinery Risk Bucket
- f) Safety Risk bucket
- g) Performance Risk bucket
- h) Funding Risk bucket
- i) Liquidity Risk bucket
- j) Profitability Risk bucket
- k) Geo-Political Risk bucket

Management risk Bucket: - A change in top management (CEO, COO) or the company changing owners etc. would be covered by this metric.

Instances of management change would include:

1. Change in a senior position (CEO, COO, CFO) or Chairman of Board
2. Company going public / private
3. Significant change in company shareholder partner.

Dependence on Tier-2/3 supplier Risk bucket: - If dependence of OEM on Tier-2 / Tier3 is more then it is a concern for OEM. This can lead to monopolistic situations. If there is any critical Tier-2 or Tier-3 then supply chain smooth processing may get hampered. Process maturity at Tier-1 must be there. If for any child part dependence of Tier-1 is more than 50% on Tier-2 or Tier-3 then Tier 1 must look for second source options. Buffer capacity down the Tier chain must be available.

Labor risk bucket:- It covers topics like: labor unrest, disruptions due to IR issues, Affiliation of labor union, contract labor ratio versus permanent manpower, dedicated people for critical operations etc. In some situations there is not complete labor unrest but intentionally workers work slowly to produce less or absenteeism is very high. These small intentions if prevails for long then ultimately the end results are threatening.

Power Risk Bucket:- Power risk involves risk related to availability of power in company. This bucket mainly involves two topics. What is state power situation and second is there adequate Power back up available within the company or no. This includes availability of DG sets.

Machinery Risk Bucket:- In this bucket, risks related to maintenance of machines is accessed. Normally it is preferred that the supplier meets the production volumes by running production for two shifts only. Third shift is kept as buffer in case any volume increases in near future.

Preventive maintenance of machines must be carried timely without any fail. Vendor must have trained manpower to maintain some special purpose machines and robots. Spare tooling must be available at all times. Tooling preventive maintenance must be followed holistically. Vendor must have tool room or tool maintenance shop. There should not be any delay in machine installation.

Safety Risk Bucket: - In this bucket, safety risks occurred in recent past is captured. Safety rating by third party agencies is mandatory. A safety team must be available in every company. All safety PPE must be available and must be used by all operators on line. Fire prone industries must have all fire safety Equipments.

Performance Risk Bucket: - Through this bucket quality versus delivery rating is calculated for suppliers. If demand is more in certain period then there are chances that quality may go down as operators by pass some checking stations to produce more. In such cases quality issues comes into picture and quality of products is found degraded. Through this method of quality delivery ratio the quality of products is strongly monitored.

Funding Risk Bucket:- In funding risk bucket, the Crisil rating comes into picture. Secondly, the overall financial health of company is accessed with help of this bucket. Debt to equity ratio is calculated. Status of significant investments is monitored.

Liquidity Risk Bucket:- In this bucket, the liquid cash available with company is captured. Sometimes vendor has many funds but it is found that all are invested in long term projects and there is shortage of liquid cash even to manage daily expenses. Such situation is not considered healthy. Salary of employees must be paid on time. Current ratio and current liabilities ratio is monitored. Payments of Tier 2 must go on time. Adequate FG must be available at supplier's end.

Profitability Risk Bucket:- This metric is used to calculate the exposure of supplier to foreign currency fluctuation. From vendor's balance sheet net exposure to foreign currency can be calculated and efforts must be made in localizing the imported parts so that maximum parts become locally available and exposure to foreign currency is reduced. PAT sales is also captured in this bucket.

Geo-Political Risk Bucket:- In this head certain aspects like geo political risks are captured. Does the vendor operate under head of regulatory industry? Number of days for which supply was disrupted due to strike or IR issues is also captured. Any natural risk like Tsunami, cyclone, volcanoes, flooding etc. is studied.

IV. CONCLUSION

The final conclusion of such assessment will help in predicting unfavorable situations well in advance. Managing the tough situations at time of risks would be easy to handle with pre-defined set of objectives. Approach to proactively assess and avoid potential threats including:

- Structured approach to prioritize categories and suppliers.
- Identification of risks, much before they become evident.
- Mitigation strategies to hedge/ eliminate risks before they happen
- Cockpit view of key risks of suppliers.

V. RESULTS

Smooth production lines in automobile companies even if situations and market is controversial. A structured approach is available with companies which can be followed and various risk are identified beforehand.

VI. FUTURE SCOPE

Some IT enabled tools can also be made with help of IT experts in which a scoring mechanism can be defined against each bucket score to have easy understanding of risk severity. For example if we look at first bucket i.e. Management risk bucket, then a matrix can be made in which scoring can be given as 0, 1 and 2. If management response is good during last one year and

there is no churn in management then score can be given as 2. If likely change is expected in management in coming year then it should be kept under monitoring then score can be given as 1. If response of management is very poor the score can be given as zero. In similar way scoring mechanism can be defined for each bucket and in single of IT tool the complete picture of supplier can be seen.

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Accessing and mitigating various Risks involved in Supply Chain

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Abstract- In Every automobile company, supply chain is quite widespread and there is a long chain of agencies involved in it starting from Raw material manufacturer to end customers. There is a hub of various type of suppliers involved in supply chain. Nature of each supplier is different, the commodities they supply is different. Every OEM (Original Equipment manufacturing) company has to manage different categories of suppliers. When multiple agencies are involved in any manufacturing then there are very high chances that any of the agency may create some issue and hamper smooth functioning of the complete supply chain. In such situation it becomes quite important for any OEM to have strong supply chain and access all risks related to supplies well in advance. Suppliers may create issues which ultimately affects the final production line at Supply chain. So in such case Risk identification and timely mitigation of them is of utmost importance.

I. INTRODUCTION

During the last twenty- odd years, supply chain management practices have evolved towards more lean process approach in order to reduce waste with in overall supply chain. Concepts such as just in time, lean inventory, supplier rationalization, outsourcing and best in class cost reduction techniques and methods have reduced total supply chain costs, but the result has been increased risk. Tradeoffs between achieving optimal supply chain efficiencies and management of supply chain risks have created a sort of conundrum and made Supply Chain more vulnerable.

Now let's talk of some risks that have actually impacted many automobile industries in the world. On March 11, 200, in early afternoon, Japan was rocked by 9.0 magnitude earthquake that caused widespread damage to the country's eastern coastal region .The Tsunami that followed the earthquake has devastated most of the eastern coastal regions of Japan.

An incident of Fukushima Nuclear power plant was also reported. Automobile companies were not able to get the components timely for final assembly at production lines.

A similar incidence of flooding in Thailand occurred in July 2011 which again impacted smooth flow of supply chain.

Sometimes fire issues are observed in supplier locations, it also impacts the production lines. Water logging at production areas hampers production.

At some places there are industrial strikes and IR issues which again impacts production and manufacturing process.

All strategies of manufacturing companies and planning got haywire due to all of the unprecedented risks and left firms with no alternate, but war footing and reactive countermeasures. All these happened due to:

- Optimized and lean supply chain
- Increased globalization through outsourcing
- Shorter product lifecycles

But for long term, this war footing approach is not at all advised and there appears a need to have structure approach to access risks associated with supply chain and search reasons well in advance to mitigate risks.

II. OBJECTIVES

Every automobile company must have structured risk management procedure. Standard metrics and their understanding amongst all supply chain members must be established to ensure identification of risks, much before they become "evident" in place.

Standard definitions and templates must be prepared for all risks associated with production line due to supply chain elements. Organization, processes and system requirements must be clearly defined.

III. THEORY

Supplier risks are broadly categorized under three heads. The heads are summarized as:-

- 1) Financial risks
- 2) Operational Risks
- 3) Location Risks

Each risk stated above has further sub heads and based on duly formed structured check sheet responses can be collected from suppliers and categorized as Red, Yellow and Green to convert qualitative data into quantitative data.

Financial Risk is further categorized into:

- a) Liquidity
- b) Funding
- c) Profitability

Based on answers collected from suppliers heads can be categorized as per defined colors. For explaining, responses collected are shown as Bold and underlined.

For Liquidity:

| Question | Answer1(Red) | Answer2(Yellow) | Answer3(Green) |
|--|---|---------------------------------|-------------------------------|
| No. of times vendor has received working capital funds from OEM in last 24 months? | If ≥ 2 | If 1 time | If 0 time |
| Interest coverage ratio (PBIT/Finance charges) | < 1.25 | If 1.25 to 1.99 | If > 2 |
| Employees paid in time? (in weeks) | > 1 month delay | Between 2 week to 1 month delay | < Less than 2 week |
| Tier 2/3 vendors paid in time? (in months) | Tier 2/3 vendor has complained to OEM or > 3 month delay | Between 2 to 3 months | $<$ Less than 2 month |

For Funding:-

| Question | Answer1 (Red) | Answer2 (Yellow) | Answer3 (Green) |
|--|----------------------------------|-------------------------|-------------------------------|
| No. of times vendor has received working capital funds from OEM in last 24 months? | If ≥ 2 | If 1 time | If 0 time |
| Current ratio (Current assets/Current liabilities) | If < 0.8 | If 0.8 to 1 | If > 1 |
| Adequate FG inventory maintained? Calculate (actual/expected inventory) in % | If $< 75\%$ | If 75% to 100% | If 100% |

For Profitability:-

| Question | Answer1 (Red) | Answer2 (Yellow) | Answer3 (Green) |
|--|----------------------------------|-------------------------|----------------------------------|
| Net forex exposure as a % of total revenue | If $> 50\%$ | If 20% to 50% | If $< 20\%$ |
| Cumulative spike in input cost over last 12 months | If $> 15\%$ spike | If 10% to 15% | If $< 10\%$ |
| Average ROCE for the last three years | If $< 6\%$ | If 6% to 13% | If $> 13\%$ |

Operational Risk is categorized into:-

- a) Management
- b) Tier 2/3

- c) Safety
- d) Labor
- e) Performance
- f) Power
- g) Machinery

For Management:-

| <u>Question</u> | <u>Answer1 (Red)</u> | <u>Answer2 (Yellow)</u> | <u>Answer3 (Green)</u> |
|--|---|--|--|
| Management change expected (next 12 months) / occurred (last 6 months) | Change is expected / has happened and is negative for OEM | Change is expected / has happened and is neutral for OEM | No change is expected / has happened or positive change |
| Management conflict in last 1 year | Yes and issue not resolved | Yes and issue resolved | No management conflict |
| Is there a succession plan in place? | No | - | Yes |
| Are there sufficient number of managers to run the business? | - | No | Yes |

For Tier 2:-

| <u>Question</u> | <u>Answer1 (Red)</u> | <u>Answer2 (Yellow)</u> | <u>Answer3 (Green)</u> |
|--|----------------------|-------------------------|------------------------|
| Is there any critical Tier2 content? | - | Yes | |
| Is there process maturity at Tier1 Answer the following for the Tier 1 supplier 1. Does the vendor follow Q & D rating system? 2. Are quality defects in critical child parts observed at OEM within permissible limits? Were more than one Quality problem reports filed for any child part of the component in the last 6 months? 3. Does the vendor carry audits on its vendors? | | | Yes to all questions |

For Safety:-

| <u>Question</u> | <u>Answer1 (Red)</u> | <u>Answer2 (Yellow)</u> | <u>Answer3 (Green)</u> |
|--|---|--|---|
| Has any major safety accident happened in the last 1 year? | Yes | Yes but countermeasure already taken | No |
| PPE used by all employees | If hazardous industry and no PPE usage as per the norms | If low PPE norms adherence | If normal operations and PPE usage is as per the norms |
| Is vendor prone to fire risk? | Adequate fire safety measures are not present | Fire prone industry but adequate safety measures present | Adequate fire safety measures are present |

For Labor:-

| Question | Answer1 (Red) | Answer2 (Yellow) | Answer3 (Green) |
|---|--|--|---------------------------------|
| Disruptions due to labor unrest in the last 24 months? | If issue unresolved | If issue resolved | No major disruption |
| Is IR contract finalization delayed or expected expiry in next quarter? | IR contract finalization delayed by > 3 months | IR contract expiry in next quarter or contract finalization delayed by 13 months | IR contract settled or no delay |
| Affiliation of labor union? | - | External | Internal or no union |
| Difference in wages and incentives of permanent and contract employees for similar work (only if % contract workers >50%) | Same work, pay difference > 70% | Pay difference 35-70% | Pay difference < 35% |

For Performance:-

| <u>Question</u> | <u>Answer1 (Red)</u> | <u>Answer2 (Yellow)</u> | <u>Answer3 (Green)</u> |
|--|--|-----------------------------|----------------------------|
| Number of dips in quality rating over last six months | If 4 or greater dips (-5% drop) | If 2 to 3 dips | If 0-1 dip |
| Number of dips in delivery rating over last six months | If 4 or greater dips (-5% drop) | If 2 to 3 dips | If 0-1 dip |
| Absolute quality rating | If < 500 | If 500 to 605 | If > 605 |
| Absolute delivery rating | If < 225 | If 225 to 290 | Greater than 290 |

Marks are on scale of 0 to 1000.

For Power:-

| Question | Answer1 (Red) | Answer2 (Yellow) | Answer3 (Green) |
|--------------------------------|---|-------------------------------|-----------------------------------|
| Is there 100% power backup? | - | - | Yes |
| State / region power situation | Greater than 4 hour power cuts daily | Up to 4 hour power cuts daily | Less than 1 hour power cuts daily |

For Machinery:-

| Question | Answer1 (Red) | Answer2 (Yellow) | Answer3 (Green) |
|----------|------------------|---------------------|--------------------|
|----------|------------------|---------------------|--------------------|

| | | | |
|---|--|---|---|
| Does the vendor run more than 2 shifts (or > 16 hours) for any process / operation related to this component? | - | Yes | No |
| Is m/c preventive maintenance followed? | If no preventive maintenance planning exist | If preventive maintenance plan exist, however compliance is < 75% | If preventive maintenance plan exists and compliance is > 75% |
| What is the vendor's OEE (Overall Equipment Effectiveness)? | If < 75% | If 75% to 85% | If > 85% |

Location Risks comprises of the factors mentioned in table below:

| <u>Question</u> | <u>Answer1 (Red)</u> | <u>Answer2 (Yellow)</u> | <u>Answer3 (Green)</u> |
|--|-----------------------------|--------------------------------|-------------------------------|
| Is the vendor operating out of a risky country? (eg. China) | - | Yes | No |
| Number of days of supply disruptions due to strikes, bandhs, riots etc. in last year | If > 7 Days | If 2 to 7 Days | If <2 Days |
| Seismic, cyclone, tsunami, flooding zone score | Red | Yellow | Green |
| Does the vendor operate in a regulated industry? | - | Yes | No |

IV. CONCLUSION:-

Based on above analysis any OEM can easily understand the overall situation of Supplier Company and accordingly corrective/preventive measures can be taken to avoid foreseen risks.

V. RESULTS:-

- Reduced Risk Impact
- Instead of reacting to crises OEM will be predicting and eliminating risks timely.
- Having control on supply chain volatility

VI. FUTURE SCOPE:-

IT enabled dashboard can be created and a count can be decided for number of questions. If in particular category there are 10 questions and supplier is found green in more than 8 questions then rating of supplier must be green. If supplier has yellow rating in 4 to 7 questions then final score must be yellow and if less than 4 then rating of supplier is red.

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The Right Of Use And Economics Of Irrigation Water In Uganda: A Comparative Analysis Of Small Scale Irrigation Schemes In Eastern, Northern And Western Uganda

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ABSTRACT

This study was conducted on the right of use and economics of irrigation water for small-scale irrigation schemes in Eastern, Northern and Western parts of Uganda to examine the extent to which irrigation is accessible to farmers and the economic returns from irrigation water. The specific objectives were to examine the profitability of using irrigation water in Uganda, to assess the sustainability of small-scale irrigation schemes in Uganda, to identify the factors influencing productivity of irrigation water in Uganda, to identify the factors influencing farmers' willingness to pay for Irrigation water and to determine the implications of water user rights and costs on adoption of irrigation in Uganda. This study used a cross sectional research design in which data from respondents were collected at a single point at a time whereby both purposive and cross-sectional data collection approaches were adopted. A systematic random sampling procedure was used to select the desired sample size from the study area. Purposive and simple random sampling was employed for key informant personnel who are stakeholders Data were analyzed using both SPSS and STATA software. The results indicated that the net returns per year from two sites namely Bukatabira and Andibo SSISs are 121,306,920 and 34,730,684 shillings for tomato and watermelon respectively at Bukatabira SSIS while at Andibo SSIS the net returns are 50,416,800 and 200,802,000 shillings for tomato and water melon respectively. This means tomato is more profitable in Bukatabira SSIS than watermelon while watermelon is more profitable at Andibo SSIS than tomato. Sprinkler and drip irrigation were found to be more water-saving, cost effective and efficient compared to other methods of irrigation for example surface or furrow irrigation systems. The values of BCR clearly indicate that tomato crop is most suitable at Bukatabira SSIS while watermelon is most suitable at Andibo SSIS with the current production systems. The analysis also revealed that investment in five crops grown at Bumusse SSIS is not economically viable. Out of the eleven explanatory variables, four such as education level, off farm income, credit access and rainfall reliability were statistically and significant at 1% level to influence the farmers' willingness to pay for irrigation water in study area. The results also indicated that the water user rights and costs have positive implications on adoption of irrigation water in Uganda and significantly contributed to different factors such as price of water for irrigation, extension services, access to agricultural information, off farm production, cooperative membership, training opportunities, personal savings, contribution for operation and maintenance and high agricultural productivity.

1. INTRODUCTION

This study investigated the economic viability of Uganda’s small scale irrigation schemes and the feasibility of water markets in Uganda.

In Uganda, unlike other East African countries specifically Kenya and Tanzania, the adoption and development of irrigation was first observed in Karamoja sub region in 1948 where a significant public investment was directed towards the construction of flood diversion structures and round bunds to enclose floods in the fields and ensure infiltration (Carruthers, 1970). In 1952 much more complicated irrigation system comprising of dams and channels was developed in Agoro in northern Uganda in 1952 (Adams and Anderson, 1988). However the most significant development in irrigation was seen with the construction of the Mubuku irrigation project on Lake George Flats that started in 1960 although by 1970, the scheme had not yet achieved its commercial viability.

The first Private scheme establishment was at Kakira sugar estate in Busoga in 1956 where 100 acres were irrigated using sprinkler and 50 acres using furrows although with time sprinkler irrigation proved more efficient due to the uneven topography thereby abandoning furrow irrigation method in 1958 (Carruthers, 1970).

1.1.2. The economic viability of Uganda’s Small scale Irrigation Systems

Considering the last comprehensive National Agricultural Census conducted between 2008 and 2009 by Uganda National Bureau of Statistics (UBOS); the Uganda Census of Agriculture (UCA) Volume 3 reported that Irrigation was being practiced by only 0.9% of the approximately 3.600.000 Agricultural Households that responded implying that agriculture was predominantly rain-fed. Eastern region registered the highest number of Agricultural Households with 53.5% of all households surveyed.

Table 1: Number and Percentage of Agricultural Households that reported Presence of Irrigation on the holding by Region

| Region | Ag HHs | percent |
|---------------|---------------|------------|
| Central | 5,492 | 17.5 |
| Eastern | 16,784 | 53.5 |
| Northern | 2,776 | 8.9 |
| Western | 6,305 | 20.1 |
| Uganda | 31,357 | 100 |

Source: National Agricultural Census 2008-2009; Uganda National Bureau of Statistics (UBOS); the Uganda Census of Agriculture (UCA) Volume 3.

The total land being irrigated was about 7,000 Hectares and the most dominant method of irrigation used was Localized irrigation that constituted 73.9% of the total irrigated land. Shallow wells were the most commonly used source of water for irrigation of the eight categories of irrigation water sources. Out of the 0.9% of households practicing Irrigation, only 0.11% were paying for agricultural water usage. The three Payment methods for Irrigation water identified were Water Fee per Hectare, Water Fee per Volume and Other form of payment (UCA, 2008/09).

Development of Large scale Irrigation Schemes in Uganda have been hindered by land acquisition snags, high capital investment that an individual farmer cannot afford and there is limited capacity for planning, designing and construction of Large scale Irrigation Schemes. In response to these challenges, government through ministries responsible for providing water for agricultural production are constructing localized Small-scale Irrigation Schemes to reduce government’s financial burden of setting up large-scale schemes and farmers’ burden of operational and maintenance. As such developments are on-going in

the irrigation sector, answers to key questions needed to be found, questions such as: Are farmers able to pay for irrigation services with their production systems? Are farmers willing to pay for irrigation water?

This expresses the importance of having an idea of the value attached to irrigation water.

1.1.3 The feasibility of water markets in Uganda

Globally, irrigation activities were seen to expand significantly in the 20th Century especially the post-World War II era (Schoengold and Zilberman, 2007). This was further accelerated by continued demand for food to take care of the continuously growing populations and the increasing competition for water among valuable economic sectors combined with the implications of global climatic change on irrigation observed through changes in hydrology (Turrall et. al). Due to this growing demand for quality irrigation water, user rights must be defined to accommodate the interest of crop producers while considering the economic value of the water.

The first Dublin guiding principle recognizes water as a finite and vulnerable resource while the fourth Dublin guiding Principle describes water as an economic good (GWP, 2018). In addition, FAO is aware of the importance of water in agricultural and food production. According to FAO, globally, irrigation continues to be the main water user despite the increases in water use by other sectors hence agriculture is responsible for about 70 percent of all freshwater withdrawals worldwide (FAO, 2018). This therefore calls for sustainable management of the water resource considering its vital socioeconomic importance.

1.1.4 Water rights in Uganda

According to the National Objectives and Directive Principles 13 and 21 of State Policy (1995), the state shall: “take all practical measures to promote a good water management system at all levels” and “protect important natural resources, including land, water, wetlands, minerals, oil, fauna and flora on behalf of the people of Uganda”

The Water Action Plan (1995) is a framework that outlines policy options and guidelines for the protection and development of Uganda's water resources as well as recommends a structure for their management. The Uganda Water Action Plan (WAP) adopted and operationalized the guiding principles for water resources management as they emanated from the Dublin-Rio de Janeiro (UNCED) process and Agenda 21's Chapter 18 on freshwater resources. The W AP adopted these guiding principles recognizing: (i) freshwater as a finite and vulnerable resource, essential to sustain life, development and the environment, (ii) management of water resources, at the lowest appropriate levels, (iii) the role of Government as an enabler and in a participatory, demand-driven approach to development, (iv) the recognition of water as a social and economic good, (v) the integration of water and land use management, (vi) the essential role of women in the provision, management and safeguarding of water" (vii)-the important role of the private sector in water management.

The National Water Policy (1999) in respect to water for agricultural production is intended to promote the development and efficient use of water in Agriculture in order to increase productivity and mitigate effects of adverse climatic variations on rain-fed agriculture, with full participation, ownership and management responsibility of users.

The Water Act (1998), Cap. 152.; provides for the use, protection and management of water resources and water supply in Uganda. The water act lays out procedures for acquiring water permits for specific water usage of water resources in the

country. A fixed charge or fee determined by Minister or Director in charge must be paid by the applicant of the water permit depending on the source and amount of water to be abstracted. The fixed fee or charge shall be in accordance with pricing policies established by the water action plan or other policy as may be determined by the government. The water permit holder has the legal rights to use water in accordance with the terms of reference stipulated. In the event that the holder of the permit fails to comply, the permit is cancelled with procedures stated in the act. Water permits have been issued for private commercial farmers, construction companies, industries, among other users.

The Water Statute (1995) provide for the use, protection and management of water resources. The objective of the Statute in relation to Agricultural productivity is to allow for the orderly development and use of water resources for watering of stock, irrigation and agriculture in ways which minimize harmful effect to the environment.

The National Environment Management Policy (1994) and Statute (1995) take account of the key policy objective on water resources conservation and management; to sustainably manage and develop 'the water resources in a coordinated and integrated manner so as to provide water of acceptable quality for all social and economic needs.

1.2. Statement of the Problem

Effects of global climate change on crop production is alarming; in the year 2010, drought accounted for 38% loss in beans production and 36% loss in maize production while in 2014, Uganda registered Uganda shillings 2.8 trillion loss of Gross Domestic Product (GDP) equivalent to 8% and 87% loss to agro-based industries (Mwaura et al 2014). Despite the low agricultural crop production being realized in most parts of Uganda as a result of relying on rainfed agriculture, farmers have shown laxity in adopting irrigation yet the country has a huge irrigation potential that is evident with numerous fresh surface water sources consisting of lakes, rivers and swamps covering over 15% of her total surface area; on the contrary the ratio of cultivated area under irrigation to the irrigation potential is only 0.5%.

Table 2: Area Irrigated according to Method of Irrigation

| Region | Surface | percent | Sprinklers | percent | Localized | percent |
|---------------|--------------|--------------|------------|--------------|--------------|--------------|
| Central | 69 | 4.6 | | | 892 | 17.6 |
| Eastern | 1,283 | 84.1 | 127 | 37.0 | 3,021 | 59.7 |
| Northern | 151 | 9.9 | | | 454 | 9.0 |
| Western | 22 | 1.4 | 216 | 63.0 | 690 | 13.7 |
| Uganda | 1,525 | 100.0 | 343 | 100.0 | 5,057 | 100.0 |

Area (Ha) Irrigated according to Method of Irrigation. (Source: National Agricultural Census 2008-2009; Uganda National Bureau of Statistics (UBOS); the Uganda Census of Agriculture (UCA) Volume 3).

This has resulted into low crop production, low and unstable incomes and consumption of farmer households, food insecurity and vulnerability to weather and climate events.

Uganda’s Vision 2040 drafted primarily to achieve a transformed Ugandan society from a peasant to a modern and prosperous country within 30 years is emphasizing commercialization of agriculture by encouraging adoption and use of cost effective technologies such as drip irrigation indicated in the National Irrigation Policy to maximize production and achieve efficiency and long-term environmental sustainability, social and economic benefits for Ugandans from water. On the other hand, this

water is only free for citizens who occupy or are residents on lands where there is water and they must use this water for domestic use, fighting fire or irrigating a subsistence garden only and not for any commercial purpose (The Water Act, Cap. 152.). The Act requires farmers interested in small scale irrigation systems to quantify and pay for irrigation water amounts sufficient for production.

To better understand this gap in adoption of irrigation, this study intended to answer the following questions: To what extent has water rights and costs hindered the farmers from actively undertaking irrigation? Does the revenue from small scale irrigated agriculture outweigh the overall cost of production by farmers? To what extent are the established irrigation schemes/facilities sustainable? These were answered by undertaking a comparative analysis of existing irrigation projects in Eastern, Northern and Western Uganda that have demonstrated differences in the level of adoption in order to assist authorities responsible for small-scale irrigation water pricing and establishment of small-scale irrigation schemes to better plan and implement irrigation projects.

1.3. Research Objectives

1.3.1 Main objective

The main objective of this study was to examine the right of use and economics of irrigation water using a comparative analysis of small scale irrigation systems in Eastern, Northern and Western Uganda.

1.3.2 Specific objectives

More specific objectives of the study were to:

1. Examine the profitability of using irrigation water in Uganda.
2. Examine the sustainability of small-scale irrigation schemes in Uganda.
3. Investigate factors influencing productivity of irrigation water in Uganda.
4. Determine farmers' willingness to pay for Irrigation water in Uganda.
5. Assess the implications of water user rights and costs on adoption of irrigation in Uganda.

1.3.3 Research Questions

1. Is using irrigation water profitable in Uganda?
2. Are small-scale irrigation schemes sustainable in Uganda?
3. What factors influence agricultural productivity in Uganda?
4. How much are Ugandan farmers willing to pay for irrigation water?
5. To what extent has water use rights and costs hindered adoption of irrigation in Uganda?

1.4. Scope of the study

1.4. Content Scope

This study was carried out on small scale irrigation schemes constructed by Ministry of Water and Environment specifically Water for Production department through its regional centers East, North and West. 16 SSIS that possessed differences in land sizes, types of irrigation, types of enterprises and water sources were chosen for study.

1.4.2. Time scope

The study was conducted during the rainy season in most parts of the country; this was due to the timing of the study but the data collected were showing results of revenue generated from farming activities carried out in the dry season.

2. LITERATURE REVIEW

This chapter comprises of three sections; section 1 gives the global, continental and regional scenarios of irrigation water use rights, section 2 provides key economic definitions, concepts, issues and definitions, section 3 highlights on different techniques used in estimating irrigation water productivity and value.

2.1. Irrigation water rights

Water right is the legal right to abstract or divert and use or store a quantified amount of water from a natural source or the legal right to use water in a natural source. Water right is different from the “right to water” - a presumed human right which is demanded to be existent in one way or the other as a right in itself or as a supplementary aspect of the “right to food” created by article 11 of the International Covenant on Economic, Social and Cultural Rights which stipulates that everyone has a right to an adequate standard of living for himself and his family including adequate food, clothing and housing. “Right to water” was developed in General Comment 15.

Property rights can be defined as “the claims, entitlements and related obligations among people regarding the use and disposition of a scarce resource” (Furubotn and Pejovich 1972). Bromley (1992:4) points out that “Rights have no meaning without correlated duties on aspiring users to refrain from use.” This means that property rights are not a relationship between a person and a thing, but are social relationships between people with relation to some object (the property). Particularly in the case of water, rights also have corresponding duties that apply to the rights holder usually to use the water and dispose of wastes in a certain manner, and often to provide money, labor, or other resources to maintain the water supply.

Water rights being one of the many forms of property rights need to be secured. Property rights are important since in most treatments of property rights, these types of rights are contrasted with open access situations in which anyone has unrestricted use of the resource. There are no specific rights assigned to anyone and no one can be excluded from using the resource. It is the lack of rules in open access that is seen as contributing to the “tragedy of the commons,” wherein resources degrade because of lack of control over their use or incentives for investing in its provision (Bromley 1992). Hence effective property rights need to be secured for the following reasons;

Efficiency: Property rights are required to provide incentives to invest in a resource. For water, this repeatedly means developing and maintaining water infrastructure such as wells and or irrigation canal.

Environmental protection: Property rights provide incentive to protect the resource, and without property rights that are enforced, resources often become degraded.

Equity: Distribution of the resource in terms of equality of access, particularly for meeting basic needs, or in terms of distribution of rights in proportion to investment that people make or both. Establishing effective property rights is costly, in cases where a resource is abundant, there is little incentive or need to define rights over it, but with increasing demands and scarcity, there is pressure to define rights (Alchian and Demsetz, 1973).

As with other types of property rights, water rights can be broadly classified as public, common, or private property, according to who holds the rights, and particularly, the decision-making rights of allocation, which lie at the heart of water rights (Pradhan, Rajendra&Meinzen-Dick, Ruth. 2003; Paul 2003).

Water legislation offers a variety of exemptions for activities that would otherwise call for a water right. This may be done by reference to the quantity of water used, the nature of activity, or both.

In Saskatchewan Province (Canada) the exemption comes from the dimension of the plot to be irrigated.

In Spain for example, such uses are termed as “common uses” and these include the use for drinking, bathing, livestock watering and other domestic purposes.

In Wales and England an exemption for water withdrawals up to 20 cubic metres per day was suggested yet this lacked a pronounced theoretical account for exempting such uses from recognized water rights systems. The legislature makes judgment by taking into account the increased financial and administrative liability of making such uses be part of the formal framework, their value to different users and their overall effect on the water resources balance.

In many parts of the world, water is allocated using a “queuing” system (Easter & William, 1986). Two commonest types of queuing systems are prior appropriation system and riparian rights system. Prior appropriation system is centered on the principle of “first in time, first in right”. Priority is given to the first person to abstract or divert water for beneficial use. Riparian rights system gives property-owners with land adjacent to the water source rights to use that water. (Tiwari et al., 2000).

There are economic restrictions to the public acquisition of water rights in a trading system when cultural and social objectives are required. The small farmers are time and again victimized as they encounter complications in obtaining shares and trading them. In such circumstances, regulatory procedures to safeguard the smallholders' rights may be required. (Howe 1996). In the western states of United States of America, the “prior appropriation” principle applies. Water rights are still created by operation of law; although mostly created on the basis of legal instruments issued by the state agencies responsible for water resources management. Such instruments are variously termed in legislation as “consents”, “concessions”, “authorizations”, “licenses” and “permissions”.

These water rights are established on the notion of the hydrologic cycle; water in its natural state is in constant motion, therefore water rights cannot be given or controlled in isolation to other activities involving watercourses. This makes the flow of water along a water course to be an important component of a water right therefore the need for maintaining a minimum flow of water in the river or canal system for sustaining downstream users to avoid exploitative situations especially where large landowners could dominate the water rights and in periods of drought.

In Mexico, water users are granted rights for water use and use of irrigation infrastructures through Water Users’ Associations (WUAs). Water users needed to be provided with certainty in user rights by forming a Public Registry of Water Rights and allow transmission of the rights amongst users of the same basin or amongst those who use water from the same source or aquifer (Klozen, 1998).

In Chile’s tradable water rights systems, a right-holder can transfer that water to others through sale or lease.

In New Zealand, the National Water Act provides for fixing quota system for water abstraction for irrigation purposes. For instance, within the Riet River and the tributary; the Modder River downstream of the Krugersdrift dam, the Act outlines the necessity for restricting up to 35% of the full quantity of water delivered from the Krugersdrift dam (National Water Resources Department, New Zealand).

In Ukraine water is a public asset where the state institutions have the right over them. The Water Code of Ukraine controls the normative structure of water rights. The procedure for getting water rights is complex, costly and bureaucratic. 12 different documents matched by different institutions have to be presented by water users prior to getting a license (Pavlov, 2004). This is extremely difficult for small farmers to manage since each document has to be paid for. Therefore farmers form associations to use one „water right“ license in a bid to minimise costs. Water rights are issued for periods up to 25 years according to the Water Code but in practice the period is however only 1 to 3 years. In this kind of situation farmers fail to make long-term strategies and investments in irrigation systems.

In Indonesia, no particular model of water resources distribution is entirely applied in the country. Traditional law controls in certain locations and statutory law prevails in others. Natural resources are governed by the State in public trust for the people according to Article 33 of the Basic Constitution. Water allocation precedence starts with drinking water, followed by agriculture, and lastly energy according to Law No. 11 (1974). Indonesian Water Law of February 2004 makes a distinction between basic or non-commercial usage rights and commercial exploitation; this law also highlights unusual consideration on the water rights for 'traditional communities'.

In China specifically Tejinin province, quota system for water allocation is well-defined and apportioned based on crop water requirements per unit of agriculture area. The agreement of rational irrigation quota for crops allotted for the eight river basins and regions in the province are centered on estimates of effective rainfall, run-off, potential water deficits and crop water requirements.

The diversity of water law is further increased in many places in Africa because each of these types of law especially state, customary, and religious may themselves be plural. In most African customary water law, water is considered as a community property and private ownership of water is not recognized (WFP, 2001).

Rights are often grouped into two broad categories: use rights of access and withdrawal, and decision-making rights to regulate and control water uses and users, including the rights to exclude others, manage the resource, or alienate it by transferring it to others (Schlager and Ostrom 1992).

While the exact definitions of these rights vary from place to place, there are several common elements in water law in Africa:

1. The state generally claims some kind of ultimate “ownership” rights over water, which may not be felt at all at the local level, or it may require that individuals or groups who want to use or develop a water source need to get some kind of permission from the state.
2. There are widespread notions that anyone is entitled to water for “primary uses,” which are usually interpreted as basic domestic needs, as well as household gardens, but may include other productive livelihood needs. Islamic law has formalized this as a “right to thirst” for people and animals.

3. Although there are individual use rights in Africa, private water allocation rights are not widespread. There are some sources such as wells or small springs which are considered private, in which the right holder has the right to allocate water from that source.

In Egypt, there is no charge for irrigation water in the Nile Valley and Delta (Hamdy et al., 1995; Attia, 1997). Farmers on traditional, below-grade tertiary canals (mesqas) must lift water about 1 to 2 metres at their expense, but the water is free, and no funds are collected for operating and maintaining the main delivery system (Ward, 1993; Nassar et al., 1996). There are no restrictions on the volume of water entering drainage canals (Ward, 1993) and farmers are not charged the variable cost of providing drainage services (Okonjo-Iweala&Fuleihan, 1993).

In Nigeria, „the Water Resources Decree of 1993 vests in the Federal Government the right to the use and control of all surface and groundwater and all water in any water-course affecting more than one State, for the purpose of promoting the planning, development and use of the country’s water resources; coordinating the distribution, use and management of water resources; and ensuring the application of appropriate standards for the investigation, use, control, protection, management kind administration of water resources“ (Kuruk, P., 2005). Under section 2 of the Water Resources Decree, any person may (i) take water without charge for his domestic purpose or for watering his livestock from any water course to which the public has free access; or (ii) may use water for the purpose of fishing or for navigation to the extent that such use is not inconsistent with any other law for the time being in force; or (iii) who, has a statutory or customary right of occupancy to any land, may take and use water from the underground water source or if abutting on the bank of any water course, from that water course, without charge for domestic purposes, for watering livestock and for personal irrigation schemes. The authority of the Minister for Water Resources to control groundwater use includes the power to define the time, places and manner in which water may be taken or used; to fix the amount that may be taken in times of shortage; to prohibit the taking or use of water for health reasons; to regulate the construction and operation of boreholes; and finally to revoke a right to use or take water in the public interest. In the discharge of his statutory duties, the Ministry is required to make proper provision for adequate supplies of suitable water for domestic, and non-domestic use; the watering of animals, irrigation, agricultural purposes as well as the generation of hydro-electric energy for navigation, fisheries and recreation.

In Ethiopia, water rules came into action recently, but prior to this the people were using water customarily and even as of 1987 it was still being observed in many parts of the country (Ewnetu 1987). The Ministry of Water Resources formulated a water policy having the irrigation component both at Federal and Regional level, basing on the Agricultural Development Led Industrialization Policy (ADLI) of the country (MoWR: 1999). The overall objective of the policy was to develop irrigated agriculture for production of food and raw materials for agro industries. As of the year 2002, Ethiopia did not yet have a single body of rules relating to the use rights of and management of water resources (Yacob 2002). This was also later reported in the year 2004 (Lemma 2004). Additional studies conducted by FAO in 2005 reaffirmed that there is no extensive legislation covering the use of water in Ethiopia although there are decrees that water is a national asset and that it can be controlled only by the central government (FAO, 2005).

In South Africa during the apartheid era, state water law was based on the English common law principle, which gave use and control rights over water to those who owned the overlying land. The new government reformed water rights through the National Water Act (Act 36 Of 1998). This Act declared that the state is the guardian of all water resources in South Africa, but it also incorporated the African customary view on water rights by declaring water to be a public resource that belongs to the

whole nation and needs to be available for common use by all South African citizens. All water required for basic human needs like drinking is guaranteed as a right (RSA 1998; Perret 2002). Under this act, people cannot own water but can be granted water use rights through a licensing system, which require users to pay for it. The money generated from water use charges is used for water service and management costs (Farolfi 2004, Tewari 2002)

In Zimbabwe's water reform of 1990s, it was declared all the water to be the property of state. People can get water rights through acquiring water permits, which gives them legal license to use but not own water. Water permits are issued in consideration of the needs of the applicant and the expected benefits of the proposed water use (Latham 2000, Mtisi and Nicol, 2003).

In Mozambique, the Water Act of 1991 regards water as a public good. People cannot have private ownership of water sources but can obtain rights to use water by acquiring a water license (Vaz and Pereira, 2000). Water licenses are granted for a period of 5 years and are renewable. The use of water for primary needs like small irrigation, domestic use, watering the livestock, is free.

In Botswana, people do not need to acquire water rights if they are using the water for domestic purposes or for watering livestock. However, people are required to obtain water rights if using the water for irrigation or commercial purposes.

According to the Ugandan National Irrigation Policy, a lot of complexities exist in land user rights. These are in the form of land access, security of land rights, dammed water and wetland use limitations are the most common unsolved issues. Exclusive water user rights for irrigation or hydropower dams have been a limitation in reaping benefits of integrated water resources management and use could have led to a rapid irrigated agricultural development. Therefore these national water and land user rights together with riparian water sharing agreements have affected the desirability for investment in irrigated agricultural development.

2.2 Key economic definitions, concepts and issues

Willingness to pay: Willingness to pay for irrigation water is defined as the maximum amount of money a farmer is willing to pay for water used in irrigating a farm. The method of determining a farmers' willingness to pay for irrigation water is detailed in the questionnaire. Willingness to pay survey results are presented graphically to show the values' distribution for a range of collected responses.

Expressed willingness to pay: Maximum amount that a farmer expresses that he or she is willing to pay for irrigation service, typically registered in monetary units per season/year, in response to a specific question

Economic benefit: Increased benefit that a farmer could receive from a proposed project compared to his or her present situation. In the case of an irrigation project, it indicates the attributed benefit of the irrigation water service in monetary units, versus the current rain fed agricultural production.

Economic analysis: Shows the economic feasibility of a project, from the perspective of the farmer as well as that of the country.

Financial analysis: Illustrates whether the project will be profitable or not, from the viewpoint of the water utility that will implement and operate the irrigation system.

Economic benefit: Increased benefit that a farmer could receive from a proposed project compared to his or her present situation.

Demographic study: The study of the project's target population (farmers) to identify and determine distinct features that would affect project feasibility.

Demand study: In the context of an irrigation project, this study determines the demand for an irrigation service in terms of number of users, size of plots/farms and market availability. A future demand projection for an irrigation project should be considered.

3. RESEARCH METHODOLOGY

3.1. Introduction

The net economic contribution of irrigation water to the value of agricultural production is termed as productivity. The cost of provision and the net value of irrigation water is of great importance to the farmers and the proprietors of the irrigation schemes. Income distribution theory emphasizes that each factor of production should receive a share of production income equivalent to the contribution made by each factor, therefore the value of a resource used in production should be within the farmers' ability to pay (Bronfenbrenner, 2007)). For instance, effecting cost recovery plans for irrigation projects greatly depends on the realistic estimates of the productivity of irrigation water which gives vital evidence on the ability of farmers to pay for irrigation services hence sustainability. This chapter provides the methodology used in the study.

3.2. Research design

In this study, a social survey was conducted whereby a cross-sectional research design was used in which data from respondents were collected at a single point at a time; both purposive and cross-sectional data collection approach were adopted. The population of interest constituted of farmers growing vegetables in SSISs. A systematic random sampling procedure was then used to select the desired sample size from the study area. The area of study was purposively chosen because the area is among the few areas where SSISs are found.

3.3. Study population

The respondents were farmers in capacities of individual/model farmers and farmer groups who have been actively engaged in farming activities in SSISs for a minimum period of 6 months. The farmers comprised of male and female youths, adults and elders. Farmer group sizes ranged between 10 and 330 members

3.4. Sampling Procedure and Sample Size

The multistage sampling technique was employed in this study. The first stage was the purposive selection of small-scale irrigation schemes in Eastern, Northern and Western Uganda where MWE has established WfPRCs that are in charge of these SSISs. In the second stage, respondents were randomly selected to make a desired sample size. Data was collected with the use

of structured questionnaires to obtain information on farmers’ socio-economic variables, farm size (ha), cost of inputs, output and value of output for the previous farming seasons.

Table 3: Category and number of respondents sampled and interviewed

| Category of respondents | Numbers interviewed | Sampling Techniques |
|---|---------------------|---------------------|
| Individual farmers using small-scale irrigation systems | 46 | Simple Random |
| Farmers groups using small-scale irrigation systems | 64 | Simple Random |
| Scheme management committees | 16 | Purposive |
| Scheme agronomists | 16 | Purposive |
| Irrigation engineers | 15 | Purposive |
| District agricultural officers | 1 | Purposive |
| District water officer | 1 | Purposive |
| District commercial officer | 1 | Purposive |
| Irrigation engineers at MWE | 10 | Purposive |
| Sociologists at MWE | 11 | Purposive |
| Farmers who have fallen out of the schemes | 2 | Snowball |
| Farmers who haven’t joined the schemes | 1 | Simple Random |

3.5.Source of data collection

Forty six (46) model/individual farmers and sixty four (64) farmer groups from sixteen SSISs were selected for study to represent the diverse characteristics of these Small scale Irrigation Schemes in Uganda. To create a wider information base, the schemes selected were from more than one region and district. The schemes selected showed diversity in types of irrigation systems (pressurized, gravity); sources of irrigation water supply (wells, rivers and streams, lakes and swamps); types of crops grown (watermelon, tomato, cabbage, eggplant, green pepper, okra and onion); farming systems (commercial, subsistence, or both); scheme farming systems (individual/model farmers and farmer groups); land user rights (free, owned and rented) and cost of renting irrigated farming plots (ranging from 50000-200000 per plot) among other parameters.

Surveys were conducted in the sixteen functional irrigation schemes (sites). The purposes of these surveys were to evaluate the social, economic and technical statuses at individual plot and scheme levels, these helped in computing economic statistics. Individual farmers were interviewed in each of the selected schemes; focused group discussions were conducted for scheme management committees and key informant interviews for irrigation engineers, sociologists and agronomists attached to the selected sites to obtain vital and general information about each of the schemes. Well-structured questionnaires were used to interview the farmers. The information captured in the individual farmer questionnaire included household characteristics, plot sizes, enterprises chosen, agricultural inputs used, monetary returns from farming, irrigation water management, cropping systems, other sources of income, and sources of credit, market access and challenges being faced in the scheme. The farmer

group questionnaire had group size, sex distribution, enterprises chosen, returns from farming and group registration as the main areas of interest.

3.5.1 Primary data

3.5.1.1 Questionnaires

These were employed to capture data from two farmer sections; individual/model farmers and farmer groups. The individual/model farmer questionnaire was more comprehensive compared to the one of the farmer group.

3.5.1.2 Interviews

These were conducted for key informant persons such as scheme agronomists, scheme sociologists, district agricultural officer, district water officer, district commercial officer, Environmental officers and Irrigation Engineers at MWE.

3.5.1.3 Focused group discussions

These were conducted for scheme management committee members to ascertain the mode of operation of their various schemes and also for farmer groups' representatives.

3.5.1.4 Observations

Key observations were made on the components of the irrigation schemes, water meter readings, type of crops grown, topography and the general environment.

3.5.1.5 Photography

This provided empirical evidence/information obtained in the field for interpretation by the researcher and consumption by the general public.

3.5.2 Secondary data

Secondary data obtained was from unpublished data sources that were collected from individuals and public offices.

$$\text{Net Profit} = (\text{Gross returns} - \text{Cost of production}) \dots\dots\dots (i)$$

For this analysis the initial cost of the project was not considered.

Net Present Value was used to analyze the sustainability and viability of SSISs; this is given by the following expression:

$$NPV = \left(\sum_{t=1}^n \frac{\text{Net Cash Inflow}_t}{1+r^t} \right) - \text{Initial Investment} \dots\dots\dots (ii)$$

Where; NPV = Net Present Value
 t = time in years
 r = R/100

R = interest or discount rate

N = number of periods or years

Or;

$$NPV = -C_0 + \frac{C_1}{1+r} + \frac{C_2}{1+r^2} + \frac{C_3}{1+r^3} + \frac{C_t}{1+r^t} \dots\dots\dots (iii)$$

Where; -C₀ = Initial investment

C = Cash flow

r = Discount rate

t = Time

Ordinary Least Square (OLS) regression analysis was carried out to determine the factors influencing productivity of crops grown in schemes and factors influencing farmers’ willing to pay water for irrigation as well as the implications of water rights and costs on the adoption of water irrigation system in the study area. In order to draw conclusion, data collected from the primary source and the analysis of quantitative data were done with the aid of two softwares namely SPSS version 20 and STATA version 13.0.

3.7 Model Specification

The production function analysis was used in four functional forms from which the lead equation was chosen based on the values of the coefficient of multiple determination (R²) as well as the signs and significance of the regression parameters. This was stated explicitly as;

$$Y=f(X_1, X_2, X_3, X_4, \dots, u) \dots\dots\dots (iv)$$

Where;

Y = Total output of crop grown (Kg)

X1 = Land size (ha)

X2 = Labour source (man/hour)

X3 = Family size (number)

X4 = Gender (1=male, 0=female)

- X5 = Age (years)
- X6 = Education level (years)
- X7 = Fertilizers (kg)
- X8 = Irrigation system (1=yes, 0=no)
- X9 = Volume of water (m³)
- X10 = off farm income (1=yes, 2=no)
- X11 = Price of produce (1=high, 0=low)
- X12 = Distance to Market (km)
- X13 = Agricultural credit (1=yes, 0=no)
- X14 = Farming experience (years)
- X15 = Extension Service (1=yes, 0=no)
- X16 = Cooperative membership (1=yes, 0=no)
- U = Error term

Profitability was estimated using gross margin analysis, which is the difference between total revenue (TR) and the total variable cost (TVC). This is illustrated as;

$$GM=TR-TVC$$

Where;

GM =Gross margin

TR = Total Revenue =P.Q (P=Price, Q=Quantity) TVC = Total Variable Cost

3.8. Model justification

Different models have been proposed in econometrics for estimating adoption processes. The most common include the linear probability, Tobit, Probit and Logit regression. The application of regression methods depends largely on the measurement scale of the outcome variables and the validity of the model assumptions. The outcome variables include continuous scale, binary measure or ordered category. In this study to determine the relationship between independent and dependent variables, two models namely Probit and Tobit regression analysis have been commonly used. Probit and Tobit models are mostly used when dependant variable is categorical and the continuous variable is either continuous or categorical.

Probit regression is used to model the association between response variables and a set of explanatory variables. It can be used where the researcher wish to study effect of explanatory variables on all levels of the ordered categorical outcome. Therefore, this study adopted the method due to the said purpose of the researcher. Tobit model gives a quantitative measure of the extent

of adoption. These two model models give the effect of the various factors on the use as well as the predicted probabilities of the use.

The Probit model is often used in adoption studies that aim at identifying factors underlying adoption. These models (Tobit and Probit regression model) are more powerful, convenient and flexible and are often chosen if the predictor variables are a mix of continuous and categorical variables, which is the case in this study.

3.9 Ethical Considerations

The researcher made efforts to adhere to ethical standards. Permission to carry out the study was obtained from the University. Further permission was obtained from Ministry of Water and Environment and the various WFPRC managers before going to the field for data collection (see annex 1). The researcher was ethically sound hence protected the participants from any physical and psychological harm and treat respondents with respect and dignity.

Another critical issue was that respondents were granted informed consent before they participated in the study. Therefore, prior to the research, the researcher clarified to the farmers the nature of the study. Participation in the study was therefore voluntary and based on informed consent

The authors quoted in the study were acknowledged

Findings were presented in a generalized manner

3.10 Limitations

Communication barrier: Most of the data collection was done in rural communities. Language barrier was a huge problem since; majority of the farmers in the rural areas do not comprehend English. Additionally, there are many tribes in Uganda with discrete languages which the researcher is not conversant with. To overcome this challenge, the researcher hired two research assistants who are university students and knew the major languages spoken in western, eastern and northern parts of Uganda; they translated the languages during interviews and while administering questionnaires.

The researcher faced a challenge of long distances traveled to locate SSISs in all regions of Uganda. Some SSISs were located as far as 600km from Kampala; having poor road networks (hard-to-reach areas) with no public means of transport available. To overcome this challenge, a great deal of transport facilitation was required which was not available at the time of data collection. Therefore, the researcher had to improvise from other sources.

Unfriendly weather affected and delayed the research. The research was carried out in the rainy season in most parts of Uganda, this made it hard to move to the field due to bad roads, and sometimes the targeted population were inaccessible since most of them would be occupied in farms outside the irrigation schemes

The researcher had not receive the research grant by the time the surveys were being conducted; being a research that was dependent on primary data and the fact that the survey required the largest share of the budget; the survey was halted for some time as the researcher was mobilizing resources; this also med to delays in commencement of the research process since there was hope of receiving the research grant.

Tribal conflict was another factor that hindered the researcher. Data collection in Karamojasubregion was hindered by the tribal conflict between the Karamojong and Iteso tribes. This made data collection in Napak district impossible and as a result resources planned for that side was not properly utilized

Due to the difficulty in acquiring permit and permission; the data obtained belonged to SSISs designed and implemented MWE only

Individual/model farmer data was obtained only from Eastern region

4RESULTS AND DISCUSSIONS

4.1Demographic Characteristics of Respondents

This part presents the demographic characteristics of the study population. The responses were analyzed using descriptive and inferential statistics as presented in table 4.

Table 4: Demographic Characteristics of Respondents

| S/n | Variables | Frequency | Percentage (%) |
|----------|------------------------|-----------|----------------|
| 1 | Gender | | |
| | Male | 35 | 76.09 |
| | Female | 11 | 23.91 |
| | Total | 46 | 100 |
| 2 | Age | | |
| | > 30 | 3 | 6.52 |
| | 30-40 | 16 | 34.78 |
| | 41-50 | 12 | 26.09 |
| | 51 and above | 15 | 32.61 |
| | Total | 46 | 100 |
| 3 | Education level | | |
| | adult education | 1 | 2.17 |
| | Attended O-level | 9 | 19.56 |
| | Attended primary | 17 | 36.95 |
| | Completed O-level | 5 | 10.88 |
| | Completed primary | 5 | 10.88 |
| | Degree | 1 | 2.17 |
| | Diploma | 5 | 10.88 |
| | Institution | 1 | 2.17 |

| | | | |
|----------|-----------------------|-----------|------------|
| | Master's | 1 | 2.17 |
| | Not attended school | 1 | 2.17 |
| | Total | 46 | 100 |
| 4 | Marital status | | |
| | Single | 1 | 2.18 |
| | Married | 41 | 89.13 |
| | Widowed | 4 | 8.69 |
| | Total | 46 | 100 |
| 5 | Family size | | |
| | 5 and less | 5 | 10.87 |
| | Between 6 and 8 | 15 | 32.61 |
| | Between 9 and 12 | 18 | 39.13 |
| | 13 and above | 8 | 17.39 |
| | Total | 46 | 100 |

According to the data shown in table 4; out of the 46 respondents who participated in the study, the majority (76.09%) were males while (23.91%) were females. This finding could be an indication that most of the farmers using agricultural best practices and technology were males. The low number of women involved in SSI farming activities may hinder the productivity, profitability and sustainability of SSISs in the study area.

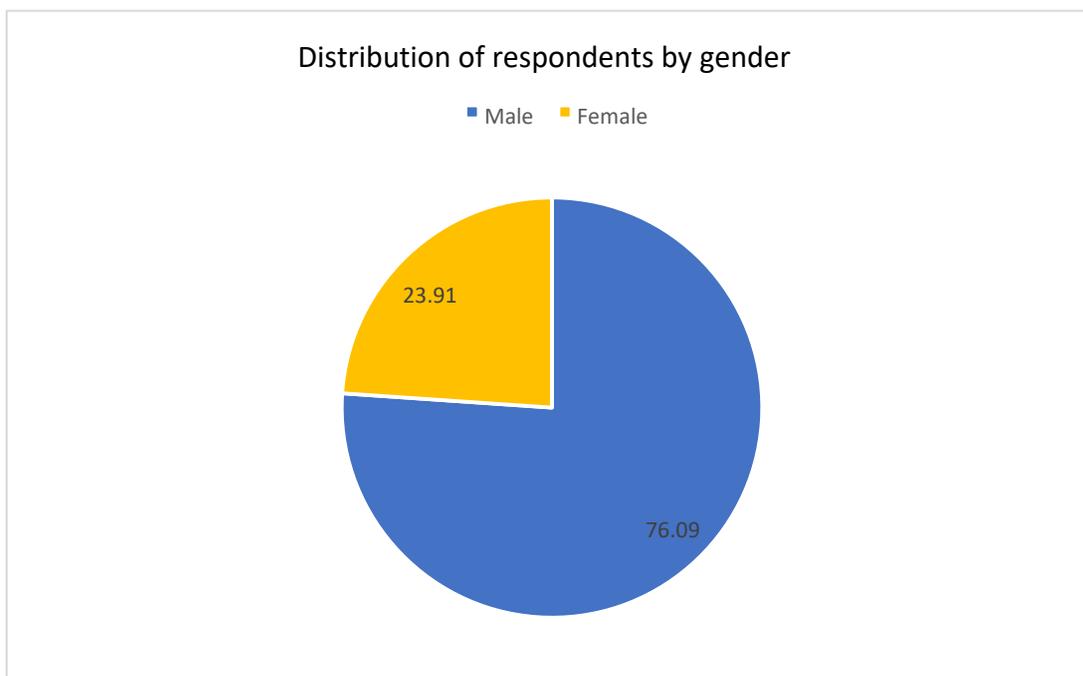


Figure 2: Distribution of respondents by gender

It is evident from the data shown in table 4 that the majority of the farmers (34.78%) were aged between 30-40 years, followed by the farmers aged 51 years and above represented by (32.61%), then the class ranging between 41-50 years (26.09%) while the least class was of 30 years and below with 6.52%. The findings reveal that respondents comprises of farmers who are young and middle aged. These are the age groups that understand innovation and contribute significantly because they are still productive. Therefore, farmers in the study area are well versed with modern farming technologies and this can influence positively the success of this economic activity.

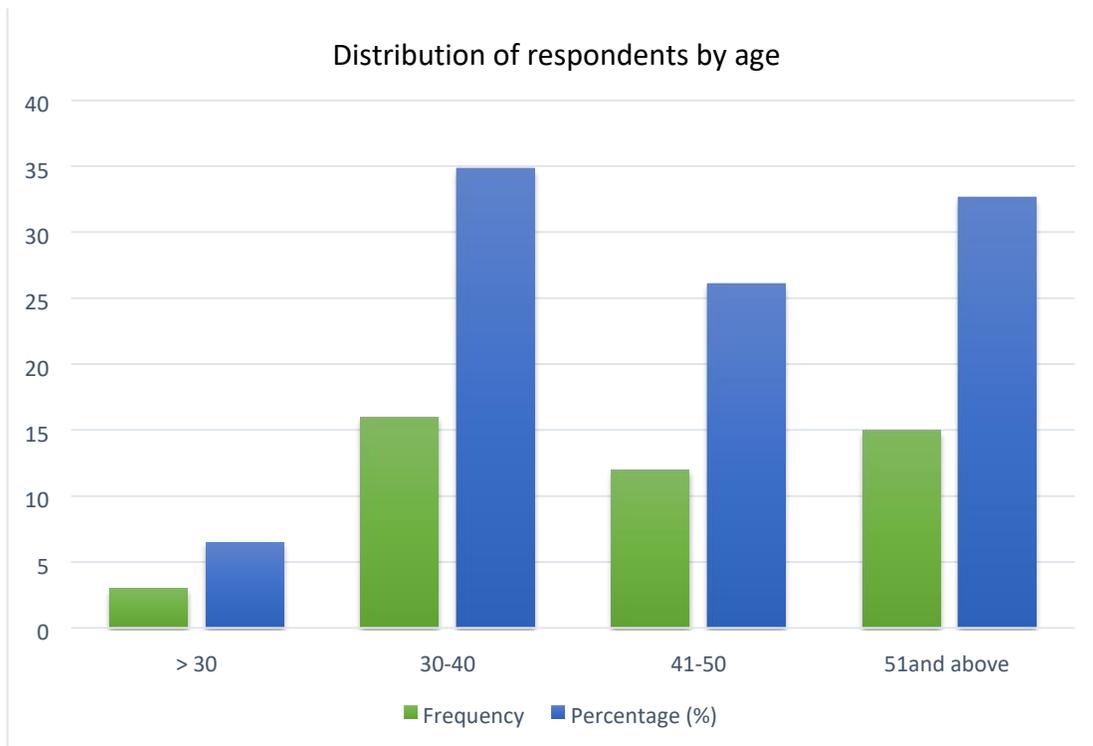


Figure 3: Distribution of respondents by age

The results in table 4 also indicated that, majority (36.95%) of the farmers have attended primary level of education followed by those that attended O-Level (19.56%), the respondents who completed primary and secondary are 10.88% and 10.88% respectively. The farmers who did not attended school represent (2.17%). Generally, the results pointed out that the majority of farmers have attained basic education. This means that the majority of farmers in the study area can easily understand various methods, innovations and new technologies in farming systems; this can greatly influence positively on productivity, profitability and sustainability of irrigation infrastructures.

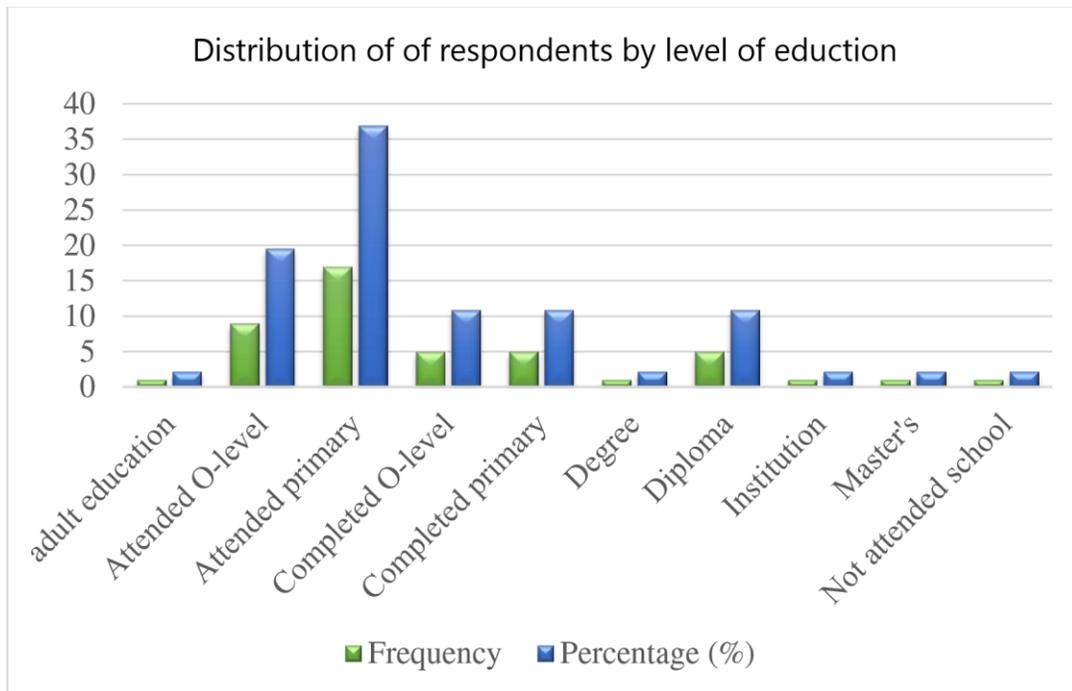


Figure 4: Distribution of respondents by level of education

The results in able 4 showed that majority (89.13%) of the farmers were married followed by widowed class with (8.69%) and the least class was that of single farmers represented by 2.18%. This is possible because many times young and unmarried people usually do not engage in the agricultural sector; another reason is that the old and elderly people are the main owners of land and have information and experience in agriculture. The restrictive factor for the young and widowed class is the limited access to agricultural bank credit and land.

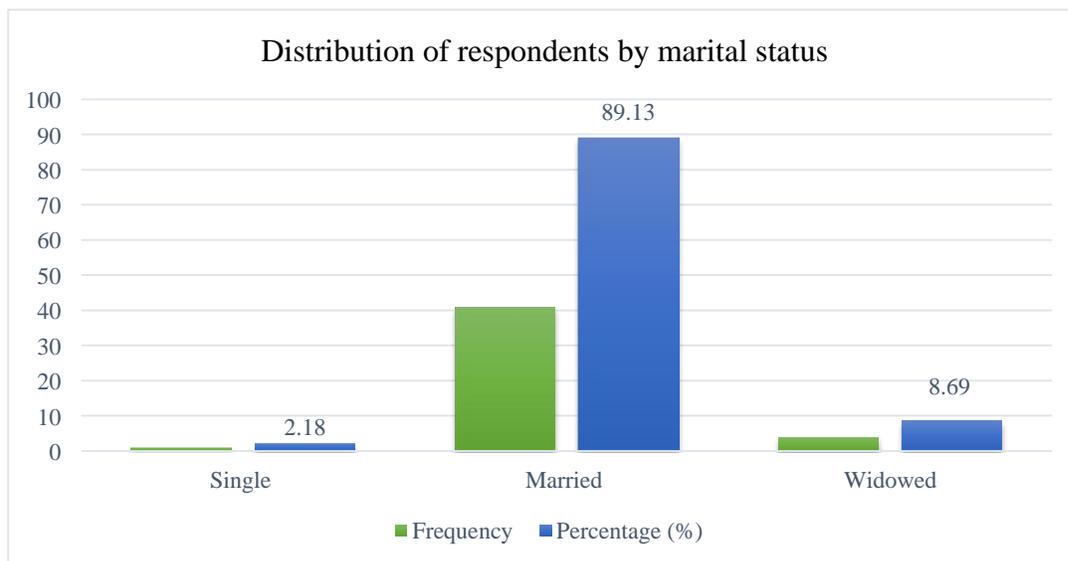


Figure 5: Distribution of respondents by marital status

The results in able 4 also revealed that majority of the farmers (39.13%) had family members ranging between 9-12 followed by the class ranging between 6-8 members (32.61) then, the class ranging from 13 and above (17.39) while the least class is of five and less members represented by (10.87%). This result indicated that most of the farmers use family labor in many of their agricultural best practices such as planting, weeding, pest and diseases control and mulching. In other words, the higher the

number of household members, the larger the labor force which many times is the limiting factor for productivity, profitability and sustainability of irrigation water in study area and other developing countries.

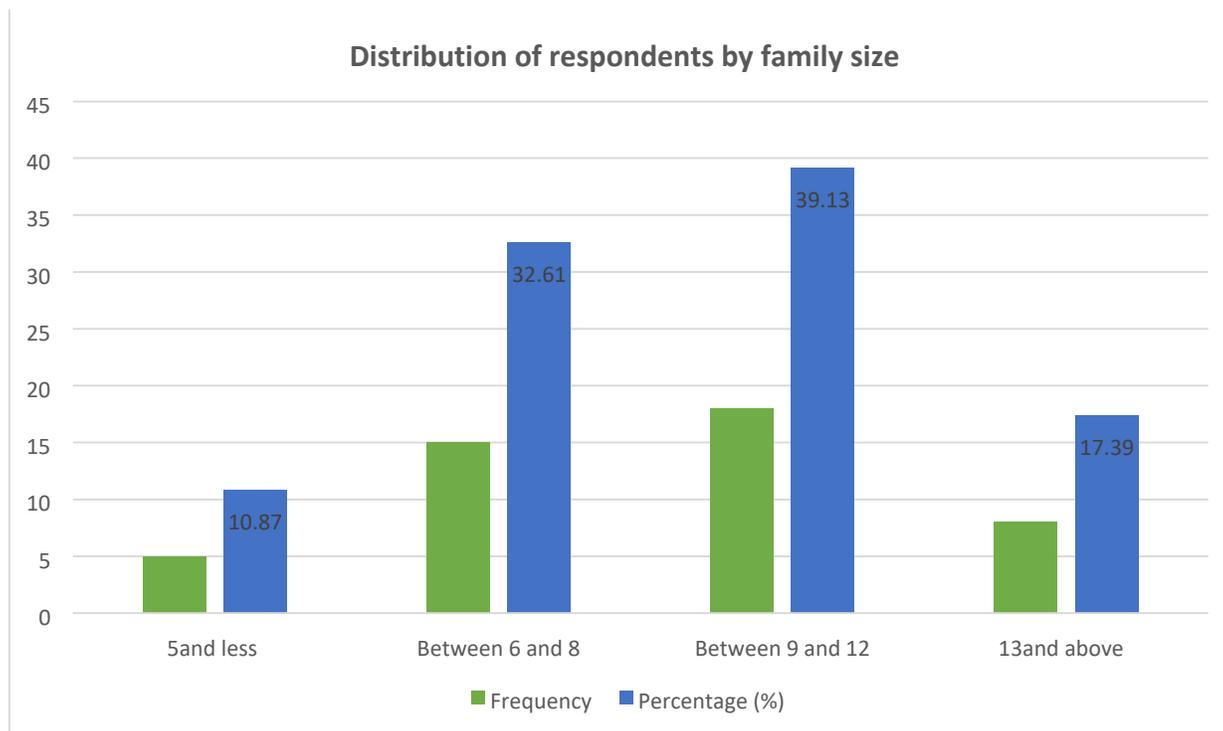


Figure 6: Distribution of respondents by family size

4.2 Regression analysis results to determine the profitability of using irrigation water

4.2.1 Profitability analysis Bumusse SSIS

The overall maximum production (gross margin) for the crops grown at Bumusse SSIS was found to be on tomato crop with a gross margin of 14099000 shillings while the highest net income generated per size of plot cultivated was found to be on watermelon crop as presented in table 5.

The discounted NPV for four out of the five crops grown at Bumusse SSIS with positive net income per year were -404374335, -565114335, -508930335 and -526414335 shillings for tomato, green pepper, cabbage and watermelon respectively. With these results, it was seen that all crops did not do well at Bumusse SSIS with the current production patterns exhibited by different crops hence the negative NPVs. This means that the overall production system should be revised in order to achieve returns on investment and make contributions to food security, household incomes and nutrition.

Table 5: Profitability analysis of Bumusse SSIS

| Crop | Acreage Planted | Gross Margin per Season/Shs. | Total Production cost per Season/Shs. | Net Farm Income per Season/Shs. | Net Farm Income per Year/Shs. |
|--------|-----------------|------------------------------|---------------------------------------|---------------------------------|-------------------------------|
| Tomato | 5.5 | 14099000 | 11275000 | 2824000 | 8472000 |
| Onion | 4 | 4244450 | 5124000 | (879550) | (2638650) |

| | | | | | |
|--------------|-----|---------|---------|---------|---------|
| Cabbage | 1 | 2211400 | 1130000 | 1081400 | 3244200 |
| Green pepper | 1 | 1363000 | 1218000 | 145000 | 435000 |
| Water melon | 0.5 | 1400000 | 610000 | 790000 | 2370000 |

Since the NPVs are less than zero, the adaptation approach of the project can be rejected. A lower and or negative NPV indicates inefficiency in production and economic approach. **Table 6: A comparative status of NPV, BCR, ARR, and PBP of four crops grown at**

Bumusse SSIS

| Particulars | Tomatoes | Green pepper | Cabbage | Watermelon |
|-------------|--------------|--------------|--------------|--------------|
| NPV (Shs.) | -404,374,335 | -565,114,335 | -508,930,335 | -526,414,335 |
| BCR | 0.29 | 0.01 | 0.11 | 0.08 |
| PBP (years) | 67.7 | 1319.1 | 176.8 | 242.1 |
| ARR (%) | 1.47 | 0.56 | 0.07 | 0.41 |

From the results summarized in table 6, the BCR for the crops grown were found to be 0.29 for tomato, 0.01 for green pepper, 0.11 for cabbage and 0.08 for watermelon while investment in onion did not yield any positive returns. The ratios for the four crops were less than one (1); this showed that investment in these crops was not economically viable with the prevailing conditions on the scheme. If factors such as soil conditions (fertility), pest and disease control and farmers commitment are improved leaving other factors such as quality farm inputs and water availability constant, then the yields per unit of land will improve.

According to the results from the study, if only one enterprise (crop) is chosen for the entire scheme, the project costs could be fully recovered in 31 years from tomato, 110 years from green pepper, 14.7 years from cabbage and 10 years from watermelon. This means that water melon is more profitable if grown on the entire scheme land followed by cabbage then tomato and lastly green pepper. The results also showed that the Average Rate of Return for the project were 1.47 for tomato, 0.56 for green pepper, 0.07 for cabbage and 0.41 for watermelon.

4.2.2 Profitability analysis for watermelon and tomato crops in Andibo and Bukatabira SSISs

The schemes are similar in the sense that both schemes have irrigable land equal to seven (7) acres and the highest values in gross margin were realized in watermelon and tomato crops. The cost of production was calculated based on the production cost at Bumusse SSIS shown in appendix 3.

The analysis results in table 7 indicated that the net returns per year from the two SSISs are 121,306,920 and 34,730,684 shillings for tomato and watermelon respectively at Bukatabira SSIS while at Andibo SSIS the returns are 50,416,800 and 200,802,000 shillings for tomato and water melon respectively. With these results, it is evident that tomato does well at Bukatabira SSIS while watermelon does well at Andibo SSIS. By comparing crops net farm income per site, tomato generated 3.5 times net return per year than watermelon at Bukatabira SSIS while at Andibo SSIS, watermelon generate 4 times net return per year than tomato. This means that tomato is more profitable at Bukatabira SSIS and watermelon is more profitable at Andibo SSIS. Looking at the highest production per crop per plot (0.5 acres) for the two (2) schemes, 2,225,400 and 8,880,000

shillings was generated from tomato and watermelon respectively at Andibo SSIS while 1,698,000 and 5,869,000 shillings was generated from watermelon and tomato respectively at Bukatabira SSIS (see appendix C). This implies that if maximum production per plot is maintained and scaled out to the entire scheme specifically for tomato at Bukatabira SSIS and watermelon at Andibo SSIS; these will significantly contribute to food security, household incomes and nutrition in the study area.

Table 7: Economics Analysis of Profitability at Bukatabira and Andibo SSISs

| Crop. | Area (acres) grown | Gross return per season (shillings) | Gross return for 7 acres per season (shillings) | Gross return for 7 acres per year (shillings) | Production cost per year for 7 acres (shillings) | Net return per year |
|-------------------|--------------------|-------------------------------------|---|---|--|---------------------|
| Bukatabira | | | | | | |
| Tomato | 2.5 | 19566300 | 54785640 | 164356920 | 43,050,000 | 121,306,920 |
| Water melon | 1.9 | 5460300 | 20116895 | 60350684 | 25,620,000 | 34,730,684 |
| Andibo | | | | | | |
| Tomato | 0.5 | 2225400 | 31,155,600 | 93466800 | 43,050,000 | 50,416,800 |
| Water melon | 1.5 | 16173000 | 75,474,000 | 226422000 | 25,620,000 | 200,802,000 |

From the scheme data collected, the number of farmers differed from one site to another. In line with gender, at Bukatabira SSIS, the number of males equals the number of females. This means that men and women supplement each other in the agriculture sector and this should be the best approach for increasing household income as well as ensuring food security and household nutrition. At Andibo SSIS, out of the 85 farmers at the scheme 65.8% were men while 34.2% were female. This revealed that men dominate the agriculture sector since men are predominantly household heads unlike women. According to the net farm income earned by each farmer, at Bukatabira SSIS one farmers should gain 1,732,956 shillings from tomato compared to 496,153 shillings from watermelon. At Andibo SSIS one farmer should gain 593,139 shillings from tomato compared to 2,362,376.5 shillings from watermelon. Generally, farmers in Andibo SSIS earned much more than farmers at Bukatabira SSIS in both crops despite being more in numbers due to the maximized production from each crop per unit area.

In the same frame of total number of farmers per scheme, most of the schemes have high number of farmers hence the net margin per farmer is so low which is a demotivating factor to participating farmers (see appendix C); for instance in Owameri SSIS where there are 330 registered farmers in a group benefiting from 12,547,500 shillings gross return from a season's production (see appendix 4)

4.3Sustainability of small-scale irrigation schemes in Uganda

4.3.1Economic analysis of sustainability of small-scale irrigation schemes in Uganda

Net present value analysis should be used in any study supporting government decisions to initiate, renew, or expand projects or programs that would result in a series of measurable benefits or costs extending from one to more years into the future. This study was done considering that the design period (lifespan) of the SSISs, which is 20 years. This analysis is done on two (2) SSISs namely Andibo and Bukatabira located in the Northern and Eastern parts of Uganda respectively.

The values of NPV, BCR, PBP and ARR are depicted in table 8. It is evident that investment in irrigation water was remunerative. Net Present Value (NPV) of future returns was discounted using the initial investment cost and the net returns generated from harvests. The discounted NPV at Bukatabira SSIS was 1,905,395,295 for tomato and 173,870,575 shillings for watermelon crops while at Andibo SSIS, the NPV were 358,336,000 and 3,366,040,000 shillings for tomato and watermelon crops respectively. The high NPV of 1,905,395,295 shillings and BCR of 4.6 for tomato at Bukatabira SSIS and NPV of 3,366,040,000 shillings and BCR of 6.2 for watermelon at Andibo SSIS indicated that it was worth investing in irrigation water. BCR clearly indicates that tomato crop is the most efficient at Bukatabira SSIS while watermelon is most efficient at Andibo SSIS.

Considering the initial costs of investment and the net annual returns generated, the project will have a payback period of 4.3 and 14.9 years when tomato and watermelon crops respectively are encouraged at Bukatabira SSIS and a payback period of 3.2 and 12.9 years when watermelon and tomato crops respectively are encouraged at Andibo SSIS. This means that, the higher the net farm income generated per year, the shorter the time taken to break even (PBP). This is evident at Andibo site where a higher net farm income was generated particularly from watermelon. At both sites, there are high values of NPV because of the high returns from production of tomato and watermelon. This therefore indicated that investments in tomato and watermelon at Bukatabira and Andibo SSISs respectively were economically viable and sustainable using irrigation water; hence the initial investment costs will fully be recovered before the 20 year project design period elapsing irrespective of the crop grown and the scheme.

The average rate of return expresses the profits arising from a project as a percentage of the initial capital cost. To determine the discounted Average Rate of Return (ARR), the values were discounted considering the difference between the initial project cost and the discounted returns from harvests of each crop. The ARR values at Bukatabira SSIS were 23.3% and 6.7% for tomato and watermelon respectively while at Andibo SSIS the ARR values were 30.8% and 7.7% for watermelon and tomato respectively. The values realized were greater than one (1) percent for both crops at the two sites. By principle, the project with the highest ARR value is considered as the best and that particular option is taken up first by an investor. For this study, all the two crops should be encouraged because the NPV, BCR, ARR, and PBP are very significant at both sites for the anticipated success of the project.

Table 8: Economic Analysis of sustainability of small-scale irrigation scheme

| Particulars | Bukatabira | | Andibo | |
|-------------------|---------------|-------------|-------------|---------------|
| | Tomatoes | Watermelon | Tomatoes | Watermelon |
| NPV (Shs.) | 1,905,395,295 | 173,870,575 | 358,336,000 | 3,366,040,000 |
| BCR | 4.6 | 1.3 | 1.5 | 6.2 |
| PBP | 4.3 | 14.9 | 12.9 | 3.2 |
| ARR (%) | 23.3 | 6.7 | 7.7 | 30.8 |

4.3.2 Tobit regression analysis of sustainability of small-scale irrigation schemes

The sustainability of SSISs in Uganda especially in study area depends on several factors. Some of factors are affordable system, reliable water supply, enough water availability, access to investment funds, labor availability, availability of extension services, security, quality of inputs, conducive land policy, and benefit on farmer's investments. Table 9 summarizes the main factors affecting the sustainability of small-scale irrigation schemes in Uganda.

Table 9: Tobit regression analysis of sustainability of small-scale irrigation schemes

| Variables | Coefficient | Std. Err. | P>t |
|------------------------------------|--------------------------|-----------|--------|
| Affordable system | 6.453 | 2.133 | 0.001 |
| Reliable water supply | -2.636 | 0.919 | 0.007 |
| Enough water availability | 0.697 | 0.248 | 0.015 |
| Access to investment funds | 0.401 | 0.546 | 0.0081 |
| Labor availability | 1.940 | 0.602 | 0.000 |
| Availability of extension services | 0.516 | 0.575 | 0.049 |
| Security | 0.983 | 0.410 | 0.087 |
| Quality of inputs | 0.021 | 0.117 | 0.000 |
| Conducive land and water policy | 0.388 | 1.512 | 0.197 |
| Benefit on farmer's investments | 0.289 | 4.685 | 0.000 |
| Constant | -1,058 | 0.528 | 0.002 |
| Number of obs = 46 | Prob> chi ² = | | 0.0000 |
| Log likelihood = -951.91224 | R ² = | | 0.815 |

In the study area, sustainability of small-scale irrigation was used as the dependent variable while factors contributing to sustainability of SSI were used as independent variables in the Tobit regression model. This was used to identify the factors that contribute to sustainability of smallscale irrigation after employing a field survey in the study area. 46 observations in our data set were used in the analysis of this study, with a p-value of 0.0000 and R² of 0.815. This tells us that our model as a whole fitted significantly at 100%. The results indicated that many factors such as affordable system, labor availability, Security, enough water availability, availability of extension services, access to investment funds, conducive land and water policy and benefit on farmer investments have significantly contributed tothe sustainability of small-scale irrigation in the study area at 1% level.

These factors therefore affect productivity of irrigation water. This positive influence suggests that when one factor increases, the sustainability of the irrigation schemes in study area also increases. This means that a one-unit increases in quality of inputs should increase the sustainability of small-scale irrigation schemes by 0.021%. It is usually expected that a unit increase in the Security of infrastructures should increase sustainability of small-scale irrigation by 0. 983%. This also implies that a 1% increase in affordable system, reliable water supply, enough water availability, access to investment funds, and labor availability should increase the sustainability of small-scale irrigation schemes at 1% significant level. The more the government focuses on these factors, the higher the sustainability of irrigation schemes.

4.4Factors influencing productivity of irrigation water in Uganda.

The factors influencing productivity of irrigation water were determined through OLS using STATA software version 13.0. The results of OLS regression are presented in table 10.Productivity of irrigation water is influenced by several factors in study area. In the study, social and economic variables such as family size, education level, fertilizers, irrigation system, farming experience, volume of water, extension service, off farm income, gender, and cooperative membership have positively influenced productivity. Factors namely family size, education level, fertilizers, type of irrigation system, farming experience are statistically significant at 1% level to influence productivity while volume of water, extension service, off farm income

were positively influenced at 5% level while gender, cooperative membership were positively influenced at 10% level. Five factors such as labor source, age, market price of produce, distance to market, agricultural credit, negatively influenced productivity in study area. One factor namely land/plot size did not have any influence on productivity. Table 10 shows that the model fits the data reasonably well (p-value < 0.0001 and R² of 0.96). This means that 96% of the variation in the dependent variable is explained by the explanatory variables.

The results show that among the variables, factors namely family size, education level, fertilizers, type of irrigation system and farming experience have high positive significant influence on productivity (p values <0.01) whereas labor source, age, price of produce, distance to market, agricultural credit have high negative significant influence on the productivity of irrigation water (p <0.01). It is expected that a unit increase in family size would lead to a 1.3unit increment in productivity in the study area while holding other factors constant. A 1% increase in extension service should increase productivity by 1.4%. This is because more contact with the extension workers enhances sharing of information regarding the market trends, farm inputs and accessibility of water for irrigation. In other words service contact is enhanced by attending stakeholder (farmer) meetings from where the farmers are met by the extension workers (agronomists). Farmers who fail to participate in such meetings/trainings often have little information and thus improper usage of agricultural inputs causing low productivity of irrigation water A 1-year increase in farming experience should increase productivity by 0.32%. This is because the more years a farmer takes in farming, the higher the knowledge and experience in different agricultural practices hence, high reduction of production challenges for example irrigation system failures and crop pests and diseases. Factors such as age, price of produce, distance to market, agricultural credit, negatively influenced productivity. It is expected that a 1-kilometer increase in distance to the market reduces productivity by 0.14%. This shows that accessibility to market is a key factor in determining the level of uptake of SSI and agricultural productivity. For a unit reduction in price of produce, there is a 0.3% reduction in agricultural productivity in the study area holding other factors constant.

Table 10: Factors influencing productivity of irrigation water in Uganda

| Variables | Coefficient | Standard Errors | P-value |
|-------------------------------|-------------|-----------------|---------|
| Land size/plot | 0.649 | 0.319 | 0.684 |
| Labor source | -0.447 | 0.305 | 0.057 |
| Family size | 1.295 | 0.211 | 0.000 |
| Gender | 0.178 | 0.055 | 0.086 |
| Age | -0.621 | 0.176 | 0.073 |
| Education level | 0.162 | 0.232 | 0.005 |
| Fertilizers | 0.191 | 0.077 | 0.001 |
| Type of irrigation system | 0.774 | 0.267 | 0.000 |
| Volume of water used | 0.999 | 0.09 | 0.013 |
| Off farm income | 0.749 | 0.361 | 0.052 |
| Market price of produce | -0.298 | 0.583 | 0.000 |
| Distance to Market | -0.138 | 0.137 | 0.077 |
| Access to agricultural credit | -0.697 | 0.213 | 0.000 |
| Farming experience | 0.319 | 0.304 | 0.000 |
| Extension Service | 1.421 | 0.113 | 0.035 |
| Cooperative membership | 0.224 | 0.306 | 0.081 |
| Constant | 0.774 | 1.402 | 0.000 |

| | | |
|--------------------|--------------------|------------|
| Number of obs = 46 | $R^2 = 0.9606$ | F(16, 39) |
| = 44.22 | Adj $R^2 = 0.9389$ | |

4.5 Factors Influencing Farmers’ Willingness to Pay for Irrigation Water

The results of the regression are presented in table 11. The results indicate that 73.72% of the variation in the dependent variable (Farmers’ Willingness to Pay for Irrigation Water) is explained by the explanatory variables. The overall significance and fitness of the model is indicated by the F value, which in this case is 83.35 and is significant at 1% level, indicating that the explanatory variables reliably and statistically predict the dependent variable.

Out of the eleven explanatory variables, four such as rate of rainfall, education level, off farm income and access to credit were statistically significant at 1% level to influence the farmers’ willingness to pay for irrigation water in study area. This implies that 1% increase in credit access by farmers increases the farmers’ willingness to pay for irrigation water by 0.074%. The results also indicated that the off farm income was statistically significant to influence farmers’ willingness to pay for irrigation water at 1% level. This explains that households that earned off-farm income were willing to pay more compared to those that do not earn off-farm income.

As expected, access to credit also positively and significantly influenced farmers’ willingness to pay for irrigation water. This could be due to the possibility that part of the accessed credit offered was used to pay for irrigation water, among other inputs thereby increasing agricultural production and eventually productivity of irrigation water. Education level on best management of irrigation water and application system positively influenced farmers’ willingness to pay for irrigation water; farmers with high education level understand more agricultural best practices and better management and use of irrigation water system. This class of educated farmers were found to be more willing to pay more compared to those who are not educated hence are not willing to pay for irrigation water.

Five factors such as age, household size, land size, rate of rain fall, and cost of inputs cost were found to have a negative relationship with farmers’ willingness to pay for irrigation water. For example rate of rainfall was found to be negative and statistically significant at 1% level to influence farmers’ willingness to pay for irrigation water. This implies that 1% increase in rate of rainfall should reduce the farmers’ willingness to pay for irrigation water by 0.97%. While a 1%, increase in household size should reduce the farmers’ willingness to pay for irrigation water by 0.013%; this may result from the extra cost of taking care of the additional person in the household.

Table 11: Factors Influencing Farmers’ Willingness to Pay for Irrigation Water

| Variables | Coefficient | Standard Errors | P value |
|-----------|-------------|-----------------|---------|
| Age | -0.076 | 0.024 | 0.014 |
| Gender | 0.036 | 0.044 | 0.414 |

| | | | |
|--|--------|-------|-------|
| Household size | -0.013 | 0.009 | 0.066 |
| Education level | 0.056 | 0.037 | 0.009 |
| Off farm income | 0.119 | 0.082 | 0.002 |
| Access to credit | 0.074 | 0.043 | 0.000 |
| Land size | -0.694 | 0.206 | 0.071 |
| Rate of rain fall | -0.967 | 0.296 | 0.000 |
| Money gained from harvest | 0.391 | 0.676 | 0.067 |
| Money paid per season | 0.035 | 0.028 | 1.923 |
| Cost of Inputs | -0.766 | 0.322 | 0.921 |
| Constant | 1.802 | 0.508 | 0.000 |
| Number of observations = 46 Prob>F = 0.0000 F (11,34) = 83.35 R ² = 0.7372 | | | |

4.6 Implications of water user rights and costs on adoption of irrigation in Uganda

The results in table 12 indicated that the water user rights and costs have positive implications on adoption of irrigation water in Uganda and has got significant influence on other factors such as price of irrigation water, extension services, access to agricultural information, off farm production, cooperative membership, training opportunities, personal savings, contribution for operation and maintenance and high agricultural productivity. This implies that 1% increase in water user rights and costs through off farm production should increase adoption of irrigation in Uganda by 0.34%. It implies also that one unit increase in water user rights and costs through Cooperative membership should increase adoption of irrigation in Uganda by 0, 93%. It implies also that 1% increase in water user rights and costs through access to agricultural information, and extension services should increase adoption of irrigation in Uganda by 0.23 and 1.46% respectively.

Table 12: Tobit estimate of implications of water user rights and costs on adoption of irrigation in Uganda

| Variables | Coefficient | Standard Error | P> t |
|------------------------------------|-------------|----------------|-------|
| Volume of water supplied | -0.245 | 7.743 | 0.109 |
| Price of water for irrigation | 0.728 | 0.220 | 0.000 |
| Extension services | 1.461 | 2.925 | 0.008 |
| Training opportunities | 1.527 | 4.571 | 0.020 |
| Access to agricultural information | 0.230 | 0.748 | 0.000 |
| Off farm production | 0.338 | 0.555 | 0.000 |
| Contribution rate on maintenance | 0.497 | 1.000 | 0.059 |
| Personal savings | 0.412 | 0.493 | 0.011 |
| Cooperative membership | 0.932 | 0.682 | 0.000 |
| Soil fertility test | -0.694 | 3.735 | 0.481 |
| High agricultural productivity | 1.325 | 2.077 | 0.078 |
| Constant | 1.031 | 0.831 | 0.000 |
| Number of obs. | 46 | | |

| | |
|------------------------|----------|
| LR chi2(11) | 114.33 |
| Prob> chi ² | 0.00 |
| Pseudo R ² | 0.09 |
| Log likelihood | -1267.24 |

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The results from the 46 respondents who participated in this research study indicated that the majority (76.09%) were males while (23.91%) were female. The findings could be an indication that most of the farmers using agricultural best practices and technology were males. The low number of women involved in SSI farming activities may hinder the productivity, profitability and sustainability of SSISs in the study area.

Also, majority of the farmers (34.78%) were aged between 30-40 years, followed by the farmers aged of 51 years and above represented by (32.61%), then the class ranging between 41-50 years (26.09%) while the least class was of 30 years and below with 6.52%. The findings reveal that respondents comprises of farmers who are young and middle aged. These are the age groups that understand innovation and contribute significantly because they are still productive. Therefore, farmers in the study area are well versed with modern farming technologies, which can influence positively the success of SSI projects.

The results also indicated that majority (36.95%) of the farmers have attended primary level of education followed by those that attended O-Level (19.56%), the respondents who completed primary and secondary are 10.88% and 10.88% respectively. The farmers who did not attended school represent (2.17%). This means that majority of the farmers in study area can easily understand various methods, innovations and new technologies in farming systems; this can greatly influence positively on productivity, profitability and sustainability of irrigation infrastructures.

The results in table 4 also showed that majority (89.13%) of the farmers were married followed by widowed class with (8.69%) and the least class was that of single farmers represented by 2.18%; the same results also revealed that majority of the farmers (39.13%) have family members ranging between 9-12 followed by the class ranging between 6-8 members (32.61) then, the class ranging from 13 and above (17.39) while the least class is of five and less members represented by (10.87%). This result indicates that most of the married farmers use family labor in many of the agricultural best practices such as planting, weeding, pest and diseases control and mulching. In other words, the higher the number of households members, the larger the labor force which many times is the limiting factor for productivity, profitability and sustainability of irrigation water; the restrictive factor for the young and widowed class is the limited access to agricultural bank credit and land.

The net benefit per year and the values of NPV, BCR, ARR and PBP clearly indicate that the investment in five crops at Bumusse is not economically viable.

The results indicated that the net returns per year from two SSISs namely Bukatabira and Andibo are 121,306,920 and 34,730,684 shillings for tomato and watermelon respectively at Bukatabira SSIS while at Andibo the returns are 50,416,800 and 200,802,000 shillings for tomato and water melon respectively. With these results, it is evident that tomato does well at

Bukatabira SSIS while watermelon does well at Andibo SSIS. By comparing net returns per crop per site, tomato generated 3.5 times than watermelon at Bukatabira SSIS while at Andibo SSIS watermelon generate 4 times than tomato. According to the net farm income earned by each farmer, at Bukatabira SSIS one farmers should earn 1,732,956 shillings from tomato compared to 496,153 shillings from watermelon while at Andibo SSIS one farmer should earn 593,139 shillings from tomato compared to 2,362,376.5 shillings from watermelon. Generally, farmers in Andibo SSIS earned much more than farmers at Bukatabira SSIS in both crops despite being more in numbers due to the maximized production from each crop per unit area of land.

The high NPV of 1,905,395,295 shillings and BCR of 4.6 for tomato at Bukatabira SSIS and NPV of 3,366,040,000 shillings and BCR of 6.2 for watermelon at Andibo SSIS indicated that it was worth investing in irrigation water. The ARR values for Bukatabira SSIS were 23.3% and 6.7% for tomato and watermelon respectively while at Andibo SSIS the ARR values were 30.8% and 7.7% for watermelon and tomato respectively. The projects will have a payback period of 4.3 and 14.9 years when tomato and watermelon crops respectively are encouraged at Bukatabira SSIS and a payback period of 3.2 and 12.9 years when watermelon and tomato crops respectively are encouraged at Andibo SSIS. These high values of ARR and short PBP are an indication that the projects are sustainable.

Factors such as affordable system, labor availability, quality of inputs used, benefit on farmer investments and access to investment funds have significantly contributed to the sustainability of SSISs in the study area.

Factors such as family size, education level, fertilizers, type of irrigation system and farming experience have high positive significant influence on productivity whereas labor source, age, price of produce, distance to market, agricultural credit have high negative significant influence on the productivity of irrigation water

Rate of rainfall, education level, off farm income and access to credit have a positive influence the farmers' willingness to pay for irrigation water in study area while age, household size, land size, rate of rain fall, and cost of inputs cost were found to have a negative relationship with farmers' willingness to pay for irrigation water. .

Water user rights and costs have positive implications on adoption of SSI in Uganda and has got significant influence on other factors such as price of irrigation water, extension services, access to agricultural information, off farm production, cooperative membership, training opportunities, personal savings, contribution for operation and maintenance and high agricultural productivity.

The field findings from Puno SSIS on the two (2) harvests so far made indicated that the second harvest made tripled the first harvest; there was a 204.5% overall increase in gross return from different enterprises in the second harvest as compared to the first. This is an indication that the farmers are adopting better methods of farming with the guidance of the agronomist on the best crop varieties as well as the market forces depending on seasonality factors. Another factor for this increase is the fact that group farming has been discouraged hence individual/model farming approach; this has eased farmer follow-ups, farming plot monitoring and management. This result therefore is an indication that the project is improving with time and all efforts should be gathered until the expected production per unit of land is obtained.

Table 13: Enterprises and gross returns for first and second harvests at PUNO SSIS

| S/n. | Enterprise | Gross Returns (Shs.) | |
|--------------|--------------|----------------------|----------------|
| | | First Harvest | Second Harvest |
| 1 | Egg plants | 2049300 | 7123300 |
| 2 | Onions | 297100 | 1194000 |
| 3 | Cabbage | 1002000 | 630000 |
| 4 | Water melons | 420000 | 1437000 |
| 5 | Tomatoes | 75000 | 1501500 |
| TOTAL | | 3903400 | 11885800 |

5.2. Recommendations

5.2.1. To government

- According to the data from the 46 respondents that participated in this research study, the majority were males in study area. Here female farmers should be encouraged and supported to participate in agricultural activities in order to increase and improve their incomes.
- According to the values of NPV, ARR, BCR and PBP in the study area, production of tomato should be encouraged at Bukatabira SSI where it is most cost effective to produce while watermelon is should be encourage at Andibo SSI.
- The production system at Bumusse SSI should be revised to realize the return on investment within the project design period
- Affordable SSI systems, quality farm inputs and investment funds should be easily accessible to prospective farmers.
- The factors that influence the farmers' willingness to pay for irrigation water in study area should be encouraged in order to have enough water for irrigation as well as to increase agricultural productivity in scheme area.
- Government should ensure that SSISs set up are supported to achieve maximum production before commissioning to farmers (beneficiaries)
- Government should ensure the availability of affordable irrigation systems, investment funds and quality farm inputs for farmers to realize benefits on investments
- Government should ensure that there is available and stable market for agricultural products
- Government should make affordable the price of irrigation water
- Government should ensure adequate extension services and agricultural information access

- Government should ensure an enabling environment for formation and operation of farmer cooperatives.

5.2.2 To Scheme Management Committees

- SSISs should focus on crops with greater production advantages
- The number of farmers per scheme should be sustainable in relation to benefit per farmer

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Nutrition Knowledge and Practices in Management of Stage 5 Chronic Kidney Disease by Adult Patients at Kenyatta National Hospital, Kenya

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Abstract: This study sought to determine nutrition knowledge and its association with practices in management of stage 5 chronic kidney disease (CKD) among renal adult patients in Kenyatta National Hospital. A cross-sectional analytical design was used to facilitate collection of qualitative and quantitative data and enable identification of associations between variables. Cochran formula was used to calculate a sample of 110 respondents. A research administered questionnaire with closed ended questions was used to collect information. Descriptive statistics such as frequency and percentage were used to describe demographic and socio-economic characteristics of the population. Inferential statistics were done using chi square with an alpha of 0.05 to test association between independent and dependent variables. Most participants had moderate knowledge levels whereas more than half of the participants (66%) indicated poor nutrition management practices of their condition. There was significant association between period on dialysis in months and practices in management of stage 5 chronic kidney disease. Knowledge on importance of diet in management of stage 5 CKD (<0.001), moderation of fluid intake (<0.001), reduction in salt/ sodium intake (<0.001), and moderation in protein intake (<0.004) were significantly associated with nutritional management practices of stage 5 CKD. The study concluded that Knowledge levels were low in identifying foods rich in phosphorus, calcium and fat soluble vitamins. Practice scores were also poor despite moderate nutrition knowledge levels. Patients' knowledge on nutrition management of their condition may be achieved through frequent and consistent nutrition education and counseling including follow ups.

Key Terms: Knowledge, Practice, chronic kidney disease, nutrition management

INTRODUCTION

Chronic kidney disease (CKD) has been categorized as one of the diseases of public health concern globally (Samar et al., 2018). The disease progresses through various stages resulting in the fifth and last stage when a patient depends on dialysis or transplant for survival (Barnet et al. 2008). Stage 5 CKD has been identified as the end stage of kidney performance increasing morbidity and mortality rates of patients. Globally 4.9-9 million people need renal replacement therapy (RRT) and out of these, only 2.6 million are on dialysis with at least 2.3 million dying prematurely due to inadequate access to RRT (Garcia et al., 2015). In Brazil, between 2000 and 2012, a study indicated an increase in incidence and prevalence rates among stage 5 CKD patients. Prevalence rates ranged between 3.2% - 4.0%/year and incidence rate 1.1% – 2.5%/year. The incidence rate was noted to increase in both sexes, in all parts of the country especially among the older age groups (Lenildo et al., 2014). Increase in prevalence and incidence rates could be attributed to inadequate knowledge on co-morbidities leading to CKD and progression to subsequent stages. The incidence and prevalence rates are based on estimates due to lack of national or regional registries on stage 5 CKD in most developing countries (Naiker et al., 2003). ESRD is projected to increase at the rate of 6-8% in Africa (Ojo A., 2014), with incidence rate estimated at 2.6% (Velandria et al., 2011).

In Sub-Saharan Africa the prevalence and incidence rates of stage 5 CKD are on the increase with communicable and non-communicable risk factors entailed (Stanifer et al., 2014). Stage 5 CKD is prevalent and linked with adverse outcomes like heart diseases and increased mortality due to many associated illnesses (Van der Velde et al., 2011). CKD is not always identified and managed in an optimal and timely manner (Plantinga et al., 2008). It is said that CKD is a growing problem particularly in the

developing countries (Fouque et al., 2017). A systematic review carried out in sub-Saharan Africa, concluded that stage 5 CKD is prevalent and potentially escalating. This was associated with the risk factors of both communicable and non-communicable diseases (Stanifer et al., 2014).

The morbidity and mortality rates of stage 5 CKD was found to be much higher compared to similar rates among the general population (Zoccali et al., 2010). Kidneys' regulate water and electrolytes like sodium, phosphorus, potassium, magnesium and calcium concentration in the blood and body fluids. Kidneys further produce hormones that help to regulate blood pressure. The organ also helps in formation of the red blood cells besides promoting strength of bones in the body (Kerry et al., 2006). CKD affects proper functioning of the kidneys, progressively and irreversibly leading to stage 5 CKD or chronic renal failure (CRF). When kidneys fail, dialysis or kidney transplant will be required to maintain survival of the victim. Commonly identified causes of CKD locally include chronic glomerulonephritis, high blood pressure and diabetes (Campbell, 2002). Patients with CKD though the level of failure may be moderate, have increased risk of developing heart diseases (Rossi et al., 2014). Proper nutritional assessments and evaluations are imperative in order to prevent increased rate of loss in performance of the kidneys. There is dire need to manage the co-morbid conditions like cardiovascular diseases, peripheral arterial diseases, stroke, and hypertension normally associated with renal failure (Adeera et al., 2008).

Patients experience difficulties during selection of foods that are ideal for their condition as prescribed. Normally tend to choose foods that are familiar and or available to them (Webb et al., 2015). Stage 5 CKD patients need sufficient knowledge on foods ideal for individualized requirements to make decisions basing on their nutritive value, portion sizes and availability of food (Elliot et al., 2015). Protein-energy wasting as an aspect of stage 5 CKD is associated with poor appetite, nausea and vomiting due to increased uremia levels in the body. Adequate knowledge on foods that increase ammonia levels in blood, adherence to the prescribed diet regimen and good practice levels have been linked to prolonged lives and reduction in adverse effects caused by the disorder. Further there is improved quality of life and substantial decline in risks of morbidity and mortality. The nutritionist at the renal unit of KNH did intermittent education and counseling to patients on dialysis basing on professional knowledge attained, with limited access to current literature. This study therefore sought to determine the demographic and socio-economic characteristics of adult stage 5 chronic kidney disease (CKD) patients attending renal unit of Kenyatta National Hospital, establish their nutrition knowledge in the management of stage 5 chronic kidney disease and determine the association between nutrition knowledge and practices in management of stage 5 chronic kidney disease (CKD) among renal adult patients in Kenyatta National Hospital

METHODOLOGY

This was a facility based cross-sectional analytical study that assessed nutrition knowledge and practices in management of stage 5 CKD among renal adult patients. A cross-sectional analytical design was used to facilitate collection of qualitative and quantitative data and enable identification of associations between variables (Katzenellenbogen et al., 2002). The study was carried out at Kenyatta National Hospital the national referral hospital in Nairobi country, Kenya. The facility is well equipped with modern dialysis equipment with well-trained health care workers specialized in managing renal insufficiency among patients undergoing dialysis in the hospital. The Hospital is a teaching and referral facility attracting many patients who are seeking for quality health care services. Patients are referred to the KNH from other smaller level facilities for specialized screening, assessment, treatment and management.

The study targeted stage 5 Chronic Kidney Disease adult patients attending renal unit for hemodialysis, a total of 305 patients underwent dialysis every week. The formula used to calculate sample size is by Cochran (Israel, 1992) for population less than 10,000 (Fisher et al., 1998).

$$N = Z^2 q (1-p) / d^2$$

Where; N = Sample size

Z = standard normal deviate corresponding to 95% Confidence Interval (1.96)

p = Prevalence of the characteristic of interest 50% used as p was unknown

q = the proportion of the absence of the characteristic of interest

d = degree of precision (set at ± 5%)

$$\text{Substituting in the formula; } N = (1.96)^2 (0.5) (0.5) / (0.05)^2 = 384$$

Since the population size was less than 10,000 (N = 100), the following adjusted formula was used;

$$nf = n / 1 + (n / N)$$

$$384 / 1 + (384 / 135) = 99.8 \text{ approx. } 100$$

10% was added to cater for non-response to make a population of 110, however data for only 103 was reported as non-response rate was 6%. Simple random technique was used to select 110 patients determined by use of formula shown above. The number was arrived at by use of a random number generator.

A research administered questionnaire with closed ended questions was used to collect information. The data collection tools were pretested at Kenyatta National Hospital where ten patients with similar conditions were interviewed two weeks prior to the study. This facilitated correction and modification of possible ambiguous and unclear questions in the questionnaire. The research assistants were trained on how to ask questions and record data in a standardized way. This was ascertained during the pretesting of the instruments. The questions were then reviewed by a panel of nutrition experts before data collection to ensure questions elicited responses that provided intended information. Test-retest method was used to test reliability of the questionnaire in producing the same responses. The subjects of the pretest were interviewed twice within a span of one week between interviews to assess reliability stability of the questionnaire. Cronbach's alpha correlation coefficient was used to measure reliability of data collection tools. The researcher recruited two research assistants with a minimum of Diploma in Food Nutrition and Dietetics and with research experience. They were trained on each objective and importance of using it as a guide during the interview.

All 14 questions on knowledge were scored according to responses made by the participants. Each correct response was awarded one point while zero was awarded for every incorrect response. Participants who scored 0-4 points were categorized as low in nutrition knowledge, 5-9 Moderate, while 10 - 14 high. Nutritional management practices were measured using five parameters namely; reducing potassium intake, identifying supplements used, feeding norms, accessibility (cost) of recommended food and reducing salt intake to combat pressure. A dummy variable (Nutritional management practiced) was deduced with average mean being the cut point. Score above the mean meant good practice while below the mean was poor. Data from KII was transcribed, responses arranged in general categories identified in the discussion guideline then coded. Common themes were identified, inference made from each theme and conclusions drawn then triangulated with the data from the questionnaire. Results were presented in form of tables. Conclusions about the study population were drawn based on statistical findings of the sample.

Descriptive statistics such as frequency and percentage were used to describe demographic and socio-economic characteristics of the population. Inferential statistics were done using chi square with an alpha of 0.05 to test association between independent and dependent variables. A percentage value of P < 0.05 was used as a criterion for statistical significance as is usually recommended for social sciences (Sproull, 1988).

RESULTS AND DISCUSSION

Demographic And Socio-Economic Characteristics Of The Study Population

Male respondents made up more of the study population than females 63.1% vs 36.9% (Table 1). Most participants had completed secondary school (39.8%), while 26.2% had completed primary and tertiary qualifications, respectively. Only 1% had never attended school. Most participants were Christians (90.3%), 6.8% were traditional African, 1.9% Muslims and 1% were Hindus. Many respondents were unemployed (49.5%), 22.3% were self-employed with 14.6% earning a salary and 13.6% doing casual work. The majority (80.6%) earned less than 20,999Ksh per month. The main source of support was the family (59.2%) or self (35%). Most of the participants were between 30-41 years, at 33% of the sampled population. The least being the elderly who were 66 years of age and above, comprising 7.8% of the respondents.

Table 1 Demographic and socio-economic characteristics of the study population

| Variables | N = 103 | n | (%) |
|-----------|---------|----|------|
| Gender | Male | 65 | 63.1 |
| | Female | 38 | 36.9 |

| | | | |
|----------------------------------|-----------------------|-----------|-------------|
| Marital status | Married | 73 | 70.9 |
| | Single | 25 | 24.3 |
| | Widowed | 3 | 2.9 |
| | Divorced | 2 | 1.9 |
| Education levels | None | 1 | 1 |
| | Primary | 27 | 26.2 |
| | Secondary | 41 | 39.8 |
| | Tertiary | 27 | 26.2 |
| Religion | Graduate | 7 | 6.8 |
| | Christians | 93 | 90.3 |
| | Traditional African | 7 | 6.8 |
| | Muslims | 2 | 1.9 |
| Main occupation | Hindu | 1 | 1.0 |
| | Employed and salaried | 15 | 14.6 |
| | Self-employed | 23 | 22.3 |
| | Casual work | 14 | 13.6 |
| Monthly earning | Unemployed | 51 | 49.5 |
| | ≤ 20,999 | 83 | 80.6 |
| | 21,000 – 30,999 | 7 | 6.8 |
| | 31,000 – 40,999 | 8 | 7.8 |
| | 41,000 – 50,999 | 3 | 2.9 |
| Source of medical support | ≥ 51,000 | 2 | 1.9 |
| | Self | 36 | 35 |
| | Family | 61 | 59.2 |
| Age category in years | External | 6 | 5.8 |
| | 18-34 | 34 | 33 |
| | 35-44 | 26 | 25 |
| | 45-54 | 16 | 16 |
| | 55-64 | 15 | 15 |
| | 65 &above | 12 | 11 |

Nutrition Knowledge in the Management of Stage 5 Chronic Kidney Disease

Over half (61.2%) of the participants said they were expected to decrease fluid intake per day (Table 2), 32% said they were required to take fluids moderately, (4.9%) said they should increase fluid intake. Only 2% said they should not change amount of fluid intake. Fluid intake should be moderated to meet body needs. On knowledge of problems resulting from excess fluid intake 35% said loss of breath. 32% weight gain, 13% lung problems and 1% weight loss. Multiple responses encompassed 19% (n=20) of the study population. Excess fluid intake results in all the options given in the choices except weight loss. These problems are also experienced when patients delay going for dialysis. Pulmonary oedema may result hampering functionality of the heart due to buildup of fluids.

Table 2 Knowledge levels on use of fluids

| Knowledge | Variables | n | (%) |
|---|------------------|----------|------------|
| Use of fluids | No change | 2 | 2 |
| | Increase | 5 | 4.9 |
| | Moderate | 33 | 32 |
| | Decrease | 63 | 61.1 |
| Problems from excess fluid intake | Loss of breath | 36 | 55 |
| | Weight Gain | 33 | 22 |
| | Lung problems | 13 | 13 |
| | Weight loss | 1 | 1 |
| Expected fluid intake 500-1000ml/day | | | |

| | | |
|-------------------|----|------|
| Strongly agree | 18 | 17.5 |
| Agree | 35 | 34 |
| Strongly disagree | 9 | 8 |
| Disagree | 41 | 39.8 |

Most participants (64.1%) said green bananas and potatoes respectively, have high potassium levels compared to other foods (Table 3) Green bananas contain 465mg of potassium/100g) while potatoes have 391mg/100g. There were multiple responses from 38.8% participants; 4.9% said milk while 3.9% said fruit. Only 1% said fish and meat respectively. The standard serum potassium level is 3.5-5 mmol/L (Ahmed et al., 2001). High potassium levels in the body causes irregular heart beat and heart disease which is often fatal. Knowledge on problems that would arise with high levels of potassium in blood indicated 65% of the participants saying itchy skin; 14.6% said dizziness and heart disease respectively, 13.6% said muscle cramps. 7.8% gave multiple responses. Most respondents had no idea on the effects of high potassium levels in the body.

Respondents' knowledge on use of salt showed majority (87.3%) saying they should avoid or reduce intake; 7.8% said they should take in moderation while 3.9% said they should increase. Only 1% would not change amounts used. Increased salt intake among stage 5 CKD patients was associated with increased thirst and buildup of fluid in the body (Nutrition and Hemodialysis, 2013). The participants' responses on food items with high sodium/salt levels showed 71.4% said sausages 15.5% said lemon while 6.8% and 3.9% boiled maize and dried fruits respectively. Sausages contain salt normally used as a preservative leading to increased levels in the food product.

Almost three quarters of the population therefore were aware of the high salt content in sausages. Three quarters of the participants (75.5%) said high blood pressure would arise on high intake of sodium/salt, 39.6% said heart burns, 28.1% gave multiple responses, 10% said cardiac disease and obesity would result. High salt intake increases electrolyte imbalance affecting osmotic pressure. This leads to increased thirst that result in high water intake in an effort to create the balance. This intercellular fluid imbalance affects the blood pressure, consequently causing high blood pressure sometimes heart burn and cardiac disease.

Table 3 Knowledge levels on use of minerals

| Knowledge | Variables | n | (%) |
|--|---------------|----|------|
| Foods with high potassium levels | | | |
| | Milk | 5 | 4.9 |
| | Fruits | 4 | 3.9 |
| | Potatoes | 66 | 64.1 |
| | Green bananas | 66 | 64.1 |
| Problems expected from high potassium levels in the blood | | | |
| | Dizziness | 15 | 14.6 |
| | Itchy skin | 67 | 65 |
| | Muscle cramps | 14 | 13.5 |
| | Heart disease | 15 | 14.6 |
| Proportion of common salt to be used (2g/day) | | | |
| | Avoid/reduce | 90 | 87.3 |
| | Moderate | 8 | 7.8 |
| | Increase | 4 | 3.9 |
| | No change | 1 | 1 |
| Foods containing high salt levels | | | |
| | Sausages | 74 | 71.4 |
| | Lemon | 16 | 15.5 |
| | Boiled Maize | 7 | 6.8 |
| | Dried Fruits | 4 | 3.9 |
| Foods rich in calcium | | | |
| | Milk | 57 | 55.3 |
| | Fish | 40 | 38.8 |
| | Rice | 9 | 8.7 |
| | Fruits | 6 | 5.8 |
| Problems expected when calcium levels are high | | | |
| | Bone disease | 68 | 57.3 |
| | Muscle cramps | 27 | 26.2 |

| | | | |
|--|----|------|--|
| Vascular calcification | 10 | 9.7 | |
| Vomiting | 3 | 2.9 | |
| Foods rich in phosphorous | | | |
| Dairy products | 57 | 55.3 | |
| Nuts and seeds | 31 | 30.1 | |
| Fruits | 11 | 10.7 | |
| Vegetables | 7 | 6.8 | |
| Problems expected when phosphorous levels are high in the blood | | | |
| Stomachache | 55 | 53.4 | |
| Liver disease | 34 | 33 | |
| Bone & Joint disease | 13 | 12.6 | |
| Cardiac disease | 8 | 7.8 | |

Milk is one of the dairy products containing high calcium levels. Half (50%) of the respondents selected milk as the food rich in calcium, 38.8%, said fish. All other foods rice, meat, fruits and beans each scored less than 10%, 13.6% gave multiple responses. Over fifty percent of the respondents gave dairy products, yoghurt and milk as foods rich in phosphorous (55.3%), a third (30.1%) said nuts and seeds while 10.7% said fruits. while 5.8% said vegetables. Dairy products, yoghurt and milk provide the highest source of phosphorous.

Over fifty percent of participants 57.3% said bone disease would result from high levels of calcium in the body, 26.2% said muscle cramps, 9.7%, 2.9% and 3.9% of the participants said vascular calcification, vomiting and multiple responses respectively. Vascular calcification normally arises due to high build-up of calcium mineral in the body. Most respondents therefore had no knowledge on the consequences of high levels of calcium in the body. Over half of respondents 53.4% said they would have stomachache if they took food high in phosphorous, 33% said liver disease, 12.6% said bone and joint disease and then 10% said cardiac disease, 6.8% of participants gave multiple responses. High phosphorous levels in the body lead to precipitation of calcium and withdrawal from the bones leading to bone disease (osteodystrophy) experienced through weakening and fragility of the clients' skeletal system. Almost three quarters of the participants (72.8%) reduced/avoided salt intake to normalize blood pressure, 37.9% took less fluid and 3.9% checked their blood pressure daily. Only 1% took less food to manage blood pressure with 15.6% multiple responses.

Respondents' use of proteins showed half of them (50.5%) saying it should be reduced (Table 4). 44.7% said it should be taken in moderation, 2.9% there should be no change and 1.9% said it should be increased. Patients undergoing haemodialysis are supposed to increase protein intake as it is lost during dialysis, metabolism and inflammation. Less intake would lead to wasting and finally Protein Energy Malnutrition a condition that increases morbidity and mortality rates. Majority of the respondents (85.4%) said malnutrition would result from low intake of proteins, 13.6% and 10.7% said oedema and bone disease respectively while 11.7% gave multiple responses. Only 1.9% said blood pressure would result. Most participants knew malnutrition would arise from low protein intake. Clarity on how they were expected to use or the right quantity corresponding to their body needs was missing.

Knowledge on co-morbidities or Non communicable diseases leading to stage 5 CKD showed majority of the participants (80.6%) said diabetes, 60.2% said hypertension. There were multiple responses from close to half of the respondents at 49.5% indicating knowledge on diabetes and hypertension as diseases leading to stage 5 CKD. Few participants (7.8%) said heart failure with only 1% saying pneumonia. Kidney disease, diabetes, hypertension and heart failure are diseases that overtime lead to stage 5 CKD. The responses indicated awareness of diabetes and hypertension leading to stage 5 CKD but not heart failure, yet all the three are co-morbidities.

Table 4 Knowledge Levels on Use of Proteins

| Knowledge | Variables | n | (%) |
|------------------------|-----------|----|------|
| Use of proteins | | | |
| | Reduce | 52 | 50.5 |
| | Moderate | 46 | 44.7 |
| | No change | 3 | 2.9 |

| | | |
|--|----|------|
| Increase | 2 | 1.9 |
| Problems that may arise due to low protein intake | | |
| Malnutrition | 88 | 85.4 |
| Oedema | 14 | 13.6 |
| Bone disease | 11 | 10.7 |
| High Blood pressure | 2 | 1.9 |
| Diseases that lead to stage 5 CKD | | |
| Diabetes | 83 | 80.6 |
| Hypertension | 62 | 60.2 |
| Heart failure | 8 | 7.8 |
| Pneumonia | 1 | 1 |

Knowledge levels considered all the categories of key food types forming a composite result. The participants' responses on importance of diet in management of stage 5 CKD indicated 63% as knowledgeable. On nutritional aspects in management of their condition over three quarters were not knowledgeable (76%). Majority of the participants understood nutrition information given as education and counseling by the nutritionist. There were 59% of respondents who did not know that fluid intake was supposed to be moderated. Buildup of extra fluid due to inability of the kidneys to regulate it can raise blood pressure more. Kidneys play an important role in regulating blood pressure with aldosterone hormone. Salt intake was reduced or totally avoided by over three quarters of the study population (78%). Most participants (86%) were not knowledgeable on use of proteins.

Table 5 Knowledge Levels among Stage 5 Chronic Kidney Disease

| Variable | n | % |
|--|-----|----|
| Diet is important in management of CKD | | |
| Not knowledgeable | 38 | 37 |
| knowledgeable | 65 | 63 |
| Nutritional aspect of management of CKD | | |
| Not knowledgeable | 78 | 76 |
| knowledgeable | 25 | 24 |
| Understanding nutrition information given | | |
| Not knowledgeable | 93 | 18 |
| knowledgeable | 10 | 82 |
| Moderate fluid intake for CKD | | |
| Not knowledgeable | 61 | 59 |
| knowledgeable | 42 | 41 |
| Reduced sodium for CKD | | |
| Not knowledgeable | 80 | 78 |
| knowledgeable | 23 | 22 |
| Moderate use of protein for CKD | | |
| Not knowledgeable | 89 | 86 |
| knowledgeable | 14 | 14 |
| Reduced use of cholesterol rich food | | |
| Not knowledgeable | 101 | 98 |
| knowledgeable | 2 | 2 |
| Reduced use of soluble vitamin A rich foods | | |
| Not knowledgeable | 90 | 87 |
| knowledgeable | 13 | 13 |

| | | |
|---------------------------------------|----|----|
| Take upto1000ml of Water daily | | |
| Not knowledgeable | 73 | 71 |
| knowledgeable | 30 | 29 |
| Hypertension lead to CRF | | |
| Not knowledgeable | 10 | 10 |
| knowledgeable | 93 | 90 |

Patient on dialysis, require increased protein intake. This should be consumed at a rate of at least 1.2 g/kg bwt/day, 50% of which should be of high biological value. Use of cholesterol levels showed that almost all participants 98% did not know that foods high in cholesterol should be reduced. Lack of knowledge on reduction in use of vitamin A rich foods (87%) and use of 500- 1000ml of water/day (71%) was realized.

All the questions on knowledge were scored according to responses made by the participants. There were 14 categories of questions used to assess knowledge levels of the participants. Each correct response was awarded one point while zero points were awarded for every incorrect response. Participants who scored 0-4 points were categorized as low in nutrition knowledge (24%), 5-9 Moderate (46%) while 10 -14 high (25%) in nutrition knowledge (Table 6). Most participants had moderate knowledge levels. Adoption of the Blooms, 1956 standards as cut -off references was used to categorize knowledge scores.

Table 6 Nutrition Knowledge Scores In Managing Stage 5 CKD

| N=103 | | | |
|----------|----|--------------|----|
| | n | scores | % |
| Low | 25 | 0- 4 points | 24 |
| Moderate | 46 | 5- 9 points | 45 |
| High | 32 | 10-14 points | 31 |

Practices On Nutritional Management Among Stage 5 CKD Patients

Slightly over half of the respondents (57.3%) ate less fruits and cooked vegetables in a lot of water to reduce the amount of potassium in fruits and vegetables. 42.7% did not know how reduce potassium levels in food used (Table 7). Slightly over half of the respondents could reduce potassium from fruits and vegetables used. Most participants did not know if they were taking iron tablets (77.7%), only 22.3 % took iron tablets. Iron tablets help increase blood levels in the body by facilitating formation of red blood cells. Over half of the participants (64.1%) had no feelings of nausea or vomiting nor constipated, while 39.5% experienced the discomforts.

Table 7 Practice on Nutrition Management

| Practice parameters | (n=103) |
|--|----------------|
| Practice | Proportion (%) |
| Cooking vegetables in much water and eating less fruit to reduce potassium levels | |
| Yes | 59 (57.3) |

| | | |
|--|-----------|-----------------------------|
| No | 44 (42.7) | |
| Taking iron supplements | | |
| Yes | 23 (22.3) | |
| No | 80 (77.7) | |
| Feeding without nausea/vomiting/constipation | | |
| Yes | 37 (35.9) | |
| No | 66 (64.1) | |
| Reducing salt to manage BP | | |
| Yes | 76 (73.8) | |
| No | 27 (26.2) | To control blood pressure |
| Ability to buy, get and take recommended food | | 73.8% of the participants |
| Yes | 14 (13.6) | reduced salt intake, while |
| No | 89 (86.4) | 26.2 % did not control salt |
| | | intake. Majority of the |
| | | participants could not |

afford to buy and take the recommended dietary regime (86.4%) the remaining 13.5 % bought and took as recommended by the nutritionist. Financial support from family members was essential for better health to the patients. Family support play an important role in practice patterns among the patients, due to the high cost implications amount of time spent during hemodialysis. More than half of the participants (66%) indicated poor nutrition management practices of their condition (Table 8) with scores between 0-2 points. Only slightly above a third of the participants (34%) indicated good nutrition management practices with scores between 3-5 points.

Table 8 Practice Scores on Nutrition Management of Stage 5 Chronic Kidney Disease

| Practice | n | N=103 | |
|----------|-----|-----------------|-----|
| | | Scores (points) | % |
| Good | 35 | 3-5 | 34 |
| Poor | 68 | 0-2 | 66 |
| TOTAL | 103 | | 100 |

Association between Demographic, Socio-Economic Factors and Practices in Management of Stage 5 Chronic Kidney Disease

There was significant association between period on dialysis in months and practices in management of stage 5 chronic kidney disease with p value of <0.001 at 95% C.I, df of 3 (Table 9). There were 14 (53, 8%) respondents with less than 3 months duration on dialysis who had good nutrition management practices compared with 12 (46.2%) respondents who displayed poor nutrition management practices. The results showed a decline in nutrition management practices as duration on dialysis increased. Age, education, marital status, education, occupation, monthly income and support for dialysis had p values of 0.582, 0.998, 0.324, 0.076, 0.833, 0.601 and 0.738 respectively. Education level missed to have a significant difference, though it impacts practice in many studies. This could be attributed to the fact that majority of the respondents (82.8%) had secondary school education and above with only 1% without education, those with primary education were 26.2%. They therefore had better understanding levels requiring continuous follow up to ensure good practices are followed. Chi square was used to determine the association between practices and socio-economic factors in nutrition management of stage 5 CKD.

A study by Marie et al., (2018) shows age to be having a statistically significant associated with practice in hemodialysis, however, it was noted that the effect of age was clinically quite small despite a statistically significant association that exists in this study. Marie's study contradicts findings in this study where age has no significant association with practice. Practice levels are associated with other factors like family support though this does not concur with this study.

The results showed that lower levels in quality of life were associated with lower levels of an individual engagement. The study further revealed that age and high monthly income, had a positive relationship with engagement with the participants. Only duration on dialysis had a significant difference with practice. The scores showed a tendency of respondents' reduced levels in practicing the recommended dietary regimen prescribed as their duration on dialysis increased. This could be attributed to the assumption by HCWs that once a participant has acquired nutrition information they remained aware and accountable throughout life. Close follow up and

motivation for behavior change remained essential to maintain participants' quality of life and focus on any unusual changes that occurred in their bodies.

Table 9 Association between demographic, socio-economic factors and practices in management of stage 5 chronic kidney disease

| Variable | Nutritional management practice (n/%) | | | | |
|-------------------------------------|---------------------------------------|-----------|---------------|----------|------------------|
| | Poor | Good | χ^2 | df | p-value |
| Age | | | | | |
| <30 years | 16 (66.7) | 8 (33.3) | 1.986 | 3 | 0.582 |
| 30-40 years | 18 (64.3) | 10 (35.7) | | | |
| 41-50 years | 9 (52.9) | 8 (47.1) | | | |
| >50 years | 24 (72.7) | 9 (27.3) | | | |
| Religion | | | | | |
| Christian | 54 (65.9) | 28 (34.1) | 0.005 | 2 | 0.998 |
| Muslim/Hindu | 8 (66.7) | 4 (33.3) | | | |
| Traditional | 6 (66.7) | 3 (33.3) | | | |
| Marital status | | | | | |
| Married | 44 (67.9) | 26 (37.1) | 0.974 | 1 | 0.324 |
| Single/divorced/widowed | 24 (72.7) | 9 (27.3) | | | |
| Period on dialysis in months | | | | | |
| <3 | 12 (46.2) | 14 (53.8) | 19.264 | 3 | <0.001 |
| 3-6 | 6 (35.3) | 11 (64.7) | | | |
| 6-12 | 19 (82.6) | 4 (17.4) | | | |
| >12 | 30 (83.3) | 6 (16.7) | | | |
| Education | | | | | |
| Primary | 22 (81.5) | 5 (18.5) | 6.864 | 3 | 0.076 |
| Secondary | 24 (58.5) | 17 (41.5) | | | |
| Diploma | 15 (55.6) | 12 (44.4) | | | |
| Degree | 7 (87.5) | 1 (12.5) | | | |
| Occupation | | | | | |
| Formal | 9(64.3) | 5 (35.7) | 0.022 | 1 | 0.883 |
| Informal | 50(66.3) | 30 (33.7) | | | |
| Monthly income | | | | | |
| <20k | 53 (63.9) | 30 (36.1) | 1.863 | 1 | 0.601 |
| 20-30 | 6 (85.1) | 1 (14.1) | | | |
| 31-40k | 5 (62.5) | 3 (37.5) | | | |
| >41k | 4 (80.0) | 1 (20) | | | |
| Support for Dialysis | | | | | |
| Self-sponsored | 23 (63.9) | 13 (36.1) | 0.112 | 1 | 0.738 |
| Family/Friends | 45(67.2) | 22 (32.8) | | | |

Association between Nutrition Knowledge and Practices

Table 4.10 shows the bivariate analysis between nutrition knowledge and practices in management of stage 5 chronic kidney disease. Knowledge on importance of diet in management of stage 5 CKD (<0.001), moderation of fluid intake (<0.001), reduction in salt/sodium intake (<0.001), and moderation in protein intake (<0.004) were significantly associated with nutritional management practices of stage 5 CKD. Conversely being not knowledgeable on nutritional aspects in management of stage 5 CKD (0.806), understanding nutrition information (0.672), reduction of cholesterol rich foods (0.547), use of soluble vitamin A rich foods (0.715), intake of up to 1000ml of water/day (0.315) and identification of co-morbidities leading to stage 5 CKD (0.326) were not significantly

associated with nutritional management practices. Respondents who were knowledgeable 22 (73.3%) on amount of water to be used (up to 1000ml/ day) tended to practice nutritional management as advised by the nutritionist (0.315). Patients responses to knowledge questions on nutrient levels in different foods was high especially those rich in potassium, phosphorus and salt/ sodium (Section B). There was however low scores on the effects caused by changes in levels of the specific nutrients in the body (in Section D).

A study by Miyata et al., (2018) was carried out to determine haemodialysis knowledge on two groups of patients, one practicing and the other not. Upon analysis, the researcher found that hemodialysis-related knowledge scores did not vary in two groups of patients implying that other factors influence practice not just knowledge scores on nutrition management of haemodialysis. Another study by Durose et al., (2004) compared knowledge on renal diet and complications the diet can cause. He came up with similar results where patients with more knowledge on renal diet were not related with practices. This could be due to much focus on types of food to restrict basing on education and counseling than impact the variation of nutrients may cause in the body. Food items like green bananas and potatoes were easily identified as high in potassium, but effects of high potassium in the body was not known. A similar trend applies to phosphorous where foods rich in the mineral were identified but not the effects of high serum levels in the body. Salt was the only mineral identified in foods consumed and its effects recognized. This may be due to the taste of salt and the fluid built up and or inter-dialytic weight gained with increased intake of the mineral. Weighing is done every visit before dialysis commences. The statistical significance in the association between knowledge and practice on salt and fluid intake was realized but not on other minerals.

Studies show that up to 75% of hemodialysis patients (Beer, Mountford, and Boundville, 2018) are at a higher risk of malnutrition caused by loss of nutrients from dialysis thus the need for high intake (Hernández Morante et al., 2014). In addition, Hernández et al.,(2014) found that high inflammation is caused by production of cytokine, loss of blood, and effects of uremic syndrome like reduced food intake or appetite. The presence of protein-energy malnutrition is often harmful to patients on hemodialysis due to increased risk of mortality, reduced quality of life, and increased risk of hospitalization (Beer, Mountford, & Boundville, 2018). Uremic state triggers the process of muscle breakdown, which could appear in form of fluid retention (Oquendo, Asencio, & de las Nieves, 2017). It is therefore important to look beyond weight loss to identify PEM, since this is not often the indicator. According to Beer et al., (2018) the patient's eating habits become the ultimate contributing factor to malnutrition making dietary intervention crucial in managing stage 5 CKD.

Table 10 Association between nutrition knowledge and practices in management of stage 5 chronic kidney disease

| Variable | Nutritional management practices (n/%) | | (df=1) χ^2 (p-value) |
|--|--|-----------|------------------------------|
| | Poor | Good | |
| Diet is important in management of CKD | | | |
| Not knowledgeable | | | |
| knowledgeable | 16 (42.1) | 22 (57.9) | 15.350 (<0.001) |
| | 52 (80) | 13 (20) | |
| Nutritional aspect of management of CKD | | | |
| Not knowledgeable | | | |
| knowledgeable | 52 (66.7) | 26 (33.3) | 0.060 (0.806) |
| | 16 (64.0) | 9 (36.0) | |
| Understanding nutrition information given | | | |
| Not knowledgeable | | | |
| knowledgeable | 62 (66.7) | 31 (33.3) | 0.179 (0.672) |
| | 6 (60) | 4(40) | |
| Moderate fluid intake for CKD | | | |
| Not knowledgeable | 49 (80.3) | 12 (19.7) | 13.652 (<0.001) |
| knowledgeable | 19 (45.2) | 23 (54.8) | |
| Reduced sodium for CKD | | | |
| Not knowledgeable | 46(57.5) | 34 (42.5) | 11.591 (<0.001) |
| knowledgeable | 22(95.7) | 1 (4.3) | |
| Moderate use of protein for CKD | | | |
| Not knowledgeable | 54 (60.7) | 35 (39.3) | 8.339 (0.004) |
| knowledgeable | 14 (100) | 0 | |
| Reduced use of cholesterol rich food | | | |

| | | | |
|---------------------------------------|-----------|-----------|----------------------|
| Not knowledgeable | 66 (65.3) | 35(34.7) | 0.547 (fisher exact) |
| knowledgeable | 2 (100) | 0 | |
| Reduced use of soluble vitamin | | | |
| Not knowledgeable | 60 (66.7) | 30(33.3) | 0.133 (0.715) |
| knowledgeable | 8 (61.5) | 5(38.5) | |
| Take upto1000ml of water daily | | | |
| Not knowledgeable | 46 (63) | 27 (37) | 1.009 (0.315) |
| knowledgeable | 22 (73.3) | 8 (26.7) | |
| Hypertension led to CKD | | | |
| Not knowledgeable | 8 (80) | 2 (20) | 0.965 (0.326) |
| knowledgeable | 60 (64.5) | 33 (35.5) | |

Fisher exact is applied appropriately, significant results bolded (<0.05), df = degree of freedom.

CONCLUSION

Most of the study participants were young male adults, married, of low socio-economic status and with secondary school education. The study showed that nutrition knowledge scores in the study population were moderate especially regarding dietary intake and following recommendations for best outcome in nutritional health and overall improvement in quality of life. Knowledge level was however low in identifying foods rich in phosphorus, calcium and fat soluble vitamins. Socio-demographic factors influenced the quality of life and practices regarding nutritional management of renal condition. Practices on nutritional management of the patients' condition were poor, considering also that 96% of them said they could not afford the recommended diet. Practice scores were poor despite moderate nutrition knowledge levels. The poor nutrition management practice scores indicated a possibility of having persistent complications among the respondents irrespective of moderate knowledge scores.

Nutrition management needs high level of knowledge on essential nutrients needed by the body, their role, interaction and functions. More focus on motivation follow up and practicing nutrition management skills acquired may greatly improve patients' quality of life. Patients' knowledge on nutrition management of their condition may be achieved through frequent and consistent nutrition education and counselling including follow ups. There is need to strengthen nutrition counselling by educating patients on reasons for restricting or modifying dietary regimen not just identifying foods as minerals, proteins or fluids. The Ministry of Health nutrition division, in collaboration with other nutrition institutions, practicing health facilities and relevant stakeholders, should come up with policy statements, guidelines, protocols and strategies specifically on nutritional management of stage 5 CKD. Standard operating procedures and Subjective global assessments need to be adopted to have a universal assessment aiding in prediction of morbidities. This will outline provision of essential nutrition services and mandatory management practices to alleviate complications slowing down progression of the disease and improving patients' quality of life

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Entrepreneurial Competencies and Micro, Small and Medium Enterprises' Performance in Nigeria

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Abstract- This study was on entrepreneurial competencies and performance of Micro, Small and Medium Scale Enterprises (MSMEs) in Nigeria. The study was a survey with questionnaire as instrument for data collection. The study's population was 1,319,607 entrepreneurs while the sample 400 was determined using Taro Yamane formular.. The data obtained in the study were analyzed with both simple and multiple regressions. The findings of the study indicated that about 51.4% of the variance in MSMEs performance was attributable to entrepreneurs' innovation skills; about 33.6% of the variance in success of MSMEs was attributable to ability of entrepreneurs to generate ideas; about 47% of the variance in performance of MSMEs was attributable to risk taking; about 50.1% of the variance in MSMEs performance was attributable to entrepreneurs' creativity and that about 37.1% of the variance in of performance of MSMEs was attributable to the entrepreneurs' ability to envision opportunities in the business environment. It was recommended that since entrepreneurial competencies can determine success in entrepreneurship, it is essential for entrepreneurs to consider acquiring useful skills before venturing into business; that existing entrepreneurs should avail themselves of various training programs for all manners of business executive to sharpen their management skills in order to improve performance of their business and that government should step up efforts at training entrepreneurs in all business lines and that encouragement should be given to competent entrepreneurs by way of contract award to spur up others into fully embracing training programmes aimed at improving their business fortune.

Index Terms- Entrepreneurship, Entrepreneurial Competencies, Micro, Small and Medium Scale Enterprises, Performance, Nigeria

I. INTRODUCTION

It is an established fact that worldwide Micro, Small and Medium Enterprises (MSMEs) enhance their countries socio-economic development. They make contributions in the areas of employment creation, production of goods and services, improvement in standard of living of citizens, payment of taxes and levies to government, reduction in poverty, creating a link with the industries among others, have variously attracted the attention of academics, researchers and the government. (Kalpande, Gupta & Dandekar, 2010).

The contributions of businesses within the MSMEs bracket to national economic growth having been recognized have made

various governments consider a number of options and approaches targeted at positioning them to play more pronounced role in the economy. In Nigeria, government has in so many ways demonstrated its interest in this class of businesses through several agencies, policies and incentives. These include, National Economic Reconstruction Fund (NERFUND), National Poverty Eradication Programme (NAPEP), Small and Medium Enterprise Development Agency of Nigeria (SMEDAN), and Small and Medium Industries Equity Investment Scheme (SMIEIS) and the like.

In spite of government initiatives towards growing entrepreneurship in the country, businesses in the category of MSMEs have not had an expected corresponding match in terms of growth, survival and performance as shown by some studies. Oyelaran (2010) revealed that small businesses contribute approximately 1% of Nigeria's GDP compared to 40% in Asia and that of USA put at 50% . These data indicate that small businesses in Nigeria are performing below expectation. Granted a number of issues confront entrepreneurship in the country and some regrettably result in their failure. It is imperative to investigate these issues with a view to managing them to brighten their likelihood of improved performance and avoidance of business failure. Authors such as Van der Laan, Driessen and Zwart (2010) asserted that the most important asset of a business is a competent manager. It therefore becomes important that the entrepreneurial competencies of operators of small business enterprises be examined.

Martina, Hana and Jiří (2012) define entrepreneurial competencies as a set of specific knowledge, abilities, skills, traits, motives, attitudes and values essential for the personal development and successful participation of each person in an organization. Rezaei-Zadeh, Hogan, O'Reilly, Cleary and Murphy (2014) defined it as the abilities of the person that enable him/her to demonstrate the appropriate entrepreneurial behaviour. Mitchelmore and Rowley (2013) state that identifying and developing entrepreneurial competencies, namely, idea generation, innovative skills, envisioning opportunities, risk taking and creativity possessed by entrepreneurs may support the development of potential businesses.

Business performance is seen as the long term well being of a business compared to those of competitors. Performance explains the degree of fulfillment of managerial goals in business practices and realized outputs of these goals by the end of a specified period (Mitchelmore & Rowley, 2010). Performance measures can take different dimensions. These dimensions may include: Sales growth, revenue growth, growth, net profit,

product/service innovativeness, process innovativeness, adoption of new technology, product/service quality, product/service variety, customer satisfaction, employee satisfaction among others (Wiklund & shepherd, 2003).

While some operators of businesses may not be aware of the significant role of competencies such as idea generation, innovative skills, envisioning opportunities, risk taking and creativity in business performance, some studies show that there is an indispensable relationship between competencies in entrepreneurial pursuit and the performance of business. This study investigates entrepreneurial competencies and performance of MSMEs as it concerns Nigeria.

II. CONCEPTUAL AND THEORETICAL ISSUES

i. Concept of Entrepreneurship

The interest in entrepreneurship derives from the mystique around the activities of the entrepreneur. How these activities lead to lucrative success in a capitalist economy and ultimately economic development has been a topic of interests for scholars across different fields of human endeavour.

Getting a clear understanding of the concept of entrepreneurship has been boosted by opinions of several individuals. Economic historians, such as Schumpeter (1947), was one of the earliest to identify and highlight entrepreneurship as being key to an economy's growth. Schumpeter notes that entrepreneurship is the fulcrum that drives the cyclical boom and busts of the capitalist system. He distinguishes entrepreneurs from small business managers by noting that entrepreneurs are concerned with establishing a firm that embodies a new idea or innovation while small business managers are primarily concerned with the administration of an ongoing business concern.

Schumpeter identifies two key characteristics of an entrepreneur that set him apart from other economic actors. The first characteristic is the ability to perceive innovative opportunities; the second is the will power adequate to break down the resistance that the social environment offers to change. These descriptions of entrepreneurship suggest that the entrepreneur not only has to possess the knowledge needed to perceive or identify innovative opportunities within extant systems, but also the skill and ability to set up a business enterprise to take advantage of opportunities.

ii. Concept of Entrepreneurial Competence

Kaur and Bains (2013) define entrepreneurial competency as the individual characteristics of a person who undertakes risk for gaining profit in the business venture.

Martina, Hana and Jiří (2012) define entrepreneurial competencies as a set of specific knowledge, abilities, skills, traits, motives, attitudes and values essential for the personal development and successful participation of each person in an organization. Rezaei-Zadeh, Hogan, O'Reilly, Cleary and Murphy (2014) define it as the abilities of the person that enable him to demonstrate the appropriate entrepreneurial behaviour including: identifying opportunities, start-up and maintenance of business. Sanda (2011) also refers to it as specific behaviour and characteristics of a person that result in effective or superior performance.

iii. SMEs Performance

Performance measurement help an entrepreneur understand, manage and improve his business activities (Pirich, Knuckey, & Campbell, 2001). Four different approaches are basically used by researchers in measuring performance namely; goal approach, system resource approach, stakeholders approach and competitive value approach. Phihlela (2012) posited that while the stakeholders and competitive approaches look at meeting the needs and expectations of the external stakeholders, the goal and system approaches focus on meeting the internally-set targets. However, the goal approach is best used when dealing with small businesses due to its simplicity and understandability (Sanda, 2011).

iv. Theoretical Framework

The Human Capital theory provided the theoretical foundation for this study. Human capital theory was originally developed by Becker in 1964 to estimate employees' income distribution from their investments in human capital. Becker defines human capital as skills and knowledge that individuals acquire through investments in schooling, on-the-job training, and other types of experiences. It comprises the stock of knowledge and skills that reside within individuals. Specifically, it includes the unique insights, skills, cognitive characteristics and aptitudes of entrepreneurs. It also includes achieved attributes, accumulated work and habits that may have a positive or negative effect on productivity. It represents a resource that is heterogeneously distributed across individuals and is thus, central to understanding differences in opportunity identification and exploitation. Researchers have employed a large spectrum of variables signifying human capital such as formal education, training, employment experience, start-up experience, owner experience, parent's background, skills, knowledge among others.

The theory suggests that individuals with more or higher human capital achieve higher performance when executing tasks. The theory maintains that knowledge provides individuals with increase in their cognitive abilities, leading to more productive and efficient potential activity. Therefore, if profitable opportunities for new economic activity exist, individuals with more or higher quality human capital should be better at perceiving them. Once engaged in the entrepreneurial process, such individuals should also have superior ability in successfully exploiting opportunities.

v. Empirical Literature Review

Ahmad (2007) investigated competencies in entrepreneurship and success in entrepreneurship in Malaysia as well as Australia. The findings of the study confirmed that entrepreneurial competencies were strong predictors of business success in both countries. Muzenda (2014) investigated entrepreneurial attributes, the features of businesses and variables outside the organization and their impact SMEs operational results. It was revealed demonstrated significant association existed among studied variables. Another study by Abubakar (2014) centred on the linkage between managers' attributes as entrepreneurs and business growth that covered the period 2006 to 2010. Findings showed that level of education, the entrepreneurs' technical skills and experiences garnered have significant and positive influence on the growth of small businesses. Luisa (2006) analysed the role of managerial

characteristics on choice and internationalization of SMEs. The result revealed that some personality traits of the manager affect the firm export intensity growth. Sanchez (2011) carried out an investigation which focused on competencies in entrepreneurship and how this influence small business in Spain. It was revealed that competencies in entrepreneurship influenced role in organizational capability and competitive scope and has a direct effect on firm performance. Julius (2011) examined the relationship between the competencies of managers and SMEs results of operations in Kenya. The results revealed a positive and strong relationship between managerial competencies and performance of SMEs.

III. MATERIALS AND METHOD

The survey research design was used in the current study. The population of this study was made up of 1,319,607, being the number of small businesses in Akwa Ibom State, Nigeria (SMEDAN, 2013). In this study, businesses surveyed cut across manufacturing, welding, process, distribution and services. The study used 400 as sample. This was arrived at through Taro Yamane's formular. Questionnaire was developed and used in obtaining data; it was titled It had two sections. Section one was for respondents' personal details and section two research questions. Section two, which contained items used in measuring variables in the study used a five-point Likert Scale. The

instrument recorded overall Cronbach alpha test result of 0.741. The study achieved 57% response rate. Simple and multiple regression analyses were employed in data analysis at 0.05 level of significance. The study's multiple regression model is represented thus:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + e$$

Where:

- Y = dependent variable (Business Performance)
- a = the y intercept
- b = regression coefficient
- x = independent variables
- INS = Innovation Skills
- IDG = Idea Generation Ability
- RKT = Risk Taking
- CTY = Creativity
- AEP = Ability to envision opportunity
- e = error term

IV. DATA ANALYSIS

Test of Hypothesis

H₀₁: There is no significant relationship between entrepreneurs' innovation skills and the performance of micro small and medium scale enterprises in Nigeria

Table 1: Model Summary of Relationship that Exists between entrepreneurs innovation skills and the performance of micro, small and medium scale enterprises in Nigeria

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .717 ^a | .514 | .463 | 9.16790 |

- a. Predictors: (Constant), innovation skills
- b. Dependent Variable: MSMEs Performance

Table 1 shows model summary of the relationship that exists between entrepreneurs' innovation skills and the performance of micro small and medium scale enterprises. The R-value (0.717) shows a positive relationship between the variables, while R-square (R²) is the coefficient of determination (0.514). The implication is that 51.4% (0.514 X 100) of the variance in MSMEs performance is attributable to entrepreneurs' innovation skills.

Table 2: Regression Analysis Result on Relationship between entrepreneurs' innovation skills and performance of micro, small and medium scale enterprises in Nigeria

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|---------|-------------------|
| 1 | Regression | 22169.602 | 1 | 20161.303 | 612.420 | .011 ^b |
| | Residual | 40358.398 | 317 | 104.525 | | |
| | Total | 62528.000 | 318 | | | |

- a. Dependent Variable: MSMEs Performance
- b. Predictors: (Constant), Innovation Skills

Table 2 shows the result of regression analysis on relationship between innovation skills and MSMEs performance. It reveals also F.value (161.420) and p- value as (.011) with a degree of freedom of 318 at .05 level of significance and p-value is less than 0.05 ($p < 0.05$). Based on the result, the null hypothesis that there is no significant relationship between entrepreneurs' innovation skills and the performance of micro, small and medium scale enterprises in Nigeria is rejected while the alternative is accepted. Hence, it can be concluded that-innovation skill has a significant relationship with performance of micro, small and medium scale enterprises. By implication, innovation is capable of predicting performance of micro, small and medium scale enterprises in Nigeria.

H0₂: There is no significant relationship between owners' ability to generate ideas and success of their micro, small and medium scale enterprises in Nigeria.

Table 3: Model Summary of the Relationship between owners' ability to generate ideas and the success of their micro, small and medium scale enterprises in Nigeria

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .611 ^a | .373 | .336 | 9.30134 |

a. Predictors: (Constant), idea generation
 b. Dependent Variable: MSMEs Performance

Table 3 shows the model summary of the relationship between ability to generate ideas and the success of their micro, small and medium scale enterprises in Nigeria. The R- value (0.611) shows a positive relationship between the variables, while R-square (R^2) is the coefficient of determination (.336). The implication is that 33.6% (0.336×100) of the variance in success of micro, small and medium scale enterprises is attributable to ability of entrepreneurs to generate ideas.

Table 4:Regression Analysis Result on Relationship between owners' ability to generate ideas and success of their micro, small and medium scale enterprises in Nigeria

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|--------|-------------------|
| 1 | Regression | 4616.091 | 1 | 4696.091 | 31.023 | .040 ^b |
| | Residual | 37362.133 | 342 | 129.857 | | |
| | Total | 55978.026 | 343 | | | |

a. Dependent Variable: MSMEs Performance
 b. Predictors: (Constant), Idea generation

Table 4 shows the result of regression analysis on relationship between owners' ability to generate ideas and success of their micro, small and medium scale enterprises in Nigeria . It reveals also F.value (31.023) and p- value as (.040) with a degree of freedom of 343 at 0.05 level of significance and p-value is less than 0.05 ($p < 0.05$). Based on the result, the null hypothesis that, there is no significant relationship between owners' ability to generate ideas and success of their micro, small and medium scale enterprises in Nigeria is rejected while the alternative is accepted. Hence, it can be concluded that business owners' ability to generate ideas has a significant relationship with success of their micro, small and medium scale enterprises. By implication, ability to generate ideas can predict business success.

H0₃: There is no significant relationship between risk taking and the performance of micro, small and medium scale enterprises in Nigeria

Table 5:Model Summary of the relationship that exists between risk taking and performance of micro, small and medium scale enterprises in Nigeria

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .686 ^a | .470 | .423 | 7.14033 |

a. Predictors: (Constant), Risk Taking

b. Dependent Variable: MSMEs Performance

Table 5 shows the model summary of the relationship between risk taking and performance of micro, small and medium scale enterprises in Nigeria. The R- value (0.686) shows a positive relationship between the variable, while R-square (R^2) is the coefficient of determination (.470). The implication is that 47% (.470 X 100) of the variance in performance of micro, small and medium scale enterprises is attributable to risk taking.

Table 6: Regression Analysis Result of Relationship between risk taking and the performance of micro, small and medium scale enterprises in Nigeria

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|--------|-------------------|
| | Regression | 3052.172 | 1 | 3051.177 | 13.071 | .000 ^b |
| 1 | Residual | 44762.2859 | 337 | 143.120 | | |
| | Total | 48310.4572 | 338 | | | |

a. Dependent Variable: MSMEs Performance

b. Predictors: (Constant), Risk Taking

Table 6 shows the model summary of relationship between risk taking and the performance of micro, small and medium scale enterprises in Nigeria. It reveals also F. value (13.071) and p- value as (0.000) with a degree of freedom of 338 at 0.05 level of significance and p-value is less than 0.05 ($p < 0.05$). Based on the result, the null hypothesis that, there is no significant relationship between risk taking and the performance of micro, small and medium scale enterprises in Nigeria is rejected while the alternative is accepted. Hence, it can be concluded that risk taking has a significant effect on the performance of micro, small and medium scale enterprises .The implication of this is that risk taking is capable of predicting the performance of micro, small and medium scale enterprises.

H₀₄: There is no significant relationship between entrepreneurial creativity and sales growth of micro, small and medium scale enterprises in Akwa Ibom State

Table 7: Model Summary of Relationship between entrepreneurial creativity and sales growth of micro, small and medium scale enterprises in Nigeria

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .708 ^a | 0.501 | 0.451 | 9.50236 |

a. Predictors: (Constant), Creativity

b. Dependent Variable: MSMEs Performance

Table 7 shows the model summary of the relationship between entrepreneurial creativity and sales growth of micro, small and medium scale enterprises in Nigeria. The R- value (0.708) shows a positive relationship between the variables, while R-square (R^2) is the coefficient of determination (0.501). The implication is that 50.1% (0.0501X 100) of the variance in MSMEs performance is attributable to entrepreneurs' creativity.

Table. 8: Regression Analysis Result on Relationship between entrepreneurial creativity and sales growth of micro, small and medium scale enterprises in Nigeria

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|-------|-------------------|
| | Regression | 633.474 | 1 | 846.131 | 8.136 | .021 ^b |
| 1 | Residual | 61830.122 | 316 | 236.221 | | |
| | Total | 615663.591 | 317 | | | |

a. Dependent Variable: MSMEs Performance

b. Predictors: (Constant), Creativity

Table 8 shows the result of regression analysis on relationship between entrepreneurial creativity and sales growth of micro, small and medium scale enterprises in Nigeria. It reveals also F.value (8.136) and p- value as (.021) with a degree of freedom of 317 at 0.05 level of significance and p-value is less than 0.05 ($p < 0.05$). Based on the result, the null hypothesis that there is no significant relationship between entrepreneurial creativity and sales growth of micro, small and medium scale enterprises in Nigeria is rejected while the alternative is accepted. Hence, it can be concluded that there is a significant relationship between entrepreneurial creativity and sales growth of micro, small and medium scale enterprises. The implication of this is that entrepreneurial creativity can predict sales growth of micro, small and medium scale enterprises.

H₀₅ There is no significant relationship between ability of an entrepreneur to envision opportunities and improvement in the performance of micro, small and medium scale enterprises in Nigeria

Table 9: Model Summary of Relationship between envisioning opportunities and improving the performance of micro, small and medium scale enterprises in Nigeria

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .609 ^a | 0.371 | 0.334 | 7.01236 |

a. Predictors: (Constant), Ability to envision Opportunity

b. Dependent Variable: MSMEs Performance

Table 9 shows model summary of the influence of envisioning opportunities on the improvement of performance of micro, small and medium scale enterprises in Nigeria. The R- value (0.609^a) shows a positive relationship between the variables under study, while R-square (R^2) is the coefficient of determination (.371). The implication is that 37.1% (.371X 100) of the total variance in of performance of micro, small and medium scale enterprises is attributable to the entrepreneurs' ability to envision opportunities in the business environment.

Table 10: Regression Analysis Result on Relationship between envisioning opportunities and improving the performance of micro, small and medium scale enterprises in Nigeria

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|-------|-------------------|
| 1 | Regression | 11161.063 | 5 | 291.813 | 6.109 | .004 ^b |
| | Residual | 301620.211 | 327 | 603.236 | | |
| | Total | 371251.104 | 332 | | | |

a. Dependent Variable: MSMEs Performance

b. Predictors: (Constant), Ability to envision opportunity

Table 10 presents the influence of envisioning opportunities on improvement of the performance of micro, small and medium scale enterprises in Nigeria. The analysis shows F-value as 6.109 with 5 and 332 degrees of freedom at 0.05 level of significance and P-value as 0.004. On the table, P-value is less than 0.05 ($p < 0.05$) i.e (0.004 < 0.05), therefore, the null hypothesis which states that there is no significant relationship between ability of an entrepreneur to envision opportunities and improvement in the performance of micro, small and medium scale enterprises is rejected while the alternative is accepted. Accordingly, it can be concluded that the ability to envision opportunities brings about improvement in the performance of micro, small and medium scale enterprises. The implication of this is that entrepreneurs' ability to envision opportunities will likely lead to improvement in the performance of micro, small and medium scale enterprises.

H₀₅: There is no significant impact of the combined competencies of innovation skills, ability to generate business ideas, risk taking, entrepreneurial creativity, and envisioning opportunities on the performance of micro, small and medium scale enterprises in Nigeria

Table 11: Multiple-Regression Analysis Result on combined effect of innovation skills, ability to generate business ideas, risk taking, entrepreneurial creativity and envisioning opportunities on performance of micro, small and medium scale enterprises in Nigeria.

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|-------|-------------------|
| 1 | Regression | 15131.761 | 6 | 223.813 | 7.704 | .007 ^b |
| | Residual | 391120.244 | 363 | 631.237 | | |
| | Total | 301252.017 | 369 | | | |

a. Dependent Variable: MSMEs Performance

b. Predictors: (Constant), innovation skills, ability to generate business ideas, risk taking, entrepreneurial creativity, envisioning opportunities

Table 11 presents the joint influence of innovation skills, ability to generate business ideas, risk taking, entrepreneurial creativity and envisioning opportunities on performance of micro, small and medium scale enterprises in Nigeria

The analysis shows F-value as 4.703 with 4 and 377 degrees of freedom at 0.05 level of significance and P-value as 0.009. On the table, P-value is less than 0.05 ($p < 0.05$) i.e ($0.009 < 0.05$), therefore, the null hypothesis which states that there is no significant impact of the combined competencies of innovation skills, ability to generate business ideas, risk taking, entrepreneurial creativity, and envisioning opportunities on the performance of micro, small and medium scale enterprises in Nigeria is rejected while the alternative is accepted. Accordingly, it can be concluded that these variables have a combined impact on the performance of micro, small and medium scale enterprises. It implies that entrepreneurial competency was can predict MSMEs performance.

V. DISCUSSION OF FINDINGS

Findings of the study indicate that all the independent variables studied namely, entrepreneurs' innovation skills, ability of entrepreneurs to generate ideas, risk taking, entrepreneurs' creativity and ability to envision opportunity have significant relationship with MSMEs performance. The implication of these findings is that these variables can predict the performance of MSMEs in Nigeria. Furthermore, the analysis that among variables studied, innovation skill (51.4%) is likely to have the greatest influence on MSMEs performance in Nigeria; followed by entrepreneurs' creativity (50.1%). The next in order of importance will be risk taking (47%), ability to envision opportunity (37.1%) and ability to generate ideas (33.6%).

The findings of this study seem to support some earlier studies while contrasting others. Those similar to this study's findings are those of Tehseen and Ramayah (2015) who studied the effects of entrepreneurial competencies on success of SMEs in Malaysian. The study discovered that entrepreneurial competencies brings about business competitive advantage. Another study by Lowden (1988) whose focus was on entrepreneurs' managerial skills came up with results that showed that without relevant managerial skills, it would be difficult for operators of businesses to do well. Again, Muzenda (2014) investigated the effect of entrepreneurial attributes, firm characteristics and external factors on the performance of SMEs with findings revealing that entrepreneurial attributes, firm characteristics and external factors demonstrated significant association with SMEs performance. Another study by Abubakar (2014) examined the relationship between entrepreneurial characteristics of owner managers and the growth of business

from the year 2006 to 2010 found that educational level, technical skills and entrepreneurial experience have significant and positive influence on the growth of small businesses Also, Tagrafa and Akinb (2009) studied the effect of entrepreneurial characteristics on enterprise ownership with a revelation that a negative relationship existed between enterprise ownership type and having entrepreneurial characteristics. Also Ojo (2007) investigated the relationship between entrepreneurial competencies and performance of SMEs in Kyaing Tong area of Myanmar with the result that organizing, opportunity, relationship, conceptual, strategic and commitment competencies had negative impact on SMEs performance.

VI. CONCLUSION

The study has shown that entrepreneurial competencies and performance of MSMEs are related. As can be seen in the analysis, sub-variables of entrepreneurial competencies significantly relate with MSMEs performance in the case of Nigeria. Therefore, it is safe to conclude that performance of MSMEs in Nigeria can be determined by competencies of entrepreneurs. A major limitation of this study is a focus on Akwa Ibom State which limits generalization of findings. An expansion of scope to include other states of Nigeria would make findings more generalizable.

VII. RECOMMENDATIONS

Following this study's findings, recommendations made are:

- i. Since entrepreneurial competencies can determine success in entrepreneurship, it is essential for entrepreneurs to consider acquiring useful skills before venturing into business
- ii. Existing entrepreneurs should avail themselves of various training programs for all manners of business executive to sharpen their management skills which can translate to improved business performance.
- iii. Government should step up efforts at training entrepreneurs in all business lines; encouragement should be given to competent entrepreneurs by way of patronage in government services. This will spur up others into fully embracing training programmes aimed at improving their business fortune.

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Benthic Macro Invertebrates Composition And Physico-Chemical Characteristics Of Garin Garba Stream, Tumu, Gombe State, Nigeria

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ABSTRACT

Macro invertebrates composition and physico-chemical characteristics of Garin Garba Stream Tumu, Gombe, Nigeria was investigated between April and June, 2019. Physical and chemical characteristics includes temperature, pH, Electrical conductivity, turbidity, depth and width and macro invertebrates were sampled fortnightly for a period of three months. It was recorded that physico-chemical characteristics of the four sampling stations shows no variation in all the sampling stations. Shannon Weiner index was employed to determine the abundance of macro invertebrates in each sampling station. The results showed a total of 68 individual organisms of Macro invertebrates in 5 family among the four invertebrates taxa of Coleoptera, Hemiptera, Odonata and Mollusca. The taxa abundance of Garin Garba Stream arranged in lessening trend as Mollusca > Odonata > Coleoptera > Hemiptera with percentage composition of invertebrates values 45.59%, 38.23%, 8.82%, and 7.52% respectively. The Shannon Weiner diversity index for the four sampling stations of A, B, C and D were 1.5, 1.11, 1.03 and 1.54 respectively. The Macro invertebrates abundance and distribution observed in this study showed Garin Garba Stream can support and sustain various organisms.

Keywords: Physico-chemical, macro invertebrates, streams, Garin Garba Tumu

INTRODUCTION

Water is the most essential assets and general solvent that all living organisms depend on for their survival, growth and reproduction (Abbati *et al.*, 2019). Without water living organisms does not likely to be survive, growth and reproduce because it's the element of life. Good water quality is obligatory in maintaining the composition of aquatic flora and fauna, reversion of the water quality can causes turn down in productivity and biodiversity of aquatic biota (Faithful and Finlayson, 2005). The quality of water is determined by its physical and chemical characteristics. Due to high population growth and heedlessness of humans, water quality is dwindling each day (Alrumman *et al.*, 2016). Deterioration of lentic water quality has been linked to both biogenic and anthropogenic activities, including volcanic eruptions, earthquake, climate change, precipitation, agricultural land use, and sewage discharge.

Pollution is said to have transpired when the values of certain physico-chemical characteristics such as pH, temperature, Dissolved Oxygen (DO), Electrical Conductivity (EC), turbidity, Total Dissolved Solid (TDS), Biochemical Oxygen Demand (BOD5), Phosphate and Nitrate are above the recommended benchmark for drinking (Kamal *et al.*, 2007). Garin Garba Stream receives large amount of wastes, nonstop from the agricultural effluents and in some way from the human activities such as washing and bathing consequent in absolute declining of water quality. The robust environment and adequate nutrients are vital

for living and growth of aquatic organisms (Alam *et al.*, 2007). Physico-chemical characteristics of the water body facilitate to determine the productivity level of aquatic ecosystem. The highest productivity is obtained when the physical and chemical characteristics are at the ultimate level. Water quality plays a part in plateful decision-making process for pollution control in environment protection purpose (Kamal *et al.*, 2007). Water quality assessment is an incessant process as it gives an update of the health status of water and its fitness for various purposes such as bathing, drinking, irrigation and its capability to support aquatic lives (Akpomie *et al.*, 2014).

Water desires in all living creatures, from minute to larger organisms are ever-increasing on a daily basis, but the supply of drinking water is a considerable setback, as all water resources have got to the point of predicament due to increase in population growth and unexpected industrial revolution (Bibbi *et al.*, 2016).

Benthic invertebrates possess several proliferative strategies and life cycles, with some categories such as snails and worms spending their entire lives in aquatic ecosystem, while others, for example some insect larvae or nymphs, only spend part of their life in the water, their winged adults live in terrestrial ecosystem (Umar *et al.*, 2013).

Benthic invertebrates can be abundant in freshwater and can be used as indicators of changes in water quality; they also form an important part of aquatic food webs. Because of their capability to respond to physico-chemical changes in freshwater conditions, benthic invertebrates are mostly used as biomarkers ñ can provide vital information on the level of biogenic and anthropogenic disturbance (Umar *et al.*, 2013).

Benthic Macro invertebrates are aquatic organisms that can be seen with the naked eyes inhabited in the bottom of the aquatic ecosystems such as lakes, stream, river and ponds. Some are found often restricted at the bottom of the stream for their feeding and at the top for respiration. They play an essential role in cycling of nutrients and transfer of energy from lower trophic level to higher in a food chain. They are classified as shredders, filter feeders and scrappers depending on the size of food such as FPOM, CFOM and organic debris as well as their functional feeding habit (Umar *et al.*, 2014).

Macro invertebrates are organisms used as a biological makers of water quality base on their responsiveness to alteration in ecological conditions of the environment, some can only be seen when the quality of water is within the acceptable or recommended limit while others can only be found when the quality of water is totally polluted (Umar, 2017).

Regardless of an assortment of studies on Physico-chemical characteristics and Benthic macro invertebrates distribution and abundance of water in Gombe state, readily available was no known study on water physico-chemical characteristics and Benthic macro invertebrates abundance and distribution of Garin Garba Stream, Tumu. Consequently, this investigation served as baseline information for further research. Its aimed at investigation of the physico-chemical characteristics and Benthic macro invertebrates distribution and abundance of Garin Garba Stream, Tumu, Gombe, Nigeria.

MATERIALS AND METHOD

Study Area

Garin Garba stream situated in the eastern part of Tumu Village in Akko Local Government Area of Gombe State. This Stream sourced its water from hilly rocks and discharge the water to Garin Garba river. It forms part of the abundant ecological habitat connected with Freshwater ecosystems in Gombe State. The Stream lies between latitude 10.02⁰8.8N and longitude 11.02⁰38.9E.

Figure 1: Map of study area showing Tumu, Gombe State, Nigeria



Sampling method

The Macro invertebrates collected using scoop net of mesh size 500um in each sampling station following the method employed by Umar *et al.*, (2014). The sample was collected fortnightly for a period of three months (April-June, 2019). Samples collected were cautiously preserved in 70% ethanol and 4% formalin and transported to the laboratory for sorting and identification to the lowest possible taxonomic level, using binocular microscope and taxa keys such as Umar *et al.*, (2013).

Physico-chemical characteristics

Water samples were collected from four different stations on the stream and mean values of the four stations were worked out and recorded. The sampling was conducted fortnightly between April-June, 2019. Sampling was done between 8.00am and 10.00am. The physico-chemical characteristics determined includes Temperature, pH, Electrical conductivity, Total dissolved solid, depth and width using digital meters as described by Umar *et al.*, (2018).

Benthic invertebrates Abundance and Distribution Estimation

The Macro invertebrates abundance were analyzed and presented using Excel Microsoft office. Shannon Weiner biodiversity index was employed to determine the Macro invertebrates abundance of each sampling station in Garin Garba Stream. Shannon Weiner's equation is given by:

$$H = -\sum P_i \ln P_i$$

$$H_{max} = \ln S$$

$$\text{Evenness (E)} = H/H_{max}$$

Where:

P=Proportion of total samples represented by species i

S= Species richness

H_{max}= Maximum diversity possible.

RESULTS AND DISCUSSION

Physico-chemical Characteristics

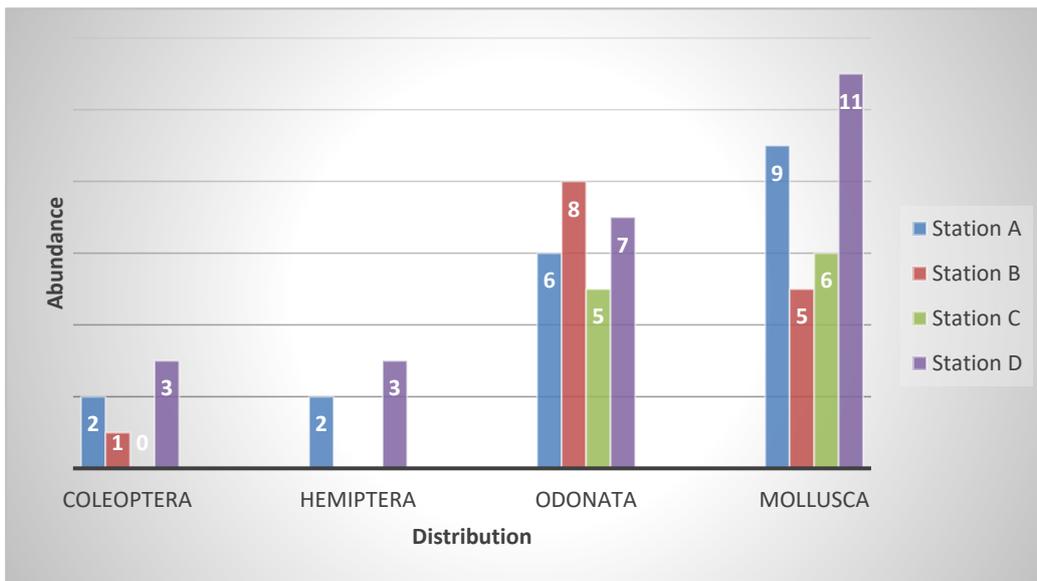
The results of physical and chemical characteristics of water in Garin Garba stream at four different sampling stations A, B, C and D were presented in table 1. Water temperature ranged between 25.8-27°C with the mean values of 26.3°C in the four stations of the stream. Station D had the highest mean temperature of 27°C while station B had the lowest temperature of 25.8°C (Table 1). The hydrogen ion concentration (pH) variation indicates that all the stations (A, B, C and D) had varied pH values of 7.9, 7.5, 7.7 and 7.8 respectively. Dissolved oxygen ranged from 6.4-6.9 mg/L in all the stations. Station A had the highest dissolved oxygen and stream C was lowest (Table 1). The highest turbidity was observed in station D with 0.4 NTU and the least turbidity level was in station B with 0.1 NTU respectively. The electrical conductivity of the four sampling stations ranged from 280-320 µS/cm. Station D recorded the highest with 320 while station A had the lowest with 280µS/cm. In terms of width and depth, all the stations ranged 2.0-4.0m depth and 3.8-5.2 width respectively (Table 1).

Table 1: The physico-chemical characteristics of Garin Garba Stream during the study period (April-June, 2019).

| Physico-chemical characteristics | Station A | Station B | Station C | Station D | Range |
|----------------------------------|-----------|-----------|-----------|-----------|---------|
| Temperature (°C) | 26.4 | 25.9 | 25.8 | 27 | 25.8-27 |
| pH | 7.9 | 7.5 | 7.7 | 7.8 | 7.5-7.9 |
| Dissolved Oxygen (mg/L) | 6.9 | 6.8 | 6.4 | 6.6 | 6.4-6.9 |
| Turbidity (NTU) | 0.3 | 0.1 | 0.2 | 0.4 | 0.1-0.4 |
| Electrical Conductivity (uS/cm) | 280 | 290 | 286 | 320 | 280-320 |
| Depth(m) | 2 | 3 | 3 | 4 | 2.0-4.0 |
| Width (m) | 5.2 | 3.8 | 4.6 | 4.2 | 3.8-5.2 |

Macro Invertebrates

The results of macro invertebrates recorded at four different sampling stations comprises of a total of 68 individuals' organisms of Macro invertebrates consists of five (5) numbers of family among the four (4) taxa of Coleoptera, Hemiptera, Odonata and



Mollusca were recorded through out the study period. The Mollusca were the most abundant benthic macro invertebrates taxon comprising 45.59% of the invertebrates abundance followed by Odonata with 38.24%, Coleoptera with 8.8%, and least abundant Hemiptera with 7.35%, (table 3, Fig. 2).

Figure 2: The distribution and abundance of macro invertebrates among four sampling stations in Garin Garba stream, 2019.

Table 2: Checklist of Macro invertebrates present in Garin Garba stream, Tumu, Gombe, Nigeria, 2019.

| Macroinvertebrates taxa | Station A | Station B | Station C | Station D | Total(%) |
|---------------------------------|-------------|-------------|-------------|-------------|------------------|
| Coleoptera | | | | | |
| Dytidae | 2 | 1 | 0 | 3 | 6(8.8) |
| Hemiptera | | | | | |
| Notonectidae | 2 | 0 | 0 | 3 | 5(7.4) |
| Odonata | | | | | |
| Gomphidae | 6 | 8 | 5 | 7 | 26(38.24) |
| Mollusca | | | | | |
| Mellanoidea | 4 | 3 | 2 | 4 | 13(19.12) |
| Limnaea | 5 | 2 | 4 | 7 | 16(26.47) |
| Shannon Weiner index (H) | 1.5 | 1.11 | 1.03 | 1.54 | |
| Evenness (E) | 0.94 | 0.69 | 0.65 | 0.96 | |

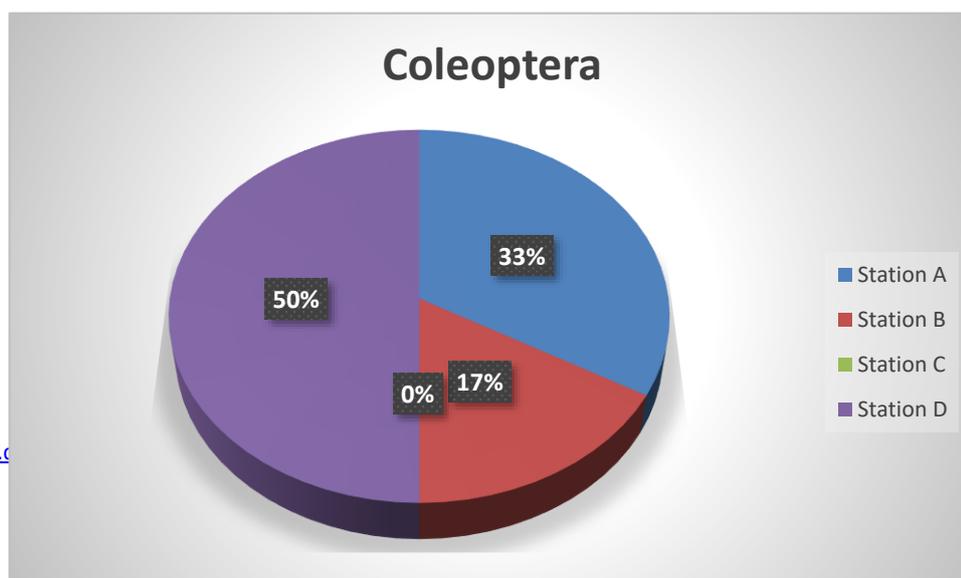
| | | | | |
|---------------------------------|------------|-------------|------------|------------|
| Richness(S) | 5 | 4 | 3 | 5 |
| Maximum diversity (Hmax) | 1.6 | 1.39 | 1.2 | 1.6 |

Table 3: Distribution and abundance of macro invertebrates among four sampling stations in Garin Garba stream, 2019.

| Macroinvertebrates taxa | Station A | Station B | Station C | Station D | Total | Abundance (%) |
|-------------------------|-----------|-----------|-----------|-----------|-------|---------------|
| Coleoptera | 2 | 1 | 0 | 3 | 6 | 8.82 |
| Hemiptera | 2 | 0 | 0 | 3 | 5 | 7.35 |
| Odonata | 6 | 8 | 5 | 7 | 26 | 38.23 |
| Mollusca | 9 | 5 | 6 | 11 | 31 | 45.59 |
| Total | 19 | 14 | 11 | 24 | 68 | |
| Distribution (%) | 27.94 | 21.88 | 16.18 | 35.29 | | 100% |

Coleoptera

Stations variation of Coleoptera showed that there was highest population count at station D and lowest count at station C (Figure 3). Stations variation showed that stations D and A with total population count of 3 and 2 individual organisms respectively higher than stations B and C with total population count of 1 and 0 individual organisms (Table 3). The Coleoptera identified



during the study period include family Dytisidae (Table 2).

Figure 3: Distribution and abundance of Coleoptera among four sampling stations in Garin Garba stream, 2019.

Hemiptera

The Hemiptera accounted for 7.35% of the population count of benthic invertebrates (68) with a total of five (5) individual organisms identified during the study period (Table 3). The study revealed that there was higher Hemiptera in station D with 60% of individuals followed by station A with 40%, while station C and B no species recorded (Fig. 4). Hemiptera identified during the study period include family Notonectidae

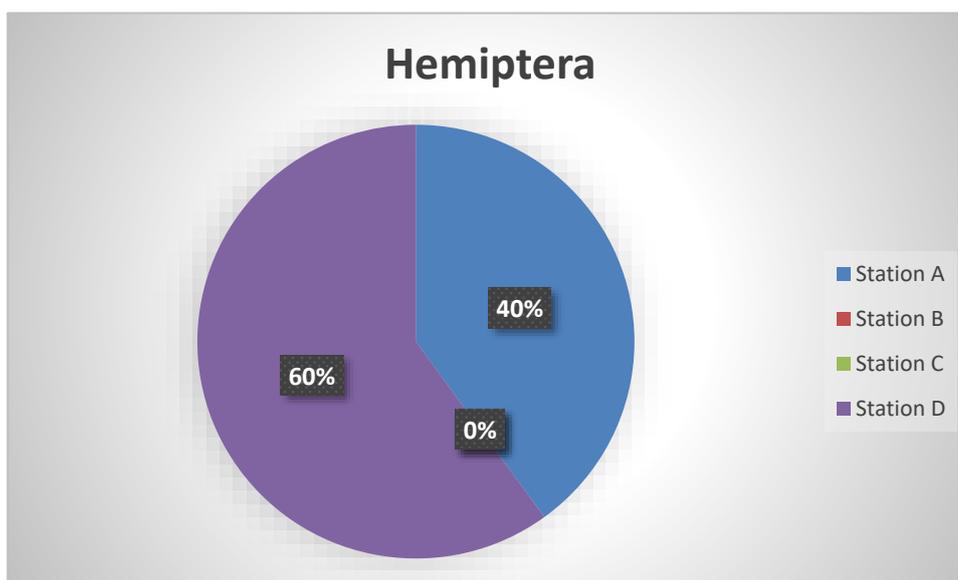


Figure 4: Distribution and abundance of macro invertebrates among four sampling stations in Garin Garba stream, 2019.

Odonata

The Odonata accounted for 38.23% of the population count of Macro invertebrate (68) with a total of twenty six (26) individual organisms identified during the study period (Table 3). The study revealed that there was higher Odonata in station B with 31% of individuals followed by station D with 27%, station A with 23% and C with 19% (Fig. 5). Odonata identified during the study period include family Gomphidae.

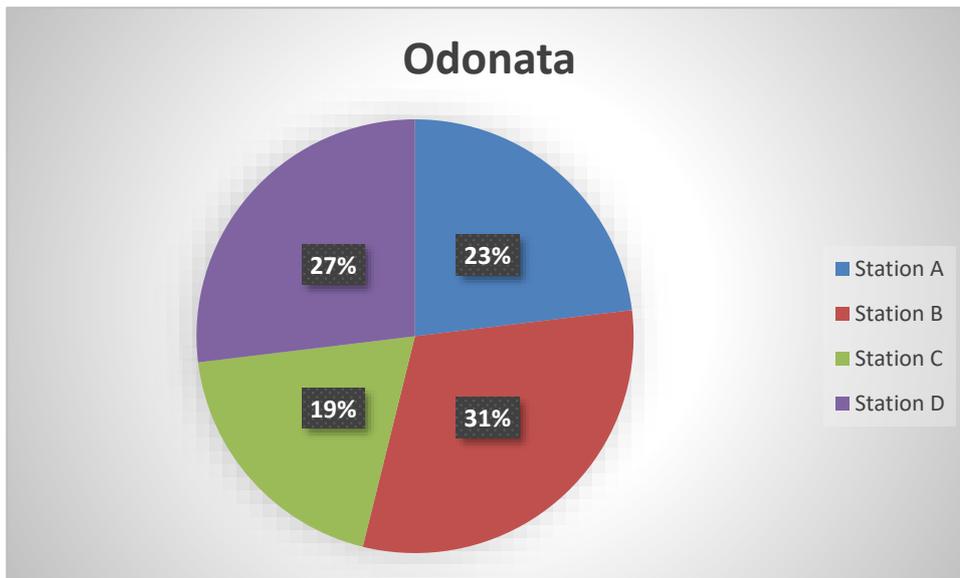
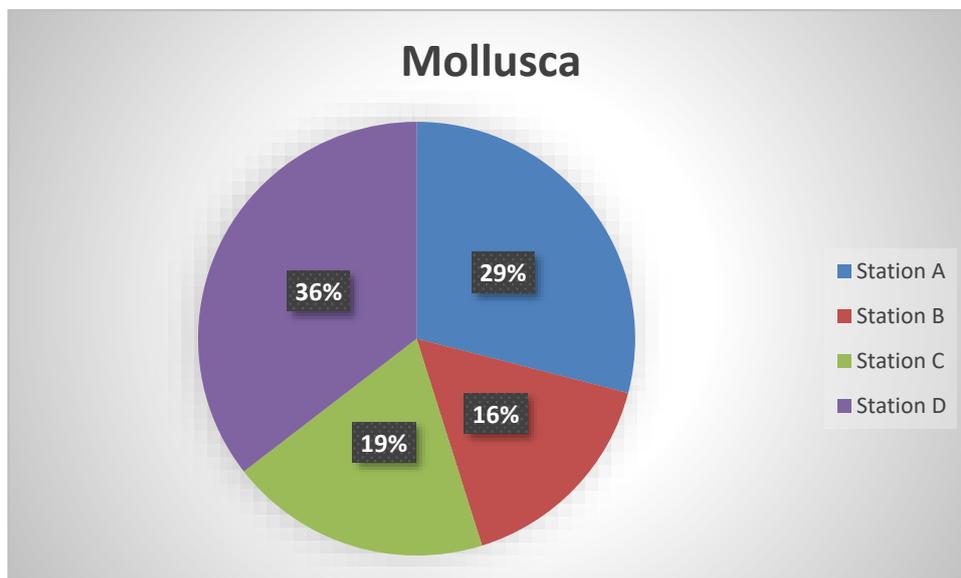


Figure 5: Distribution and abundance of macro invertebrates among four sampling stations in Garin Garba stream, 2019.

Mollusca

Stations variation of Mollusca showed that there was highest population count at station D and lowest count at station B (Figure 6). Stations variation showed that stations D and A with percentage of 36 and 29 respectively higher than stations B and C with 19 and 16 percent (Table 3). The Mollusca identified during the study period include Mellanoides and Lymnadae (Table 2)

Figure 6: Distribution and abundance of macro invertebrates among four sampling stations in Garin Garba stream, 2019.



DISCUSSION

The physical and chemical characteristics of the four sampling stations in Garin Garbage stream were in line with condition of some lowland tropical streams, which indicated that the temperatures recorded in all the sampling stations of the stream were within the tolerable limit for the proliferation, continued existence and development of aquatic organisms and it is in agreement with the findings of Umar *et al.*,(2018) in Dadin Kowa Streams. Longevity and abundance of various streams are mostly dependant on water temperature and any slight change of the mean temperature in the stream could alter the abundance and distribution of flora and fauna of the water (Umar *et al.*, 2018). The hydrogen ion concentration (pH) values recorded throughout

the period of study lies within the recommended range (6.5-9) as suitable for survival, reproduction and growth of aquatic living organisms. Adjustment in pH may directly or indirectly affects the aquatic life because all metabolic processes exhibited by water organisms are pH dependant (Okafor *et al.*, 2013). Turbidity in the water may resulted due to organic and inorganic constituents. Throughout this study the recorded turbidity mean were between 0.1-0.4m which is below the recommended standard figure for turbidity by WHO, (2011). Consequently, this finding agrees with the findings of an ealier study which reported a mean turbidity value of 0.06m in some streams in Dadin Kowa (Isah *et al.*, 2018 and Umar *et al.*, 2018). Dissolved oxygen concentration in natural waters depends on the physical, chemical and biochemical activities in the water body. Dissolve oxygen values recorded during this study were slightly higher than the permissible limit of 5.0mg/l. This agrees with the findings of Umar *et al.*, (2018) who reported highier DO of 7.0mg more than the WHO standard value in a study conducted in Dadin Kowa, Gombe, Nigeria. Electrical Conductivity indicates the presence of ions such as magnesium ion, calcium ion in the water which is usually due to the salt intrusion and leaching. The electrical conductivity is an essential water quality characteristic for indicating risks associated with salinity and dissolved substances in the water. The value of electrical conductivity recorded were intermediate and hence suitable for the abundance and distribution of organisms.

The total number of invertebrates observed from this research is quite abundant and this is conform by the fact that streams in tropical were mostly dominated a huge number of invertebrates compared to temperate streams (Sharma and Samita, 2011). In addition, rivers found in tropical region tend to proliferate rapidly; the rate of reproduction and relatively high primary productivity has been suggested as factors responsible (Oscar *et al.*, 2015). Macro invertebrates are very essential in indicating ecosystem dynamism in water environment in relation to human disturbances. Benthic invertebrates distribution is mostly affected by the nutrients available and habitat rather than the chemical and physical characteristics (Oscar *et al.*, 2015).

Similar results of distribution and abundance of Macro invertebrates have been reported by Hassan and Umar (2018) and Abbati *et al.* (2020) stated that Mollusca is the most frequent organisms found in Kodon Stream, Gombe State and Lande Stream Tumu, Gombe State and contrary to the finding of Umar *et al.*,(2014) who reported Odonata as the most abundant macro invertebrates in three contrasting streams of Dadin Kowa, Gombe State Nigeria. The abundance of Mollusca in Garin Garba Stream, Tumu may be due to their adaptation strategy to changes in ecological condition and ability to bear up different ecological struggle. Dynamism and alteration in the substrate composition around the Stream stations caused by anthropogenic activities such as bathing, car washing and farming is believed to add more external substances into the water which eventually affects the whole physical and chemical characteristics of the water and hence made it an unfavorable condition for proliferation, survival and development of aquatic organisms. This is in agreement with a work reported by Hassan and Umar, (2018) and Hynes, (1970) who simultaneously reported that the alteration of substrate composition associated with various types of organic contamination have key impact on the bottom community in the stream.

Mostly, the benthic invertebrates found in the Stream served as a biological indicator or biomarkers of water quality. Therefore, any inputs of foreign substances from riparian land used may deplete the amount of dissolved oxygen present and seriously affect the living organisms that largely required an oxygen for their metabolic activities. The higher the invertebrates that utilized more oxygen, the higher will be the quality of water and vice versa. Therefore, Mollusca are organisms that can survived high ecological struggle (Umar, 2014). The abundance of Mollusca in Garin Garba Stream Tumu indicated that, the Stream is very susceptible to pollution.

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Nature Based Eco-Tourism Projects as A Strategy to Leverage Hiv/Aids Prevalence Along The Beaches of Usenge and Mageta Island, Usigu Division, Siaya County, Kenya

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Abstract- In Kenya ecotourism is seen as having the potential of driving the economy for locally directed developments based on utilization of the ecosystem and cultural resources. The study explores how nature based eco-tourism products can leverage the fight against HIV/AIDS in Usigu Division. This study sought to establish nature based ecotourism products in Usigu Division that can be explored to leverage prevalence of the pandemic. This study was anchored on Product Branding Theory and conducted through a descriptive research design. Research population consisted of beach assembly members. The study hypothesized that: H1: There is a significant relationship between nature based eco-tourism projects as a strategy to leverage the fight against HIV/AIDS prevalence on the islands and Beaches of Usigu Division. The Hypothesis was accepted and concluded that nature based eco-tourism products projects could leverage the fight against HIV/AIDS prevalence on the islands and beaches of Usigu Division. The finding established that, the natural attractions in Usigu Division can promote eco-tourism activities and reduce poverty, and that there are plenty of nature based opportunities for ecotourism projects. The study recommends the Branding and marketing of Usigu nature based products and destinations such as natural attractions, and heritage sites.

Index Terms- Ecotourism, Ecotourism projects, Nature based products, Heritage sites, Livelihood, HIV/AIDS prevalence. Branding and destinations

I. INTRODUCTION

Ecotourism projects remains the hope of the future for many developing countries given that agriculture and dwindling fish resources which has been the mainstay economic activity is facing adverse effects of climate change (Hayombe, 2011). In USA, of the 1200 tour operators listed in the National Tour Association (NTA), 62 offered eco-tours (5%). Domestic and international travellers made nearly 287 million recreation visits to the 378

recreation areas administered by the U.S. National Park Service (NPS) in 2008 compared to the 275 million visits in 2007 this is an increase of 4.4% (Travel Industry Association of America, 2008). Travel to the United States National Parks Service areas generated direct and indirect economic impacts for local communities to the tune of US\$14.2 billion and supported almost 300,000 tourist-related jobs during 2008 (Tourism Works for America, 2008). In Germany, according to the information of the German Travel Agency and Tour Operator Association (DRV, 2008), at least 122 tour operators specialize in ecotourism, which is around 6 – 8% of all tour operators. The vast majority of these tour operators are either small or very small. For this reason the estimated share of ecotourism trips among all package tours sold in Germany is less than 1 % (WTO, 2008).

In Spain, an approximation of 5-6% of the outbound tourism departures can be considered as nature or eco-tourism according to a survey of 20 tour operators (WTO, 2008). There are an estimated 600 ecotourism operators in Australia today, approximately 85% of these, employs more than 20 staff members. Ecotourism businesses are estimated to have an annual turnover of some \$250 million, and employ a total staff of around 6500 staff members, the equivalent of 4500 full-time staff (Australian Government, 2009). There has been a considerable increase of international visitors to Australia's national parks, with a rise in visitor numbers between 2004 and 2007 from around 1.2 million to more than 1.6 million, an increase of 33.3 per cent. By 2008, this figure had increased to nearly 1.7 million, or 47% of all inbound visitors to Australia aged 15 and over reported having visited national parks (Australian Government, 2009). In Australia, recent research found eco-tourists to represent nearly 30% of domestic travellers (McLaren, 2008).

In Brazil, there are more than 150 conservation areas, of which 40 are National Parks. An estimated number of 3.5 million visitors went to these National Parks in 2008. Especially the last few years the number of foreign eco-tourists has grown, it had 600,000 Brazilian eco-tourists and attracted 200,000 foreign eco-tourists in 2008 (Janér, 2008). According to (WTO, 2007), the

current increase in international tourist arrivals is projected to be around 4%, much in line with the forecast long-term annual growth rate of 4.1% through 2020. In 2004, ecotourism was growing globally 3 times faster than tourism industry as a whole, WTO (2008) stated that ecotourism and all nature-related forms of tourism account for approximately 20%, of total international travel, Fillion (2008) identified, through an analysis of inbound tourist motivations to different worldwide destinations that 40-60% of all international tourists are nature tourists and that 20-40% are wildlife-related tourists.

In Africa, major destinations such as South Africa, Kenya and Morocco all continued to post excellent results in ecotourism, South African Tourism Board, (2008). In 2008, an average of 36.7 million tourists visited Africa, up from 33.3 million in the previous years, compared to some 443 million tourists who visited European countries in the same period. In the period of 1996 to 2008, the number of visitors to game and nature reserves in South Africa grew by 108% annually. Game and nature reserves were the number one activity for visitors to the country in 2007 (60%), rising by 2% over the previous year (South African Tourism Board, 2008). In Kenya, the Government recognises eco-tourism as having the potential of driving the economy especially for locally directed and participatory rural development based on a rational utilization of the ecosystem, environmental and cultural resources on which tourism and ecotourism relies on for instance, Kenya and Mozambique turned out to be the fastest growing tourism destinations (Mclaren, 2008). In Tanzania and Kenya, Wildlife attracts over 75 percent of the tourists. According to the Central Bureau of Statistics (CBS, 2008), 1.68 million tourists visited Kenya in 2008, 23 percent more than 2007. The sector contributed Ksh48.9 billion to the national revenue. This was up from Ksh42 billion realized the previous year, (Africa WTO, 2008). Kenya quest therefore to be one of the top ten long-haul tourist destinations globally require a strategic focus as envisaged in Kenya's Vision 2030. Eco-tourism is therefore emerging as an alternative development path to enhance source of sustainable livelihood (Hayombe, Agong, Nystrom, Mossberg, Malbert & Odede, 2012).

II. REVIEW OF RELATED LITERATURE

Eco-tourism projects has the potential to alleviate poverty through resource mobilization into the economy and creating jobs while providing alternative ventures to the communities (Clarkin & Kahler, 2011). With the growing of ecotourism cultural ventures and heritage, there is a great opportunity to capitalize on eco-tourism ventures to ensure that the people living in the areas being visited are benefiting from the economic growth (Tuohino & Hynonen, 2009). Ecotourism activities involves the community participation, where the local people's voices are heard and their engagement recognized, it is essential for eco-tourism ventures to be utilized through involving the full participation of the local people (Buckley, 2004). Eco-tourism activities involve inclusion of local people's skills to create employment for themselves and others through eco-ventures. In some instances, local job creation and economic development of the local vulnerable groups are facilitated, contributing to the alleviation of poverty and supports the achievements goals and criteria for success and community developments (Cater & Lowman, 2004). Another move is the

growing number of community led and managed ecotourism initiatives in which rural communities capture the bulk of the benefits through eco-ventures and artifacts (Honey, 2008).

Through ecotourism projects, the communities exploit natural and cultural heritage to reduce poverty, enhance livelihood, transform the community and support local development (Agong, Odede & Ananga, 2012). The money generated can be used to help the poor fishermen and fishmongers living along the beaches to improve their economic status and empower them to fight the pandemic. The more, the involvements of the local people have in the management of ecotourism and tourist ventures in their areas, the more likely they will benefit economically (Duffy, 2000). Another benefit gained by the people living where eco-tourism is utilized is better roads, hospitals, schools and communication. Most of the areas that eco-tourism is developed are remote areas where the people do not have access to these facilities (Sharma, 2008). When eco-tourism projects are developed, there is necessity for roads, communication and schools for the travelers to visit and spend their money. According to (Naughton, 2005), Conservation cannot solve poverty, but it can significantly help to prevent and reduce poverty by maintaining ecosystem services and supporting livelihoods. Through the use of eco-tourism, ecosystems are conserved and local peoples are supported through jobs creation and better economies (Mathesen, Alister & Geoffrey, 2009).

As one of the three pillars of the economic success, ecotourism is a dynamic activity that is constantly evolving to cater for new needs and challenges ((Barkin, 2002). Eco-tourism in return also creates opportunities through which economic benefits can be generated from the environment, culture and heritage (Honey, 2008). Through this, eco-tourism can be utilized to combat the spread of HIV/AIDS through Poverty alleviation in the Islands and along the beaches due to its potentials to create alternative livelihood. Eco-tourism is growing three times faster than tourism (Ndaskoi, 2003). Ecotourism protects local cultures and empowers indigenous peoples to preserve cultures, while providing visitors with unique opportunities to learn about the unique community practices and heritage as they visit and contribute to its success. Tourist seeking unique experiences to help preserve cultural heritage and environment and the need to help address various challenges facing the communities including poverty and HIV/AIDS pandemic (Clem, 2002). This contributes flexibility to adopt to change by the community to eco-ventures and other ecotourism activities, the growing significance of eco-tourism as an economic activity is reflected in the rising recognition it has been given due to its vital role as development tool and contribution in curbing socio-economic challenges such poverty and HIV/AIDS pandemic (Butler & Hinch, 2008).

Eco-tourism Society of Pakistan (ESP) asserts that ecotourism is a travel activity that ensures direct financial support to local people where ecotourism activities are being generated and enjoyed. It ensures respect for local cultures, and supports community participation to ensure that money flows to local economies to finance protection of the environment and preserve cultural heritage, thus ecotourism is major industry of the economy as it represents a significant portion of the gross domestic product and economic activity (Kin, 2002).

It improves benefits to local people who do not have the capacity to develop themselves, provides access and turn eco-

benefits for local developments (Demetrio, 2008). The eco-tourism products includes activities that enhance quality of life and health of people living within the eco-tourism destinations enabling them focus on nature based products, socio-cultural products and encourage ordinary community members to participate and benefit from eco-ventures thus changing and providing alternative livelihood to marginalized fishing communities living along the lake and the Islands within the lake Victoria region (Elper, 2008). The fishing communities are renowned for their traditional crafts, artifacts, boat riding, nature trail, basketry of which are some of the most popular practiced by many groups within the beaches and Islands offering individualistic designs and patterns (Martin & Ian, 2010). These useful skills can be harnessed for ecotourism gain and help support livelihood through cultural heritage and socialization process in the community (Odhiambo & Odede, 2012)

Eco-tourism projects has a significant contribution in alleviating poverty which is the cause of poor health and is an important sector with potentials to fight the spread of HIV/AIDS among the fishing communities by utilizing the potentials of eco-tourism potentials in fighting or combating HIV/AIDS among the fisher folk communities (Scheyvens, 2004). There are several eco-tourism activities that can be utilized to create awareness on the spread of HIV/AIDS and promote behavior change process among the fishing communities by providing alternative livelihood to the fishing communities of Lake Victoria (Mayaka & Prasad, 2011).

The concern for the utilization of eco-tourism projects to combat HIV/AIDS among the fisher folk living in the Island and beaches of Usigu is based on the fact that eco-tourism has a great potential to change the life style of fishmongers and fishermen to get income from eco-ventures, heritage sites and other activities available around the beaches and the islands to provide alternative source of income which is sustainable (Martin & Ian, 2010). It's noted that the fish catch has become scarce due to overfishing and climate change and hence high competition among fishermen and fishmongers for the resources (Allison & Seeley, 2004). It is also evident that the Island and the beaches have potential eco-tourism attraction that can provide alternative income through eco-ventures.

Eco-tourism project products such as artifacts, heritage sites among others are useful for alleviating the HIV/AIDS impact and reduction of poverty through provision of alternative income and employment creation thereby improving local economy and promotion of local developments, such activities like local tour guides, making of crafts and potteries by the local community members can transform the fishmongers and fishermen to fully engage on eco-tourism activities, thereby reducing poverty level responsible for HIV/AIDS spread (Haacker, 2002). This is often identified as a promising growth sector especially in small islands and beaches in the developing countries. It offers one of the few opportunities for economic diversification for the fisher folk (Honey, 2008). Through linkages with other sectors and integrated into national and County economic development plans with adequate provisions for inter-sectoral linkages, Ecotourism can contribute to the growth of all major economic sectors like fishing, agriculture, transportation and other service industry (Chiutsi, Mukoroverwa, K arigambe & Mudzengi, 2011). The economic benefits derived from eco-tourism are diverse, in some islands in

the developing states, eco-tourism has become the major contributor to the gross domestic product (Barkin,2002).

The promotion of eco-tourism projects as a growth sector to accelerate the development at national County and local level, support gainful employment, foreign exchange earnings and other tax revenue to the government and the local people are some of the advantages of ecotourism (Briffa& Lee,2004). It plays an important role in the growth and development of Small Island and the beaches if appropriate measures are taken to support other sectors, in particular agriculture and fishing, so that they can more adequately meet the eco-tourism demand for consumer goods and services (Ziffer, 2003). For some islands and beaches, with careful planning and provision of adequate facilities such as credit for modernization and diversification, where necessary, support viable fishing and agricultural activities as well as eco-tourism can easily be utilized to reduce poverty and HIV/AIDS (Barnett& Whiteside, 2002). The high rate of HIV/AIDS infection also calls for urgent need to assess the socio-economic impact of the pandemic in the country and especially the impact on rural household fishing communities included. The HIV/AIDS related burden of disease increases the demand for medical care; the pandemic also affects the health workforce in terms of increasing emotional, physical and mental stress (Morgan, Mahe & Mayanja, 2002).

The HIV/AIDS infected are often brought to the hospital at an advanced stage of illness resulting into high death rates combined with the limited possibility of effective care contribute to professional frustration, higher absenteeism and burnout and low staff morale. Eco-tourism can be of great importance in promoting income generation to the communities (Isaacs, 2010) and hence reduce economic burden of HIV/AIDS. The benefits that accrue from eco-tourism activities can reduce the burden caused by the pandemic through reduction of poverty and income capacity improvement to the communities (Kamauro, 2006). Eco-tourism activities may go a long way to minimize the potentials social and economic impact of HIV/AIDS especially to the fishing communities in Africa if greater understanding of the economic opportunities associated with eco-tourism is explored and utilized (Barkin, 2002).It's therefore necessary to identify and utilize the ecotourism products along the beaches and Islands for economic empowerment to the fisher folk.

III. THEORETICAL FRAMEWORK

This study was anchored on branding Theory. This theory seeks to promote the ecotourism destinations with the potentials of economic growth and development. The Branding Theory was advanced by Anholt (2007) and is applied to places (destinations) for variety of reasons and purposes, which include product promotions/ marketing and increase of exports, attraction of new investments and diversification of revenue generation streams of ecotourism destinations. The (destinations) Place Branding Theory is relevant to the study because it focuses on the promotion of the destination value and places or seeks to position that destination as a potential target market segment for ecotourism activities.

The Theory has been applied in diverse attempts to conceptualize and understand the dynamics of ecotourism potentials and markets places/destinations. Historically these

involved about the relationship between ecotourism products like cultural heritage, nature and society, including resource and social processes, the split and the interplay between, environment, cultural heritage, traditional practices and economic diversity as ecotourism products and sustainable income for the communities (Gordon, 2010).

The Theory promotes economic and social development to impact on the welfare of the community and the beneficiaries, this effect is reflected through the monetary form and the market mechanism for ecotourism product. The Branding directly affects the economic environment and other economic benefits through promotion, income, empowerment and price influences. Through this, communities develop interest in ecotourism activities and eco-ventures while shunning away from fishing activities and fish trade which contribute to high prevalence of HIV/AIDS through fish for sex behavior. The development of ecotourism industry is advantageous to local communities to change the ideas of traditional values, practices and the way of life and production, realizes the replacement of traditional practices like farming, fishing, fish trade, utilizes nature based products and resources like ecotourism in the form of non-consumption, promotes the development of local communities by use of local resources in the local economy to address local health challenges (Saayman, 2012). At the same time, ecotourism activities help the communities to explore their local cultural and natural resources for development and economic empowerment. The branding theory therefore markets the places and products as ecotourism destinations.

While there is criticism that ecotourism environment has its own carrying capacity and that ecological tourists may bring pressure to the ecological environment inevitably when they carry on eco-tourism activities (Cater, 2004). Natural and historical humanities resources are the foundations of developing ecotourism as a source of communities' income, as opposed to other traditional activities like fishing, fish trade, farming among others which contribute to health challenges. The development of ecotourism is based on the carrying capacity of ecological environment (Kamauro, 2006). The economic activities and driving of benefits are in the guiding ideology of developing ecotourism in many places, while environmental and social benefits are ignored, and the phenomena that some places gain short-term benefits at the cost of long-term benefits and environmental protection often occur. It emphasizes that, the communities become too much focused in creating jobs and provide alternative platform for local development through the ecosystem and more particularly ecotourism attractions. Likewise, this trend could lead to conservation so that the communities view ecotourism as viable livelihood.

IV. STUDY OBJECTIVE.

To establish nature based eco-tourism products that can enhance and promote eco-tourism as a strategy to leverage the fight against HIV/AIDS prevalence on the islands and Beaches of Usigu Division, Siaya County, Kenya

V. RESEARCH METHODOLOGY AND DESIGN

This study was conducted through a descriptive research design which described the situation and state of affairs and conditions that currently exists. To define the descriptive type of research, Creswell (1994) stated that the descriptive method of research is to gather information about the present existing condition. The emphasis is on describing rather than on judging or interpreting. The aim of descriptive research is to verify formulated hypotheses that refer to the present situation. The descriptive research design is appropriate because it is not restricted only to the fact findings, but may often result in the formulation of important principles of knowledge and solutions to problems (Kerlinger, 2009). This design was selected to facilitate rapid and cost effective collection of data and for its potential to enable one to understand a population from a sample and to allow the researcher to adopt a holistic approach of the study sample, thus enabling and utilizing research tools like questionnaires and Focused Group Discussion guides, moreover, It is a flexible approach when important new issues and questions arise during the duration of the study, further investigation may be conducted. The researcher equally obtained information from a sample rather than the entire population at one point in a given time.

Target Population

Research population of the study consisted of beach assembly members who included fishmongers, fishermen, beach leaders, youth groups, beach management units (BMU's), and beach interest groups in Usigu, Bondo Sub-County. Multistage sampling was utilized: cluster sampling was used to segregate the population into distinct subpopulations representing the target population; this formed the primary sampling units (PSU), further sampling was done to identify locations/groups from which individuals assembly members were drawn from. Purposive sampling techniques was then engaged to identify key informants and respondents knowledgeable in the field of study who constituted the focus groups members, this sampling technique was also used by Lwonga (2009) because it involved selection of individuals or objects that yielded the most information about the topic under investigation.

Sample size and selection

Purposive sampling techniques were used to settle on the beach assembly members of study. The sample size of 397 respondents drawn from beach assembly members

Sample Techniques.

The study used stratified sampling procedure to divide the population into subgroups. The samples were stratified according to the groups in the beaches. Using the Yamane formula, a sample of 397 consisting of beach assembly members was selected.

Data collection and analysis techniques

Data collection was from two main sources; Secondary and Primary. Secondary sources included relevant documents and reports, beach assembly records, journals, articles among others. The data was collected by reviewing available literatures or publication in relation to the Research topic. Primary sources data was collected from selected respondents. Primary data was gathered using Focused Group Discussion Guides and

Questionnaires. The use of the two approaches at the same time in basic research was recommended by (Gay, 2006) as the best way to get sufficient results.

Data was analyzed using Inferential and descriptive statistics (mean test) then presented using frequency and percentage tables. A multiple regression and correlation statistical analysis (Using SPSS version 11.5) was used to determine the degree of association among the factors that were associated with the study objectives. Multiple regression analysis was conducted to determine the variables that had the greatest degree of association. A correlation analysis was conducted to examine patterns of correlation among all the original variables included in the regression analysis as well as the predicted dependent variable score.

To test the Hypothesis, the independent t-test was used to determine the difference and relationships within and between populations in the data. The p- value was set at level 0.05. Cross-tabulation was used to show the interrelationship between the independent variables and the dependent variable. The number of respondents who responded to a particular option were recorded in one column and percentage calculated and recorded in another column. The strength of percentages indicated the preferred response. Results from quantitative data was presented by use of frequency distribution in form of frequencies and percentage

tables while responses from qualitative data were grouped into themes based on the objectives of the study and reported

VI. RESULTS AND DISCUSSIONS.

The aim of the study was to assess the role of eco-tourism projects as a strategy to leverage the fight against HIV/AIDS prevalence on the islands and beaches of Usigu Division, Bondo sub-county, Siaya County. The Principal guiding factor on the data analysis presented in this chapter was the objectives of the study. A sample size of 397 respondents selected through purposive sampling techniques from accessible population consisting of beach assembly members.

The study hypothesized that: H₁ There is a significant relationship between nature based eco-tourism projects as a strategy to leverage the fight against HIV/AIDS prevalence on the islands and Beaches of Usigu Division. Using the p- value to test the hypothesis significance level: 0.05% (95%), Decision Rule: Reject the H if the p -value is less than 0.05. P value was 0.076, more than 0.05. The Hypothesis was therefore accepted and concluded that nature based eco-tourism projects could leverage the fight against HIV/AIDS prevalence on the Islands and beaches of Usigu Division.

Table 4.1: No. of respondent against their age in Usigu Division

| Age | Frequency | Percent | Valid Percent | Cumulative Percent |
|--------------|------------|------------|---------------|--------------------|
| 20-29 | 130 | 35 | 35 | 35 |
| 30-39 | 144 | 39 | 39 | 75 |
| 40-49 | 45 | 12 | 12 | 87 |
| 50-59 | 39 | 11 | 11 | 98 |
| 60< | 9 | 3 | 3 | 100 |
| Total | 367 | 100 | 100 | |

Table 4.2: Comparison on Age and against sex of the respondent cross tabulation

| Age | Sex | | Total |
|--------------|------------|------------|------------|
| | Male | Female | |
| 20-29 | 56 | 65 | 121 |
| 30-39 | 48 | 105 | 153 |
| 40-49 | 10 | 35 | 45 |
| 50-59 | 30 | 9 | 39 |
| 60< | 3 | 6 | 9 |
| Total | 147 | 220 | 367 |

Source: Field survey 2014

Table 4.1 and 4.2 above, 130 (35%) of the respondents fell within the age bracket of 20 – 29 years, while 144 (39%) of the Respondents fell within the age bracket of 30 – 39, 45 (12%) of the respondents were in the age range 40 – 49 years, 50-59 age range of respondent represented 39 (11%). Only 9 (3%) of the

respondents were 60 and above years of age. As can be observed from Table 4.2, 74% of the respondents fell below 40 years of age a sign that beach activities were mostly engaged by respondents below the age of 40.

Table 4.3: Community listing of some nature based eco-tourism project products that can leverage the fight against HIV/AIDS in Usigu Division

| Perception | Frequency | % |
|--|-----------|----|
| Environmental factors, Sceneries, | 245 | 62 |
| Historic factors, | 29 | 7 |
| Marine, birds, wildlife, heritage sites, | 123 | 31 |

Source: Field Survey 2014

Table (4.20) provided a variety of listed nature based products, 245 (62%) of the respondents were in support of environmental factors and sceneries as some of the nature based eco-tourism products that could leverage the fight against HIV/AIDS through economic empowerment. A stronger distribution of 123 (31%) respondents suggest that marine, birds, wildlife and heritage sites were some of the nature based eco-tourism products that could leverage the fight against HIV/AIDS,

while 29 (7%) of the respondents felt that Historic factors were nature based eco-tourism products that could leverage the fight against HIV/AIDS.

During the focused group discussion respondents expressed that marine, birds, wildlife, heritage sites, were not properly utilized in Usigu division, they equated the sceneries found within their community to those found in most well known national parks yet in Usigu division such resources were untapped.

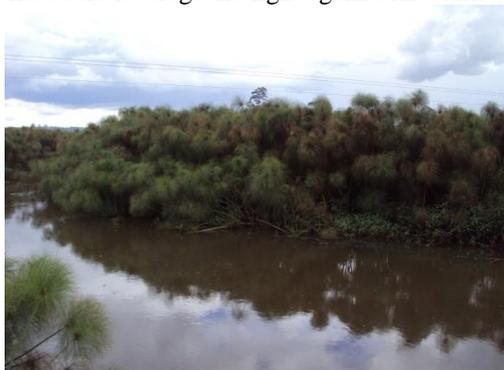


Plate 10: Goye beach- wetland –Usenge beach



Plate 11: Nature trail- Mageta Island wetland

Table 4.4: The perception of respondent on natural attractions available in the beaches and islands that can promote ecotourism and reduce poverty and HIV/AIDS prevalence in Usigu Division

| Category | Frequency | Percent | Valid Percent | Cumulative Percent |
|--------------|------------|------------|---------------|--------------------|
| SA | 147 | 40 | 40 | 40 |
| A | 161 | 44 | 44 | 84 |
| UD | 44 | 12 | 12 | 96 |
| SD | 15 | 4 | 4 | 100 |
| Total | 367 | 100 | 100 | |

Source: Field Survey, 2014

Table (4.21) statements touching on Respondent’s feelings on perceived relationships between natural attractions available in the beaches, eco-tourism, poverty and HIV/AIDS were sought and presented as follows: 147 (40%) of the

respondents felt strongly that there were natural attractions in the beaches and the Islands that could promote eco-tourism and hence reduce poverty and fight against HIV/AIDS prevalence, while 161 (44%) of the respondents were in agreement that there were

natural attractions based opportunities for ecotourism promotion and income as opposed to fishing activities which leads to HIV/AIDS prevalence, 44 (12%) of the respondents had no



Plate 13: Bird watching Sika beach Usenge

opinion, while only 15 (4%) had contrary opinion that there were natural attractions sites available for ecotourism activities which could be exploited for ecotourism activities.



Plate 14: Mageta Island Mau Mau detainee Camp - Nature - trail

VII. CONCLUSION AND RECOMMENDATIONS.

Nature based eco-tourism projects and products can enhance facilitate eco-tourism activities as a strategy to leverage the fight against HIV/AIDS prevalence on the Islands and Beaches of Usigu Division through a stronger distribution respondents established that marine, birds, wildlife, heritage sites, were not branded and marketed in Usigu division. Respondents strongly agreed that nature based ecotourism activity can support the fight against the pandemic. They further stated that the natural attractions in the beaches and the Islands can promote eco-tourism and hence reduce poverty and fight against HIV/AIDS prevalence and that this was a growing concern with plenty of nature based opportunities for ecotourism promotion and income as opposed to sex for fish activities which accelerates the spread of the pandemic.

Conclusion

There is need to empower beach communities including women fish mongers and the youth beach boys and girls to engage in nature based ecotourism projects as critical in order to tackle the HIV/AIDS prevalence in Usigu Division. The study concludes that natural attractions in the beaches and the Islands can promote eco-tourism and hence reduce poverty and fight against HIV/AIDS prevalence by providing alternative occupation and income as opposed to dwindling fish resources.

Recommendation

The researcher recommends that the beach ecotourism project sites be identified, branded and marketed while proper design of eco-tourism plan and programs be undertaken to provide and include an incentive and strategy for HIV/AIDS fight especially through triggering positive economic change to the beach communities and especially fishermen and fishmongers, furthermore, development of a greater understanding on how to make or promote ecotourism business for fishing communities as an effort to provide alternative source of livelihood from fish trade to eco-tourism business as an effective means to reduce the spread of the HIV/AIDS pandemic through reduction of fish for sex behavior.

The researcher also recommends the Branding and marketing of Usigu nature based products projects and

destinations including natural attractions, artifacts and cultural and heritage sites.

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Canine parvovirus infection in young German Shepherd dog : A Case Report

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Abstract- Canine parvovirus infection is serious life threatening infectious viral disease and major cause of death in young puppies. Due to lack of proper vaccination , mismanagement and lack of knowledge about proper vaccination schedule to pet owners are key cause of occurrence of canine parvo viral disease in Nepal. The disease occurs in two form intestinal and cardiac form in which occurrence of intestinal form is higher with hemorrhagic enteritis. The German shepherd dog of 6 months old was presented at Central Referral Veterinary Hospital (CRVH). The dog was suffering from anorexia , vomiting , bloody diarrhea , dehydration and subnormal temperature . The clinical sign and symptoms were similar to parvovirus infection and rectal swab was taken and was confirmed by Rapid Test Kit showing parvo positive. Symptomatic and supportive therapy was done as a line of treatment by using Ringers lactate @ 400ml I/V for 5 days along with Ranitidine @ 0.5mg / kg body weight BID I/M , antibiotic: Ceftiofur @2.2mg /kg body wt. I/M for 5 days , antidiarrheal :Metronidazole @ 20mg/kgb.wt. IV daily for 3days,antiemetic: Perinorm (Metoclopramide) @ 0.2mg/kg b.wt. I/V for 3 days , Vitamin K: @ 0.5 ml I/V single dose , Conciplex (Vitamin B-complex) @ 3ml I/V for 3 days and Transamic acid @ 5mg/ kg b. wt. for 3 days was given. The pet owner was instructed not to give food and water for 3 days and the prognosis of dog was satisfactory.

Index Terms- Canine parvovirus , German shepherd , Infection , Vaccination

I. INTRODUCTION

Canine parvovirus (CPV) is leading viral infection in the young and immature puppies which mainly attack young mitotic cells or rapidly dividing cells including crypt of intestinal epithelial cell , lymph nodes , thymus and bone marrow precursor cell ¹. It is the most common cause of death in young puppies and causing severe enteritis ². The virus mainly affect the young dog up to 6 months of age and some of the new genotype can also affect the cat population ^{3,4}. The disease has world wide distribution having cardinal signs and symptoms manifested by anorexia , vomiting , harsh dehydration , bloody or mucoid foul smelling diarrhea^{5, 6}. Parvovirus is a single stranded genetically-compact DNA virus consisting of 5000 bases with hairpin structure⁷. Parvovirus affect almost all age group of the dog but puppies are found to be more susceptible then adults⁸. The virus infect all breed of dogs but some breed like American pit-bull , Rottweiler , Doberman pinscher , Labrador retriever and German shepherd are at high risk of viral infection⁹. The spread of virus from one dog to another dog is by fecal-oral route¹⁰. Since , the morbidity and mortality of parvo viral infection is very high but the infection can be managed by application of proper antibiotics , appropriate fluid therapy and strict monitored for at least 2-3 days ¹¹.

II. CASE PRESENTATION

A. Case presenting site :

The case was presented at Central Referral Veterinary Hospital , Tripureshwor, Kathmandu .

B. History of dog along with clinical sign and symptoms:The presented six month old German shepherd dog has history of anorexia , vomiting and blood tinged foul smelling diarrhea from last 2 days. The dog has no history of vaccination and deworming.



Figure 1 : Thin yellowish mucoid vomiting

Figure 2: Blood tinged foul smelling diarrhea

C. Diagnosis:

The dog was examined for physical , hematological ,serum biochemical , fecal and Rapid Immunochromatographic assay for diagnosis and examination revealed following result:

1. Physical Examination

| Parameter | Result | Normal Reference Range |
|-----------------------------|------------------------------------|-------------------------------|
| Heart Rate | 140 bpm | 70-120 bpm |
| Respiration Rate | 36 bpm | 18-34 bpm |
| Rectal temperature | 99.5 degree fahrenheit | 100.2-103.8 degree fahrenheit |
| Dehydration | Moderate : Skin tenting time 4 sec | Normal 2 sec |
| Capillary Refill Time (CRT) | > 3 sec | Less than 2 sec |
| Mucous Membrane | Slight pale | Pink |

Reference : MSD Vet Manual¹²

2. Hematological Examination

| Parameter | Result | Normal Reference Range |
|--------------|--------|------------------------|
| PCV % | 26% | 35-57 |
| Hemoglobin | 8.6% | 11.9-18.9 |
| Leucocytes | 4.5% | 5.0-14.1 |
| Neutrophils | 54.0 | 58-85 |
| Lymphocytes | 7.0 | 8-21 |
| Monocytes | 1.8 | 2-10 |
| Thrombocytes | 205 | 211-621 |

Reference : MSD Vet Manual¹²

3. Serum Biochemical Examination

| Parameter | Result | Normal Reference Range |
|-----------|--------------------------|------------------------|
| Sodium | Hyponatremia : 115 mEq/L | 142-152 mEq/L |

| | | |
|-----------|-----------------------------|---------------|
| Chloride | Hypochloremia :90 mEq/L | 110-124 mEq/L |
| Potassium | Hypokalemia : 2.8 mEq/L | 3.9-5.1 mEq/L |
| Glucose | Hypoglycemia : 66 mg/dl | 76-119 mg/dl |
| Albumin | Hypoalbuminemia : 1.9 mg/dl | 2.3-3.1 mg/dl |

Reference : MSD Vet Manual¹²

4. Fecal Examination

The fecal examination of the dog was done to check parasitic infestation or not . No parasitic involvement was observed in fecal examination.

According to history of no vaccination , physical , hematological , serum biochemical examination and fecal examination , it appeared to be the case of Canine Parvo virus (CPV). For further confirmation of the diagnosis , Immunochromatographic assay (ICA) was done .

Immunochromatographic assay (ICA)

For rapid examination and detection of the pathogen ICA was done . The rapid test kit of ASAN Easy Test[®] CCV/CPV was used for ICA.

Test Procedure :

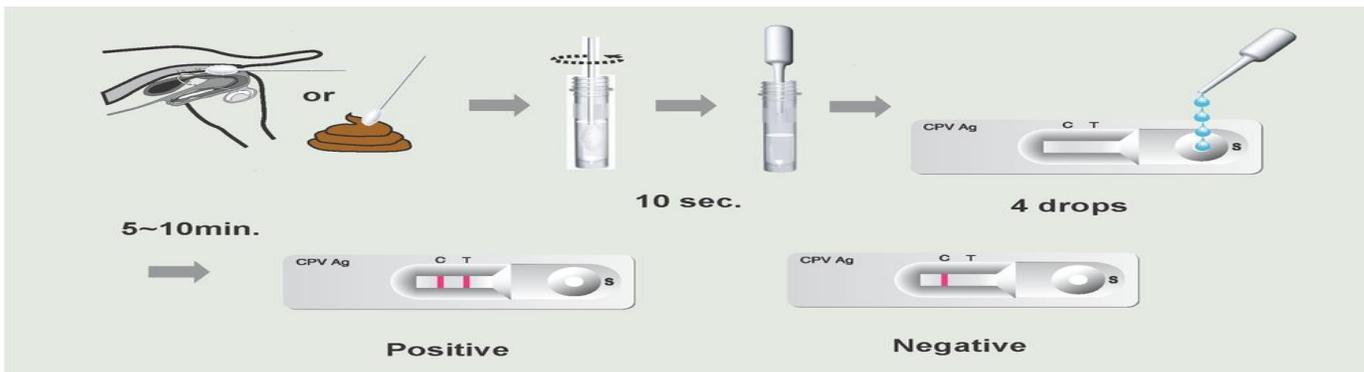


Figure 3: Test Procedure on Rapid Test Kit

Source: Dan Scott and Associates¹³

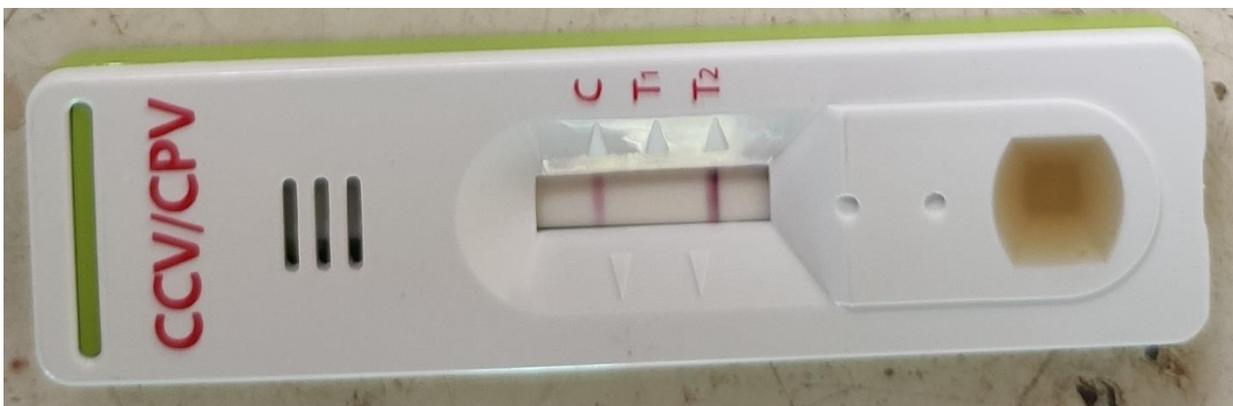


Figure 4 : CCV/ CPV Test Kit showing CPV positive

As suspected ,the dog was found CPV positive in Rapid test kit.

D. Treatment:

As there is no treatment for any viral infection , so the treatment for Canine Parvo Infection is mostly supportive and symptomatic during the course of the disease. So, symptomatic and supportive therapy was used as a line of treatment.

i. Fluid therapy: Ringer Lactate @ 400 ml I/V for 5 days to correct hydration status.

- ii. Antibiotic: Ceftiofur @ 2.2mg/Kg b.wt. I/M for 5 days
- iii. Antidiarrheal: Metronidazole @ 20mg/kg b.wt. IV daily for 3 days.
- iv. Antiemetic: Perinorm (Metoclopramide) @0.2mg/kg b.wt. I/V for 3 days.
- v. Vitamin K: @ 0.5 ml I/V single dose
- vi. Conciplex (Vitamin B-complex):@3ml I/V for 3days.
- vii. Transamic acid @ 5mg /kg b.wt. I/V for 3 days.

The pet owner was instructed strictly to monitor the dog and restrict feed and water for 3 days orally.



Figure 5: Dog under Treatment at CRVH

E. Prognosis of dog:

The prognosis of the dog was found satisfactory.

III. CASE DISCUSSION

Parvoviruses are small, non enveloped, single-stranded DNA viruses having incubation period of 3-7 days that are known to cause disease in a variety of mammalian species but most parvoviruses are host specific^{14, 15}. In 1967 it was first discovered and called as a minute virus of canines and named as CPV-1¹⁶. The virus is known as Canine Parvo Virus Type 2 (CPV-2) since it was second parvovirus which was discovered in dog after 1978 outbreaks in the United States where an unfamiliar contagious enteric diseases were reported and named as CPV-2. In the canine population, there is lack of preexisting immunity leading to rapid spread of virus and it was reported to be common worldwide after 1980¹⁴. The virus attack host cell for replication especially rapidly dividing cells leading to cell lysis and death¹⁷. Canine Parvovirus infection occurs in two forms; intestinal and myocardial or cardiac form but the intestinal form is more common¹⁸. Diarrhea is the most common clinical sign seen in intestinal for causing severe dehydration and imbalance and loss of electrolyte. Viral infection cause damage in intestinal wall leading to hemorrhage and loss of blood and protein causing decrease in PCV, severe anemia and hypoproteinemia and have higher risk of intussusception in young puppies¹⁹. Myocarditis by CPV-2 is very rarely observed nowadays, but can develop from infection in uterus or in puppies less than 8 weeks old which are born from unvaccinated bitches²⁰. Multifocal necrosis is seen in myocardial lesion in which lysis of myofibers with or without inflammatory response observed and myocardial cell nuclei consists intranuclear inclusion bodies²¹. The use of antibiotic and appropriate fluid therapy showed improvement in 3 days and returned towards normal pathophysiological condition requires 4-7 days²². The infected dog will die within 3 days if it is kept untreated²³. The rapid infection in young puppies below six months of age may be due to viral replication in rapidly dividing intestinal crypt cell just after weaning may cause enhance of bacterial flora leading to CPV infection in puppy²⁴. The prevention and control of CPV can be done by vaccination. The modified live vaccine are used for immunization at the age of 45 days with booster dose annually and thereafter 3 years. Inactivated vaccines are preferred in pregnant and colostrum deprived puppies. Vaccination is the key tool for prevention of disease so pet owners should be aware of vaccination and vaccination schedule to

prevent the occurrence of disease. Good hygienic practices in kennels, including proper disinfection of all exposed surfaces and personnel, is extremely important in the prevention of the spread of the disease in the puppies.

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A Case Report On Septic Cavernous Sinus Thrombosis In A 10 Year Old Rural Fulani Girl From North-Western Nigeria Associated With Bilateral Orbital Cellulitis

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Abstract- Septic Cavernous Sinus Thrombosis (CST) is a rare infective condition affecting the cavernous sinus in the brain associated with high morbidity and mortality, especially when appropriate and prompt intervention is delayed. Although there is limited data on CST globally, the low prevalence in developing countries may not be unconnected with factors such as poor health seeking behaviour of the people, inadequate healthcare facilities and the dearth of radio-imaging diagnostic techniques, as well as low level suspicion for CST amongst physicians. Here is a case report on a 10 year old indigent nomadic (Fulani) girl diagnosed to have septic cavernous sinus thrombosis and bilateral orbital cellulitis confirmed by enhanced computed tomography (CT) scan of the brain. The case would have been missed, were it not for the intervention of a "Good Samaritan" who facilitated her access to the right medical facility for timely intervention.

The objective of this case report is to highlight on the importance of having high index of suspicion for CST and initiating therapy promptly, in resource constraint settings for better outcomes and reduced morbidity and mortality.

Index Terms- Cavernous sinus thrombosis (CST), orbital cellulitis, high index of suspicion

I. INTRODUCTION

Cavernous sinus thrombosis (CST) is the formation of septic or aseptic blood clots within the cavernous sinus. Septic CST usually results from sepsis or spread of infections from surrounding facial or other intracranial structures while aseptic CST can arise from trauma or pro-thrombotic aetiology.¹ Because of the complex neurovascular anatomy of the cavernous sinus and its intimate relationship with other intracranial structure, septic thrombosis involving the sinus is usually taken with very serious concern. Propagation of septic emboli from infected foci on the face and other intracranial structures through valveless veins constitute major source of infections.²⁻³ Other risk factors for CST

include trauma, immunosuppressive states, obesity, thrombophilia, chemotherapy and dehydration.⁴

It is a rare disease which can end with a fulminant outcome. However, the introduction of antibiotics has significantly reduced the morbidity and mortality. Despite that, early diagnosis and prompt treatment is key to favourable outcomes in the management.^{3,5} Septic causes are mostly caused by bacterial organisms, but other micro-organism such as viruses, parasitic and fungal are also seldom implicated. Staphylococcus aureus is the commonest organism accounting for about 70% of septic causes; others include streptococcal species, pneumococcal, gram negative species, Bacteriodes and Fusobacterium. Other rarely implicated organisms such as the human immunodeficiency virus (HIV), cytomegalovirus, measles and aspergillus have been reported.⁶

There is dearth of data on the incidence of CST⁷. It account for up to 1-4% of cerebral and sinus thrombosis. Frank et al⁸ estimated an annual incidence of 0.2- 1.6/1000,000 per year,⁸ while Maliha etal⁹ reported an incidence of 7/1000,000 in India, they attributed the increasing incidence to the emergence of newer and more advance diagnostic imaging technology in the evaluation of suspected cases. There is conflicting reports in sex prevalence, Weerasinghe et al¹⁰ documented a male predominance with a ratio of 2:1.

The clinical presentation of CST depends on the structures affected. Most often the symptoms and signs are as a results of venous obstruction and damage to cranial nerves.¹¹ The classical symptoms include headache, fever, photophobia, chemosis, visual impairment, vomiting, convulsion or altered level of consciousness.¹²⁻¹³ Complications such as cranial nerve palsy, visual impairment, thrombosis in the lateral and superior sagittal sinus, infarct or ischaemia around related structures could occur.¹² Radio imaging, especially enhanced contrast Computed Tomography and Magnetic Resonance Imaging (MRI) are the most preferred diagnostic modalities. However, diagnosis could be challenging and easily missed in resource constraint settings where there is dearth of modern diagnostic facilities, unless where

physicians maintain high index of suspicion and follow it up, accordingly.^{11,14} Other investigations are targeted at suspected causes.³

Prompt and early use of broad spectrum intravenous antibiotics is the main stay of treatment. This practice takes into consideration, the commonest causative agents or based on culture and sensitivity pattern. Anticoagulant has also been found to be useful, other modalities of treatment depend on identified causes.¹⁵

We report a case of an indigent 10 year old nomadic Fulani girl, from a rural setting in North-west, Nigeria, who was brought into our facility on the 21st September, 2019. She presented with three day history of high grade fever, generalized throbbing headache, generalized body rashes, bilateral purulent eye discharge, red eyes with swelling and inability to see. There was also history of joint and bone pain associated with inability to walk, no associated convulsion or irrational talk, neither was there history of any insect or snake bite. No history of boil on the face or nasal discharge. All the above symptoms were noticed about three hours after she came back from the bush where she went to fetch firewood. Parents gave about 10mls of herbal concoction diluted with water twice and applied an unknown eye drop obtained from a local patent medicine shop twice to both eyes before presentation.

Significant examination findings at presentation, were that of an acutely ill-looking child, in obvious painful distress, irritable, febrile 38.6^oC (axillary temperature), fully conscious, in obvious painful distress, generalized maculopapular rashes of varying sizes with few intersperse hyperpigmented patches, pale, bilateral purulent eye discharge, redness and swelling of the eyes, marked photophobia, proptosis, conjunctival chemosis, inability to open both eyes and tenderness over the eye balls. She had tenderness in all the limbs but no swelling, no cranial nerve palsy, no significant lymphadenopathy, no scratch or sting mark, acyanosed, anicteric, bilateral pitting pedal oedema up to the mid-thigh, no nuchal rigidity, kerning and brudzinski signs not elicited because of severe pain across the joints. Vital signs were; PR-92b/m, regular with good volume and BP-100/60mmhg, HS-SIS2 only, RR-24c/m. Other systems were essentially normal.

Initial diagnosis was that of sepsis (meningitis and bilateral orbital cellulitis) with cavernous sinus thrombosis, other differentials considered were Sick Cell Disease (SCD), Leukaemia, Rheumatic fever and Lyme disease. She was commenced on high dose intravenous ceftriaxone, crystalline

penicillin, dexamethasone, pentazocine, and dexamethasone eye ointment and gutt ciprofloxacin.

Forty eight hours after admission, fever and headache had resolved, other symptoms were still present. Patient was jointly reviewed by an Ophthalmologist and an Optometrist with examinations findings of copious purulent eye discharge, conjunctival and orbital chemosis, generalized bilateral blepharitis, peri-ocular and corneal oedema with associated proptosis, photophobia, significant loss of light perception and widely fixed and dilated pupils with extraocular muscle limitations. Slit lamp biomicroscope showed anteriorly displaced granulomatous uveal tissues in the right eye while the left eye shows iris bombe and anterior chamber cells. Raised intraocular pressure in the right eye (35mmHg) while that of the left eye (30mmHg).

Normal saline irrigation was commenced before all the eye medications are applied. Subconjunctival dexamethasone, gutt timolol, tab Diamox, Maxitrol ointment and later gutt diclofenac (replaced Maxitrol). Gutt Pilocarpine was also added to the treatment but was not available. Five days after admission, she was able to open her eyes unaided.

On day eight, enhanced Computed Tomography (CT) was done which revealed a left Cavernous sinus thrombosis with the following findings (There is a small filling defect in the left cavernous sinus which measures HU 40 in post-contrast studies, where the surrounding cavernous sinus measures HU 142 (7 days post-presentation). This finding was highly suggestive of cavernous sinus thrombus. The ophthalmic veins and the dural sinuses were normal in appearances. The internal jugular veins were also normal. The optic nerves and the optic chiasma were normal with uniform enhancements present. There were no intraconal lesions within the orbits. The globes were not flattened posteriorly. The cerebral hemispheres were normal in CT densities with no intracranial collection present in the intra-axial or extra-axial regions. There were no areas of meningeal enhancements, which exclude meningitis. There were no solid lesions present, and midline structures maintained their positions. The pituitary gland was found to be normal. The circle of Willis was normal. The lateral, 3rd and 4th ventricles were normal in size with no effacements and no features of raised intracranial pressure.). Fig1. Based on the above findings a definitive diagnosis of left cavernous sinus thrombosis complicating bilateral orbital cellulitis and sepsis was established.

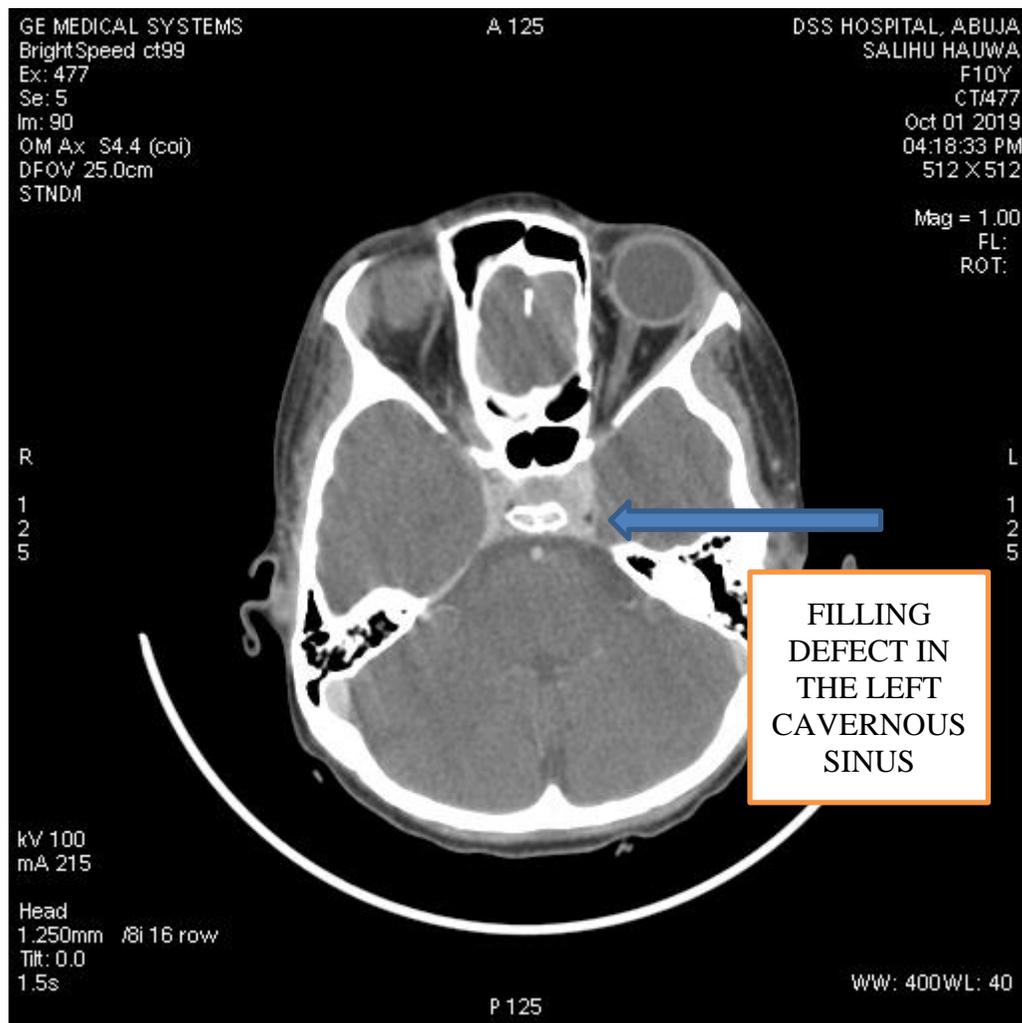


Fig I: Contrast enhanced Computer tomography showing filling defect in the left cavernous sinus as shown by the arrow in blue on day 8th of Admission

She was also reviewed by the Dermatologist who documented post inflammatory hypo and hyperpigmented rashes in keeping with meningococcaemia.

By the tenth day on admission, pain had resolved and rashes were healing. Although she developed limitations of movement on both elbow and left leg, urgent x-ray of affected limbs showed no abnormality.

Ophthalmic review showed a reduction in the intraocular pressure to 25mmhg. However, there was corneal haziness on the right eye with formation of oclusio pupillae. The left eye however, was found to have a mid-dilated pupil with photophobia and pupillary membrane, as well as lens opacity and posterior synaechia. Patient could only follow hand movement in both eyes. Gutt timolol was continued with gutt Xalatan, while gutt diclofenac was replaced with dexracin for the left eye and gutt Ivyflur for the right eye.

Having completed 21 days of intravenous antibiotics, patient showed significant clinical improvement. The rashes have healed appreciably, and she could move all limbs, and was able to open both eyes, although visual impairment persisted. There were no neurological deficits. She was eventually discharged and scheduled for a follow up. She was seen 15days later with

sustained improvement except for the visual impairment. She was followed up for further evaluation and management by the Ophthalmologist. All the investigations done and the results are as shown on Table I & II below.

II. DISCUSSION

Cavernous sinus thrombosis is a rare disease entity, especially in children. However, when it occurs, it is usually associated with high morbidity and mortality.^{1,16-17} There is paucity of published data especially in an era of abundant antibiotic therapeutic options. Sweis and co-author¹ were only able to report 12 cases in thirteen years (2000-2013) at Philadelphia children hospital in United States (USA) while a retrospective study by Press et al¹² reported 10 cases in a retrospective study over a period of ten years among children aged 3-17 years, in university of Colorado, also from USA. In Nigeria, a study done over a ten year period, Adeoti et al¹⁸ in Osogbo, South-Western region only reported 2 cases with CST among subjects aged 2-85 years. It is difficult to attribute the apparent low incidence of the reporting of CST in developing countries, this

might be as a result of missed diagnosis or death of those affected at home because of poor health seeking behaviour, distance of health facility, mystification of disease condition or poverty unlike in developing countries which might be related to early and prompt use of appropriate antibiotics. Our patient, a 10 year old nomadic Fulani girl from a rural setting in North-West, Nigeria had already resorted to alternative treatment with herbal concoctions until help came her way through unexpected means. Our patient presented with bilateral purulent eye discharge, redness of the eyes, swelling and inability to open the eyes. She also had fever and typical skin rashes suggestive of meningococcaemia, along with laboratory evidence of sepsis such as leukocytosis with absolute neutrophilia and elevated erythrocyte sedimentation rate. Suspicion was more to bilateral orbital cellulitis and general sepsis as risk factors that predisposed the young girl to CST.

Cavernous sinus thrombosis has a variable clinical presentation,^{3,14,18} the clinical features usually reflect the various causes or risk factors.¹ Headache, fever, redness of the eyes, swelling and inability to open the eyes were the commonest presenting symptoms in our patient. While the major clinical signs included redness, swelling and inability to see, photophobia, conjunctival chemosis and proptosis indicating that the eyes were the main source of the infection. Headache is related to the involvement of the ophthalmic and maxillary branches of the fifth cranial nerves.¹² while the ophthalmic signs and visual disturbances were related to the involvement of oculomotor, abducent nerves and posterior spread of the infections due to their relationship to the cavernous sinus.^{12,2} Where affection of the eyes is the main cause of CST, orbital manifestation become the most predominant clinical presentation. This has been documented in many literatures.^{3,12-13,1}

No organism was isolated from both tissue and blood cultures. The inability to culture any organism may not be unconnected with the fact that there was delay in carrying out relevant investigations including blood and cerebrospinal fluid (CSF) culture due to financial constraints. This would have affected the culture results. This findings is consistent with reports in other literatures including that of weerasinghe et al.^{10-11,19-20} Similarly lumbar puncture was not done in this patient at presentation and few days after because of the unstable clinical conditions and suspected raised intracranial pressure. Serological tests for HIV, Hepatitis B and C were all negative, although other viral causes cannot be completely ruled out since facility for viral culture was not available. The haemoglobin phenotype was HbAC.

Central nervous system manifestation such as irritability, confusion, convulsion, mental status changes and coma are not

uncommon in septic CST.¹⁹ Our patient presented with irritability and confusion but she was conscious.

Various radio imaging techniques are available for the diagnosis of CST, however, enhanced CT and MRI are the diagnostic investigations of choice.⁸ Definitive diagnosis of CST in our patient was made using enhanced CT with a finding consistent of left CST.

Early diagnosis and use of broad spectrum antibiotics, anticoagulant and surgical drainage are the modality of treatment.^{16,21} Prompt use of antibiotics have been found to be associated with good outcome and has significantly reduced both morbidity and mortality in CST.^{1,16-17} Consistent with other reports in the literatures,^{1,16-17,20} our patient responded very well to intravenous antibiotics. Patient received ceftriaxone and crystalline penicillin for 21 days. She also had intravenous dexamethasone, clexane and oral warfarin upon resolution of clinical and laboratory finding, although visual disturbances persisted.

Neurological deficits especially cranial nerve palsy and visual impairment are usually the commonly reported complications in CST.¹³ Our patient suffered visual impairment with ophthalmic findings of panuveitis, lenticular opacities, ocular synchia and reduced corneal reflex, dilated and fixed pupil. This was the only complication which is consistent with findings reported in other studies.^{8,12,22-23} It is pertinent to note that the extent of retinal involvement was not ascertained due to media opacity resulting from complications of panuveitis and lenticular opacities. Patient would have benefitted from B-scan but, she was unable to access it due to financial constraint.

The management of this case was not without challenges. The patient was indigent and could barely afford the cost of treatment except for the philanthropic gesture of the managing team and the hospital Management. This resulted in delay in carrying out most of the laboratory and imaging tests. The parents initially resorted to the use of herbal concoction.

III. CONCLUSION

We present this case to highlight that with high index of suspicion and prompt use of antibiotics, morbidity and mortality in highly fatal disease condition like CST can be drastically reduced even in resource constraint countries such as Nigeria.

Ethical Consent was obtained from parents and assent from the child to enable us publish this case and provide information for research.

Table I. Investigations results

| Investigations | Date | Date | Date | Date | Date | Date | Date | Normal Range | Comment |
|------------------------|------------------------|---------|------------------------|------------------------|---------|---------------------|----------|--------------|--------------|
| Full Blood Count (FBC) | 21/9/19 | 23/9/19 | 30/9/19 | 3/10/19 | 4/10/19 | 9/10/19 | 10/10/19 | | |
| White Cell Count (WBC) | 30.6 x 10 ⁹ | | 15.6 x 10 ⁹ | 14.8 x 10 ⁹ | | 7.5x10 ⁹ | | | Leucocytosis |

| | | |
|---|--------------|------------------|
| Wound swab Microscopy anand sensitivity | No growth | |
| Blood Culture | | neg ativ e |

Table II. Further Investigation Results

| | 30/9/19 | 4/10/19 | 10/10/19 | Normal Range | Comment |
|---|------------|----------|------------------|---------------|---------|
| Clotting Profile | | | | | |
| Prothrombin Time (PT) | | | 18.4sec | (6.5-13.1)sec | |
| Partial Activated Prothrombin Time (PTTK) | | | 32.1sec | (26-41)sec | |
| International Normalised Ratio (INR) | | | 1.98 | (0.6-1.2) | |
| Serological Tests | | | | | |
| HIV | | Negative | | | |
| HBsAg | | Negative | | | |
| HCAB | | Negative | | | |
| Hb Phenotypes(HPLC) | | | | | |
| HbF | 0.4% | | | | |
| HbC | 35% | | | | |
| HbA | 60.2% | | | | |
| HbA ₂ | 4.4% | | | | |
| Rheumatoid Factors(Quantitative) | 17.9IU/ml | | (0 - 14IU/ml) | | |
| Anti DNA B | 76.8 U/L | | (0- 170U/L) | | |
| Lyme Disease (Borrelia B) | Negative | | | | |
| Antistreptolysin Titre (ASO) | 150.6IU/ml | | (0 - 200IU/ML) | | |
| Antinuclear Antibodies (ANA) | Negative | | | | |





Fig 3: Photograph of patients on day 5 of admission



Fig 4- photograph of patient on day 8 of admission showing healing process



Fig 5: Photograph of patient at follow up, 15 days after discharged

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Sonographic Evaluation of the Hepato-Biliary System in Viral Hepatitis at Jos University Teaching Hospital.

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Abstract- BACKGROUND: Ultrasonography offers a non-invasive and cost effective method for evaluation and hepatobiliary surveillance in viral hepatitis. Two distinct ultrasound patterns are often detected: Accentuated brightness and more extensive demonstration of the portal vein radicle in background of decreased echogenicity of the liver in acute hepatitis. While chronic hepatitis reveals; decreased brightness and number of portal vein radicle walls and overall increased liver echogenicity. Therefore, the aim of the present study was to detect the changes in the hepatobiliary system on ultrasound in viral hepatitis and the significance of these findings.

MATERIALS AND METHODS: This is a cross-sectional screening study of 322 patients in Jos, Plateau State, and Northern part of Nigeria. All participants were serologically tested for viral hepatitis B and C, and subsequently scanned.

All examinations were performed using LOGIC 5, a real-time ultrasound machine using a 5MHZ curvilinear transducer and ultrasound coupling gel. Results obtained were statistically analyzed using SPSS software version 17, which were presented in tables.

RESULTS: Out of 322 patients, 121 were males and 201 were females. Maximum number of infection was within age group of 20-39 years. Out of 121 males, 46(38%) were infected with HBV while 47 (23.4%) of the 201 females had HBV with p-value of 0.005. Only 1 male (0.8%) and 5(2.5%) of the females tested positive for HCV with $p = 0.286$. One patient with HBV had decreased hepatic parenchymal echogenicity. Eighty three (29.5%) of HBV patients had normal liver echogenicity. Similarly, 5(1.8%) HCV patients had normal liver echogenicity with p-value of 0.926. 7 (31.8%) of patients had coarse liver echo texture $p = 0.753$. Eighty six (28.7%) of the 322 participants had normal liver echo texture. Moderate ascites was noted in one patient $P = 0.129$

CONCLUSION: The notable imaging findings of viral hepatitis on ultrasound, includes; decrease parenchymal echogenicity and accentuation of portal vein radicles and ascites.

However, in early and uncomplicated viral hepatitis, ultrasound findings were normal in majority of the patients.

Index Terms- Viral hepatitis, ultrasound, hepatobiliary system

I. INTRODUCTION

Inflammation of the liver due to viral infection is referred to as viral hepatitis. Other agents, both infectious (ie, viral, bacterial, fungal, and parasitic organisms) and non-infectious (eg, alcohol, drugs, autoimmune diseases, and metabolic diseases) have been known to cause inflammation of the liver.^[1,2]

Viruses are the commonest cause of hepatitis and it often results from one of five viral agents: hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV), the HBV-associated delta agent or hepatitis D virus, and hepatitis E virus^[1,2,3] (HEV). Infections caused by (HAV), (HBV), and (HCV) are by far the commonest. These three viruses can all result in acute disease with symptoms of nausea, abdominal pain, fatigue, malaise, and jaundice.^[4] Additionally, acute infection with HBV and HCV can lead to chronic infection. Patients who are chronically infected may go on to develop cirrhosis and hepatocellular carcinoma (HCC).^[2,4] Hence, the need for follow up and surveillance of these 2 viruses (HBV and HCV).

Ultrasonography offers a non-invasive, cost effective and readily available, method for evaluation and hepatic surveillance in viral hepatitis; hence its use in this resource limited setting.^[5] Two distinct ultrasound patterns are often detected. In acute hepatitis, the predominant findings were accentuated brightness and more extensive demonstration of the portal vein radicle walls and overall decreased echogenicity of the liver. Chronic hepatitis primarily revealed decreased brightness and number of portal vein radicle walls and overall increased liver echogenicity.^[6]

The aim of this study was to detect the changes in the hepatobiliary system in viral hepatitis and evaluate the significance of these ultrasound findings.

II. MATERIALS AND METHODS

STUDY AREA

Jos is the capital city of Plateau State. Plateau state has over 40 different ethnic groups. The 2006 Nigerian census put the population of Plateau State at 3,206,531, with a projected population of 4,200,442 in 2016.^[7,8] Jos University Teaching Hospital (JUTH) is one of the three teaching hospitals in the North-Central Zone of Nigeria. It serves as a referral center for the neighbouring states of Bauchi, Gombe, Benue, Kogi, Nassarawa, Taraba, Adamawa and parts of Kaduna State.

III. STUDY POPULATION AND DESIGN

This was a hospital-based Cross-sectional screening study that was done in the General outpatient department (GOPD); Jos University Teaching Hospital (JUTH), a tertiary health institution situated in the central part of Jos. A total of 322 volunteers attending the GOPD were recruited into the study during the hepatitis day celebration of 2015.

IV. INCLUSION CRITERIA

- Patients that consented to the study (abdominal ultrasound and viral serology)
- Patients who tested positive to either Hepatitis A and B serology.
- Viral hepatitis A and B patients on follow up.

V. EXCLUSION CRITERIA

- Subjects with decompensated liver disease
- Patients with known primary liver cell carcinoma
- Subjects who did not consent to participate in the study

VI. DATA ACQUISITION

The procedure was explained to all participants, and informed consent was obtained. A data sheet was completed for the all participants in which the ages, sex and alcohol consumption were obtained. All ultrasound examinations were done on GE Logiq 5 machine a real-time ultrasound machine fitted with a 5MHZ curvilinear transducer.

VII. IMAGING TECHNIQUE AND PARAMETERS

All subjects were scanned in supine and both lateral decubitus positions. Ultrasound findings were analyzed systematically for gall bladder (GB) distension, liver and splenic size, periportal cuffing, and ascites.

The liver was considered to be enlarged if the size was >15.5 cm in the midclavicular line. Spleen size >12 cm was considered as splenomegaly. Periportal cuffing was considered to be present

when there were increased brightness and clear visualization of portal vein radical walls. Partially distended or empty GB in the fasting state indicated the reduced volume of the GB. The gall bladder measuring > 10cm was considered dilated while GB wall showing diffuse and >3 mm was considered thickened.

VIII. STATISTICAL ANALYSIS

The data obtained from the structured questionnaire and imaging findings was entered into a computer to generate a computerized database for subsequent analysis and processing using SPSS version 22. Statistical parameters such as student's test were used for the association between different variables. P-value of 0.05 or less was considered statistically significant. The results were presented in the form of tables.

IX. ETHICAL CONSIDERATION

Ethical clearance was obtained from the general outpatient department as well as verbal informed consent from the participants. They were assured of confidentiality of information provided.

X. RESULTS

Only 322 participants met our inclusion criteria from the patients attending the general outpatient clinic. Out of 322 participants, 121 were males and 201 were females Table 1. Out of 121 males, 46(38%) were infected with HBV while 47 (23.4%) of the 201females had HBV with p-value of 0.005. Only 1 male (0.8%) and 5(2.5%) of the females tested positive for HCV with p = 0.286.

Majority of the infected individuals were young people with the age group of 20-29years, followed by 30-39years. There were more patients with hepatitis B virus (93persons) compared to hepatitis C viral infection (6persons)[Table 1and 2].

Table 1 Sex distribution of viral hepatitis B and C

| Variable | Gender | | P |
|-------------|-----------|-----------|-------|
| | Male | Female | |
| Hepatitis B | | | |
| Positive | 46(38.0) | 47(23.4) | 0.005 |
| Negative | 75(62.0) | 154(76.6) | |
| Hepatitis C | | | |
| Positive | 1(0.8) | 5(2.5) | 0.286 |
| Negative | 120(99.2) | 196(97.5) | |

Table 2. Age distribution of hepatitis infection in subjects

| Variable | Age group | | | | | | P |
|-------------|-----------|----------|----------|----------|----------|----------|-------|
| | <20 | 20-29 | 30-39 | 40-49 | 50-59 | >59 | |
| Hepatitis B | | | | | | | |
| Positive | 3(25.0) | 37(41.1) | 24(25.5) | 13(21.7) | 11(23.4) | 5(26.3) | 0.093 |
| Negative | 9(75.0) | 53(58.9) | 70(74.5) | 47(78.3) | 36(76.6) | 14(73.7) | |

| | | | | | | | |
|-------------|-----------|----------|----------|----------|-----------|----------|-------|
| Hepatitis C | | | | | | | |
| Positive | 0(0.0) | 2(2.2) | 2(2.1) | 1(1.7) | 0(0.0) | 1(5.3) | 0.787 |
| Negative | 12(100.0) | 88(97.8) | 92(97.9) | 59(98.3) | 47(100.0) | 18(94.7) | |

Only one patient with HBV show decreased hepatic parenchymal echogenicity $p=0.568$. Majority of HBV infected participants 83(29.5%) had normal liver echogenicity. Similarly, almost all the HCV infected individuals 5(1.8%) had normal liver echogenicity. Only 1(2.6%) showed hyper echoic liver parenchyma with p-value of 0.926 [Table 3].

Table 5a

| Variables | Ascities | | | P |
|-------------|-----------|----------|----------|-------|
| | Nil | Mild | Moderate | |
| Hepatitis B | | | | |
| Positive | 92(29.0) | 0(0.0) | 1(100.0) | 0.129 |
| Negative | 225(71.0) | 4(100.0) | 0(0.0) | |
| Hepatitis C | | | | |
| Positive | 6(1.9) | 0(0.0) | 0(0.0) | 0.953 |
| Negative | 311(98.1) | 4(100.0) | 1(100.0) | |

Table 3. Relationship between viral hepatitis infection and hepatic parenchymal echogenicity.

| Variables | Liver echo pattern | | | P |
|-------------|--------------------|--------------|-------------|-------|
| | Normal | Hyper-echoic | Hypo-echoic | |
| Hepatitis B | | | | |
| Positive | 83(29.5) | 9(23.1) | 1(50.0) | 0.568 |
| Negative | 198(70.5) | 30(76.9) | 1(50.0) | |
| Hepatitis C | | | | |
| Positive | 5(1.8) | 1(2.6) | 0(0.0) | 0.926 |
| Negative | 276(98.2) | 38(97.4) | 2(100.0) | |

Table 5b. A comparison of ascities in relation to some parameters

| Parameter | Status of ascities | | | P |
|---------------------|--------------------|------------|----------|-------|
| | Nil | Mild | Moderate | |
| Liver size | 13.9±1.60 | 13.3±71.84 | 12.100.0 | 0.427 |
| Gall bladder size 1 | 5.68±1.33 | 5.03±0.13 | - | |
| Gall bladder size 2 | 2.10±0.74 | 2.65±0.88 | - | 0.007 |
| Spleen size | 8.34±1.48 | 9.03±4.07 | 8.000.0 | |

In table 4, Only 7 patients (31.8%) of patients with coarse liver tested positive for HBV, with p-value= 0.753. 86 (28.7) of the 322 participants had normal liver parenchymal echo texture. Also, all patients with HCV had normal liver echo texture; p-value=0.503. Nil hepatomegaly was however seen.

Table 4. Relationship between viral hepatitis infection and hepatic parenchymal echotexture.

| Variables | Liver echotexture | | P |
|-------------|-------------------|-----------|-------|
| | Normal | Coarse | |
| Hepatitis B | | | |
| Positive | 86(28.7) | 7(31.8) | 0.753 |
| Negative | 214(71.3) | 15(68.2) | |
| Hepatitis C | | | |
| Positive | 6(2.0) | 0(0.0) | 0.503 |
| Negative | 294(98.0) | 22(100.0) | |

Echogenic spleen was seen in 2 (50%) of HBV cases with $p=0.186$ and only 1 (100%) hypo echoic spleen with $P = 0.186$ [Table 6]. All patients however had normal sized spleen.

Table 6

| Variables | Spleen echo pattern | | | P |
|-------------|---------------------|-------------|-----------|-------|
| | Normal | Hypo-echoic | Echogenic | |
| Hepatitis B | | | | |
| Positive | 90(28.4) | 1(100.0) | 2(50.0) | 0.186 |
| Negative | 227(71.6) | 0(0.0) | 2(50.0) | |
| Hepatitis C | | | | |
| Positive | 6(1.9) | 0(0.0) | 0(0.0) | 0.953 |
| Negative | 311(98.1) | 1(100.0) | 4(100.0) | |

Moderate ascites was noted in one patient [Table 5a] who tested positive for viral hepatitis B. P -value = 0.129 which was not statistically significant. The liver size was also within normal range in case with ascites. $P=0.427$ which is not significant statistically.

Gall bladder wall (GBW) thickening and size was within normal limits. However there was statistical variation in size in those with and without ascites with $P = 0.001$ [Table 5b].

XI. DISCUSSION

Viral hepatitis (HBV and HCV) has become a major public health concern worldwide especially in sub-Saharan Africa.^[2] Hepatitis B viral infection is more prevalent than hepatitis C virus.^[2,9,10] as demonstrated in this study. Nevertheless, they are both associated with chronic hepatic manifestation with similar ultrasound findings.^[11]

The findings on ultrasound in viral hepatitis, depends on the chronicity and pathological severity of the disease.^[6,11] Hence, in acute hepatitis, the predominant findings were decrease liver parenchymal echogenicity with brightness and more extensive demonstration of the portal vein radical, giving the starry sky appearance.^[11,12] Giogio et al detected only 32.2% of the hepatitis patients with increased brightness and clear visualization of portal vein radicle walls; which were also seen in 30.9% of their normal controls.^[17] similarly in this study, only one patient showed hypoechoic parenchyma with accentuation of the portal vein radicles. Chronic hepatitis often reveals decreased brightness and number of portal vein radicle walls with overall increased liver echogenicity.^[6,11] In a study by Shen J. et al, where they evaluated liver echogenicity by ultrasound, to predict liver fibrosis of chronic hepatitis B patients without clear treatment indications however^[18]. They established that; there was a significant difference with respect to liver echogenicity between the mild and severe groups. These studies demonstrated that liver echogenicity was an independent predictor in patients with cirrhosis which could result from viral hepatitis.^[18] In this study, most of the patients had normal hepatic parenchymal echogenicity and echotexture. Only 10 patients showed increase parenchymal echogenicity and 7 with coarse liver. This may be attributed to the fact that; liver parenchymal echotecture may be normal especially in early stage of the disease.^[13]

HBV and HCV are notable causes of chronic liver disease. Ascites is one of the common features of chronic liver disease, especially in the setting of portal hypertension. In this study, only one patient infected with viral hepatitis (HBV) had moderate ascites, with $p= 0.129$. This is statistically insignificant and consistent with early findings in uncomplicated hepatitis.^[1,6,11,13,14] Similar findings were seen in study by Sudhamshu KC.^[16] in which none of the patients had ascites.

Splenomegaly is seen in 10%–20% of cases of viral hepatitis.^[3] Maurya et al, had splenomegaly incidence of 27.5% in their study.^[1] In this study, splenic sizes were however within normal limits. This could be attributed to asymptomatic state of patients in this study, which is in keeping with ultrasound findings in uncomplicated hepatitis.^[11]

XII. CONCLUSION

Hepatitis B and C virus are common causes of hepatitis in sub Sahara Africa, Nigeria inclusive. They have notable imaging findings on ultrasound: which includes; decrease parenchymal echogenicity and accentuation of portal vein radicles, ascites . However, in early and uncomplicated viral hepatitis, ultrasound findings may be normal in majority of the patients.

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The Influence Of Ngo's Capacity Building On Enhancing Girl Education Programs In Rwanda

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Abstract

This study sought to find out the influence of NGO's capacity building programs on enhancement of girl's education in Rwanda. This study adopted both qualitative and quantitative data. Structured questionnaires were administered to acquire primary data whereas key informant interviews were used to acquire qualitative information and a sample size of 116 respondents was representative enough to inform the findings of the report. Rwanda has ratified several UN conventions on child rights which have enabled the design of policy frameworks that have seen an increased enrolment for both girls and boys in schools. However, as the enrolment rate for girls is higher in lower primary classes, the completion rate has been low compared to boys. Findings revealed that income generating skills were taken by many more among the respondents. Results indicated that capacity building initiatives had influence on a relative extent. However, the correlation between training and school attendance was low the opinion of respondents in which 58.5% felt it had no influence at all. 36.6% felt there was an appreciated extent of influence and this showed that capacity building had a bearing on school attendance. The role of the NGO's in ensuring girls enrolment and completion of the basic education cycle cannot be underestimated. Their contribution in capacity building for teachers and parents has been remarkably recognized. The study findings indicate that NGOs in Rwanda have played a very critical role in enhancing the girl child's education through capacity building of not only teachers but also the parents and the girls themselves. NGOs embarked on building the capacity of teachers on gender responsive methodology that helped enhance girl's participation in class. Parents' economic capacity to support the girl child's education has also been the focus of NGOs. They have also empowered girls through catch up programs that have helped spur their academic potential to competitively thrive through the different levels of the education cycle. However, 62.5% of parents indicated that they have not received any capacity building which calls on NGOs to increase focus on capacity building of parents if girl's education has to be realized. One of the key recommendations is that benefits of NGO efforts should be shared fairly among those not in need and those in need. This is indicative that more focused interventions need to be developed in the future. It was also recommended that efforts from NGOs operating in the country should be coordinated so that there is no replication. NGO should be controlled by a body that could focus on strategic and coordinated intervention initiatives so that reduplication is minimized.

Keywords: *Capacity building, NGOs, girl's education.*

Background

The result of the several international and country-specific policy frameworks has been an outpouring in school populations across the globe. Whereas the demand side has seen considerable improvements in enrolment rates in schools, the supply side in terms of budgetary allocations and infrastructural development and capacity building has not matched the increase, posing administrative challenges to the school administrators (Arowoshegbe & Anthony, 2011).

Since 1984, numerous human right treaties have reaffirmed this right and have supported entitlement to not only free but also obligatory key education for 'all' children. (Jagannathan, 2009). Rwanda has ratified several conventions on the rights of the children and has accented on the millennium development goals (MDGS) as well as the sustainable development goals (SDGs) on promotion of access to equitable and quality education. However, Weak institutional capacity to support the increase in enrolment, including

teacher capacity to deliver quality gender sensitive educational programmes, among other myriad of challenges have compounded the work of the administrators against the backdrop of leaders responding to the global push for increased numbers in basic education.

According to Armstrong and Allan (2009), while notable advancement is achieved on category of enrolment, much progress is still needed, especially in addressing the gender parity and equality in education that addresses the socioeconomic problems of all in society. Even though MDG 3 aims to reduce the gender gap in education, the problem still persists due to the following reasons; high level of both urban and rural poverty, socio-cultural issues, level of illiteracy and ignorance in society, early marriage which keep the girl-child out of school, premature pregnancy, difficult child birth, obnoxious widowhood rite, male preference and other harmful traditional practices.

In 2008, the government of Rwanda enacted the Universal Basic Education to enable both girls and boys access basic quality education where legislations enabling a compulsory education for all school going age children were enacted (MINEDUC, 2008). The universal primary and secondary education program have enthused a tremendous rise in the enrolment of both girls and boys in school.

However, the question of dropouts has been so significant among girls than boys as they advance further into higher levels of secondary schools. Factors such as poverty, parents' ignorance, culture that pushes more for the education of boys than girls, early marriages and pregnancies as well as management of the menstruation periods and menstruation cycle among others account to the shortfalls. According to the Ministry of Education (MINEDUC, 2013), the enrolment rate of girls in schools was higher than that of boys but completion rate of boys is higher than that of girls. In addition, UNESCO (2009) reported higher enrolment and low completion rates in primary and secondary school for girls than boys. This clearly indicates that more girls drop out of school while boys persist to the end. MINEDUC (2013) associates this backdrop to early pregnancy, early marriages, lack of sanitary pads, and poverty.

The gender analysis conducted by the USAID LEARN project in 2014, whereby from 2001, net enrollment in primary school was 76.1% for girls, and 74.5% for boys. According to the ministry of Education report by 2013 net enrollment in primary school was 97.5% for girls, and 95.7% for boys.

The government of Rwanda set an ambitious vision 2020 to respond to global millennium development goals (MGDs) and prioritised a Knowledge based economy. Rwanda's EDPRS has provided a medium-term framework for achieving the country's long-term development aspirations as embodied in Rwanda Vision 2020. The approach builds on strong achievements in human capital development and promotes three flagship programmes. These flagships serve to prioritize actions by the GoR, mobilize resources for development and improve policy implementation through more coordinated interventions across sectors. NGOs have been critical to helping the state in many areas or fields, ranging from health and education to livelihood sustainability. NGOs intervention in education sector played a vital role in the realization of the MDGs and helping the government achieve the universal 9-year basic education and of recent the 12-year basic education to help Rwandan children complete a cycle of secondary education. Their contribution in capacity building for teachers and parents has been remarkably recognized.

In education, the report found that 68 per cent of females in Rwanda are literate as compared to 73 per cent males but across the different levels; primary education has the biggest enrolment of girls at 95 per cent higher than 92 per cent for boys. However, for those above 25 years, 26 per cent of females attain primary education as compared to 35 per cent of males. Also, males at 59 per cent dominate the figure of students who are supposed to be in primary but are out of school as compared to only 41 per cent of females.

Civil Society role in education is now more crucial than ever as the Government is taking education and training as a priority now so that it can support other sectors. Public Private Partnership (PPP) is required at all levels with special attention on (TVET and Higher Education). Hence the urge of this study on NGOs capacity building on enhancing girl education programs in Rwanda.

Literature Review

Theoretical Review (Knowledge based theory).

This theory focuses at knowledge as a strategic important reserve that a firm can be proud of. Different authors claim that knowledge-based resources are usually difficult to replicate. In the comprehensive knowledge-based competition, the protagonist of hominoid wealth has developed enormously. Most folks are not only mere fundamentals of a manufacture system but proprietors and managers of the most important factor of production – knowledge. Different people basing on skills in organizations may decide on implicating their skills geared towards motivation in impacting how the organization works. Kogut and Zander (2010) looked at knowledge as the key source for professional performance. Therefore, the knowledge-based view of an organization must be unwritten as a social community that specializes in efficiency and effectiveness hence transference of knowledge as a theory of the firm.

It is largely accepted that the knowledge-based (KBV) of the firm is a recent extension of the RBV of the firm (Sveiby, 2001b; Bontis, 2002b; De Carolis, 2002; Huizing and Bouman, 2002; Balogun and Jenkins, 2003). The KBV of the firm considers knowledge as the most important strategic resource and, in that sense, this perspective is an extension of the RBV of the firm (De Carolis, 2002). The theory suggests that people use their capacity-to-act in order to create value in mainly two directions; by transferring and converting knowledge externally and internally to the organization. The value grows each time a knowledge transfer or conversion takes place. The strategy formulation issues are concerned with how to utilize the leverage and how to avoid the blockages that prevent sharing and conversion. Activities that form the backbone of a knowledge-based strategy are to be aimed at improving the capacity-to-act both inside and outside the organization.

As Rafael *et al*, (2008), contends knowledge-based view on how the of the firm is managed brings about a notion of administrative erudition providing organizations with approaches as a way of accomplishing viability. With NGO support to school via capacity building the study will enhance the knowledge gained by students to enable the girl child compete effectively in Rwanda. This is achieved through increased NGO involvement in the formulation and administration of the Knowledge based theory

Conceptual framework

The conceptual framework shows the school system as an input process-output model in which the roles played by the NGOs serve as inputs into the system, school administration as the through put process and access to education by vulnerable children as an output of the system. The inputs (NGOs' roles) that may influence access to education by vulnerable children are financial support, provision of basic necessities, capacity building of parents and teachers and development of infrastructure. Capacity building of parents of vulnerable children serves to mitigate the effects of stigma associated with negative perceptions about girl child education. Besides, sensitizing the parents on the importance of taking these children to school (child's right to education) which is integrated with training on counselling skills provides the necessary psychosocial support that ensures that such children are eventually enrolled in school. Parents are also trained on their obligations and responsibilities as stakeholders in the school system leading to good discipline among learners hence stability in the school. This article however focuses on capacity building as a key driver to the enhancement of girl education

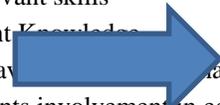
Independent Variable

Dependent variable

Capacity building indicators

- Teacher capacity
- Child rights
- Parents capacity to engage
- Psychosocial support

Educated girl child Indicators

- Relevant skills
 - Right Knowledge
 - Behaviour change
 - Parents involvement in education
- 

Capacity building activities in enhancing girl child education

The empirical review has indicated that Capacity building is another NGO's strategy that helps to bring about sustainable community development. Capacity building is an approach to development that builds independence. It can be: (i) a 'means to an end', where the purpose is for others to take on programs; (ii) an 'end' in itself, Where the intent is to enable others, from individuals through to government departments, to have greater capacity to work together to solve problems or (m) a process, where capacity building strategies are routinely incorporated as an important element of effective practice. Before beginning to build capacity within programs, practitioners need to identify pre-existing capacities such as skills, structures, partnerships and resources. Frankish (2013) has counted a number of dimensions for community capacity including financial capacity (resources, opportunities and knowledge), human resources (skills, motivations, confidence, and relational abilities and trust) and social resources (networks, participation structures, shared trust and bonding).

UNDP (2017) has introduced capacity building as the process by which individuals, groups, and organizations increase their abilities to (1) perform core functions, solve problems, define and achieve objectives; and (2) understand and deal with their development needs in a broad context and in a sustainable manner. Furthermore, in terms of NGOs' functions, Langran (2012) has defined capacity building as the ability of one group (NGOs) to strengthen the development abilities of another group (local communities) through education, skill training and organizational support. Capacity building is an approach to development not a set of pre-determined activities. There is no single way to build capacity. Although experience tells us that there is a need to work across the key action areas, practitioners approach each situation separately to identify pre-existing capacities and develop strategies particular to a program or organization, in its time and place. NGOs, through the provision of education, skill and knowledge, develop the capacity of community towards achieving sustainable development. In fact, NGOs act as a capacity builder to help the community to develop the resources, building awareness, motivating to participation in project and finally improving the quality of community's lives.

A link to empowerment is frequently cited as one of the reasons for and outcomes of community capacity building. Empowerment is discussed at the level of individual empowerment (changes in skills, knowledge, consciousness and awareness, hope, action and beliefs in abilities to affect change) and changes in wider social structures and processes that result in increased resources and opportunities (Verity 2017). Furthermore, with regards to sustainability, capacity building has been identified in much sustainable development policy as one of the key strategies for increasing the potential towards sustainable development. For example, in a program to train women to establish a small enterprise, a positive result was that women have co-operated to start the enterprise, but a sustainable outcome will depend on whether women have the capacity to make it work and derive an income from it without external financial or technical assistance (Viswanath 2011).

Building community capacities and fostering empowerment are more effective ways of achieving sustainable community development than programs and success indicators imposed by outside experts (Mobbs 2012). They point out that outside experts usually have limited knowledge and understanding of the particular context, needs and issues of a community. Local solutions to

achieving sustainable community and economic development are therefore seen as important outcomes of a capacity-building approach (Lennie 2015).

Research Methodology

This study adopted a descriptive survey research design. It is a scientific method that involves observing and describing the behavior of a subject without influencing it in any way (Coopers & Schindler, 2011). The target population of the study was 116 respondents who included 72 students; 24 school principals and 20 CEOs/project managers working in the NGOs that support education programmes in the Bugesera district.

A Stratified random sampling technique was used to select the respondents. Stratified random sampling technique ensures that different groups of a population are adequately signified. Stratified sampling divides the population into homogeneous groups such that the elements within each group are more alike than the elements in the population as a whole (Nachimas & Nachimas 2008).

$$n = \frac{N}{1 + N (e)^2}$$

Where n = the desired sample size

e= probability of error (i.e., the desired precision, e.g.,0.05for95%confidence level)

N=the estimate of the population size (116)

$$n = \frac{116}{1 + 116 (0.05)^2} = 90$$

Table 1: Sample Size

| | Numbers | Sample |
|----------------------|---------|--------|
| Students | 72 | 62.0 |
| School headteachers | 24 | 20.6 |
| NGO project managers | 20 | 17.4 |
| Total | 116 | 90 |

Both qualitative and quantitative data was considered for this study. Structured questionnaires were used to generate quantitative information that fed the study while key informant interviews were critical for generating qualitative research data. A pretest to the questionnaires from where proposed suggestions to improve the questionnaire were brought forward and adjustments made to obtain a refined tool.

The coefficient of variation was used to determine the extent of variability of the research instrument in relation to the mean of the population. This was done using CV determination formula by Reed et al., (2012). Low CVs % was taken to indicate validity of the instrument.

$$CV = \frac{SD}{\bar{X}} \times 100$$

Data analysis included sorting, cleaning and organization of data from the questionnaires. The information was then coded and entered into a spreadsheet and analyzed using Statistical Packages for Social Sciences (SPSS) Version 21 and was analyzed using descriptive statistics. The main quantitative techniques used included descriptive statistics such as absolute and relative (percentages) frequencies, measures of central tendency and dispersion (mean and standard deviation respectively). Quantitative data was presented in tables and explanation presented in prose. Qualitative data was analyzed based on the content matter of the responses. Responses with common themes or patterns were grouped together into coherent categories.

Results and findings.

Influence of NGO capacity building on access to education by the girl child

The study sought data on whether the parents had attended any training in capacity building. This was to establish the extent to which NGOs had extended capacity building training to parents of vulnerable children within the district.

The results in Table 2 showed that 62.5% had not undergone any capacity building training. This indicated that more than half of the parents had not undergone capacity building training. This capacity building is in relation to financial literacy and financial management. Respondents admitted to have been trained on entrepreneurial skills, business proposal development and on stating small scale income generating activities. These activities were designed to equip parents with skills to generate sustainable income that would help sustain their children in school. Through the sustainable access to finance initiatives (SAFI) program, Plan International in partnership with the Global Humanitarian Development Foundation (GHDF); a registered local NGO pioneered initiative that promote women’s access to sustainable sources of finance to increase their financial independence and capacity to support the girl child’s education. Through this program women were taught to craft shoes, make liquid soap and also make the common wrappers that women use that generates a regular domestic income. This has improved family welfare and henceforth improved the conditions of the girl children attending school. Parents have been enabled to pay school dues through these initiatives and this has minimized on the syndrome of give the boy a priority that was largely caused by poverty and inability to meet daily domestic bills.

These results indicated that income generating skills were taken by many more among the respondents. However, the correlation between training and school attendance was low the opinion of respondents in which 58.5% felt it had no influence at all. In table 2 results indicated capacity building initiatives had influence to a low extent while it had influence to a great extent. However, in that 36.6% there was an appreciated extent of influence, this showed that capacity had a bearing on school attendance.

Table 2: Parents undergone capacity building training

| | Frequency | Percent |
|--------------|------------------|----------------|
| Yes | 42 | 53.8 |
| No | 36 | 46.2 |
| Total | 78 | 100.0 |

Also, NGOs have helped to build the capacity of parents to address the gender-based barriers to girls’ education. This was mainly done by Rwanda Men’s’ Resources Centre (RWAMREC) through the positive masculinities program that was implemented in 21 secondary schools in the Bugesera district. Through capacity building for local opinions and programs mainstreamed through the parent’s evenings (Umugoroba w’ababyeyi), parents’ attitude towards girl’s education were changed tremendously hence enhancing the girl child’s sustainability in acquisition of basic education. The boys for change clubs initiated by RWAMREC also helped the boys to accommodate the shift from the cultural norms that hindered their sisters’ progress in education and adopted the rather

positive norms of assisting them with domestic chores and school works that supported them to complete the 9-year basic education cycle.

Table 3: Teacher capacity building

| | Frequency | Percent |
|---------------------------------------|-----------|---------|
| English language training | 60 | 25.5 |
| Learner centered methodology | 68 | 29.0 |
| Gender responsive pedagogy | 68 | 29.0 |
| Sexual Reproductive Health and Rights | 47 | 20.0 |

The study revealed that NGOs have contributed greatly in the capacity building of teachers in key pedagogical areas that enhances and support girl children learning. Trainings in sexual reproductive health and rights, gender responsive pedagogy and learner centered methodology are key pedagogical knowledge and skills that enhances teacher capacity to support girl’s in school. 29% received training in gender responsive methodology and learner centered methodology, 20% were trained in sexual reproductive health and rights (SRHR) and 25.5% got training in using English as a medium of instruction.

The International Education Exchange (IEE) with support from UNICEF and Plan International implements capacity building programs for teachers on gender responsive pedagogy. This has been so crucial to the holistic approaches for addressing the gender gap in education. The gender responsive pedagogy prepares teachers to gender sensitivities while teaching and helps teachers to identify areas such as shyness that could probably retard the girl child’s competitiveness and therefore their progress in education. Also, IEE has played a very important role of building the capacity of academically struggling girls to help raise their academic performance and increase competitive edge with other students as a key motivator for their sustenance in school. This has been done through organized catch up classes

To determine the extent to which capacity building has influenced school attendance, the study sought data on respondents’ assessment on the influence of school attendance among the vulnerable children. This was to gauge the extent which capacity building among parents of vulnerable children had influence school attendance in the children themselves. The results indicated that most (53.8%) did not think capacity building did influence school attendance

Table 4: Extent to which capacity building has influenced school attendance

| | Frequency | Percent |
|----------------|-----------|--------------|
| Limited extent | 42 | 53.8 |
| Great Extent | 36 | 46.2 |
| Total | 78 | 100.0 |

On how training/capacity building for parents had affected administrative work with respect to enabling vulnerable children access basic education, most indicated that there was no way of connecting the two since they did not have a strong case, they could refer to that would help them respond to the question. On whether NGOs built the capacity of parents/guardians, PO3 and PO5 indicated they

do it through community-based approaches of empowerment. They indicated that most of the people they trained were themselves in groups and were identified communally.

Correlational analysis

Correlation analysis was conducted to empirically determine whether capacity building was a significant determinant in enhancing girl child education.

Table 5: Correlation Analysis on capacity building

| | | Capacity building | Enhancing girl child education |
|--------------------------------|---------------------|-------------------|--------------------------------|
| Capacity building | Pearson Correlation | 1 | |
| | Sig. (2-tailed) | | |
| | N | 78 | |
| Enhancing girl child education | Pearson Correlation | .789** | 1 |
| | Sig. (2-tailed) | .000 | |
| | N | 78 | 78 |

** . Correlation

Table 5 indicate that capacity building is significantly correlated to enhancement of girl child education ($r=0.789$, $p<0.01$). There is a Strong positive relationship between capacity building and NGOs enhancement of girl child education as indicated by correlation of 0.789. This shows that the sampled data can be applied to the general

Discussions

This paper draws on the theoretical arguments of a model that argues that the end result of development should be developing people’s capability. Capability refers to the opportunity to accomplish and function within a lifestyle that a person perceives as valuable (Sen, 2016). When people have capability, their agency is enhanced. Agency is the ability to act on behalf of what you value and have reason to value (Ibrahim & Alkire, 2017). To sum up, for women and girls, especially in the rural context, one of the most empowering factors is to have agency—agency in making decisions with regards to women’s own bodies and informed decision making with regards to family matters—this is the true essence of capability in capacity building. Uninterrupted access and equitable education for female children, from kindergarten to the highest level of achievement based on ability: provide an awareness of personal freedoms, develop personal agency and choice, and promote the ability to choose a life that is meaningful and of value to the child as she grows into adulthood. Nussbaum (2010) argues that when women and girls are provided the right opportunities to develop capabilities, they ultimately contribute to their local economies in a more meaningful way, and thus help build community capacity.

Conclusions and Recommendations

These results indicated that income generating skills were taken by many more among the respondents. However, the correlation between training and school attendance was low the opinion of respondents in which 58.5% felt it had no influence at all. In table 4.19 results indicated capacity building initiatives had influence to a low extent while in table 19.5 it had influence to a great extent. However, in that 36.6% there was an appreciated extent of influence, this showed that capacity had a bearing on school attendance.

Empowering parents and guardians through capacity building did not indicate a major influence on school attendance. However, it still showed relevance in that many seemed to agree that it raised the chances for sustainable access to education for girls.

Therefore, although there was no major evidence that capacity building of parents contributed to increased school attendance or wider provision of education to vulnerable students, it should not be minimized but efforts to ensure it achieves its success rate should be enhanced. Increased income to parents and guardians could ensure that they are able to fend for themselves. It can also create a favorable environment at home for the students to excel in their academics. Therefore, success rate for income generation training initiatives should be enhanced.

Benefits of NGO efforts should be shared fairly among those not in need and those in need. This is indicative that more focused interventions need to be developed in the future. The future of NGOs contributions is in the form of putting up infrastructure.

Efforts from NGOs should be coordinated so that there is no replication. Those NGOs operating in the district should come under one umbrella body that could focus on strategic and coordinated intervention initiatives so that reduplication is minimized.

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Study On Prognostic Role Of Low Platelet Count In Preeclampsia And Eclampsia

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Compliance with ethical standards

Conflict of interest – Dr Kumari Renu, Dr. Rita Shukla Dr Meenakshi Devi, declare that they have no conflict of interest.

Informed Consent–Informed consent was obtained from all individual participants included in the study.

Abstract- Aim: For predicting the severity of preeclampsia and eclampsia, thrombocytopenia remains the most consistent and reliable method. This study aimed to correlate the prognosis of preeclampsia and eclampsia with low platelet count. **Design:** prospective study **Method:** study was conducted on 200 pregnant women more than 20 weeks of gestation attending OPD or Inpatients in the Department of Obstetrics and Gynecology, SRN and KMNH Hospital, MLNMC, Prayagraj from September 2018 to September 2019. The study group were divided into cases and controls. Cases were further divided into mild preeclampsia, severe preeclampsia and eclampsia. Investigations like platelet count, LFT, RFT, CT, BT and Coagulation profile were done. **Result:** The mean platelet count observed among cases of mild preeclampsia, severe preeclampsia and eclampsia was 2.39, 1.08 and 0.90 lacs/mm³ respectively. Among cases and controls the difference in mean platelet count was statistically significant. **Conclusion:** Low platelet count is the most common complication of preeclampsia and eclampsia and at times is life threatening. Therefore platelet count alongwith other investigations can be used to assess the severity and disease progression to HELLP syndrome, DIC and PPH.

Index Terms- preeclampsia, eclampsia, platelet count

I. INTRODUCTION

Hypertensive disorder remains most significant & intriguing Unsolved problem in Obstetrics. In developed countries 17% maternal deaths were attributed to HTN disorders. In India they account for the third most important cause of maternal mortality.¹World Health Organization estimates around six lac women die each year from preeclampsia.²Preeclampsia is defined as occurrence of new onset HTN with blood pressure $\geq 140/90$ mm Hg after 20 weeks of gestation in women with previously normal

BP with or without proteinuria. Thus, proteinuria is an objective marker & reflects the system wide endothelial leak, which can be seen in preeclampsia syndrome.

1) Proteinuria greater or equal to 300 mg per 24hour urine collection. Or protein creatinine ratio greater than or equal to 0.3 or Dipstick reading of 1+ (used only if other quantitative methods not available. Proteinuria is recognized as an independent risk factor for cardiovascular and renal disease and as a predictor of end organ damage.³

2) Or in absence of proteinuria new onset hypertension with the new onset of any of following-

- a) Thrombocytopenia- platelet count less than 1.5 lac/ mm³.
- b) Renal insufficiency –serum creatinine concentration greater than 1.1mg/dl or a doubling of serum concentration in the absence of renal disease.
- c) Impaired liver function- elevated serum concentration of liver transaminases to twice normal concentration.
- d) Cerebral symptoms –headache, visual disturbances, convulsions.
- e) Pulmonary edema.

Eclampsia is defined as preeclampsia along with convulsions, seizures are generalized & may appear before, during or after labor. Eclampsia is most common in last trimester.

ETIOLOGY

- a) Placental implantation with abnormal trophoblastic implantation of uterine vessels.⁴
- b) Immunological maladaptive tolerance between maternal, paternal (placenta) & fetal tissue.⁵
- c) Maternal maladaptation to cardiovascular or inflammatory changes of normal pregnancy.
- d) Genetic factors including inherited predisposing genes & epigenetic influences.

PATHOGENESIS

1. Vasospasm
2. Endothelial cell injury
3. Increased pressure response

THROMBOCYTOPENIA

The platelet count is routinely measured in women with any form of gestational HTN. Overt thrombocytopenia defined by a

platelet count $<1,00,000/\mu\text{L}$ indicates severe disease. Lower the platelet count higher the rate of maternal & fetal morbidity & mortality. After delivery platelet count may continue to decline for the first day then progressively reach to normal level within 3 to 5 days. Thus, this study was carried out to assess the value of platelet count as a prognostic indicator in women with raised blood pressure.

II. MATERIAL AND METHODS

The study was carried out in 160 antenatal women attending outpatient department as well as indoor cases of Swaroop Rani Nehru Hospital and Kamala Nehru Memorial Hospital, Department of Obstetrics and Gynaecology, Motilal Nehru Medical College, Prayagraj, over a period of one year from September 2018 to August 2019.

METHOD OF COLLECTION OF DATA

Inclusion criteria:

- Pregnant women beyond 20 weeks of gestation were included and divided into two groups.
- Study group included women with hypertensive disorders of pregnancy and control group included healthy pregnant women with no risk factor.
- Cases was subdivided into mild preeclampsia, severe preeclampsia and eclampsia. Control was selected by consecutive sampling.

Exclusion criteria:

- Thromboembolic episode
- Haemorrhagic disorder
- Epilepsy
- Pre-existing Diabetes Mellitus
- Hypertension in less than 20 weeks
- Drug intake which leads to platelet count and function to get altered.

Every 10th patient in antenatal OPD was selected as control by simple random sampling and cases were further subdivided into mild preeclampsia, severe preeclampsia and eclampsia

Routine antenatal investigations like Blood group/Rh factor, haemoglobin, blood sugar (2 hours after 75 gm of glucose), HIV I and II, VDRL, HCV, HBSAg, fasting sample of S. TSH, Free T3, Free T4 and urine routine and microscopic was done. In women with hypertension additional investigations were done - platelet count, bleeding time clotting time, prothrombin time, activated partial thrombin time, LFT, RFT, Urine for albumin, 24 hr urine for proteins, USG for fetal growth and amount of liquor, fundus examination.

Principle of method: Sample collection - 2 ml of venous blood sample was collected in EDTA (ethylene diamine triacetic acid) vial. The blood is mixed well and the vial placed under automated haematology analyser. Automated haematology analyser work on the principle of electrical impedance. Impedance counting discriminates particles based on their size. As platelets pass singly through an aperture between positive and negative electrodes, passing of the cell reverses the resistance, so a pulse is

generated which is recorded. Each pulse size is proportional to size of platelets. Cells with volume between 2- 30 fl are counted as platelet (average 8- 12 fl). Different cells in the blood component was counted & results was printed. Count was rechecked manually using Leishman's stain method in patients with very low platelet count. Average no of platelets per field was calculated and multiplied by 20,000 to set approximated value in each cubic mm blood manual.

All participants were followed up until delivery and in post-partum period for six weeks for the maternal outcome. Maternal outcome was studied in terms of following:

- Onset of labour – term or preterm
- Mode of delivery
- Antepartum complications like abruptio placentae, HELLP syndrome.
- Post partum complications like primary PPH, secondary PPH, pulmonary edema, DIC, haematoma formation or maternal death.

Fetal outcome was noted in terms of birth weight, and for fetal complications like intrauterine growth restriction, low birth weight, meconium aspiration syndrome, intrauterine death of fetus or any neonatal complication e.g. jaundice/respiratory distress/septicaemia.

Statistical Analysis: Descriptive data was presented in the form of proportions and percentages. Association of various variables with different categories of hypertensive diseases of pregnancy i.e. mild preeclampsia, severe preeclampsia and eclampsia was done with the help of Chi square test, independent sample t test and Pearson coefficient correlation test. Two tailed p value of <0.05 was taken as significant.

Table 1. Systolic blood pressure pattern

| Systolic Blood Pressure in mm Hg | No. Of Patients | Percentage (%) |
|----------------------------------|-----------------|----------------|
| 100-120 | 44 | 27.5 |
| 121-140 | 36 | 22.5 |
| 141-160 | 25 | 15.6 |
| 161-180 | 37 | 23.1 |
| >180 | 18 | 11.3 |
| Total | 160 | 100 |

From above table we observed that in our study group most of the pregnant women 44 (27.5%) out of 160 had systolic blood pressure between 100- 120 mm of mercury, 36 (22.5 %) women had systolic blood pressure between 121- 140 mm of mercury, 25 (15.6%) females had systolic blood pressure

between 141-160mm of mercury, 37 (23.1%) females had systolic blood pressure between 161- 180 mm of mercury and 18 (11.3%) women had systolic blood pressure more than 180 mm of mercury.

Figure 1. Systolic blood pressure pattern

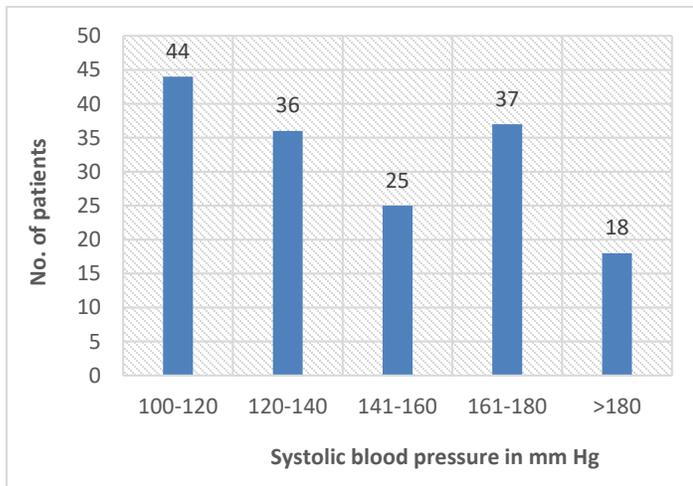


Figure 2. Diastolic blood pressure pattern

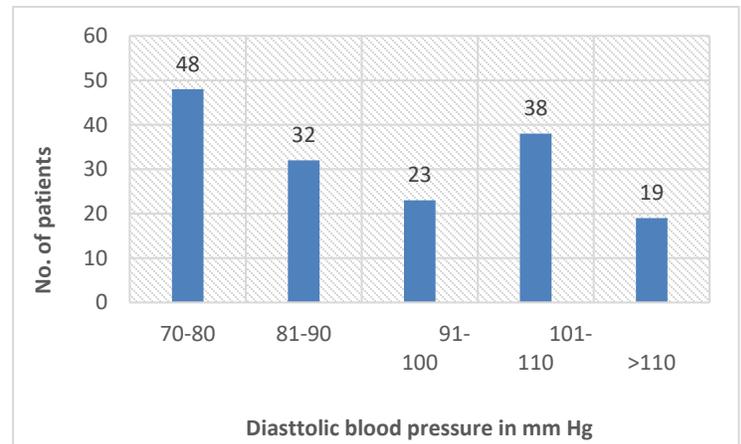


Table 2. Diastolic blood pressure pattern

| Diastolic Blood Pressure in mm Hg | No. Of Patients | Percentage (%) |
|-----------------------------------|-----------------|----------------|
| 70-80 | 48 | 30 |
| 81-90 | 32 | 20 |
| 91-100 | 23 | 14.4 |
| 101-110 | 38 | 23.8 |
| >110 | 19 | 11.8 |
| Total | 160 | 100 |

From above table we observed that in our study group most of the pregnant women 48 (30%) out of 160 had diastolic blood pressure between 70-80 mm of mercury, 32 (20%) women had diastolic blood pressure between 81-90 mm of mercury 23 (14.4%) women had diastolic blood pressure between 91-100 mm of mercury, 38 (23.8%) females had diastolic blood pressure between 101-110 mm of mercury and 19 (11.8%) women had diastolic blood pressure more than 110 mm of mercury. From both tables we observed that mean arterial pressure in study group was 116.30 ± 1.67 mm of mercury as compared to mean arterial blood pressure in control group was 80.62 ± 4.28 mm of mercury. $P < 0.0001$ which is highly significant.

Table 3. Distribution according to platelet count in control and cases

| Platelet Count Lac/Mm ³ | Group 1 | | Group 2 | | | | | |
|------------------------------------|---------|-------|----------------------|------|------------------------|-----|-----------|------|
| | Control | | Mild Pre - Eclampsia | | Severe Pre - Eclampsia | | Eclampsia | |
| | Count | % | Count | % | Count | % | Count | % |
| >1.5 | 73 | 91.25 | 31 | 77.5 | 7 | 28 | 3 | 20 |
| 1-1.5 | 7 | 8.75 | 7 | 17.5 | 13 | 52 | 7 | 46.6 |
| <1 | 0 | 0 | 2 | 5 | 5 | 20 | 5 | 33.4 |
| Total | 80 | 100 | 40 | 100 | 25 | 100 | 15 | 100 |

Table 4. Mean platelet count in control and cases

| Group | No. Of Patients | Mean Platelet Count (Lacs/Mm ³) | P Value (Compared to The Control) |
|---------------------|-----------------|---|-----------------------------------|
| Mild Preeclampsia | 40 | 2.39 ± 0.41 | < 0.001 |
| Severe Preeclampsia | 25 | 1.08 ± 0.42 | <0.001 |
| Eclampsia | 15 | 0.90 ± 0.37 | <0.001 |
| Control | 80 | 2.75 ± 0.59 | |

From the above mentioned table it was observed that:

Out of 80 women in control group 73 (91.25%) patients had platelet count more than 1.5 lac/mm³ while 7 (8.75%) women had platelet count between 1-1.5 lac/mm³. Out of 40 cases with mild preeclampsia 31 (77.55%) cases had platelet count more than 1.5 lac/mm³ while 7 (17.5%) patients had platelet count between 1-1.5 lac/mm³ and only 2 (5%) patients had platelet count less than 1lac/mm³. In severe preeclampsia 7 (28%) patients had platelet count more than 1.5 lac/mm³, 13 (52%) patients had platelet count between 1-1.5 lac/mm³ and 5 (20%) cases had platelet count less than 1lac/mm³. In eclampsia 3 (20%) patients had platelet count more than 1.5 lac/mm³, 7 (46.6%) patients had platelet count between 1-1.5 lac/mm³ and 5 (33.4%) patients had platelet count less than 1lac/mm³. Mean platelet count of control was 2.75 ± 0.59 lac/mm³. Mean platelet count in mild preeclampsia was 2.39 ± 0.41 lac/mm³. Mean platelet count in severe preeclampsia was 1.08 ± 0.42 lac/mm³. Mean platelet count in eclampsia was 0.90 ± 0.37 lac/mm³.

Figure 3. Distribution according to platelet count in control and cases

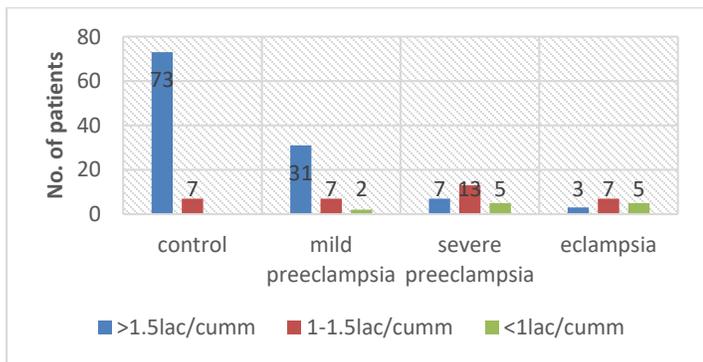


Table 5. Distribution according to mode of delivery in control and cases

| Mode Of Delivery | Control | | Mild Pre Eclampsia | | Severe Pre Eclampsia | | Eclampsia | |
|------------------|---------|-------|--------------------|-----|----------------------|-----|-----------|------|
| | Count | % | Count | % | Count | % | Count | % |
| Vaginal | 55 | 68.75 | 22 | 55 | 7 | 28 | 1 | 6.6 |
| Caesarean | 25 | 31.25 | 18 | 45 | 18 | 72 | 14 | 93.4 |
| Total | 80 | 100 | 40 | 100 | 25 | 100 | 15 | 100 |

From above Table in control group 55 (68.75%) women delivered vaginally and 25 (31.25%) women delivered by caesarean while in cases 22 (55%), 7 (28%) and 4 (26.6%) patients with mild preeclampsia, severe preeclampsia and eclampsia respectively delivered vaginally and 18 (45%), 18 (72%) and 14 (93.4%) patients with mild preeclampsia, severe preeclampsia and eclampsia respectively delivered by caesarean section.

Figure 4. Distribution according to mode of delivery

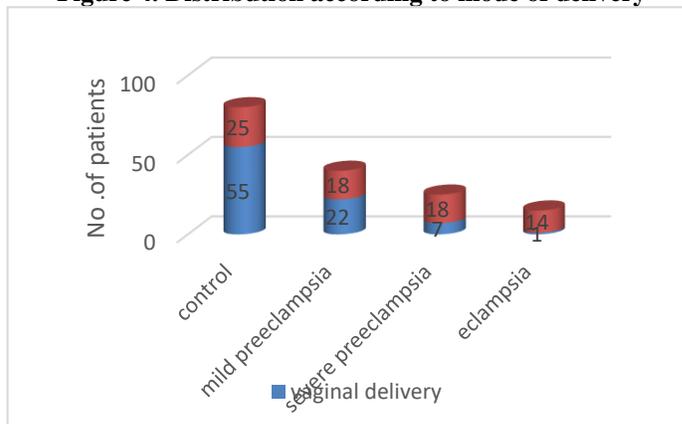


Table 6. Maternal outcome in control and cases

| Group | Preterm Labor | Abruptio | DI C | Pulmonary Oedema | PPH | Maternal Death |
|--------------------------|---------------|----------|------|------------------|-----|----------------|
| Mild Preeclampsia N=40 | 7 | 0 | 0 | 0 | 0 | 0 |
| Severe Preeclampsia N=25 | 18 | 9 | 0 | 0 | 2 | 0 |
| Eclampsia N=15 | 8 | 1 | 2 | 2 | 1 | 9 |
| Control N=80 | 14 | 0 | 0 | 0 | 0 | 0 |
| Total N=160 | 47 | 10 | 2 | 2 | 3 | 9 |

From Table 6 we observed that the most common maternal complication was preterm labor in both group that was 7 out of 40 in mild preeclampsia, 18 out of 25 in severe preeclampsia and 8 out of 15 patients with eclampsia and 14 out of 80 in control group. In severe preeclampsia placental abruption was the second most common complication in 9 patients out of 25 and 2 patients had PPH out of 25 patients. In eclampsia 2 patients each had DIC, pulmonary edema while one patient each undergone PPH, abruption and nine died.

Figure 5. Maternal outcome in control and cases

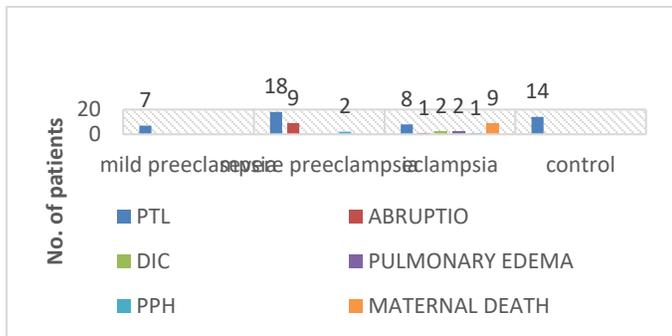


Table 7. Fetal outcome in control and cases

| Group | Term | Preterm | IUGR | IUD | MAS | Jaundice | LBW |
|-----------------------------|------|---------|------|-----|-----|----------|-----|
| Mild Preeclampsia N=40 | 33 | 7 | 7 | 0 | 3 | 0 | 2 |
| Severe Preeclampsia N=25 | 7 | 18 | 19 | 6 | 8 | 0 | 8 |
| Eclampsia N=15 | 7 | 8 | 2 | 10 | 3 | 2 | 4 |
| Control N=80 | 66 | 14 | 6 | 0 | 0 | 0 | 7 |
| Total N=160 | 113 | 47 | 23 | 10 | 2 | 2 | 3 |

From above table we observed that 33 (82.5%) patients with mild preeclampsia, 7 (28%) patients each with severe preeclampsia and eclampsia in study group and 66 (82.5%) patients in control group had delivered term babies while rest are preterm babies. The most common fetal complication was IUGR, 7 out of 40 in mild preeclampsia, 19 out of 25 in severe preeclampsia MAS was the second most common complication in 3 out of 40 in mild preeclampsia and LBW was the third most common complication in 2 out of 40 patients. In severe preeclampsia MAS and LBW were the second most common complication seen in 8 patients each out of 25 and 6 patients had IUD out of 25 patients. In eclampsia IUD was most common complication seen in 10 out of 15 patients and 3 out of 15 had MAS, 4 out of 15 had LBW and 2 each out of 15 had jaundice and IUGR. In control group 6 were IUGR and 7 were LBW.

Figure 6. Fetal outcome in control and cases

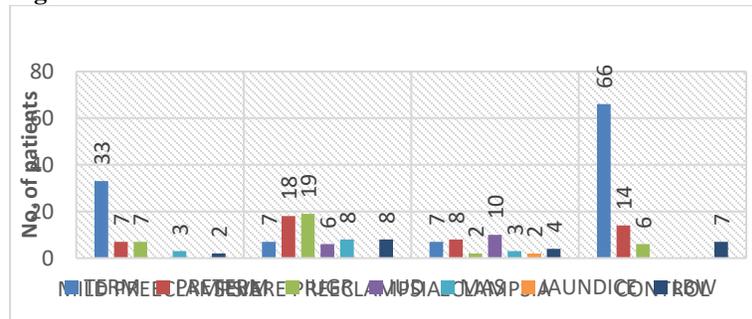


Table 8. Distribution of maternal and fetal complications among cases in relation to the platelet count

| Platelet count in lacs/mm ³ | Maternal complication | Fetal complication |
|--|-----------------------|--------------------|
| <1 | 10(17.2%) | 6(9.6%) |
| 1-1.5 | 28(48.7%) | 32(51.6%) |
| >1.5 | 20(34.4%) | 23(37%) |
| total | 58(100%) | 62(100%) |

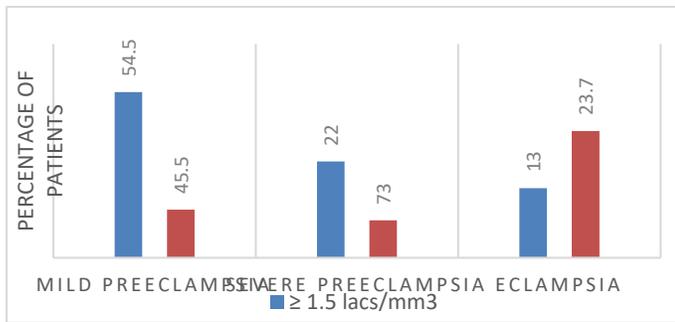
From the above table we observed that out of 80 patients 58 showed maternal complications while 62 showed fetal complications. 28 (48.7%) of the maternal complications and 32 (37%) of fetal complications were seen in cases with platelet count in range of 1-1.5 lacs/mm³ and 10 (17.2%) maternal complications and 6 (9.6%) of fetal complications were seen in cases with platelet count less than 1 lacs/mm³. Maternal and fetal complications often coexisted in the same patient.

Table 9. Association between platelet count and cases

| Platelet count | Hypertensive disorders in pregnancy | Statistical analysis |
|----------------------------|-------------------------------------|------------------------------------|
| ≥ 1.5 lacs/mm ³ | 32(54.2%) Mild preeclampsia | X ² =6.1684, p=0.045766 |
| < 1.5 lacs/mm ³ | 13(22.0%) Severe preeclampsia | X ² =6.1684, p=0.045766 |

From above table we observed that 32 (54.2%) cases with mild preeclampsia were had platelet count more than or equal to 1.5 lacs/mm³. 14 (22.0%) cases with severe preeclampsia had platelet count less than 1.5 lacs/mm³ and this association was found statistically significant on Chi-Square test (X²=6.1684, p=0.045766) at 5% level of significance and 95% confidence interval.

Figure 7. Association between platelet count and cases



III. DISCUSSION

Blood pressure distribution

One of the criteria for severity of preeclampsia and eclampsia is blood pressure, more than 160/110 mm of mercury. In our study only 23 (14%) patients had blood pressure more than 160/110 mm of mercury and rest 137(86%) patients had blood pressure less than 160/110 mm mercury. Mean blood pressure of our study group was 116.30 ± 1.67 mm Hg. (Table-1,2, Figure-1,2)

Platelet count

Out of all hematological abnormalities that occur in hypertensive disorders of pregnancy, thrombocytopenia is the most common. **Sibai BM et al (1996)**⁶. There was progressive fall of mean platelet count with the increasing severity of disease. In present study, it was seen that there was significant decrease in platelet count in preeclampsia and eclampsia patients when compared to control group i.e. normotensive pregnant. Out of 80 patients in control group 73(91.25%) patients had platelet count more than 1.5 lacs/mm³ while 7(8.75%) patients had platelet count between 1-1.5 lacs/mm³. Out of 40 patients with mild preeclampsia 31(77.55%) patients had platelet count more than 1.5 lacs/mm³ while 7(17.5%) patients had platelet count between 1-1.5 lac/mm³ and only 2(5%) patients had platelet count less than 1lac/mm³.

7(28%) patients with severe preeclampsia had platelet count more than 1.5 lac/mm³, 13(52%) patients had platelet count between 1-1.5 lacs/mm³ and 5(20%) had platelet count less than 1lac/mm³. In eclampsia 3(20%) patients had platelet count more than 1.5 lac/mm³, 7(46.6%) patients had platelet count between 1-1.5 lac/mm³ and 5(33.4%) patients had platelet count less than 1lacs/mm³. Mean platelet count of control was 2.75 ± 0.59 lac/mm³ Mean platelet count in mild preeclampsia was 2.39 ± 0.41 lac/mm³ Mean platelet count in severe preeclampsia was 1.08 ± 0.42 lac/mm³ Mean platelet count in eclampsia was 0.90 ± 0.37 lacs/ (table 3,4 and figure 3). The mean platelet counts in both the case and control group was compared with other studies conducted by **Chaware SA et al, Mohapatra S et al, Joshi KV et al.**^{7,8,9} In all the studies including the present one, the mean platelet counts in the control was more than 2.2 lakh/mm³ and it also demonstrated a decreasing trend as the severity of preeclampsia increased even though in most of the studies the mean platelet counts were in the normal range of 1.53 lac/ mm³. But in eclampsia the mean platelet count was seen to be below 1 lac/mm³.

Mode of delivery

Majority of patients 55 (68.75%) delivered vaginally in control group and maximum patients 50 (62.5%) were delivered by caesarean section in study group. Thus, more operative interventions were required in patients of preeclampsia and eclampsia (Table 5, Figure 4)

Fetomaternal outcome

Hypertensive disorders of pregnancy are a leading cause of maternal and perinatal and morbidity worldwide, in India, they account for the third most important cause of maternal mortality (International journal of reproduction, contraception, Obstetrics and Gynecology 2017)¹. In present study we observed that the rate of maternal complications and fetal complications during pregnancy was higher in the cases of severe preeclampsia and eclampsia. In our study incidence of intrauterine growth restriction, low birth weight, preterm, meconium aspiration syndrome and intrauterine death increased as platelet count decreases below 1.5 lacs/mm³

In 80 patients among study group, in mild preeclampsia 7 (17.5%) patients, 18 (72%) patients with severe preeclampsia and 8 (53.3%) with eclampsia underwent preterm labor, 10 cases (12.5%) of placental abruption, 3 (3.75%) went into postpartum hemorrhage, 2 (2.5%) went into DIC, 2 (2.5%) had pulmonary edema and 9 (11.25%) eclamptic patient died. While in control group 14 patients had undergone preterm labor. In study group 33 (82.5%) patients with mild preeclampsia, 7 (28%) patients each with severe preeclampsia and eclampsia and 66 (82.5%) patients in control group delivered term babies while rest were preterm babies. In study group the most common fetal complication was IUGR followed by IUD then LBW. IUGR was present in 7 (8.75%) patients with mild preeclampsia, 19 (23.8%) with severe preeclampsia and 2 (2.5%) with eclampsia and in 6 (7.5%) patients of control group. IUD occurred in 16 (20%) cases with 6 (7.5%) seen in severe preeclampsia patients and 10 (12.5%) in eclampsia. LBW was observed in 2 (2.5%) with mild preeclampsia, 8 (10%) with severe preeclampsia and 4 (5%) eclampsia cases and 7 (8.75%) patients of control group. MAS was observed in 3 (3.25%) mild preeclampsia, 3 (3.25%) severe preeclampsia and 2 (2.5%) eclampsia cases. 6 (7.5%) had fetal complications of IUGR and 7 (8.75%) had LBW in control group. (table 6,7,8 figure 5,6)

In the present study we observed that Out of 80 cases who presented with thrombocytopenia, 33 underwent preterm labor, 10 had placental abruption, 3 had PPH, 2 had DIC, 2 women had pulmonary edema and nine maternal death occurred. Most of the fetal complications were also seen in cases with platelet count in the range of 1-1.5lac/mm³.

IV. CONCLUSION

1. One fourth patients 40 (25%) had systolic blood pressure more than 160 mm of mercury in our study,
2. Less than one fourth patients 23 (14%) had diastolic blood pressure more than 110 mm of mercury.
3. Mean arterial pressure in study group was 116.30 ± 1.67 mm of mercury as compared to mean arterial blood pressure in

control group was 80.62 ± 4.28 mm of mercury which was highly significant ($P < 0.001$).

4. Strong association was found between the platelet count and the severity of preeclampsia and eclampsia. ($P < 0.001$). Moreover thrombocytopenia (platelet count < 1.5 lakh/mm³) was present in a total 80 cases of which 31 had mild preeclampsia, 7 had severe preeclampsia and 12 patients had eclampsia. Thus it can be considered as a reliable prognostic indicator in preeclampsia and eclampsia.

5. Maximum number of patients 55 (68.75%) delivered vaginally in control group and maximum number of patients 50 (62.5%) were delivered by caesarean section in study group. Operative interventions were required in most of cases of preeclampsia and eclampsia.

Most common maternal outcome was preterm labor in both study and control group. Placental abruption was second most common cause in severe preeclampsia and 2 patients of eclampsia had undergone DIC while nine patients died of eclampsia. Thus, risk of maternal complications increases in preeclampsia and eclampsia.

6. Of normotensive pregnant women maximum babies 57 (71.24%) were born at term while 46 (58%) were term babies in preeclampsia and eclampsia.

7. IUGR was the most common fetal complication in study group while LBW was most common fetal complication in control group. IUD was the second most common complication followed by LBW in study group.

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Analysis Of The Dynamics Of The Number Of Microtus Ilaeus Population In The Lower Amudarya

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Abstract- The article presents the results of studies analyzing the population dynamics of *Microtus ilaeus* in the lower Amudarya. It has been established that in the conditions of the South Aral Sea region, the moisture content of the territory for the vole population is a limiting factor in the autumn period. This confirms that under pessimum conditions, the vole population is very sparse and its abundance is limited mainly by external factors. The effect of all analyzed factors on the dynamics of the vole abundance is always complex, interdependent and variable depending on the population density and the totality of the conditions of its existence.

Index Terms- Southern Aral Sea region, lower reaches of the Amudarya, *Microtus ilaeus*, environmental factors, dynamics, abundance

I. INTRODUCTION

The dynamics of the population reflects the history and the entire course of the conflicting relationships of the population with the environment. And in these relationships, both the external environment and the adaptive compensatory mechanisms of the studied population are equally involved. Based on our studies, we did not oppose them to each other or, moreover, ignore one of the sides of the dynamic interaction of the environment and the population, but conducted a comprehensive quantitative analysis of all environmental factors explaining the changes in the abundance of one of the small species of the fauna of mammals of the Aral Sea region - the Ili vole. Similar work for the vole population has not previously been carried out.

II. MATERIALS AND METHODS

In the analysis, they used: the size and structure of the population at the present and previous points in time, meteorological conditions (air temperature, wind speed, rainfall, snow cover thickness, etc.), the feed capacity of the land, the Amudarya water regime and the moisture content of the habitat. By hydration is meant a set of abiotic factors, taken as of 1970 for 100% [2, 9]. Of the breeding parameters, the following were analyzed: the proportion of breeding females; total spring and autumn abundance (percentage of animals falling); the number of overwintered individuals; the number of pregnant females (counting all females, regardless of age); fertility (average number of embryos per 1 female). Also used the survival rate of individuals for the winter.

Microtus ilaeus is one of the few species in the mammalian fauna of the South Aral Sea region. In the lower reaches of the Amudarya, the vole inhabits mainly kupaks, moist areas with dense vegetation of reed, cattail, tamarisk, sedge, periodically flooded with water. It is also found in humid areas of tugai, along the banks of river channels, reservoirs, as well as in irrigated fields. Previously, the vole of the lower reaches of the Amudarya was attributed to the Transcaspian vole *Micritus transcaspicus* Satunin, 1905 [6, 7, 8, 9], or to the Kyrgyz vole *Microtus kirgisorum* [6, 9]. However, according to modern concepts, it is precisely the Ili vole that lives in the lower reaches of the Amudarya [7].

III. RESULTS AND DISCUSSION

According to the data of R. Reimov (1972; 1987) in 1968-1969. The number of voles in the Amudarya delta was very low, despite the fact that the humid conditions of the delta are optimal for its habitat. Reach for 200-300 traps did not exceed 1-2 animals or 4-6 specimens. on 1 ha [9]. In 1970-1975 the abundance of this species increased sharply, in places by 100 catches / day., the incidence was 10-15% or 15-20 ind. on 1 ha [8, 9]. Due to the change in the hydro regime of the Amudarya delta and the aridization of the habitat conditions of this species, the settlement areas have significantly decreased, and the population has decreased.

In recent years, due to the regulation of the flow of the Amudarya and the increase in the processes of desertification of the delta and aridization, the habitat conditions of the vole have worsened and its abundance has sharply decreased. According to experts [1, 4], this species becomes scarce. At present, it is generally accepted that in optimal living conditions, intrapopulation factors play one of the main roles in the regulation of numbers, and in pessimal conditions, the role of external factors increases. We also performed a quantitative assessment of the main parameters of the dynamics of the vole population for two periods: spring (beginning of the breeding season) and autumn (end of the reproductive cycle).

The analysis showed that the share of the explained variance of all environmental factors in the dynamics of the vole population is quite high and ranges from 88% to 98%. (tab. 1).

Table 1
Distribution of effects determining the size and structurespring Iliys vole population (in %%)

| Population characteristics | endogenous factors | | exogenous factors | | | | Explained Dispersion |
|------------------------------------|--------------------|--------------------|---------------------|---------------|-------------------------|---------------------------|----------------------|
| | Previous number | the current number | Climatic conditions | Feed security | Hydro mode of Amu Darya | Humidity of the territory | |
| Number | 23,2 | 0 | 20,5 | 12,14 | 17,4 | 15,2 | 88,44 |
| The proportion of pregnant females | 54,8 | 0 | 10,4 | 8,53 | 9,7 | 6,3 | 89,73 |
| Number of wintering | 36,6 | 0 | 18,7 | 6,45 | 11,7 | 20,3 | 93,75 |
| Winter Survival | 25,8 | 0 | 28,3 | 17,5 | 7,16 | 13,3 | 92,06 |

The rest of the variance is due to unaccounted factors (disease, predators, cyclic solar activity, etc.). The main contribution to the total variability of spring numbers is made by abiotic factors - 65.24%. The contribution of endogenous factors to the explained variance is somewhat less - 23.2%. The greatest impact of exogenous factors is made by climatic conditions. It was also established that at the beginning of the breeding season, the number of overwintered individuals is also determined by abiotic factors, their contribution to the total explained variance is 57.0%. Exogenous factors contribute up to 34%. In spring, the breeding intensity is mainly determined by the demography of voles in the autumn of the previous year - 54.8%, as well as meteorological conditions (10.4%) in October-November, i.e. during the period when a group of animals leaving for the winter forms in the population and serving as the basis for a new breeding cycle. The mechanism that implements these relationships is still unclear. Probably one of the acceptable explanations is the restructuring of the sex, age and genetic structure of the population under the influence of high weather conditions, aimed at the selective selection of animals (during the winter period), which may have any advantages in reproduction and survival.

The effect of high densities, on the one hand, is expressed in a decrease in reproductive activity and an increase in mortality of adult animals, and on the other hand, in a subsequent decrease in the viability and breeding intensity of voles that were at a high number of stages of embryonic and early stages of postembryonic development [1, 4, 5]. The contribution of such exogenous factors as food supply, the Amudarya hydro regime, and the territory's moisture content were distributed in almost the same ratio from 6.3% to 9.7%. The contribution of the density and structure of the vole population at the moment is negligible and almost no effect was found on winter survival. The prehistory of the population

had a more significant effect (up to 25.8%). The total share of exogenous factors is very high and amounted to 66%. Of these: climatic factors up to 28%, forage conditions up to 17.5%, the moisture content of the territory also makes a sufficient contribution - up to 13.3%.

As the results of the study showed, in the autumn period, the distribution of effects affecting the dynamics of numbers sharply differs from their distribution in the spring. From the table. Figure 2 shows that the effect of contributions of external and intra-population factors to the total autumn abundance was distributed almost equally (47.7% and 49.27%, respectively). The proportion of pregnant and breeding females is closely related to population density and breeding intensity in previous periods, as well as to the abundance level in this period. The contribution of intrapopulation factors to the proportion of pregnant and breeding females is very high and ranges from 68% to 70%, respectively. The rest of the total variance is due to exogenous factors. As for fertility, here the main contribution is also made by internal factors - 53%. Of the exogenous factors, the greatest contribution is made by the moisture content of the habitat territory - 12.5% and the hydro regime of the Amudarya - 11.73%.

The materials obtained indicate a significant variability in breeding indicators under the influence of the conditions of existence and the number of animals. The study of the age structure of the vole population allows us to evaluate the biological identity and the specific role of individual generations in the reproduction of species. The relationship between the proportion of immature females born in spring and early summer (3-6 months) with the abundance level in April and the reproductive activity of females of a younger age group (1-2 months) was revealed.

Table 2
The ranking of effects affecting the structure and abundance of the Iliysk vole in autumn, in %%

| Population characteristics | endogenous factors | | exogenous factors | | | | Explained Dispersion |
|----------------------------|--------------------|--------------------|---------------------|---------------|-------------------------|---------------------------|----------------------|
| | Previous number | the current number | Climatic conditions | Feed security | Hydro mode of Amu Darya | Humidity of the territory | |

| | | | | | | | |
|--|-------|-------|------|------|-------|-------|-------|
| Number исленность | 17,3 | 30,4 | 7,54 | 8,63 | 12,3 | 20,8 | 96,97 |
| The proportion of breeding females | 36,0 | 33,41 | 4,38 | 6,41 | 7,4 | 9,6 | 89,8 |
| The proportion of pregnant females | 32,3 | 35,5 | 6,06 | 3,17 | 4,26 | 4,7 | 85,99 |
| Fertility | 34,6 | 18,48 | 4,51 | 4,33 | 11,73 | 12,5 | 86,15 |
| The proportion of females age 1-2 months | 51,42 | 9,74 | 4,35 | 2,62 | 5,65 | 8,31 | 82,1 |
| The proportion of females age 3-6 months | 47,36 | 3,46 | 2,61 | 7,08 | 10,3 | 15,4 | 86,21 |
| The proportion of females age 7-16 months | 43,08 | 3,81 | 1,18 | 4,93 | 12,45 | 26,31 | 91,76 |

Intrapopulation factors also have the greatest effect on the youngest animals (1-2 months) (61.16%). Of the exogenous factors, a significant contribution is made by the moisture content of the territory - 8.3%, hydro mode Amudarya - 5.65%. Intrapopulation factors also make a large contribution to the proportion of females of the older age group (7–16 months). I would like to highlight that of the exogenous factors, the moisture content of the habitat territory is 26.3%. This is probably due to the fact that, with increasing aridization and desertification of the Amudarya delta, the moisture content of the habitat is probably a limiting factor.

IV. CONCLUSION

Thus, on the basis of the analysis we can conclude that the combination of abiotic and biotic factors significantly affects the dynamics of the vole population. It was established that the dynamics of the vole population is controlled by the following parameters: a) the structure and population at previous times, b) the current situation in the population, c) weather conditions, d) food supply, e) the moisture content of the territory and e) hydro mode of the Amudarya. The effectiveness of the action of density and weather factors on the population dynamics has a pronounced seasonal specificity. The studies confirm the opinions of scientists that the age structure of the vole population is closely related to the characteristics of reproduction - the rate of puberty, the frequency of birth of broods, etc. The wide variability of the age structure and its focus on a certain level of population size has been established. The breeding processes that form the abundance at the beginning of summer are determined by both the state of the population and the intensity of breeding, and weather conditions in the previous year.

It has been established that in the conditions of the South Ural region, the moisture content of the territory for the vole population is a limiting factor in the autumn period. This confirms that under pessimum conditions, the vole population is very sparse and its abundance is limited mainly by external factors. The effect of all

analyzed factors on the dynamics of the vole abundance is always complex, interdependent and variable depending on the population density and the totality of the conditions of its existence.

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Effects Of Refuse Dump On Ground Water Quality Within The Rivers State University Campus, Port Harcourt, Nigeria

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Abstract- Water remains one of the essential needs of man. Although, supply of fresh water is finite, availability of water is further threatened by contamination arising from man's use of space. Rivers State University has witnessed increase in its student and staff population. This increment has also resulted to huge wastes generation within the University campus. This study examined if there is any variation in physiochemical properties of borehole water at wastes dump sites and those away from the dumpsites. Out of a total of 174 boreholes and 15 dumpsites within the Rivers State University campus, three bore holes located close to wastes dump sites and another three located 100 meters away from existing dumpsites were purposely selected for study. The result of investigation reveals that there exists variation in the Physiochemical properties of bore hole water found at dumpsites with those located 100 meters away. Further analysis showed that most parameters examined for bore holes at the dumpsite fell below the WHO and Standard Organization of Nigeria minimum requirement for drinking water. The variation in these parameters was attributed to the effect of wastes dump close to this water source. The study recommends that the University management should as a matter of necessity install water treatment plants especially for wells around dumpsites before the distribution of water for consumption. There is also the need to put in place effective wastes disposal and management mechanism within the university campus as a desideratum for ensuring the protection of the health of students and staff of the University.

Index Terms- Ground water; contamination; dumpsite; wastes, Physio-chemical properties

I. INTRODUCTION

One of the challenges facing urban managers the world over is on how to effectively manage wastes such that they do not degrade the human environment. Man's interaction with his environment often times results in the degradation of the environment with attendant negative footprints.

According to Wilding and Zachars, (1991) anthropogenic activities are becoming of great concern to scientist as the chemical utilized in the course of agricultural, residential and industrial activities could impact greatly on the soil, ground water

of surrounding environment resulting to potential threat to public health and human properties.

The 21st century has been characterized by very rapid growth in the number of urban centers. Unfortunately, increased population growth also transforms to increased wastes generation that may result in environmental degradation when not well handled. Increase volume of wastes generation impacts on biodiversity, and increase in global temperature as a result of the introduction of environmentally unfriendly gases on the environment.

Ground water constitute two third of the total fresh water reserve on the earth (Chitton, 1992). The world ground water reserve is estimated at about 5.0×10^{24} L accounting for over 2000 times the entire volume of water contained in all the rivers and creeks of the world and over 30 times the total fresh water contained in the world fresh water lakes (Buchanan, 1993).

In spite of the importance of water to man, its natural provision cannot be increased as less than 1 per cent of the earth's fresh is accessible to man and with increasing population, the demand for fresh water is expected to be one-third greater it is today (Melissa, 2018).

Ground water is mostly used for irrigation purposes accounting for over 50 percent of total irrigation water used and over 98 percent of domestic water usage in the rural areas (Todd, 2000). Although the quality of water found in ground water is very perfect as it satisfy the WHO drinking water requirement, anthropogenic activities such as manufacturing, agriculture could result in the pollution of ground water through the seepage of water from the surface of the earth to the ground water (Skinner, 2002).

Ground water can also be easily contaminated by the poor management of an open waste dump site, the use of latrine, mining activities, activities of manufacturing industries and other agricultural practices such as the utilization of pesticides and herbicides on the farm. The Rivers State University has witnessed increase in both student and staff population. Recent estimate has it that the school has a student population of 22,400 with a staff 3,000 which all together totaled 25,400 in 2017 (Wikipedia, 2020) The import of increase population simply means more wastes generation with attendant management challenges..

In a bid to manage wastes within the campus, certain locations have been designated as wastes dumpsites. Poor waste management practice within and around the University campus

may lead to the contamination of ground water through infiltration of leachates more so that unsafe water kills more people each year than war and all other forms of violence combined.

Poor wastes handling may further tasks the capacity of university management to supply adequate fresh water in both quantitative and qualitative terms giving the increasing population of students and staff. Our surmise is that indiscriminate allocation of wastes collection points may portend serious water quality challenges with attendant negative consequences on the socio-economic and health status of staff and students of the university. This work therefore seeks to examine the impact of open wastes dump on ground water quality within the Rivers state University campus.

II. AREA OF STUDY

Rivers State University Port Harcourt is located within the Diobu Area of Port Harcourt, Mile III, in Port Harcourt City Local Government Area of Rivers State.(Figure 1) The Rivers State University Port Harcourt has a population of about 3,000 civil force and 22,400,000 students in it making a total of 25,400 populations as at 2017. This figure does not include persons such as lecturer's children, staff children and of course some who make their living in and around University.

The climate of Rivers State University Port Harcourt is not different from the entire climate of Port Harcourt where it is superimposed. The dry season is short lasting for just two months with very brief influence of the harmattan. Precipitation in the region last for about 10 months with the heaviest month in September averaging 367mm of rain. December on average is the

driest month recording about 20mm, temperatures throughout the year in Rivers State University of Science and Technology are relatively constant. Average temperatures are typically between 250c – 270c on campus.

The Rivers State University is generally a lowland area with average elevation below 20 meters above sea level. The region is made up of sedimentary formation and the basement complex rock. Some areas of the university campus is still having its natural vegetation especially the slums. It comprises the raffia palms and light rainforest, this is due to high rainfall in and around the campus. Other vegetation includes home gardens and ornamentation that beautifies the campus.

The prevalence of sandy or sandy loam is paramount in the University Campus. The soil on the campus is always leached, and beneath it is an impervious pan layer. This is due to construction works that is always happening on campus.

There are 2 campuses, old site and the new site. Other places include the agric site, Faculty of Law site, Staff Quarters both at the old and new sites properly linked together. The ISS section and the Arena, the Staff Club around the Amphi Theatres and the Commercial Area. Hostels include hostel H, D, etc.

The school runs a private health-care retainership scheme of its own that renders medical assistance to both staff and students.

The University has a permanent water supply scheme incorporated in the Department of works, where mini tankers are used to make water available to users in hostels, classrooms and laboratories. But is has been enhanced in recent times when boreholes are sunk and connected to almost all buildings in Rivers State University making the water board of the Department of works functional. Figure 1 is the schema showing study area

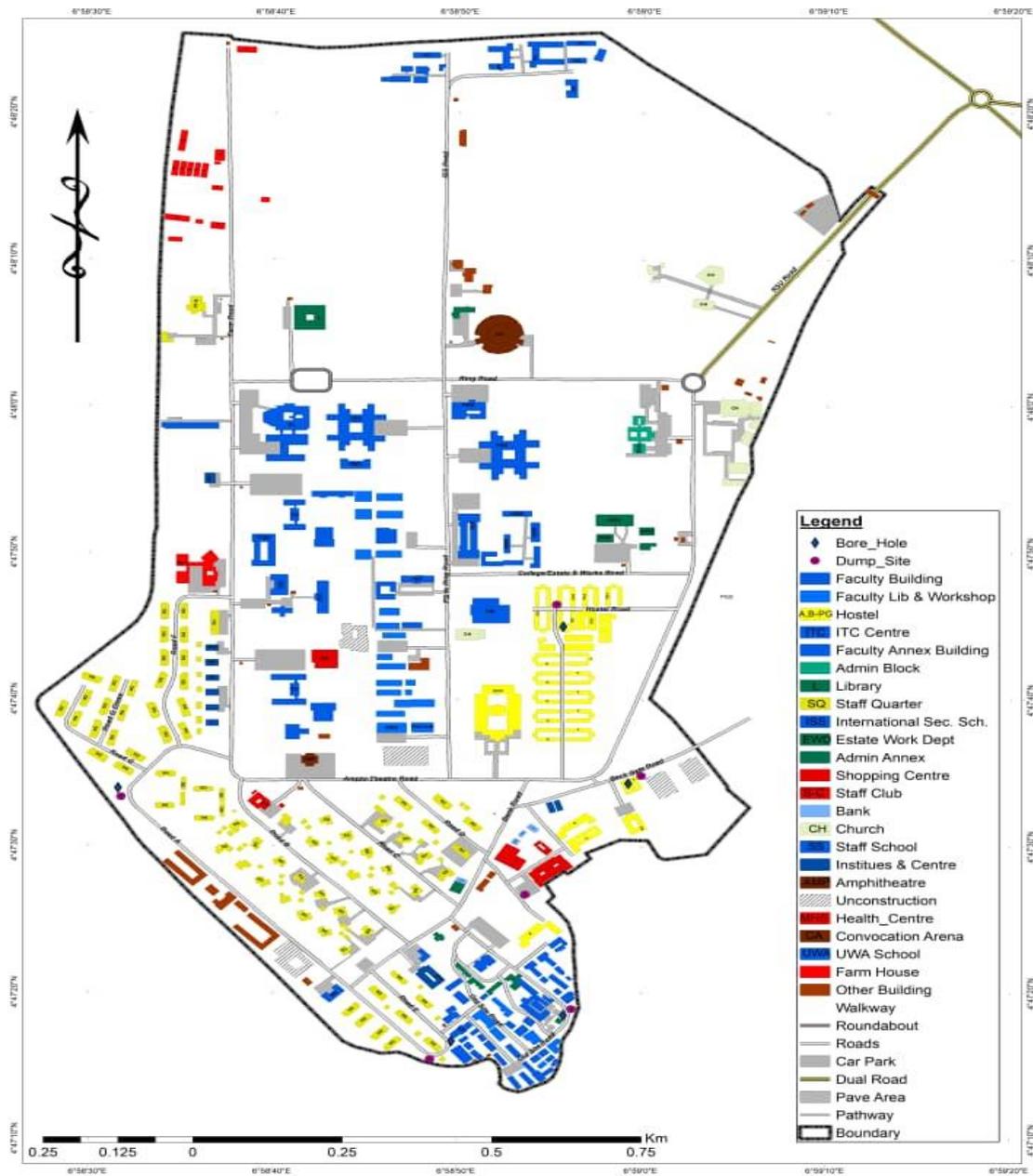


Figure 1: Rivers State University showing bore hole and waste dump sites

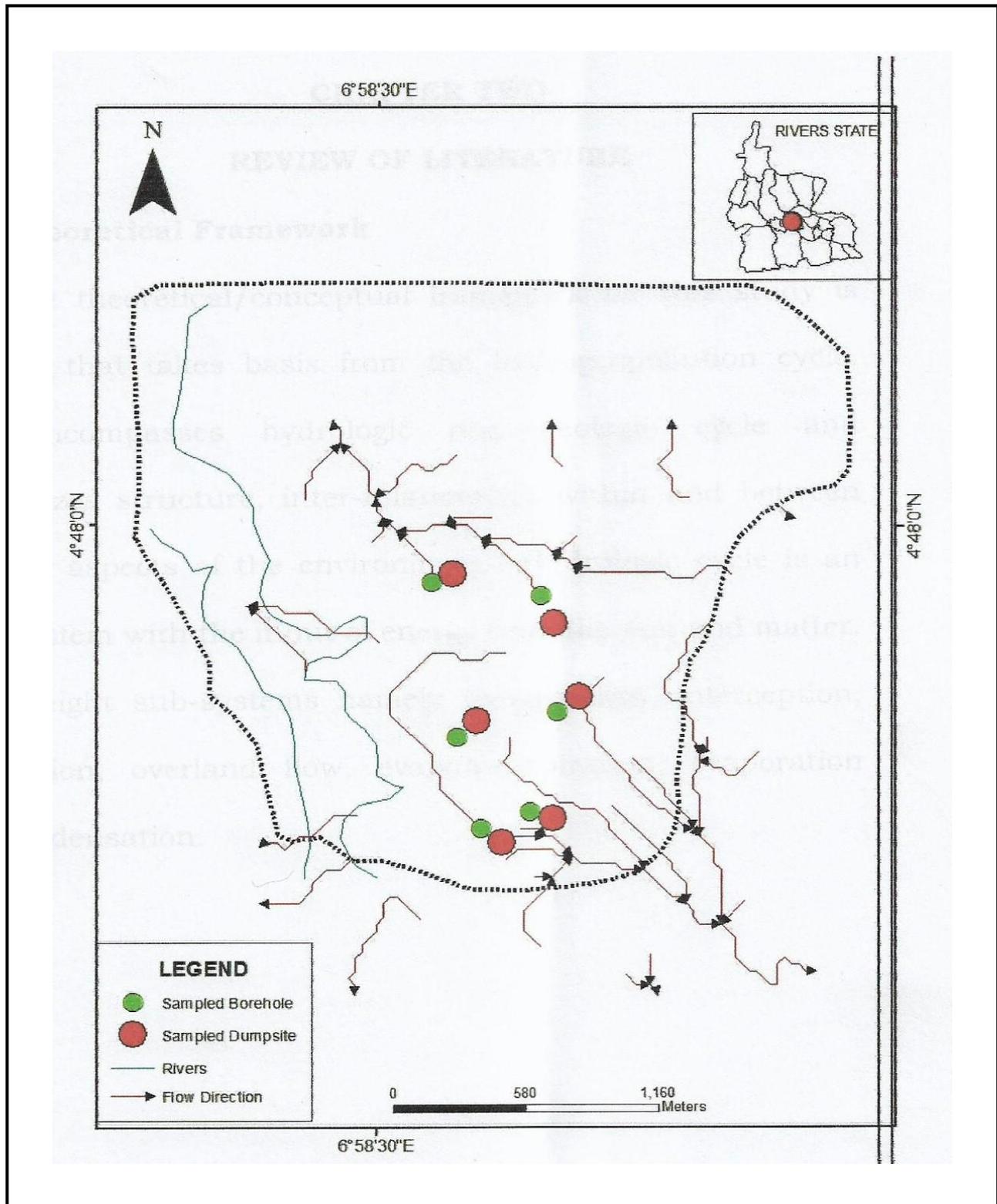
III. METHODS AND MATERIALS

The research employed experimental research design since the study intends to show if there is any statistically significant relationship between quality of bore whole water at wastes dump sites and those away from dumpsites. The objective is to determine if the variation in physio-chemical properties of borehole water at waste dumpsites varies with those located 100 meters away. This research design allows the investigation of cause and effect relationship as observed among the study parameters.

There are a total of 174 boreholes and 15 dumpsites within the Rivers State University campus (figure.2). The choice of the number of boreholes was based on their proximity to wastes dump sites. Six boreholes three located close to wastes dumps and another three located 100 meters away from dumpsites were also selected for study. The direction of flow within the campus was a major yardstick for selection of borehole for study (figure 2).

Two sets of samples were collected for this study. Samples were collected from boreholes at selected dumpsites (Hostel F& G, staff Quarters and Old site) spots and a second sample that acted as control were also collected from boreholes at 100 meters away from

dump sites. The water parameters of interest are Ph, Chlorine (Cl), Sulphur dioxide, SO₃, Nitrogen dioxide (No₃), Total Dissolved Substance, Turbidity, Ammonium (NH₄), Iron (Iron),



Lead (Pb), Potassium (k), Calcium (Ca), Magnesium (Mg), Sodium (Na).

The water samples were collected using a 2-liter hand plastic and screw-capped bottles that have been sterilized to avoid contamination by any physical, chemical or microbial means. The collected well water samples were aseptically transferred into sterile 2 plastic containers.

Figure 2: Sampled Borehole and Dumpsite in relation to Flow Direction within Rivers State

University campus

Source: Author's field work, (2020)

After collection, the samples were immediately placed in ice coolers for transportation to the laboratory and stored in refrigerator. The result of experiment was placed side by side with the WHO standards for water quality to ascertain if the physiochemical properties of the sampled wells are within the minimum allowable limit. The results of this work are presented in form and of tables and charts to enhance comprehension.

IV. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The theoretical framework for this study is the hydrogeopollution cycle. (Figure 3). This encompasses hydrologic and geologic cycle and emphasizes structure, inter-relationship within and between different aspects of the environment. Hydrologic cycle is an open system with the input of energy from the sun and

matter. It has eight sub-systems namely precipitation, interception, percolation, overland flow, evapotranspiration, evaporation and condensation.

The entrance of pollutants into the hydrological cycle is subject to the failure of proper management of the system. The entrance is via percolation from the geological cycle and atmospheric precipitation of acidic rain and other forms of atmospheric pollutants. The cycle here refers to the movement of water from the atmosphere to the earth and back to the atmosphere induced by the energy of the sun. Some infiltrates into the soil and later percolates to become groundwater. Groundwater is subsurface water that fills voids in geologic formations

At any stage of the hydrological cycle, pollutants and contaminants may be introduced and cyclically dispersed from one point to another, as pollutant could be either from a point or nonpoint source.

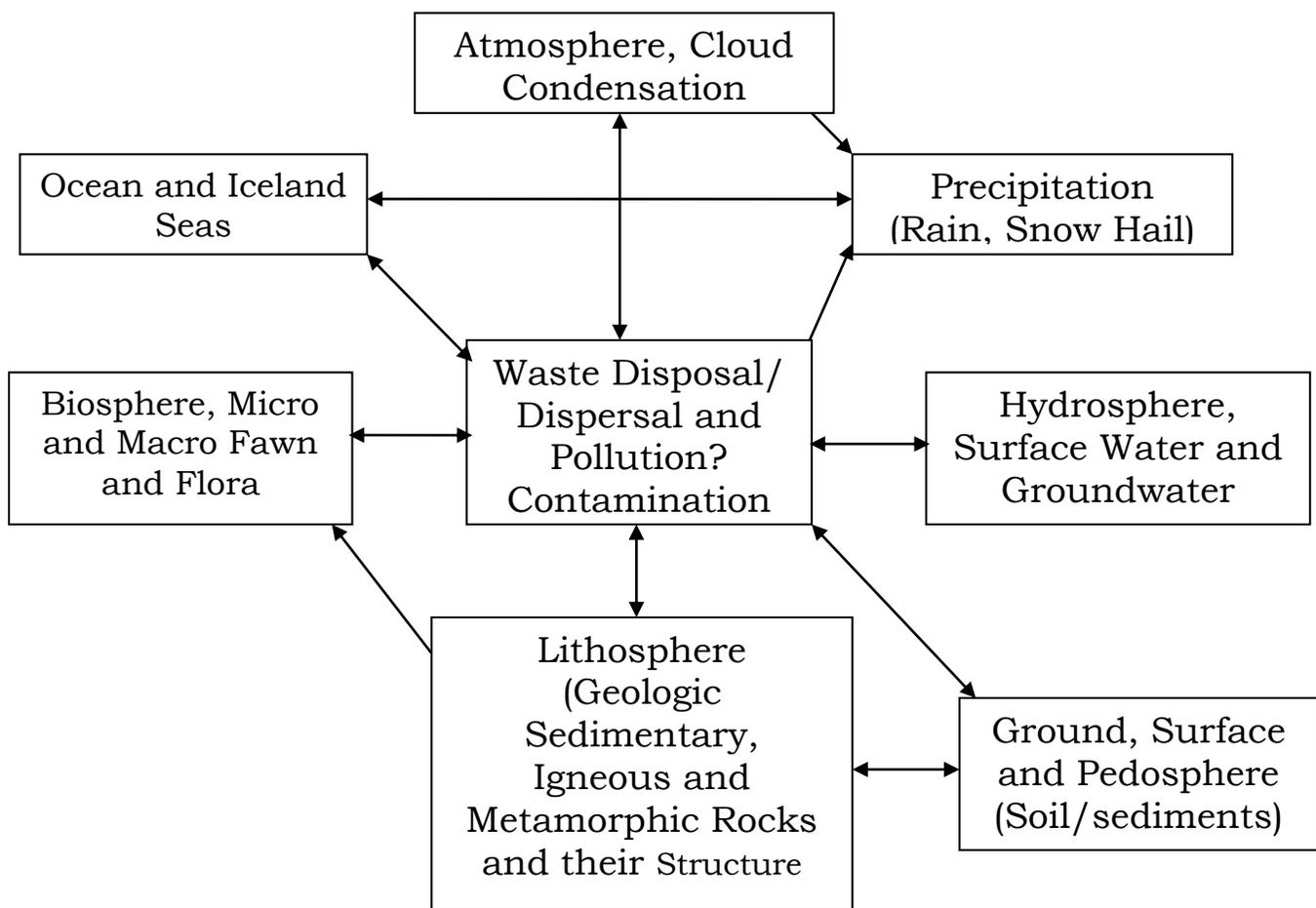


Fig 3: The Hydrogeopollution cycle Source: Egboka et al (1998)

2.2 Literature Review

Waste refers anything that has no use value. NISP (2003) described wastes as material from the production process that can no longer be put to use. Waste can be in diverse forms which are, solid, liquid or gaseous state. Waste in the solid state are waste generated in the form of broken bricks, bottles and so on while waste generated in the liquid form are waste such as effluent and finally waste generated in the gaseous state are waste in the form released from industrial stacks making for particulate matter in the air (Adedibu, 1992).

The growth of population and the pace of urban development have resulted in the generation of large volumes of wastes outpacing the level of sanitation in the cities making life difficult for the urban poor who live with no sanitation in most of their environment. This situation has resulted to poor access to sanitation by over 2.4 billion people globally distributed at the tune of 80 to 13 percent in Asian and Africa respectively. Though, the situation is different in the urban centers but still with poor presence of sanitation awareness in the urban area though significantly better than the rural areas.

Water governs the survival of all living things on the planet earth. Though the essence of water and the scarce availability of fresh water is also complicated by man industrial activities by the introduction of pollutants via sewage into the scarce available fresh water system affecting the physical, chemical and biological processes of the environment to include plant and animal life. Lee and Jonelee, (1996) while considering the impact of wastes on ground water quality argued that little amount of land fill leachate can contaminate huge amount of ground water expose the reserve unsuitable for household and lots of additional function.

A cloud of contaminant is frequently in attendance downward slope from landfill sites. This cloud can be recognized by high chemical apparatus in the ground water, which have been consequential from the sequential collapse and leachate of the waste (Akan, et.al 2007) Natural concentration and micro-biological distinctiveness of the waste matter are capable of causing physiochemical change in soil, as a consequence of the

nutrient and pathogen level in the ground (Dawes and Goonetilleke, 2001.; Wetherill, 2001) observed that the financial side of landfill in municipal Australia do not pull through the spending cost, and regulator be supposed to think about burning amenities. The core difficulty is that current occurs from beginning to end of jagged rock fractures that are mainly responsible for the conveyance of leachate (Lee and Jones Lee op cit). Although there is high level awareness' on the negative impact of wastes on water resources among residents in the study area, there is need to scientifically ascertain the impact of open wastes dump site on physiochemical properties of water within the Rivers State University campus

V. RESULTS AND DISCUSSION

Analysis of the physio-chemical parameters of bore hole water within the dumpsite areas and those 100 meters away from the dumpsites (table 1, figure 2) reveals that the parameters varied for all the water parameters investigated. From the results, the pH value of the samples collected at the different dumpsites located at F& G Hostel, Staff Quarter and Old site fell short of the WHO standards with values of 6.1, 5.9 and 5.7 respectively compared to the PH of bore hole water found 100 meters away from the dumpsites that were within the minimum WHO standards (6.5-8.5).

for Lead (Pb), the results of water analysis shows that here is no trace of Pb for boreholes 100 meters away from the dumpsites while at dumpsites Lead was detected with values ranging from 0.105, 0.87 and 0.094 for F& G Hostels, Staff quarters and Old site respectively (table 1). According to the Standard Organization of Nigeria (2007), the high lead value of these environment if it percolates into the groundwater is capable of causing cancer, interference with vitamin D metabolism, affect mental development in infants, toxic to the central and peripheral nervous system. Figures 5and 6 shows the lead values vis-a-vis the SON's range

Table 1: Physio-chemical properties of Bore hole water at different dumpsites in RSU Campus

| Parameters | Pysio-chemical properties of Bore hole water at different dumpsites in RSU Campus | | | Physio-chemical properties of Bore hole water 100 meters away from dumpsites in RSU Campus | | | WHO Minimum Standard |
|------------|---|--------------------|-------------------|--|--------------------|-------------------|----------------------|
| | F & G Dumpsite | Staff Qts Dumpsite | Old Site Dumpsite | F & G Borehole | Staff Qts Borehole | Old Site Borehole | |
| pH | 6.1 | 5.9 | 5.7 | 7 | 6.9 | 6.8 | 7.0 – 8.5 |
| CI | 5.92 | 5.94 | 14.32 | 4.94 | 4.43 | 3.45 | 250 mg/l |
| SO2 | 4 | 2 | 3 | 1 | 1 | 1.12 | 200 mg/l |
| NO3 | 4.04 | 1.08 | 1.03 | 0.01 | 0.03 | 0.03 | 4.5 mg/l |
| TDS | 87 | 63.7 | 153 | 1 | 4 | 2 | 200 mg/l |
| Turbidity | 20.04 | 20.11 | 18.34 | 0.01 | 0.04 | 0.02 | 5 NTU |
| Nh4 | 1.05 | 0.88 | 0.06 | 0.06 | 0.06 | 0.05 | 0.2mg/l |
| Fe | 5.721 | 3.2 | 4.201 | 0 | 0 | 0 | 0.3 mg/l |
| Pb | 0.105 | 0.87 | 0.094 | 0 | 0 | 0 | 1.5mg/l |
| K | 16.71 | 20.44 | 21.42 | 0.01 | 0.001 | 0.002 | 200mg/l |
| Ca | 4.6 | 3.07 | 9.21 | 1.53 | 1.53 | 2.3 | 75mg/l |
| Mg+ | 0.93 | 1.01 | 1.4 | 0.46 | 0.93 | 0.093 | 10mg/l |

| | | | | | | | |
|----|-------|-------|-------|------|------|-------|---------|
| Na | 5.196 | 4.147 | 5.181 | 2.91 | 4.03 | 2.557 | 200mg/l |
|----|-------|-------|-------|------|------|-------|---------|

Source: Author's field work, (2020)

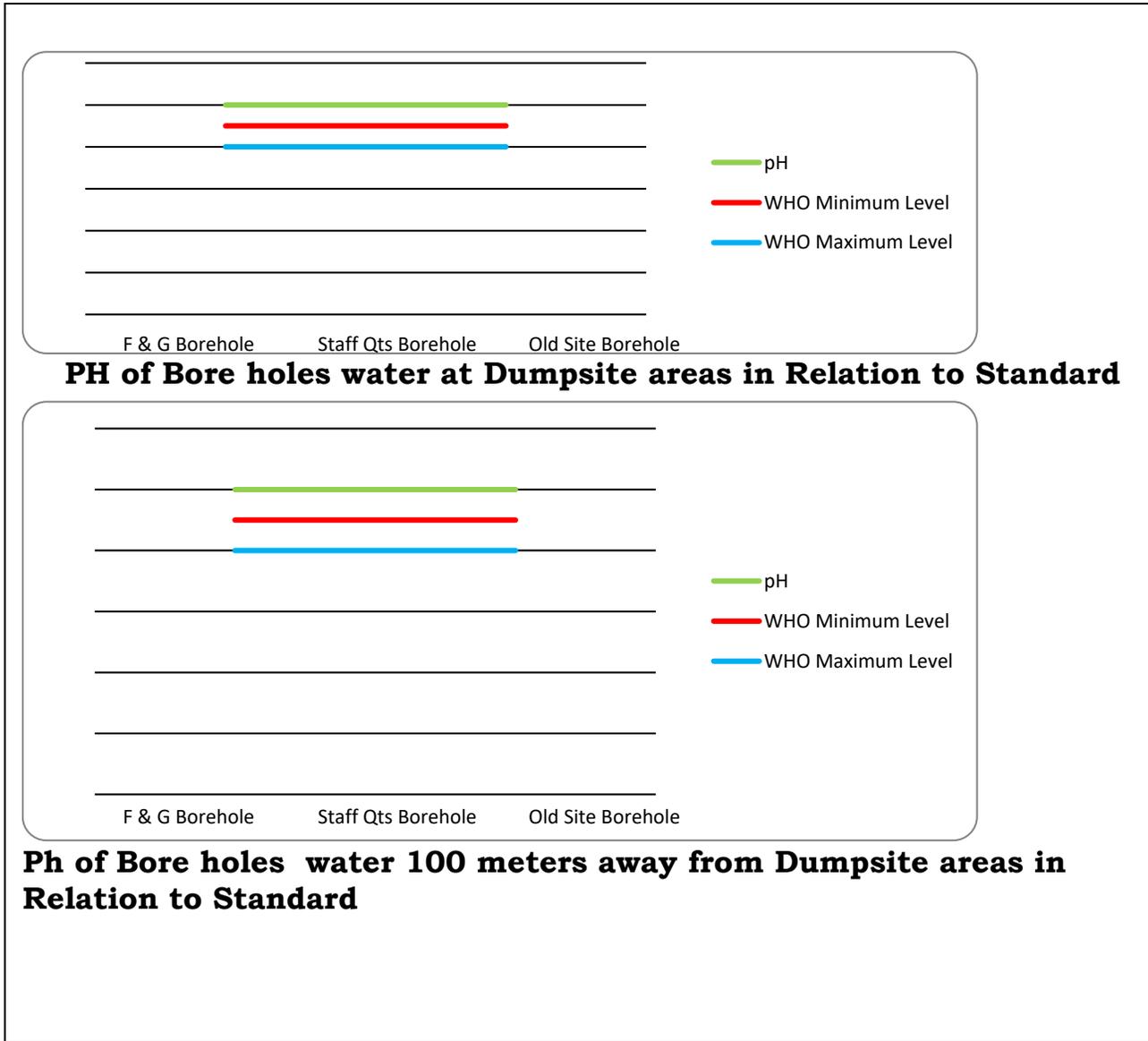


Figure 4: Values of boreholes at dumpsites and boreholes 100meters away from Dumpsite in Relation to Standard

Source: Authors field work, (2020).

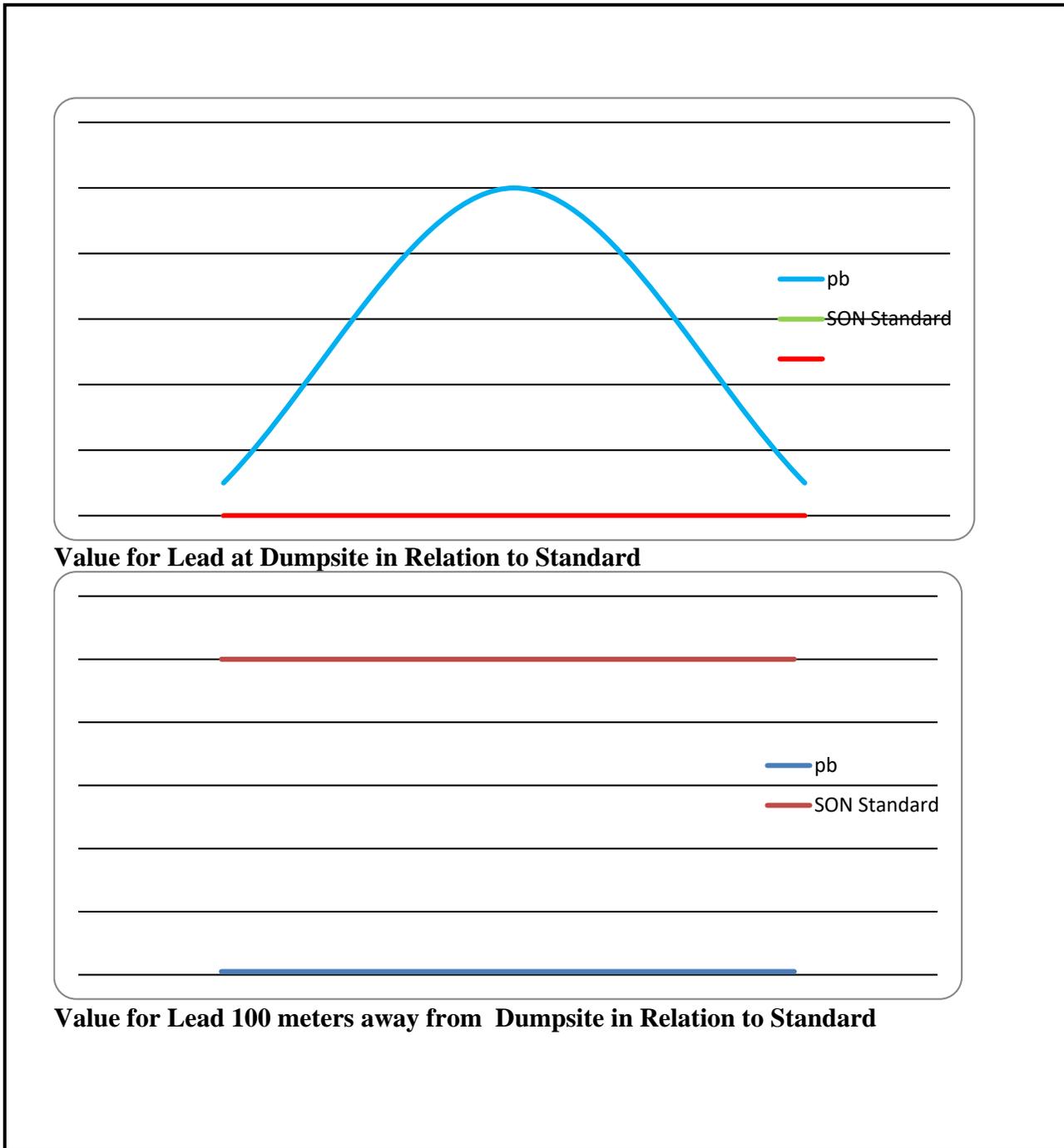


Figure 5: Values of boreholes at dumpsites and boreholes 100meters away from Dumpsite in Relation to Standard

Source: Authors field work, (2020).

Analysis of Magnesium however showed that they are below WHO acceptable limit for borehole water at dumpsite and those 100 meters away. The values range from 0.93- 1.4mg/l for bore holes at the dump site to 0.4-, 0.093 for bore holes 100 meters away.

Further analysis indicated that values for iron (Fe^{+2}) for borehole water at the dump sites were all higher than WHO limit of 0.3mg/l. the values measured at different points were 5.72mg/l for F&G hostel, Staff quarter, 3.2mg/l and Old site 4.2mg/l. This is in contradistinction with values of boreholes 100 meters away from dumpsites where there was no detection of iron

While a low level of iron isn't harmful in and of itself, iron in drinking water is classified as a secondary contaminant. This is because iron often carries with it bacteria that feed off the iron to survive. These small organisms can be harmful when digested. Excessive iron levels may lead to gene mutation. More so, Water with iron has a metallic taste to it, which makes it very unpleasant to drink. While water with high levels of iron is not recommended for cooking needs. Vegetables and other foods cooked in such water will blacken and absorb bad tastes.

For other water parameters such as Chlorine, Sulphur dioxide (SO_2), Nitrogen dioxide (NO_3), Total Dissolved Substance (TDS), potassium (k) and calcium (Ca) were all within allowable WHO limit for bore holes waters at dumpsites and those 100 meters away from dumpsites.

One implication of the findings of this study is to the fact that borehole waters close to dumpsites around the F&G Hostels, Staff quarters and old sites are not good for drinking in line with microbial standard. Their quality therefore needs to be improved with adequate treatment.

VI. CONCLUSION AND RECOMMENDATION

This work looked at the impact of waste dump site on the physio-chemical characteristics of borehole water within the Rivers State University campus. Water samples were taken from borehole located at dumpsites and another sample from boreholes 100 meters away from dump sites. It was observed that there are some levels of contamination of the ground water within the waste dump site as against those located 100 meters away from the dump sites.

The import of this is that borehole waters at dumpsites around the F&G Hostels, Staff quarters and old sites of Rivers state University campus are not good for drinking as they have been contaminated by leachates from wastes. The quality of water located close to wastes dumps in the university campus needs to be improved with adequate treatment before they are eventually consumed. Putting in place effective wastes disposal and management mechanism within the university campus is a desideratum for ensuring the protection of the health of students and staff of the university.

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Business Network, Competitive Advantage and Business Performance: Empirical evaluation in the Makassar hotel sector

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Abstract

Objective: This study aims to prove empirically the improvement in business performance driven by business networks through the competitive advantage in the Makassar city hotel sector.

Design / Methodology / approach: Questionnaires and statistical analysis were applied in this study

Findings: The results of the study indicate that business networks have a positive and significant effect on competitive advantage and business performance. Business networks have a significant effect on business performance through competitive advantage, and competitive advantage has a positive and significant effect on business performance.

Originality: Previous research studies still lack research about business networks as the ability of corporate resources in resource-based theory. Therefore this study fills these gaps by conducting an empirical evaluation of business networks in the perspective of hospitality managers.

Keywords: Business network, Competitive Advantage, Business performance, Hotel sector

Introduction

In 2016 the number of hotels in South Sulawesi Province were as many as 641 hotels in 24 regencies and cities in South Sulawesi Province. For the city of Makassar itself there are 135 hotels and the remaining 506 spread in 23 districts and other cities in the province of South Sulawesi. This shows that the majority of hotels in the province of South Sulawesi are in the city of Makassar as the provincial capital. From 2012 to 2015 the development of the number of hotels in the province of South Sulawesi continued to increase, only in 2016 the number of hotels decreased but there were only 2 hotel units reduced. Along with the development of the number of hotels, hotel room occupancy rates experienced a downward trend. Although in 2013 there was an increase in the occupancy rate of rooms, but afterwards until 2016 continued to decline. This study takes objects in Makassar City based on the consideration that most of the hotels in the South Sulawesi Province are located or located in Makassar City.

Some empirical research on business networks has been carried out by several researchers such as Muhammad Anwar, Atiq Ur Rehman (2017) who investigated the influence of business networks on new business performance and the extent to which competitive advantage affected the process. Networks help businesses to access new ideas and capture new opportunities in the market which in turn allows businesses to position in the market and gain competitive advantage. Therefore, the effect of the network on business performance can be maximized if managers and owners use the network as a means of creating competitive advantage. Anwar's research results (2018) revealed that the network positively influences competitive advantage and new business performance.

The business relations of the leaders of the company provide important information to the company, foster trust, and promote shared goals among the parties who exchange. First, business relationships enable companies to acquire advanced technology developed by business partners and integrate it with existing technology. Thus companies can launch products that are newer and perform better than their competitors (Chen & Wu, 2011). Yassine Sefiani's study, Barry J Davies, Robin Bown (2016) found that networking is a significant factor influencing the success of SMEs. However, a study conducted by ByoungHo Jin Sojin Jung (2016) found no significant effect between business networks and business performance

Based on the phenomenon of hospitality and previous research, this study wants to prove empirically about improving business performance driven by business networks through competitive advantage as follows: 1) Does business network have a positive and significant effect on business performance? 2) Does the business network have a positive and significant effect on competitive advantage? 3) Does the business network have a positive and significant effect

on business performance through competitive advantage? 4) Does competitive advantage have a positive and significant effect on business performance?

Literature review

Resource-based theory

Barney in his article in his 1991 resource-based view argues that sustainable competitive advantage comes from the company's valuable and scarce resources and control capabilities, which cannot be replicated, and cannot be substituted. These resources and capabilities can be seen as a collection of tangible and intangible assets, including company management skills, processes and organizational routines, as well as information and knowledge that they control (Barney, Wright, & Ketchen, 2001). The history of corporate resource-based views as cited by Debadutta Panda Sriharsha Reddy (2016) can be traced from Robinson's theoretical work in 1933 from his book on the economy of imperfect competition and Chamberlin's 1933 from his book on monopolistic competition theory and Penrose's 1959 from the theory of company growth. Clulow et al. (2007) cited by Debadutta Panda Sriharsha Reddy (2016) explained that resource-based views are also discussed in relation to customers where customer value greatly contributes to real and unreal company resources and competencies. The resource-based view (RBV) has evolved into a resource-based theory (RBT), and vice versa that the use of the term resource-based view has diminished, reflecting the view of the research community. The use of the term resource-based theory shows a picture of a contemporary theoretical framework. Resources and capabilities are the main constructs in resource-based theory. Resources refer to tangible and intangible assets that companies use to understand and implement their strategies Barney and Arikan, 2001 in Kozlenkova, Samaha, & Palmatier (2013). The word resource refers to something that an organization can pull to achieve its goals. Barney and Hesterly (2012) cited by Kozlenkova et al. (2013) suggest four main resource categories: physical, financial, human, and organizational. Capability is a part of a company's resources, representing the company's specific resources that are not transferable in an organization whose purpose is to increase the productivity of other resources owned by the company that are generally based on information, tangible or intangible processes that enable the company to deploy resources others more efficiently thereby increasing the productivity of these resources. Thus, capability is a special type of resource whose purpose is to increase the productivity of other resources owned by Makadok (2001) in Kozlenkova et al. (2013).

Business network

Wu, (2011) explains that business networks refer to the bonds between organizations built by companies and key business actors that aim to access broad areas of knowledge, resources, and complementary capabilities of partners to carry out innovation activities. His studies focus on four specific types of business relationships, namely ties with competitors, relationships with university institutions, relationships with suppliers and relationships with users. Wu's study, (2011) recognizes that companies are embedded in complex and diverse business networks / ties and empirically shows that different types of business ties have relatively different impacts on product innovation. Jasmine Tata Sameer Prasad, (2015) explains that businesses that have built high levels of trust and obligation in their relationships with network contacts can gain greater access to information and resources needed for business success. Törnroos & Holmlund, (2006) describe three forms of network layers that reveal content and structure in business networks, namely the production network layer, the resource network layer, and the social network layer. These layers affect each other in complicated ways. Three network layers are embedded in business networks and reflect various types of actors in business networks. First, the company actors refer to the actors who are companies that carry out production activities in the business network. Corporate actors connected in business networks involved in production activities constitute the business network production network layer. This network layer is limited by the value chain and is closely related to the products / services and systems produced. Second, resource actors provide important resources needed to carry out production activities that are not owned by company actors. Resources can be in the form of financial resources, technological knowledge, marketing and others. These actors for example consultants, banks, insurance companies, or forwarding agents. Together with corporate actors, these actors constitute a network layer of resources within a particular business network. The resource network layer consists of more actors than the production network layer and is more difficult to limit, because of the many types of resource actors involved. The network layer of resources in a business network consists of a network of interrelated corporate actors and resource actors who use and combine web competencies. The third network layer refers to a network of human actors who are interconnected in business networks. This layer consists of networks of actors at the individual level, and reflects how people and groups of people in various companies in business networks interact. Individuals and groups are important carriers and providers of knowledge, they act as representatives of the company and they make important decisions. Brownhilder Ngeek Neneh, (2017) examines the relationship between customer orientation, network relations and

company performance in the context of developing countries. The research shows that the relationship between customer orientation and company performance is more positive when business relationships and social networks are high, this suggests the need for businesses to use their network relationships to improve their performance and also the implications of network bond performance on the internal strategic orientation of the business. Therefore, when business relationships and social networks are developed properly and utilized effectively, it can improve business competitiveness and performance.

Victor Zengyu Huang Anup Nandialath Abdulkareem Kassim Alsayaghi Emine Esra Karadeniz, (2013) conducted a study that focused on networks and relationships and explained the emergence of entrepreneurial-based networks, developing and changing over time. Social relationships play an important role in building a company. Entrepreneurs use their social capital to access resources in each phase of the establishment process. By emphasizing the social attachment of economic activities, and departing from the nature, culture, and personality perspective, each phase of building a business requires a different emphasis and nature of the advisory network, depending on socio-demographic factors. The use of social networks by entrepreneurs really influences demographic differences. By using the perspective of social networking will be able to generalize between countries. Sources of advice used by new company founders and their social networks as a whole are essential for providing resources and knowledge for businesses. This strengthens the company's absorption capacity which in turn is associated with improved performance.

Klerk & Saayman, (2012) investigated the network behavior of festival entrepreneurs, who considered that relationships (networks) were very important for entrepreneurs and relied heavily on event suppliers and coordinators to support their business and adapt to changing needs and their environment. This implies that festival management and the tourism industry recognize the value of networking opportunities for entrepreneurs. Networks should also be facilitated between organizational management and entrepreneurs involved to build managerial skills and their networks, which implies that a more structured approach must be followed when organizers want to attract or even foster relationship problems to support the formation of trust between the parties involved. A better sense of community among entrepreneurs to share ideas and improve their business through networking initiatives. The tourism industry is considered a community industry, therefore factors such as trust and relationships are identified as important issues and key factors in entrepreneurial success.

Sheng, Zhou, & Li, (2011) in their study investigated the role of social relations in the developing economy in China. The influence of social ties depends on the institutional and market environment. Relational governance is divided into two types of social ties, namely business and politics. This distinction is important because business and political relations capture two different aspects of relational governance and provide access to different resources. The reason is that with market resources and long-term orientation, business relationships must have a stronger performance impact than political relations, which provide regulatory resources and are short-term in nature. The results confirm that business ties have a stronger effect on performance than political relations. The role of political relations decreases as institutional infrastructure increases, while business relations remain prominent. Because institutions (formal and informal) tend to change gradually which reveals the dynamic role of social ties in changing the institutional environment.

Ritter, Wilkinson, & Johnston, (2002) provide the view that business network relationships are not limited to one type of partner, relationships are important ways of interaction in many or even all areas of economic exchange, including: Relationships with customers; to be truly customer-oriented, a company needs to develop a good working relationship with its customers because it is this relationship that allows companies to understand customer needs and to serve them according to their needs. Relations with suppliers; no company produces its own products and services, but it is embedded in a complex value creation system that only functions competitively if good business relationships are developed. Innovation Network; is a locus of innovation because strong relationships with suppliers, customers, consultants, research institutions and governments are essential for knowledge creation and technology transfer.

Competitive advantage

Ma (1999) explains that competitive advantage arises from differences among companies along the dimensions of company attributes and characteristics that allow one company to create customer value better than another. A company's competitive advantage often arises from one or more than three sources: ownership-based; skills-based; and access based. That is, companies can gain an advantage by owning or owning assets or certain valuable factors, for example strong market positions, unique endowment of resources, or reputation with opportunities or rights to gain superior access to inputs and markets, for example exclusive relationships with suppliers or channels distribution; by superior knowledge, competence, or ability to conduct and manage business processes. Ma (1999) further explained that competitive advantage consists of three sources, namely: 1) Ownership-based sources of advantage refer to any asset or factor under company ownership where the company can benefit from competitors in better serving customers. Namely, by having certain characteristics or with certain statuses, the company enjoys advantages over the others. The source of ownership-based excellence lies within the company. 2) Access-based source of

excellence refers to the possibility that the company enjoys a competitive advantage over competitors because it has superior access to factor markets, namely resource inputs or product markets, that is customers or have access that is totally unavailable to competitors. This access depends on the ability of the company to utilize its resources and skills, knowledge and expertise, market reach, and the strength and authority of other business or non-business entities. That is, the source of excellence based on access lies in the company's external relations with other related parties in its operating environment. Examples include company relationships with suppliers, partners, distributors, licensing authorities, government agencies responsible for sales or import / export quotas, or agencies that oversee approvals for the introduction of certain products or services. 3) Skill-based sources of excellence refer to the knowledge, competencies, and abilities of a company that enable it to carry out its business processes more effectively and efficiently than competitors. Different from access-based sources that are outside the company, these sources are located primarily within the company. Different from ownership-based sources that lie in the status or ownership of a company, skill-based sources depend on the company's ability to actually do something to do business in manufacturing, selling products and providing services. Sources of this advantage include, for example, strength in the R&D process, technical knowledge, in-depth customer knowledge, the ability to identify market opportunities. Simply put, to achieve any profit in business, companies must look deeply and systematically into what they have, what they know and do, and what they can get. Because profits come from differences in the attributes of any company, be it ownership, access, or knowledge-based, which allows one company to provide customer value better than another, any factor that contributes to the existence or differential enlargement can function as a source of profit company.

Ma (2000) made three observations about competitive advantage and conceptually explored various patterns of relationships between competitive advantage and firm performance. First, competitive advantage is not the same as superior performance. Second, competitive advantage is a relational term. Third, the context is specific. Also explained are the three patterns of the relationship between competitive advantage and company performance: 1) competitive advantage that leads to superior performance; 2) competitive advantage without superior performance, and 3) superior performance without competitive advantage. Its main aim is to help generate a healthy debate among strategists about the usefulness of the construct of competitive advantage for theory making and testing. In presenting these three observations, Ma (2000) suggests improving and operationalizing "competitive advantage." Then conceptually explore the relationship between competitive advantage and performance. It also said that there was no need to determine cost advantages, differentiation advantages, or other types of competitive advantages. If a company has valuable, scarce and incomparable resources, superior performance will occur. That is, the definition of these resources (as the essence of sustainable competitive advantage) already has inherent performance implications. Finally, for competitive advantage to be a theoretically useful construct, it must be better defined and operated.

Porter & Canada (1985) say that the competitive strategy is the relative position of the company in its industry, which determines whether the company's profitability is above or below the industry average. A company that can position itself well can obtain high rates of return even though the industrial structure is not profitable and the average profitability of the industry is simple. The fundamental factor of above-average performance in the long run is sustainable competitive advantage even though the company has a myriad of strengths and weaknesses from its competitors. There are two basic types of competitive advantage proposed by Porter & Canada (1985) that a company can have; low cost or differentiation. The importance of whatever strength or weakness a company has ultimately is a function of its impact on costs or relative differentiation. Furthermore Porter & Canada (1985) put forward three general strategies namely; 1) Cost Leadership; Cost leadership is perhaps the clearest of the three general strategies. In it, the company is determined to be a low-cost producer in its industry. If a company can achieve and maintain overall cost leadership, it will be a player above the average in its industry as long as it can manage prices at or near the industry average. At prices that are equal or lower than their rivals, the low cost position of the cost leader translates into higher returns. 2) Differentiation; in the differentiation strategy, the company strives to be unique in its industry along several dimensions that are widely valued by buyers. It selects one or more attributes that many buyers in the industry consider important, and uniquely positions itself to meet those needs. Means of differentiation are typical for each industry. Differentiation can be based on the product itself, the shipping system sold, the marketing approach, and various other factors. A company that can achieve and maintain differentiation will be an above-average player in the industry if the premium price exceeds the extra costs incurred as something unique. Therefore, a differentiator must always look for ways to differentiate from a price premium greater than the cost of differentiation. A differentiator cannot ignore the cost position, because the premium price will be canceled by a very low cost position. A differentiator thus aims at cost parity or closeness to competitors, by reducing costs in all areas that do not affect differentiation. The logic of the differentiation strategy requires that companies choose attributes to distinguish themselves that are different from their competitors. Companies must be truly unique in something or be considered unique if they expect premium prices. In contrast to cost leadership, however, there is more than one successful differentiation strategy in an industry if there are a number of attributes that are widely valued by buyers. 3) Focus; The third generic strategy is focus. This strategy is very different from the others because it relies on the choice of a

narrow competitive scope in an industry. Focusers choose segments or groups of segments in the industry and adjust strategies to serve them by setting aside others. By optimizing its strategy for the target segment, the focuser strives to achieve competitive advantage in its target segment even though it does not have a competitive advantage. The focus strategy has two variants. In a cost focus, a company seeks cost advantages in its target segment, while in the focus of differentiation, a company seeks differentiation in its target segment. Both focus strategy variants depend on the difference between the focusing target segment and other segments in the industry. The target segment must have buyers with unusual needs or the production and shipping system that serves the target segment must be different from other industry segments. The cost focus exploits differences in cost behavior across segments, while the differentiation focus utilizes the specific needs of buyers in certain segments. Such differences imply that the segment is poorly served by broadly targeted competitors who serve them at the same time as they serve others. Thus, the focuser can achieve competitive advantage by dedicating himself exclusively to segments. The extent of targets is clearly a matter of level, but the essence of focus is the exploitation of narrow target differences from the industry balance.

D. Passemard Brian H. Kleiner (2000) examines competitive advantage in the global industry, he explains that to create competitive advantage, companies are required to advance, innovate, and find the best competitive opportunities and exploit them. The company should not stop improving the quality of its products and methods. Its main role is to take risks and invest. A country succeeds in a sector when the national framework creates a favorable environment for this ongoing effort, and when capacity is given to companies to be strategically aggressive and react quickly. Sustainable competitive advantage in the long run requires these benefits to be continuously improved because of sustainable investment policies. To maintain this advantage, companies must adopt continuous evolution, which is not easy from an organizational point of view. Internationally, success is needed to be able to change domestic positions into global ones.

Devlin, Ennew, Devlin, & Ennew (2006) conducted research to understand competitive advantage in retail financial services. It was explained that For services that are very intangible and also mentally complex, there is a greater dependence on factors throughout the organization, such as reputation, image and service quality, in an effort to add value and gain competitive advantage. Such an approach helps in accommodating customer dependence on experience and in particular the quality of trust in service evaluation. It was also explained that a wider and more sophisticated target market would further enhance the ability of service providers to develop sources of competitive advantage based on more specific factors such as price and service features.

Kamukama (2013) examines intellectual capital as an unseen source of corporate competitive advantage, the aim of which is to examine the individual contribution of the intellectual capital element to competitive advantage by exploring the extent to which the element of intellectual capital can explain competitive advantage in the microfinance industry. The study further determined that the dimensions of intellectual capital operate synergistically to influence competitive advantage in microfinance institutions. More importantly, the study provides more explanation for the relative contribution of intellectual capital elements in influencing competitive advantage and establishes the main elements of intellectual capital in influencing the level of competition of microfinance institutions. Its relative contribution to competitive advantage in descending order is structural capital, human capital and relational capital.

Caldwell, Floyd, Taylor, Woodard, & Woodard (2014) explain virtue as a source of competitive advantage, goodness is explained as a management concept which is an action related to intention. This explains how kindness is an important element for leaders in building trust. The importance of kindness is seen as an act or intention to do what is beneficial to others. The implications of applying goodness as a source of competitive advantage can contribute to increasing profits and enhancing relationships in every industry, and in all aspects of life. Jorge Pereira-Moliner Eva M. Pertusa-Ortega Juan José Tarí Maria D. Lopez-Gamero Jose F. Molina-Azorin, (2016) describes the relationship between a proactive environment with a cost competitive advantage and competitive advantage of differentiation. It was explained that hotels that are environmentally proactive can achieve better competitive advantages, they are able to save costs in environmental practices and are able to increase their differentiation and are able to gain a stronger reputation among customers.

Jorge Pereira-Moliner Eva M. Pertusa-Ortega Juan José Tarí Maria D. Lopez-Gamero Jose F. Molina-Azorin (2016) sees that quality management practices and organizational design characteristics are able to drive cost competitive advantage and differentiation. operational systems that are in terms of quality standards in services, and collaboration with intermediaries and suppliers (quality management operational systems) enable people to know how to develop their tasks better (this can increase efficiency, produce fewer errors) and develop more efficient processes through collaboration with other suppliers and intermediaries. When a hotel implements a system When a hotel develops its information system it uses quality information / data to analyze and improve processes and services and maybe even introduce innovations, it will have an impact on service quality. When hotels develop strategic systems, they focus on tourist satisfaction and continuous improvement. All this leads to an increase in competitive advantage in differentiation. Thus, hotels that implement and develop practices that are oriented to cost efficiency and practices that are oriented towards differentiation.

Kamila Borsekova Anna Vanova and Katarina Petrikova (2015) propose a conceptual approach to the creation, exploitation and development of competitive advantages that make it possible to create a unique place of tourism space. His research presents a theoretical background for problems at the place level, types, factors and approaches to creating, building and exploiting competitive advantage. The first part of empirical research is aimed at identifying competitive advantage. All respondents asked were able to identify competitive advantages and each person from the expert group determined what was considered a competitive advantage or advantage. Among the competitive advantages of the Slovak region that most often emerge are competitive advantages based on resources, competitive advantages from low costs and competitive advantages of differentiation. An innovative and marketing-oriented approach to tourism development based on the exploitation of unique regional competitive advantages offers new possibilities for increasing employment, creating new jobs, attracting tourists and residents, developing tourism-oriented entrepreneurs and overall socioeconomic development.

Bobirca & Cristureanu (2015) citing the explanations of several authors identified five broad categories of investment: human resources, physical resources, knowledge resources, capital resources, and infrastructure. It is said that a country's natural resources are an important source of comparative advantage in tourism. Competitive factors refer to secondary tourism supply. They can be produced and improved by tourism companies or government policies. A destination that is endowed with a wealth of resources may not be as competitive as a destination that is lacking in resources, because the latter may make use of the least much more effectively. A destination that has a tourism vision, sharing this vision among all stakeholders recognizing and understanding both its strengths and weaknesses, developing a positioning strategy and implementing it successfully may be more competitive because of its effective strategic approach.

Hokey Min Hyesung Min (2006) defines the competitive advantage of the hotel industry as the quality of existing services. The survival of a hotel is very dependent on its ability to provide superior service, hotel employees generally believe that the service attributes that contribute the most to their customers' impression of service quality are the cleanliness of guest rooms and the politeness of employees. Atmosphere such as cleanliness, comfort, and decoration are the standard for hotel hospitality. Employee courtesy is also the most important service attribute, because hotel services often require interactions with personnel such as hotel staff. In addition, because previous service quality has a large impact on the patronage behavior of fixed hotel customers, the hotel must not only maintain minimum service failures, but also effectively monitor customer complaints in the event of service failures.

Rapert & Wren (1998) views quality as a viable competitive strategy. A successful company carries out its strategy which is centered on the pursuit of quality. It was found that this single pursuit had a positive impact on operating income and revenue growth. Strategies built on quality can be sustainable because quality is something that not all companies are able to do well. Providing quality services requires commitment in terms of planning, leadership and implementation. This commitment leads to the development of a corporate culture that internalizes a quality orientation in all activities. Thus, companies that have the required skills and resources are better able to pursue quality-based strategies that cannot be carried out by less skilled companies. The advantage that companies get from pursuing a quality-based strategy is that it cannot be copied by other companies. Unique unique competencies must be fostered to support quality orientation so that it serves as a barrier for competitors to adopt similar strategies. Thus this will make excellence based on quality will be relatively more durable.

Kandampully & Duddy (2001) also view that the competitive advantage of the hotel industry is interpreted as the uniqueness of existing services. It is said that when an organization in the hotel and tourism sector makes customers and employees the most important thing, then it is a big change in the way the organization looks at managing and achieving competitive advantage. The service system will maintain positive integrated values that impact customers, employees, managers, organizations and enable an organization to maintain competitive advantage. Service is a reflection of competitive advantage in the hospitality sector because of the uniqueness of its services.

Business performance

Slova 1980 cited by Tseng & Lee (2014) says that performance is the level of targets achieved by organizations or as an evaluation of the effectiveness of individuals, groups, or organizations. At the individual level, this refers to job satisfaction, goal achievement, and personal adjustment; at the group level, this refers to enthusiasm, cohesion, efficiency, and productivity; and at the organizational level, this is about profit, efficiency, productivity, absenteeism, turnover, and adaptability Ivancevich, (1977) in Tseng & Lee (2014). Lin (2005) quoted by Tseng & Lee (2014) shows that performance is not only about previous achievements, but also includes potential abilities to successfully achieve future goals. Robbins and Coulter (1996) written by Tseng & Lee (2014) further show that performance is an objective fact that exists that provides objective and subjective evaluations. Organizational performance is all behavior related to organizational goals depending on the level of individual contributions to the organization (Borman and Motowidlo, 1993) in Tseng & Lee (2014). The ultimate goal of a company is to improve performance; Therefore, improving organizational performance is at the core of the company's strategic management, which in itself affects the company's prospects (Venkatraman and Ramanujam, 1986) in Tseng & Lee (2014). At present, the

performance measurement index is largely based on multivariate effectiveness measures, which itself can be divided into financial and non-financial measurement indices. Venkatraman and Ramanujam (1986) cited by Tseng & Lee, (2014) also assume that performance can not only be measured based on financial measurement indexes, but also by organizational performance, which can be measured based on financial performance, business performance, and organizational effectiveness. Financial performance is measured by standards: return on investment, sales growth rate, and income; while business performance includes not only financial measurement indices, but also includes operational performance that includes market share, product quality, new product introductions, marketing effectiveness, value added production, and other non-financial matters.

N. Gladson Nwokah (2009) quotes from several authors that the goal of measuring final performance is an increase in financial results in a commercial organization. However, this type of measurement of financial results alone does not provide enough information to help direct decision making that will achieve improved performance. Explained further that financial metrics are usually the first type used to evaluate marketing performance. Financial measurements include turnover, contribution margins, and profits. Market share is also used as an indicator of business performance in assessing the extent of customer focus on business performance. They argue that market share is often used to describe the position of an organization in its industrial sector. The implication is usually that the greater the market share, the more successful the organization.

Conceição et al. (2018) which cites the opinion of Slater et al. (2006) explains that performance is defined as the achievement of set goals, which implies that if someone achieves or exceeds the set goals, the person has achieved positive performance. There are two broad groups of indicators that are most commonly used as evidence of performance in organizations, namely financial or non-financial.

Anil Menon, Sundar G. Bharadwaj (1999) uses perceptual measures of marketing performance that are estimated or valued through market share, and sales growth rate to measure marketing performance. Anil Menon, Sundar G. Bharadwaj, (1999) explains that marketing performance or market performance is a common construct (factor) to measure the impact of a company's strategy. The company's strategy is always directed to produce company performance, both in marketing and in finance. Study conducted by Anil Menon, Sundar G. Bharadwaj, (1999) as a measurement of output using marketing performance as measured by three scale items, where the level of achievement or strategy performance is met with expectations for overall sales achievement or performance, and profit.

Relationship of business networks to competitive advantage and business performance.

Haahti (2006) empirically tested a model that described the relationship between perceived uncertainty, networks and export performance. Public officials must encourage SMEs to strengthen their existing foreign networks and facilitate formation through trade missions in other countries. Companies use network strategies to overcome the uncertainties they feel in their environment in order to improve their export performance. The results of the study (Haahti, 2006) found that foreign networks had a significant positive effect on export performance. In other words, SMEs that have relations with foreign entities show better export performance. Smaller SMEs must find alternative sources and / or develop core competencies (eg managerial / technical expertise. Public officials must encourage SMEs to form and / or strengthen existing relationships with members of foreign networks and facilitate the formation of these entities through trade missions.

Mu (2013) emphasizes the importance of network capabilities in new business performance. The performance advantage of the company arises not only from the network structure, but also from the network capabilities. Such a reconfiguration of social network structures can mobilize and collect complementary network resources needed for value creation. Companies must maintain the ability of the network to gain access to network resources for successful innovation in an increasingly open market environment. The idea is that sources of discovery and innovation are distributed in a variety of geographies and organizations, and various inventions must be combined to achieve market success. The benefits derived from networking capabilities give a company the advantage of specialization, cost advantage, complementary resources, flexibility, variety of knowledge and ultimately the benefits associated with innovation. Networking capabilities can help new businesses to take advantage of opportunities that are discovered and serve markets that are not exploited. Networks are essential for finding opportunities and testing ideas and gathering resources for new organizations. The company must have the ability to build, manage and utilize the network for its benefits. By building network capabilities, companies can find new resources that are not known to them so that it helps change the system of obstacles and dependencies faced by the organization. By leveraging network capabilities, companies can change their resource base by intentionally acquiring, releasing, integrating and reconstructing resources at various stages of development to develop new products and services to achieve their goals. Network capabilities can be a powerful weapon for companies to implement open innovation strategies to build a solid business and to gain a sustainable competitive advantage. The company needs to develop the ability of the network from the start to make up for its lack of resources and territory with larger and more established competitors. The company can advance its own business model by utilizing the intellectual property of its network partners.

Peng and Yadong Luo (2000) found interpersonal relations of managers with top executives in other companies and government officials to help improve organizational performance. Relationships with officials are more important than relationships with managers at other companies, this shows that companies may have greater resource dependence on officials than at other companies. Given the enormous power officials have in transition economies, good relations with them have a stronger impact on the company, even after the substantial costs to build and maintain these relationships (including gifts, meals, etc.) are taken into account. Companies need to identify in what situations managerial relationships are beneficial, in particular, the impact of personal relationships with managers in other companies. The impact on ROA from company relationships with other managers is stronger for companies in the small service sector, in low growth industries, the relationship has little effect on ROA. Similarly, companies that benefit more from relationships with government officials in terms of market share and ROA are those in the service sector, and small. Although managerial relationships are important, companies also need to have capabilities in areas such as quality and advertising in order to perform well.

Yassine Sefiani, Barry J Davies, Robin Bown (2016) investigates the impact of networks on business performance. Using connections through social networks is important because it allows access to the latest information that is very important for the success of the Business. Connections are intrinsic to the operation of many valuable social processes, centers of transmission of knowledge, and the creation of opportunities. Social networks in the form of strong and weak social ties can act as sources of information and new ideas and provide access to new resources. Strong relationships with suppliers allow companies to obtain financial resources in the form of trade credit, this shows that business networks using connections have a large impact on financial performance. Networking relationships will provide a powerful impetus for successful companies to truly become proficient in partnership work. Every business needs partnerships with others to succeed. Yassine Sefiani's study, Barry J Davies, Robin Bown, (2016) found that networking is a significant factor influencing the success of SMEs.

Parashar (2007) explains that the competitiveness of small and medium businesses in the international market increases with the industrial network group approach. The network cluster provides an ideal setting for SMEs to access support systems. The effort to form a network group from scratch is the first step in a cluster development program. Geographic concentrations of companies that are similar or complementary, and the similarity of needs and support requirements accelerate the spread of best practices through the demonstration effect. Successful groups are those who are able to respond to changing global market demands in terms of quality, reliability, fast delivery and price awareness. Approaches such as quality up-grade programs, marketing promotions through exhibitions and overseas missions and the creation of export consortia can be applied to improve the competitiveness of network clusters. All of these approaches are based on group approaches that lead to stronger networks between companies.

Eisingerich, Bell, Eisingerich, & Bell (2008) in their study explained that social networks can help in understanding why some service companies have managed to reinvent themselves and continue to succeed in the business-to-business environment, while others are slow to change and decline. Marketing concepts and practices recognize that exchanges between buyers and sellers are often embedded in social relationships, so it is necessary to include the role of the larger social network in which business-to-business service companies operate. The strength of the network between companies and openness to new actors as supporters of competitive advantage in business-to-business services. Successful service providers tend to be characterized by the capacity to maintain the right balance between network strength, openness, and the ability to adjust changing conditions over time. Network characteristics, such as connectivity, stability and relationship intensity when combined with diversity of membership and openness to new exchange partners, can help explain why certain service providers fail while others dynamically adapt to changing environments. The characteristics of network relationships, such as intensity and openness, act as challenges and opportunities. Strong and open network relationships are very important in maintaining the performance of service companies. (Eisingerich et al., 2008) explained that the strength of the network between companies and openness to new actors as supporters of competitive advantage in business-to-business services.

Wu & Chen (2012) conducted a study of the social ties of corporate leaders, namely the ties of business networks affecting a company's competitive advantage. Networks between organizations in terms of reach and boundary alliances can predict the effectiveness of leaders. The social relations of corporate leaders are as important as human capital such as the nature, behavior, attitudes, and other individual attributes. In Asian markets with underdeveloped institutions and inefficient strategic factor markets, social ties play an important role in obtaining important assets, identifying valuable information, and gaining legitimacy. Networking is a means needed to get resources that might not be available through the right market channels. The results of the survey show that business leaders' business relationships contribute positively to the company's competitive advantage.

Anwar (2018) revealed that business networks positively influence competitive advantage and business performance. Competitive advantage fully mediates the relationship between business networks and new business performance. Businesses must utilize business networks to gain competitive advantage and improve performance. The mediating role of competitive advantage reveals that competitive advantage is a significant mediator between business networks and business performance. The establishment of networks rooted between companies and suppliers allows the

creation of new information mechanisms, solutions to shared problems, trust and commitment which in turn provide innovative reflective capabilities that enable companies to improve performance.

The relationship of competitive advantage and business performance

Vinh Nhat Lu (2007) examines variables that have an impact on export marketing performance. It was explained that the two uses of the internet in export marketing contributed significantly to variations in the export marketing performance of the Australian export market business namely cost reduction and competitive advantage. This means that how an export market business considers the use of the internet in relation to cost reduction and competitive advantage can be used to significantly predict its marketing performance. With regard to the internet providing a company's competitive advantage, study findings show that if the internet is used to provide a company's competitive advantage over competitors, this will have a positive impact on export marketing performance. Therefore, the internet gives companies a competitive advantage over competitors and reduces the intensity of competition in foreign markets. The management of export market businesses also needs to be aware of this and must use the internet as a competitive weapon for the success of export marketing.

Kamukama, Ahiauzu, & Ntayi (2011) investigated and tested the mediating effects of competitive advantage on the relationship between intellectual capital and financial performance in the microfinance industry. The findings show that the mediating effect of competitive advantage on the relationship between intellectual capital and firm performance satisfies mediation conditions. This is true because the unique intellectual assets within the organization can put the organization in a better competitive position. This finding links well with the resource-based view (RBV) of companies which postulates that the existence of assets that is difficult to replicate is related to the company's competitive position. Other scientists also determined that intellectual capital is a group of invisible assets that are ascribed to the organization and that most significantly influences the company's competitive position and performance. The discussion above confirms that the presence of competitive advantage acts as a channel between intellectual capital and financial performance in microfinance institutions. Thus, competitive advantage is a true mediator of the relationship between intellectual capital and financial performance.

Qun Tan Carlos M.P. Sousa (1983) revealed the important mediating role of competitive advantage in the relationship between marketing capabilities and export performance. Specifically, it was found that two types of competitive advantage (ie low cost advantage and differentiation advantage) positively mediated the effect of capabilities on financial export performance and / or non-financial export performance. These results indicate that exporting companies need to develop professional skills and knowledge in designing and developing new products, responding to market changes with pricing tactics, managing good relations with distributors and customers, and delivering communication messages effectively. This determines the level of marketing ability to meet customer needs, and therefore, establishes the basis for high exporters' financial and non-financial export performance. In addition, when developing marketing capabilities, managers must always pay attention to competition. That is, they need to develop marketing capacity that can bring a position of competitive advantage. In this way, the potential of marketing capabilities to achieve superior financial and non-financial export performance can be fully realized. Therefore, the development of competitive profit-oriented marketing capabilities, which depend only on marketing capabilities, is very important. The decision on what type of competitive advantage the company will focus on depends on the resources and skills available at the company. Similarly, one can build the ability to produce certain types of competitive advantage. Mzoughi, Bahri, & Ghachem, (2008) investigated the effect of competitive advantage on organizational performance. The results show that competitive advantage has an important influence on performance. Every company strives to pursue competitive achievements in efficiency, effectiveness, creation of value-added services, customer satisfaction levels for superior performance. Competitive advantage was found to have a significant effect on market performance and financial performance (Mentzer, Min, & Zacharia, 2000). Li, Ragu-nathan, Ragu-nathan, & Rao (2006) prove that product innovation, quality from time to time as a competitive advantage can lead to organizational performance. Rua, França, & Fernández Ortiz (2018) stated that the strategy to increase competitiveness will be able to improve business performance. Potjanjaruwit (2018) found that competitive advantage has a direct positive effect on company performance, where differentiating business products and services as competitive advantages will be able to improve company performance. Md, Shamimul Azim (2017) The competitive strategy approach ensures companies to adapt in a competitive environment will improve company performance.

Daniel I. Prajogo Adegoke Okay (2016) understands competitive advantage as excellence in service innovation. Service innovation excellence is the result and service process that consists of new features, new processes and new ways of providing services. Innovations in features, processes, activities and methods to provide core services are seen as competitive weapons for companies. Companies with competitive advantages in innovation can improve business performance by providing superior value. The ability to offer superior services leads to the creation of new market niches that can be utilized by companies, thus enabling companies to attract more customers which leads to an increase in market share and increased performance.

Campo et al. (2014) Competitiveness excellence in service innovation has a direct and positive influence on marketing performance. The perception of competitive advantage in service innovation and performance confirms the importance of investing in innovation to improve services offered in the medium and long term. Excellence in service innovation as a mechanism to differentiate and improve performance for customers so that the company is in a position to obtain greater business profits. Increasing the ability of a hotel to innovate compared to its competitors is a major investment in human resources and capital as well as improvements in the internal administration process allowing an increase in service quality.

Haim Hilman Narentheren Kaliappen (2015) examines the relationship between innovation strategies as competitiveness (process innovation and service innovation) and organizational performance in the context of the hospitality industry. The results show that hotels use process innovation and service innovation as functional level strategies. Process innovation and service innovation strategies are positively related to performance. The application of process innovation and service innovation as a functional strategy can help to achieve better performance in the hospitality industry. Innovation for the hospitality industry as an important strategic issue in today's highly competitive environment because it is believed will improve their overall performance. Hoteliers want to reduce costs, gain greater market share, increase internal efficiency, reach economies of scale and monitor potential competitors. Hoteliers are pursuing service innovation to create unique service creation, change business designs and quickly respond to customer requirements and achieve better performance. Service innovation as a competitiveness for hoteliers to struggle in today's turbulent business environment.

Ahmed Agyapong, Henry Kofi Mensah (2016) found the importance of innovative capabilities in developing the right strategy for hotels. The hotel's dependence on innovative capabilities enables managers to develop appropriate responses to intense competition in the hospitality industry, thereby improving performance. This helps managers develop appropriate responses to meet the increasing needs of customers. This shows that innovative capabilities as competitiveness capabilities affect hotel performance. Nair & Ph (2016) service quality is seen as hospitality competitiveness because it involves the comfort of hotel guests. Very useful hotel managers to improve service quality because it has a significant effect on business performance. Ph, Crina, & Coșuț (2017) view quality in the hospitality industry as a competitive advantage in an increasingly competitive market, guaranteeing quality of service is very important and increasingly influenced by a number of factors such as expanding consumer rights and the allegation of the emergence of more quality-conscious tourists. Companies that offer services that do not meet these expectations will gradually lose their customers, with their market share shrinking, while companies that provide quality services with standards will succeed in terms of customer loyalty, increasing market share and profitability. Based on the conceptual framework that has been proposed, the conceptual framework can be described as follows:

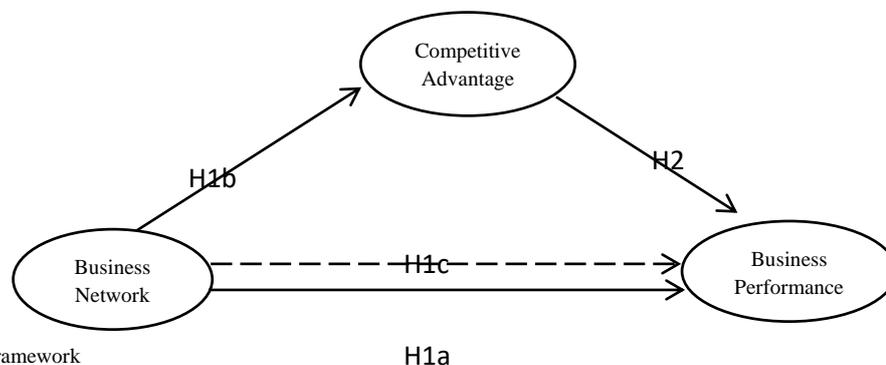


Figure 1: Conceptual framework

Based on the conceptual framework of this study, the following hypotheses are proposed:

Hypothesis 1: Business networks have a positive and significant effect on competitive advantage and business performance

Hypothesis 1a: Business networks have a significant positive effect on business performance.

Hypothesis 1b: Business networks have a significant positive effect on competitive advantage.

Hypothesis 1c: Business networks have a significant positive effect on business performance through competitive advantage

Hypothesis 2: Competitiveness advantages have a significant positive effect on business Performance

Methodology

This research was designed using the Hypothetical-descriptive approach, which is a research process approach that enables the development and testing of the null hypothesis with complete empirical descriptions and facts to illustrate

the accompanying theoretical conceptions (Ferdinand, 2014). To test the hypothesis in this study, the instrument for data collection in this study began with the determination of the variables to be investigated and then determined the indicators, then then made a list of questions in tabular form to be submitted to respondents. The population of this study is all hotels in Makassar, which are 135 hotels. The sample used in the study was 97 taken based on the number of questionnaires returned. A total of 97 samples met the criteria for testing using the Partial Least Square (PLS) analysis tool. Based on the objectives of this study, the organization of the unit of analysis in this study is the organization or the hotel manager. Respondents representing the unit of analysis were taken as sources of information at the hotel manager level. The analytical method used in this research is Structural Equation Modeling (SEM) with the variance approach or commonly called Partial least square path modeling (PLS-PM) using the Smart PLS 3 application program. SEM is a statistical technique that has the ability to analyze patterns of relationships between latent constructs with each other, as well as direct measurement errors. The reason for using SEM is because of SEM's ability to estimate relationships between variables that are multiple relationships. This relationship is formed by the structural model, in addition, SEM also has the ability to describe the pattern of relationships between latent (unobserved) and manifest variables (manifest variables).

Results

The first evaluation is a measurement model that is evaluating the relationship between constructs and indicators through two stages of evaluation, namely convergent validity and discriminant validity. The results of the evaluation of the convergent validity look like in table 1 below:
 Table 1: Convergent validity

Contract reliability and validity

| | Crombach's alfa | rho_A | Composite Reliability | Average Varian Extracted (AVE) |
|-----------------------|-----------------|-------|-----------------------|--------------------------------|
| BUSINESS NETWORK | 0,777 | 0,787 | 0,848 | 0,530 |
| BUSINESS PERFORMANCE | 0,843 | 0,848 | 0,881 | 0,515 |
| COMPETITIVE ADVANTAGE | 0,860 | 0,867 | 0,900 | 0,643 |

From table 1 it can be seen that the Crombach's alpha value is above 0.7. Likewise, the rho_A value is above 0.7 and the composite reliability value is above 0.7 while the AVE value for all constructs is above 0.5 so it can be said that the business network construct, competitive advantage and business performance are reliable. For the evaluation of discriminant validity as shown in table 2 below:
 Table 2: Discriminant validity

Discriminant validity

| | Business Network | Business Performance | Competitive advantage |
|-----|------------------|----------------------|-----------------------|
| BN1 | 0,698 | 0,306 | 0,515 |
| BN2 | 0,700 | 0,459 | 0,336 |
| BN3 | 0,657 | 0,348 | 0,452 |
| BN4 | 0,769 | 0,435 | 0,401 |
| BN5 | 0,805 | 0,543 | 0,503 |
| BP1 | 0,394 | 0,717 | 0,378 |
| BP2 | 0,357 | 0,712 | 0,434 |
| BP3 | 0,307 | 0,707 | 0,383 |
| BP4 | 0,432 | 0,653 | 0,478 |
| BP5 | 0,379 | 0,739 | 0,397 |
| BP6 | 0,499 | 0,792 | 0,545 |
| BP7 | 0,492 | 0,696 | 0,504 |
| CA1 | 0,488 | 0,508 | 0,756 |
| CA2 | 0,579 | 0,534 | 0,820 |
| CA3 | 0,442 | 0,578 | 0,877 |
| CA4 | 0,493 | 0,510 | 0,831 |
| CA5 | 0,427 | 0,383 | 0,716 |

From table 2 it can be seen that each indicator correlates higher with each construct compared to other constructs so it is said to have good discriminant validity. The R square values are shown in table 3 below:

Table 3: R Square

| R Square | | |
|-----------------------|----------|-------------------|
| | R Square | R Square Adjusted |
| Business performance | 0,461 | 0,449 |
| Competitive Advantage | 0,372 | 0,365 |

Based on table 3 above, the R square value of the business performance construct is 0.461, which means that the business network construct and competitiveness excellence can simultaneously explain the variability of business performance constructs of 46.1%, the rest is determined by other factors outside this research model. Furthermore, the value of R square for a competitive advantage construct of 0.372 means that the business network construct is able to explain the competitive advantage construct of 37.2%, the rest is determined by other factors outside this research model. The structural model, as shown in Figure 2 below:

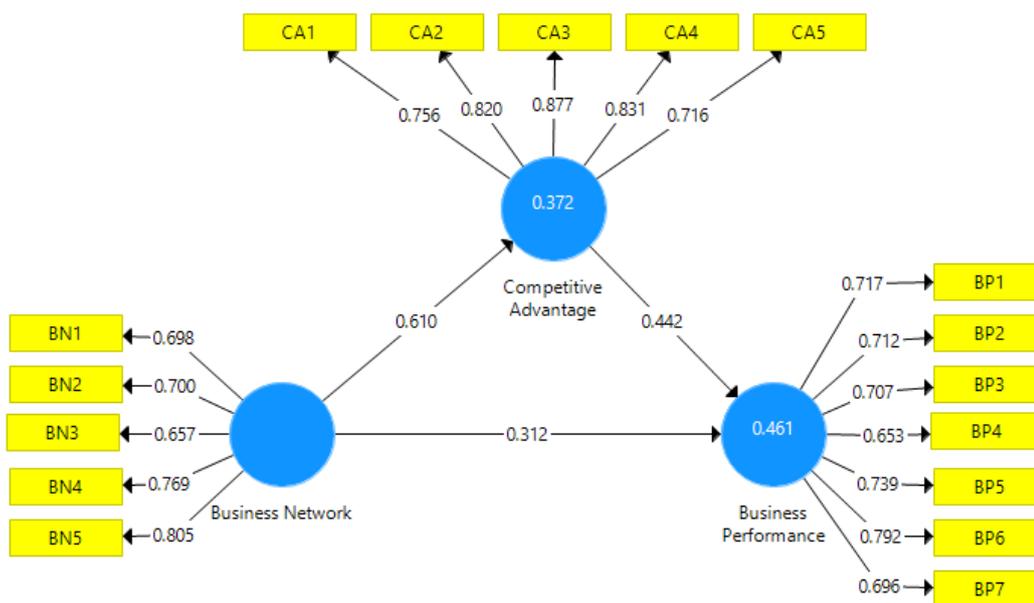


Figure 2: Structural model

The next evaluation is testing the research hypothesis as shown in the table below:

Table 4: Path coefficients

| | | | Path coefisien | | | | |
|-----------------------|---------------------------|-----------------------|---------------------|-------------|--------------------|--------------------------|---------|
| | | | Original sample (O) | Sample Mean | Standard Deviation | T statistics (O/STDEV) | P value |
| Business Network | → | Business performance | 0,312 | 0,324 | 0,094 | 3,325 | 0,001 |
| Business Network | → | Competitive Advantage | 0,610 | 0,622 | 0,062 | 9,846 | 0,000 |
| Competitive Advantage | → | Business performance | 0,442 | 0,439 | 0,113 | 3,927 | 0,000 |
| Business Network | → Competitive Advantage → | Business performance | 0,269 | 0,272 | 0,072 | 3,722 | 0,000 |

From table 4 shows the results of testing of 4 hypotheses namely H1a, H1b, H1c and H2. direct and indirect influence. For testing the influence of business networks on business performance shows a path coefficient of 0.312 and a statistical T value of 3.325 which is above 2.0 and P value <0.05. This result means that the business network has a significant positive effect on business performance. Thus H1a is accepted. For business networks, the competitive advantage shows a path coefficient of 0.610 and a statistical T value of 9.846 which is above 2.0 and a P value <0.05. This result means that the business network has a significant positive effect on competitive advantage. Thus H1b is accepted. For the influence of business networks on business performance through competitive advantage shows a path coefficient of 0.269 and a statistical T value of 3.722 which is above 2.0 and P value <0.05. This result means

that the business network has a significant positive effect on business performance through competitive advantage. Thus H1c is accepted. And for the influence of competitive advantage on business performance shows a path coefficient of 0.442 and a statistical T value of 3.927 which is above 2.0 and P value <0.05. This result means that competitive advantage has a significant positive effect on business performance. Thus H2 is received.

Discussion

This finding is in line with the view of the company's business relationships providing important information to the company, fostering trust, and promoting shared goals among the parties that have mutual interests. Business relationships enable companies to obtain technology development developed by business partners and integrate it with existing technology. Thus the company can launch products / services that are newer and perform better than its competitors (Chen & Wu, 2011). This study is also in line with the study conducted by Wu & Chen (2012) network relations are the means required to obtain resources that may not be available through market channels. Business ties that occur with suppliers, customers and distributors will be able to create products that have unique benefits compared to competitors, have superior quality than competitors, products that are more advanced than products in the same market and different products from competing products. The results of this study are also not in line with the views of Yassine Sefiani, Barry J Davies, Robin Bown (2016) that the business network is also related to the strength of the network where the business network has a network of supporting government, financial institutions, business partners (suppliers, customers, contractors) and trade association. This is in the study of Yassine Sefiani, Barry J Davies, Robin Bown (2016) as a reflection of business success. This research is in line with research conducted by Anwar (2018) that the company's efforts in developing relationships with customers, suppliers and competitors will create customer value through services, create products / services with certain brands, and be able to adjust products / services to changing customer needs, so that this will be able to increase customer satisfaction, sales growth and increase the quality of products / services. Huang, Lai, & Lo (2012) put forward their view that business networks relate to interactions with suppliers, customers and competitors. Where companies often communicate and build partnerships with suppliers, customers and competitors, interact with suppliers, customers and competitors to stimulate new product ideas, developing new products and working with suppliers, customers and competitors to test new products. Interaction in the business network will reflect innovation in improving quality, competitiveness, brand awareness, new service processes, and product / service designs that are faster than competitors. Thus, it will be able to increase profits, market share and sales growth. Mukhamad Najib Akira Kiminami (2011) considers that innovation in a business is an effort to maintain competitiveness in an ever-changing environment. Changes in the business environment, such as shifting consumer demand, technology, and others, can encourage companies to be more innovative. Nadjib (2011) states that cooperation with customers, suppliers and cooperation with other companies in the same business and service development providers will be able to create novelty or modification in product, process or marketing aspects so as to increase sales volume, profitability and market share.

Conclusion

Efforts to establish connections with buyers, spend a lot of effort to develop connections with competitors, maintain good communication with customers, suppliers and competitors, commitment and responsibility in relationships with customers, suppliers and competitors can increase competitive advantage. Efforts to establish connections with customers, efforts to develop connections with competitors, maintain good communication with customers, suppliers and competitors, and commit and take responsibility in relationships with customers, suppliers and competitors can improve business performance

Implications of theory

The variable of competitive advantage in this study is proven as a mediation between business network variables on the performance of the hotel business in Makassar City and proves a resource-based theory that sustainable competitive advantage comes from valuable and rare resources and control capabilities of companies. can be substituted.

Managerial Implications

Hospitality managers need to consider business networks in an effort to achieve competitive advantage and business performance. The ability of company resources such as business networks can improve competitive advantage so as to improve the performance of the hospitality business.

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Development Of Calcium Rich Candy From Fish Bone Powder

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Abstract- Candy, known also as sweets and confectionery, has a long history as a familiar food treat that is available in many varieties. It is influenced by the size of sugar crystals, aeration, sugar concentrations, color and flavors. People usually prefer food items that fulfill their taste buds rather than healthy ones. So in order to make them healthy and free from diseases we have incorporated calcium rich fish bones, specifically Mackerel fish, to develop sweet and attractive candies. Besides being a calcium rich (18-22g/100g) matter, product development from the powdered fish bones can also bring down pollution caused due to kitchen wastes. It is also complemented by high levels of vitamin A, omega 3 fatty acids, iron and zinc. Along with this, palm sugar, which fights against anaemia and diabetes, is added as a substitute for sugar. Therefore it is hoped that this product would gratify the consumers with its abundant health benefits along with its flavors and allure.

KEYWORDS: Calcium rich candy, Nutritional composition, Storage studies and sensory evaluation

I. INTRODUCTION

Candy is a confection made from concentrated solution of sugar in water to which various flavorings and colorants are added to promote sumptuousness. Various types of candies include caramels, gummies, hard candies, lollipops, rock candy, chewing gums and licorice. From a very young age people are drawn to candies due to their attractive shape and colors. Certain research has also shown that eating candy and other sugary treats can have a positive effect on our mood. Even the act of licking a lollipop or crunching a piece of chocolate can reduce stress. Due to excessive sugar and synthetic additives in candies they are considered to be unhealthy. It increases the risk of asthma and causes certain allergies. Therefore indulgence in nutritious candies can control the risks as well as give them delight. Processing of fish bone powder is one way to reduce environmental pollution and provide added value. It is used as a fortification source of calcium in food products. Mackerel fish has reported to improve bone density in both men and women and omega 3 amplifies the effects of vitamin D. Since palm sugar is an unrefined sugar, it is known to be rich in vitamins and minerals. As a result, it has become increasingly popular as a substitute to white and brown sugar. Researchers have found that the GI of palm sugar is 35, compared to table sugar at 68. Orange peel extract as flavoring agent is beneficial as the peel has high nutrients content and antioxidant. It is also recommended by nutritionists and dieticians to reduce health related issues and cholesterol. Fish bone and orange peels are primary kitchen wastes which are recycled to make this candy.

II. MATERIALS AND METHODS

A. Preparation of fish bone powder

The first step in the procedure of making candy is the powdering of fish bones. The fresh bones were collected and cleaned thoroughly. They were soaked in NaOH and ethanol solution in the ratio 1:5 for about 10 hours to remove the odour. It was then weighed and found to be 423g before heating. The bones were pre heated in hot air oven at 50°C for half an hour. Mass of the sample was determined during 15 minutes interval of time to test the moisture. For the complete removal of the moisture it was again placed in hot air oven at 100°C for two hours and ground at low RPM into fine powders. After completing the whole procedure the powders weighed 315g.

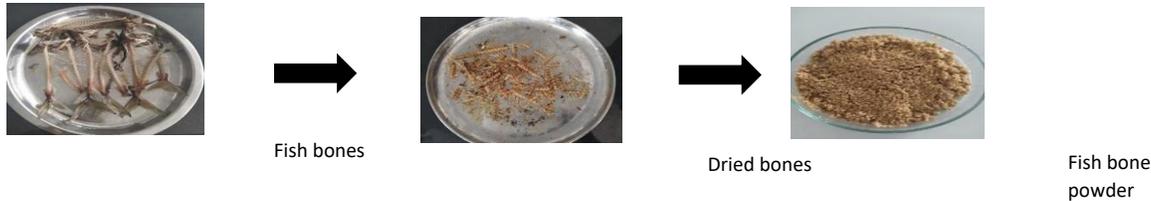
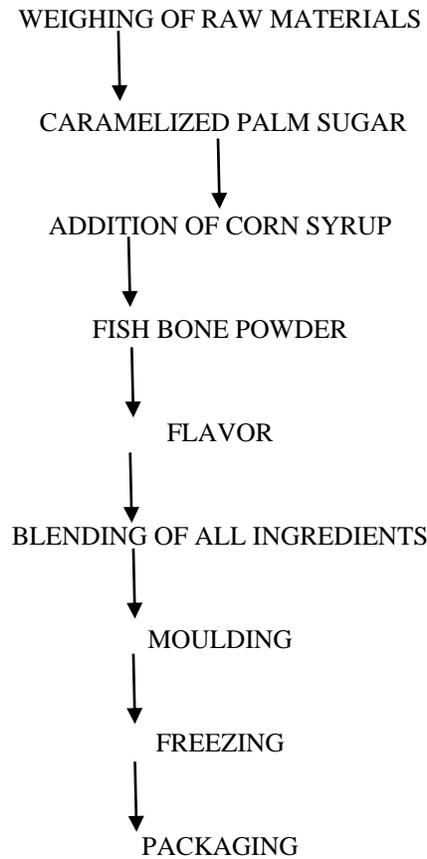


Figure 1: Processing of fish bone powder

B. Preparation of candy



Candy was prepared using palm sugar, corn syrup, fish bone powder, orange flavor and vanilla essence. Fish bone powder was added in three different proportions (0.5g, 0.8g, 1g) to obtain the best one. Palm sugar weighing 100 g was added to 150ml of water and stirred well. 6g of corn syrup complemented to the slimy nature of the solution. To this fish bone powder of the above mentioned proportion was added to make 3 different candies. Flavoring using orange flavor essence was added as 5ml, 7ml and 10 ml respectively. To each sample 2 drops of vanilla essence was introduced to enhance the flavor. It was boiled until desired concentration was acquired. After completion of caramelization it was cooled and poured into molds of different shapes. Finally the hardened candies were taken for nutritional and sensory analysis.



Caramelization Orange flavor Fish bone powder Molding Candy Corn Syrup

Figure 2: Preparation of candy

C. Analysis

Fresh mackerel fish bones were analyzed for moisture content, sensory evaluation and nutritional content. The moisture content of fish bones were determined using the hot air oven method. The candy samples were dried at 100°C for 2 hours. The moisture content was calculated from the weight difference between the original and dried sample and expressed in percentage. The weight was calculated on 15 minutes interval of time. Nutritional analysis was done using FSSAI method. Organoleptic testing was done by 5 panelists on 9 hedonic scale.

D. Sensory analysis

Sensory evaluation of prepared fresh and stored candies was done by taste testing panel. The panel consisted of 5 panelists. They were asked to evaluate for appearance, taste, texture, colour and overall acceptability on a 9-point hedonic scale; 9=Like extremely, 8=Like very much, 7=Like moderately, 6=Like slightly, 5=Neither like nor dislike, 4=Dislike slightly, 3=Dislike moderately, 2=Dislike very much and 1=Dislike extremely. The difference preferences as indicated by scores were evaluated by statistical methods (ANOVA). The analysis of variance method was used for this evaluation. The difference was quantified by Duncan’s Multiple Range Test (DMRT).

IV. RESULTS AND DISCUSSIONS

A. Sensory analysis

- The sensory evaluation was carried out by organoleptic testing from each combination of samples by 5 panellists.
- The samples were evaluated for their Appearance, Colour, Texture, Taste and their overall acceptability was found.

Table 1: Sensory Analysis on 9 point hedonic scale

| PARAMETERS | APPEARANCE | TEXTUR E | TASTE | COLOUR | OVERALL ACCEPTABILITY |
|------------|------------|----------|-------|--------|-----------------------|
| SAMPLE 1 | 8.3 | 7.6 | 7.8 | 8.1 | 7.8 |
| SAMPLE 2 | 8.5 | 8.3 | 8.5 | 8.4 | 8.4 |
| SAMPLE 3 | 7 | 7 | 7 | 8.2 | 7 |

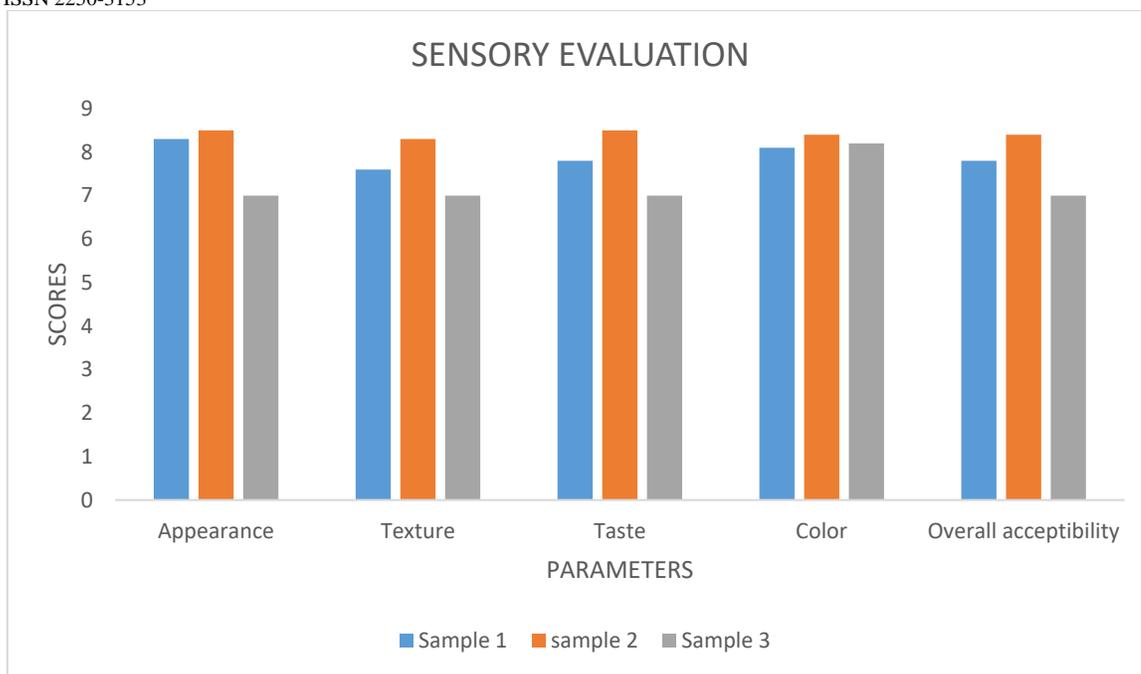


FIGURE 3: Graphical representation of sensory evaluation

Sample 2 was found to have high acceptability with correspondence to sensory evaluation

B. Nutritional analysis

The samples were tested for their nutritional value specifically calcium at Green link Analytical and Research Laboratory

Table 2: Nutritional Analysis of Calcium Rich Candy

| S.NO | TEST PARAMETER | Method | Result per 100g |
|------|----------------|--------------------|-----------------|
| 1. | CALCIUM | FSSAI | 29mg |
| 2. | PROTEIN | Kjeldahl | 12mg |
| 3. | FAT | Acid value | 1mg |
| 4. | TRANS FAT | Gas chromatography | 0g |
| 5. | SATURATED FAT | GC | 2g |
| 6. | CARBOHYDRATE | Anthrone test | 34mg |

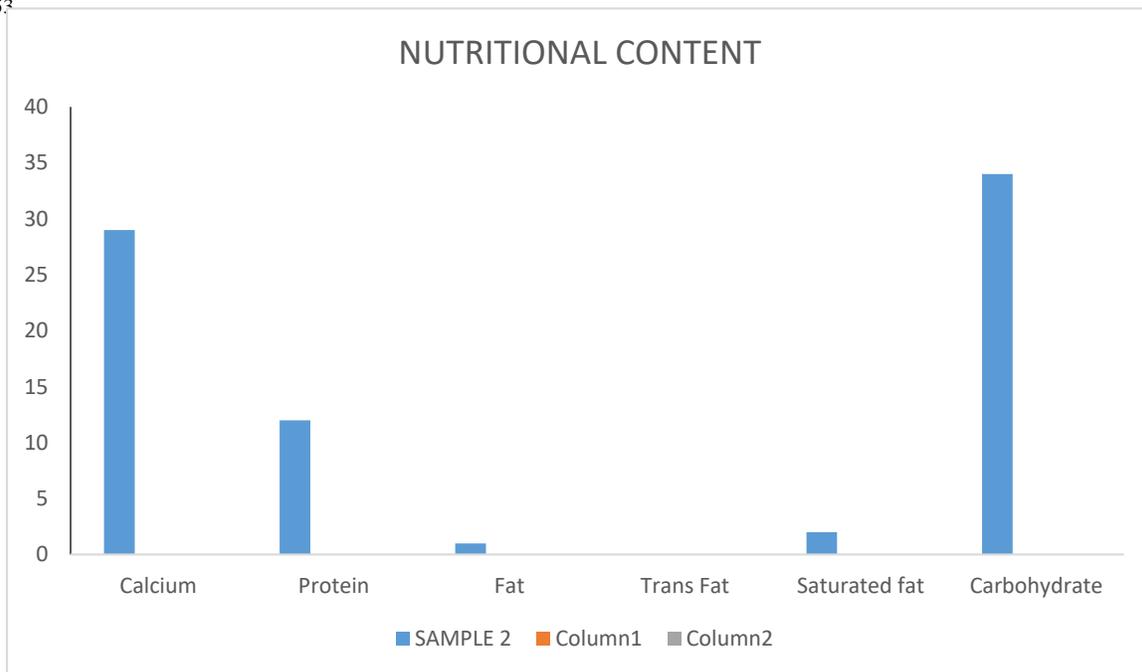


Figure 4: Nutritional content of sample 2

C.Shelf life testing

The shelf life of the sample optimized after the sensory analysis is checked for its shelf life. The sample was kept in room temperature and microbial count was checked regularly on certain interval of time.

Table 3: Microbial and total plate count of sample 2

| SAMPLE | COLIFORM (CFU/μg) | TOTAL PLATE COUNT (CFU/μg) |
|----------------------------------|-------------------|----------------------------|
| Sample 2 (0 th day) | Ab | 1* 10 ² |
| Sample 2 (7 th day) | Ab | 2*10 ² |
| Sample 2 (14 th day) | Ab | 2*10 ³ |

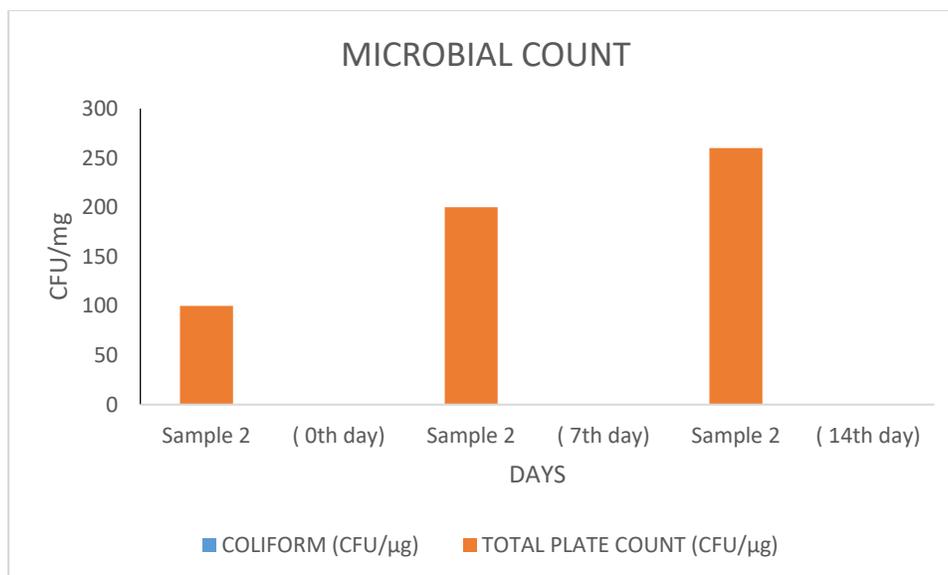


Figure 5: Graphical representation of microbial testing in sample 2

V. CONCLUSION

The candy fortified with calcium from fish bone powder showed to have high nutritional value due to relatively greater content of calcium as compared to the normal candy. Research shows that the combination of ingredients such as palm sugar, home made corn syrup and orange peel extract used for the development of the candy has brought about suitable taste, flavor and smell. The optimization process was carried out to find out the best combination of calcium powder and the corresponding flavoring. It was confirmed that the sample comprising of 0.8g calcium powder and flavors added accordingly produce most satisfactory savor. The sample was also subjected for shelf life testing for two weeks and the study is undergoing. The study is to be continued for three months and an estimated shelf life is then computed. It can be concluded that this candy is an adequate mode for intake of supplement calcium especially for children.

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Examining Pre-Service Teachers' Attitude towards ICT-Integration In Teaching And Learning Of Geometrical Constructions

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Abstract- This study was designed to examine the effect of ICT-integration (use of Smart Notebook) on pre-service teachers' attitudes at a selected college of education in the Bono Region of Ghana. One group experimental design was used to examine 36 first-year mathematics major pre-service teachers' cognitive, affective and conative domains of attitude towards ICT-integration. The Tripartite model of attitude was used to examine the relationships and predictability of cognitive, affective and conative dimensions of attitude towards the integration of ICT-based intervention. A four point likert-Scale questionnaire instrument was used to collect data on all the four constructs involved in the framework. The questionnaire was administered on the pre-service teachers before and after the ICT-based intervention and the data were analyzed using correlation, regression, and paired samples t-test, based on which the research questions were answered. The results showed that all the dimensions have a strong influence on pre-service teachers' attitudes before and after the ICT-based intervention in teaching and learning of geometrical constructions. The cognitive domain reported the strongest relationship and the best predictor of pre-service teachers' attitudes while affective dimension showed the least relationship and least predictor of attitude before the ICT-based intervention. However, the Affective dimension reported the strongest relationship and best influential determinant of the pre-service teachers' attitude after the intervention. In addition, the study found significant differences in pre-service teachers' attitudes before and after the ICT-based intervention in teaching and learning of geometrical constructions. This study as well suggests that to influence pre-service teachers' attitudes positively, the affective (feelings) domain should be given more attention when designing ICT-integration lessons in the teaching and learning of geometrical constructions. It is therefore recommended that mathematics tutors in the colleges of education should identify such ICT-based interventions and use them in teaching and learning of mathematics to develop pre-service teachers' attitudes positively towards the subject.

Index Terms- Attitude, Cognitive, Affective, Conative, ICT-integration.

I. INTRODUCTION

In this current technological advanced world, both developed and developing countries are finding new and better ways of improving educational standards. Improved educational standards depend mostly on the quality of teaching and learning that take place in the classroom environment.

One of most concerned subjects to every government and other educational stakeholders is Mathematics and research indicates that performance of students in the Sub-Sahara Africa appears to be the least among their counterparts elsewhere (Ngware, Ciera, Musyoka, & Oketch, 2015) and TIMSS (2011; 2012) results also suggest same.

In Ghana, the search for new strategies in improving teaching and learning focused attention on teacher training education. This is because such institutions are mandated to train and supply teachers to the Basic Schools in the country. Based on government and stakeholder consultation forum, there was 99.0% endorsement for the revision of the National Teachers Education Curriculum Framework (NTECF, 2017) which now included in its cross-cutting issues, under the core skills the information and communication skills (ICS), and Information Communication Technology (ICT) which is also a key to effective communication in the 21st Century. This consequently, reflected in the National Teachers' Standards (NTS) under the professional practice, teaching and learning which puts many emphases on ICT-integration to enhance effective teaching and learning (NTS, 2017, (3(J))). In view of this ICT inclusion, more attention has been shifted to ICT integration in teaching and learning of mathematics.

As a result, most researchers in and out of Ghana have integrated ICT-Based Activity learning to specific topics in mathematics at different levels of the educational system aimed at improving teaching and learning of the subject. It is difficult, if not impossible to train any specialist of any kind without ICT knowledge in this Technological era. Again Maldague, Kuimova, Burleigh and Skvortsova (2016), expressed how important ICT-integration is to education as it influences motivation to learn, stimulates cognitive activity and independent work, enables effective classroom discourse and improve learning outcomes.

The ICT-Activity Based learning was employed by Agyei and Voogt (2014) on pre-service teachers at the university level, using spreadsheets and reported that teachers were significant components in determining the transfer of learning of ICT-enhanced activity-based learning. Again, the will skill tool model was used to establish the technology integration level of both prospective and practicing teachers at the secondary school level. The study came out that prospective and practicing teachers correlated positive attitude towards computers, which contradicts the findings of already existing literature (Agyei & Voogt; 2010). ICT-Activity Based learning was again modified and extended by Brouwer, Ekimova, Jasinska, VanGastel, and Virgailaite-Mec'kauskaite (2009), to investigate the effectiveness of online assessment based on a computer-based mathematical assessment tool (Maple TA) in two preparatory remedial courses in two universities in the Netherland. The study suggested that there had been an improvement in both students' and teachers' mathematical knowledge and skills level. Hwa (2018) demonstrated the use of ICT-based learning to improve mathematics classroom discourse by applying a digital game-based learning situation in the form of entertaining and educating students at the same time in Malaysia. The study indicated that the digital game-based learning approach appeared to be more effective than the traditional or usual methods.

The literature reviewed to confirm the fact that the direction and current trends in both mathematics education research and practice is ICT-Activity Based learning classroom environment which allows students to construct their knowledge in the computerized learning environment. Most of the studies conducted in ICT integration education concentrate more on algebra and showed limited attention to the teaching of geometry, more especially geometrical constructions since most teachers consider using mathematical instruments (a pair of compasses and a ruler) as adequate as it provides Activity-Based learning. Therefore, this study is to add ICT touch to the activity-based learning approach in the teaching and learning of Geometrical Constructions. The study would focus specifically on evaluating the pre-service teachers' attitudes towards the use of ICT-Activity Based learning (SMART Notebook) in Geometrical Constructions classroom environment.

The main focus of this study was to examine first-year Pre-service Teachers' attitudes towards ICT-integration (using SMART Notebook application) in teaching and learning of Geometrical Constructions at a selected college of education in the Bono region of Ghana. The study explored the relationships and extent to which Cognitive, Affective and Conative (independent variables) dimensions influence pre-service teachers' attitude (dependent variable) towards ICT-integration in teaching and learning of Geometrical Constructions.

II. LITERATURE REVIEW ON ATTITUDINAL VARIABLES

After investigating the interaction between cognitive style, achievement scores and attitudes towards computers on university students reported no significant relationship between cognitive style and attitudes towards computers and, concluded that students' attitude towards computers is not influenced by their cognitive style (Altun, 2006). It was also reported (Abun,

Magallanes & Incarnacion, 2019) that students' cognitive and affective correlates significantly to higher education and their academic engagement. In another study, Millar and Tesser (1990), indicated that one's attitudes have inconsistent predictability on the attitude-behaviour relationship and explained that attitude reports are based on whatever aspect of the attitude is salient when the report is given and that if the behaviour is intended to achieve a goal, then is likely to exhibit cognitive driven attitude. This suggests that attitudinal variables may predict attitude depending on the intended function of the attitudinal object. Ahn and Back (2018), in their study conducted on brand loyalty of customers, reported that cognitive, affective and conative domains have a positive relationship with brand attitude.

A practical study conducted by Chowdhury and Salam (2015), a measured attitude of internet shoppers against the attitudinal variables (Cognitive, Affective and Conative) and found that all these components have a positive and significant relationship with each other and overall attitude, except cognitive that related negatively with the attitude. Also, Huang, Beatson, and Lings (2015), in their study described the impact of concern as a factor of cognitive domain and attitude. The results showed that attitude was influenced directly by concern.

1.1. Theoretical / Conceptual framework (model)

The study was situated in the constructivist theory of learning as pre-service teachers actively participate and interact (Altuna & Lareki, 2015; Wilson & Myers, 2000) with the SMART Notebook to construct their knowledge as they go through a defined task in geometrical constructions. The lessons were embedded in activity-based learning as pre-service teachers manipulate the SMART Notebook resources on a computer to construct the defined task in geometrical constructions.

Attitude has been researched and studied for decades now and one important model that has helped describe attitude is the tripartite (or ABC model) model of attitudes. The ABC model decomposed attitude into three domains: Affective (how people feel), Conative (what people intend to do), and Cognitive (what people think). Attitude can also be described as feelings, intentions, and beliefs respectively. For this study, the constructs were contextually defined as how pre-service teachers feel about the ICT-integration in Geometrical constructions lesson using the SMART Notebook as a tool (affective); what pre-service teachers think about the lesson (Cognitive); and whether pre-service teachers intend to use the SMART Notebook in their geometrical constructions lessons during and after their Supported Teaching in Schools (STS) programme (Conative). Hence, the study adapted the Tripartite Model of Attitude (TMA) which was proposed by Sauro, (2019) as its conceptual framework. The framework explains the directional relationships between the independent variables (Cognitive, Affective and Conative) and the dependent variable (pre-service teachers' attitude) as used in the study. The overarching questions underpinning the study were in three folds:

- (a) Is there any relationship between pre-service teachers' attitude towards ICT-integration (dependent variable) and cognitive, affective and conative (independent variables) respectively;
 - (i) before the ICT-based intervention?

- (ii) after the ICT-based intervention?
- (b) To what extent do affective, cognitive and conative predict Pre-service teachers' attitude towards ICT-integration in teaching and learning of Geometrical Constructions;
- (i) before the ICT-based intervention?
- (ii) after the ICT-based intervention?
- (c) Is there a statistically significant difference in pre-service teachers' attitudes before and after the ICT-based intervention?

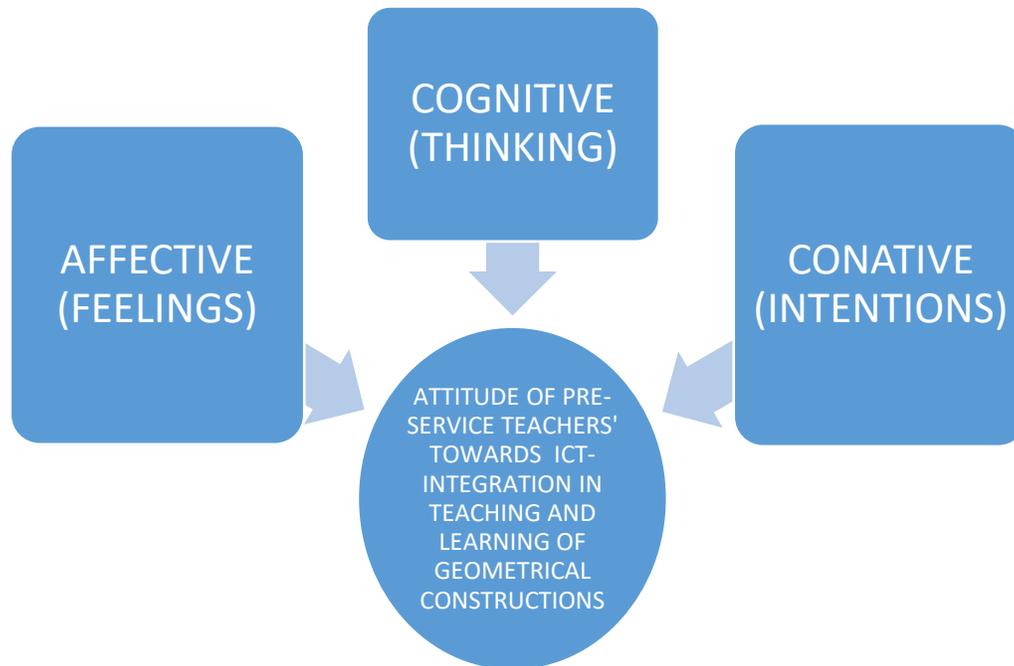


Figure 1: Conceptual framework of the study (Adapted from the Tripartite model of attitude (TMA): Sauro, 2019)).

III. METHODS

1.2. Research design

The design used for the study was a single-group experimental design, which measures the level of pre-service teachers' attitude (before and after) towards ICT-integration (SMART Notebook application) in the teaching and learning of Geometrical Constructions.

1.3. Instruments and Data Analysis

To answer the research questions raised, both descriptive (means and standard deviations) and inferential statistics (correlation and regression and paired samples t-test analysis) were used to study the internal characteristics of the constructs and their relationships respectively. Data was collected using a questionnaire designed based on the constructs operationalized in the framework. A four Likert-Scale questionnaire was designed using Strongly Agree (SA) as the highest scale to Strongly Disagree (SD) as the lowest scale. The questionnaire was divided into 5 parts of which the first part sorts personal information about the respondents and included age, gender, and programme. The other four parts were about the constructs (attitude towards ICT-integration in Geometrical Constructions, Cognitive, Affective and Conative) involved in the study. Apart from the questionnaire items on the pre-service teachers' attitude which was adapted from Maldague, et al., (2016)'s questionnaire on

students' attitudes, all the items on the other three constructs were self-constructed purposely for this study.

1.4. Participants

The study targeted the first-year pre-service teachers at the colleges of education in Ghana. The college was conveniently selected and a purposive sample was employed to select the mathematics major first-year class (36 Pre-service Teachers) as the main participants for the study and one tutor who teaches the College Geometry Course at the selected college. The reason being that these pre-service teachers were being trained purposely as mathematics teachers and as such likely to teach mathematics during and after their Supported Teaching in Schools (STS) programme. Also, the first-year mathematics major class offers College Geometry as a course which includes Geometrical Constructions as a topic in the first semester.

1.5. Procedure

The pre-service teachers were introduced to the **Smart Notebook** application in two (2) hours section on how to use the resources in the application and were given two hours (from 6 pm to 8 pm) access for three consecutive days to practice and familiarized themselves with the Smart Notebook application. The researcher and the tutor (a regular tutor for the course), then designed two (2) lessons on geometrical constructions which were used for the study. The procedural issues that came up were also discussed and resolved during this period. The duration of each lesson was 2 hours for the two (2) days period. The same

questionnaire was administered twice (before the first lesson and after the second lesson) to measure pre-service teachers' attitudes before and after the ICT-based intervention respectively. The tutor who taught the lessons knew and have been using the application for her lessons in geometrical constructions at the college.

instrument used and the number of items under each variable including attitude towards ICT-Integration in geometrical constructions. It is also important to note that the questionnaires that did not have enough information were excluded in the analyses. For instance, out of the 36 respondents, 30 and 32 were used respectively for analyses on before and after the ICT-based intervention. The reliability of the variables was respectable using (Devellis, 2003) benchmarks (see Table 1).

IV. RESULTS

The mean, standard deviation and Cronbach's Alpha for the various attitudinal variables show the reliability of the

Table 1: Descriptive Statistics (Mean and Standard Deviation) and Reliability of Variables

| Variable (scale) | Mean | Standard Deviation | Number of Items | Number of Respondents (N) | Cronbach's Alpha |
|----------------------------------|-------|--------------------|-----------------|---------------------------|------------------|
| Attitude Towards Ict-Integration | 30.03 | 4.482 | 10 | 36 | .822 |
| Cognitive | 25.44 | 3.760 | 8 | 36 | .796 |
| Affective | 25.06 | 3.900 | 8 | 36 | .869 |
| Conative | 31.31 | 4.180 | 10 | 36 | .825 |

Table 2 shows the descriptive of pre-service teachers who answered questions on attitude before the ICT-based intervention.

Table 2: Descriptive table for pre-service teachers' initial attitude towards ICT-Integration (before the intervention, N = 30)

| Variables | N | Mean | Std. Deviation |
|------------|----|------|----------------|
| Attitude1 | 34 | 2.51 | .624 |
| Cognitive1 | 36 | 2.60 | .609 |
| Affective1 | 34 | 2.53 | .577 |
| Conative1 | 34 | 2.52 | .461 |

1.6. Pre-service teachers' attitude towards ICT-Integration and cognitive, affective and conative domains of attitude before ICT-based intervention

The first research question dealt with was whether there exists any relationship between pre-service teachers' attitudes towards ICT-integration (dependent variable) and cognitive, affective and conative (independent variables) respectively. To achieve this, a Pearson product-moment correlation was calculated between the various attitudinal variables and attitudes towards ICT-Integration before the ICT-based intervention. Correlations were significant for "cognitive" ($r = 0.684, p < 0.001$), "conative" ($r = 0.567, p < 0.001$) and "affective" ($r = 0.395, p = 0.031$) at 0.01 and 0.05 levels of significance respectively. Though it appears that all the independent variables showed a positive relationship with pre-service teachers' attitudes towards ICT-Integration before the ICT-based intervention, however, the strongest relationship was between Cognitive and attitude towards ICT-Integration. This suggests that pre-service teachers were thinking more about how ICT was to be integrated into the teaching of geometrical constructions, (see Table 3).

Table 3: Relationship between Dependent variable and Independent variables (before the intervention, N = 30)

| | Cognitive1 | Affective1 | Conative1 |
|--|------------|------------|-----------|
| | | | |

| | | | | |
|------------------------------|---------------------|--------|-------|--------|
| Attitude1 | Pearson Correlation | .684** | .395* | .567** |
| | Sig. (2-tailed) | .000 | .031 | .001 |
| ** $P < 0.01$; * $P < 0.05$ | | | | |

The correlational relationships before the ICT-based intervention were explored graphically. Figure 2 shows the relationship between attitude towards ICT-Integration and pre-service teachers’ cognitive, affective and conative domains of attitude. There seems to be a more strong positive relationship between cognitive and attitude towards ICT-Integration. This is an indication that cognitive is the best predictor of pre-service teachers’ attitudes towards ICT-Integration before the intervention.

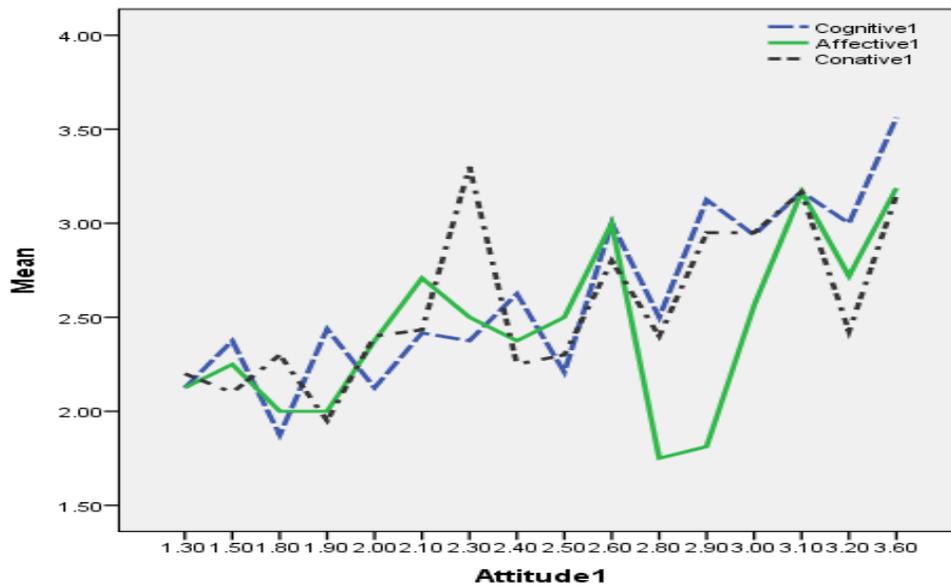


Figure 2: Pre-service teachers’ attitude towards ICT-Integration (before the ICT-based intervention)

4.1.2. Impact of Cognitive, Affective and Conative domains on attitude towards ICT-Integration in teaching and learning of Geometrical Constructions

Research Question 2 sought to examine the extent of pre-service teachers’ affective, cognitive and conative domains in the prediction of pre-service teachers’ attitudes towards ICT-Integration in teaching and learning of Geometrical Constructions before the ICT-based intervention. A regression analysis model equation with cognitive and conative domains being positively related while the affective domain was negatively related to pre-service teachers’ attitudes towards ICT-Integration. Thus, all three predictors were significantly related to pre-service teachers’ attitude towards ICT-Integration ($R^2 = 0.508$, $F(3, 26) = 8.957$, $p < 0.001$). Standardized coefficients of the predictors were observed as follows: 0.538, -0.009 and 0.253 for cognitive, affective and conative domains of pre-service teachers’ attitude before the ICT-based intervention respectively.

The resultant regression model for the standardized coefficients was formulated as:

$$\text{Pre-service teachers attitude towards ICT-Integration} = 0.538\text{Cognitive} - 0.009\text{Affective} + 0.253\text{Conative}$$

As indicated in the regression model above, cognitive appeared to be the best predictor of pre-service teachers’ attitudes towards ICT-Integration while conative appeared to be quite acceptable and affective was least acceptable. It is therefore clear that there is a positive relationship between the dependent variable and two of the independent variables, (cognitive and conative) with significant values of 0.006 and 0.170 respectively. The regression analysis verified that the F-value was significant indicating that the independent variables have an impact on the dependent variable (see Table 4).

Table 4: Coefficients of Predictors (Cognitive, Affective and Conative of Pre-service teachers’ attitude towards ICT-Integration before the intervention, N = 30)

| | R | R-square | F (Sig.) | Standardized coefficients | t | sig |
|--|---|----------|----------|---------------------------|---|-----|
|--|---|----------|----------|---------------------------|---|-----|

| | | | | | | |
|--|-------|-------|--------------|-----------------------|-------------------------|----------------------|
| Impact of Cognitive1, Affective1 and Conative1 on Pre-service teachers' attitude towards ICT-Integration | 0.713 | 0.508 | 8.957(0.000) | .538 -.009 .253 | 3.018 -.054 1.410 | .006 .957 .170 |
| a. Dependent Variable: Attitude1, b. Predictors: (Constant), Conative1, Affective1, Cognitive1 | | | | | | |

Table 5 shows the descriptive of pre-service teachers who answered questions on attitude after the ICT-based intervention.

Table 5: Descriptive statistics of pre-service teachers' attitude towards ICT-integration (after the intervention)

| Variables | N | Mean | Std. Deviation |
|------------|----|------|----------------|
| Attitude2 | 34 | 3.00 | .448 |
| Affective2 | 34 | 3.13 | .487 |
| Cognitive2 | 36 | 3.18 | .470 |
| Conative2 | 36 | 3.13 | .418 |

1.7. Pre-service teachers' attitude towards ICT-Integration and cognitive, affective and conative domains of attitude after ICT-based intervention

The first research question dealt with whether there exists any relationship between pre-service teachers' attitudes towards ICT-integration (dependent variable) and cognitive, affective and conative (independent variables) respectively. To achieve this, a Pearson product-moment correlation was calculated between the various attitudinal variables and attitudes towards ICT-Integration after the ICT-based intervention. Correlations were significant for "cognitive" ($r = 0.535, p < 0.001$), "affective" ($r = 0.791, p < 0.001$) and "conative" ($r = 0.763, p < 0.001$) at 0.01 significant level respectively. It appears that all the independent variables showed a positive relationship with the pre-service teachers' attitude towards ICT-Integration after the intervention, however, the strongest relationship was between Affective and pre-service teachers' attitudes towards ICT-Integration. This implies that pre-service teachers had a positive feeling towards the integration of ICT in the teaching and learning of geometrical constructions, (see Table 6).

Table 6: Relationship between Dependent variable and Independent variables (after the intervention, N=32)

| | | Cognitive2 | Affective2 | Conative2 |
|------------|---------------------|------------|------------|-----------|
| Attitude2 | Pearson Correlation | .535** | .791** | .763** |
| | Sig. (2-tailed) | .002 | .000 | .000 |
| **P < 0.01 | | | | |

The correlational relationships after the ICT-based intervention were represented graphically. Figure 3 shows the relationship between attitude towards ICT-Integration and cognitive, affective and conative domains respectively. The results suggest a strong positive relationship between affective and attitude towards ICT-Integration. This means that affective is the best predictor of pre-service teachers' attitudes towards ICT-Integration after the intervention.

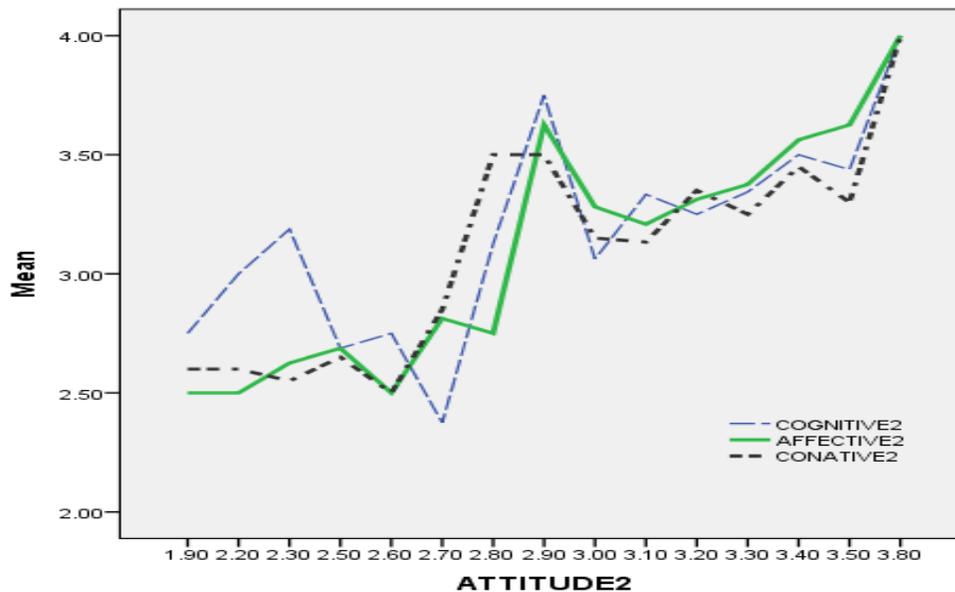


Figure 3: Pre-service teachers' attitude towards ICT-Integration (after the ICT-based intervention)

1.7.1. Impact of Cognitive, Affective and Conative domains on attitude towards ICT-Integration in teaching and learning of Geometrical Constructions

Research Question 2 sought to examine the extent to which pre-service teachers' affective, cognitive and conative domains predict pre-service teachers' attitudes towards ICT-Integration in teaching and learning of Geometrical Constructions after the ICT-based intervention. A regression analysis model equation with cognitive, affective and conative domains being positively related to pre-service teachers' attitudes towards ICT-Integration. All the three predictors were significantly related to pre-service teachers' attitude towards ICT-Integration ($R^2 = 0.692$, $F = (3, 28) = 20.998$, $p < 0.001$). The observed standardized coefficients of the predictors were obtained as 0.017, 0.490 and 0.387 for cognitive, affective and conative domains of pre-service teachers' attitude after the ICT-based intervention respectively.

The regression model for the standardized coefficients were formulated as below:

$$\text{Pre-service teachers attitude towards ICT-Integration} = 0.017\text{Cognitive} + 0.490\text{Affective} + 0.387\text{Conative}$$

From the above model, affective appeared to be the best predictor of pre-service teachers' attitudes towards ICT-Integration while cognitive and conative appeared to be quite acceptable. It is therefore clear that there is a positive relationship between the dependent variable and all the three independent variables, (cognitive, affective and conative) with significant values of 0.907, 0.013 and 0.021 respectively. The regression analysis verified that the F-value was significant indicating that the independent variables have an impact on the dependent variable (see Table 7).

Table 7: Coefficients of Predictors (Cognitive, Affective and Conative of Pre-service teachers' attitude towards ICT-Integration after the intervention, N = 32)

| | R | R-square | F (Sig.) | Standardized coefficients | t | sig |
|--|-------|----------|---------------|---------------------------|-------------------------|----------------------|
| Impact of Cognitive2, Affective2 and Conative2 on Pre-service teachers' attitude towards ICT-Integration | 0.832 | 0.692 | 20.998(0.000) | .017 .490 .387 | 0.117 2.658 2.448 | .907 .013 .021 |
| A. Dependent Variable: Attitude2 | | | | | | |
| B. Predictors: (Constant), Conative2, Cognitive2, Affective2 | | | | | | |

1.8. Paired Samples T-test Results

Research Question 3 sought to determine whether there was a statistically significant difference in the pre-service teachers' attitude towards the ICT-Integration before and after the interventional period, a paired samples t-test was used (see table 8).

Table 8: Descriptive table from the paired sample t-test (N = 33)

| | | Mean | Std. Deviation | t-value | Effect size (d) | Sig. (2-tailed) |
|--------|-----------|------|----------------|---------|-----------------|-----------------|
| Pair 1 | Attitude1 | 2.51 | .634 | -3.506 | 0.28 | 0.001 |
| | Attitude2 | 3.01 | .455 | | | |

From the tables 8 above, there was a statistically significant differences in the pre-service teachers' attitude towards ICT-Integration before the intervention 'Attitude1' (M = 2.51, SD = 0.634) and after the intervention 'Attitude2' (M = 3.01, SD = 0.455); $t(32) = -3.506, p = 0.001, (p < 0.05)$. This result suggests that the use of the SMART Notebook application in teaching geometrical constructions had a positive influence or impact on the pre-service teachers' attitude. The magnitude of the impact (effect size) was calculated as (d) = 0.28 which is considered as a modest effect (Cohen et al., 2007).

V. DISCUSSIONS

This study examined the relationships and the impact that cognitive, affective and conative domains have on pre-service teachers' attitudes towards ICT-integration in teaching and learning of geometrical constructions, using the Tripartite Model of Attitude (TMA). Also, the study sought to find out whether there were statistically significant differences in pre-service teachers' attitudes before and after the ICT-based intervention. The results showed that cognitive, affective and conative correlated positively with the pre-service teachers' attitude before the ICT-based intervention, and this is supported by other studies (Abun, Magallanes & Incarnacion, 2019). The strongest and the least relationships were registered for cognitive and the affective domains respectively. Also, cognitive reported the best predictor of pre-service teachers' attitude (Altun, 2006; Huang, et al., 2015) while affective dimension was the least predictor of attitude before the ICT-based intervention. These results suggest that before the ICT-based intervention the pre-service teachers were thinking or doubtful as to how the Smart Notebook could be used in teaching and learning of geometrical constructions.

The results after the ICT-based intervention also showed strong positive relationships between cognitive, affective, conative domains and the pre-service teachers' attitude (Ahn & Back, 2018; Chowdhury & Salam, 2015) towards the ICT-integration. The affective domain reported the strongest relationship and the best predictor while cognitive reported the least relationship and influential to the pre-service teachers' attitude towards the ICT-integration. In this case, the results seem to suggest that the pre-service teachers were feeling relief after the use of the Smart Notebook application in teaching and learning of geometrical constructions. Based on the results discussed so far, there was a movement between the cognitive and affective domains of pre-service teachers' attitudes. That is affective moving from being the least predictor to be the best predictor before and after the ICT-based intervention

respectively. The cognitive domain also moved from being the best predictor to be the least predictor of pre-service teachers' attitude. This also suggests that the predictability of the domains to attitude largely depends on the situational environment (the ICT-based intervention) as confirmed by Millar and Tesser (1990).

Furthermore, the result from the paired samples t-test suggests that there was much improvement in pre-service teachers' attitudes towards ICT-integration and that the ICT-intervention helped improved pre-service teachers' attitudes positively.

VI. IMPLICATIONS

Some educational implications on professional development and support can be deduced from this study. The results suggest that ICT-integration tends to influence the attitude of pre-service teachers at the colleges of education in Ghana. This study as well suggests that to influence pre-service teachers' attitudes positively, the affective (feelings) domain should be given more attention when designing ICT-integration lessons in the teaching and learning of geometrical constructions. It is therefore recommended that mathematics tutors in the colleges of education should identify such ICT-based interventions and use them in teaching and learning of mathematics to develop pre-service teachers' attitudes positively towards the subject. The pre-service teachers should also be supported to integrate ICT in their mathematics lessons during and after the Supported Teaching in Schools (STS) programme. It was also evident that pre-service teachers had hands-on experience in the use of computers and this boosted their confidence in using the computers in the classroom.

VII. LIMITATIONS

Some of the limitations of this study are outlined as First, the study concentrated on only the first-year mathematics major pre-service teachers and therefore its findings are limited to only first-year mathematics pre-service teachers. Second, this study again considered the integration of ICT in only teaching and learning of geometrical constructions and that its findings cannot be generalized to cover all first-year mathematics topics. Third, some of the respondents failed to provide sufficient information on the questionnaire which led to the exclusion of such questionnaires from the data analyses and that interned reduced the number of respondents for the study.

VIII. CONCLUSIONS

This study highlights the importance of ICT-integration in teaching and learning of mathematics at the colleges of education institutions in Ghana. The ICT-based intervention showed the great potential of causing positive attitudinal change towards teaching and learning of geometrical constructions among pre-service teachers. It is, therefore, necessary for all stakeholders concerned with mathematics education to find new ways of developing content delivery through ICT-integration in the educational institutions in Ghana.

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The impact of Local language Dialect toward the Teacher's Language Attitude in EFL Class Room in South Sulawesi, Indonesia

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Abstract: The behavior that shows a misunderstanding of Standard English becomes an indicator of dialect prejudice (Devi & Kariko, 2017). This issue attracted the writer to observe the language attitude that arises due to the influence of local dialects on the use of English in speaking. In this case, the dialect prejudice of the English teachers toward English spoken by the students. Regarding the observation, the researcher investigated English teachers in some schools, a university and a course institution in South Sulawesi, to find out whether there is a language prejudice toward local dialect in EFL class. South Sulawesi is considered such a right location to conduct the investigation because there are many local dialects that still spoken by the society (including teachers and students) such as local dialects of Bugis, Toraja, Makassar, Mandar, and etc. There were 10 participants from a different area, and the teaching place had responded to nine items of questionnaire and two interview questions regarding the aims of the study. The data analysis shows that the English teachers misunderstand the standard English should be, and the dialect prejudice happens in the EFL classroom.

Keywords: Dialect Prejudice, Standard English, language attitude, English as a foreign language

1. Introduction

As part of the international community, Indonesian people should a lot opportunities to learn and acquire English as the most spoken language whole over the world; it has become intercultural communication in the current contextually (Sharifian, 2017). Even though in Indonesia, English still play role as a foreign language, it is necessary to be mastered by Indonesian nowadays (Marlina, 2012). Teaching English in Indonesia is needed to communicate on an international scale, both written and oral communication (Widiati & Cahyono, 2006). These needs encourage an effort to make English is easy to understand and use by everyone in the world.

No wonder in the Education curriculum of Indonesia, English is one of the subjects taught at all levels of education, starting from the elementary school level, secondary school, even university level (Agustin, 2015). In addition to schools, many course institutions provide English language learning services to meet the needs of the English language in Indonesia (Ruhamak & Rahayu, 2017).

The position of English, which is still a foreign language, especially in Indonesia, becomes a challenge for English teachers in teaching it (Mumary & Songbatumis, 2017) (Abrar et al., 2018). That is because in Indonesia, in addition to the use of Indonesian as a national language (Rosdiana, 2014), there are more than 742 regional languages that are still heavily used by speakers of each region, including students (Farisiyah & Zamzani, 2018). Not infrequently, the local language becomes the daily spoken language used in even in a formal situation such as in the educational environment; thus, it dramatically influences the teaching of English in schools or other course institutions (Falahuddin, Saleh, & Fitriati, 2019).

Some of the most influential things are the grammar equalizer between Indonesian and English (Novianti, 2015), then, confusion in using the correct tenses because this does not work in Indonesian (Fauziati, 2017), looking for appropriate words in the translation and the most influential is the way of speaking of local dialect. Then triggers a misunderstanding in English teachers about which English standards are needed (Devi & Kariko, 2017).

Standard English is a variety of English that is used in a formal situation and international communication (Knapp, 2015). There are various types of standard English in the world, such as North American English, Australian English, and British (Smith, 2015). Although these standard varieties differ in their pronunciation, they have the same common in grammar and spelling. The behavior that shows a misunderstanding of Standard English becomes an indicator of dialect prejudice. This issue attracted the writer to observe the language attitude that arises due to the influence of local dialects on the use of English in speaking. In this case, the dialect prejudice of the English teachers toward English spoken by the students. Regarding the observation, the researcher investigated English teachers in some schools, a university and a course institution in South Sulawesi, to find out whether there is a language prejudice toward local dialect in EFL class. South Sulawesi is considered such a right location to conduct the investigation because there are many local dialects that still spoken by the society (including teachers and students) such as local dialects of Bugis, Toraja, Makassar, Mandar, and etc.

2. Literature Review

People who live in a multilingual speech community, including children and students, experience an imbalance between the language spoken at home and language used at school (Gorter, Zenotz, & Cenoz, 2014). Even though students learn English as a foreign language (Novianti, 2015), the Standard English is needed as a regulation of English to be mastered professionally, because it can affect the way students use written and spoken English in the real context.

2.1 Standard English

The use of English with any distinctive local dialect or accent has become a concern of several types of research for a long time ago. With those attached dialects resulting in creating English variety. Particularly in Indonesia, Standard English is understood by the teachers affects learning results and material delivery to the students (Devi & Kariko, 2017).

Language is a much more complicated circumstance than attitude norm: it is also the central aspect of human experience and knowledge. Thus, the English speakers (either the native speakers or non-native speakers) may have their perspective as to "which one is a correct or incorrect of the language that they use (Milroy & Milroy, 2012).

Strevens (1981) claimed that there are specific contrary theories regard to what Standard English does not include such as, Standard English cannot be defined as "the best English" or "literary English," or "Oxford English," or "BBC English," that is not supposed as an arbitrary Standard English is not "upper-class English," only any particular speech community does not use it. The standard does not attempt to what is "the most often heard."

Standard English is not produced by planning the linguistic regulations or philosophy, or even conscious design. Moreover, he continued to define what Standard English is, as follows:

"Standard English is a particular dialect of English, being the only non-localized dialect, of global currency without significant variation, universally accepted as the appropriate educational target in teaching English, which may be spoken with an unrestricted choice of accent." (Strevens, 1981). Either way, however, Standard English, once defined as the dialect of the use of English in writing, is undeniable from the side of educational perspective. However, as the use of English as a spoken language, it can be concluded that the learning of English to non-native speakers is commendable, to avoid the discrimination which is already existed against non-standard dialect (Tony & Watts, 1999).

Davies (2010) argued that language English teaching need to lead properly if the students used their local dialect while speaking English is ignored; they may experience disaffection. Considering that every language or dialect has been given official status to be spoken in society. We cannot blame the non-native English speakers for sounding their dialect in speaking English as a foreign language as language defined as follows:

Every language is equal

The equivalent here means that all languages are not the same in some devices like grammar and vocabulary or even the chance of language to develop, but in a sociolinguistic viewpoint, that language is equal to be used or set to be used, including its dialect.

Political change favors dialect maintenance.

The revolution happened on behalf of minorities and discrimination. Therefore, the feeling of being respected becomes the strength and interest for the speech society to struggle toward their dialect as their identity.

The different language uses require different language code

A linguistic character shows that it has more than one dialect code, e.g., to communicate at home, work, school, religion; it may need different codes based on their dialectal policy.

Speech societies have a unique membership

The identity of language and dialects in real life are correct, but no one can be bilingual or bidialectal is just an unclear argument, in fact, as a member of the speech community. Most of us can be members of more than one speech community.

Language teachers seek chances to use authentic language

Language teachers have the interest to set their students to use authentic language in learning the target language. The teachers want the use of their dialect just left at home; in the language classroom, the students are supposed to be native speakers of the target language. The teachers assumed that the "standard" must be used (Avies & Davies, 2010, pp. 184–186)

Further, even though English standard defined as the way natives learn to read and write, but most English speakers do not speak that way. Thus, English standard does not regard native dialect or more about the origin of English. It refers to the kinds whose grammar, which has been described in an English grammar book or even dictionaries that present the rules of spelling (Trudgill & Jean, 2013).

Finally, the recent statement claimed that Standard English has become spoken language in the way British, American; Canadian, Indian, Malaysian, Korean people used that language to communicate (Devi & Kariko, 2017). Thus, based on the theories above, there is nothing to do with the particular accent toward Standard English.

2.2 Language Attitude and Dialect Prejudice

The effect of standardization may cause linguistic insecurity, the attitude of dialects, self-appointed authorities, and changing standards. It is recognized among the society that standard pronunciation was needed to measure others and become judgment for social advancement (Hickey, 2012).

Language attitude commonly affects professional scholars of language, and it seems it does not matter on the general public who keep looking at the grammar handbook or dictionaries (Milroy & Milroy, 2012). It seems to influence others to do what they want to do (Zeinivand, Azizifar, & Gowhary, 2015) and a positive language attitude can help learners succeed in their language learning and use process including dialect, speech style, speech communities (Ianos, Huguet, Janés, & Lapresta, 2015) (Khan, 2016).

The attitude that is shown to the students can affect their reaction either in a positive or negative way. The positive attitude toward English as a foreign language can be an essential aspect to learn English quickly; it also can increase the amount of input that students receive. The positiveness shown can motivate students to bring out their effort as EFL learners (Lubis, 2015). Moreover, a positive attitude helps learners cultivate their motivation to learn English beyond school hours (Gardner, Lalonde, & N, 1985). On the other hand, negative attitudes toward English, making students shy to speak English or practice their English (Lubis, 2015).

Some studies also had discussed this issue in Indonesia; since Indonesia has a multilingualism culture, it is necessary to find out the language attitude toward English and does dialect prejudice exists during the learning process of English as a foreign language. An attitude toward English differed between females and males (Wati, 2018). A study also reported that Sundanese dialect speakers have no problem with the accent of English; they show positive cognitive language attitude toward English (Wati & Zulaikha, 2019).

However, language attitude also shows regarding dialect prejudice particularly in Solo; it has been researched that English teachers in Solo show dialect prejudice because the lack of understanding about the Standard English should be, and it can affect the English teaching and learning curriculum in Indonesia (Devi & Kariko, 2017). Dialect Prejudice is a kind of discrimination to the person's vernacular dialect (Nordquist, 2018). In fact that people in society have the freedom to express their ideas using dialect (Litt, Martin, & Place, 2015). Regarding previous researches above, the research intended to find out whether or not the dialect prejudice exists in South Sulawesi, especially in the education field.

People who live in a multilingual speech community, including children and students, experience an imbalance between the language spoken at home and language used at school (Gorter, Zenotz, & Cenoz, 2014). Even though students learn English as a foreign language (Novianti, 2015), the English standard is needed as a regulation of English to be mastered professionally, because it can affect the way students use written and spoken English in the real context.

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Finally, the recent statement claimed that Standard English could be spoken in the way British, American, Canadian, Indian, Malaysian, Korean people used that language to communicate (Devi & Kariko, 2017). Thus, based on the theories above, there is nothing to do with the particular accent toward standard English.

3. Research Methodology

3.1 Participants

This study was conducted in some schools from elementary to senior high school, a university, and an English course institution in South Sulawesi. Excluding Bahasa Indonesia, the most spoken language by the students is their vernacular dialects, such as Bugis, Makassar, Toraja dialects.

In order to representative every kind of vernacular dialect, the researcher spread the observation some areas in South Sulawesi. That is why the participants needed should be deliberately (Chaklader, 2019). Along this line, the researcher found the English teachers who were corporate purposely to be observed and asked as follows:

Table: 1 Participants List

| Code | Teaching in: | EFL Teachers' Local Dialect | Most Spoken Local Dialect of the Students |
|------|--|-----------------------------|--|
| (A) | MTsN 1 Jeneponto | Makassar-Jeneponto | Makassar-Jeneponto |
| (B) | MTsN 1 Jeneponto | Jawa-Malang | Makassar-Jeneponto |
| (C) | SMAN 9 Wajo | Bugis-Sengkang | Bugis-Sengkang Bugis-Pammana |
| (D) | Univeristas Muhammadiyah Parepare | Bugis-Parepare | Bugis Enrekang Toraja / Mamasa |
| (E) | MTsN 3 Enrekang | Maspul-Marangin | Maspul (Marangin; Tanete; Pariwang) |
| (F) | SMP IT Wahdah Islamiyah Bantaeng | Makassar-Jeneponto | Makassar-Bantaeng Bugis-Bulukumba Bugis-Sinjai |
| (G) | SMPN 4 Mattiro Sompe, Pinrang | Bugis-Pinrang | Bugis-Pinrang |
| (H) | SMAN 6 Pinrang | Bugis-Pinrang | Bugis-Pinrang |
| (I) | IPEKA Christian Elementary School Makassar | Makassar | Makassar |
| (J) | The International English Center, Makassar | Bugis-Barru | Makassar Bugis |

3.2 Instruments

The participants asked questions regarding their perspective and their language attitudes toward students' local dialect. There are two types of instruments. The first part is presented in a questionnaire form, both closed-ended and open-ended questions. Considering the questionnaire is an effective and efficient method to do observation (Gahng, 1990). Closed-ended

questions talked about the English teachers' assumptions about the Standard English categorizations; it consisted of six items. Further, mixed closed-ended and opened-ended questions to examine teachers' language attitudes toward local dialect in speaking English. In addition, the questionnaire is provided in Google form; thus, the participants should have an e-mail account to access the form, and the questions are adopted from Devi & Kariko's instruments.

The second part is doing an interview. In this session, the researcher did it in some ways, such as using a Voice Note feature in WhatsApp application and doing a direct interview with the teachers. The interview questions consist of two questions: (1) Standard English, what does it mean according to you? (2) What will you do if your students have thick local dialect when they speak English? Question number 2 is also adapted from Devi & Kariko's instrument.

3.2 Data Analysis Procedures

The data was collected by counting the total number of responses in every question. Each participant was given the google form link to distribute the questionnaire, and they were given two interviewed questions and had to answer by recording their voice. The researcher eventually collected the data from 10th to 16th of February, 2020. Even though the method of this study used a descriptive qualitative approach, but data collected analyzed both quantitative and qualitative presentations. The quantitative data presented in the form of percentage by implementing this following formula:

$$Percentage = \frac{\text{total number of "yes" answers}}{\text{total number of participants}} \times 100\%$$

Farther, the qualitative data were transcribed from the Voice Note. The messages repeatedly read (Bohman & Borglin, 2014) to avoid the missing idea of what the participants had explained through their voice. Repetition of listening to the voice note or teachers' explanation helps the researcher to categorize the answers in which one of the explanations has the same meaning.

4. Findings and Discussion

4.1. English Teachers' Assumptions and Perspectives of Standard English

In order to investigate the EFL teachers' perspective about Standard English categorizations and definitions, the researcher distributed questionnaires (Devi & Kariko, 2017) and interviewed the participants who are teaching English in different educational levels and local dialects around South Sulawesi. The data consisted of two parts, the first is presented in the form of the table below, and the interview question about the definition of standard English explained narratively.

Table: 2 EFL Teachers' Assumptions of Standard English Categorizations

| No | Statements | Total | Percentage |
|----|-------------------------------------|-------|------------|
| 1 | Grammatical Correct Sentence | 7 | 70% |
| 2 | Sounds like native-speakers | 4 | 40% |
| 3 | Having American accent | 6 | 60% |
| 4 | Correct spelling in written English | 9 | 90% |
| 5 | Correct use of tenses | 6 | 60% |
| 6 | Having British accent | 5 | 50% |

Table 2 shows that 90% participants agree that correct spelling in written English is the part of Standard English, following with 70% agreement of the respondents who have the same assumption that grammatical correct in sentence categorized in standard English, and 60% EFL teachers believe that the use of correct of tenses is part of the standard English either. Based on <http://dx.doi.org/10.29322/IJSRP.10.03.2020.p9990>

the data presented, most of the respondents stand with the same assumptions about Standard English in English written categorization. The result indicated that grammar, vocabulary mastery, spelling, and punctuation are part of the linguistic features of English (Crystal, 1994). Farther, some of the participants agree that Standard English means the speakers should not have an American accent (40%) and a British accent (50%). Thus, they assume that the EFL speakers do not need to sound like native-speakers (60%). The American and British dialects do exist, but they statistically meaningless (Strevens, 1981). On the other hand, there still numbers of the respondents who believe that sounds like native-speakers with having American (60%) or British English accent (50%) are part of Standard English categorization. As a result, there is not a plenty number of respondents who think that sounds like native-speakers (40%) are needed in spoken English as a foreign language. Related EFL teachers' assumption above, the following table shows the teachers' perspective about the definition of Standard English.

Table: 3 EFL Teachers' Perspective of Standard English Definitions

| Code | Statements (Standard English is..) |
|------|---|
| (A) | How we use English sentences to explain particular situations, and of course, the sentence should be correct according to English grammar and how we pronounce the words correctly and adequately. |
| (B) | The language spoken can be understood by anyone. It does not matter where they come from as long as they can understand what speakers say. It means they already use standard English. |
| (C) | The standard language that used generally and acceptable either in written or spoken usage. This kind of English language is usually in English handbooks, newspapers, or any public service facilities. |
| (D) | When we try to use general English toward our students. We should only use one accent so that it can be easier to be understood. Because if we use many accents or even combine different accent, let say American and British accent, our students could be confused. It is better if you just use one accent along with the lesson. |
| (E) | The English with any kind of rules or regulations, and it is taught in an educational environment, e.g., using properly and politely English, the correct tenses and grammar. |
| (F) | The standard that has been arranged in the curriculum to be reached for each level of education. |
| (G) | The standard that have been arranged in curriculum to be reached for each level of education |
| (H) | Something that related to correct tenses, grammar, and spelling, particularly in written form, those standards are essential. However, to speak English, the grammar and else does not matter even also sometimes the speakers affect their particular accent (non-native accent). |
| (I) | Standard English should follow the rules of British and American English. |
| (J) | The usual English or the standard English |

The statements above collected by interviewing the participants, nine of them were interviewed via voice note feature, and one was interviewed by meeting the teacher directly. Based on table 3, it can be concluded that most of the participants have a similar definition of Standard English; they believe that standard English is related to the proper written and spoken English that should be reached in education target.

There are four participants (A, C, E, G) stated that Standard English has a big deal with the rules of correct grammar, tenses, and spelling both in written and spoken English as foreign. There are two of them (D, I) believe that American and British English have become Standard English; they involve both of the English styles toward standard accent of spoken English. Finally, the

participants (B, F, H, J), who state both ideas believe that is not only grammar, or written correct rules of English matter, the way they pronounce the words in communication are matter either. They express their idea by writing down standard English is something to do with the English origin itself or Standard English.

In this case, most of the participants argued that the British and American accent is the English standard that the students need to master in order to reach what curriculum arranged and defined in learning English as a foreign language. They assume that Standard English is linked with the British and American accent (Devi & Kariko, 2017). The statement of participant this misconception of Standard English can lead EFL teachers to commit dialect prejudice.

4.2. Teachers' Language Attitude toward Local Dialect of Spoken English in EFL Classroom

It cannot be denied that dialect prejudice is widespread nowadays, even in the speech society that multilingual spoken varieties (Litt et al., 2015). This issue has been observed for years. In Indonesia itself, local dialect exists too (Devi & Kariko, 2017). The researcher had set questions regarding language attitude toward the local dialect by adapting Devi & Kariko's instruments. The data shows that as follow.

Table: 4 EFL Teachers' Language Attitude toward Local Dialect of Spoken English

| Items | Answers | Reason |
|--|---------|---|
| Do you think accent (Native-like accent) is important in teaching English as Foreign Language? | Yes (8) | a. Because it's one of Standard English, students need to be introduced to sounds or real pronunciation of the English origin (4) b. In order to make students get used to speaking English like native and can be understood easily by a native when they talk someday (4) |
| | No (2) | a. I think that's not really important, because we have our own accent (1) b. As long as the students can pronounce the sentences well, I think their accent is not a big deal (1) |
| Do you expect your students to have native like accent? | Yes (9) | a. In order to make listeners easy to understand what they're talking about by using authentic English accent (5) b. So that they will be able to learn and understand the English better (2) c. I do not expect much, but hope they will speak like native is a good thing (2) |
| | No (1) | a. They just need to speak English in correct pronunciation, no matter if they sound like the used to (1) |
| Do you try to sound like native speaker when you are teaching? | Yes (9) | a. To become a good speaker in English (1) b. I am trying my best, so that students be able to imitate and get used to sound like-native accent (7) c. Sometimes (1) |
| | No (1) | a. I am not really good at native English accent |

| | |
|---|--|
| What will you do if your students have thick vernacular accent when they speak English? | <ol style="list-style-type: none">a. I try as much as possible to sound like native, because I myself have problem in producing English in native way, so will listen to YouTube native video, and teach the students the way native talking in the classroom. (2)b. Actually, it is OK if our students have thick accent when they speak English, they are still learning, it doesn't matter for now as long as we can get what they mean to say and the say, <i>but it is my job as their teacher to lead them in order to reduce their thick accent.</i> Because if we force them, they will lose interested in learning English (3)c. I will fix their thick accent to sound more like native English (3)d. It's OK as long as they speak correct pronunciation and their speech are understandable (2) |
|---|--|

Based on the collected data in table 4, native English accent is stated as standard in learning English, 80% respondents believe that native-like accent is essential in order to achieve what education target demand in learning English, it can also be said that local dialect is given negative attitude toward spoken English. They said that in order to make students get used to speaking English like natives and can be understood easily by a native when they talk someday. On the other hand, two of them think that the native English accent is not essential.

In question number two, a significant number (9) that shows EFL teachers expect their students to sound like a native, they considered that if their students have a native accent, they will be able to speak correctly with the native and be easier to understand English spoken either. Moreover, there are nine of the participants to speak like native speakers in the classroom in order to get their students used to listen the proper English should be spoken, again they highly assumed that having English native speakers accent is standard in education target which English taught as a foreign language. It is their responsibility to teach it to their students.

The summary of the three questions above is the language attitude of the EFL teachers toward the local dialect of their students when they speak English. Based on table 4, it can be said that dialect prejudice happens in teaching and learning English process, the teachers possess to sound like native, they will fix their students accent, even in the first place they stated that it is ok to not sound like native, they compromised at first, but then they intend to change the local dialect to more sound like native, however. Thus, the researcher claimed there is a negative evaluation of the local accent that clearly explained in the table above.

5. Conclusion

Dialect prejudice can be found in as such a way to use English in vernacular dialect; some people think that should be confronted openly by people in education that still mismatch between standard English and local dialect (Milroy & Milroy, 2012).

Related to that, this study had conducted an observation regarding language attitude toward local dialect of spoken English in some schools, a university, and an English course institution in South Sulawesi.

Based on the analysis above, it is found that most of the EFL teachers in South Sulawesi assumed that Standard English is not only the standard of proper grammar, tenses or spelling used in written English but also native-like accent is part of Standard English. This assumption makes the teachers work hard to sound like a native while teaching English as international students in the classroom. In the same line, they expect their student to be able to sound like natives either.

This attitude of language caused the dialect prejudice of spoken English. Even though they think that using, local dialects when speaking English is not a problem, but they still make an effort to make their students sound more like a native. In this case, in South Sulawesi, dialect prejudice happens in some areas where the researcher conducted the study.

The researcher assumed that having a suitable comprehension toward what Standard English could help curriculum in arranging the demand of which rules of English should be taught at school in order to increase the dialect awareness and reduce the dialect prejudice that can affect students' confidence in speaking English.

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BlockFlow: A decentralized SDN controller using blockchain

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Abstract—With the rise of cloud computing, data centers, and big data, the current rigid network architecture has been found to be inadequate. The modern technological demands require a flexible and easily reconfigurable network architecture. Software Defined Networking is a revolutionary concept that separates the control plane of network devices from their data plane and centralizes the control plane of all devices, facilitating the controlling of the entire network through a single portal. This helps us create flexible network architectures that can be reconfigured quickly to fit different needs. However, centralizing control leads to a Single Point of Failure and makes the network vulnerable to Denial of Service attacks, which is one of the major reasons why industries are reluctant to adopt this technology. Blockchain provides us with a distributed ledger and a decentralized state, allowing us to create decentralized applications that run over multiple computers. This research aims to distribute the control plane of Software Defined Networks across multiple devices using blockchain. This addresses the existing security vulnerabilities of the Software Defined Network architecture such as Single Point of Failure while continuing to keep the control plane logically centralized, thereby allowing the network to be configured through a single portal. The resulting architecture has a physically distributed control plane whose logic is centralized.

Keywords—*blockchain, software defined networking, decentralized applications, sdn controllers*

I. INTRODUCTION

Traditional network devices have a tightly coupled data plane and control plane. Therefore, rules on how to handle packets and where to forward them, and the algorithm that produces such rules are all found in one device.

This means that to reconfigure a network, one must reconfigure each device in the network. Since under various circumstances networks need to be able to be reconfigurable without being highly labor intensive, such an architecture has proven to be ineffective and inefficient [1].

Owing to modern demands such as cloud computing and the need to be independent of network device vendors to implement the protocols and capabilities that may be needed by different companies [2], an easily configurable and controllable network paradigm was needed.

Software Defined Networking (SDN) is a concept that was conceived to solve the problem of excessive dependence on network device vendors, and the inability to make network-wide configurational changes easily.

SDN decoupled the data plane and control plane of network devices, centralized the control plane and placed it out of network devices allowing network administrators to not only make network-wide configurational changes through a central point but also implement the desired routing algorithms, protocols and policies irrespective of whether network device vendors support them.

This has allowed networks to be flexible and easily reconfigurable helping them change quickly to cater to different use cases and ensure Quality of Service [3]. However, the centralization of the control plane introduced new challenges such as Single Point of Failure and vulnerability to Denial of Service attacks [4]. In addition, SDN also creates security issues such as lack of authentication between applications and the controller, absence of encryption between controller and switches, and weak authentication between the controller and the switches [5].

Blockchain helps us create trustless consensus among different nodes, and a distributed ledger allowing us to build decentralized applications that run across a network of computers [6]. Using Blockchain to build a decentralized controller application for SDN solves the following issues.

1. Single point of failure as the controller application will be running over multiple computers
2. Denial of Service attack since hijacking just one controller will not suffice for disrupting the network.
3. Application-controller authentication as blockchain uses private-public key pairs

Thus, an SDN controller that is physically distributed but logically centralized will provide the same benefits of a typical SDN architecture while addressing the major security issues of SDN.

The scope of this research is limited to building a controller application logic that would perform basic network functions such as routing.

This paper is composed of the following sections: Section 2 briefs about the related works done, section 3 gives a primer on SDN, section 4 discusses blockchains and their relevance

to this research, section 5 explains how blockchain is incorporated in to the SDN architecture, section 6 describes the methodology, section 7 deals with the tests and results, section 8 briefs about future works, and section 8 provides a conclusion.

II. RELATED WORK

Researches in the past have tried to create a multi-controller SDN architecture. Examples of such works are ONIX [7], HyperFlow [8], ONOS [9], DISCO [10], ELASTICON [11], KANDOO [12], and ORION [13]. But such architectures suffer from many problems such as developing an efficient communication between multiple controllers, creating an adequate network design, and integrating new applications that work with the northbound APIs of multiple controllers [14]. Little work has been done to explore the possibility of utilizing the distributed state management capabilities afforded by blockchain to create a multi-controller SDN architecture. Even though C. Tesilos et al. studied the possibility of using blockchain to authenticate and store data from IoT devices using SDN, no architectural changes to SDN to mitigate problems arising from centralized control was proposed [14]. ChainGuard uses SDN to create a firewall for a blockchain network [15]. VeidBlock tries to verify IoT sources using SDN and blockchain [16]. DistBlocknet is the only product that tries to utilize blockchain to distribute an SDN controller, but it is done specifically for IoT networks with the intention of enabling trustless communication between IoT devices.

III. SOFTWARE DEFINED NETWORKS

SDN consists of three layers, viz., the application layer, the control layer, and the infrastructure layer [17]. The infrastructure layer consists of the data-forwarding devices that forward packets based on the flow rules.

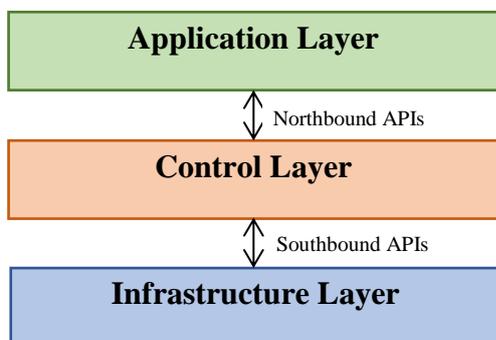


Figure 1 SDN architecture

The control layer consists of the controller device that acts as the interface between the application layer and the infrastructure layer. It is through this layer that network applications that want to control the network can communicate with the infrastructure layer. The controller is typically a server that runs an SDN controller software [18].

The application layer consists of networking applications that program the network infrastructure [19]. This can include routing applications that build routes based on which the data-forwarding devices forward data, firewall applications that control access to different parts of the network, and security monitoring applications.

The control layer provides two Application Programming Interfaces, namely, the northbound APIs and the southbound APIs. The northbound APIs allow the application layer to communicate with the control layer, whereas the southbound APIs provides a communication channel between the control layer and the infrastructure layer.

IV. BLOCKCHAIN

Blockchain is a combination of different algorithms that uses a mixture of hashing and asymmetric encryption to create a distributed ledger, and trustless communication between different nodes in a network. This technology was introduced through Bitcoin which proposed a peer-to-peer transaction system without a trusted intermediary [20].

In blockchain, transactions between individuals are verified using a private-public key pair, and hashes. A previous transaction is hashed and the hash along with the public key of the receiver of the new transaction is encrypted by the sender's private key to create the signature of the sender. Thus, by verifying the signed transaction using the public key found in the previous transaction (that of the sender who was the receiver in the previous transaction), a transaction can be verified.

A bunch of these transactions is hashed together to form a Merkle tree, and the root hash of the tree is stored in a timestamped block. This block includes the hash of the previous block and the succeeding block will contain the hash of the current block. This way a chain of blocks is formed. If one of the blocks is mutated, then the hash of it will change. Since the hash of this block is a part of the hash of the succeeding block, and since every succeeding block includes the hash of the previous block, mutating one block will make the whole chain that follows the mutated block invalid.

A proof of work algorithm is used to ensure that creating a block results in a cost to the creator of the block. Thus, mutating multiple blocks in a blockchain can be made costly to the point that the cost of fraudulently modifying a blockchain is much more than the supposed benefits. This helps us create an immutable blockchain.

Creators of blocks, called miners, are required to produce a hash that is less than or equal to a certain target. Miners try to achieve this by adjusting a value called nonce in the block. Since it is computationally difficult to reverse engineer a hash, miners are forced to use the trial-and-error method to try to produce a valid hash. This is an expensive process as far as CPU power is concerned. Miners are rewarded for expending their CPU power with bitcoins.

This network of miners helps create a decentralized system that allows trustless communication between individuals while allowing to store data in a distributed ledger, i.e., the blockchain.

Though meant to create a transaction system initially, blockchain can also be used to create decentralized applications that run across multiple nodes.

V. BLOCKFLOW ARCHITECTURE

The SDN architecture is slightly modified by using a blockchain network in the control layer to create a decentralized SDN architecture. A decentralized SDN

controller application is built and deployed among several blockchain nodes. Thus, multiple nodes in the network work together to create a combined effect of a controller.

The global state of the network is stored in a ledger distributed among the nodes. Blockchain ensures that the states stay synchronized across multiple nodes. The blockchain also offers JSON based Remote Procedure Calls that allow applications to interact with the blockchain. This is used to create the northbound and southbound APIs.

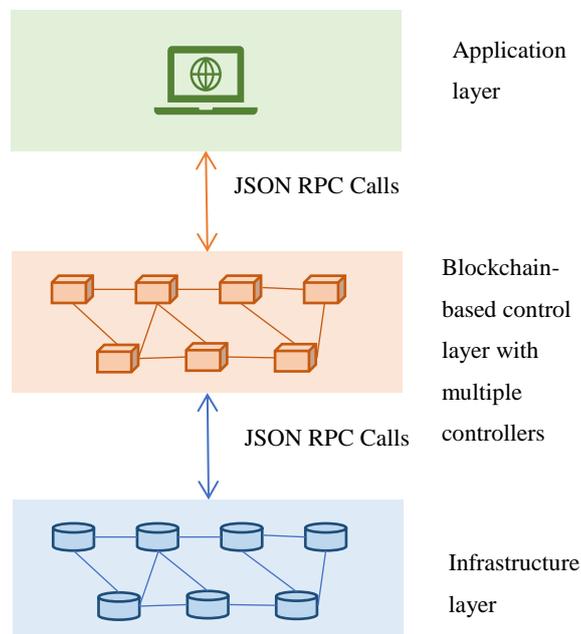


Figure 2 The architecture of BlockFlow

A network application can compute the routes and create a global flow table and write it to the blockchain, which will then be distributed among all the nodes. Data-forwarding devices can then read their respective flows from the blockchain and update their own flow table accordingly.

VI. METHODOLOGY

Ethereum is used to implement the blockchain network. A smart contract is created using Solidity containing the controller application logic. This smart contract is then deployed on a private Ethereum network.

A. Smart contract

The smart contract acts both as a database and application logic. Mainly two sets of data are stored in the database:

1. Switches
2. Routes

The switches dataset stores the following data:

1. Switch ID
2. Switch Name
3. Version

The routes dataset is essentially a flow table with the following fields:

1. Route ID

2. Switch ID
3. Next Hop IP address
4. Destination IP address

Each data-forwarding device, called a switch, will have an entry in the switches dataset. The Switch ID is used to uniquely identify each switch in the network. The version of the switch is used to find whether routing for the concerned switch has undergone changes. The default version is set to one and the number is incremented every time a routing entry pertaining to that switch is added, deleted or updated.

The route ID in the routes dataset is used to uniquely identify each routing entries. The switch ID specifies the switch to which the routing entry belongs. The destination IP address stores the IP address to which a packet is meant for. The next hop IP address stipulates the IP address of the port to which a packet should be forwarded. Even though the routes dataset is limited to just 4 datasets owing to the limits of the scope of this research, it can be further expanded to allow switches to function as firewalls.

The smart contract allows the following switch-related functions:

- Create a switch
- Update a switch
- Read a switch
- Delete a switch

The following routes-related functions are allowed:

- Create a route
- Read a route
- Update a route
- Delete a route

B. Switch Controller

A Python-based application is built to control a traditional network router in the infrastructure layer. However, this application can be bundled together with any switch software such as OpenVSwitch to work with the proposed architecture.

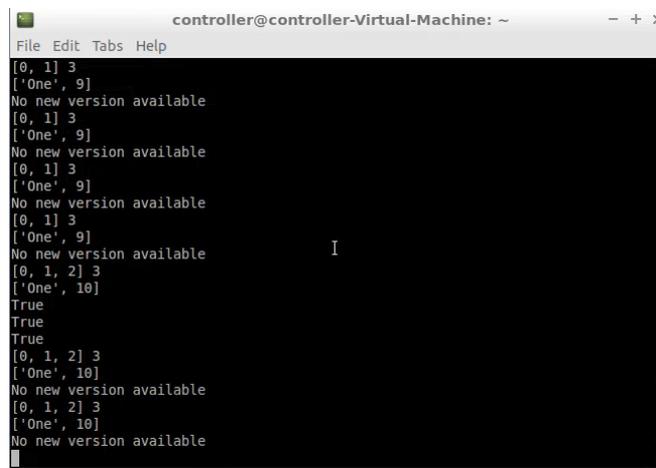


Figure 3 The Command Line Interface of the Switch Controller

This Python application uses Web3.py library and the Application Binary Interface provided by it to interact with a smart contract. An ID can be assigned to each switch using this application. The application, then, will query the smart contract to see if a new version of routing entries for the concerned switch is available. If available, the application will then update the routing table of the network device.

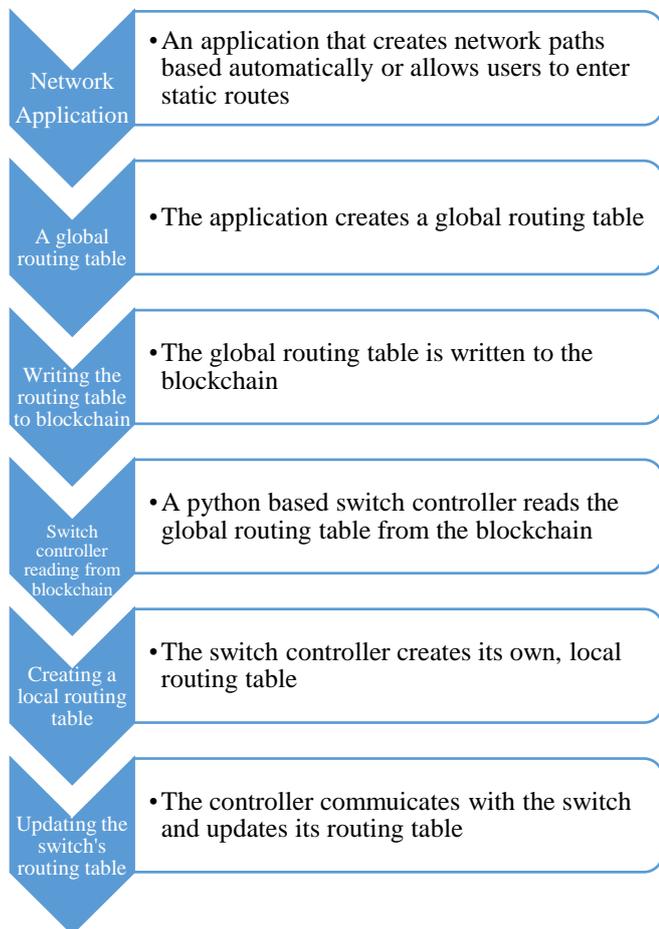


Figure 4 The process workflow of BlockFlow

C. Ethereum Virtual Machine

A valid user or application can add or modify the switches and routes dataset in the smart contract by performing a signed transaction. The ether required to perform the transaction can be gained by mining blocks in the Ethereum network using the same account.

The smart contract is deployed in an Ethereum Virtual Machine. This virtual machine is the logical collection of all nodes in the blockchain network.

The Ethereum blockchain network is run using the geth command line interface written using Go. Once the network is created any number of nodes can be added to the network as the administrators see fit.

The communication between the switches and the controllers is outbound, i.e., the network among them is independent of the SDN network.

D. Application Layer

The smart contract provides an Application Binary Interface that allows applications written languages like

Python, Java, JavaScript, and C# to interact with the smart contract. The applications can make JSON Remote Procedure calls to read or mutate the state of the Ethereum virtual machine.

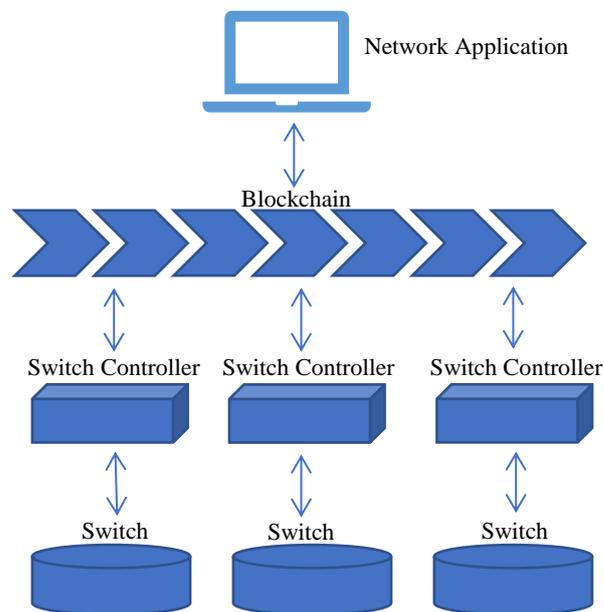


Figure 5 A typical network setup of BlockFlow

VII. TEST SETUP AND RESULTS

A test network was created virtually on a Windows 10 Pro PC (build 1809) with an Intel Core i7-8550U 1.8GHz CPU and 16 GB of RAM. Microsoft's Hyper-V was used to create a virtual network. The Ethereum nodes were run on Ubuntu 18.10 with 256 MB of RAM and one vCPU.

VyOS, an Open Source Linux-based Network OS, was used to create network switches. The Python-based switch controller controlled these switches via SSH.

A React.js-based Single Page Application was created to function in the application layer. This was a simple application that allowed the creation, deletion, and modification of routes and switches.

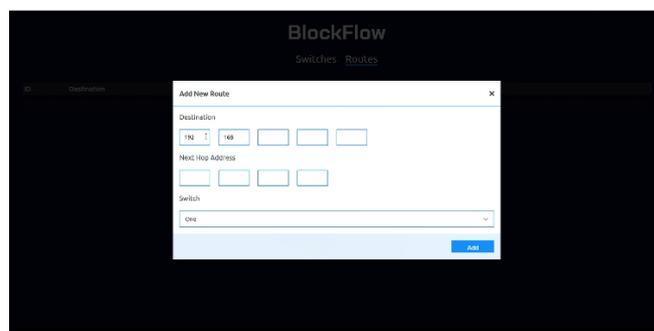


Figure 6 The GUI of the Single Page Application

The following network was created to test the SDN architecture.

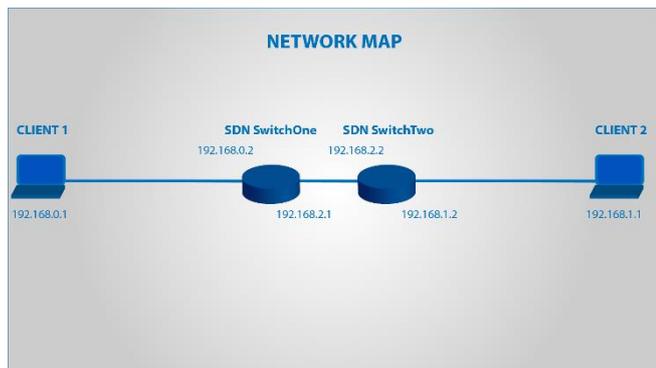


Figure 7 Test network

The network switches were connected together and a Linux client was attached to each of those two switches. ICMP packets, using ping, were sent from one client to another to test connectivity. As the routes dataset was empty in the smart contract, pings kept failing.

Then, routing entries to route packets from one network to the other on each switch were created and the network convergence time was measured. This was repeated 10 times to find the average time. The average convergence time was found to be 14.3 seconds.

The measured time is in consistent with Ethereum’s block time of 10 to 19 seconds [21]. However, in order to discourage users from using the proof work algorithm, Ethereum introduced a function called the difficulty bomb. This would result in the block time increasing exponentially every 100,000 blocks.

The difficulty of compromising the SDN network can be calculated as follows.

The hash rate of a controller is the number of hashes a controller can produce per second. The total hash rate of a blockchain network is given by the equation:

$$H = \sum_{i=1}^n h_i$$

Where:

H is the total hash rate of the controllers in the network

n is the total number of controllers in the network

h_i is the hash rate of a controller

According to Bitcoin’s whitepaper, the probability P of an attacker compromising the network, when the probability of an authentic controller mining the next block is A, and the probability of a rogue controller mining the next block is Q [20]:

$$P = 1 \text{ if } Q \geq A$$

The probability Q of a rogue controller mining the next block is given by

$$Q = \frac{h_q}{H}$$

The probability A of an authentic controller mining the next block is given by

$$A = \frac{h_a}{H}$$

Where:

h_q is the total hash rate of the rogue controllers

h_a is the total hash rate of the authentic controllers

H is the total hash rate of both the authentic and rogue controllers.

Therefore, if Q is to be greater than or equal to A, then the total hash rate of the rogue controllers (h_q) should be more than 50% of the total hash rate (H) of the controller in the network. Thus, the threshold of compromise C of a network can be defined in terms of H as:

$$C = \frac{1}{2}H$$

So, an attacker needs to have a total hash rate exceeding C to be able to successfully compromise a network.

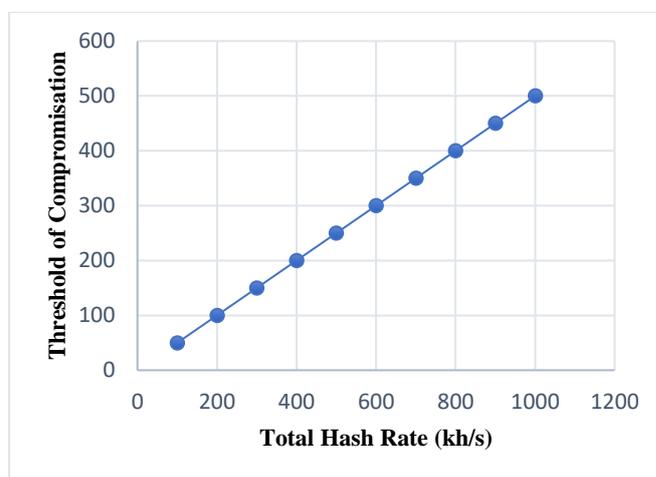


Figure 8 Line graph showing the linear relationship between the total hash rate and the threshold of compromise (C)

There is a linear relationship between the threshold of compromise and the total hash rate of the network. Thus, the higher the hash rate, the more difficult it is to compromise a network.

The hash rate of a network can be increased both vertically—by adding a more powerful CPU to a controller, and horizontally—by increasing the number of controllers. Increasing the hash rate vertically is less secure since an attacker can gain access to a high hash rate by simply compromising one controller.

Using blockchain to create a distributed database afforded additional advantages such as synchronization of states across multiple controllers, distributing the workload of the Ethereum virtual machine across all devices, and creating an immutable table of flow entries. Storing state information on the blockchain also ensured the history of changes was available for security auditing and analysis.

VIII. FUTURE WORK

This research could be expanded further by adding a topology discovery logic to the smart contract. At present, devices are added manually through the React based application. However, network switches, on connecting to the control layer, can be allowed to add themselves along with the details of the neighboring switches to a list of connected switches in the smart contract. Then, the application layer may approve the switch and add it to the topology.

In the longer run, the difficulty bomb function as discussed in the above section can make mining blocks increasingly consume more time and may lead to a phenomenon called the ice age [22]. Even though this will no more be a problem once Ethereum adopts the proof of stake algorithm, a custom Ethereum client can be built by modifying the difficulty function to avoid this problem.

IX. CONCLUSION

This research aimed to solve the problems of Single Point of Failure, Denial of Service attacks, and absence of authentication between the application and the controller. By distributing the control plane of SDN across multiple devices while keeping it logically centralized allowed us to solve the aforementioned problems. In addition, using blockchain also helped resolve the usual challenges posed when trying to use a multi-controller setup such as:

1. State synchronization across devices
2. Even distribution of workload over all controllers
3. An immutable database of flow entries
4. A history of state changes for security auditing and analysis

By offering a solution to the security problems found in SDN using blockchain, this research helps alleviate the security-related skepticism against SDN and facilitates the industry adoption of this technology by network engineers.

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Paradigms of sustainable development of Libya

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Abstract- Sustainable development is a complex, more dimensional concept. The concept of sustainable development implies balanced economic, social and cultural development without endangering the environment, which will enable future generations to develop at the same or higher level. It is aimed at preserving and protecting the environment and on the rational use of natural wealth of the state and related to raising the quality of the environment and quality of life. In order to achieve sustainable development, it is necessary to establish new social values that are based on knowledge, creativity and ability of human resources in a word of creating quality management with the tendency to **transform the society so far into the learning society.**

Index Terms- sustainable, economic, environment, management.

I. INTRODUCTION

The concept of sustainable development implies fostering learning and knowledge. Non-rational and irresponsible use of natural resources has caused catastrophic pollution of air, water and land. A large number of pollutants around the world have led to global changes: ozone depletion, climate change, biological disorders, the disappearance of many species of flora and fauna. However, the last decades of the twentieth century marked significant efforts to preserve and improve the rather degraded environment. Many projects and strategies have been designed, in all areas of human activity, as well as in agriculture, which will help reduce environmental pollution to the borders of the norm. Sustainable development, as a complex term, combines three dimensions: environmental sustainability, economic efficiency and social responsibility. This conception of the term is known as the “three pillar model”:

1. The ecological dimension concerns, first and foremost, the conservation of biodiversity, the conservation and rational use of natural resources, the reduction of environmental pollution, the care of endangered species, their habitats, ecosystems and the like.
2. The social dimension refers to social relations, respect for human rights, achievement of social well-being, transparency of social activities, people's involvement in decision-making, and it is monitored through five areas: health, social justice, education, population, security and housing.
3. The economic dimension of sustainable development is based on the principles of alignment of economic development with resources and production capacity.” (Giddings et. al, 2002).

II. CONCEPT OF SUSTAINABLE DEVELOPMENT

The original concept of sustainable development, which rested on three dimensions: economic, social and environmental, Joahim Spangenberg expanded and included the institutional dimension, as the fourth pillar of sustainable development, thus creating the “sustainability prism” model. This model indicates that there must be interconnectedness and coherence between the dimensions of sustainable development, and that the institutional apparatus should support the implementation of activities related to other dimensions of sustainable development (Spangenberg, 2002). In order for the Sustainable Development Goals to be successful, it is necessary to pay equal attention to each of these four aspects and to balance them. This is often a problem, and based on the experience of countries actively pursuing sustainable development policies, it can be observed that the economic dimension of sustainable development often has the best institutional support, while the social and environmental dimensions are less covered by the institutional apparatus (Hafner, 2009).

The concept of sustainable development can be operationalized in different ways. In theory and practice, four approaches are generally recognized in achieving the concept of sustainable development (Sudhir and Sen, 1996):

1. Maintaining unchanged consumption,
2. Maintaining unchanged reserves of natural resources,
3. Establishing a safe minimum standard
4. Application of operational environmental principles.

It is virtually impossible for modern man to avoid environmental impact, but that impact can be minimized (minimized) while adhering to certain principles that make up sustainable development policies. Adherence to these principles enables the development of human society while preserving the environment. First, these principles include:

1. Integrity,
2. Precaution,
3. Resource reproducibility and
4. Preventive action.

The principle of integration, as the most comprehensive principle, refers to political decision-making in all decision-making domains, and is implemented at three levels of care for the living environment, ie. at the level of society, economy or product. At the societal level, this principle is implemented in politics, when making decisions, with limitations through legal means. At

this level, the public or the general population is involved in environmental care, which is achieved by developing public awareness and acquiring adequate knowledge of all aspects of environmental protection. At the economy level, it involves the introduction of legal obligations for legal entities to manage all types of waste responsibly and integrated waste management. At the product level, a legal obligation for the manufacturer to pre-define the environmental impact of the product is created, as a preventive measure, integrally throughout the product life cycle, ie. from raw materials and production to waste.

III. DETERMINANTS OF SUSTAINABLE DEVELOPMENT

If the determinants of sustainable development are well recognized and define, then it is possible to establish an appropriate model (models), sustainable development of Libya. The concept of sustainable development must improve social inequalities and environmental damage, while maintaining a sound economic basis. Preserving natural capital is essential for sustainable economic production and intergenerational equity. From an ecological perspective, both the population and the total demand for resources should be limited in size, and the ecosystem integrity and species diversity should be maintained. Social equity, the fulfillment of basic health and educational needs, and the participatory character of democracy are key elements of development and are linked to environmental sustainability. Taken together, these principles clearly point to new guidelines for process development. One of the ways to contribute to the preservation of natural infections is the ecological system of food production, that is, organic farming. This mode of production works in accordance with the principles of sustainable development. The general hypothesis that if they are well recognized and define the determinants of sustainable development then it is possible to establish the appropriate model (models), sustainable development of Libya. Of course, all actors from the Government of Libya to the local population should be involved. Before that, it is necessary to look at the necessary conditions, which implies the cessation of all types of divisions in Libya. Then it is necessary to analyze the existing situation of all determinants, to make preparations, to take appropriate measures, to implement previously prepared plans, and finally to make decisions that will support sustainable development in Libya at all levels from local to national. In doing so, it is necessary to start from smaller goals because the goals of sustainable development are higher, they are a bigger obstacle for the actors involved in it, and it is more difficult to achieve them.

IV. SUSTAINABLE DEVELOPMENT PARADIGMS

The strong normative nature of the sustainability of the development concept makes analytical analysis difficult. Nonetheless, the three principles outlined above are echoed on a healthy scale level. They meet the earlier criterion for a powerful, easy to understand concept which may have wide applicability. If we were to get closer to achieving this triple goals, the world would be a better place - and equally surely we will often be short on respect for all three goals. It may be easier to identify unsustainability than sustainability - and identifying

unsustainability can motivate us to take the necessary political action. It is instructive to examine the problem from the perspectives of different disciplines. Certainly, the set goals require insights from multiple disciplines. Economists, one might assume, would strive to give greater weight to economic goals, environmentalists to environmental dimensions, and social theorists on social issues. However, before we try to balance these different perspectives, we need to understand them and explore their inner logic. Each of the three areas is commonly referred to as a system: the economic system, the ecological system and the social system have their own logic. This is an impossible task to analyze all these systems at once. We must therefore start by considering each separately, as suggested in the Balaton report on sustainability indicators: "The total system of which human society is a part and on which it depends on support consists of a large number of component systems. The whole cannot function properly and is not sustainable if the individual component systems cannot function properly. Sustainable development is only possible if the component systems, as well as the overall system, are sustainable. Despite the uncertainty about the direction of sustainable development, it is necessary to identify the essential components of the system and define indicators that can provide essential and reliable information on the sustainability of each and the overall system.

This implies that we can use different indicators to measure different dimensions of sustainability. Indicators imply measurement; measurement involves a theoretical definition measurement concepts. Proponents of sustainable development, as we have observed, recognize the social the development component as an essential part of the new paradigm (Holmberg, 1992). In doing so, they confirm the significance of a much older perspective. A "human development" approach that emphasizes issues of necessities and equality, it is well established in the history of economic theory.

V. PARADIGMS OF SUSTAINABLE DEVELOPMENT OF LIBYA

One of the main priorities for achieving sustainable development is the protection and improvement of the environment and the rational use of natural resources. The adoption and implementation of the National Strategies for the Sustainable Use of Resources and Commodities will have the effect of reducing the pressure on natural resources. In order to integrate environmental policy into other sectoral policies, especially in the field of spatial and urban planning, capacities for the implementation of strategic environmental impact assessment, policies, plans and programs in line with the law should be strengthened. The development of cleaner technologies, increased energy efficiency and the use of renewable energy sources will certainly have the effect of reducing environmental pollution. The biggest potential for increasing energy efficiency is the reduction of thermal energy consumption (estimated by more than 50%) by improved insulation in buildings and the reduction in the number of households using electricity for heating. There is great potential for improving energy efficiency in the industrial sector as well. Promoting renewable energy sources requires the introduction of incentive measures, which can encourage private investment in the energy sector and strengthen competitiveness in the energy and economy sectors in general. Energy stability and security can be

achieved by saving non-renewable energy sources at the expense of greater use of renewable energy and by saving and rationalizing consumption. Sustainable development means agreeing on the balance of three different processes: economic development, community development and environmental development. The importance of maintaining a balance between these three processes can be demonstrated by the example of any major city. For example, if local water supply is not satisfactory (economic dimension of development), if water is not chemically and bacteriologically correct and not enough (ecological dimension), and if water is not available to all residents (social dimension), then the quality of life and attractiveness of the city will decline. In developing countries, structural transformation is carried out with the effective development of the state. A successful state is one that brings long-term growth and structural transformation as its primary goal and strives to devise policies and institutions that facilitate the evolution of the economic system so that the goals of economic development are achieved. The Libyan state will need to take on not only a development role, but also a broader role of sustainable development for the country to be successful.

Promoting economic development is not the only task. Successful developed countries have a common approach to government. Creating dynamic development and focusing the private sector should be at the heart of policy to promote sustainability by the developing country. The key elements of the Libyan government's strategy should be public investment, private investment, as well as rules in the manufacturing sector, in order to generate a strong private sector response aimed at increasing investment and technological change in the development directions the government wants to achieve. The state of Libya should see the environment as an essential component of its development strategy, so that the state has a leading role in formulating a vision that sets clear goals to change the structure of the economy, include in the relative separation of resource use and environmental impact, as well as increase human well-being. in the short, medium and long term. It should also formulate a number of appropriate policies, regulations and incentives to ensure the successful achievement of the Sustainable Development Goals and take the necessary measures, through key actors, and in particular in the private sector, to ensure their effective implementation. In the Libyan context, a major negative side effect of the structural adjustment phase is the erosion of state capacities. Building the capacity of developing countries to formulate and implement structural transformation policies will thus be a major challenge for the new Libyan state.

One important area where much more work is needed is for the Libyan government to establish a system for monitoring and evaluating progress towards sustainability. This should include strengthening statistical capacity in the design of sustainability indicators, using the national system through environmental monitoring, and monitoring the productivity of resources, strengthening institutional capacity to monitor sustainable development goals over a period of time towards progress towards these indicators. The Libyan government must play a leading role in formulating and implementing a sustainable development strategy, creating an appropriate environment, including support measures, to establish them internationally. This can be interpreted in various ways. The critical strategic issue facing the Libyan government in developing a sustainability strategy is a matter of

priority. However, strategic choices can be identified from assessing the relative advantage of sector-level measures, targeting economic sectors where resource use has been found to be more intensive, such as agriculture, industry, energy and construction. At the same time, the government can assess the relative advantages of measures to improve the sustainable use of special renewable and non-renewable resources, such as water, land, fossil fuels, materials and metals and minerals. Libya must aim not only at industrial development, but also at improving resource efficiency and mitigating pollution and waste generation. Libya has significant amounts of natural resources (oil and gas) that are the main driver of economic growth. But these resources are non-renewable, which means that spending them will limit the ability of future generations to meet their needs. In addition, mismanagement of resources often exacerbates economic instability, social conflicts and environmental problems in Libya. One of the challenges facing the government of Libya is how to use its resources for productive purposes and manage them in a way that improves living standards for present and future generations.

VI. CONCLUSION

Libya and the whole region of North Africa suffer from the serious effects of climate change. Recurrent severe droughts and other natural disasters cause famine, environmental degradation, poverty and economic hardship in Libya and the region. The impact of climate change is exacerbated by inadequate water management facilities and poor water practices, inefficient and outdated water production facilities. The insufficient quantity and uneven distribution of precipitation and high temperatures in certain periods make the situation more than critical. The consequences include lack of water and food for animals and humans, leading to a high incidence of hunger and loss of life for humans and animals across the region. In order to overcome this nutritional deficiency, Libya must import large quantities of food. Such a level of dependence on food imports is not sustainable and can turn into a humanitarian tragedy that threatens not only to threaten peace but also to preserve a unique environment and biodiversity, as well as Libya's ability to play a more important role in an increasingly global environment. Libya also faces the challenge of economically managing the transition from a planned economy to a market-oriented one. The risk of over-reliance on the oil economy is that too many people become employed in an oil-based industry, including agriculture, and thus miss out, advance, educate or earn more. Another risk is that the governments of resource-rich countries are becoming hungry and therefore prone to neglect the need for sound economic policies as well as the need for good education. A nation that believes that natural capital is their most important asset can develop a false sense of security and become negligent by the accumulation of human capital. A clear policy framework that recognizes all these oil-related issues is an essential basis for creating an effective and transparent fiscal plan for managing the country. Establishing a resource pool, while necessary, is not a sufficient condition for these problems to be adequately addressed. Also, oil funds usually solve a number of problems and are recommended as a contribution to the diversification of resource income.

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Effects of heat killed *Lactobacillus plantarum* (HK L-137) supplemental diets on growth, survival and health of juvenile striped catfish, *Pangasianodon hypophthalmus*

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Abstract: The present study was conducted to determine the effects of dietary heat killed *Lactobacillus plantarum* (HK L-137) on growth, survival, and immune response of juvenile striped catfish (*Pangasianodon hypophthalmus*). Feeding trial was carried out and four replicates groups of experimental fish (initial wt. 0.06 g) were fed with respective test diets containing four different concentrations of HK L-137 (0 ppm-control diet), 10 ppm, 20 ppm and 50 ppm, respectively. At the end of the feeding trial, results showed that the dietary supplementation of HK L-137 significantly enhanced the final weight (W_t), weight gain (WG) and specific growth rate (SGR) of juvenile striped catfish fed the diets containing 20 ppm and 50 ppm HK L-137 ($p < 0.05$). Simultaneously, the survival rate of experimental fish fed the diet contains 50 ppm HK L-137 was significantly higher than the HK L-137 free group of fish fed with control diet ($p < 0.05$). The highest protein efficiency ratios (PER) were also recorded in HK L-137 supplemented groups. Moreover, feed conversion ratio (FCR) of HK L-137 supplemented groups were also significantly lower than the control group. Furthermore, the dietary supplementation of HK L-137 improved and augmented the immune parameters including lysozyme activity, the number of RBC and WBC of juvenile striped catfish. Thereafter, a 14-day bacterial challenge experiment was also carried out and the highest mortality rate (100%) was recorded in positive-control group of fish fed with control diet. Consequently, post challenge survival rates (PCSR) of HK L-137 supplemented groups were higher than the control group. Present study demonstrated that the dietary supplementation of HK L-137 has the tremendous positive-effects on SR, FCR, WG, SGR, FI, PER, immune response and disease resistance of juvenile striped catfish.

Keywords: Heat-killed *Lactobacillus plantarum*, HK L-137, striped catfish, *Pangasianodon hypophthalmus*.

Vietnam is the world's largest producer country of striped catfish (*Pangasianodon hypophthalmus*) (Sauvage 1878) all over the world, produced 1.252 million tons in 2017. Striped catfish is commercially important species belongs to the family Pangasiidae, one of the major fish species and native of Mekong River, spread to the rivers in Southeast Asia. Disease is one of the most serious constraint and obstacles to sustainable striped catfish farming (Phuong *et al.*, 2009), caused by bacteria and parasites that lead to massive losses for farmers, the farming of striped catfish has also been struggling with several diseases. Moreover, striped catfish are also vulnerable and susceptible to bacterial diseases that would result in loss of appetite and lethal weakness to fish. Striped catfish farming are also being intensified for maximizing profits. Consequently, intensifying stocking densities are having devastating effects on water quality as well as pond's environment that would be a perfect place or paradise for bacteria, parasite, fungi, virus and such kinds of pathogens and diseases. Most common diseases in striped catfish farming are Bacillary Necrosis Disease (BNP- the causative agent- *Edwardsiella ictaluri*), Motile *Aeromonad septicemia* (MAS) - caused by *Aeromonas* spp. (mainly *A. hydrophila*, *A. sobria* and *A. caviae*) and other Parasitic Diseases-caused by *Trichodina* spp. and *Epistylis* spp. Probiotics are being used in aquaculture in order to protect against pathogens such as bacteria, virus, fungi and parasites (Balcazar *et al.*, 2006). More recently, the use of prebiotic and probiotic have been increasing significantly in aquaculture. Probiotics are microorganisms that are associated with the host animals and get beneficial effects for the host (Salmien *et al.*, 1999) while prebiotic is a non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth and/or the activity of one or a limited number of bacteria in the colon (Ringo *et al.*, 2010). The supplementation and administration of prebiotics and probiotics have become one of the most important preventive and control measures for environment-friendly sustainable aquaculture (Pandiyani *et al.*, 2013) instead of using antibiotics and chemicals.

I. INTRODUCTION

In modern aquaculture, good aquaculture practices and managements are the most crucial for sustainable aquaculture industry (Dawood *et al.*, 2016). Heat killed *L. plantarum* L-137 was used as an immunostimulant to induce interleukin-12 production and antitumor effect in mice, and to enhance gamma interferon production, which stimulates a substance that suppresses virus reproduction and other T-cells and activates macrophages cells (Murosaki *et al.*, 2000). Accordingly, previous studies have found and reported that the dietary administration and supplementation of dietary feed HK L-137 enhanced, improved and augmented the survival rate, growth rate, immune responses, disease and stress resistances of marine and freshwater aquatic species (Duc *et al.*, 2016, 2017; Doan *et al.*, 2016; Nguyen *et al.*, 2019; Dawood *et al.*, 2015a; Tung *et al.*, 2009). HK L-137, can increase the performance oxidative status in a specific manner compared to the control regimen by elevating the levels of antioxidative enzymes. Blood immune markers upregulated by supplementation with HK L-137 could have a significant effect on preserving fish health and could in turn enhance defense against infectious pathogens (Dawood *et al.*, 2016).

Thus, HK L-137 has been shown as an immunobiotic, and plays an important role in enhancing growth, innate immune responses and resistances against diseases and stress of aquatic animal. Up to now, there are no studies on the effectiveness of HK L-137 of juvenile striped catfish. Hence, the present study aims to determine the effects of HK L-137 on the growth performances and immune responses of juvenile striped catfish. Moreover, the juvenile striped catfish were challenged with *Edwardsiella ictaluri* (BNP- Bacillary Necrosis of Pangasius) in order to examine and evaluate their immune response and disease resistance of juvenile striped catfish.

II. MATERIALS AND METHODS

2.1 Experimental fish

The newly hatched striped catfish larvae were purchased from a private hatchery at Dong Thap Province in Mekong Delta of Vietnam. The larvae were reared and acclimated for 21 days in 500-L plastic quarantine tanks at 28±2°C. All the fish were fed with control diet during nursing in RAS before feeding trial.

2.2 Experimental diet

The formulated feed (45% crude protein) was prepared which followed Hien *et al.* (2003), the composition and ingredients of formulated diets are shown in (Table 1). Heat-killed *Lactobacillus plantarum*, strain L-137, HK L-137 with 20% heat killed *L. plantarum* L-137 and 80% dextrin in dried-weight basis was made by House Wellness Foods Corporation in Itami, Japan. HK L-137 was added and mixed thoroughly with the ingredients of formulated diets before pellet extrusion. Experimental feed was produced following the procedure described by Hien *et al.* (2017). Experimental ingredients were homogeneously mixed and pelleted at 80°C without steam to produce feed with a diameter of 2 mm. The experimental feed was then sterilized at 105°C for 10 min and dried at 45°C for 24 h to reach 11–12% moisture. Experimental diets were stored and kept at 4°C until

use. Four experimental diets were prepared including control diet (without HK L-137) and each diet contains different supplemented doses of HK L-137 at 0 ppm (control diet), 10 ppm, 20 ppm and 50 ppm, respectively.

Table 1 The formulation and chemical composition of experimental diets (dry matter basis)

| Items | Experimental diet |
|---|-------------------|
| Ingredients (g.kg⁻¹ dry diet) | |
| Fish meal* | 357 |
| Soybean meal | 332 |
| Cassava | 74 |
| Rice bran | 150 |
| Premix mineral and vitamin** | 20 |
| Carboxymethyl cellulose | 3.8 |
| Butylated hydroxytoluene | 0.2 |
| Methionine | 2.8 |
| Lysine | 4.0 |
| Shrimp solution | 15 |
| Phytase | 0.2 |
| Squid oil | 7.4 |
| Soybean oil | 32.5 |
| Total | 1000 |
| Chemical composition (%) | |
| Crude protein | 45.0 |
| Crude fat | 9.0 |
| Ash | 12.5 |
| NFE | 29.9 |
| Crude fiber | 2.16 |
| Gross energy (KJ g ⁻¹) | 19.5 |

* *Ca Mau fishmeal*, Vietnam; *cassava* and *local rice bran* were supplied by Viet Thang feed mill.

**Premix mineral and vitamin were supplied by Vemedim Company (unit.Kg⁻¹): Vitamin A. 2,000,000 IU; Vitamin D. 400,000 IU; Vitamin E. 6g; Vitamin B₁. 800mg; Vitamin B₂. 800mg; Vitamin B₁₂. 2mg; Calcium D. Pantothenate. 2g; Folic acid. 160mg; Vitamin C. 15g; Choline Chloride. 100g; Iron (Fe²⁺). 1g; Zinc (Zn²⁺). 3g; Manganese (Mn²⁺). 2g; Copper (Cu²⁺). 100mg; Iodine (I). 20mg; Cobalt (Co²⁺). 10mg.

2.3. Experimental design

The experiments were assigned 4 treatments with 4 replicates into 16 plastic tanks (100 liter/tank) in indoor mini Recirculating Aquaculture System with appropriate stocking density of 3 ind./L (initial weight 0.06 g) with density 300 ind./tank. A feeding trial was conducted for 60 days.

Fish were fed with 4 diets twice a day and the amount of feed consumed by the fish in each tank was recorded daily by removing and weighing (dry weight) excess feed to ascertain intake. Amounts of feed provided per replicate were recorded so that feed conversion ratio (FCR) and protein efficiency ratio (PER) could be calculated at the end of the experiment.

During experiment, water temperature ranged from 28.5-30.6°C, dissolved oxygen from 5.3-6.6mg·L⁻¹, pH from 6.7-8.0, NO₂⁻ from 0.4-0.5 mg·L⁻¹ and TAN<0.1 mg·L⁻¹, so the water

quality parameters in all treatments were in a suitable range for the normal growth and development of this species.

The experiment lasted eight weeks, at the end of which fish were measured, weighed and then used in a bacterial challenge experiment. Blood samples of a subset of experimental fish were taken at the end of experiment and examined for white blood cell count, white blood cell differential, red blood cell count, lysozyme activity.

Growth parameter and carcass analysis

Initial (W_i) and final weights (W_f) of individual fish were determined before and after the experiment, respectively. Survival Rate (SR, %), Specific Growth Rate (SGR; %/d), Feed Conversion Ratio (FCR), Protein Efficiency Ratio (PER), Net Protein Utilization (NPU), and Hepatosomatic Index (HSI) were calculated as follows (where t = time in days):

$$SR = [(number\ of\ fish\ at\ the\ end\ of\ experiment)/(number\ of\ initial\ fish)] \times 100$$

$$SGR = (\ln(W_f) - \ln(W_i)) \times 100 / t$$

$$FCR = (amount\ of\ consumed\ feed\ in\ dry\ matter) / (weight\ gain)$$

$$PER = (W_f - W_i) / (protein\ intake)$$

Initial fish (ten fish/tank), final fish (ten fish/tank) and feed (100 g) were collected, minced and stored at -20°C until analysis of their chemical composition following methods of AOAC (2000).

Sample collection and Immune parameters analysis

Blood sampling (9 fish/treatment) of juvenile striped catfish were conducted at the end of the feeding trial for haematological parameters and lysozyme analysis. The red blood cells (RBC) count was determined in duplicate for each sample using Neubauer hemocytometer after dilution with Natt-Herrick solution (Natt and Herrick, 1952). White blood cells (WBC) count and white blood cell differential were also analyzed according to the method previous described by Chinabut *et al.* (1991). The lysozyme activity was evaluated from a standard curve generated by the lysis of a Gram-positive bacterium (*Micrococcus lysodeikticus*) according the method previous described by Ellis (1990); One unit of lysozyme activity was defined as the amount of enzyme producing a decrease in absorbance of 0.001 min⁻¹ mL⁻¹. Gram-positive bacteria are

attacked and destroyed by fish lysozyme. The lysis rate of (*M. lysodeikticus*) was measured by the serum lysozyme. This is a turbid- metric method based on the fact that absorbance is a linear function of (*M. lysodeikticus*) concentration.

Bacterial challenge test

The bacterial challenge experiment was conducted at the end of the feeding trial. Total of 30 fish from each feeding treatment (10fish/replicate) were intraperitoneally (IP) injected with 0.1 mL (10⁵ CFU/mL) *Edwardsiella ictaluri* at a dose causing 50% mortality (LD₅₀). Fish from control feeding treatment was also IP injected with 0.1 mL of physiological saline (0.85%) as negative control treatment. Ward *et al.* (2016). During the 14 d post-inoculation, fish continued to be fed their respective diets, and clinical signs and cumulative mortality were noted daily. Moribund fish were sampled for bacteria confirmation by PCR method (Panangala *et al.*, 2007). The data were analyzed by the Kaplan-Meier log-rank survival test, with pairwise Holm-Sidak multiple comparison procedure where appropriate (Ward *et al.* 2016).

2.4 Statistical analysis

Data were analyzed at the end of the experiment. SPSS-16 (SPSS Inc., Chicago, Illinois, USA), One -way analysis of variance (ANOVA; *p*<0.05), followed by Duncan test was applied to determine the significant differences.

III. RESULTS

3.1 Growth performance

The results showed that the final weight (W_f), weight gain (WG) and specific growth rate (SGR) of experimental fish fed the diets contain 20 ppm and 50 ppm HK L-137 were significantly higher than the control groups and fish fed 10 ppm HK L-137 diet (*p*<0.05). FCR of control group was significantly higher than the three other groups (*p*<0.05). On the other hand, the protein efficiency ratio (PER) of experimental fish fed the diets contain 10 ppm, 20 ppm and 50 ppm HK L-137 were significantly higher than the HK L-137 fed the control diet (*p*<0.05). Besides, the highest survival rate (SR) was recorded juvenile striped catfish fed the 50 ppm diet is significantly higher than those of fish fed control diet (*p*<0.05). Meanwhile, the lowest survival rate was recorded in without HK-LP treatment.

Table 2. Growth parameters, survival rate and nutrient utilization in striped catfish fed experimental diets for 60 days. W_i : initial mean weight, W_f : final mean weight, W_g : mean weight gain, SGR: specific growth rate, FI: feed intake, PER: protein efficiency ratio, FCR: feed conversion ratio, SR: survival rates

| Parameters | Treatments | | | |
|----------------|------------------------|------------------------|------------------------|------------------------|
| | HK L-137 (0ppm) | HK L-137 (10 ppm) | HK L-137 (20ppm) | HK L-137 (50ppm) |
| W_i (g/fish) | 0.06±0.01 | 0.06±0.00 | 0.06±0.00 | 0.06±0.00 |
| W_f (g/fish) | 14.3±1.10 ^b | 15.4±0.98 ^b | 17.5±1.06 ^a | 18.1±0.77 ^a |
| WG (g) | 14.2±1.10 ^b | 15.4±0.98 ^b | 17.4±1.06 ^a | 18.1±0.78 ^a |
| SGR (%/day) | 9.10±0.13 ^b | 9.2±0.10 ^b | 9.43±0.10 ^a | 9.49±0.06 ^a |

| | | | | |
|-----------------|------------------------|-------------------------|-------------------------|------------------------|
| FI (% fish/day) | 29.9±1.29 ^a | 26.7±3.86 ^{ab} | 25.5±2.87 ^b | 24.9±0.98 ^b |
| FCR | 1.06±0.05 ^a | 0.90±0.11 ^b | 0.81±0.09 ^b | 0.78±0.02 ^b |
| PER | 2.11±0.09 ^b | 2.48±0.28 ^a | 2.76±0.34 ^a | 2.84±0.07 ^a |
| SR (%) | 41.8±16.9 ^b | 56.2±28.5 ^{ab} | 57.8±18.4 ^{ab} | 74.2±4.72 ^a |

Values (mean±SD) in a row with different superscripts letter are significantly different ($p < 0.05$).

3.2 Immunity

Lysozyme: A 60-day feeding trial was carried out and lysozyme activity of striped catfish was analyzed at the end of the feeding trial. The lysozyme activity of experimental fish fed the HK L-137 diets were significantly higher than fish fed with HK L-137 without diet ($p < 0.05$). Whereas, the highest serum lysozyme activity was found in the group of experimental fish fed the diet contains 50 ppm HK L-137. There was no significant difference between the groups of fish fed the diets contain 10 ppm and 20 ppm HK L-137.

Red blood cell (RBC): the number of erythrocytes of experimental fish fed the diet that contains 50 ppm KH L-137 are significantly increased at the end of the feeding trial

($p < 0.05$). However, there were no significant differences among the control group and two other groups of fish fed with the diets contain 10 ppm and 20 ppm HK L-137 ($p > 0.05$).

White blood cell (WBC): white blood cells were counted and results showed that the leukocyte number of juvenile striped catfish fed the diets contains 20 ppm and 50 ppm HK L-137 were significantly increased compared to the HK L-137 free group fed with control diet ($p > 0.05$). By comparison, the greatest number of WBC was found in the group of fish fed with diet 50 ppm HK L-137. The dietary supplementation of HK L-137 significantly increased and improved the number of white blood cells that results in higher immune response of juvenile striped catfish.

Table 3. The immunity of Lysozyme activity, Red blood cell (RBC), White blood cell (WBC) of striped catfish after 60 days culture with dietary supplementation in different concentration of HK L-137.

| Parameters | Treatments | | | |
|---|-------------------------|-------------------------|-------------------------|-------------------------|
| | HK L-137 (0ppm) | HK L-137 (10ppm) | HK L-137 (20ppm) | HK L-137 (50ppm) |
| Lysozyme (µg/ml) | 344.5±31.5 ^c | 410.0±23.7 ^b | 449.8±13.4 ^b | 496.8±33.3 ^a |
| RBC (x 10 ⁶ cell/mm ³) | 3.47±0.34 ^b | 3.97±0.20 ^b | 3.99±0.39 ^b | 4.69±0.42 ^a |
| WBC (x 10 ⁵ cell/mm ³) | 2.48±0.47 ^c | 3.26±0.69 ^{bc} | 3.60±0.49 ^b | 5.52±0.57 ^a |

Values (mean±SD) in a row with different superscripts letter are significantly different ($p < 0.05$).

3.3 Bacterial challenge

The null hypothesis that HK-137 levels in the feeding trial above do not lead to significantly different survival in a post-trial bacterial challenge was tested. The highest mortality (100%) was recorded in positive-control group of fish fed the control diet. The first mortality of positive control group and 10 ppm HK L-137 supplemented group were found on the first day of bacterial challenge experiment. Afterwards, the first mortality of 20 and 50 ppm HK L-137 supplemented group were noted on the third and fourth day respectively. On the other hand, there was no mortality occurred in negative-control group (Fig. 1). There were no significant differences among the HK L-137 supplemented groups. In contrast, the cumulative mortality of fish fed with diet contain 20 ppm was significantly lower than the positive control group of fish fed control diet. On average, cumulative mortality

of HK L-137 supplemented groups were lower than the Positive-control group fed control diet (Fig. 1).

IV. DISCUSSION

In aquaculture, antibiotics and chemicals have been applied for many decades in order to protect against pathogens. The use of prebiotic and probiotic have been increasing in aquaculture in order to enhance and promote immune response and growth performance of animals. In environment-friendly sustainable aquaculture, prebiotic and probiotic have become alternative method to antibiotic treatment. As in other developing aquaculture ventures, health problems that include disease outbreaks from parasites and bacteria have been encountered. For pangasius, the most important disease problems are caused by the bacteria (*Edwardsiella ictaluri*), (*Aeromonas hydrophila*), (*A. sobria*) and (*A. caviae*). At the end of the 60-day feeding trial, growth performance, protein efficiency ratio, feed conversion ratio of juvenile striped catfish were evaluated and compared. The experimental fish fed with the test diets contain 20 and 50 ppm HK L-137 grew faster than the without HK L-

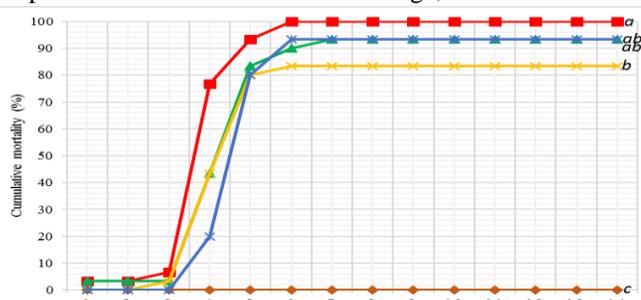


Figure 1. Cumulative mortality of juvenile striped catfish after 14 days challenged with *E. ictaluri*.

137 diet. However, there was no significant difference was found between the control group and 10 ppm HK L-137 supplemented group ($p>0.05$). Similarly, the highest weight gain of white leg shrimp (*L. vannamei*) was found in 100 ppm HK L-137 supplemented group (Duc *et al.*, 2016).

Similar previous studies reported that the dietary administration of HK L-137 enhanced the survival rates, growth rates, immune parameters, disease, and stress resistance of experimental animals. Murosaki *et al.* (1998, 2000) summarized that HK L-137 induces the interleukin (IL-12) production that enhances the production of specific interferon (IFN) and T-cells growth. Besides, Tung *et al.* (2009) also reported that the growth rate of juvenile Kuruma shrimp (*Marsupenaeus japonicas*) fed with diets contain 100 and 1000 mg/kg HK L-137 significantly higher than the HK L-137 free group. Dawood *et al.* (2015b) found that HK L-137 supplemented groups grew significantly faster than the control group in red seabream (*Pagrus major*). Moreover, Duc *et al.* (2016, 2017) reported that the dietary administration of HK L-137 enhanced the growth performance and improved immune response of juvenile white leg shrimp (*L. vannamei*). In addition, the higher growth rate, phagocytic and lysozyme activity of Nile tilapia (*Oreochromis niloticus*) were also recorded in HK L-137 supplemented groups (Nguven *et al.*, 2019).

In the study, the highest survival rate (SR) of experimental fish was recorded in 50 ppm HK L-137 supplemented group and that is significantly higher than fish fed 10 and 20 ppm HK L-137 diets ($p<0.05$). However, there were no significant differences among control group and two other groups fed with 10 ppm and 20 ppm HK L-137 diets ($p>0.05$). According to the result of present study, the different concentration of HK L-137 can strongly affect the survival rates of juvenile striped catfish *i.e.* the higher the concentration of HK L-137 results in the higher survival rate of experimental fish. Duc *et al.* (2016) also reported that the highest survival rate of white leg shrimp (*L. vannamei*) was recorded in shrimp fed the diet containing 100 ppm HK L-137. As a result, the survival rate of juvenile striped catfish was also obviously increased in fish fed the diet contains 250 ppm HK L-137. Likewise, the feed conversion ratio (FCR) of HK L-137 supplemented groups were significantly lower than the control group fed control diet ($p<0.05$). Although, the highest feed intake (FI) was also found in control group, the protein efficiency ratio (RER) were significantly higher in HK L-137 supplemented groups ($p<0.05$). Feed costs were also calculated and compared among the groups at the end of the feeding trial, the lowest feed cost was recorded in fish fed the diet contain 20 ppm HK L-137 ($p<0.05$). Nonetheless, there were no significant differences among the three other groups ($p>0.05$).

The immune parameters of juvenile striped catfish were also evaluated and compared including lysozyme activity, red blood cell and white blood cell count. The obtained results showed that the lysozyme activity of experimental fish fed with the HK K-137 diets significantly higher than fish fed control diet ($p<0.05$). Among them, the highest lysozyme activity was recorded in 50 ppm HK L-137 supplemented diet ($p<0.05$). According to Nguyen *et al.* (2019), the higher lysozyme activity of Nile tilapia (*O. niloticus*) was also found in HK L-137 supplemented groups.

Lysozyme, known as an important defense molecule of fish innate immune system antibacterial agent that attack and destroy the outer cell wall of bacteria. As a result, the higher lysozyme activity can be able to strongly against pathogenic bacteria. Likewise, the higher lysozyme activity of red seabream (*Pagrus major*) was also found in HK L-137 supplemented groups (Dawood *et al.*, 2015b). For this reason, dietary administration of HK L-137 enhanced the innate immune response of juvenile striped catfish. Afterwards, blood samples of experimental fish were taken and examined for red blood cell and white blood cell count. Red blood cells, known as erythrocyte carries and transport oxygen to body tissues. Lower level of red blood cells cause anemia that weaken animal. In this study, the number of red blood cells were significantly increased in 50 ppm HK L-137 supplemented group ($p<0.05$). Nevertheless, there were no significant differences among the three other groups ($p>0.05$). Furthermore, the white blood cells of experimental fish were also counted at the end of the feeding trial. The dietary administration of 20 ppm and 50 ppm HK L-137 significantly increased the number of white blood cells compared with control group fed with control diet ($p<0.05$). White blood cells are known as the immune cells of animal's body that against and attack the foreign invaders. Accordingly, dietary supplementation of 20 ppm and 50 ppm HK L-137 tremendously enhanced the immune response of juvenile striped catfish. Hirose *et al.* (2006) also reported that the daily intake of HK L-137 augmented the acquire immunity in healthy adults.

Furthermore, a 14-day bacterial challenge experiment was also carried out at the end of the feeding trial in order to evaluate the disease resistance of juvenile striped catfish. The first mortalities were recorded in positive control group and 10 ppm HK L-137 supplemented group on the first day of bacterial challenge experiment. The first mortalities of 20 ppm and 50 ppm HK L-137 supplemented groups were noted on the 3rd and 4th day respectively (Fig. 1). After the 14-day bacterial challenge experiment, the highest mortality (100%) was found in positive control group. The post challenge survival rate of HK L-137 supplemented groups were higher than the positive control group. Interestingly, the lowest cumulative mortality was recorded in 20 ppm HK L-137 supplemented group ($p<0.05$). There was no mortality in negative control group. In comparison, Duc *et al.* (2017) also reported that the highest cumulative mortality of white leg shrimp (*L. vannamei*) was recorded in positive control group fed without HK L-137 diet after challenged with (*Vibrio parahaemolyticus*). Likewise, 1g/kg HK L-137 supplemented group showed the highest tolerance against low salinity stress in red seabream (*Pagrus major*) (Dawood *et al.*, 2015b).

According to the results of present study, the juvenile striped catfish fed the diets contain 20 ppm and 50 ppm HK L-137 showed the significant specific growth rate, survival rate, feed conversion ratio and weight gain. Furthermore, the dietary supplementation of HK L-137 enhanced and improved the immune response of juvenile striped catfish including lysozyme activity, the number of white blood cells and red blood cells. Moreover, the post-challenge survival rates were also higher in HK L-137 supplemented groups. In this study, HK L-137 was

applied as an immuno-stimulant and growth promoter by enhancing feed conversion efficiency, innate immune response and growth of experimental fish. Accordingly, the dietary supplementation of HK L-137 has tremendous positive effect on specific growth rate (SGR), weight gain (WG), survival rate (SR), feed conversion rate (FCR), protein efficiency ratio (PER), immune response and disease resistance of juvenile striped catfish. In conclusion, the dietary supplementation and administration of HK L-137 can be applied as growth promoter and alternative method to antibiotic treatment for environment-friendly sustainable aquaculture.

V. CONCLUSION

The study demonstrated and proved that the dietary supplementation of HK L-137 tremendously enhanced the weight gain (WG) and specific growth rate (SGR) of juvenile striped catfish, improved the survival rate and feed conversion ratio (FCR) of juvenile striped catfish. Dietary supplementation of HK L-137 obviously augmented and enhanced the hematological immune parameters. The requirement of HK L-137 by juvenile striped catfish was determined as 10-50 mg.kg⁻¹ feed in the laboratory condition.

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Estimating the Performance Measure of Exponential-Gamma Distribution with Application to Failure Rate Data

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Abstract- Statistical distributions pose importance usefulness in predicting and analyzing real life occurrences. Several researchers have applied different statistical distributions in analyzing real life data. Therefore, this study focused on applying the newly developed Exponential-Gamma distribution in modeling data on the number of successive failures of air conditioning system of each member in a fleet of 13 Boeing 720 jet airplanes. The result of the performance and adequacy of the Exponential-Gamma distribution was compared with other existing statistical distribution. The result showed that Exponential-Gamma distribution is adequate and fits data better than other existing distribution compared.

Index Terms- Exponential-Gamma distribution, Failure Rates, AIC, BIC

I. INTRODUCTION

The call for statistical inferences and modeling of data sets demands the prior knowledge of suitable distribution and assumptions for the data sets. Consequently, virtually all the existing statistical distributions have been applied to data of various types in many areas of life to makes inferences about a particular subject matter which includes: modeling environmental pollution in environmental science, modeling duration without claims in actuarial science, modeling machine life span in engineering, modeling survival times of patients after surgery and modeling failure rate of software in computer science. Moreover, the process of generating data in many of these areas is typically based on varied degrees of skewness and kurtosis. Also, the data may exhibit non-monotonic hazard rates such as the bathtub, unimodal or modified unimodal hazard rates. Hence, modeling the data with the existing classical distributions does not provide a reasonable parametric fit and is often an approximation rather than reality.

In view of these, the development of new statistical distributions in the recent decades have continuously received great interest from researchers who study and develop new methods for modifying existing distributions to make them more flexible and robust or developing new statistical distributions for modeling data sets from different areas of study these methods are aimed towards yielding distributions with heavy tails, monotonic and non-monotonic hazard rates, tractable cumulative distribution

function for efficiency in simulation and analyzing data with varieties of degrees of skewness and kurtosis.

In light of their adequacies, variety in usage and performance, statistical distributions have received numerous attentions from various researchers such as; [1],[2],[3],[4],[5]and[6] Therefore, this study aim to examine the adequacy and performance of the new Exponential-Gamma distribution to other exiting probability distributions using the data on the number of successive failures for the air conditioning system on each member in a fleet of 13 Boeing 720 jet airplanes, using the model selection criteria like the Akaike information criterion (AIC), Bayesian information criterion (BIC) and the log likelihood function (l).

II. METHODS

The Exponential-Gamma distribution was developed by [7] and its pdf is defined as

$$f(x; \alpha, \lambda) = \frac{\lambda^{\alpha+1} x^{\alpha-1} e^{-2\lambda x}}{\Gamma(\alpha)}, x, \lambda, \alpha > 0 \quad (1)$$

With the mean and variance;

$$\mu = \frac{\alpha}{2^{\alpha+1}} \quad (2)$$

$$\text{and } V(x) = \frac{\alpha(\alpha 2^\alpha - \lambda\alpha + 2^\alpha)}{\lambda(2^{2(\alpha+1)})} \quad (3)$$

The cumulative distribution function is defined as

$$F(x) = \frac{\lambda\gamma(\alpha, x)}{2^\alpha \Gamma(\alpha)} \quad (4)$$

The survival function for the distribution defined by $S(x) = 1 - F(x)$ was obtained as;

$$S(x) = 1 - \frac{\lambda\gamma(\alpha, x)}{2^\alpha \Gamma(\alpha)} \quad (5)$$

While the corresponding hazard function defined by

$$h(x) = \frac{f(x)}{S(x)} \text{ was obtained as;}$$

$$h(x) = \frac{\lambda^{\alpha+1} x^{\alpha-1} e^{-2\lambda x} 2^\alpha}{2^\alpha \Gamma(\alpha) - \lambda \gamma(\alpha, x)} \quad (6)$$

The cumulative hazard function for distribution defined by

$$H(x) = W(F(x)) = -\log(1 - F(x)) \equiv \int_0^x h(x) dx \text{ and was}$$

obtained as;

$$H(x) = \frac{\lambda \gamma(\alpha, x)}{2^\alpha \Gamma(\alpha) - \lambda \gamma(\alpha, x)} \quad (7)$$

A. Maximum Likelihood Estimator

Let X_1, X_2, \dots, X_n be a random sample of size n from Exponential-Gamma distribution. Then the likelihood function is given by;

$$L(\alpha, \lambda; x) = \left(\frac{\lambda^{\alpha+1}}{\Gamma(\alpha)} \right)^n \prod_{i=1}^n x_i^{\alpha-1} \exp\left(-2\lambda \sum_{i=1}^n x_i\right) \quad (8)$$

by taking logarithm of (9), we find the log likelihood function as;

$$\log(L) = n \log \lambda + n \log \lambda - n \log \Gamma(\alpha) + (\alpha - 1) \sum_{i=1}^n \log x_i - 2\lambda \sum_{i=1}^n x_i \quad (9)$$

Therefore, the MLE which maximizes (9) must satisfy the following normal equations;

$$\frac{\partial \log L}{\partial \alpha} = n \log \lambda - \frac{n \Gamma'(\alpha)}{\Gamma(\alpha)} + \sum_{i=1}^n \log x_i \quad (10)$$

$$\frac{\partial \log L}{\partial \lambda} = \frac{\alpha n}{\lambda} + \frac{n}{\lambda} - 2 \sum_{i=1}^n x_i \quad (11)$$

The solution of the non-linear system of equations is obtained by differentiating (9) with respect to (α, λ) gives the maximum likelihood estimates of the model parameters. The estimates of the parameters can be obtained by solving (10) and (11) numerically as it cannot be done analytically. The numerical solution can also be obtained directly by using python software using the data sets.

In this study, we applied the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC) and the log likelihood function (l) to compare the new developed Exponential-Gamma distribution with the existing probability distributions such as the Exponential and the Gamma distributions.

The AIC is defined by;

$$AIC = 2k - 2In(\hat{\ell}) \quad (12)$$

where k is the number of the estimated parameter in the model

$\hat{\ell}$ is the maximized value of the model.

The BIC is defined by;

$$In(n)k - 2In(\hat{\ell}) \quad (13)$$

where k is the number of the estimated parameter in the model
 n is the number of observations

$\hat{\ell}$ is the maximized value of the model.

The approach in (12) and (13) above is used when comparing the performance of different distributions to determine the best fit model. To select the appropriate model by considering the number parameters and maximum likelihood function; the AIC, BIC and likelihood function are examined; consequently an acceptable model has smaller AIC and BIC value while the log likelihood value is expected to be greater. The Python software was used for the comparison of the performance of the Exponential-Gamma, Exponential and Gamma distributions.

III. RESULTS

The analysis of the data set was carried out by using python software

This data has been previously used by [8],[9] and [10] consist of the number of successive failures for the air conditioning system of each member in a fleet of 13 Boeing 720 jet airplanes. The data consist 213 observations as follows;

Table 1

| |
|---|
| 194, 413, 90, 74, 55, 23, 97, 50, 359, 50, 130, 487, 102, 15, 14, 10, 57,320, 261, 51, 44, 9, 254, 493, 18, 209, 41, 58, 60, 48, 56, 87, 11, 102,12, 5, 100, 14, 29, 37, 186, 29, 104, 7, 4, 72, 270, 283, 7, 57, 33,100, 61, 502, 220, 120, 141, 22, 603, 35, 98, 54, 181, 65, 49, 12, 239, 14,18, 39, 3,12, 5, 32, 9, 14, 70, 47, 62, 142, 3, 104, 85, 67, 169,24, 21, 246, 47, 68, 15, 2, 91, 59, 447, 56, 29, 176, 225, 77, 197, 438,43, 134, 184, 20, 386, 182, 71, 80, 188, 230, 152, 36, 79, 59, 33, 246, 1,79, 3, 27, 201, 84, 27, 21, 16, 88, 130, 14, 118, 44, 15, 42, 106, 46,230, 59, 153, 104, 20, 206, 5, 66, 34, 29, 26, 35, 5, 82, 5, 61, 31,118, 326, 12, 54, 36, 34, 18, 25, 120, 31, 22, 18, 156, 11, 216, 139, 67,310, 3, 46, 210, 57, 76, 14, 111, 97, 62, 26, 71, 39, 30, 7, 44, 11,63, 23, 22, 23, 14, 18, 13, 34, 62, 11, 191, 14, 16, 18, 130, 90, 163,208, 1, 24, 70, 16, 101, 52, 208, 95. |
|---|

Table 2: Summary of data (Boeing jet)

| Parameters | Values |
|------------|----------|
| n | 213 |
| Min | 1.0 |
| Max | 603 |
| Mean | 93.14085 |
| Variance | 11398.47 |
| Skewness | 2.108908 |
| Kurtosis | 4.906632 |

The results from the table 2 indicated that the distribution of the data is skewed to the right with skewness 2.108908. This shows that Exponential-Gamma has the ability to fit a right skewed data. Also, it was observed that the kurtosis is 4.906632 which is greater than 3. This implies that the distribution has longer and fatter tails with a heavy peakedness when compared to that of the Normal distribution.

Table 3: Estimates and performance of the distributions (Boeing jet)

| Distribution | Parameters | log likelihood (l) | AIC | BIC |
|--------------------------|--|--------------------|--------------|--------------|
| Exponential-Gamma | $\hat{\alpha} = 0.82$ $\hat{\lambda} = 1.0$ | -8.09 | 22.30 | 32.26 |
| Exponential | $\hat{\lambda} = 1.0$ | -1171.94 | 2347.94 | 2354.60 |
| Gamma | $\hat{\alpha} = 0.82$ $\hat{\lambda} = 1.0$ | -1165.17 | 2336.46 | 2346.41 |

The estimates of the parameters, log-likelihood, Akaike information criterion (AIC) and Bayesian information criterion (BIC) for the data on the number of successive failures for the air conditioning system of each member in a fleet of 13 Boeing 720 jet airplanes is presented in Table 3. It was observed that Exponential-Gamma provides a better fit as compared to

Exponential and Gamma distributions since it has highest value of log-likelihood (l) and the lowest value of Akaike information criterion (AIC) and Bayesian information criterion (BIC). Hence, the Exponential-Gamma distribution performed better than other distributions compared.

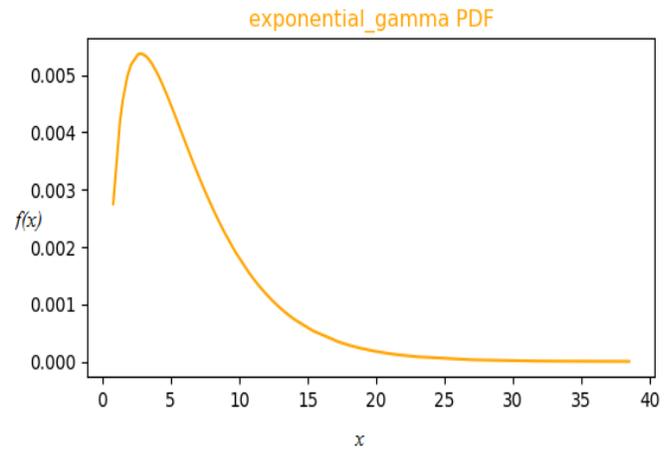


Figure:1 Exponential-Gamma distribution pdf plot for the data sets

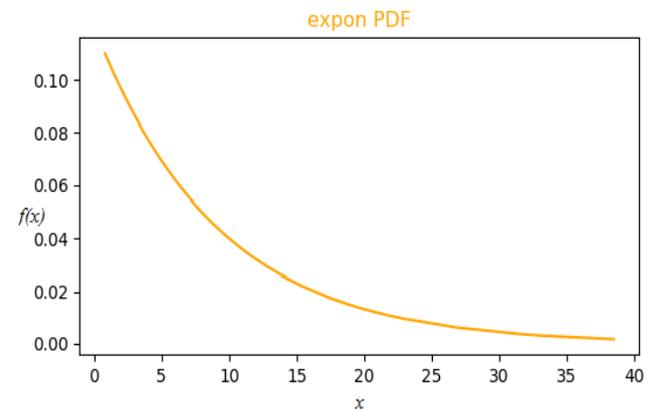


Figure:2 Exponential distribution pdf plot for the data sets

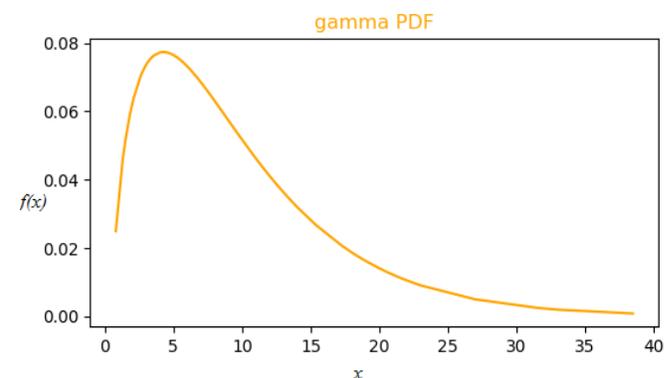


Figure 3: Gamma distribution pdf plot for the data sets

IV. CONCLUSION

Statistical distributions play a crucial role in describing and predicting real life occurrence, many distributions have been developed and there are always rooms for developing distributions which are more flexible and capable of handling real world application. In this study we apply the new Exponential-Gamma in modeling data on the number of successive failures for the air conditioning system on each member in a fleet of 13 Boeing 720 jet airplanes. The result of the performance and adequacy of the Exponential-Gamma distribution was compared with other existing statistical distribution. The result showed that Exponential-Gamma distribution is adequate and fits data better than other exiting distribution compared.

Therefore, for higher precision in analyzing data on failure rates, the use of Exponential-Gamma distribution is highly recommended in various fields where analysis of data failure rate is crucial.

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Comparative Study Of The Effects Of Epley's And Lemperts' Roll Over Maneuvers In Patients With Paroxysmal Positional Vertigo In Tertiary Care Hospital Kanyakumari District- Hospital Based Study

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Abstract- Background: Benign Paroxysmal Positional Vertigo (BPPV) is among the commonly diagnosed disease of vestibular system. It can be described as a momentary sensation of spinning amid getting up or lying down on the bed. turning the head up or looking down and it lasts a few moments before resolving. One in 30 patients were diagnosed with the BPPV . it can mild moderate or severe depending on the symptoms.

AIM AND OBJECTIVE - To compare the effectictiveness of Epley's and Lemperts' roll over maneuvers in paroxysmal positional vertigo.

METHODS AND MATERIALS,

SAMPLING:

Sample size of each group: 41

Total sample size of study: 82

Scientific basis of sample used in the study

$$N = \frac{4O^2 (Z_{r-crit} + Z_{pwr})^2}{D^2}$$

D^2

Where N is the total sample size (the sum of the sizes of both comparison groups)

- O is the assumed SD of each group (assumed to be equal for both groups) the z_{crit} (95% of confidence interval) value Standard Normal Deviate (z_{crit}) corresponding to Selected Significance Criteria and $CI=2.576$

Standard Normal Deviate $z_{pwr}(0.95)$ Corresponding to Selected Statistical $\alpha= 1.645$

D is the minimum expected difference between the two means.

Both z_{crit} and z_{pwr} are cutoff points along the x axis of a standard normal probability distribution.

SUMMARY

This is a hospital based prospective randomized controlled study to compare the effects of Epleys and Lemperts maneuver in BPPV.

It was on 82 patients between the age group of 18-75yrs. The effectiveness of the maneuvers was compared on the 1st, 2nd and 3rd follow-ups by PGA scoring system.

In the study, all patients fulfilling the inclusion criteria were taken up for the study and BPPV was diagnosed by Dix Hallpike's maneuver. Following this, they were divided into 2 groups. 1st underwent Epleys maneuver and 2nd Lemperts maneuver.

The 2 groups were comparable in every nature. The patients were followed up on the 3rd, 7th and 30th days and their symptoms were assessed using PGA score and plotted. In the study, it was found that BPPV was common in females and more often the right side ear was affected.

The results were statistically analyzed for both the groups and were found out that p value was less than 0.05 which implies that there is no significant difference in the values which means that Lemperts maneuver is not inferior to Epleys maneuver.

CONCLUSION

- Most commonly involves the right side than the left.
- Most common age group involved in BPPV is 41 to 60 years.
- BPPV is less common among males.
- Lemperts maneuver is not inferior to Epleys in the treatment of BPPV.
- Results show a p value of less than 0.05 which means difference in outcome of treatment with either maneuvers are insignificant.
- The results obtained in our study was comparable with other international studies showing that Lemperts and Epleys maneuvers are very effective in our population for treating BPPV.

I. INTRODUCTION

Benign Paroxysmal Positional Vertigo (BPPV) is among the commonly diagnosed disease of vestibular system. It can be described as a momentary sensation of spinning amid getting up or lying down on the bed. turning the head up or looking down and it lasts a few moments before resolving.

Benign Paroxysmal Positional Vertigo accounts for almost thirty one percentages of all cases of dizziness seen in dizziness clinics. It can be described as an abnormal perception of motion and can be elicited by stimulating positions.

Symptoms can manifest in different grades of harshness. Minor ones include unpredictable episodes of positional vertigo and Moderate symptoms include frequent positional attacks along with disequilibrium. If severe, vertigo provoked by most head movements, mimicking persisting vertigo & can last from days to even years together.

Majority of the cases of BPPV are benign² and they respond very well to physical therapy maneuvers.

Based on studies, canal repositioning procedures remain the most effective non-invasive treatment of BPPV¹.

The incidence of BPPV is from 11% - 64% / 100,000 /year⁴.

Benign paroxysmal positional vertigo is usually idiopathic⁵.

Other causes include

- Head injury
- Vertebrobasilar artery insufficiency,
- ear surgeries
- menieres disease
- vestibular neuritis⁶
- Middle ear diseases⁷.

An association between BPPV and Meniere's disease has also been reported. 2. AIM AND OBJECTIVE - .to compare the effects of Epley's and Lemperts roll over maneuvers in ' paroxysmal positional vertigo.

II. METHODS AND MATERIALS:

It is a hospital based randomnized hospital based study.

III. SAMPLING:

Sample size of each group: 41

Total sample size of study: 82

Scientific basis of sample used in the study

$$N = \frac{40^2 (Z_{r-rit} + Z_{pwr})^2}{D^2}$$

Where N is the total sample size (the sum of the sizes of both comparison groups)

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- is the assumed SD of each group (assumed to be equal for both groups) the z_{crit} (95% of confidence interval) value Standard Normal Deviate (z_{crit}) corresponding to Selected Significance Criteria and CIs=2.576

Standard Normal Deviate $z_{pwr}(0.95)$ Corresponding to Selected Statistical= 1.645

Δ is the minimum expected difference between the two means.

Both z_{crit} and z_{pwr} are cutoff points along the x axis of a standard normal

probability distribution that demarcate probabilities matching the specified significance criterion and statistical power, respectively.

Both groups that make up N are assumed to be equal in number, and it is assumed that two-tailed statistical analysis will be used.

F depends only on the difference between the two means; it does not depend on the magnitude of either one.

Since we are doing a non parametric analysis, power efficacy of 5% extra also considered. Since we expect a lost follow up of 15%, the sample size has been increased by 10%. Hence the total sample size has been upsized to 82.

i) Inclusion criteria:

- All cases of benign paroxysmal positional vertigo diagnosed by Dix- Hallpike's test.

- Age group of 18-75yrs

j) Exclusion criteria:

- Patients having a recent head injury
- Patients having a recent neck injury
- All cases diagnosed of cervical spondylosis.
- If the patient is on Labyrinthine sedatives
- Patients having other comorbid conditions
- If Dix-Hallpike's is negative
- Age below 18yrs and above 75 yrs
- Patients who have undergone Ear surgery
- Those who are having ear discharge
- Patient on drugs causing dizziness

Parameters to be studied:

1. Nausea
2. Vomiting
3. Nystagmus
4. Tinnitus
5. Hearing loss
6. Vertigo

The response to treatment was assessed using Physician Global Assessment, Response to Treatment which has a nine- point scale.

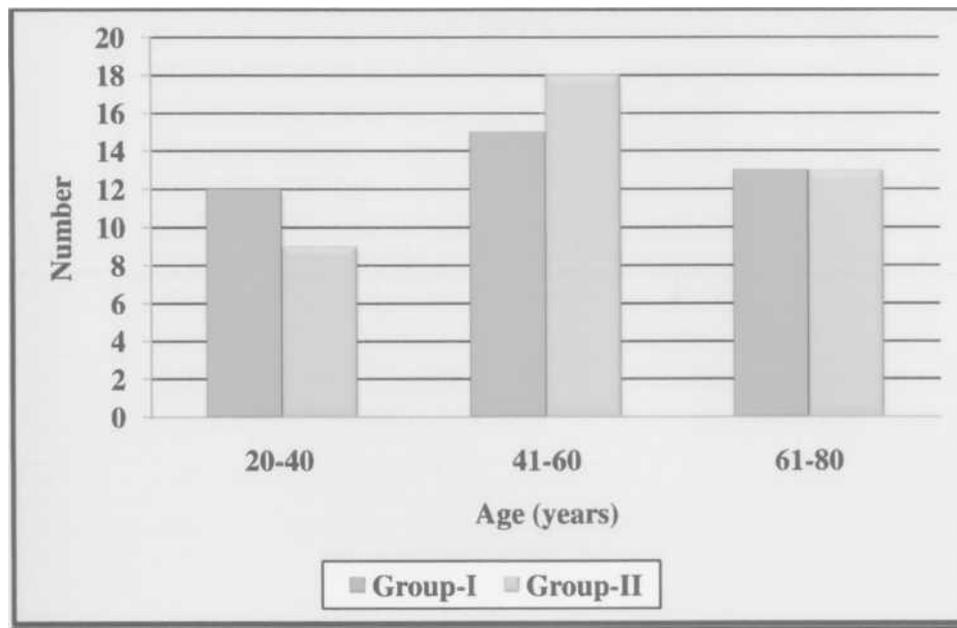
- +4 Clearance of signs and symptoms (above 100% improvement).
- +3 Marked improvement (about 75% improvement).
- +2 Moderate improvement (about 50% improvement).
- +1 Slight improvement (about 25% improvement).
- 0 Unchanged
- -1 Slight worsening (about 25% worse).
- -2 Moderate worsening (about 50% worse).
- -3 Marked worsening (about 75% worse).
- -4 Severe worsening (about 100% worse).

o) Methods/techniques/instruments/reagents/kits etc used to measure the quantitative parameters along with their manufacturing source details:

- Epleys maneuver
 - Lemperts roll maneuver
 - table
 - wrist-watch
- Procedure in detail:

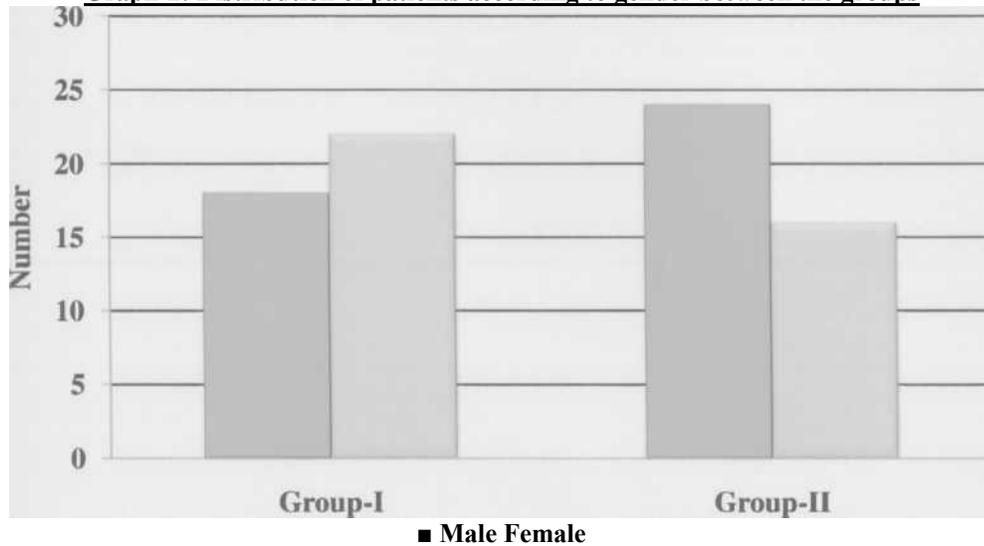
At first history of the patients was taken about duration of vertigo, its severity, associated hearing loss and tinnitus. Detailed examination of ear was. Dix Hallpike's test done to confirm the diagnosis. In dix-hallpike maneuver, the patient was subjected to two brisk movements, both beginning with the patient, while sitting. The patients head was first turned forty five degrees toward one side, and then the patient is briskly lie straight, with the head still turned hanging over the end of the examining table. The patients head is held in that position for 30 seconds and observed for nystagmus .Next the patient is returned to the sitting position and eye movements observed for any nystagmus. The maneuver is then performed with the head turned 45 degrees to the other side. 3rd group A treated with Epley's Maneuvre , which started with the patient in read upright position. Then the Dix Hallpike's provoking position was assumed. The eyes were observed for nystagmus until it stopped. Then after Thirty seconds the head is turned towards the opposite side while keeping the read extended for three seconds and then patient was rolled into lateral rcsition. In this position the head position was in 180 degrees opposite to initial Dix Hallpike's position. After the disappearance of nystagmus for 30 seconds maintaining the head position the patient is rapidly brought to sitting position with head rotated forwards. The patient was then kept in this position for one minute to complete the Epleys. Group B was treated with Lempert's -roll maneuver. The patient's head was positioned with the affected ear down, the head was then turned quickly 90 degrees toward the unaffected side (face up). A series of 90-degree turns toward the unaffected side was then undertaken sequentially until the patient had turned 360 degrees and was back to the affected ear-down position. From there, the patient was turned to the face-up position and then brought up to the sitting position. The successive head turns can be done in 15- to 20-second intervals even when the nystagmus continues. The patient was then observed for 45 minutes at the end of which if they still complain persistence of vertigo ?r nausea, the procedure is taken as a failure and the patients were sent after giving them drugs. If there was relief from symptoms, the patients were examined on 3rd day, 7th day, 30th day and efficacy of treatment was recorded

Graph-1: Distribution of patients according to age between the groups



As per the study, majority of the patients were in the age group of 41-60 years of age (15 patients).

Graph-2: Distribution of patients according to gender between the groups



According to the study, majority of the patients with BPPV were females (22 females in group 1 and 16 in group 2) i.e., 55% in 1 and 40 % in 2nd group respectively.

Distribution of patients according to presence/absence of spontaneous- nystagmus .

| Clinical observations | Spontaneous Nystagmus | |
|-----------------------|-----------------------|------------|
| | Number | Percentage |
| Present | 67 | 81.71 |
| Absent | 15 | 18.29 |

'Out of the 82 patients in the study, 67 of them, i.e, 81.71% had spontaneous nystagmus on clinical examination.'

Table-4: Comparison of distribution of nausea in patients in three follow-ups between the groups

| Nausea Grade | Group-I | | | Group-II | | |
|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | 1 st | 2 nd | 3 rd | 1 st | 2 nd | 3 rd |
| +4 | 2 | 10* | 28* | 2 | 8 | 28* |
| +3 | 6 | 13* | 10 | 4* | 11 | 6* |
| +2 | 13 | 13 | 1 | 7*># | 15 | 2* |
| +1 | 8 | 4 | - | 13* | 2* | - |
| 0 | 9 | - | - | 8 | - | - |
| -1 | 2 | - | - | 2 | - | - |
| -2 | - | - | - | 1 | - | - |
| -3 | - | - | - | - | - | - |
| -4 | - | - | - | - | - | - |

‘(*P<0.05 significant compared with in the group-I and II, #P<0.05 significant compared between group-I with group-II)’

As per PGA scoring, after doing the maneuvers, 28 patients had complete relief from nausea by the e 3rd follow up in both groups, 10 patients in group 1 and 6 patients in group 2 had about 75%improvement , 1 patient in group 1 and in group 2 had 50% improvement of symptoms of nausea .

Table 1: Comparison of distribution vomiting patients in three follow-ups between the groups

| Vomiting Grade | Group-I | | | Group-II | | |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | 1 st | 2 nd | 3 rd | 1 st | 2 nd | 3 rd |
| -4 | 2 | 10* | 27* | 2 | 10* | 31* |
| -3 | 4* | 12 | 4* | 7 | 16* | 3 |

| | | | | | | |
|----|----|----|----|----|----|----|
| | 13 | 8 | 1* | 12 | 6* | 1* |
| -1 | 8 | 1* | - | 7 | 2* | - |
| | 6 | 1* | | 6 | 1* | - |
| -1 | 1 | - | - | 2 | - | - |
| | - | - | - | - | - | - |
| •A | - | - | - | - | - | - |
| -4 | - | - | - | - | - | - |

According to the study, 27 patients in group 1 and 31 in group 2 had complete recovery (100%) from the symptoms of vomiting by the 3rd follow up.

- patients in group 1 and 3 in group 2 had marked improvement (75%) of symptoms of vomiting by 3rd follow up.

1 patient each of group 1 and 2 had moderate improvement of symptom of

• vomiting (50%) by the 3rd follow up.

Table-2: Comparison of distribution of patients in three follow-ups between the groups

| Nystagmus Grade | Group-I | | | Group-II | | |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----|
| | 1 st | 2 nd | 3 rd | 1 st | 2 nd | ya- |
| -4 | - | 8 | 28* | - | 8 | 27* |
| -3 | 7 | 22* | 8* | 6 | 19* | 8* |
| 4-2 | 19 | 4* | 2* | 20 | 5* | 2* |
| -1 | 8 | 4 | - | 6 | 3 | - |
| 0 | 3 | - | - | 5 | - | - |
| -1 | 1 | - | - | 1 | - | - |
| -2 | 1 | - | - | 1 | - | - |
| -3 | - | - | - | - | - | - |
| -4 | - | - | - | - | - | - |

(*P<0.05 no significant compared with in the group-1 and II, P>0.05 no significant compared between group-I with group-II)

As per the study, 28 patients in group 1 and 27 in group 2 had 100% clearance of nystagmus by the 3rd follow up, 8 in each group had marked improvement (75%) clearance and 2 in each group had moderate improvement(50% clearance) of nystagmus while doing the maneuvers by 3rd follow up.

Table-3: Comparison of distribution of patients in three follow-ups between the groups

| Vertigo Grade | Group-I | | | Group-II | | |
|---------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | 1 st | 2 nd | 3 rd | 1 st | 2 nd | 3 rd |
| +4 | - | 8* | 27 | - | 7 | 29* |
| +3 | 9 | 29* | 12* | 8 | 21* | 8* |
| +2 | 15 | 5* | 1* | 15 | 8* | 2* |
| +1 | 8 | 2* | - | 7 | 2 | - |
| 0 | 5 | 1 | - | 6 | 1 | - |
| -1 | 2 | - | - | 2 | - | - |
| -2 | 2 | - | - | 2 | - | - |
| -3 | - | - | - | - | - | - |
| -4 | - | - | - | - | - | - |

(*P<0.05 no significant compared with in the group-I and II, P>0.05 no significant compared between group-I with group-II)

27 and 29 patients each of group 1 and 2 respectively had 100 % clearance of symptoms, 12 in group 1 and 8 of group 2 had 75% clearance, and 1 from group 1 and 2 from group 2 had 50% vertigo clearance by the 3rd followup.

IV. DISCUSSION:

This is a study to compare the effects of Epleys maneuver and Lemperts logroll maneuver in benign paroxysmal positional vertigo. It was done by dividing the patients into 2 groups. Group 1 underwent Epleys maneuver and group 2 Lemperts log roll maneuver. We had 82 patients who were freshly diagnosed of benign paroxysmal positional vertigo by undergoing dix-Hallpike’s maneuver. A detailed examination of the ears, vestibular system and central nervous system were done and all other causes of vertigo were ruled out. By systemic random sampling they were divided into 2 groups and were followed up on the 3rd, 7th and 30th days and the maneuvers were repeated on each followup. As per the study, 27 and 29 patients each of group 1 and 2 respectively had 100 % clearance of symptoms, 12 in group 1 and 8 of group 2 had 75% clearance, and 1 from group 1 and 2 from group 2 had 50% vertigo clearance by the 3rd followup. According to the study, 28 patients in group 1 and 27 in group 2 had 100% .learance of nystagmus by the 3rd follow up, 8 in each group had marked vnpovement (75%) clearance and 2 in each group had moderate improvement(50% clearance) of nystagmus while doing the manuevres by 3rd follow up.

According to the study, 27 patients in group 1 and 31 in group 2 had complete recovery (100%) from the symptoms of vomiting by the 3rd follow up.

- patients in group 1 and 3 in group 2 had marked improvement (75%) of symptoms of vomiting by 3rd follow up.

1 patient each of group 1 and 2 had moderate improvement of symptom of vomiting (50%) by the 3rd follow up.

In the study, after doing the maneuvers, 28 patients had complete relief from nausea by the e 3rd follow up in both groups.

10 patients in group 1 and 6 patients in group 2 had about 75%improvement.

1 patient in group 1 and in group 2 had 50% improvement of symptoms of nausea by the 3rd follow up.

As percentage of the sample, we had 31.75% and 24.39% in the age group of 18-40 in groups 1 & 2, 36.58% & 43.9% in 41-60 yr old age group, and 31.71% each in 61-75 age group .

Maximum number of patients was in the age group of 41-60 years.

As percentage of distribution of sample according to gender, we have 46.34% males in group 1 and 60.98 % males in group 2. 75.61% and 78.05% in either group were employed.

Right side was more frequently involved in both the groups, i.e, 53.66% in both the groups.

The mean pulse rate was 73.25 ± 7.81 in group 1 and 74.42 ± 8.32 in group 2.

The mean systolic and diastolic blood pressure on laying down was 127.62 ± 1.16 and 72.27 ± 8.43 in group 1

The mean systolic and diastolic blood pressures in group 1 on standing up were 124.65 ± 1.13 and 72.02 ± 8.27 .

The mean systolic and diastolic blood pressure in group 2 while lying down was 125.50 ± 1.22 and 69.77 ± 8.58 .

The mean systolic and diastolic blood pressure in group 2 while standing was

123.40 ± 1.21 and 69.74 ± 8.58 , 17.50% patients in group 1 & 2 had pallor on clinical examination.

.81.71% (61 patients) in group 1 and 57.50% in group 2 had nausea as a presenting symptom.

35% patients, in 1st group and 65%, in- 2nd group had vomiting as a symptom.

The primary aim of the study was to compare the effects of the 2 maneuvers in management of BPPV. All the results showed minimal, insignificant difference in values implying that Lempert's log roll maneuver is not inferior to Epley's maneuver.

Epley's maneuver is the gold standard for treating BPPV. A lot of studies have been conducted to prove the efficacy of Epley's maneuver but till now, none have been conducted on Lempert's maneuver. Hence, in this study we have come to a conclusion that Lempert's maneuver is not inferior to Epley's maneuver and almost equally effective as Epley's

V. SUMMARY

This is a hospital based prospective randomized controlled study to compare the effects of Epley's and Lempert's maneuver in BPPV.

It was on 82 patients between the age group of 18-75 yrs. The effectiveness of the maneuvers was compared on the 1st, 2nd and 3rd follow-ups by PGA scoring system.

In the study, all patients fulfilling the inclusion criteria were taken up for the study and BPPV was diagnosed by Dix Hallpike's maneuver. Following this, they were divided into 2 groups. 1st underwent Epley's maneuver and 2nd Lempert's maneuver.

The 2 groups were comparable in every nature. The patients were followed up on the 3rd, 7th and 30th days and their symptoms were assessed using PGA score and plotted. In the study, it was found that BPPV was common in females and more often the right side ear was affected.

The results were statistically analyzed for both the groups and were found out that p value was less than 0.05 which implies that there is no significant difference in the values which means that Lempert's maneuver is not inferior to Epley's maneuver.

VI. CONCLUSION

- Most commonly involves the right side than the left.
- Most common age group involved in BPPV is 41 to 60 years.
- BPPV is less common among males.
- Lempert's maneuver is not inferior to Epley's in the treatment of BPPV.
- Results show a p value of less than 0.05 which means difference in outcome of treatment with either maneuvers are insignificant.
- The results obtained in our study was comparable with other international studies showing that Lempert's and Epley's maneuvers are very effective in our population for treating BPPV.

VII. RECOMMENDATIONS

Further studies need to be conducted with a larger sample size.

The study should be done for longer periods to find out the long term efficacy of the corrective procedures for BPPV.

In BPPV further studies should be conducted to find out the 'true prevalence and burden' of untreated BPPV in older adults, the normal history of untreated BPPV and functional impact of BPPV on day to day life.

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Chemical Analysis of Ground Water of Purnia District town, Bihar, India – A case study

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Abstract: Water pollution is a serious problem as nearly 80% of India surface water and a considerable number of growing groundwater sources have been contaminated by inorganic and biological pollutants. Pollution of water resources occurs mainly through point and nonpoint (diffusion) sources. The major source of water pollution can be categorised as Municipal agricultural and industrial. Municipal water consists of water from houses and commercial establishments, which run-off leached up to groundwater table to contaminate the source. Agriculture including commercial livestock and animal farm waste and lots are the main source of many organic and inorganic pollutants. These contaminants include both sediments from erosion of cropland and compounds of phosphorus and nitrogen that partly originated from animal wastes, fertilizers and common Agro-biocides. Animal wastes and domestic wastes are high oxygen demanding materials such as nitrogen and phosphorus often they harbour pathogenic microbes. In India, raw level of major ions (notably phosphates, nitrate fluorides and chlorides), metals (notably iron and arsenic) and liable and non liable DOC vary significantly across the region and with Season. However, in India particularly rural sector groundwater (major source of potable water) resources are polluted through the poor septic systems, small disposal pits, landfills, animal lots, fertilizers and application of sledge's. Keeping this view a laboratory study was conducted to monitor the groundwater quality of selected sites are Purnea, sub-urban town by examining the various physicochemical parameters such as temperature, pH, T.D.S., D.O. and COD etc. comparison with ICMR, WHO and other Agencies standard, shows that the groundwater is nearly suitable for drinking purposes and for other useful anthropogenic activities.

Keywords: contamination, septic system, water characteristics, potable water

1. Introduction

Groundwater is ultimate and most suitable fresh water resource having nearly balanced concentrations of the required salt of human use. Rapid urbanizations and population explosion have led to a great demand of an increasingly smaller potable water supply in the country. Problem with water qualities are as severe as problems with water sustainability, but less attention has been paid towards this issue in our country. The high rate of exploration than its charging in appropriate dumping of waste (liquid / solid), lack of enforcement of law and unhealthy governance are the factors of deterioration of ground water quality. Purnea municipality almost does not facilitate the treated water supply. In alternate to this, the inhabitants keep options as hand pumps and motor pumps. The objective of this work is to assess the groundwater quality and an idea about to hypothesise some new chemical formulation for water management in Purnea town, a sector of Kosi region, Bihar.

1.1. Source of pollution

Groundwater and surface water resources are mainly polluted through point and nonpoint (diffusion) sources. Nonpoint sources of pollution occur when harmful substances are directly discharge into water bodies such as Industrial effluents, sewage discharge in domestic untreated sewage and nonpoint source delivers ground water resources while fluoride ions and dissolved solids are for anthropogenic activities such as application of fertilizers and crop plants, iron and dissolved solids are dealt with by suitable treatment methods of extracted water.

1.2. Pollution from domestic activities

About 14% of rural and 70% of urban inhabitants have access to adequate sanitation facilities. Hence, water contaminated by domestic waste as it is directly discharged into water bodies are seeps into the groundwater table due to improper location of septic tanks / pit latrines, inadequate facilities for treatment of human and animal wastes contribute the high intensity of water borne diseases in the North Eastern parts of Purnea, Bihar, (Kosi region), India such as renal problems, hypertension, skin diseases, fluorosis etc. are commonly seen in this region hence called as "Kala Pani."

1.3.Pollution from Geochemical Activities

Groundwater of certain geographical regions may not be of desired qualities for potable use due to geochemical conditions. Groundwater with high fluoride contact period between groundwater and fluoides bearing rocks such as fluorospars ,phosphatic rocks and phosphates. The fluoride contents in India aquifer vary from <1ppm- 25 ppm. The other factors contributing to excess of fluorides in groundwater are overexploitation of groundwater reservoirs,high level of fluorides in potable water or drinking water. They lead to dental and skeletal fluorosis.In India ,about seventeen States have been identified as endemic to fluorosis in drinking water and Bihar is one of them. Arsenic compounds with Ores and Minerals such as in combination with iron and manganese oxides and under some natural conditions it can be soluble and released into groundwater table.

This north-eastern region of Bihar ie.Kosi region has existing concentration of iron in groundwater in the form of ferrous ions in anaerobic conditions, but when after extraction comes in aerobic conditions ferrouss converted into ferric state to make water as “Red Water” with offensive smell. The long uses of this water impart reddish colour in the inner wall of container and even platform of the hand pump gets red in colour.Though iron content in drinking water may not affect the human health as a simply dietary load. But in the long run, prolonged use causes bioaccumulation which may result in damages of tissues ie.”Homochromatosis”

1.4.Pollution from Agricultural Activities

The excess use of fertilizers, pesticides,herbicides,fungicides, rodenticides etc. to improve soil fertility and protection of crops emerging as an environmental menace . These chemical products find their way to accumulate into the lung tissues through foodc-hains resulting,implication on human health . Biocide and fertilizers entered the water resources through run-off and become hazardous to human animal and plant lives.

2.materials and methods

2.1.study area

Purnia is a sub-urban area and district town of north -eastern region of Bihar(Kosi region),which consists of 46 wards under its own municipal corporation, located in India at 25^o 47’N latitude and 87^o28’E longitude and 40.61 metre above the sea level. The hottest month are July -August and coolest months are December- January. The temperature varies from 8^oC-16^oC in winter and 29^oC-39^oC in summer In winter,the temperature sometimes varies from 3^oC-5^oC and shoots up in summer about 40^oC – 42.5^oC. The relative humidity in and around this area is about >75% during the month of July- September.The average rainfall is in between 141 mm - 145mm.About 80% of the total rainfall Is normally received during the monsoon month of June to September.Besideshaving itself a municipal corporation with some extension areas,it lacks proper planning and managements .In total five sites are selected for the study and boring depths of hand pump vary in between 18-25feet (Table 1).

Table-1

Sampling Location and Corresponding habitats

| SL.No. | Sampling Location | Habitats | Source of Water Sample | Depth of HAND Pumps (feet) |
|--------|-------------------|------------------|------------------------|----------------------------|
| 1 | Madhubani (S1) | Residential Area | Hand Pump | 20-22 |
| 2 | Line Bazar (S2) | Residential Area | Hand Pump | 19-21 |
| 3 | Rambagh (S3) | Residential Area | Hand Pump | 19-21 |
| 4 | Khuski Bagh(S4) | Residential Area | Hand Pump | 18-20 |
| 5 | Gulabbagh(S5) | Residential Area | Hand Pump | 18-21 |

2.2.Sampling and sampling sites (station)

The samples were collected in clean polythene bottles of capacity two litres having no air bubbles. Before sampling evacuation of the stored water in hand pump head has been made to take fresh groundwater sample .The selected sites are urban residential areas of the

town detected in figure 1 (a map view of the Purnea district town assite S₁–S₂). Groundwater is particularly important for about 80%-88% safe drinking water in rural areas where population is widely dispersed and the minimum possible infrastructure needed for treatment of water doesn't exist. The sampling has been carried out in post monsoon session October to May 2011. The temperatures are the samples were measured in the field itself at the time of collection. The samples were kept in refrigerator at 4^oC.

2.3.Methodology

The ware quality parameter analysed were pH with the help of pH meter standardized wuth pH buffer 4 and 7 .TDS were estimated by evaporation method at 1800C .Calcium content bt EDTA titrimetric method , hloride content by argentometric method , total hardness (TH) by EDTA methods ,alkalinity and chemical oxygen demand (COD) by open reflux methods.Table.2.

Table.2

Comparision Of Water Quality Parameters Of Ground water,Purnea Town(in/mg/L) with Standard Values Of ICMR,WHO&BIS

| Parameters | S1 | S2 | S3 | S4 | S5 | Mean | ICMR | WHO | BIS |
|----------------------|-----|------|------|------|------|------|-------|-------|-------|
| Temp. ^o c | 22 | 21 | 20 | 21.5 | 22 | 21.3 | — | — | — |
| Ph | 7.9 | 6.8 | 7.3 | 7.3 | 6.9 | | 7-8.5 | 7-8.5 | 7-8.3 |
| TdS | 800 | 1100 | 980 | 1020 | 1100 | | 500 | 500 | 500 |
| t.h | 121 | 130 | 125 | 150 | 201 | | 300 | 200 | 200 |
| COD | 164 | 170 | 160 | 162 | 235 | | — | 255 | 255 |
| CL | 70 | 80 | 80.8 | 100 | 113 | | 200 | 250 | 250 |
| Aik | 90 | 112 | 90 | 95 | 102 | 97.8 | 200 | 120 | 200 |
| Ca-Hardness | 79 | 80 | 80 | 82 | 110 | | | 75 | 75 |
| Turbidity (NTU) | 10 | 10 | 12 | 18 | 20 | | | | |
| Conductance Mmho/cm | 450 | 500 | 500 | 550 | 660 | | | | |

3.Results and Discussions.

3.1.Result

The results of the physico chemical analysis (2010-2011) of the ground water samples as S₁-S₂ of five different Sites of Purina are summarized in table 2. The value of pH range among 6.8 to 7.9 is well within the prescribed limit of ICMR and other Agencies (WHO/BIS). A little bit increases in the pH may depress the effectiveness of the used disinfectants such as chlorination thereby additional chlorine is required. The value of TDS varies in between 800- 1100 mg/l where as the average of TDS in the groundwater is 1000 mg/L, the maximum permissible level in is 2000 mg/L as per IMCR(Table 3).

Table.3.

| Parameter | ISI | | WHO | | ICMR | | BIS | |
|------------|---------|------|---------|---------|---------|---------|---------|---------|
| | HDL | MPL | HDL | MPL | HDL | MPL | HDL | MPL |
| Ph | 6.5-8.5 | -- | 7.0-8.5 | 6.5-9.5 | 7.0-8.5 | 6.5-9.2 | 7.0-8.3 | 8.5-9.0 |
| TDS | 500 | 2000 | . | | 500 | 1500 | 500 | 2000 |
| Ca | | 75 | | 75 | | | | 75 |
| Cl | | 250 | | 250 | | 250 | | 250 |
| TH | 300 | 600 | 200 | 600 | 300 | 600 | 200 | 600 |
| Alkalinity | 200 | 600 | | 120 | | | 200 | 600 |
| COD | 150 | 255 | | 225 | | | 150 | 255 |

High TDS in groundwater may be due to groundwater pollution when wastewaters from residential areas are discharged into pits, ponds and other water bodies leached to the water table. Total hardness from 164-235 mg/L chloride content is 7-12 mg per liter. And it is also in the limit of standard IAMCR / WHO oblique bias. COD ranges from 90 to 120 mg per liter indicating the nearly pure symptoms. The standard desirable limit of alkalinity in drinking water is 120 mg per litre. The maximum permissible level is 600 mg per litre. The mean value of alkalinity in the ground water sample is 97.8 mg per litre. The value of alkalinity in the water provides an idea of natural salt present in what search water research has various ionic species that contribute to alkalinity includes bicarbonate Hydroxide phosphate borate and organic acids on the other hand one more possibility is here that is the degradation of dissolved organic matter as disinfectants / USA of use of Agro biocide in the crop land main causes some disinfection by-products black adbp bracket close as the use THM (try hello Methane) close, ha a bracket hello Acetic Acid (close etc. Some of them are of potential threat to carcinogenic activities, and Reena problem and a short period exposure can associated with headache X, dizziness as well as some problems related to nervous system problems at Sector this is more prevalent in those factors where Hai contamination of dissolved oxygen organic matter exist due to Excess application of disinfectants.(table.2.)

Conclusion

Quality of groundwater under study area is nearly suitable for drinking and other domestic uses. Hence, it is recommended that the water analysis should be carried out from time to time to monitor the rate and kind of contamination in context to the human health. The groundwater of this Kosi region has existing concentration of iron which requires specific analysis cum treatment. Hence, it is good to set-up common Commission for water and sanitation on state and national level to enforce in rural population in particular as water and sanitation of course related. Improper and poor sanitation is the cause of many diseases and it also results in poor quality of water. For example, a toilet or pit latrines within a distance of 18- 20 metres from a hand pump / Bore well will contaminate groundwater table. There is less increasing awareness among the people to maintain the groundwater at their highest quality and purity level and the present study may prove to be useful in achieving the same.

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Abbreviations:

HDL- Highest Desirable Level

MPL- Maximum Permissible Level

BIS- Bureau of Indian Standard

ICMR- Indian Council Of Medical Research

WHO- World Health Organization

ISI – Indian Standard Institute

TDS- Total Dissolved solid

TH- Total Hardness

COD- Chemical Oxygen Demand

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Simulation of Heat Dissipation for a Satellite using Carbon Nanotube Nanofluids

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Abstract - Satellites cope with harsh environment when working in the orbit so they require heat management by various methods such as heat pipes, louvers, pumped fluid loop, etc... to improve stability, durability and longevity. The pumped fluid loop (PFL) is one of the most significant components as it is more efficient than other passive thermal control as it can deal with environmental extremes or to accommodate equipment dissipating high power. Carbon nanotube (CNT) is known as the material that has high thermal conductivity ($k_{CNT} = 2000\text{W/mK}$), so it is possible to use as nano-additive for enhancing thermal conductivity of fluids. In this report, we present some results on simulation of heat dissipation for a satellite using carbon nanotube nanofluids. These results open the potential application of CNTs in nanofluids for heat management in PFL of satellites.

I. INTRODUCTION

Thermal management is control is generally considered to be a crucial part of designing electronic systems, where each device's performance varies considerably depending on temperature. Furthermore, the lifetime of the electronic devices can be reduced due to the high operating temperature. Finding new materials with high thermal conductivity has become an important to improve heat management efficiency for electronic devices. [1]

Satellites are one of the electronic devices that have to survive in the extreme environment when working in orbit. They require heat management by various methods such as heat pipes, louvers, pumped fluid loop, etc... to improve stability, durability and longevity. The pumped fluid loop (PFL) is one of the most significant components as it is more efficient than other passive thermal control as it can deal with environmental extremes or to accommodate equipment dissipating high power. Improving the thermal conductivity of fluids will help improve the heat management efficiency of the PFL system. [2]

Nanofluid is a colloidal mixture of nanometre-sized (<100 nm) metallic and non-metallic particles in conventional fluid. Nanofluids are considered to be potential heat transfer fluids because of their superior thermal and tribological properties. Nanoparticles are made from different materials, for example, carbonnanotubes, metals, semiconductors, nitride ceramics, oxide ceramics, carbide ceramics, and composite materials.

Nanofluids improved thermophysical properties such as thermal conductivity, thermal diffusivity, viscosity, and convective heat transfer coefficients, in comparison to those of base fluids like oil or water [2-7].

Carbon nanotube (CNT) is known as the material that has high thermal conductivity ($k_{CNT} = 2000\text{W/mK}$) in comparison with thermal conductivity of silver is 419 W/m.K [8-11], so it is possible to use as nano-additive for enhancing thermal conductivity of fluids [12-15].

Initial results on simulating the dissipation of heat using carbon nanotube nanofluids for a small satellite is showed in this article.

II. METHOD OF SIMULATION

Figure 1 shows the diagram of a PFL system for a satellite using carbon nanotube nanofluids. In this configuration, we arrange for the heat-sink to touch a heat source (satellite's power electronic component). The nanofluid was pumped from heat-sink to radiator-cover of satellite by using a fluid-pump. Inside the heat-sink, the track was made so that nanofluids could run through and take in the heat from electronic component that generate high power, then the nanofluids will flow from the heat-sink to satellite's cover for heat emission and returns back to the nanofluid-container.

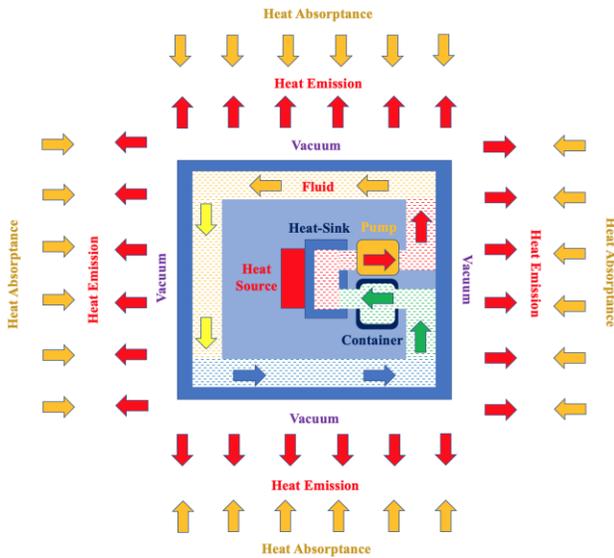


Figure 1. Diagram of the PFL system for a satellite using carbon nanotube nanofluids

For the simplification of the simulation process, we worked on the assumption that the heat exchange process occurs only in heat-sink and satellite's cover. To run the simulation, the operating time of electronic component is broken into small differential times (Δt). The heat transfer equations were calculated by dedicated software in each very short differential time. Results of the simulation are reached by repeating the above processes multiple times.

We worked on the assumption that:

- + v is the flow-rate of nanofluids (m^3/s)
- + Δt is the differential time in our simulation (s)
- + ΔV is the amount of fluid that flows in Δt (m^3)

We have:

$$\Delta V = v \cdot \Delta t \quad (1)$$

The heat transfer equation showing the relationship between the volume of nanofluid ΔV that flows from the nanofluid-container to the heat sink and nanofluids in the heat-sink is as follows:

$$T_h' = \frac{C_0 D_n [(V_h - \Delta V) T_h + \Delta V T_c] + C_h T_h}{C_0 D_n V_h + C_h} \quad (2)$$

Where:

- + V_h is the volume of nanofluids in the satellite heat-sink (m^3)
- + T_h is the nanofluid's temperature in the satellite heat-sink ($^{\circ}\text{C}$)
- + T_h' is the nanofluid's temperature in the satellite heat-sink after ΔV (the volume of nanofluids) flowing from the nanofluid-container to the satellite heat-sink ($^{\circ}\text{C}$)
- + T_c is the nanofluid's temperature in the nanofluid-container ($^{\circ}\text{C}$)
- + C_h is the heat capacity of the satellite heat-sink (J/K)
- + C_0 is the specific heat capacity of nanofluids (J/kg.K)
- + D_n is the density of nanofluids (kg/m^3)

We calculate the amount of heat that flows from electronic component to nanofluids as follows:

$$I_{p-h} = \frac{(T_p - T_h')}{R_{p-h} + R_h + R_n} \quad (3)$$

Where:

- + I_{p-h} is the amount of heat that flows from satellite heat source to nanofluids in the satellite heat-sink (W)
- + T_p is the temperature of the satellite heat source ($^{\circ}\text{C}$)
- + R_{p-h} is the heat resistance of the contact layer between satellite heat source and the satellite heat-sink (K/W)
- + R_h is the heat resistance of the satellite heat-sink (K/W)
- + R_n is the effective heat resistance of nanofluid (K/W)

We calculate the effective heat resistance of nanofluids as follows:

$$R_n = \frac{1}{2} \cdot \frac{1}{k} \cdot \frac{d}{S} = \frac{1}{2} \cdot \frac{1}{k} \cdot \frac{d}{a \cdot b} \quad (4)$$

Where:

- + k is the thermal conductivity of the nanofluid (W/mK)
- + d is the thickness of the nanofluid in the satellite heat-sink (m)
- + S is the cross-sectional area of the nanofluid in the satellite heat-sink (m^2)
- + a, b are the width and length of the nanofluid in the satellite 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' is the temperature of the satellite heat source after very short differential times Δt ($^{\circ}\text{C}$)
- + ΔQ is the retain heat in the satellite heat source ($^{\circ}\text{C}$)
- + C_p is the heat capacity of the satellite heat source (J/K)
- + P is the heat generation power of the satellite heat source (W)

We calculate the nanofluid's temperature in the satellite heat-sink after a brief period of differential time Δt as follows:

$$T_h'' = T_h' + \frac{\Delta Q_h}{C_h + C_n} = T_h' + \frac{I_{p-h} \cdot \Delta t}{C_h + C_n} \quad (6)$$

$$T_h' = T_h' + \frac{I_{p-h} \cdot \Delta t}{C_h + C_0 D_n V_h} \quad (7)$$

Where:

- + T_h'' is temperature of the nanofluid in the satellite heat-sink after very short differential times Δt ($^{\circ}\text{C}$)
- + ΔQ_h is the heat from satellite heat source to nanofluid and the satellite heat-sink (J)
- + C_n is the heat capacity of the nanofluid in the satellite heat-sink (J/K)

The heat transfer equation showing the relationship between nanofluids in satellite's radiator -cover and nanofluid volume ΔV that flows from heat-sink to satellite's radiator -cover is:

$$T_r' = \frac{C_0 D_n [(V_r - \Delta V) T_r + \Delta V T_h] + C_r T_r}{C_0 D_n V_r + C_r} \quad (8)$$

Where:

- + V_r is the volume of the nanofluid in satellite's radiator-cover (m^3)
- + T_r is the temperature of the nanofluid in satellite's radiator-cover ($^{\circ}\text{C}$)
- + T_h is the temperature of the nanofluid flow from heat-sink to satellite's radiator-cover ($^{\circ}\text{C}$)

+ T_r is the temperature of the nanofluid in radiator-satellite's cover after the amount of ΔV nanofluid flowing from the satellite heat-sink to satellite's radiator-cover ($^{\circ}\text{C}$)
+ C_r is the heat capacity of the satellite's radiator-cover (J/K)

The heat emission from satellite's radiator-cover to space is calculated by Stefan -Boltzmann's Law:

$$I_{r-s} = \varepsilon \sigma A_r T_r^4 \quad (9)$$

Where:

+ I_{r-s} denote the heat emission from satellite's radiator-cover to space (W)
+ A_r denote the emissive area of satellite's radiator-cover (m^2)
+ σ denote the Stefan-Boltzmann constant
+ ε denote the emissivity of non-black body

The heat absorptance from space to satellite's radiator-cover is calculated by following formula:

$$I_{s-r} = \eta \phi A_r \quad (10)$$

Where:

+ I_{s-r} denote the heat absorptance from space to satellite's radiator-cover (W)
+ A_r denote the emissive area of satellite's radiator-cover (m^2)
+ ϕ denote the flux from space to satellite's radiator-cover (W)
+ η denote the absorptance of non-black body

We make the assumption that the shape of the liquid-track inside the radiator is rectangular. We calculate the effective heat resistance of nanofluids in the radiator as follows:

$$R_n = \frac{1}{2} \cdot \frac{1}{k} \cdot \frac{d'}{S} = \frac{1}{2} \cdot \frac{1}{k} \cdot \frac{d'}{a \cdot b} \quad (11)$$

Where:

+ d' is the thickness of the nanofluid in the radiator(m)
+ S is the cross-sectional area of the nanofluid in the radiator(m^2)
+ a , b are the width and length of the nanofluid in the radiator, respectively (m)

We calculate the nanofluid's temperature in the radiator after a short period of differential time Δt as follows:

$$T_r^n = T_r - \frac{\Delta Q_{r-e}}{C_r + C_n} = T_r - \frac{(I_{r-s} - I_{s-r}) \cdot \Delta t}{C_r + C_n} \quad (12)$$

$$T_r^n = T_r - \frac{(I_{r-s} - I_{s-r}) \cdot \Delta t}{C_r + C_0 D_n V_r} \quad (13)$$

Where:

+ T_r^n is temperature of the nanofluid in the radiator after very short differential times Δt ($^{\circ}\text{C}$)
+ ΔQ_{r-e} is the heat from radiator to environment (J)
+ C_n is the heat capacity of the nanofluid in radiator (J/K)

The heat transfer equation showing the relationship between nanofluids in the container and nanofluid volume ΔV that flows from the radiator to the container is:

$$T_c = \frac{C_0 D_n [(V_c - \Delta V) T_c + \Delta V T_r] + C_c T_c}{C_0 D_n V_c + C_c} \quad (14)$$

Where:

+ V_c is the volume of the nanofluid in nanofluid-container (m^3)
+ T_c is the temperature of the nanofluid in nanofluid-container ($^{\circ}\text{C}$)
+ T_r is the temperature of the nanofluid flow from radiator to nanofluid-container ($^{\circ}\text{C}$)

+ T_c is the temperature of the nanofluid in nanofluid-container after after very short differential times Δt ($^{\circ}\text{C}$)

+ C_c is the heat capacity of the nanofluid-container (J/K)

III. RESULTS AND DISCUSSION

We chose CNTs-based propanol, the concentration of CNTs was from 0.0 vol. % to 1.0 vol. % for the entire simulation. In the simulation process, the parameters are as follows:

+ The differential time of the simulation: $\Delta t = 10^{-8}$ (s)
+ The density of the nanofluid: $D_n = 803 \text{ kg/m}^3$
+ The specific heat capacity of the nanofluid: $C_0 = 2400 \text{ J/kg.K}$
+ The dimensions of the satellite heat-sink: $a \times b \times c = 40 \text{ mm} \times 40 \text{ mm} \times 6 \text{ mm}$
+ The dimensions of liquid-track in the radiator: $a \times b \times c = 30 \text{ mm} \times 5 \text{ mm} \times 0.5 \text{ mm}$
+ The volume of nanofluid-container: $V_c = 0.1 \text{ liter}$
+ The heat power of satellite heat source: $P = 20 \text{ W}$
+ The the flow-rate of the nanofluid: $v = 5 \text{ (cm}^3/\text{s)}$
+ The heat emission and heat absorptance between satellite's radiator-cover and space was balanced at $T_r = 30^{\circ}\text{C}$.
+ The initial temperature of satellite's satellite heat source was equal to the temperature of satellite's radiator-cover is 30°C

We calculated the thermal conductivity of nanofluids as follows [16]:

$$\frac{k}{k_w} = 1 + \frac{1}{3} \frac{k_{CNT} \varepsilon r_w}{k_w (1 - \varepsilon) r_{CNT}} \quad (15)$$

Where:

+ $k_w = 0.14 \text{ W/mK}$, is the thermal conductivity of propanol.
+ $k_{CNT} = 1750 \text{ W/mK}$, is the thermal conductivity of CNT.
+ $r_w = 0.15 \text{ nm}$, is the radius of water molecule.
+ $r_{CNT} = 5 \text{ nm}$, is the average radius of CNT.
+ $\varepsilon = 0.0 \text{ vol. \%} \div 1.0 \text{ vol. \%}$, is the volume concentration of CNTs in nanofluid.

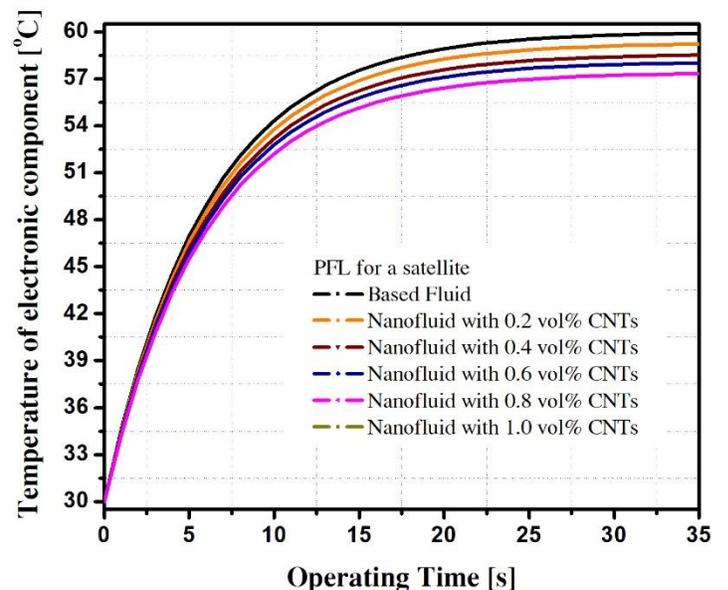


Figure 2. Simulation result on heat dissipation for a satellite using carbon nanotube nanofluid

Figure 2 shows the results of heat dissipation being simulated for electronic component using carbon nanotube nanofluid in a

satellite. As can be seen in the figure, the temperature of electronic component increased exponentially. When the satellite is in orbit, the saturation temperature of electronic component is usually reached after a period of 35 minutes. As shown in Figure 2, we recorded a decrease in the saturation level of electronic component when we increased the concentration of CNTs. One possible explanation is that when we added CNTs into nanofluids, its thermal conductivity increased. This increase then improved the heat transfer at the substrate and radiator-cover of the satellite. Simulation results also showed as shown in figure 2, the saturated temperature of electronic component dropped by about 1°C to 3.5°C. When replacing based-fluid by nanofluids with 1.0 vol. % of CNTs, we have recorded that the saturated temperature of electronic component dropped by 3.5°C.

IV. CONCLUSION

The thermal dissipation for for a satellite using carbon nanotube nanofluids was simulated. Simulation results showed that the saturated temperature of electronic component dropped by about 1°C to 3.5°C, concentrations of CNTs were (0.0 vol. %) to (1.0 vol. %) in nanofluids. The saturated temperature of electronic component dropped by 3.5°C when we use nanofluids with vol. % of CNTs compare to only using based fluid. The above results of our simulation have shown the considerable benefit that CNTs can bring about as an additive component in nanofluids for dissipating heat in PFL.

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Reconstructing the identities of Afran Qalo Oromo: A case of Babile Tribe a View of Recent Raiding Conflicts in Babile, Eastern Ethiopia

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Abstract: The Hararghe oromo are descendants of the Barentu confederacy who are found in eastern part of the country. They are classified in to Afran Qalo, Itu, Humbana, Dhumuga and Karrayu. The paper is focused on the Afran Qalo those settled in the Eastern Hararghe, particularly Babile tribe who landing zone in the peripheral boarder restrict with Somali ethnic clans. As a name indicate four Qalo sons Jarso, Babile, Nole and Ala living in this area. Jarso and Babile were live mixed together with Somali. Babile is the oldest son of Qallo who settled beyond the Erer River and the peripheral corner with the Somali in the eastern part. Currently, the town entitle Babile found in the eastern part and it proclaims the center of Babile Oromo tribe in ancient time. Because of the restricted with the Somalia ethnic in the peripheral area, the some Babile Oromo tribe were lost and forget their original identity. The researcher disclose two dissimilarity opinion based on the Babile have a child or not. Some were advocate have a children's and other elaborately Babile have an *ilma guddufacha*. The paper seeks to investigate the historical background of Babile Oromo tribe based on the literature and Primary data collected from informants which is the most important for the objective was gathered through interview. The paper argues that for the recent conflict, the role of political elite in ethnic and the intervention of religious leader in politics were highly visible. To accomplish this idea, the researcher utilized qualitative research method. Document analysis, group discussion and observation were part of this part.

Index Terms- ethnic identities, Babile, Afran Qallo, Hawiya, ethnic conflict

I. Introduction

Afran Qalo Oromo who settled in the Eastern part of Ethiopia are classified in to Babile, Jarso, Alla and Aniya tribe. Among these clans the Babile tribe are found in the Babile woreda and its environs. Oral Oromo tradition reveal that Babile is the first son's of Qallo, therefore due to keep enemies from his youngest brothers, Babile take duty and settled the count line places which edge with Somali. Currently, the area is a home of plural societies from different Somali and Oromo ethnic clans. The controversial Question raised is either Babile have a child or not? The recent raiding conflict in the area was a center of identities. The paper investigate the reconstruct the identities of tribe under the Babile clan and background of inter-ethnic conflict in the area. It's a kind of historical and documentary survey which achieves deliver complication on the different issues related with the Babile clans specifically the tribe embrace under the Babile. Due to the absence of clear literature which investigates on ethnic in the area, the researcher used under this paper the majority of the elder's informants and what the elite agree each other on the point.

II. The people of Babile

Babile is woreda located in some 561km from Finfine 30 km from Harar in the east direction and 72km from Somali capital's Jijiga in the west direction. Geographically, Babile is located surrounded by the Fik in the east and southeast, Gursum town in the northeast, Fadis Woreda in the southwest and Harari region in the west. According to central statistical authority's population census 1994, the Woreda¹ population is estimated to be 93,527, Numerically, Oromo and Somali population of ethnic group were dominating the Woreda specially the rural area, while, Amhara, Gurage and others ethnic grups were concentrating with Somali and Oromo in the urban dweller. The major ethnic group in the Woreda are Hawiya, Madigan, Akisho, Wara Doyo, Doyo, Maru, Ogaden and few other ethnic communities.

¹ Woreda is a unit of administrative structure in Ethiopia and it has equal weight with district

The population of the area were engaged in the farmers and Agro-pastoralists. Hence, countless of the western, southern and northern parts of the Woreda population are predominantly settled farmers, while, while in the eastern and south-eastern parts are dominated by agro-pastoralists.

In the area previously, sporadic violent clashes between these pastoralists of the local ethnic groups were occurred usually in the grazing areas because majority of them engaged pastoralist, and sometimes related with ethnics.

III. Survey of ethnic background of Babile Oromo tribe

Identities as served as pride and late or not lead nation in to contention, particularly complex in the Horn of Africa. Know our ancestors; history and your background serve a pleasure among the communities because it ambiguous and nature rule. It serve to search for their identity that they lost in the past system and feel comfort with their indigenous clan. Beside, identities collapse national identity that real possibility what we are seen today in Ethiopia. The question of nationalism had no long age in the Ethiopian context, launch by birth time of EPLF² and OLF³ latterly the issue were exacerbated almost entire the whole country since the coming of current regime to power. However, the issue of nationalism among the Oromo goes back to a period when the land of Oromo was conquest by the Abyssinian at the end of 19th century.⁴ Scholars define identities depending on the context; Wolbert describes identities as ethnic zones of confederation under a common identity or language where partially separate groups of people are unified. However, the author argue; is procession and seeks further clarification on the agents

² Eritrean People liberation front

³ Oromo People liberation front

⁴ Mukria, bulcha. “the survival and reconstruction of Oromo National Identity” Being and Becoming Oromo, Historical and Anthropological Enquiries, edited by P.T.W Baxer et al., 48-66. New Jersey: The Red Sea Press, Inc., 1996.

doing the identifying and the purposes for such an exercise e; it's distinctively conceive self-background and beyond self-interest being have sincerity for the rest ethnic clans.⁵

Geographically, Oromo people who are found in the eastern part of the country are considered as a Barentu Branch of ancient moieties of Oromo. They categorised in to different clans; some of them are Arfan Qallo, Itu, Humbana, Dhumuga and Karrayu. Among these clans, Afran Qallo are found in the corner part and neighbour with different Somali ethnic groups, located the presently named east Hararge. It refers to four decendent of Qallo who are Babile, Ala, Daga ans Obora. Among the Afran Qallo decendent, Babile is settled in the corner of the territory which presently located share border with some Somali ethnic ancestry. Thus, in this paper the author emphasizes investigate on the Afran Qallo specifically focused among on the Babile tribe identity.⁶

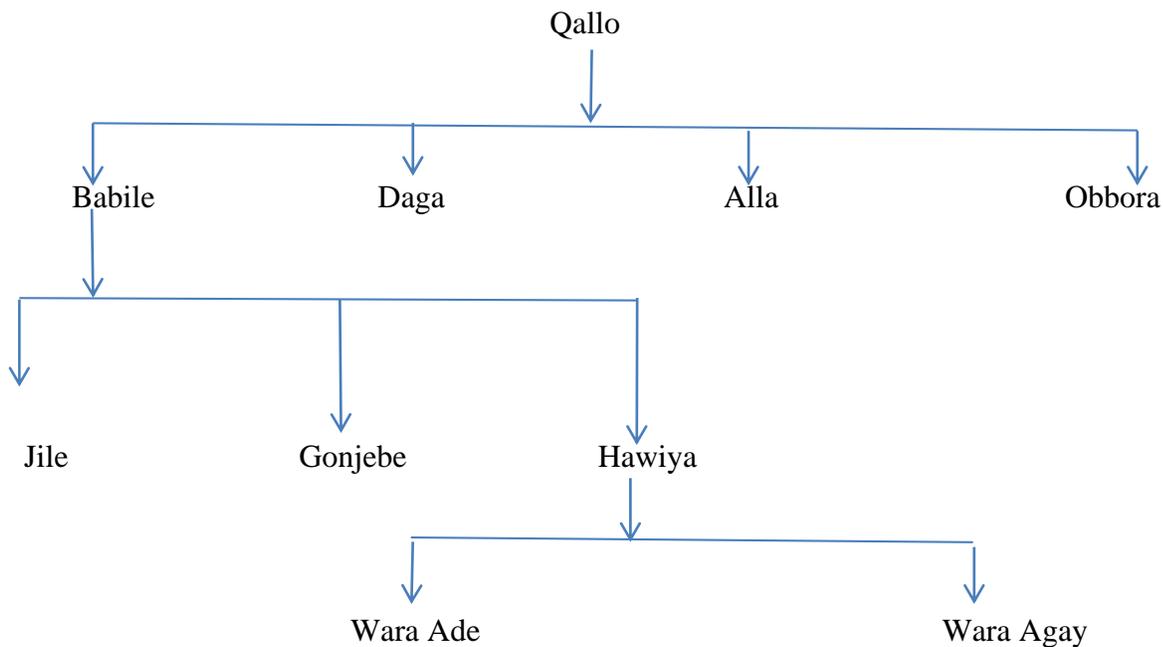
Ancient Oromo oral history reveal that, a person named Babile one of the Afran Qallo son's settled in the present location Babile town. His tribe was not like others Afran Qallo clan, it's so controversial. I raise a sensitive question for those indicate Babile have child. They respond what they heard from the oral tradition. the Hawiya are not classified an Babile ancestory, they are mainly settled the area due to Babile gave his daughter and adopt him an his son through Guddifacha.⁷ The other groups are those voiced Babile have a child to mention genealogically related with other Afran Qallo tribe. According to this group circumstantial evidence, people seek to deteriorated and erase the original history of Babile ethnic clan through voiced uncorroborated deliberately history due to an absence of literatures. However, the Oromo elders in the area culminate the above arguments; Babile is an oldest son among the Afran Qallo and settled the peripheral area of the region and he has no delivery son, so, he adopted Hawiya as a

⁵ . Wolbert C.G. Smidt "The Tigrinnya-Speakers across the Borders: Discourses of unity and separation in ethno historical context" Borders and Borderlands as Resources in the Horn of Africa, eds. Dereje Feyissa & Markus Virgil Hoehne (Suffolk: James Currey, 2010), pp. 67-68

⁶ Chala Abdurahman. "Harari-Oromo Inter-Ethnic Interaction in the city of Harar from 1887 to 1991" MA Thesis. (Bahir Dar University, 2010), p, 15;

⁷ Informant: Ato Muhamud Abdul-aziz

son.⁸ In anyhow, due to lack of literature and absence of better research, the researcher directly involves the argument for the readers. Later, for better interpretation, I attempt to classify the clan figure of Afran Qallo according to prominent elders Oromo elite from Hararghe in below figure.



Genealogical Tree of the Afran Qallo Oromo ethnic clans

IV. Hawiya Oromo or Somali

In the somali socio cultural solicit life, identify the person by genealogy is obvious. Undoubtedly, between an unacquainted people in somali, usually, to be rise one question is mandatory. That is “*Tal maa tahay*”? Who are your clan? This kind of cultural achievement was also expanding with Oromo neighbour specially, with the eastern Oromo ethnic groups. Although, this can also refer to ethnic groups in Babile and it’s surrounding. Under this, the paper investigates the controversy of ethnic identity in the area. Hawiya is a Somali clan

⁸ Informants: Abba Gada Yuyya wario and Abba Gada Alisho Bakhar. Communication with these Abba Gada elders, who have knolegable about the Gada and history of Afran Qallo as much.

Many prominent Hawiya in Babile, include traditional leader, have identified themselves either Oromo or Somali. Since referendum held in the area, majority of them identified themselves as Somalis, though, we have still others that identify themselves as Oromo. Majority of Hawiya in Babile town speak both Oromifa and Somali languages, however, in the rural district, numerically, almost many of them only speak Oromifa. They lived with the Oromo tribes including Jarso, Nole and Obora of Afran Qalo clan. Identifying and understanding the conflict is important to for designing effective peace building strategies in the area.

According to Oromia administration report, a tribe where dominance of Oromifa language in the area including mayo, Hawiya, Madigan, Akisho Maru, and others belong to Oromo. Among these clans, the researcher focused on Hawiya due to two reasons, the first, numerically, hawiya is dominant in the area, the conflict appear in the area was directly involved with Hawiya. Beside above reasons, different manuscript elucidate Hawiya with other Oromo ethnic groups outside the study area, like in Mi'eso west Hararghe and Borana area.⁹ There was an argument among Oromo elite on the issue of Babile tribe; some are negating Babile's child and other brace having a child. According to eminent Oromo elders in the area, Babile was not born Hawiya.¹⁰

It's so hard to be investigating and announce the complex Babile identity clan, because it's controversy. However, the researcher attempt to identify either Babile had son or had an "adoption son" *ilma guddifacha* through an interview from local elder's elites. Hawiya, in Babile, under pressure from Oromo in the area interms of socio culture interaction, directly or indirectly claimed themselves genologically Oromo. Sometimes, they claim their descent as the Son of Babile. Social Simplification, they decoded as Oromo. Historically, Hawiya is an adopt son of Babile. Hence, according to Oromo cultural life, after accept the process of Guddifacha, then, the child adopt the Oromo identities and accept call him an clan who adopt him. However,

⁹ Fekadu, Gelaw. "The Sources of Ethnic Strives and Tensions among the Issa-Somali and Ittu-Oromo Pastoral Communities of Eastern Ethiopia" pdf (Haramaya University, 2013), pp,3,5.

¹⁰ Informants: Abba Gada Yuyya wario and Abba Gada Alisho Bakhar.

the situation over there is not like that, due to an existence of Hawiya ethnic clan in other places.¹¹

A history lesson taught us; Adoption is a common practice throughout the world.” It is the taking of one’s family child into another as son or daughter and heir, and conferring up on it a title to the rights and the privileges of such.”¹² Is a process adoption of child or children of someone by a family via fulfilling every necessity to the child as self or own in the presence of the community members and leaders such as ‘Luba from the Gada system official.¹³ In Oromo society, guddifachaa practice has a long history and started during the time of Gada system commencement. According to Oromo elders Abbaa gada, claimed that,

At the same manner, Somalia official believe, all tribes live in Babile town and it’s environs as being originally ethnic Somalis. They argue, speaking Oromifa language does not make them to be Oromo. Because of close ethnic interaction with Oromo, the local ethnic were culminated by the Oromo. Local Hawiya elders indicate the above statements strongly. Many literatures supports that, Hawiya is from Somali clan which live in both Somaliland and Somali Ethiopia region.¹⁴ According to Fox, Hawiya is a Somali clan and they are among the four main Samale

¹¹ Ibid.

¹² Taka Daba, 1983 Law of adoption under the civil code and the custom among the

Oromo of Wallagga with particular reference to the experience of the people in Qellem administrative district. Addis Ababa University Law School Library, p,2.

¹³ Bekele Nadi (1958) Adoption among the Oromo of Shawa in Ethnological Society

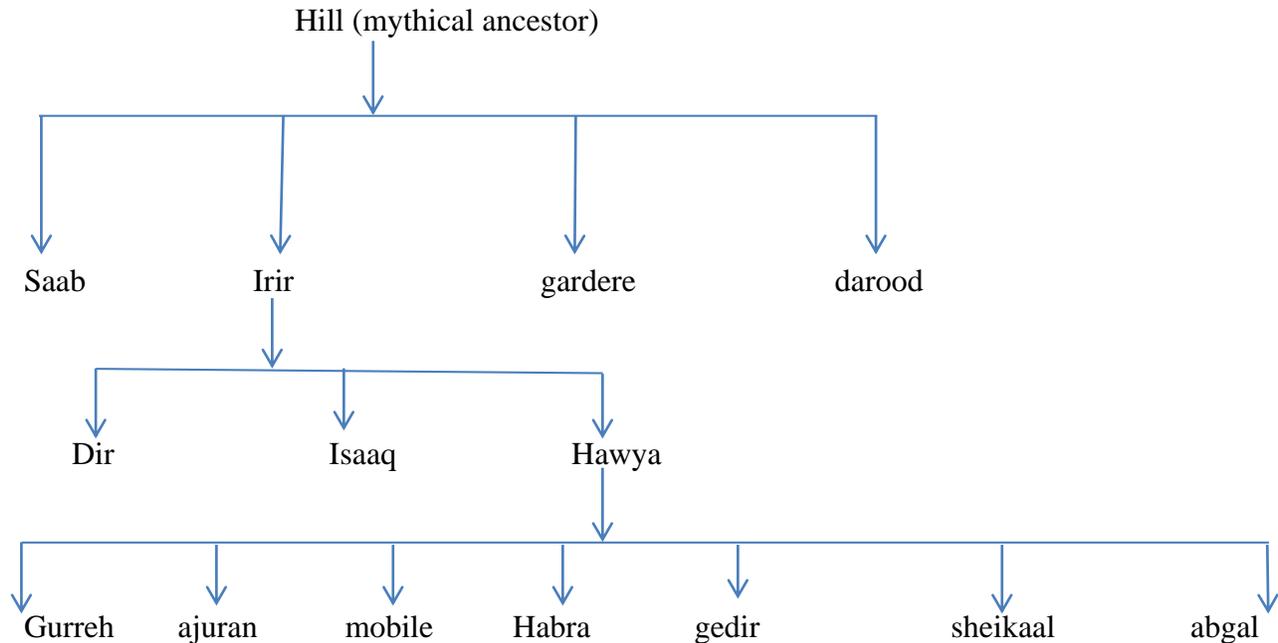
Bulletin Vol.1, No 1-10 and Vol. II, No1 1953-61. Reprint Edited by Alula

Pankhurst in 2002

¹⁴ Fekadu, Gelaw. “The Sources of Ethnic Strives and Tensions among the Issa-Somali and Ittu-

Oromo Pastoral Communities of Eastern Ethiopia” found pdf (Haramaya University, 2013), pp,3,5.

clans the rest are Darod, Dir, and Isaaq.¹⁵ Like many Somali, Hawiya tribe trace their paternal ancestor to Irir, the first son of Samaale. To be identify the Hawiya ethnic clan, elucidate the distinguished Somalia genealogical Lineages from the top to sub-lineages are draw it.



Notable Hawiya Somale Genealogical figure

V. Inter-ethnic conflict

In Ethiopia, majority of conflict squirrel ethnic are boundary between two regions.¹⁶ Several inter-ethnic conflicts have arisen across boundaries of regional states.¹⁷ The conflict appear in

¹⁵ M. J. Fox. *The Roots of Somali Politica*, (I Culture, A DIVISION OF LYNNE RIENNER PUBLISHERS2015) p,5.

¹⁶ Abbink, Jon 2006. Ethnicity and conflict generation in Ethiopia: Some problems and prospects of ethno-regional federalism. *Journal of Contemporary African Studies*, 24 (3),P. 389.

¹⁷ Legesse, Tigabu 2015. Ethnic federalism and conflict in Ethiopia: What lessons can other jurisdictions draw? *Africa Journal of International and Comparative Law*, 23 (3), p. 3.

the eastern part of the country was also the emblem ethnic phenomenal. Older elders of the region exposes had had a long history of cultural and linguistic interactions between other Oromo ethnic and Hawiya (majority in the area.) According to some elder's informants, during the Hailesilase government between Ogaden and Hawiya, there has been a conflict in the area. The main cause and effort for the violence were Hailesilase government's tribal land policy. During this violence, numbers of people were killed and livestock looted from both sides. Then, government had forcibly stopped the Conflict after gone nearly eight years.¹⁸ No violent conflicts between Somali and Oromo people during the Derg regime in the area as such. Post, 1997 there had not been violent confrontations in the area like the previous time. before the 1997 election, even in the town of Babile, both Somali and Oromo administration have open their offices and ruled the Woreda what is known by the time district. However, post 1997 election, the Woreda culminated under the Oromia region. According to local resident, post administration under one system rule, the numbers of local conflict are drop-off in the Woreda and with outside the Woreda too.

A numbers of conflict occurred since the current regime come to power between the local ethnics. The first incident of killing occurred in early 1993 after an active OPDO cadre was shot dead in the town of Babile. Late 1997, in the rural area, the conflict was exacerbated between Kebele militia in a place Darera-Arba. The competition between OPDO¹⁹ and ESDL²⁰ in the local communities aggravated the situation more before. Many informants confirm, the same incident as one occurred between the Somali and Oromo local groups in the area. Whatever the case may be, this is an evident that violent confrontations has started with the appearance of local

¹⁸ Ali, K. (2005) '*conflict and conflict resolution in Somali regional state*' Final consultancy

report for GTZ, Capacity Building in Governance Conflict Prevention / Transformation CPT, under Ministry of Federal Affairs (MFA), Addis-Ababa, Ethiopia.

¹⁹ Oromo people's Democratic Party, governed the Oromia region at a time. currently they changed their name to ODP, recently, based on the change of political system in the country, they affiliated with Prosperious party, the same is true for ESDL.

²⁰ Ethiopian Somali Democratic League, a party which lead the Somali region currently.

political elites in the environment between the local ethnic groups. According to data 2004 referendum, out of the 27 kabales²¹ that referendum took place, Somali administration won 11 kabales, while Oromo state also secured 15 rural kabales and the Babile town. The committee out from the prime minister office, regional affairs and local elites made a regional settlement and decided that Babile town and other 34 rural kabales to be given to Oromia Woreda administration, while only 8 rural kabales were put under Somali district administration. The numbers indicate us; Babile is a center of competition for both ethnic groups. However, the Somali reject the result and Oromo accepted it.²²

Post referendum time, all disputed border area gathered in Addis Ababa Conference. Hence, the local cadre from Somali and Oromo started to coerce the local peoples those who share common culture with each other. Unlawful actions were held on the people to get the hearts and minds of the local people. They went to arrest and punish those who opposed their campaign; initiated the people to conflict through ethnics.²³

In the past, in the Babile, local conflicts around the rural area were mainly caused by competition over natural resources of land between the pastoral and agro-pastoral ethnic groups. However, related with the change of political system in the country, ethnic conflicts changed the objectives and scope in politics. The recent contention which started from January 2015 up to September 2018, the major causes of conflicts were disputes over natural resources which appeared in previous, ethnic boundaries which led to political disagreements between two regions. The political intention affected the relationship between Oromo and Somali ethnic groups in the area. With the exception of control over resource land and political disagreements

²¹ Kabale is the lowest administrative unit of the new state structure of Ethiopia.

²² Ali, K. (2005) *'conflict and conflict resolution in Somali regional state'* Final consultancy report for GTZ, Capacity Building in Governance Conflict Prevention / Transformation CPT, under Ministry of Federal Affairs (MFA), Addis-Ababa, Ethiopia, p.39

²³ Informants: Ato Muhamud Abdul-aziz, Sheik Abdulfatah Ayub: these are prominent elders and religious leaders who have better knowledge about the area and situation what's going on over there.

between two regions, there have not been open violent conflicts between ethnic Somali and Oromo communities in the area as such.²⁴ Therefore, the data convincing us; ethnic difference is the only causes of conflict between Somali and Oromia in General and in the Babile, identify ethnic self-assertion specifically in the area.

The big Question is how the political elite used the mind of aseptic people to dirty politics? In the area I have elucidated above, different ethnics groups were lived. Historically, Babile, the son's of Afran Qallo found in the region. In his ancestor, Babile have no child, except the adaption son (Ilma Guddiffacha) that is Hawiya.²⁵ Purposely, the political elite used this narrow hole between the people and bear on intensify the ethnic contention. The recent discourse indicated the above statement briefly. National Disaster Risk Management Commission report that; due to conflict between oromo and Somali, nearly, 1.7 million people has displaced within a very short period of time. Among these, 68,000 Somali planned site in the peripheral Babile border, and At least 256,000 Oromo planned to landing in the Babile town.²⁶ According local residents, Some of Hawiya descent flew to Fik where majority of Hawiya live it. This due to exacerbated the situation and make relate the issue with ethnics. Majority of them are those honours among the communities like Sheik, Haji and Ustad. However they are active to participate on politics. The residents confirm, many Emam²⁷ fade the town and runaway to Jigjiga and others to Fik.²⁸ Many of displayed from Babile, was denied to return when the mediation started by the local elders,

²⁴ OCHA (2018). "Ethiopia: Conflict Displacement Situation Report". For Public Circulation, January, 2018, Addis Ababa, Ethiopia.

²⁵ *Guddiffachaa* practice is one of the common cultural practices of child caring, supporting, and right protection system used by Oromo society. For more detail go to under subtitle Hawiya Somali or Oromo

²⁶ Report by EU Civil Protection & Humanitarian Aid <https://www.youtube.com/watch?v=nDTRxcoCb>
Report from FRANCE 24 English on <https://www.youtube.com/watch?v=lm3KePO2IEk>.

²⁷ Title used by religion leader who commands Masjid prayer in congregation.

²⁸ Informants: Aliyi Hasan, Sheika Abdosh. Communicate with author in the Babile town September 23/2017

religious leader committee invite them for discussion.²⁹ When I met the same people during the conflict time in Babile Town, one of my key Hawiya informant, an ordinary resident in the town, married the Jarso clan women and delivered child with her, inform me the situation briefly. According to him, people who fled from the area was those have relation with officials and no one frightened him by their ethnic.³⁰

Having a strong socio cultural affiliation between ethnic groups in area, the conflict has safeguarded by traditional conflict resolution mechanism before it turn to violence ethnic conflict. Having the same religion, culture and social life, there was no established animosity and violent conflicts at the grass root level in Babile at such.³¹

VI. Conclusion and implications

Ethnic identities are one of the big debates in the Ethiopian political discourse and it's very complicated issue currently. Eastern part of the country is a place where multi ethnic nation lived together and where ethnic tension appear several time specially, within Somali and Oromo ethnic groups. The paper aimed to identify the controverse of some ethnic identity which lead to contention. Geographically, the relationship between ethnic clan from Somali and Oromo in the area are complex one. Historically, in the area relationships are sanitary co-existence and cultural integrations. For example, some of the people who speak Oromo language claim that they originally belong to ethnic Somalis and the reverse for the Oromo.

The Oromo people who are found in the Eastern part of Ethiopia are considered as different clans. These are Afran Qallo, Itu, Humbana, Dhumuga and Karrayu. Among these Afran Qallo is settled with Somali ethnic groups. Afran Qallo refers to four decendent of Qallo who are Babile, Ala, Daga ans Obora. Among these tribes, Babile is settled in the corner of the territory which

²⁹ The Author was there at atime invited on the conference. Eminent Afran Qallo elite, great religious leaders gather and discused about the conflict issue.

³⁰ Informant: Xaha Ali. During the conflict period, I was visit the area due to gathering data for my MA thesis, and I communicate with different elders in the town.

³¹ Ibid.

presently located share border with some Somali ethnic ancestry and lived in present Babile town and its environs.

The ethnic identity is so controversy in the area due to mixed with Somali ethnic group. Hawiya, who call themselves an Babile ancestry, however, Somali genealogical placed their as an Somali. The historical elites in the area assumed, Hawiya is a Son of Babile through adoption Oromo Gada Process; Ilma Guddiffacha. Cultural and social life, these people were merged each other. Identifying and understanding the conflict is important to for designing effective peace building strategies in the area. In previous time, conflicts appear on the resource, however, recently, due to political identification the ethnic identities, conflict appear in the area. The situation more complicated after the referendum settle in the Babile town.

All in all, one must come to the conclusion, identify the ethnic identity in Babile and reconstruct their identity through recording is very necessary to regulate unnecessarily ethnic contention in the area. There was a general consensus, that the territory was the historical land of Afran Qallo son's Babile. Despite this, In contrast, the conflict between contending local political elites had triggered down and impacted a lot on local people in the area. Therefore, the researcher conceives consequences of identification on the ethnic in area need to be addressed and better investigation and the consequence is multifarious for the next work.

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HBase or Cassandra? A Comparative study of NoSQL Database Performance

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Abstract- A significant growth in data has been observed with the growth in technology and population. This data is non-relational and unstructured and often referred to as NoSQL data. It is growing in complexity for the traditional database management systems to manage such vast databases. Present day cloud services are offering numerous NoSQL databases to manage such non-relational databases addressing different user specific requirements such as performance, availability, security etc. Hence there is a need to evaluate and find the behavior of different NoSQL databases in virtual environments. This study aims to evaluate two popular NoSQL databases and in support to the study, a benchmarking tool is used to compare the performance difference between HBase and Cassandra on a virtual instance deployed on OpenStack.

Index Terms- NoSQL Databases, Performance Analysis, Cassandra, HBase, YCSB

I. INTRODUCTION

Data is growing in complexity with the rise in data. Large amount of data is being generated every day from different sources and corners of the internet. This exponential data growth is represented by big data. It is serving different use cases in the present day data driven environment and there is a need to manage it with respect to velocity, volume and variety. The traditional way of managing the databases using relational database management systems could not handle because of the volume and they are capable of storing the data which is schema based and only in certain predefined formats. Big Data paradigm is gradually changing the present data storing techniques, processing, administration and the methods of analysis [1]. This lead to new developments in design and architecture of database management systems to handle the big data. As the data also is non-relational it is often known as NoSQL data. The NoSQL data do not have a fixed structure or schema and it is enormous in volume. They allow storing of multiple forms of data which is structured, unstructured or even semi-structured [1]. They store data in the form of column families, key value data stores, document data stores etc. Hence NoSQL database management systems are designed to replace the traditional SQL DBMS. Since these databases are non-relational, the query language support is subjective.

Different types of NoSQL data bases are being used in the present day applications as they are not dependent entirely on queries for data management. These databases are designed to provide flexible storage requirements. These databases are extensively used in environments where data do not rely on a relational model. There are different NoSQL databases, categorized depending on the type of data store. They are categorized into document based, key value based, column based etc. Each type of database serves user specific data storage requirements. Two such databases are Apache HBase and Apache Cassandra. Both the databases are NoSQL databases and are popularly used for present day non-relational database management. With the rise in cloud technologies, virtualization has become one of the widely adapted technologies. Open source offerings such as OpenStack are providing different platforms to execute the workloads on virtual machines. Though the virtual environments are scalable and highly performing, there are certain challenges when it comes to the latency and bandwidth allocation. As a solution, offerings such as Amazons CloudFront are providing edge locations to replicate and store the data to the closest possible availability zones. However, the performance of the databases in virtual environments and clouds has remained a question to the research community. The types of NoSQL databases are given in figure 1.

This paper aims to evaluate the performance of NoSQL Databases, HBase and Cassandra that are deployed over a single virtual machine in OpenStack. The later sections of the paper, gives an understanding of the key characteristics and the architectures of both the databases and the differences. As a part of the study, the later sections of the paper also covers the performance evaluation techniques implemented in previous research concluding with the evaluation and the results.

| Type of Database | Example |
|----------------------------|---|
| Key-Value Store | Azure Table Storage, Amazon DynamoDB, Redis, Riak, Berkely DB, etc. |
| Column-Family Database | HBase, Cassandra, Hypertable, Amazon SimpleDB, etc. |
| Document-Oriented Database | MongoDB, RavenDB, CouchDB, OrientDB, etc. |
| Graph Databases | Neo4J, Infinite Graph, etc. |

Figure 1 Examples of NoSQL Databases

Identify the constructs of a Journal – Essentially a journal consists of five major sections. The number of pages may vary depending upon the topic of research work but generally comprises up to 5 to 7 pages. These are:

- 1) Abstract
- 2) Introduction
- 3) Research Elaborations
- 4) Results or Finding
- 5) Conclusions

In Introduction you can mention the introduction about your research.

II. LITERATURE REVIEW

There has been a vivid research that was carried out in the field of performance evaluation of database management systems. Several techniques and methodologies were proposed to benchmark the performance of NoSQL databases. [11] has emphasized on the frameworks that are capable of performance evaluation of databases. They proposed a framework that can monitor, analyze and predict the behavior of a database. This architecture helped in forming the challenges that are faced in evaluating NoSQL databases. And it was observed that the behavior of the evaluation framework depends on the database characterization and the testing system. However, their model is inclined toward machine learning and prediction of the database behavioral patterns. [12] gave insights for evaluation of in memory databases. The study emphasized on the available variations of NoSQL databases and the need to determine the best performing databases management system. Their study drew evaluations between the MongoDB, Memcached, Redis and Cassandra. A software based on Java has been used to draw the evaluations over metrics such as the execution time per operation. And their tool was based on the studies conducted by [13]. And [5] emphasized on the advantages of HBase over other NoSQL databases, similarities and the differences between HBase and Googles BigTable.

[14] suggests that NoSQL databases are generally characterized by the properties such as no-schema data models, horizontal scalability, and simple cloud deployment. The study also suggests that there is a need to identify the correct system requirements before deployment to avoid overprovisioning. The benchmarking was done between MongoDB, HBase and Cassandra databases deployed on Amazon EC2. YCSB was used as a benchmarking tool. They have testes each of the database with specific workload deployed on different virtual instances offered by Amazon EC2. The proposed modelling approach suggested complex modelling of replication to accurately depict the performance of a replica. [15] has proposed an approach to benchmark the similar databases such as the column family databases. Brian Cooper emphasized on two tier benchmarking in which one focuses on the performance of the database while the other focuses on the impact on performance due to the scalable feature of database. Their benchmarking system measures the metrics such as the inserts, updates, reads and scans. And they have defined certain workloads to choose from depending on the targeting metric.

[16] compared the performance and the working of SQL databases and NoSQL databases. The comparison is done on a specific dataset. Their study suggested the implementation of transactions in the both types of databases. The transactions were tested over storing the digital media with respect to social media platforms and simulated the social network environments to test the workloads. Their experiment results suggested that NoSQL databases surpass the SQL operations when it comes to the transactions for storing the digital media. Similar evaluations were conducted by [17] between MySQL, Cassandra and Hbase on the write heavy operations. Their experimental implementation was executed with the help of a web-based REST application. The study also emphasized on the CAP properties of the databases and suggests the trade-offs between each database management system. They made use of a java application that in executed with the help of Representational State Transfer. It puts the data in the database using HTTP POST requests. The standard metric for the throughput selected is transactions per second (TPS) and the application was hosted on a Tomcat server. Their test results suggest that HBase has write speeds twice as fast as MySQL database which is a relational database. It is also observed that Cassandra gives significantly fast writes even in a write heavy application.

In summary, [5] gave insights on the differences between the conventional relational database management systems and the Non-relational DBMS. While [11], [12], [13] suggested other evaluation techniques available to evaluate the performance of different types of databases. The implementation that was carried out in the work done by [14] suggested a stable methodology to evaluate the performance of NoSQL databases over the cloud instances.

It's the foremost preliminary step for proceeding with any research work writing. While doing this go through a complete thought process of your Journal subject and research for its viability by following means:

- 1) Read already published work in the same field.
- 2) Goggling on the topic of your research work.
- 3) Attend conferences, workshops and symposiums on the same fields or on related counterparts.
- 4) Understand the scientific terms and jargon related to your research work.

III. KEY CHARACTERISTICS

There are various NoSQL databases available to store different forms of data. Apache HBase and Apache Cassandra were selected for this performance evaluation. These databases offer wide range of functionalities starting from the type of data store. And each database offers different features to manage the data. The key features that differentiate HBase and Cassandra are in the following sections.

A. HBase

Apache HBase is a part of Apache Hadoop. It offers a scalable and distributed big data store in Hadoop. It can be used to achieve real time and random read/write access to the data. It helps in storing very large tables. As it is a column family database, it is capable of storing tables with billions rows X million columns. And this can be deployed in commodity hardware. Similar to BigTable by Chang et al., HBase is a distributed, Open Source non-relational database model. It provides the capabilities of a BigTable over Hadoop file system similar to BigTable for Google File System. The following are the key features offered by HBase;

- HBase provides linear scalability and modularity to the database
- It offers consistent read/write operations
- It offers automatic sharding of tables and can also be configured as per user requirements
- In case of region servers, HBase supports automatic failover
- Hadoop MapReduce tasks are supported by Convenient base classes with Apache HBase tables
- Java API can be used with less complexity for client access
- Real-time queries can be implemented with the help of Bloom Filters and Block caches
- Server side Filters can be used in HBase for Query predicate push down
- HBase offers REST-ful service and Thrift gateways that supports Protobuf, XML, and binary data encoding
- Jruby based shell (JRIB) is included with HBase
- Exporting metrics to files or JMX or Ganglia is supported by metric subsystem of Hadoop

Since HBase is a NoSQL database it does not support SQL. However, SQL support is under development which can be used with the help of Hive. And as it uses MapReduce, requests with low latency cannot be implemented [2]. HBase when compared with a traditional RDBMS, it does not work as a column family database but makes use of the storage format on disk [3]. This is one of the factors that differentiate HBase from the traditional RDBMS. Real time access to analytical data can be seen in the traditional column based databases whereas Hbase provides support to key based access to a single cell of the data or a specific range of cells.

B. Cassandra

Cassandra is a scalable and highly available NoSQL database. It is an open source column store designed to accommodate enormous amount of data over commodity hardware. It is highly available without a single point of failure. This database is also a widely known Column family database and it also works as a Key value store. Similar to HBase it also shares features with Big table [4]. Cassandra is licensed by Apache and is designed to manage large structured datasets. One of the main features of Cassandra is that it allows low latency operations with the help of asynchronous replication without a master node. This can be achieved over the clusters if multiple datacenters. Other than this, Cassandra offers a lot of features which make it stand out. Some of the key characteristics of Cassandra are as follows;

- Cassandra is highly scalable and it can be scaled linearly and elastically
- Increase in the size of a cluster can contribute to the performance of Cassandra database
- It offers continuous availability to the operation critical environments as it has no single point of failure
- Cassandra is highly tolerant
- It allows easy distribution of data by data replication over multiple datacenters

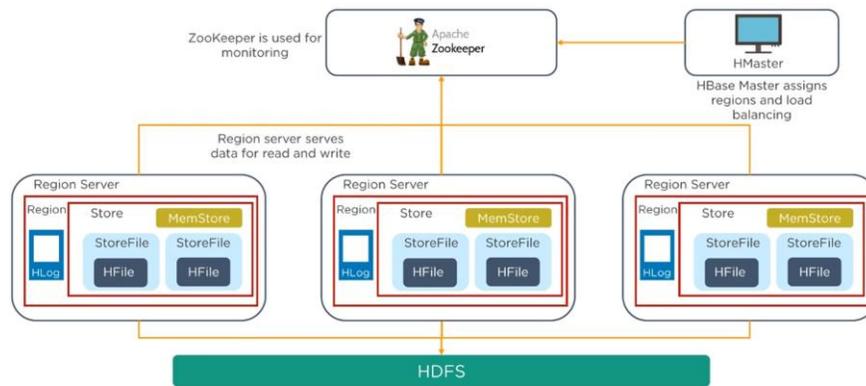


Figure 2 HBase Architectural Components

- It also supports ACID properties which ensures the quality of service and supports high speed writes
- It supports all kinds of data such as unstructured, structured and semi-structured data and also allows user specific changes to the data structures

When compared to a relational database management system, Cassandra is highly dissimilar due to its data model. Efficient storage, associations between concerns, relational look ups are few of the best known characteristics of relational data models whereas the data model for Cassandra is built for large amounts of data storage and performance. Similar to HBase, the data model for Cassandra is query dependent.

IV. NOSQL DATABASE ARCHITECTURES: APACHE HBASE

As mentioned in the previous sections, HBase is a Database designed for Hadoops Distributed File System and it is built on the Map Reduce framework. The difference between HBase and Hadoop HDFS is that HDFS is a file system for storing large datasets or files and unlike a normal file system, it fails to provide instant record lookups and updates [5]. But HBase stores the data in the form of indexed storefiles that are stored in HDFS. This allows to achieve fast lookups of the files. The architecture of HBase has a master node and several slave nodes. Figure 2 Explains the architectural components of HBase. It consists of Master and slave nodes. A Single master node is present in the HBase architecture which assigns the regions and load balancing called HMaster. The slave nodes are Known as the Region Servers. These region servers are the computers in a Hadoop cluster that serves different regions. Each region can only be handled by one region server. When a write request is sent by the client, it is received by the HBase Master and it is further sent to the specified region server. Zookeeper is used to monitor the system. Hence the three major components of HBase are;

- HMaster
- Region Server
- ZooKeeper

A. HBase HMaster

HBase H Master is the Master node or the master server in the cluster. It is responsible for the monitoring of the region servers. It also acts as an interface for any changes that goes into the metadata. In case of distributed clusters, the HMaster node of HBase runs on the NameNode of the Hadoop Map Reduce framework. The startup behaviors and the runtime impacts of the master vary depending on the multi-master setup. When a Hmaster is released by ZooKeeper, the rest of the masters present in the cluster will compete for the role of HMaster. But in case of a Master Shut down, the cluster can be functional as the HBase client directly communicates with the Regional servers. However, the critical functions are controlled by Master such as failover of Region Server. And hence it is required to have another master allocated instantly. According to Jahar Mohamed, an HMaster consists of the following components:

i. ZooKeeper System Trackers

ZooKeeper is used by the HBase HMaster and the Region Server to maintain a track of events that are happening in a defined cluster. ZooKeeperWatcher is a centralized class that is defined in a Master which acts as a proxy for the event tracker targeting ZooKeeper. All node management jobs such as exception, connection handling are handled by the ZooKeeperWatcher. Registered trackers with this class can get notified of the defined event.

ii. External Interfaces

These interfaces are used to establish communication between HBase and the external entities such as HMaster, Region Servers and other utilities. It contains Info server. It is an instance of a jetty server that is initiated by HMaster to follow http requests. It also contains RPC server to maintain the protocols and a Master MXBean to view the monitoring metrics in HBase.

iii. Executor Services

Different types of events posted in an event queue can be abstracted with the help of Executor Services. Each of these events are handled by a specific event handler which are capable of picking the threads from the thread pool.

iv. Chore

Chores are the tasks that are performed regularly in HBase. These tasks are executed in their own threads. Hence this is a repeated function, this provides a while loop and sleep to pause the iterations. The basic function of a Chore in HBase is to keep checking for any unhandled work. Balancer Chore, Catalog Janitor Chore, Log Cleaner Chore and HFile Cleaner Chore are the chore tasks present in HBase.

v. File System Interfaces

The services that interact with Hadoop Distributed File System to manage and store the data with respect to the HMaster code control are categorized as File system interfaces. It contains MasterFileSystem abstraction class that abstracts the operations such as delete region, delete table etc. It also has Log Cleaner and HFile Cleaner chores which are responsible for performing cleaning tasks in the file system.

B. RegionServers

HBase tables are horizontally divided by a row and each vertical unit is the basic available unit of data distribution for tables. These units are called as regions. Each column family is assigned a data store. Regions are assigned to the nodes in the cluster called Region Servers. A region server implementation in HBase can be executed by HRegionServer. They are responsible for serving data to the regions for read and write operations. Region Servers typically run over a DataNode in a distributed cluster. Each Region Server consists of components such as, BlockCache, MemStore, Write Ahead Log, HFile [6].

C. ZooKeeper

ZooKeeper acts as a monitoring system for HBase for assigning regions to the Region Servers and to recover failed Region Servers by replacing them with others. It is a central server which is capable of maintaining the configurations and providing synchronization over distributed systems. The communication link between the client and the regions is managed by the Zoo- Keeper. The Region Servers and the HMaster are to be registered with the ZooKeeper Service. To establish a connection with such HMaster and the Region Servers, a client has to access the ZooKeeper quorum. It quorum is responsible for generating the error messages and recovery in the event of node failure.

The ZooKeeper Service is also responsible for tracking and maintaining information about the Region Servers present in HBase. It maintains information such as the No. of working region servers and the Region Server allocation to data nodes. Different services that are offered by ZooKeeper are as follows:

- Establishing client communication with region servers
- Tracking server failure and network partitions
- Maintain Configuration Information
- Providing ephemeral nodes, which represent different region servers

V. NOSQL DATABASE ARCHITECTURE: CASSANDRA

Handling Workloads in Big Data without a single point of failure is one of the main motivations behind the design and development of Apache Cassandra. In a cluster running with Cassandra, nodes are interconnected in a peer to peer fashion and the distribution of data is achieved over all the nodes of the cluster. Each node in the cluster is independent by itself and also communicates with other nodes and all the nodes are given the similar role. Regardless of the data location, these nodes in the cluster are capable of accepting read and write requests. During the node failure, the data which is replicated into another node is served in the network.

A. Cassandra Ring:

The scalability, performance and the continuous availability are the three key features of Cassandra database and its architecture contributes to it. It has a Ring type architecture in which the master node is absent, often referred to as masterless ring. This ring type architecture makes Cassandra less complex to install and maintain. Due to the scalable property of the architecture, Cassandra is capable of managing large data sets. It also allows several no. of operations that can be performed in a second over multiple datacenters. For example, when a workload is specified to a particular node, that node is not entirely responsible for the operations but the workload is spread across all the nodes in the cluster and hence all the nodes contribute to the operations and the behavior of the cluster [7].

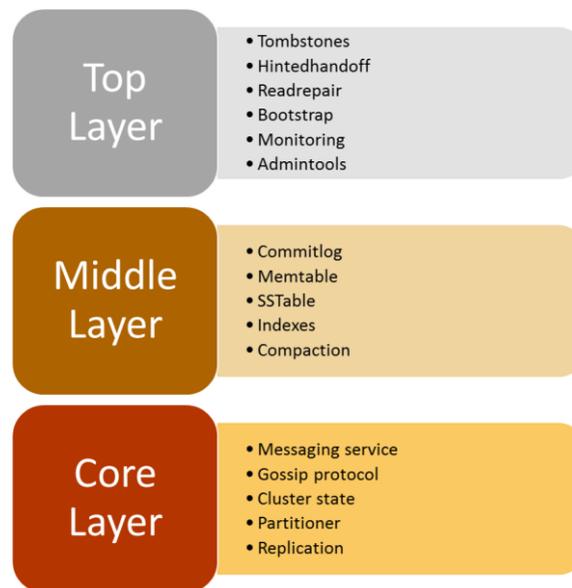


Figure 3 Three layers of Cassandra Architecture [8]

Since the Cassandra cluster implements a continuous hashing algorithm for the distribution of data it is often depicted as ring. Token ranges are defined for each node during the start- up of a cluster. This helps in determining the data range that is stored in the node and the position of a node in the cluster. Each node in the cluster is defined a specific token range to ensure the even distribution of data in the ring. A partitioner determines the set of data that has to be assigned to a node and the node takes the responsibility to manage that data in the cluster. A partitioner acts as a hash function that is capable of computing the token result for a specific row key. This resultant token determines the node to store the data replication. Cassandra includes data partitioners such as RandomPartitioner, Murmur3 and ByteOrdered Partitioners. The architecture of Cassandra mainly contains three layers classified depending on the functions. The three layers are the Core, Middle and the Top Layers. Figure 3 Explains the responsibilities of the three layers in the architecture of Cassandra. Each layer handles different tasks. The responsibilities of each layer are as follows:

i. Core Layer

All the basic operational features of Cassandra are handled by the core layer. Responsibilities such as partitioning, communication across multiple loads, the gossip protocols, messaging and interaction through Thrift or Binary protocol, Clusters, cluster behavior and the replication of data are maintained by the Core layer.

ii. Middle Layer

The middle layer of Cassandra architecture acts as the communicator between the nodes and the clusters. It is responsible for maintaining the communication and logs the communication requests. It maintains Commitlogs, Mem tables and the SSTables to track the two phase commit in the database. This helps to maintain the consistency of the data. It also maintains the data indexes to know in which node the data is getting stored and the compactions to leverage the optimal utilization of the memory.

iii. Top Layer

This layer acts as the communicator between the external entities and the cluster. It provides an extraction layer responsible for communicating with the core layer services. The top layer has services such as Tombstones, Hintedhandoff, readrepair which are responsible for maintaining backups and restores of the data in a particular node. Other services include system Cluster bootstrapping, Monitoring the cluster ecosystem and admintools to give maintain security and integrity of the data on the node.

B. Gossip Protocol

Gossip protocol is one of the vital component of Cassandra cluster. It is used to know the state of all the nodes that are available in a cluster. Nodes in the cluster implement gossip protocol to exchange state information about other nodes they were notified about and themselves. This can be achieved with other three nodes in the cluster. To reduce the network load, the nodes do not send messages to all the other nodes in the cluster but can only send messages over a time period and the node information will reach all the nodes of the cluster. Gossip protocol is helpful in case of failure detection. The advantages of this protocol are that the execution is simple, it facilitates the cluster scaling up or scaling down at any point of time as there is no single entity that takes up the responsibility of all the nodes in the cluster. Every node in the cluster has mutual and equally shared responsibility. This differentiates Cassandra from conventional

Master-Slave implementation. Reliability is also one of the best features of Gossip Protocol as it can help discover any node failures in the cluster and can immediately replace the node.

C. Cluster Bootstrapping

Each cluster in Cassandra database must be identified by a name tag. All the nodes inside the cluster will have the same name. Some nodes are used to help the startup processes of a cluster and these are called as seed nodes. The main purpose of these seed nodes is to assist in bootstrapping a cluster with the help of Gossip Protocol. Seeds provide the list of active nodes in a cluster which can be used by the newly launched nodes to find the nodes in its cluster. As mentioned above each node can communicate about the state information only with other three nodes. The state information of the nodes is continuously shared and updated in the cluster which contains the information about the message sending node and the other nodes that previously sent the message in the cluster. This helps to disclose the information of all the nodes.

VI. DIFFERENCES BETWEEN HBASE AND CASSANDRA

HBase and Cassandra are two different NoSQL databases licensed by Apache. Since both the databases are non-relational databases they share identical features. Similarities such as being wide-column NoSQL database stores based on BigTable are prominent. As HBase runs on top of Hadoop, it does not support query languages but it works with HBase shell which is based on JRuby and can also include features such as Hive and Drill. Cassandra on the other hand supports its own Cassandra query language. Both of these databases offer different security policies and also differ in transaction management.

A. Security

Similar to any other NoSQL database, Cassandra and HBase have their own security challenges and workarounds. The first issue with high security in these databases can be loss of performance. But both of them offer unique features to address these security issues. They ensure security of data by authentication and authorization. But, Unlike HBase Cassandra has more rigid security features such as inter-node and client to node data encryption. But HBase makes use of other technologies to secure the communication between the client and the cluster.

HBase offers cell level security features. It offers the following options;

- Authentication,
- Role-based security
- Data Security, Logging

HBase offers authentication both from server side and the client side. As it maintains the user credentials it also provides secure storage of these credentials. It uses different kinds of protocols to authenticate the traffic into the database. As HBase also works in distributed mode, the database servers can authenticate themselves with each other to secure the communication in the cluster. A credential store is provided to securely store the data about the user credentials. It is often stored in an external file. HBase also ensures the security by providing roles. It is a secure approach to authorizing the user access into the contents of database. Implementation of role-based security can simplify the operations and administration of security in the database. It allows users to create their own roles called custom roles and also provides default roles. Moreover, it is essential to define the scope of each role to ensure finer granularity especially for highly sensitive data.

Logging is also one of the security features of HBase which is helpful in maintaining the database security. HBase achieves database security by encrypting the database partitions. Logging the events also helps in ensuring the security of the environment. Security logs can record the information such as the no. of users that are logged into the cluster. HBase defines a administrator to select the events to be recorded in the log. HBase supports Configurable event logging and Fixed Event logging

B. Security: Cassandra

Cassandra provides three different security functionalities to the database. They are

- Client Authentication
- Authorization and
- Inter-node and client communication encryption with TLS/SSL

However, these features come disabled initially as Cassandra is known to be easily found by the members of cluster. Proper configuration of these given security features can help in ensuring the security of the cluster. Communication security is achieved by enabling TLS/SSL encryption for inter node communication and between client machine and database. It ensures that the data in transit is not compromised. FIPS settings can also be configured at the runtime level to not change the encryption settings in Cassandra.yaml. Cassandra also implements roles for the database which can be applied to a single user or to a user group. These roles can define permissions and authenticate the users. Role management is also facilitated by Cassandra which enables to configure the default role configurations.

Authentication and authorization are essential to maintain security in the database. The authentication is provided by an authenticator

class in Cassandra configurations. It allows two options, allow authenticator which is responsible check the authentication without any credentials required and Password Authenticator which takes the user credentials such as passwords and stores them in a table. Authorization is handled by an authorizer configuration. There are Allow authorizer which does not require any checking and grants permissions to the user roles. It also comes with default Cassandra authorizer which handles permission management and stores the user data in a system table.

In Detail, not only both the databases provide access control over the whole system but also they allow a level of flexibility. HBase offers access control to the deepest level such as the cell level. whereas, Cassandra provides access control to Row level. User roles are other security feature offered by Cassandra which sets access control to the users and other nodes and can be used later to determine the user access over a particular data set. Unlike Cassandra, HBase offers an inverse approach to user roles by providing visibility label that can be assigned by the administrator to a particular data set. This can give the user access form the administrators side.

C. Transaction Management: HBase

HBase supports ACID properties and hence it provides atomicity to any changes on the basis of Rows, even in case of changes to different column families. However, it is not assured that a transaction is consistent for changes across rows. Even though HBase uses HDFS to store the data, the write operations often go through region servers and they are responsible for diverting the traffic to multiple regions. In case of a write operation to a particular row, that is present in a region, the region server locks that row across all the other columns and does not allow any writes to that particular row. It means that it can only allow a single row transaction. And further the region server records the transaction in the Write ahead log to store it on HDFS. After this transaction, put operations are performed over all the column families that are defined in the put operation. Since the writes are recorded in the Write Ahead Log, new region servers that replace the failed region servers can perform all the write operations for a region and start serving traffic.

However, HBase also offers a concurrency control system called Multiversion Concurrency Control that multiple concurrent reads and writes across multiple rows in a region ensuring the semantics of row-level transactions. Briefly, HBase tables consists Key-value pairs. The first column can be considered as a Key and the rest as the values for the defined key. As it is defined similar to a SQL record, transactions within the columns can be possible. As it is a NoSQL database, transactions between the column families are not supported. However, external support can be available from other engines such as Apache Tephra [9] which is a transaction engine. It comes with Transaction Server, transaction client and a transaction processor.

D. Transaction Management: Cassandra

Similar to HBase, Cassandra also supports ACID properties but unlike a conventional RDBMS, it does not use locking and rollbacks. It offers transactions that are atomic and isolated with user defined consistency to ensure the durability. Which means it can only support atomicity, Isolation and durability of the ACID properties. Being a non-relational database, Cassandra does not foreign key joins. It offers isolation and atomicity at row level and also provides high availability and high speed write by losing transactional atomicity and isolation. It treats an operation of write over multiple rows of a partition as a single operation, an atomic operation and it is similar for a delete operation. Client side timestamps are used by the database to define the latest transactions to a column. On a data request, the latest timestamp is viewed first as it is the last updated record in the database.

Other operations such as writes and deletes are fully isolated at the row level. A write to a row in a column or a single partition over a node can only be accessed by the user that is performing the operation. This operation is isolated from the other nodes and the users until the transaction is deemed complete. But performing isolated batch operations is not supported by Cassandra when it comprises multiple partition changes. The transactions in the database are durable, as all the write operations are recorded in a commit log and memory. In the event of a node failure before the flushing of memtables to the disk, the commitlog helps in recovery of lost writes. Replication in Cassandra contributes to the durability of the transactions. Another feature of Cassandra is that it offers light weight transactions often referred as compare and set transactions [10]

VII. PERFORMANCE TEST PLAN

For testing the performance of HBase and Cassandra, a java based tool YCSB has been taken into consideration. The test follows several iterations to test both the databases in different workloads. A test harness file is used to bind the databases with YCSB. The configurations and the specifications required for the test environment are as follows:

A. System Specifications

Native Machine:

- Processor: AMD A8-6410 APU with AMD Radeon R5 Graphics, 4CPUs 2.0 GHz
- Memory: 16 GB
- Operating System: Windows 8.1

```
sidewinder@dsm1:~$ lscpu
Architecture:          x86_64
CPU op-mode(s):       32-bit, 64-bit
Byte Order:           Little Endian
CPU(s):               2
On-line CPU(s) list: 0,1
Thread(s) per core:   2
Core(s) per socket:   1
Socket(s):            1
NUMA node(s):        1
Vendor ID:            GenuineIntel
CPU family:           6
Model:               79
Model name:           Intel(R) Xeon(R) CPU E5-2673 v4 @ 2.30GHz
Stepping:             1
CPU MHz:              2294.686
BogoMIPS:             4589.37
Virtualization:       VT-x
Hypervisor vendor:   Microsoft
```

Figure 4 lscpu console of Virtual instance

Virtual Instance: OpenStack

- Processor: Intel Xeon CPU E5-2673 v4 2.30 GHz
- VCPUs: 2
- Memory: 8 GB
- Hadoop 3.1.2 for HBase
- Apache HBase 1.4.0
- Apache Cassandra 3.11.4
- YCSB-0.14.0 Yahoo! Cloud Servicing Benchmark

Figure 4 shows the other system specifications of the virtual instance launched on OpenStack. This is achieved by executing lscpu command.

B. Workloads Selected:

YCSB[15] is an open source benchmarking tool that offers different workloads to test different read and writes in a distributed environment. It offers five different workloads; these workloads vary in nature. Following are the selected workloads;

- Workload A: Update heavy with 50-50 reads and updates
- Workload D: Read latest with 95-05 read-inserts

C. No. of Opcounts Defined:

The performance tests are executed with different number of operational counts.

- 100000
- 125000
- 175000
- 200000
- 250000

The performance test strategy is to install and run standalone HBase and Cassandra data-bases on a virtual machine deployed on OpenStack. To achieve this an OpenStack VM was launched with minimal configuration. Hadoop was installed to support the underlying HDFS system of HBase. Later HBase and Cassandra were installed and tested. YCSB was installed and configured to test both the databases. A set of configuration files called testharness were used to define the no. of opcounts, the test database and the workloads.

VIII. EVALUATION

To evaluate the performance of HBase and Cassandra, YCSB-0.14.0 was used. As suggested by the previous evaluation studies over NoSQL databases and the performance evaluation of distributed cloud environments, Yahoo Cloud Servicing Benchmark is chosen to draw the analysis. From different workloads offered by YCSB, workload A and workload D are selected. Both of these workloads have different specifications. The evaluation of both databases is executed on a single virtual instance with 2 VCPUs and 8GB of memory. After each test run, YCSB generates data over different metrics of the operations involved in the workload. Metrics such as throughput, runtime, scavange time, sweep time etc. Since the operations involved in the workloads present the metrics for evaluation, average latency is taken over the operations performed.

A. Workload A:

The YCSB client’s workload A is an update heavy workload. It uses read() and update() methods to evaluate. These methods represent the standard create, read, update, delete operations in a database.

i. Average Read Latency over Read operations:

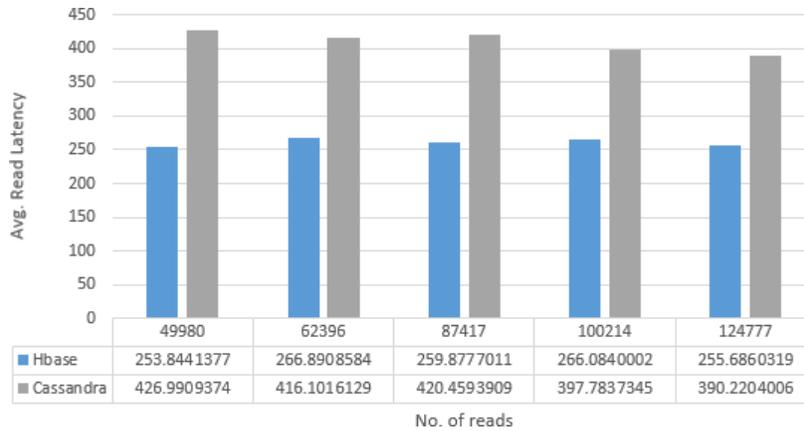


Figure 5 No.of read operations against average read latency

The above given data is the representation of the performance variations in workload A. The graph in Figure 5 is plotted between the average read latency of the operations. The test is executed in five iterations with different operational counts. It can be observed that HBase has less latency in over the read operations and the latency stayed almost the same except for the operations more than 100000 and the latency tends to decrease with further increase in reads.

ii. Average Update Latency over Update operations

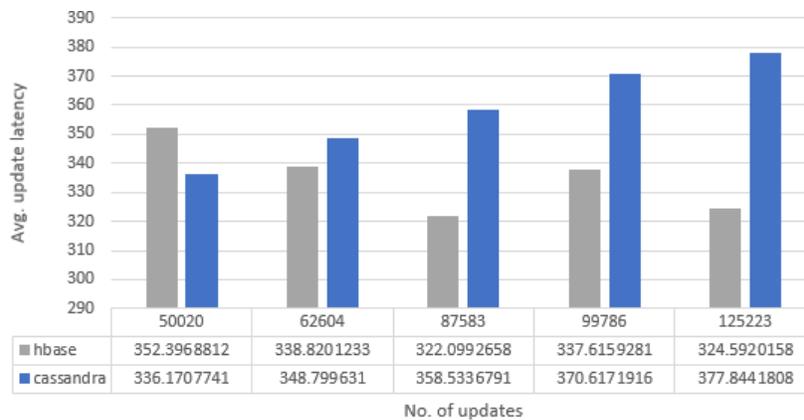


Figure 6 No.of Update operations against average Update latency

From Figure 6, it can be observed that from the given operational counts, the Update latency in Cassandra increased with the increase in no. of updates performed. But HBase has fluctuating latency over different no.of update operations.

| Reads | HBase | Cassandra |
|--------|----------|-----------|
| 49980 | 253.8441 | 426.9909 |
| 62396 | 266.8909 | 416.1016 |
| 87417 | 259.8777 | 420.4594 |
| 100214 | 266.084 | 397.7837 |
| 124777 | 255.686 | 390.2204 |

| updates | HBase | Cassandra |
|---------|----------|-----------|
| 50020 | 352.3969 | 336.1708 |
| 62604 | 338.8201 | 348.7996 |
| 87583 | 322.0993 | 358.5337 |
| 99786 | 337.6159 | 370.6172 |
| 125223 | 324.592 | 377.8442 |

Table 1 Average update and read latency in HBase and Cassandra

The above given data represents the no. of Read and Update operations performed and the recorded average latency for both the operations. As YCSB presented different metrics for performance evaluation, the throughput performance is also considered.

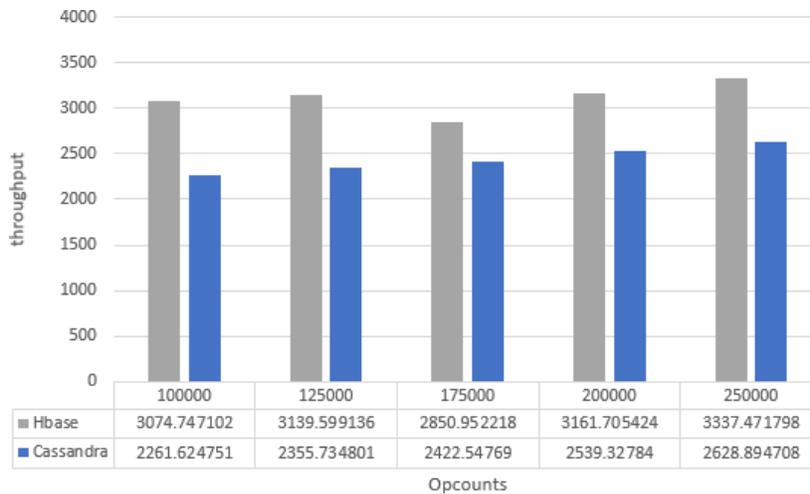


Figure 7 Throughput over no.of operations in HBase and Cassandra

The throughput performance of both HBase and Cassandra are presented in Figure 7. It is observed that Cassandra has a rise in throughput with increase in workload. whereas HBase showed equivalent throughput but higher throughput is recorded at the highest operational count i.e 250000.

B. Workload D

Workload D offered in YCSB is a read latest workload which has 95 percentiles of read operations and 05 percentile of insert operations. These operations are executed in several iterations similar to workload A.

i. Average Read Latency against No. of Read operations:

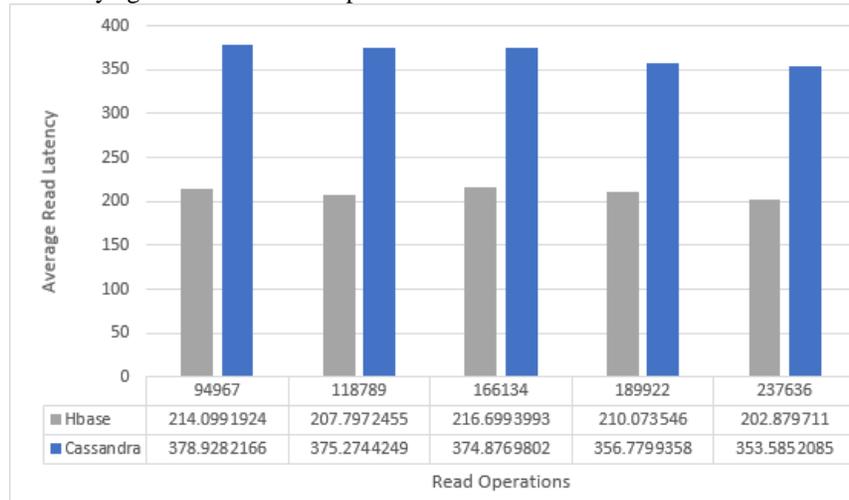


Figure 8 Average Read Latency over no. of reads

Figure 8 shows the differences in average latency in read against the number of read operations in the database. It can be seen that Cassandra has higher average read latency than HBase but all the operation counts are relatively equivalent.

ii. Average Insert latency against No.of Insert operations:

It can be seen in Figure 9 that the average insert operations in Cassandra are equivalent to all the different counts of inserts but Hbase showed significant peaks in workload D at 8866 and 10078 inserts. As workload D is a read latest workload, less inserts are observed. Higher insert operations are performed with the higher number of operational counts. The graph in Figure 10 represents the throughput of each operation for different number of operations. From the recorded observations, it can be seen that Cassandra has slight increase in the throughput with increase in operational counts. On HBase, fluctuations in throughput are observed. at the beginning of the workload, the throughput was high and the highest was recorded at 250000 opcounts.

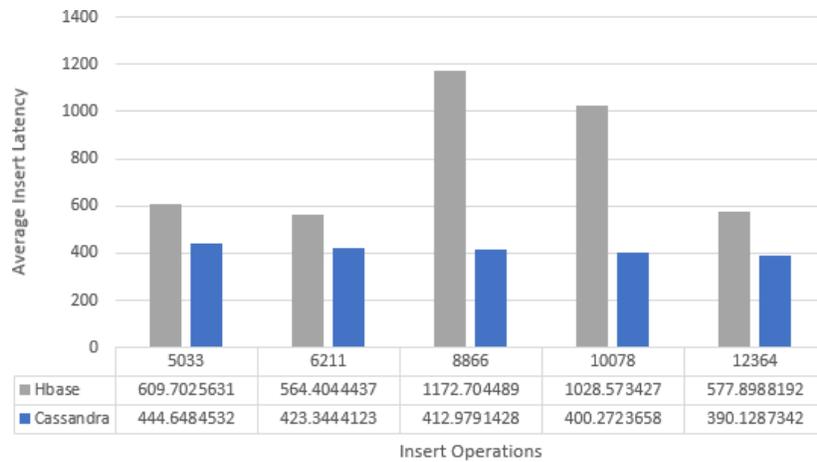


Figure 9 Average Insert latency over Insert operations

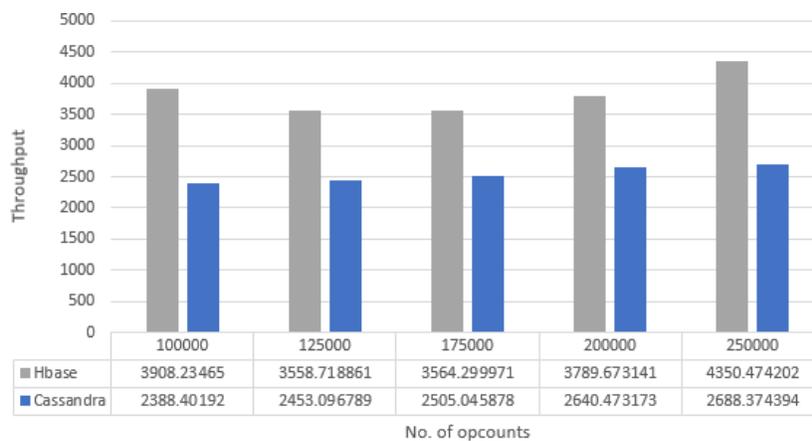


Figure 10 Throughput of databases over opcounts

Table 2 represents the data that is recorded in workload D. As the workload is read latest both read operations and the insert operations are considered for both the databases. Throughput is also given to determine the best performing database among the two.

| Read | Read Latency | | Opcounts | Ththroughput | | Insert | Insert Latency | |
|--------|--------------|-----------|----------|--------------|-----------|--------|----------------|-----------|
| | Hbase | Cassandra | | Hbase | Cassandra | | Hbase | Cassandra |
| 94967 | 214.0992 | 378.92822 | 100000 | 3908.235 | 2388.402 | 5033 | 609.70256 | 444.6485 |
| 118789 | 207.7972 | 375.27442 | 125000 | 3558.719 | 2453.097 | 6211 | 564.40444 | 423.3444 |
| 166134 | 216.6994 | 374.87698 | 175000 | 3564.3 | 2505.046 | 8866 | 1172.7045 | 412.9791 |
| 189922 | 210.0735 | 356.77994 | 200000 | 3789.673 | 2640.473 | 10078 | 1028.5734 | 400.2724 |
| 237636 | 202.8797 | 353.58521 | 250000 | 4350.474 | 2688.374 | 12364 | 577.89882 | 390.1287 |

Table 2 Workload D Data

IX. CONCLUSION AND DISCUSSION

NoSQL databases are gaining attention with the rise in distributed technologies, digital media etc. Unlike the conventional relational DBMS, NoSQL are non-relational and they offer more functionalities to store different kinds of data. From the performance evaluation conducted over HBase and Cassandra, several variations in the database behavior has been observed and presented in the evaluations. HBase being backed up with HDFS, it has a relatively larger ecosystem that Cassandra. Both the databases have performance exceptions at higher workloads. At workload A, Cassandra has fluctuating latency during read operations but HBase presented significantly less latency during reads. with the rest of the operations as updates, HBase showed the fluctuating records but Cassandra has increased latency. Runtime for each operation can also be considered but to know the performance of the virtual machine running both databases other metrics had to be considered. however, form the observations, Cassandra has higher runtimes than HBase.it can be assumed that it is because of the Hadoop map reduce framework.

Though YCSB helped in the evaluation of performance with different metrics, multiple databases cannot be evaluated in a single execution of the tool. However, features such as high scalability and the fast writes speeds of Cassandra can help when executing higher workload as observed. The properties of HBase such as SQL type execution and properties shared with BigTable can make the database suitable for write heavy applications. And significant performance increase can be observed on a native deployment as the network

latency issues can be mitigated. Though YCSB is successful in presenting the metrics, new metrics can be can also be included and tested. There is a scope in research towards forming new metrics and simplified performance evaluation tools.

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DETERMINATION OF ANTIFUNGAL ACTIVITY OF HERBAL OINTMENT PREPARED FROM LEAF EXTRACT OF *Cassia fistula* ON LABORATORY SPECIMEN OF *Candida albicans*

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Abstract: Plants produce variety of medicinal components that can inhibit the growth of pathogens. Current advancement in drug discovery has intensified the efforts for exploring novel medicines from Ayurveda Medicine. In Ayurveda system of medicine, every part of *Cassia fistula* is used for the treatment of many diseases. Leaves extract of *Cassia fistula*, which is used as an external application in indigenous medicine in Sri Lanka to cure many skin diseases such as *Kustha*, *Dadru*, *Visarpa* and *Vruna*. *Candida albicans* is the most common fungi that cause skin infections. This study was conducted to determine the antifungal activity of *Cassia fistula* leaf extract against the laboratory specimens of *Candida albicans*. 6 mm diameter wells on Sabouraud Dextrose Agar were used in the application of well diffusion method. Fluconazole 2.5 mg/ml was used as positive control. Supernatant solution of leaf extract of *Cassia fistula* and fresh leaf extract of *Cassia fistula* were used comparatively to determine the antifungal activity. The mean inhibitory zone diameter of fresh leaf extract of *Cassia fistula*, supernatant solution and positive control were 23 ± 1.0 mm, 0 ± 0.0 mm and 22.66 ± 0.5 mm respectively. Fresh leaf extract of *Cassia fistula* showed more inhibitory effect than the effect of supernatant solution of leaf extract of *Cassia fistula* and positive control. Antifungal (22 ± 0.5 mm) ointment was prepared by using fresh leaf extract of *Cassia fistula* on the basis of previous results. The mean inhibitory zone diameter of the positive control was 23.3 ± 0.5 mm. According to the results obtained, it could be concluded that herbal ointment of *Cassia fistula* fresh leaf extract has potential effect in the management of infections caused by *Candida albicans*. Further studies are needed to determine the antifungal effect of isolated active compounds present in fresh *Cassia fistula* leaf extract.

Keywords: *Cassia fistula*; Leaf extract; Antifungal effect

Introduction

The frequency of life-threatening infections caused by pathogenic microorganisms has increased worldwide. Large number of antimicrobial agents have been discovered; pathogenic microorganisms are constantly developing resistance to these agents. Therefore, it is necessary to search for more effective and less toxic novel antifungal agents. An important group of the skin pathogens are the fungi, among which dermatophytes and *Candida* spp. are prominent. *Candida albicans* (sometimes referred to as monilia) is a fungus that is normally present on the skin and in mucous membranes such as the vagina, mouth, or rectum. When an overgrowth of *Candida* develops on the skin, an infection can occur that called as candidiasis of the skin, or cutaneous candidiasis. Candidiasis of the skin often causes a red, itchy rash to form, most commonly in the folds of the skin which also spread to other areas of the body.

Cassia fistula Linn, belongs to family Caesalpiniaceae commonly known as *Ahala* in Sinhala has been widely used in different types of traditional medicines. *Cassia fistula* has been described to be useful against skin diseases, liver troubles, tuberculosis, hematemesis, pruritus, leukoderma, and diabetes. It contains various types of constituents such as rhein, triterpenes, sugar, and potassium. The antibacterial and antifungal activities of hydroalcohol extracts of leaves of *Cassia fistula* were tested against Gram-positive, Gram-negative, fungal strains. (Bhalodi and Shukla, 2011). In Ayurvedic medicine, the golden shower tree is known as *Aragvadha*, which meaning as "disease killer". Leaves extracts of *Cassia fistula* are medicine for external application which is used in Indigenous Medicine in Sri Lanka to cure disease such as *Kustha*, *Dadru*, *Visarpa*, *Vruna*, *Daha* and etc. (Department of Ayurveda, 1976). Application of the leaves pulp of *Rajavrksa* cures *Kustha*. (Sharma, 2004). Amongst the Eighteen types of *Kusthas*, *Dadru* is characterized by itching sensation, redness, pimples and circular patches with elevated edges (Sharma, 2004). Prepared *kalka* from the leaves of *Aragvadha* by titrating them along with *aranala* (a sour drink) used for external application to cures *Dadru* (Ringworm), *Kitima*, *Sidhma* and other varieties of *Kustha* like skin disease including Leprosy. (Lochan, 2006).

Objectives of this study were to identify the suitable method to prepare the Antifungal Ointment according to the antifungal activity of fresh leaf extracts of *Cassia fistula* and supernatant of *Cassia fistula* with fluconazole which is used as an antifungal drug in modern medicine. Also, to determine the Antifungal activity of prepared Ointment with fluconazole which is used as an antifungal drug in modern medicine.



Figure 1: *Cassia fistula* Plant



Figure 2: *Candida albicans*



Figure 3: Candidiasis of the skin

Methodology

Fresh leaves of *Cassia fistula* were collected from the Gampaha Wickramarachchi Ayurveda Institute. All materials were cleaned by using hot water. 700g of fresh leaves were measured by using electronic precision balance. Fresh leaves were cleaned well by using water. Measured fresh leaves were blended well by using the wooden pestle and motor to form small particles. Fresh extraction was taking by filtering through autoclaved filter cloths. 500 ml of *Cassia fistula* fresh leaf extract was collected.

- Preparation of Supernatant of leaf extract of *Cassia fistula*

Cassia fistula fresh extraction was centrifuged by using centrifuger and 8 centrifuge tubes that filling of 12 ml for each tube. Fresh extraction was centrifuged in the rate of 3500 rpm for ½ hr. Precipitate was removed and reminder was collected to a conical plasque by using the pipet. 100 ml of above supernatant was collected to the beaker.

- Preparation of Inoculum

3-5 colonies of standard strain *Candida albicans* was suspended in 9 ml of distilled water. The turbidity was adjusted to be visually comparable with 0.5 McFarland standards.

- Preparation of Sabouraud Agar

Sabouraud Agar was prepared from a commercially available dehydrated base according to the manufacturer's instructions and allowed to autoclave for 2 hrs, and then it allowed cooling. Poured medium into glass flat-bottomed petri dishes on a level; horizontal surface to give a uniform depth of approximately 4 mm. This corresponds to 25 ml to 30 ml for plates with a diameter of 100 mm. The plates were incubated at 37°C for 1 hour then it allowed solidifying at room temperature.

- Preparation of positive control

Fluconazole (Pfizer-Roerig, Inc., New York, N.Y.) was prepared from 50-mg tablets suspended in distilled water to a final stock concentration of 2 mg/ml and filter sterilized.

- Preparation of Petridis

Inoculum was spread over the nutrient agar plate using a sterile cotton swab in order to obtain uniform microbial growth. Well was prepared by sterile 8 mm cork borer. Pour the 50 µl of Supernatant of *Cassia fistula*, 50 µl of prepared Fluconazole as the positive control and 50 µl of distilled water as the negative control into wells. Pour the 50 µl of Fresh leaf extract of *Cassia fistula*, 50 µl of prepared Fluconazole as the positive control and 50 µl of distilled water as the negative control into wells. The plates were incubated at 37°C for 24 hours and measured the inhibition zone by using normal ruler.

- Interpretation of the zone sizes

Using the interpretative chart, the zones size of each antimicrobial, reporting the organisms as 'Resistant', Intermediate sensitivity', Sensitivity (susceptible).

Zone size for fluconazole 8 mcg: Resistant < 14mm, Susceptible dose dependent – 15mm-18mm, Sensitive > 19mm

- Preparation of an Herbal cream

White soft paraffin - 100g

Boiling distilled water – 40 ml

Emulsifying wax - 60g

Leaves extraction of *Cassia fistula* – 160 ml

Liquid paraffin - 40 ml

Emulsifying wax, White soft paraffin and Liquid paraffin were mixed in a beaker which immersed in a water bath at 70 °C while steering at 800-1200 rpm. Boiling distilled water was taken in another beaker and slowly added the water part into the container and kept steering. water bath was turned off and reduce the temperature up to 40°C. Leaves extraction was added to it and steered well to form the cream. It was steered until cool just above room temperature and transferred in to suitable containers.

Results

- Trial 01



- (+) - Fluconazole
- (-) - Distilled water
- (P) - Supernatant of *Cassia fistula* leaf extract

Figure 4: Zone of inhibition in Trial 01

| Disc number | 1 | | 2 | | 3 | |
|-------------------|---|---------------------|---|---------------------|---|---------------------|
| Type of Sample | P | Fluconazole 8mcg | P | Fluconazole 8mcg | P | Fluconazole 8mcg |
| Zone Diameter(mm) | 0 | 23 | 0 | 23 | 0 | 22 |

Table 1: Mean inhibitory zone diameters between Sample P with Fluconazole

- Trial 02



- (+) - Fluconazole
- (-) - Distilled water
- (A) - Fresh leaf extract of *Cassia fistula*

Figure 5: Zone of inhibition in Trial 02

| Disc number | 4 | | 5 | | 6 | |
|----------------|---|-------------|---|-------------|---|-------------|
| Type of Sample | A | Fluconazole | A | Fluconazole | A | Fluconazole |

| | | | | | | |
|-------------------|----|------|----|------|----|------|
| | | 8mcg | | 8mcg | | 8mcg |
| Zone Diameter(mm) | 24 | 22 | 22 | 23 | 23 | 23 |

Table 2: Mean inhibitory zone diameters between Sample A with Fluconazole

- Trial 03



- (+) - Fluconazole
- (-) - Distilled water
- (E) - Prepared Ointment of Fresh leaf extract of *Cassia fistula*

Figure 6: Zone of inhibition in Trial 03

| | | | | | | |
|-------------------|----|------------------|----|------------------|----|------------------|
| Disc number | 7 | | 8 | | 9 | |
| Type of Sample | E | Fluconazole 8mcg | E | Fluconazole 8mcg | E | Fluconazole 8mcg |
| Zone Diameter(mm) | 22 | 23 | 22 | 23 | 22 | 24 |

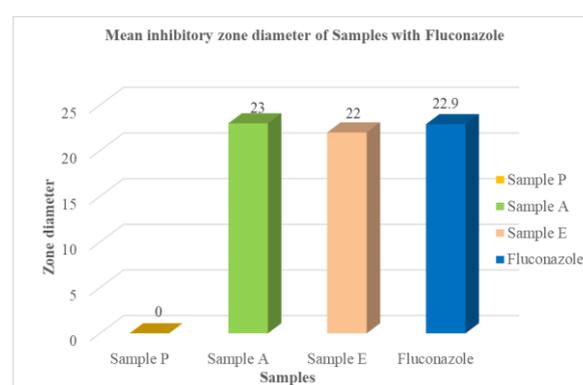
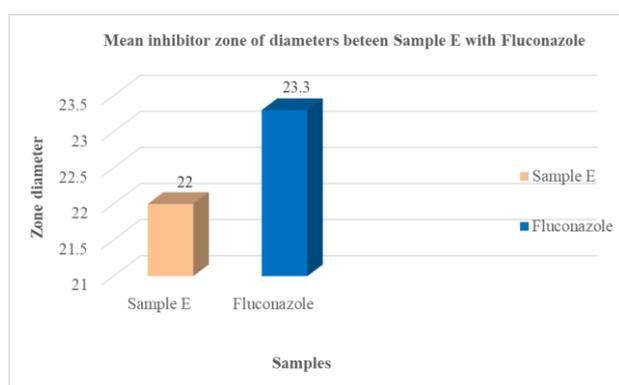
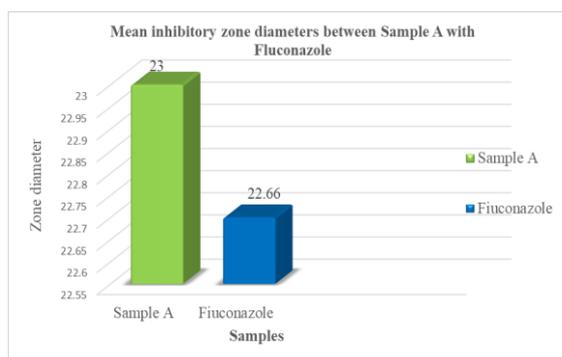
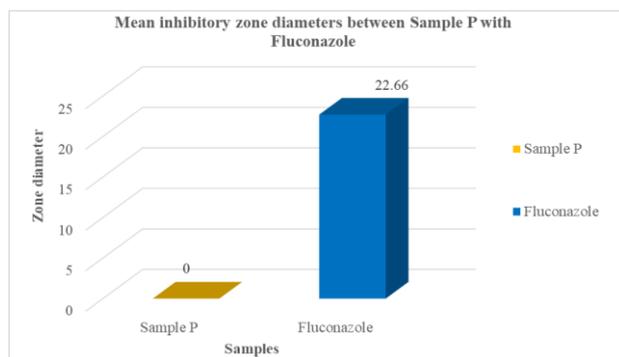
Table 3: Mean inhibitory zone diameters between Sample E with Fluconazole

| | | | | | | |
|-----------------------------------|---|------------------|----|------------------|------|------------------|
| Type of Sample | P | Fluconazole 8mcg | A | Fluconazole 8mcg | E | Fluconazole 8mcg |
| Mean inhibitory Zone Diameter(mm) | 0 | 23 | 23 | 22.7 | 22.4 | 23 |

Table 4: Mean inhibitory zone diameters of Samples with Fluconazole

| Trial | Samples | Mean inhibitory zone diameters | Std. Deviation |
|----------|-------------|--------------------------------|----------------|
| Trial 01 | Sample P | 0.0000 | 0.00000 |
| | Fluconazole | 22.6667 | +0.57735 |
| Trial 02 | Sample A | 23.0000 | +1.00000 |
| | Fluconazole | 22.6667 | +0.57735 |
| Trial 03 | Sample E | 22.0000 | +0.00000 |
| | Fluconazole | 23.3333 | +0.57735 |

Table 5: Std. Deviation on Mean inhibitory zone diameters of Samples



Prepared Ointment of Fresh leaf extract of *Cassia fistula* was presented as 22.4 mm of Mean inhibitory zone diameter. Mean inhibitory zone diameter was higher than 19 mm. Therefore Sensitivity of *Candida albicans* against the Ointment was higher than the normal level of sensitivity (> 19 mm).

Discussion

Plant based antifungal compounds have enormous therapeutically potential as they can serve the purpose without any side effects that are often associated with synthetic antifungal. Antifungal activity of the *Cassia fistula* leaves measured by using Supernatant of leaf extract of *Cassia fistula* (sample P) and Fresh leaf extract of *Cassia fistula* (sample A). Suitable method was identified to prepare the antifungal cream according to the evaluated antifungal activity of those samples. Sample P was prepared by using the supernatant of leaf extract of *Cassia fistula* in trial 1 and Mean inhibitory zone diameter of sample P has given 0 mm that results showed no any inhibitory effect against *Candida albicans*. According to the sample P that antifungal effect on supernatant of leaf extract of *Cassia fistula* showed no inhibitory effect against *Candida albicans*. This showed that using the Supernatant of leaf extract of *Cassia fistula* was not the most suitable method to prepare the Antifungal cream. The trial 2 was done by using the Fresh leaf extract of *Cassia fistula* as sample A and Mean inhibitory zone diameter of sample A has given 23 mm. The Fluconazole 8 mcg were used as controls for comparison with the selected herbal extract. Mean inhibitory zone diameter of 8 mcg of Fluconazole has given 22.66 mm. These results were interpreted that the Fresh leaf extract of *Cassia fistula* has more inhibitory effect than the supernatant of *Cassia fistula*. This tends to show that the active ingredients were better extracted in Fresh leaf extract of *Cassia fistula* than Supernatant. The active ingredient of the *Cassia fistula* leaves was less extracted to the Supernatant and other part of active ingredient were extracted to the precipitate which was clear from the present results of sample A.

It means the efficacy of sample A is better than Fluconazole that treatment for *Candida albicans*. Therefore, Fresh leaf extract of *Cassia fistula* can use to treatment for *Candida albicans* infection. The Antifungal Ointment was prepared according to the above evaluated antifungal effect of Fresh leaf extract of *Cassia fistula*. Antifungal activity of the Ointment that made from Fresh leaf extract of *Cassia fistula* were evaluate and Mean inhibitory diameter was identified 22 mm as Sample E. Therefore, this antifungal Ointment that made from Fresh leaf extract of *Cassia fistula* can use to treat for *Candida albicans* infection.

Conclusion

Standing on above results it was concluded that *Cassia fistula* leaves has antifungal activity of *Candida albicans* infection. The efficacy of the Fresh leaf extract of *Cassia fistula* is higher than the Supernatant of leaf extract of *Cassia fistula*. The efficacy of the sample A was better than 8 mcg of Fluconazole. This antifungal Ointment that made from Fresh leaf extract of *Cassia fistula* can conclude to treat for *Candida albicans* infection.

Further research is necessary to determine the identity of the antifungal compounds from within the plants and also to determine their full spectrum of efficacy. Also, further research is necessary to determine the antifungal activity against fungal species of Human Ringworm Disease. However, the present study of in vitro antifungal evaluation of some plants forms a primary platform for further phytochemical and pharmacological studies to discover new antibiotic drugs.

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Factors Influencing Assertiveness in Nursing

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Abstract- Nursing is a profession, centered on the nurse-patient relationship. For the successful and satisfactory work nurses require effective cooperation with patients and other health care professionals. Assertiveness is necessary for effective nurse/patient communication, and it is suggested that its development may also aid the confidence of the profession as it develops. It is considered as one of the essential life skills that has to be developed by everyone. There are different factors that determines the assertiveness behavior of the individual in general. This review describes various factors influencing assertiveness in nursing.

Index Terms- Assertiveness, Factors influencing, nursing, life skill

I. INTRODUCTION

Assertiveness is a very essential skill required for our daily lives. We can get things done if we are assertive. Of course, we must ensure that we are not aggressive. Whatever has to be said has to state in clear and matter-of-fact terms and not in an abusive manner.

Andrew Salter, the hypnotherapist and early behavior therapist at London is credited with introducing the term assertiveness, in 1949, to mean an inner resource to deal peacefully with confrontations. The term was reintroduced by Arnold Lazarus, Professor of Psychology who defined it as “expressing personal rights and feelings. “Since its introduction it has become the major focus in changing the stress related behaviours.¹

II. DEFINING ASSERTIVENESS

- Assertiveness is a form of behaviour characterized by a confident declaration or affirmation of a statement without need of proof; this affirms the person's rights or point of view without either aggressively threatening the rights of another (assuming a position of dominance) or submissively permitting another to ignore or deny one's rights or point of view.²
- Assertiveness is described as the ability to be comfortably strong willed about one's thoughts, feelings, and actions; and neither inhibited nor aggressive in actions for the betterment of oneself in the surrounding environment.³

- Assertive behaviour promotes equality in human relationships, enabling us to act on our own interest, to stand up for ourselves without undue anxiety, to express honest feelings comfortably, to exercise personal rights without denying the rights of others.⁴

III. NEED FOR ASSERTIVENESS

In all spheres of our professional lives, we have to be assertive. It is a competitive world today. One faces many challenges in one's work arena. Also, one has to deal with all kinds of people. Some may be helpful and cooperative and others may not be so helpful. It may not be very easy to convince some people. At times your views may not be acceptable to the other person. Only the person who is assertive can get his way or else everybody will trample upon him or her. One has to be firm about things and not give easily to everything that another person wants him or her to do.

WHY ASSERTIVENESS IS ESSENTIAL FOR NURSES?

Assertiveness is an important requisite for today's professional nurse. As nurses move away from traditional subservient roles and perceived stereotypes it is increasingly being recognized that a nurse needs to be assertive.

It mitigates against personal powerlessness and results in personal empowerment. Nursing has determined that assertive behavior among its practitioners is an invaluable component for successful professional practice. It enables us to express ideas while respecting the ideas of others, overcome burnout and to reduce distress, to solve problems diplomatically and tactfully, to negotiate healthily to tackle verbal abuse and violence in work environment

Nursing is centred on the nurse-patient relationship. Nursing is a profession whose “object” is the human being and thus the success of the work is partly determined by the effective cooperation with patients and other health care professionals. Assertiveness is necessary for effective nurse/patient communication, and it is suggested that its development may also aid the confidence of the profession as it develops. It is considered as one of the essential life skills that has to be developed by everyone.

IV. FACTORS INFLUENCING ASSERTIVENESS IN NURSING

Assertiveness is considered as an important responsibility of the nurses. And it is a learned skill that has to be developed. There are different factors which influence the development and practice of assertive behaviour in a person.

Two main factors that influence our decision to “speak up” or be assertive are

1. Our perception of the reaction of others to the situation

Generally, in a group setting, if we see something wrong, we first look at how others are reacting before we speak up. When we look at the reaction of others, we are checking to see if they appear concerned with the situation. If we find that others do not appear concerned then we will probably be reluctant to speak up.

2. Perceived obedience to authority

We may also not “speak up” because we believe we are just following orders or that speaking up would represent questioning authority. This type of obedience towards authority and the personal feeling of powerlessness inhibit the assertiveness. Team leaders can reduce these barriers by ensuring that team members understand that assertive behaviour is demanded of all personnel. Junior members must be confident that senior leadership has empowered them to speak up, without fear of reprisal.⁵

The factors influencing the assertiveness of a person can be broadly classified as

- **EXTRINSIC FACTORS:** Are factors lying outside the person.
- **INTRINSIC FACTORS:** Are factors within the person.

Extrinsic factors include

- Type of country
- Culture
- Religion
- Type of family
- Socio-economic status
- Educational status
- Profession
- Mass media
- Rearing pattern
- Parent –child interaction
- Striving to keep up-to-date
- Peer group
- Role models

INTRINSIC FACTORS

- Gender
- Marital status
- Genetics
- Personality
- Self –esteem
- Self confidence
- Level of knowledge & Skill in practice
- Attitude
- Psychological factors-anxiety
- Style of coping with stress

TYPE OF COUNTRY

In some countries, the proper way of being assertive is important in creating relationships. Project Globe (2003) studied

the cultural differences in leadership, organizations, and society over 60 countries. The study showed the level of assertiveness of the countries included in the study as follows, the least assertive country was Sweden; the median assertive countries consisted of Egypt, Ireland, Philippines, Ecuador, and France and the most assertive country was Germany. In a professional atmosphere what some may see as assertive in America, may see as aggressive in Asia. So, the way and style of behaviour of individuals highly depends on the country in which they live, and the culture in which they are brought up.⁶

Implication for nursing profession and research:

Researches revealed that nurses from USA and other developed countries demonstrate assertive behaviour. More studies are needed to identify the level of assertiveness of Indian nurses. Comparing the assertiveness of Indian nurses working in India and abroad, at various countries may be helpful to identify the influence of working atmosphere in assertiveness.

Where ever it is assertiveness can be improved through various strategies and professionals has to catch the students and has to give training to improve assertiveness.

CULTURE

Culture determines the level of assertiveness to some extent. Assertiveness is seen as a leadership quality in all types of cultures. Some cultures view being assertive as being confident. There are important variations in interpersonal communication across cultures that impact the “what” and “how” of being assertive. For example, traditional Asian cultures value subtlety and indirectness in communication. More direct or confrontational styles may be viewed as disrespectful and lacking in finesse. The traditional Indian culture also demands high level of obedience from the students, ‘Guru’ is considered as god and the words of guru has to be followed without any questions.⁶

RELIGION

Generally, it is seen that some religious rituals don’t promote the assertive behaviour from its followers. They want people who blindly follow religious activities. The aggressive behavioural style from these followers towards the persons of another religion results in communal riots. On the other hand, some religions may be supporting the passive style, for example the Buddhist.⁶

Implication for nursing profession and research:

Culture and religion affect the assertive behaviour of the individuals to some extent but its influence is limited and can be overcome through proper training. Cultural and religious influence on the assertiveness of Indian nurses is another area to be studied. But generally, it can be stated that these influences is negligible.

FAMILY INCOME & OTHER FAMILY FACTORS:

Family income is an important determining factor in predicting the assertive behaviour of the person.

Implication for nursing profession and research:

Studies in nursing students revealed that family income and assertiveness have positive correlation. Yet more researches are needed to study the influence of other family factors like type of

family, communication pattern, parental dominance ect. in development of assertiveness. Studies in Indian setting are also less.

V. REVIEW OF LITERATURE

A study to investigate the factors affecting assertiveness among student nurses was conducted among student nurses of Port-Said University, Egypt in the year 2001- 2007 student nurses from four different grades were assessed. Rathus Assertiveness Schedule, consisted of 30 items, was used to measure the students' assertiveness level and a 12-item scale developed by Spreitzer was used to measure students' psychological empowerment. The study results showed that 60.4% of the students were assertive, while about half of the students were empowered. A positive relation between student assertiveness and psychological empowerment was detected. Moreover, positive relations regarding family income and students' assertiveness and psychological empowerment were determined. The researcher commended introduction of specific courses aiming at enhancing the acquisition of assertiveness skill. Also emphasised that, nurse educators must motivate the students to express their opinion and personal rights and must pay attention for students' empowerment and enhance students' autonomy⁷

EDUCATIONAL STATUS

Education increases the awareness regarding the personal rights and the rights of others. So, education promotes assertiveness. On the other end the individual may be either not aware regarding their rights and remains as passive or behave aggressively considering the self-rights alone.

PROFESSION

Professional autonomy determines the level of assertiveness of its members. Professionals' having more independent and administrative function demonstrates high level of assertiveness. Assertiveness increases with increase in professional experience also.

MASS MEDIA

Variety of behavioural styles and reactions in the community are communicated through mass Medias like radio, television, newspaper and the magazines. These reflect the perceptions and opinions of the majority. Thus, helps in the formulation of behavioural styles. Mass medias also influence the formation of personality this intern affects the assertive behaviour of individuals.

Implication for nursing profession and research:

Educational status, status of the profession and influence of mass media are the factors that have to be considered together when thinking about nursing profession. In nursing also as the educational status increases assertiveness increases. Researches have to be conducted to study the assertiveness of nursing personnel's in the supervisory position.

The status of the nursing profession is communicated through Medias. In the past it was a female dominant profession and now changed, these types of changes and the way Medias portraying nurses may be influencing the assertive behaviour of nurses. So these factors has to be studied in depth.

PARENT –CHILD INTERACTION & REARING PATTERN

The interaction between the child and the parent for satisfaction of biological needs play a significant role in the development of personality and behavioural style. It also helps in the development of social dimensions of the child. It is from the parent the child learns the ways for reacting to various situations and gets the confidence to react. The self-image of the child is also formulated to some extent through parent child interaction. Some situations parents may be accepted as the role models by the child. So, it is considered as an important factor determining the assertive behaviour of an individual.

PEER GROUP

Peer group is the first group of individuals of the same/similar age may be unrelated biologically but are related socially. Interacting with this group the child learns that he/she should give up a little of individuality to be accepted socially in the peer group. With the peer group, the child learns to take turns, to suppress his/her wish in favour of the decision of the group, to dovetail his/her activities with the activities of the group. And with the desire to be accepted, he/she moulds his/her behaviours to the standards set by the group which suggests to him continually what would please the group members, in adolescence and even later also this happens. The peer group persists as a factor of environment throughout life, of course changing with time and maturity and helps in the development of individuality and behavioural styles.

ROLE MODELS

Role models influence the behavioural style of the individuals. It can be parents, teachers, famous personalities or the personalities observed through films or cartoons.

Implication for nursing profession and research:

Though parent child interaction and the role modelling of the parent influence the development of assertiveness, it can be modified through peer group interaction and role modelling. Nursing student's assertiveness can be improved through group activities, involving peer group activities. Role modelling and role play in this direction may also be helpful, but needs more researches to support.

GENETICS

Basically, we inherit certain characters from the insisters, which include some physical characteristics and some tendencies to function in certain ways. For example, the way we react, predisposition to react slowly or fast ect. Thus, assertiveness is also influenced by the hereditary factors.

GENDER:

Gender is considered as factor predictive of assertiveness of the person. Hersen et al. (1973), Ory and Helfrich (1976), Adejumo (1981) and Eskin (2003), all reported that men are more assertive than women. In the same vein, this finding is also contradicted with reports of researchers like Chandler et al. (1978) who found that women were significantly more assertive than men in some specific situations. Generally, it is said that the culture and

the level of education of the person determines the gender variation in assertive behaviour.⁸

MARITAL STATUS

Culturally, the unmarried are mostly considered to be free and without restrictions. For instance, the unmarried may make unilateral decisions on issues; the married may not be able to do same. So, it is generally said that the unmarried is more assertive. But the literature Search reveals that not much had been done with respect to marital status.

Implication for nursing profession and research:

Genetics, gender, marital status ect. are factors that can't be modified, but the influence of these on the assertiveness are modifiable through proper training. But the effectiveness of these type of training has to be studied.

VI. REVIEW OF LITERATURE

An ex-post factor survey research design was used to examine the influence of gender, marital status and religious affiliation on assertiveness of education majors. For the purpose of the study, 367 pre-service science teachers were randomly selected from two institutions of higher education in South west Nigeria. This was made up of 96(26.2%) males and 271(73.8%) females; 165 (45%) married, 191 (52%) singles and 11 (3%) widowed. Participants' ages ranged between 17 to 53 years. Rathus assertiveness schedule (RAS) was used as the primary instrument to measure assertiveness. Collected data was analyzed using univariate analysis of variance. The result showed no significant differences for gender, marital status or religious affiliation. In the discussion part the researchers stated that, one would have expected that gender would be a significant predictor of assertiveness among the samples used in the study; this is basically because of the culture that operates in the setting where the research was conducted. This present finding may possibly have been confounded by the influence of exposure to higher education, which has brought about a change in the persons orientation as well as their cultural beliefs about gender bias.⁸

KNOWLEDGE

As knowledge and assertiveness has positive correlation. Literatures states that Nurses practising with a diploma and highest level of education were significantly less assertive than nurses having a baccalaureate or above and there was a significant difference in assertiveness between groups of nurses practising in different clinical specialties.

Review of literature

A descriptive study was conducted among the registered professional nurses with the Minnesota (USA) State Board of Nursing to determine assertiveness levels of professional nurses and to determine if assertiveness levels are related to selected demographic factors including age, gender, years of nursing experience, basic nursing education, and clinical nursing speciality, type of employer, highest educational level and prior assertiveness training. The sample was composed of 500 registered nurses (64% response rate), chosen randomly from the

list of active licensees registered with the Minnesota (USA) State Board of Nursing, who completed and returned an assertiveness questionnaire The questionnaire consisted of the Rathus Assertiveness Schedule (RAS) and a personal/ professional data form Data analysis included descriptive as well as inferential statistics. The results revealed that the oldest group of nurses (60–76 years) was significantly less assertive than any of the younger groups of nurses. Nurses practising with a diploma and highest level of education were significantly less assertive than nurses having a baccalaureate or above and there was a significant difference in assertiveness between groups of nurses practising in different clinical specialties. It appears that the majority of nurses in this study are assertive and believe in themselves and their abilities. The researcher concluded that the self-assertion generated by this belief will eventually lead to further personal and professional empowerment⁹

PLACEMENT IN THE COURSE

As the student moves from basic to advanced areas of the course the assertiveness increases. Also attending various assertive training courses also help to increase the assertiveness.

Review of literature

Irish nursing students' perceived levels of assertiveness prior to, and nearing the completion of, their three-year pre-registration programme was assessed using a descriptive study. 72 students commencing general nurse education programmes in two schools in Southern Ireland participated in the study. A questionnaire adapted from a number of assertiveness scales, and tested for validity and reliability in this population, was used to collect data. The results revealed that students' assertiveness levels rose as they approached completion of their three-year education programme. The researchers concluded that Nursing students' assertiveness skills could be augmented through concentrated efforts from nurse educationalists and clinicians to reduce the communication theory practice gap in nurse education today. Also address the multi-dimensional nature of assertiveness and strategies to increase assertiveness. The students in this study reported an increase in levels of assertiveness as they approached completion of their three-year education programme.¹⁰

A study was conducted to evaluate the effectiveness of a nursing programme on assertiveness of the nursing students among 150 volunteer American born female students. A causal-comparative design was used in this study. There were 50 students in three groups. The experimental group had two courses in assertiveness and completed the Associate Degree Nursing program, whereas the other two groups entering either in the second or first year of the nursing program did not receive any courses in assertiveness. All subjects were tested for levels of assertive behaviour with the Rathus Assertiveness Schedule. Result revealed that student nurses who had two courses in assertiveness and completed the nursing program demonstrated higher scores in the level of assertiveness than students who had not received the courses in assertiveness before entering the second year of the nursing program. Student nurses who had two courses in assertiveness and completed the nursing program demonstrated higher scores in levels of assertive behaviour than students who had not received the courses in assertiveness before entering the first year of the nursing program and the students who

had not received the courses in assertiveness before entering the first or second year of the nursing program would demonstrate no significant difference in level of assertiveness.¹¹

A study was conducted among undergraduate nursing students to assess the level of assertiveness. The study population was composed of nursing students in different semesters at one school in Central Greece (n=298) who agreed to complete a questionnaire on assertiveness level assessment, which had been translated into Greek and adapted to this population. All students present in class completed the questionnaire, representing 80% of the total population of active students. Mean assertiveness scores between semesters were compared by ANOVA and comparisons of advanced semester students were done by Pearson's chi square. The main finding of this study was that the assertiveness levels displayed by students increase slightly in advanced semesters by comparison to those displayed by first-semester students. The researcher concluded that assertive behaviour should be encouraged through learning methods. Nurses should preferably obtain this training throughout their studies. Instructors have an essential role in the improvement and achievement of assertiveness training curriculums for undergraduate nursing students.¹²

Implication for nursing profession and research:

Knowledge increases the level of assertiveness. As the students moves from first semester to higher levels the knowledge increases. Thus, the way in which knowledge is imparted and the type of knowledge also influence the level of assertiveness. Along with theoretical knowledge, practical knowledge and the skill in practice is important in nursing. So these have to be compared and its effect on level of assertiveness has to be investigated.

PERSONALITY

Personality is considered as an important factor that determines the assertive behaviour. Neuroticism and extraversion and openness is said to be associated with assertive behaviour. 'Type A personality' usually having aggressive behaviour.

ATTITUDE

Attitude determines the behaviour of the person. Persons having positive attitude reacts assertively.

Implication for nursing profession and research:

Personality and attitude are two important aspects in nursing profession. These may be determining the practice of nursing care. So the studies regarding personality and attitude of the nurses and its influence on assertiveness may be helpful for improving the professional status. And in the long run we can expect selection of nurses based on personality and attitude tests as for some professions.

Review of literature

In a Chinese sample of 208 the Big Five personality traits profile was compared for 104 assertive and 104 non-assertive students. While assertiveness was associated with higher scores on Neuroticism, Extraversion, and Openness, Non-assertiveness was associated with greater scores on Agreeableness and

Conscientiousness. Implications of the findings for cross-cultural counselling were highlighted.¹³

A study was conducted among the BSc nursing students to assess the profession-specific qualities of assertiveness, and to explore the interaction of the personal traits that significantly define assertiveness during the period of professional training. Rathus Assertiveness Schedule, Empathy Questionnaire, Brengelmann Anxiety Scale, and Social Intelligence Test were used to collect the data. Descriptive and mathematical statistical methods were employed in the data analyses. The result revealed that, one of the basic dimensions of assertiveness is marked by the simultaneous functioning and successful complementing of the empathy-based „other-centred” attitude and the enforcement of self interest. The other decisive feature, from the aspect of the functioning of the social relation system, has been found to be the quality of reaction types that is the psycho vegetative and emotional harmony.¹⁴

PSYCHOLOGICAL FACTORS-ANXIETY & STYLE OF COPING WITH STRESS

Anxiety is a barrier to assertive behaviour. If a person is anxious about the result of assertive behaviour or what other people think if 'I say NO' won't be able to behave in assertive manner. Literatures also reveal that there is negative correlation between anxiety and assertiveness.

Implication for nursing profession and research:

Psychological factor like anxiety and stress affects assertiveness negatively. A person having stress can't think properly and may be anxious to react. The negative effect of stress is studied by many researchers, but its influence on assertiveness has to identify. It is especially important as nursing is a profession with its own stresses and dealing with human being. It's also helpful to study whether assertiveness training or measures to increase assertiveness is helpful in decreasing the stress.

Review of literature

A study was conducted among 173 nursing students (68 males and 105 females) and 77 midwifery students from the Tehran University of Medical Sciences in Iran to determine the relation of assertiveness and anxiety in nursing and midwifery students. In this correlational, cross-sectional study, Data were collected using a questionnaire including personal-social factors, the Spielberger Trait Anxiety Inventory and the Assertion Inventory of Gambrill and Richey. More than half of the nursing and midwifery students (59.5% and 59.7%, respectively) had moderate assertiveness. Also, 43.3% and 36.4% of them had moderate and high levels of anxiety. Pearson correlation test revealed that assertiveness and anxiety had negative correlations in nursing ($r=-0.51$, $P < 0.001$) and midwifery ($r=-0.449$, $P < 0.001$) students... Considering the relation of assertiveness and anxiety and its effects on mental health and educational and occupational performance, researchers concluded that students should be informed of the required skills for positive interaction with others and to increase assertiveness and decrease anxiety.¹⁵

A study was conducted to examine the effectiveness of assertiveness training in improving self-perceived levels of stress and assertiveness among nurses in Taiwan, Republic of China. The two-group experimental design was conducted in a 2,000-bed

veteran general hospital. A sample of 60 volunteer Chinese-speaking nurses participated in the study. Subjects were randomly assigned to one of two treatments: assertiveness training (AT) or alternate treatment control (ATC), which served as a control and contained updated knowledge of new computer technology for in patient settings. Subjects in each group participated in six 2-hour workshops in the same two-week period. All subjects were pre-, post-, and follow-up post tested for stress and assertiveness with the Perceived Stress Scale (PSS) and Rathus Assertiveness Schedule (RAS), respectively. Results revealed the following: (1) subjects in both groups of pretest were clearly subassertive and under considerable stress; (2) by the end of training, the AT group scored significantly higher on the rating of assertiveness than those in the ATC group, and had successfully maintained their improvement by the 4-week follow-up; and (3) by the end of training, the AT group reported significantly lower levels of stress than the ATC group as indicated on the PSS, and successfully maintained their improvements at the 4-week follow-up. Overall, the results indicate clear support for the effectiveness of assertiveness training for treating sub assertive behaviours and stress in a population of professional nurses in Taiwan.¹⁶

VII. SELF ESTEEM & SELF CONFIDENCE

Only a person having good self-esteem and self-confidence may be able to stand for him/ her.

Implication for nursing profession and research:

Self-esteem and self-confidence can be increased through various measures and this may be increasing the level of assertiveness. Thus, the professional image and the practice can be improved. More studies in Indian setup are needed to generalise this.

Review of literature

A study was conducted to evaluate the self-esteem of undergraduate students of nursing. The research was carried out with 156 undergraduate students of the third year at Department of Enfermagem, Universidade Federal de São Paulo. Socio-drama techniques of Neurolinguistics were used and the evaluation was done. The result revealed that students usually confuse self-esteem and self-image, and that both are stereotyped for men and women. As nurses are always worried about the client/patient's life quality, they neglect themselves. The researchers concluded that, Workshops for improving self-esteem are essential for the students to rescue interior knowledge about them, and to realize that in order to take good care of clients/patients, they must be physically and psychologically healthy.¹⁷

A longitudinal study was conducted to investigate nursing students' experiences of stress and levels of self-esteem during three years of their undergraduate nursing programme. Participants completed the stress in nurse education questionnaire and the culture free self-esteem inventory at various time points in the study, and a demographic questionnaire at baseline. The students who took part in the study commenced their nurse training in September 2002. The result demonstrated that levels of self-reported stress and "general" self-esteem are significantly different at different stages of the nurse training process. Self-reported stress was at the highest at the beginning of the third year

and these were significantly higher when compared to stress reported at any other time point. Self-esteem levels were lowest at the end of training.¹⁸

A study to explore the nursing students' perceived levels of self-esteem and their fear of negative evaluation prior to, and nearing the completion of, their 3-year preregistration programme was conducted at School of Nursing and Midwifery Studies, Trinity College Dublin. A descriptive, quantitative, comparative survey design was used. All students in the first intake of 1995 in two general nursing schools in Southern Ireland were selected as the sample (no. 72). A questionnaire developed from the Rosenberg Self-esteem Scale and the Watson and Friend Fear of Negative Evaluation Scale was used to collect data at the start of their programme and again 2 months before completion. The result revealed that students' reported self-esteem rose as they neared the end of their education programme and their fear of negative evaluation decreased; however, their overall self-esteem levels at their highest were only average. The researchers commended over the importance of conducting more researches in the area of self-esteem and viewed that nursing students' self-esteem might be increased by expansion of intrinsic job characteristics, improving their job satisfaction and providing frequent positive feedback.¹⁹ A study was conducted to evaluate the effect of an assertiveness training program on nursing and medical students' assertiveness, self-esteem, and interpersonal communication satisfaction. Using a longitudinal research design, 69 participants whose scores on the Assertive Scale were 50% (i.e., low assertiveness) and who were willing to participate were included and assigned to an experimental group (33 subjects) or comparison group (36 participants; participants were matched with the experimental group by grade and sex). Participants in the experimental group received eight 2-hr sessions of assertiveness training once a week. Data were collected before and after training and again one month after the end of the training using the Rotter's Internal versus External Control of Reinforcement Scale, Sex Role Inventory, Assertive Scale, Esteem Scale, and Interpersonal Communication Satisfaction Inventory. The generalized estimated equation (GEE) method was used for statistical analysis. The assertiveness and self-esteem of the experimental group were significantly improved in nursing and medical students after assertiveness training, although interpersonal communication satisfaction of the experimental group was not significantly improved after the training program.²⁰

VIII. BARRIERS TO ASSERTIVENESS

Mutual respect and restraint promote assertive behaviour. However, miscommunication, misperception and other factors can create barriers. All must be aware of these potential barriers and share the responsibility of eliminating them.

Barriers include:

- Lack of confidence in one's own ability.
- Perception that someone is not approachable; by his/her position, rank, of knowledge should already know what is happening.

Nurses are often considered to be lacking in assertive skills. An exploratory study was conducted to compare the assertive behaviour of trained nurses at work and in general life situations. Questionnaire and interview techniques are used to investigate the

behaviour of a small sample of sisters, staff nurses and enrolled nurses in general hospital settings. Trained nurses are found to be less assertive at work than in general life situations. In the work situation sisters are more assertive than staff nurses. The enrolled nurses are the least assertive of the trained nurses. The complex nature of assertive behaviour becomes apparent. Factors which promote assertiveness at work include knowledge, confidence, experience and the wearing of uniform. Factors which inhibit this behaviour are tradition, training and the hierarchical structure within the hospital. The use of assertiveness tends to be situation specific. Assertiveness is viewed as a positive behaviour and is of value to nurses, but there are mixed feelings about the usefulness of assertiveness training.

IX. CONCLUSION

Assertive behaviour helps individuals feel better about them. This increases self-esteem, job satisfaction and ability to develop satisfying interpersonal relationships and there by contributes to enhanced satisfaction in care recipients, be it the patient, family, community or the students in school or college.

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Mechanical Properties, Column Buckling Behaviour And Concrete Beam And Slab Reinforcement Behavior Of Bamboo

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Abstract- The study focused on the use of Bamboo as reinforcement for reinforced concrete slab and beam samples. A comparison was also made on the use of bamboo as reinforcement against steel reinforcement in concrete. Both beams and slabs designed for bamboo tensile reinforcement equivalent to steel reinforcements resulted in significantly lower failure loads at 63% and 34% respectively of the steel beam and slab equivalents.

The mechanical and column buckling behavior in bamboo culms was also studied. The type of bamboo used here was *Bambusa vulgaris*(yellow bamboo). An average moisture content of 62.1% and 10% were observed for the green and dry bamboo samples used in the study respectively

Moisture content was found to have a significant influence in the physical and mechanical properties of bamboo with the strength and stiffness of bamboo being reduced with increase in moisture content.

For the column investigations the second moment of area against critical shear of dry bamboo were plotted for both theoretical and actual values measured in the laboratory. Variation factors of 1.50 and 0.48 were observed for green and dry bamboo samples respectively. In the case of second moment of area against critical load the variation numbers were 1.93 and 1.61 for dry and green bamboo respectively. The variation from theoretical values were slightly lower in both cases for green bamboo, this could be due to the effect of moisture content which lowers strength parameters of bamboo.

I. INTRODUCTION

Bamboo is a group of [perennialevergreens](#) in the [true grass](#) family [Poaceae](#), subfamily [Bambusoideae](#), tribe [Bambuseae](#). Giant bamboos are the largest members of the grass family. There are more than 70 [genera](#) divided into about 1,450 species in the world (Gratani et al. 2008).

Bamboo is found in diverse climates, from cold mountains to hot [tropical](#) regions. Most of the bamboo resources in Kenya are found within government forests and in trust lands and farmlands, which were once within the Government forests but have since been degazetted. Another small proportion is found domesticated by farmers with *Bambusa vulgaris* as the dominant species (Ongugo et al, 2000). Some of the districts where reasonable amounts of bamboo are found in Kenya are; Mt. Elgon, West Pokot, Nakuru, Trans-Nzoia, Kiambu, Nyeri, Malindi/Kilifi, Nyandarua, Keiyo-Marakwet, Uasin Gishu, Narok, and Kakamega (Warinwa et al, 2016)

Bamboo's feasibility as reinforcement in precast concrete elements was investigated by the U.S Army Engineer Waterways Experiment Station in 1964(Brink F. E and Rush P. J, 1966). Bamboo is unique in that it is strong both in tension and compression. While its tensile strength remains the same, its compressive strength increases as it gets older. Its strength is in its culm (Y. Xiao et al 2007)

The bamboo culm, in general, is a cylindrical shell, divided by transversal diaphragms at the nodes. Bamboo is an orthotropic material with high strength along and low strength transversal to its fibres. The structure of bamboo is a composite material, consisting of long and aligned cellulose fibres immersed in a ligneous matrix. A close-up of a cross-section of a bamboo culm shows that the distribution of the fibres is variable along its thickness. This presents a functionally graded material, produced according to the state of the stress distribution in its natural environment. The fibres are concentrated more as they approximate the outer skin, in a way that the culm could resist wind forces, to which it is constantly subjected during its life as shown in Figure 1 (Y. Xiao et al 2007).

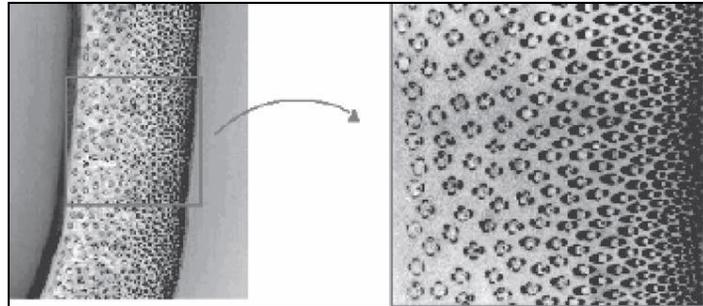


Figure 1: Concentration of fibres in bamboo culm (Y. Xiao et al 2007)

Culm, the primary product which is majorly used in construction, is the structure of bamboo that holds it up. The culm comprises of approximately 40% cellulose fibers, 10% vessels and 50% parenchyma tissue. The fibers which provide the culm’s strength are grouped around vessels for water and sap transport in vascular bundles.



Figure 2: longitudinal and transverse sections of bamboo culm

2.3.5 Buckling

A perfectly straight column that is loaded with a normal stress at its ends deforms linearly until a certain load level, P_{cr} (critical load), where the structure cannot hold its initial straight line resulting in a transverse deflection. Buckling load for a slender column pinned at both ends;

$$\text{Pinned at both ends } P_{cr} = \frac{\pi^2 EI}{(LK)^2} \tag{1}$$

Where, P_{cr} the Euler critical buckling load

E, the modulus of elasticity

$$I, \text{ the least moment of inertial of the column cross section } (I = \frac{\pi(D^4 - d^4)}{64} \text{ mm}^4) \tag{2}$$

L, the height of the column

K, the effective length factor (=1.0 for column pinned both ends)

$$A = \frac{\pi(D^2 - d^2)}{4} \text{ mm}^2 \tag{3}$$

$E_d = 17600 \text{ N/mm}^2$ for $MC < 20\%$

For moisture content, i.e. $MC > 20\%$ the modulus is modified for wetness by multiplying with a wetness factor K_2 (Timber design manual, 2006)

For a Value of $K_2 = 0.8$

$E_g = 14080 \text{ N/mm}^2$

$$\text{Critical stress } \tau_{cr} = \frac{P_{cr}}{A} = \frac{\pi^2 EI}{A(L)^2} \tag{4}$$

II. MATERIALS AND METHODS

Reinforced Concrete Beams and Slabs

Pozzolana Portland cement 32.5N to (BS EN 197 Part 1) was used in casting all the beams and slabs. Clean natural river sand was used as fine aggregates, and natural crushed stone from local suppliers were used in preparation of the concrete. Concrete class 25 was designed to BS 5328: Part 2: 1997 and used in preparation of beam and slab samples. Mature, well seasoned bamboo (*Bambusa Vulgaris*) showing pronounced yellow colour from University of Nairobi, Chiromo Campus was used. The whole bamboo culms were split into approximately 25mm to 35mm sizes. Small samples of the bamboo were taken for moisture content testing. Tensile strength test was carried out on the bamboo specimen to BS EN 4449:1997.

Beams and slabs were designed to BS8110-1:1997 to resist a maximum load of 50 kN using conventional square twisted main steel reinforcement. The tensile reinforcement was then replaced with equivalent bamboo reinforcement using relative tensile strength of bamboo to that of steel steel.

Beams were constructed with uniform dimensions of 300 x 150 x 1500 mm. Mild steel bars (R8) bars at 250mm spacing were used to offer shear resistance as shown in the Figure 3A. These beams were demolded after 24 hours and cured under wet rugs for a further 27 days prior to testing. The reinforced concrete beams were then subjected to three point loading to failure Figure 3B. Maximum load, deflection and crack patterns were noted



Figure 3A: Beam reinforcement arrangement



Figure 3B Three point beam loading arrangement

Concrete slabs were constructed of uniform dimensions of 500 x 500 x 100 mm with bamboo splits reinforcement as shown in the Figure 4A. The beams were demolded after 24 hours and cured further for 27 days covered by wet rugs before testing. These slabs were then loaded to failure using a load cell setup three point line loading (Figure 4 B). Maximum load, deflection and failure modes were also observed.



Figure 4: (A) Bamboo slab reinforcement; (B) Bamboo slab line loading arrangement

Buckling

Bamboo specimens of length 1500mm and varying diameters were loaded using a load cell and hydraulic jack setup with pinned end supports. Longitudinal deformations were taken using an LVDT. Using the laboratory determined critical buckling load P_{cr} , the sample section property I , and the sample length L , the samples' modulus of elasticity E was determined.

The theoretical buckling of each specimen was calculated using Equation (1), with $K = 1.0$ and $K = 0.8$ for dry and green samples respectively, giving $E_d = 17600 \text{ N/mm}^2$ for dry and $E_g = 14080 \text{ N/mm}^2$ for green bamboo samples. The critical stress was calculated using Equation (4)



Figure 5: (A) Dry bamboo sample under compression testing; (B) Failed bamboo showing split of the stem following buckling

III. RESULTS AND DISCUSSION

Bamboo

Moisture Content

The moisture content for the green bamboo was determined at 50.5% and dry bamboo at 22.7%

Beam and Slab Strength

The average ultimate measured loads for the beams and slabs was 31.5 kN and 17 kN respectively, these being 63% and 34% of the targeted design loads for the beam and slab respectively.

The main cause of this difference in strength was thought to have been caused by several reasons including loss of bond occasioned by the smoother bamboo reinforcement surface and a possible shrinkage of the bamboo reinforcement due to moisture loss during curing of the samples

The failure modes for the beams (Figure 6 A) was consistent with the three point load the beams were subjected to, this was expected as the beams were designed to be weakest in bending. Similarly, failure modes for the slabs (Figure 6 B) were consistent with the three-point line loading that the slab elements were subjected to. A closer inspection showed breaking of the bamboo reinforcement around the area of the element cracks suggesting at least partially failure of the reinforced concrete elements due to tensile failure of the bamboo reinforcement. It is also possible that some slip of the bamboo reinforcement might have occurred though this was not confirmed



Figure 6: (A) Beam failure mode and, (B) Slab failure mode

Bamboo Column

Second moment of area and shear stress of dry bamboo

Table 1: Second moment of area and shear stress of dry bamboo

| L Mm | D mm | D mm | D-d Mm | A mm ² | I mm ⁴ | τ (theory) | τ(empirical) | E N/mm ² | % Moisture |
|---------|---------|---------|-----------|----------------------|----------------------|------------|--------------|------------------------|---------------|
| 1500 | 52 | 40 | 12 | 113.1 | 233274.6 | 159.26 | 300.6 | 33218.62 | 9.2 |
| 1500 | 44 | 33 | 11 | 95.05 | 125786.8 | 102.20 | 178.86 | 30802.37 | 10.79 |
| 1500 | 35 | 25 | 10 | 78.55 | 54494.06 | 53.57 | 203.69 | 66917.69 | 11.32 |
| 1500 | 32 | 24 | 8 | 50.27 | 35190.40 | 54.06 | 79.56 | 25906.33 | 12.31 |
| 1500 | 24 | 17 | 7 | 38.50 | 12187.77 | 24.45 | 64.95 | 46750.47 | 11.56 |
| 1500 | 20 | 15 | 5 | 19.64 | 5369.63 | 21.12 | 76.38 | 63667.4 | 9.7 |
| 1500 | 15 | 10 | 5 | 19.64 | 1994.43 | 7.84 | 50.92 | 114274.80 | 10.23 |

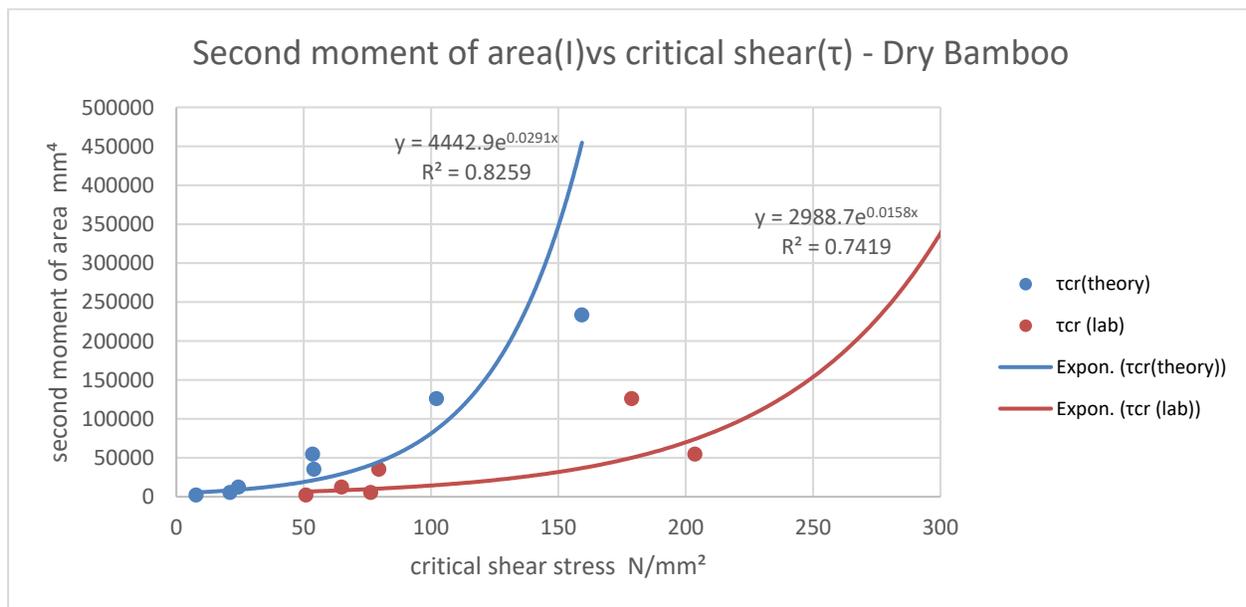


Figure 7: Second moment of area VS shear stress for Dry Bamboo

From Figure 7, as the second moment of area increases there's an increase in shear strength of the bamboo. The samples had an average moisture content of 10.73%. This moisture content of the culms was at equilibrium point.

The curve is steeper in the theoretical shear curve than that of the laboratory, this may be due to experimental errors and other non-factored conditions during the experiment. The theoretical curve had a percentage accuracy of 82.59% from the equation $R^2 = 0.8259$, while that of the lab had an accuracy of 74.19 % from the equation $R^2 = 0.7419$. A semi-empirical relation of the two curves can be determined such that, a factor when applied to the theoretical curve can map the curve to the empirical curve.

$$\frac{4442.9 e^{0.0291x}}{2988.7 e^{0.0158x}} = 1.506$$

Hence when theoretical curve is factored by 1.506 it maps the curve to the empirical curve.

Second moment of area and shear stress of green bamboo

Table 2: Second moment of area and shear stress of green bamboo

| L Mm | D Mm | D mm | D-d mm | A mm ² | I mm ⁴ | T (theory) | T (empirical) | E N/mm ² | % Moisture |
|---------|---------|---------|-----------|----------------------|----------------------|---------------|------------------|------------------------|---------------|
| 1500 | 69 | 52 | 17 | 1615.74 | 753859.3 | 28.82 | 18.57 | 9069.87 | 64.8 |
| 1500 | 61 | 45 | 16 | 1332.20 | 478429.20 | 62.22 | 15.76 | 10003.96 | 62.22 |
| 1500 | 46 | 27 | 19 | 1089.50 | 193724.70 | 62.72 | 10.09 | 12941.30 | 62.72 |
| 1500 | 44 | 23 | 21 | 1105.20 | 170269.6 | 61.38 | 8.14 | 12046.9 | 61.38 |
| 1500 | 43 | 21 | 22 | 1105.20 | 158294 | 60.5 | 5.42 | 8638.87 | 60.5 |
| 1500 | 34 | 19 | 15 | 624.47 | 59207.8 | 63.2 | 7.21 | 17322.23 | 63.2 |
| 1500 | 30 | 21.5 | 8.5 | 343.85 | 29275.83 | 61.23 | 8.72 | 23355.13 | 61.23 |

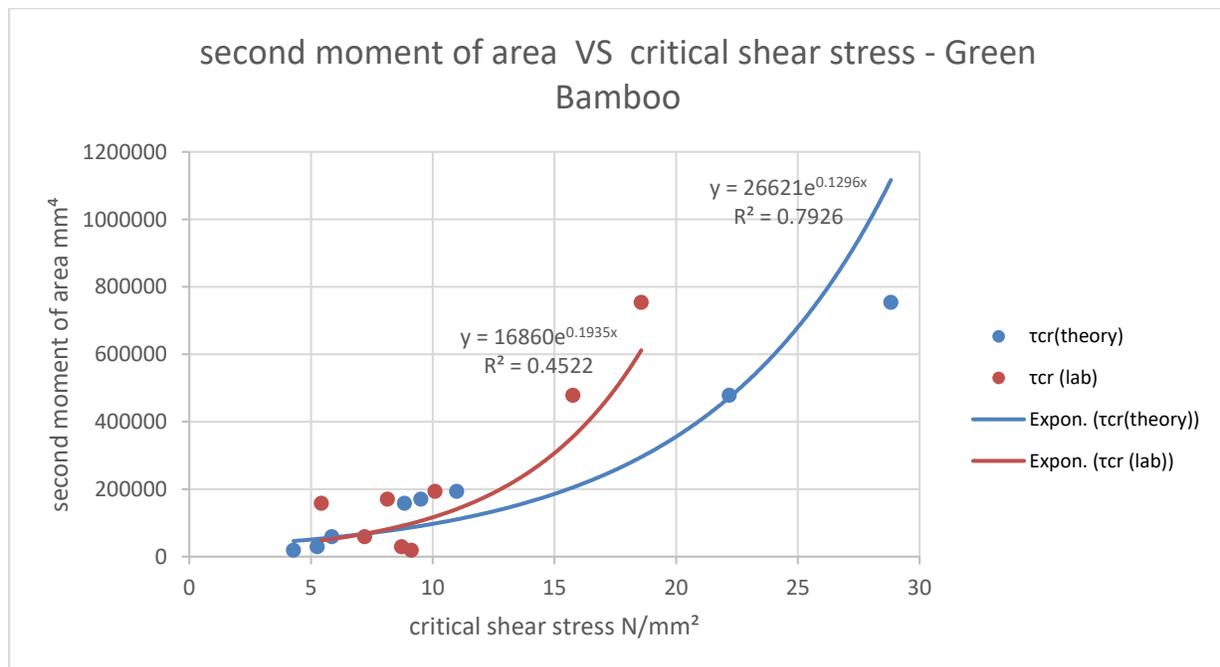


Figure 8: Second Moment of Area vs Shear Stress for Green Bamboo

From Figure 8 and analysis of the curves, there’s an increase in shear strength of the bamboo as second moment of area increases. The curves are gentler and less steep than in the dry bamboo (Figure 7). This is due to the effect of high levels of moisture content, the samples had an average moisture content of 62.10%, moisture content therefore, clearly influences the strength and stiffness of these samples. Strength and stiffness of bamboo decrease with an increase in moisture content.

In addition to changes in strength and stiffness, dimensional changes also occur due to changes in moisture content. Shrinkage takes place with diminishing moisture content. The Timber design manual (2006) states that an average shrinkage of 4.6% occurs when the moisture content (M.C.) goes from 24% to 6%.

The curve is steeper in laboratory shear curve than the theoretical curve, this is a total opposite of the dry bamboo which was indicating that the theoretical curve is steeper than the lab one. This is clearly due to the high moisture content and also possibly experimental errors. The theoretical curve had a percentage accuracy of 79.26% while that of the lab had an accuracy of 45.22%. There’s a significant variation in the accuracies of the dry and green bamboo data, 3.33% and 28.97 % respectively. This variation was caused

by a high level of moisture content which affected other parameters of the bamboo. A semi-empirical relation can be determined to express the theoretical curve in form of the empirical one.

$$\frac{26621e^{0.1296x}}{16860e^{0.1935x}} = 1.48$$

Therefore, when a theoretical curve is factored by 1.48 it maps to the empirical curve. The factor is lesser than the one in dry bamboo, because moisture affects the strength properties of the bamboo.

Second moment of area VS critical load (dry bamboo)

Table 3: Second moment of area and critical load dry bamboo

| L mm | D Mm | d mm | D-d mm | A mm ² | I mm ⁴ | Pcr (theory) | Pcr (empirical) | E N/mm ² | % Moisture |
|------|------|------|--------|-------------------|-------------------|--------------|-----------------|---------------------|------------|
| 1500 | 52 | 40 | 12 | 113.1 | 233274.6 | 159.26 | 300.6 | 33218.62 | 9.2 |
| 1500 | 44 | 33 | 11 | 95.05 | 125786.8 | 102.20 | 178.86 | 30802.37 | 10.79 |
| 1500 | 35 | 25 | 10 | 78.55 | 54494.06 | 53.57 | 203.69 | 66917.69 | 11.32 |
| 1500 | 32 | 24 | 8 | 50.27 | 35190.40 | 54.06 | 79.56 | 25906.33 | 12.31 |
| 1500 | 24 | 17 | 7 | 38.50 | 12187.77 | 24.45 | 64.95 | 46750.47 | 11.56 |
| 1500 | 20 | 15 | 5 | 19.64 | 5369.63 | 21.12 | 76.38 | 63667.4 | 9.7 |
| 1500 | 15 | 10 | 5 | 19.64 | 1994.43 | 7.84 | 50.92 | 114274.80 | 10.23 |

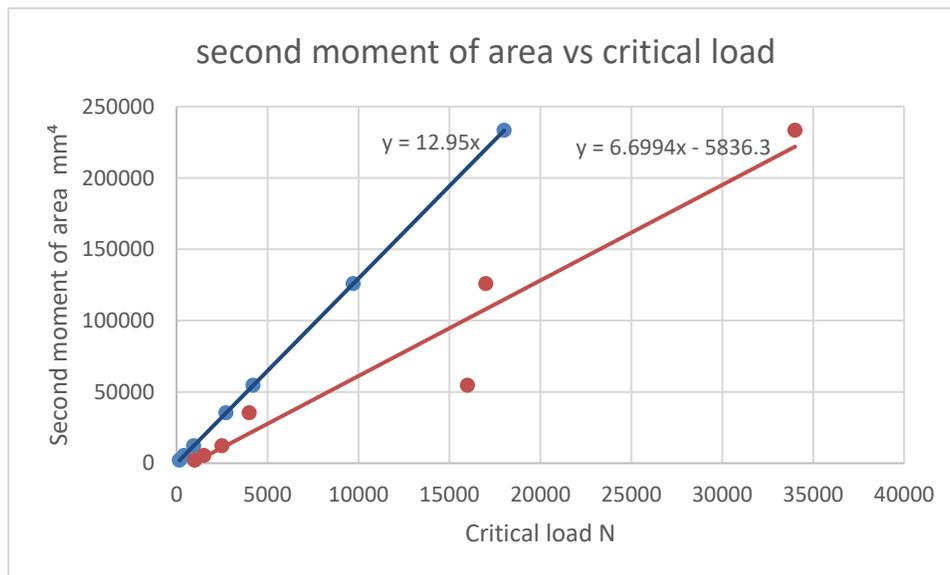


Figure 9: Second moment of area vs critical load for dry bamboo

From the curves (Figure 9) above its clear that as second moment of area increases there's an increase in the critical load of the bamboo samples. This is true in that a larger area moment of area increases the efficiency of a cross-sectional material to resist bending caused by loading. Therefore, critical load increases with an increase in second moment of area.

There's a variation in the curves of theoretical and the empirical. The theoretical curve is steeper than the empirical one, indicating that theoretical samples are stronger than the empirical samples. Hence there is need for a semi-empirical relation of the two curves to come up with a factor which can map the theoretical curve to the empirical curve.

$$\frac{12.95x}{6.6994x} = 1.933$$

Therefore, when 1.933 is factored to the theoretical curve it maps to the empirical curve.

Second moment of area VS critical load (green bamboo)

Table 4: Showing data for moment of area and critical load

| L mm | D Mm | D Mm | D-d mm | A mm ² | I mm ⁴ | Pcr (theory) | Pcr (empirical) | E N/mm ² | % Moisture |
|------|------|------|--------|-------------------|-------------------|--------------|-----------------|---------------------|------------|
| 1500 | 69 | 52 | 17 | 1615.74 | 753859.3 | 46571.78 | 30000 | 9069.87 | 64.8 |
| 1500 | 61 | 45 | 16 | 1332.20 | 478429.20 | 29556.31 | 21000 | 10003.96 | 62.22 |
| 1500 | 46 | 27 | 19 | 1089.50 | 193724.70 | 11967.89 | 11000 | 12941.30 | 62.72 |
| 1500 | 44 | 23 | 21 | 1105.20 | 170269.6 | 10518.89 | 9000 | 12046.9 | 61.38 |
| 1500 | 43 | 21 | 22 | 1105.20 | 158294 | 9779.05 | 6000 | 8638.87 | 60.5 |
| 1500 | 34 | 19 | 15 | 624.47 | 59207.8 | 3657.73 | 4500 | 17322.23 | 63.2 |
| 1500 | 30 | 21.5 | 8.5 | 343.85 | 29275.83 | 1808.59 | 3000 | 23355.13 | 61.23 |

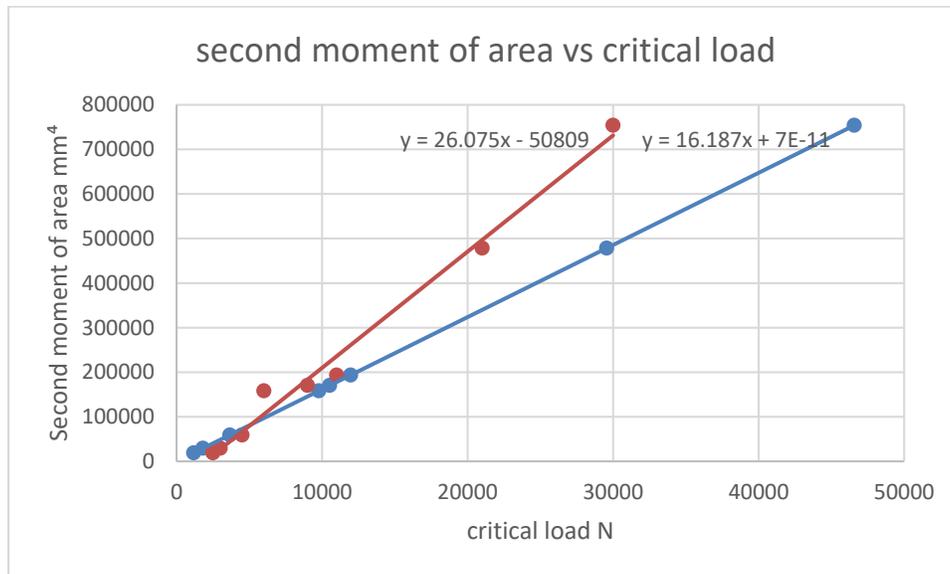


Figure 10: Second moment of area VS critical load for green bamboo

In the case of green bamboo (Figure 10), empirical curve is steeper than the theoretical one as shown from the graph. This is the total opposite of the dry bamboo curves which showed that, theoretical samples were much stronger than the empirical ones. This can be attributed to the high moisture content which has effects the strength of bamboo. The theoretical curve still needs to be factored to the empirical curve which is the correct representation of the relation above.

There is a need for a relation factor, to map the theoretical curve to the empirical one which is relatively accurate compared to the theoretical one.

$$\frac{26.075x}{16.187x} = 1.61$$

The factor 1.61 is slightly less than the factor in dry bamboo. This is due to high moisture content in the samples which adversely affects, the strength properties of bamboo. Therefore, there is need for seasoning of bamboo culms to the right moisture content before using them.

Critical load VS flexural rigidity

Table 5: Critical load and flexural rigidity of dry bamboo

| L mm | D mm | d mm | D-d mm | A mm ² | I mm ⁴ | τ (theory) | τ(empirical) | E N/mm ² | % Moisture |
|------|------|------|--------|-------------------|-------------------|------------|--------------|---------------------|------------|
| 1500 | 52 | 40 | 12 | 113.1 | 233274.6 | 159.26 | 300.6 | 33218.62 | 9.2 |
| 1500 | 44 | 33 | 11 | 95.05 | 125786.8 | 102.20 | 178.86 | 30802.37 | 10.79 |
| 1500 | 35 | 25 | 10 | 78.55 | 54494.06 | 53.57 | 203.69 | 66917.69 | 11.32 |
| 1500 | 32 | 24 | 8 | 50.27 | 35190.40 | 54.06 | 79.56 | 25906.33 | 12.31 |
| 1500 | 24 | 17 | 7 | 38.50 | 12187.77 | 24.45 | 64.95 | 46750.47 | 11.56 |
| 1500 | 20 | 15 | 5 | 19.64 | 5369.63 | 21.12 | 76.38 | 63667.4 | 9.7 |

| | | | | | | | | | |
|------|----|----|---|-------|---------|------|-------|-----------|-------|
| 1500 | 15 | 10 | 5 | 19.64 | 1994.43 | 7.84 | 50.92 | 114274.80 | 10.23 |
|------|----|----|---|-------|---------|------|-------|-----------|-------|

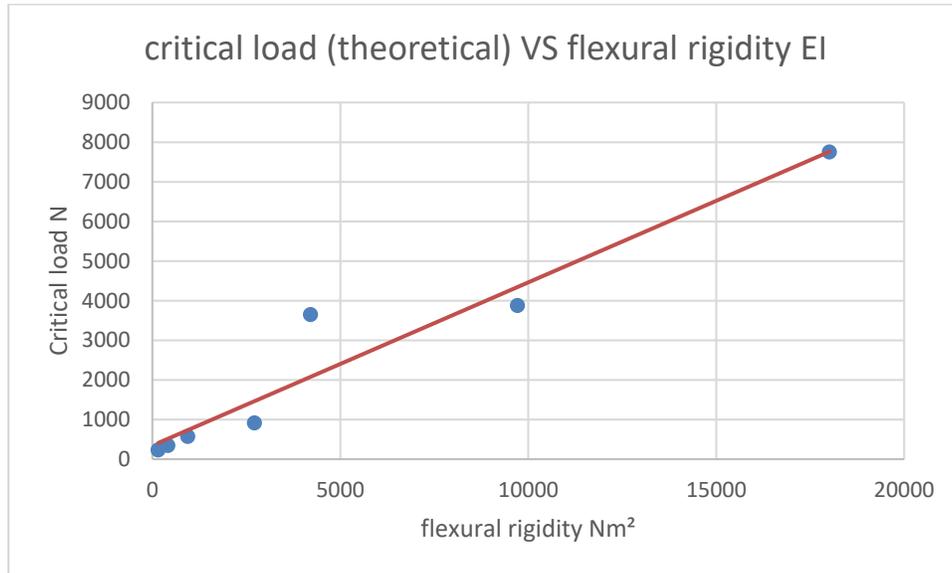


Figure 11: Theoretical critical load VS flexural rigidity for dry bamboo

Table 6: Data for critical load and flexural rigidity of green bamboo

| L mm | D mm | D Mm | D-d mm | A mm ² | I mm ⁴ | τ (theory) | τ (empirical) | E N/mm ² | % Moisture |
|---------|---------|---------|-----------|----------------------|----------------------|--------------------|-----------------------|------------------------|---------------|
| 1500 | 69 | 52 | 17 | 1615.74 | 753859.3 | 28.82 | 18.57 | 9069.87 | 64.8 |
| 1500 | 61 | 45 | 16 | 1332.20 | 478429.20 | 62.22 | 15.76 | 10003.96 | 62.22 |
| 1500 | 46 | 27 | 19 | 1089.50 | 193724.70 | 62.72 | 10.09 | 12941.30 | 62.72 |
| 1500 | 44 | 23 | 21 | 1105.20 | 170269.6 | 61.38 | 8.14 | 12046.9 | 61.38 |
| 1500 | 43 | 21 | 22 | 1105.20 | 158294 | 60.5 | 5.42 | 8638.87 | 60.5 |
| 1500 | 34 | 19 | 15 | 624.47 | 59207.8 | 63.2 | 7.21 | 17322.23 | 63.2 |
| 1500 | 30 | 21.5 | 8.5 | 343.85 | 29275.83 | 61.23 | 8.72 | 23355.13 | 61.23 |

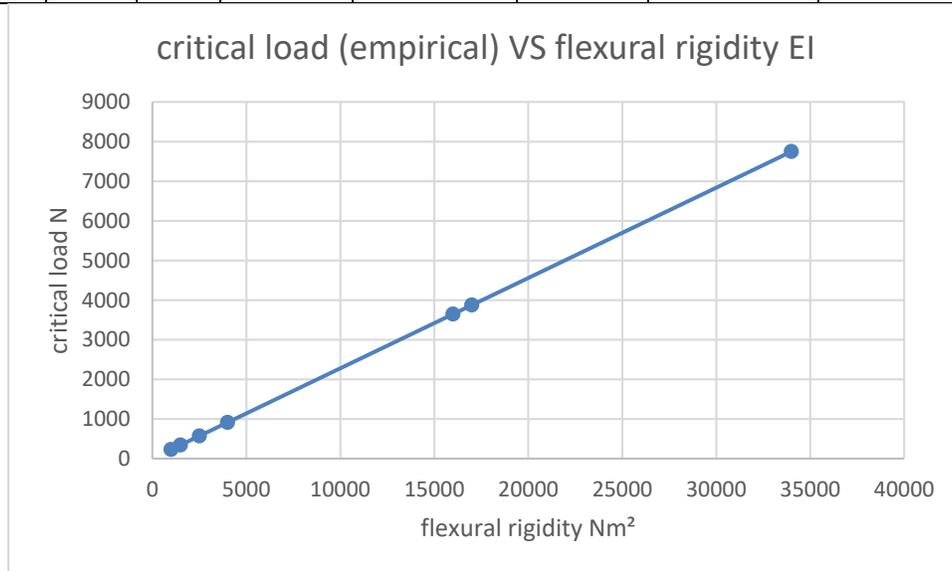


Figure 12: Critical load VS flexural rigidity for green bamboo

Flexural rigidity is the resistance offered by a structure while undergoing bending. From the graphs (Figures 11 and 12) it's clear that the critical load is proportional to the flexural rigidity of the samples. Moisture content has a significant effect on the flexural rigidity, as bamboo dries it shrinks hence second moment area and section modulus reduces this results in the reduction of the flexural rigidity. Increasing flexural rigidity leads to an increase in the strength property of a material as is observed in these figures.

Flexural rigidity is increased by using a stiffer material i.e. a material with larger modulus of elasticity or by distributing the material in such a way as to increase the moment of inertia I of the cross section. The moment of inertia is increased by distributing the material farther from the centroid of the cross section. Hence a hollow tubular member is generally more economical for use as a column than a solid member having the same cross-sectional area.

Reducing the wall thickness of a tubular member and increasing its lateral dimensions (while keeping the cross-sectional area constant) also increases the critical load because moment of inertia is increased. This process has a practical limit, however, because eventually the wall itself will become unstable. When this happens, localized buckling occurs in the form of small corrugations or wrinkles in the walls of column. This type of failure was also observed in some samples as is shown in Figure 5(B).

Critical stress VS slenderness ratio

Dry bamboo samples

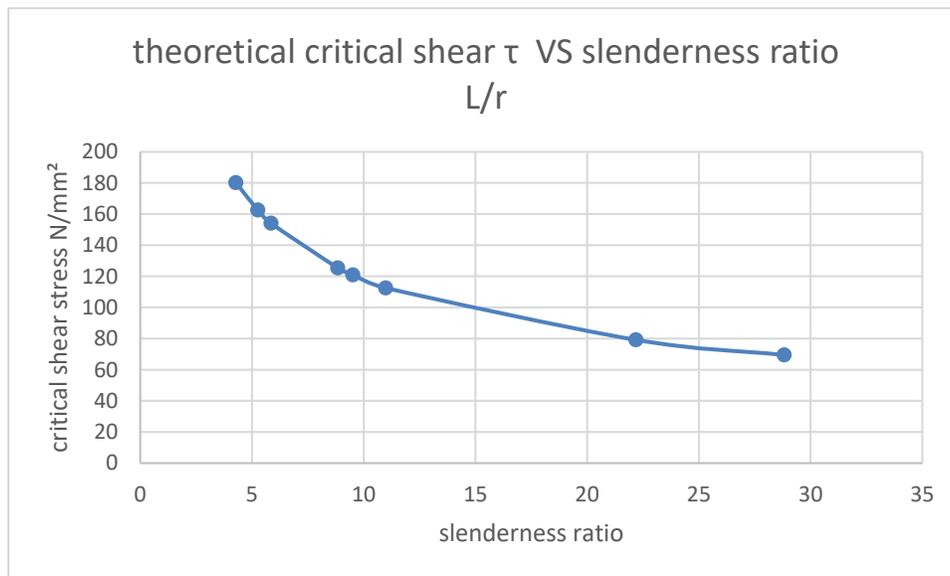


Figure 13: Theoretical critical shear VS slenderness ratio

Green bamboo samples

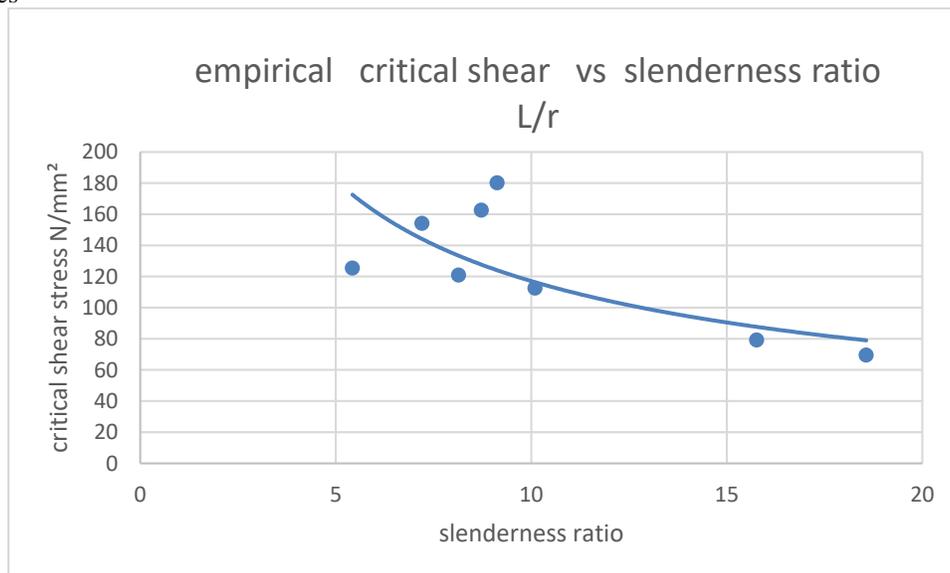


Figure 14: Empirical critical shear VS slenderness ratio

Slenderness ratio is the ratio of the length of a column and the least radius of gyration of its cross section. From the graph it's seen that an increase in the slenderness ratio results to a decrease in critical stress. Slenderness ratio depends on dimensions of the column of bamboo, a column that is long and slender will have a high slenderness ratio and therefore a low critical stress. While the column that is short will have a low slenderness ratio and will buckle at a high stress. This is the case in both the green and dry bamboo. The critical shear stress was observed to vary with the slenderness ratio for both dry and green bamboo columns (Figures 13 and 14)

Cross-sectional area VS critical load

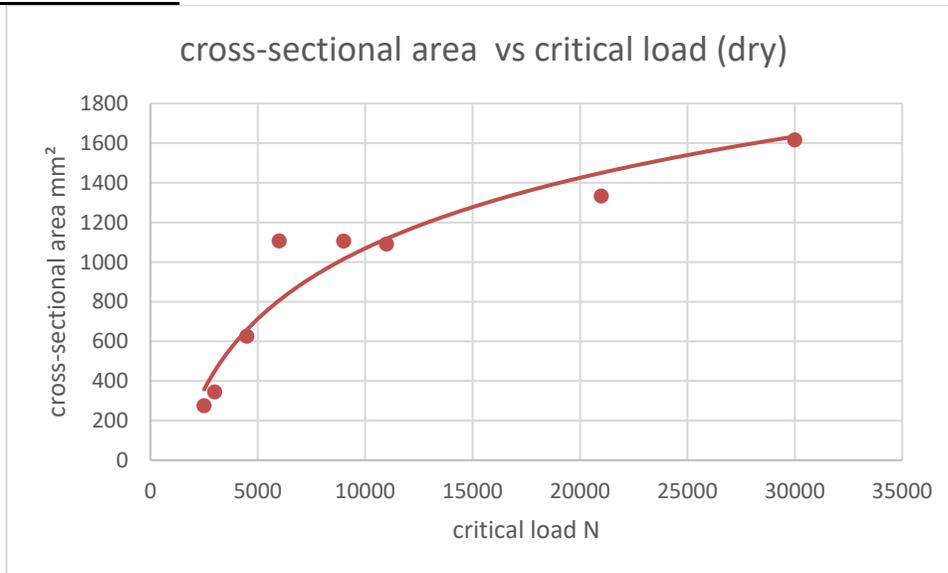


Figure 15: Cross sectional VS critical load for dry bamboo

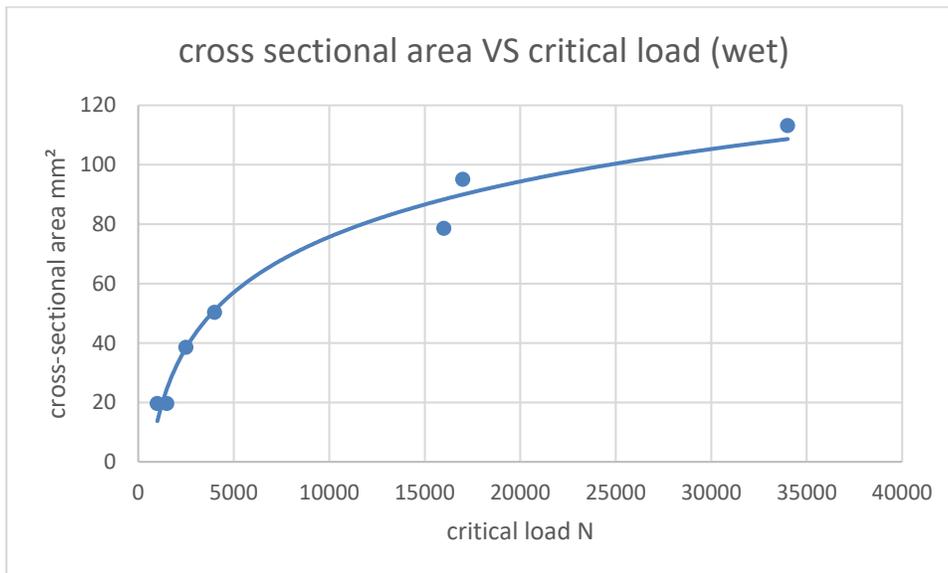


Figure 16: Cross sectional VS critical load for green bamboo

From Figures 15 and 16, there is an increase in critical load as the cross-sectional area of the samples increases. The curve is steeper and then it gets less steep as the cross-sectional increases. For the same shape, the cross sectional area has a direct effect on second moment of area which in turn affects the bending and buckling properties of the bamboo column. A big cross-sectional area has a large second moment of area the reason why there's an increase in critical load as the area increases. Hence columns of large cross sections are recommended in construction as they can effectively carry more loading with lower possibility of buckling. Also, from the two curves, Figures 15 and 16, the dry bamboo was found to be a lot stiffer than the green bamboo column

Moisture content VS modulus of elasticity

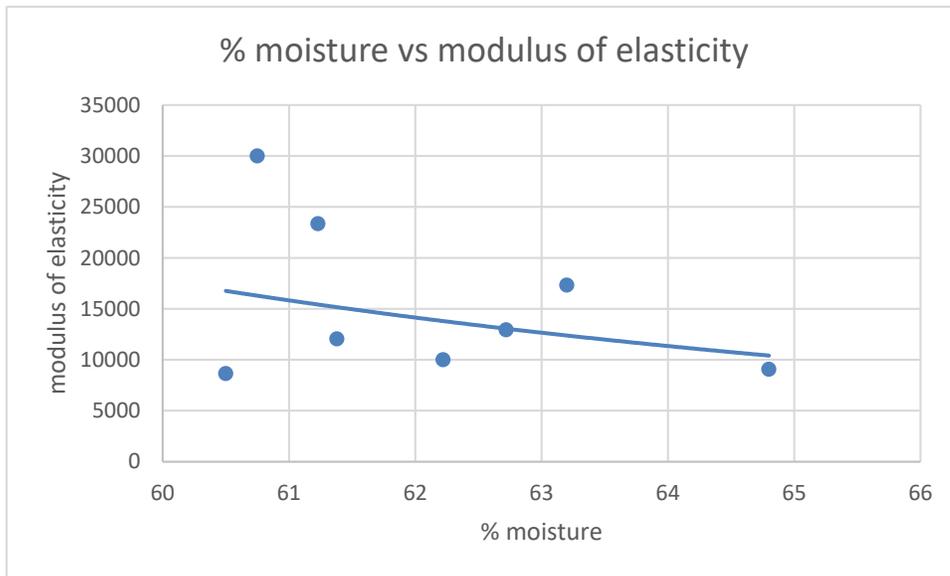


Figure 2Moisture content VS modulus of elasticity

From Figure 17 it can be seen that an increase in moisture leads to a decrease in modulus of elasticity. A decrease in modulus of elasticity, means even the strength and stiffness of bamboo is decreased, the right moisture content is significant in construction. Clearly moisture content is an important influence on the physical and mechanical properties of bamboo. This has to be taken into account when using bamboo in structural purposes. Therefore, the right amount of moisture content is required so as to ensure higher strength and stiffness of bamboo columns.

IV. CONCLUSIONS AND RECOMMENDATIONS

In view of the results and analysis gotten above, these conclusions were arrived at

- (i) Concerning bamboo as reinforcement in concrete:
 - There is reduced bond between the concrete and the bamboo reinforcement. This causes a concern as it leads to low strength development in the beams and slabs leading to both failure under lower loading and also more brittle failure
 - Curing and drying of the bamboo reinforcement is important as it can considerably increase the strength of bamboo reinforced concrete.
- (ii) Concerning bamboo as column element
 - The variation of diameter and thickness in bamboo columns had a considerable effect on their axial buckling resistances. It is important to incorporate the variation of diameter and thickness for bamboo columns when determining their axial buckling capacity.
 - Local failure of the bamboo column as it buckles can occur and may need to be checked during design of such columns
 - The lower the moisture content of a bamboo column, the higher the buckling resistance, when other factors are held constant

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Revisiting Financial Development And Economic Growth In Sub-Saharan African Low-Income Countries: A Panel Data Approach

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Abstract- The aim of this paper is to re-assess the relationship between financial development and economic growth in 17 Sub-Saharan African Low-Income Countries (SSALIC) over the period of 2000 to 2015. Both static and dynamic panel estimation techniques are used to re-assess the relationship.

On the static model, although, liquid liability and commercial bank central bank are statistically insignificant, the private sector credit and openness are positive and highly statistically significant, consistent with many of theoretical and empirical studies while, the dynamic panel analysis provides no clear indication on the relationship between financial development and economic growth.

Consequently, this empirical difference provides some insight and a good basis for reflection on stipulated relationship between indicators of financial development and economic growth.

Index Terms- Economic growth, Financial development, Panel data

JEL Classification: F10, F14

I. INTRODUCTION

Ongoing debate has revolved around whether financial development is one of the engines of growth. However, there are mixed findings and opinions on the relationship between financial development and economic growth.

The number of studies has agreed that financial sector development has positive effect on growth (Beck, Levine, & Loayza, 2000; Christopoulos & Tsionas, 2004; Jedidia, Boujelbene, & Helali, 2014; Khan & Senhadji, 2000; King & Levine, 1993a, 1993b; Levine, 1997; Levine, Loayza, & Beck, 2000).

Recent empirical studies, however, offer contradictory evidence (Kaminsky and Reinhart, 1999; Deidda and Fattouh, 2002; Wachtel, 2003; Favara, 2003; Rousseau and Wachtel, 2011 and Arcand et al., 2011 and Demetriades and Rousseau, 2011).

Despite the wealth of research in these areas, the absence of consensus of the opinion has meant that no one theory has gained the full support of the entire economic community. On the contrary, somewhat conflicting and often contradicting findings have left many deeply puzzled.

To shed light on this puzzle, this study re-assesses the relationship between financial development and economic growth in the context of Sub-Saharan African Low-Income Countries.

This study however differs from the previous studies, we are re-assessing the relationship between financial development and economic growth using alternative estimation techniques to identify the empirical differences in findings that might have profound implications on the stipulated relationship.

This paper is structured into five sections after the introduction, a review of relevant literature is presented in section two while the third section discusses the methodology and data whereas, section four presents the results and discussions and the conclusion comes last.

II. DISCUSSION OF RELATED LITERATURE

2.1. Theoretical foundations

The economic theory postulates three channels on which financial development affects economic growth. First, payment methods are the least expensive services offered by the financial system that promote efficiency of the economy by reducing the transaction cost (Kindleberger, 1993). Secondly, a volume effect, where the financial activity increases savings and thus resources can be a source of investment financing.

Financial development → Capital accumulation → Economic growth.

Thirdly, an allocation effect, that financial development improves the allocation of resources for investment.

Through Capital accumulation → Economic growth

↑
Financial development

2.2. Empirical studies

The theoretical literature has occasioned in ample studies and empirical works to support the relation of financial development. Initially, the works of Schumpeter (1912), Gurley and Shaw (1955) and Goldsmith (1969) holds that a well-developed financial system stimulates growth by channelling savings to the most productive investment projects.

Recently empirical studies done by Beck et al. (2000), using a sample of 74 developed and developing countries use two methodological approaches to take account of the endogeneity of the financial development variable in a growth model over the

period 1960-1995. He concluded for the existence of a positive link between the exogenous component of financial development and economic growth. By applying Generalized Moments in dynamic panel show that the development level of the banks (measured by the ratio of credits to the private sector in proportion of GDP) and the development level of stock exchange markets (measured by the turnover ratio) independently exercise each a positive impact on economic growth.

Despite the number of empirical studies which find a positive relationship between financial development and economic growth, a new emerging literature calls the robustness of this relationship into interrogation.

The study of Anderson and Trap (2003) have shown that the positive relationship between financial development and per capita growth not always borne out in all sample and the period. Brought to light by Levine, Loayza and Beck(2000) restricted to some countries, for developing countries witnessed crises during the 1980s, when they liberated their financial sectors and put more rapid liberalization reforms in place that the significant impact on growth. Aghion, Howitt and Mayer-Foulkes (2004) have also found an insignificant direct impact of financial development (measured by credit/GDP) on economic growth. But the coefficients of the crossed variable of the financial development level and of the initial level of GDP per head (relative to that of the United States), presents a negative and significant sign. They highlight an ambiguous relationship between financial development and economic growth. The level of credits as a percentage of GDP influences growth only in the intermediary stages of development.

III. METHODOLOGY

3.1. Data and sample selection

This study applied balanced panel data covers 17 Sub-Saharan Africa Low-Income Countries (SSALIC) as classified by the World Bank in 2010. The data set spanning from 2000 to 2015. The dependent variable is the log of real per capita GDP taken from the World Development Indicators (WDI)¹. The main regressors are three different proxies for financial development at the country level, namely, liquid liabilities (LIQLIAB), commercial-central bank (DMA), and private credit (CPRS), all taken from the International Financial Statistics (IFS) database². Liquid liabilities are defined as the liquid liabilities of the financial system (currency plus demand and interest-bearing liabilities of banks and non-bank financial intermediaries) divided by GDP. Commercial-central bank is defined as the assets, of deposit money banks divided by assets of deposit money banks plus central bank assets. Private credit refers to the credit by deposit money banks and other financial institutions to the private sector divided by GDP. Finally, the following control variable is also considered: openness to trade (OPN) from WDI. The openness to trade (the ratio of exports plus imports to GDP as a proxy for the importance of international factors in influencing economic activity).

¹ Source: World Development Indicators online database (accessed November 10, 2019)

3.2. Analytical procedure and model specifications

In this study, both the static and dynamic panel estimation techniques are used. The reason for using both techniques is to identify the empirical differences in the output.

a. Static models

The static panel setup is given by the following model:

$$Y_{it} = \beta X'_{it} + \eta_i + \varepsilon_{it} \dots \dots \dots (1)$$

where Y_{it} is the logarithm of real per capita GDP, X_{it} represents a vector of regressors.

Where, i and t denote country and time respectively, η_i is the unobserved time-invariant specific effects. Finally, ε_{it} is the two-way error component term of the model assumed to be normal, independent and identically distributed (IID)

with $E(\varepsilon_{it})=0$; $Var(\varepsilon_{it}) = \sigma^2 > 0$. Under this static model specification the Hausman (1978) test helps us to select the most suitable model.

b. Dynamic panel model

We use the generalized method of moments (GMM) estimators developed for dynamic models of panel data by Arellano and Bond (1991) and Arellano and Bover (1995).

Let rewrite the model (1) to capture the dynamism in our model in the following setup

$$Y_{it} = \alpha Y_{it-1} + X'_{it} \beta + \eta_i + \varepsilon_{it} \dots \dots \dots (2)$$

where Y_{it-1} is the initial level of per capita income.

To eliminate country-specific effects, we take first differences of equation (2)

$$\Delta Y_{it} = \alpha \Delta Y_{it-1} + \beta \Delta X'_{it} + \Delta \varepsilon_{it} \dots \dots \dots (3)$$

To deal with the likely endogeneity of the financial development and economic growth and because by construction the new error term ($\varepsilon_{it} - \varepsilon_{it-1}$) in (3) is correlated with the lagged dependent variable, ($Y_{it-1} - Y_{it-2}$).

The first GMM panel estimator uses the following moment conditions:

$$E[Y_{it} - s(\varepsilon_{it} - \varepsilon_{it-1})] = 0 \text{ for } s \geq 2; t = 3, \dots, T$$

$$E[X'_{it} - s(\varepsilon_{it} - \varepsilon_{it-1})] = 0 \text{ for } s \geq 2; t = 3, \dots, T$$

The first GMM panel estimator shows that when the explanatory variables are persistent over time, lagged levels of these variables are weak instruments for the regression equation in differences. To reduce the potential biases associated with the difference estimator, the system GMM estimator combines the differences and levels regression by adding moment conditions for the second part of the system which is the regression in levels are:

² Source: International Financial Statistics (IFS) online database (accessed November 10, 2019)

$$E[(Y_{it-s} - Y_{it-s-1})(\eta_i + \varepsilon_{it})] = 0 \text{ for } s = 1$$

$$E[(X_{it-s} - X_{it-s-1})(\eta_i + \varepsilon_{it})] = 0 \text{ for } s = 1$$

These moment conditions above employs a GMM procedure to generate consistent and efficient parameter estimates.

IV. RESULTS AND DISCUSSIONS

4.1. Preliminary analysis

The aim of this section is to re-evaluate the effect of financial development on economic growth and descriptive statistics are summarised in Table 1.

Table1. Descriptive statistics

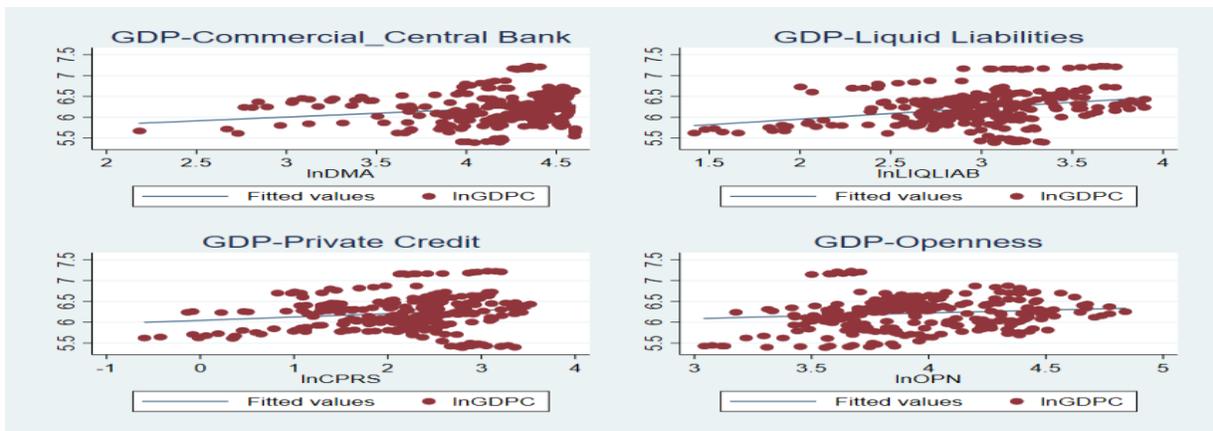
| VARIABLES | N | Mean | sd | Min | Max | skewness | kurtosis |
|-----------|-----|-------|-------|--------|-------|----------|----------|
| lnGDPC | 272 | 6.215 | 0.413 | 5.391 | 7.225 | 0.321 | 3.065 |
| lnDMA | 272 | 4.157 | 0.419 | 2.183 | 4.605 | -1.738 | 6.314 |
| lnLIQLIAB | 272 | 2.971 | 0.452 | 1.418 | 3.900 | -0.714 | 4.178 |
| lnCPRS | 272 | 2.127 | 0.788 | -0.595 | 3.520 | -0.868 | 3.678 |
| lnOPN | 272 | 3.947 | 0.361 | 3.043 | 4.839 | 0.134 | 2.455 |

Source: Own computation

The general observations from the results in the table1 is that the sample countries experienced volatility in GDP growth rates showing a mean value of GDP per capita growth of approximately 6% and a standard deviation exceeding 4 % for the sample. The DMA appeared to be stable, averaging almost 4%

within the sample period, while average LIQLIAB and OPN show results with a mean value of 3% whereas CPRS indicate around 2%.This data variability is suitable for our panel specification and analysis.

Figure:1Scatter plots of financial development indicator and economic growth



Source: Author's computation

We extend the analysis using partial scatter plots for indicators of interest. This show an intuitive contribution of financial indicator to GDP per capita growth to identify the nature of the relations. The overall indicator show broadly resemblance positive linear association with GDP growth.

4.2. Regression estimates

This section provides both static and dynamic regressions results of the relationship between financial development and economic growth. For static regression comprised by: OLS, LSDV, RE and for the dynamic panel model the FDGMM(Arellano and Bond, 1991) and SYS GMM(Blundell and Bond, 1995) have been used.

Table 2: Financial Development and Economic growth: Static Panel Models

| | OLS | LSDV | FE | RE |
|----------------|---------------------|--------------------|--------------------|--------------------|
| lnDMA | 0.278*** (0.08) | 0.043 (0.03) | 0.043 (0.03) | 0.046 (0.03) |
| lnLIQLIAB | 0.492*** (0.09) | -0.059 (0.05) | -0.059 (0.05) | -0.050 (0.05) |
| lnCPRS | -0.244*** (0.07) | 0.121*** (0.03) | 0.121*** (0.03) | 0.116*** (0.03) |
| lnOPN | 0.018 (0.07) | 0.228*** (0.04) | 0.228*** (0.04) | 0.226*** (0.04) |
| <i>N</i> | 272 | 272 | 272 | 272 |
| <i>AIC</i> | 259.473 | -413.914 | -445.914 | . |
| Log-likelihood | -124.737 | 227.957 | 227.957 | . |
| R-Squared | 0.140 | 0.936 | 0.400 | . |
| F stat | 10.834 | 182.539 | 41.832 | . |
| RMSE | 0.386 | 0.109 | 0.109 | 0.109 |

Standard errors in parentheses

The dependent variable is lnGDPC.

Specific effects dummies in LSDV not shown to save space

Source: own computations.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Author's estimation

The Hausman tests (Prob>chi2 = 0.6705) do not reject the null hypothesis, thus the random effects model yields consistent estimates.

For the RE model, although, liquid liability and commercial bank central bank are statistically insignificant, the private sector

credit and openness are positive and highly statistically significant. This is implying that if the private sector credit and openness increase by 1% the par capital GDP increases by 0.11% and 0.22% respectively Ceteris paribus, consistent with many of theoretical and empirical models.

Table 3: Financial Development and Economic growth: Dynamic Panel Model

| | OLS | FE | FDGMM | SYSGMM |
|-----------------------|---------------------|---------------------|---------------------|---------------------|
| L.lnGDPC | 1.000*** (0.008) | 0.848*** (0.028) | 0.801*** (0.040) | 0.891*** (0.149) |
| lnDMA | 0.016 (0.013) | 0.008 (0.018) | -0.002 (0.024) | 0.150 (0.253) |
| lnLIQLIAB | -0.028** (0.013) | -0.054** (0.024) | -0.070* (0.036) | 0.082 (0.133) |
| lnCPRS | 0.005 (0.009) | 0.020 (0.016) | 0.026 (0.023) | -0.114 (0.169) |
| lnOPN | 0.027*** (0.010) | 0.073*** (0.018) | 0.083*** (0.023) | 0.105 (0.110) |
| <i>N</i> | 255 | 255 | 238 | 255 |
| <i>R</i> ² | 0.986 | 0.889 | . | . |
| <i>AIC</i> | -789.668 | -857.018 | . | . |
| <i>N</i> countries | | | | |
| Log likelihood | 411.834 | 445.509 | | |
| AR(1) | | | -4.770 | -1.649 |
| AR(1) (p-value) | | | 0.000 | 0.099 |
| AR(2) | | | -0.997 | -0.732 |
| AR(2) (p-value) | | | 0.319 | 0.464 |

| | |
|------------------|--------|
| Hansen | 0.000 |
| Hansen (df) | 56.000 |
| Hansen (p-value) | 1.000 |

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Author's estimation

The lag of real GDP per capita has a significant coefficient and a positive effect on growth for both FDGMM and SYSGMM estimators, which points to a downwards bias respectively from 80% to 89% in our simulations. whereas the direct impact of the three financial development variables considering openness as control variable are statistical insignificant on growth. This finding is similar with some studies (Anderson and Trap (2003), Aghion, Howitt and Mayer-Foulkes (2004)) shown that direct effect of financial development and economic growth can be observed at the transition stage of financial development.

The diagnostics test for both Sargan-Hansen and second-order serial correlation tests do not reject the null hypothesis, thus the instruments are exogenous and valid.

V. CONCLUSIONS

The study re-examined the relationship between financial development and economic growth in Sub-Saharan Africa Low Income Countries over the period 2000-2015.

The relationship has been revisited by using both static and dynamic panel data. The Hausman test showed that random effects model yields consistent estimates, although the liquid liability and commercial bank central bank are statistically insignificant. The private sector credit and openness are positive and highly statistically significant. While the dynamic panel analysis, allows us to determine the relative changes in growth rate following the changes in the level of financial development, provides no clear indication on the direction of the relationship between financial development and economic growth.

Consequently, this empirical difference provides some insight and a good basis for reflection on stipulated relation between indicators of financial development and economic growth.

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Sustainable development and water management as quality of life indicators in Mediteranian area

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Abstract- Water is a key biodiversity item, crucial for both, economy and society. Without it there is no human survival. Water sustainability has its environmental, social and economic aspects, and each of them is in relation to each other's intertwining.

There are human needs as well as the needs of ecology, placed above all others. The problem is that water and water resources must be put in the form of a water resource policy, which will be correlated, that is, have an integrative relationship with sustainability, and the crucial parameters that it entails.

The bottom line is that in the promotional approach promoted, indicators must also be integrative, meaning representative, simple, extremely clear, measurable, well-connected to economic, social and physical aspects, so that future testing can rely on them, in terms of reliable rappers.

Index Terms- water,biodiversity,environmental,sustainability

I. INTRODUCTION

Water sources in the the Mediterranean area are limited, unequally distributed in time and space, and very vulnerable to external influences. In the last century, water needs have grown, growing the coasts in many countries by three hundred cubic meters, annually. When such countries are considered as those with a water scarcity problem, their total population is nearly two hundred million. Sixty million of these are experiencing water shortages of five hundred cubic meters of water annually. Especially big is the problem in the southeastern part of the Mediterranean, where about twenty million people are facing water shortages. A factor that exacerbates the already difficult water scarcity situation is "the overexploitation of one part of groundwater."¹

In the Mediterranean area, water is a key resource, necessary for its development. Without it, there is no improvement in the lives of residents. This is not the case only when it comes to local households, but also applies to major sectors of the economy, such as agriculture, agro-industry, ie food and beverage production, tourism, paper production and the like. For example, in some Mediterranean countries (Portugal), according to the

National Water Plans, nearly eighty percent of water goes to agriculture, then fourteen for energy production, and about four and a half for industrial purposes.

II. MEDITERRANEAN AREA

There are numerous ongoing projects in order to improve the situation in the Mediterranean area. One such project (Melia), insists on dialogue, with a view to introducing integrated water resources management throughout the Mediterranean. The term integrative implies that the solution does not come from the imposition from above, and by the same such planning, and then the implementation of the given infrastructure, but that a multi-layered process, which involves the theoretical part, and then open and transparent planning and implementation process, in which stakeholder involvement can take place.

Therefore, issues that need to be considered in order to achieve the concept of sustainability of water supply resources are, above all, general and political issues, and after that technical. Those issues are necessary for sustainability of water supply resources concept in order to work.

Some experts consider this to be more than just a political issue. They agreed that the focus should be on ensuring the health of mankind as a whole, and therefore the priorities for water resources must be set at the highest political levels, both international and national, which will accelerate the adoption of minimum water levels by the heads of the population of each of countries, which will be guaranteed by national governments and international representatives (relevant agreements and top-level international acts).

It is necessary to raise awareness regarding the use of water resources, by taking care of our own management of each of us individually, and when it comes to the disposal of our own water resources (at the individual level), thus confirming our genuine interest in the well-being of all in the home country.

Furthermore, work on changing the paradigm of regional, because the water is still not considered to be everywhere, as well as a resource that has its limitations, since "it is vital to reach the concept of sustainability."² Although tourism development is

¹ Benoit G., Comeau A. (2005). A Sustainable Future for the Mediterranean: The Blue Plans Environment and Development Outlook (UNEP). Mediterranean Action Plan (MAP). United Nations Environment Programme. Earthscan. London. p. 36

² Osório-Peters, S. (2003) Recycling. In: Rennings K., Zwick T. (Employment Impacts of Cleaner Production. ZEW Economic Studies (Publication Series of the Centre for

important, work should be done on a recycled water use system. Also, the price of water greatly affects the quality of water resource management.

As waters exceed the boundaries between the states (rivers, lakes, ...), it is necessary to establish better cooperation between the states that share common reservoirs with water.

When it comes to technical issues, however, there are key changes that need to be made: water resource management needs to improve the water supply infrastructure as well, and ensure greater efficiency of network supplies, also to minimize water loss in these processes, to improve capacity, both technically, for water supply and management, and to reduce water requirements by forcing the use of state-of-the-art technological solutions, thereby achieving great savings, using the latest irrigation and supply techniques.³

It must be started with defining the ways how to measure water. For example, the waters contained within an aquifer contribute a great deal to the final values, although they are classified as non-renewable sources of water, sometimes exceeding, in importance, renewable sources of water. This is crucial from the point of water resources sustainability concept. Likewise, green waters are a significant factor in drought-prone countries. Neither desalinated or recycled water should be neglected, as they are valuable for irrigation. When, as it happens, the aforementioned water sources are excluded, and all measurements are reduced to dealing with blue water only, then this has consequences for the planning processes that make measurements the most.

Difficulties also arise from spatial variations in surface or groundwater. The problem arises because measurements and estimates are made so that they are separated from each other, although both represent the same water cycle.

This, unfortunately, usually results in an overestimation of the estimated water supplies in the territory for which the measurement is being made. Such mistakes are very common, even when research is conducted by experts who are closely expert in the field.

Special problems arise when measurements are taken in the waters fragmented boundaries, and they are to approach difficult. In this case, the surface water must be measured according to the principle of river basin, while the groundwater must be approached as underground or via an aquifer. The aforementioned basins rarely have the same geographical conditions, especially when "it comes to countries where the government drought, while almost never correspond to political boundaries (do not match).⁴

Thus, for example, in countries where there are heavy droughts, the final amount of water that will be assessed as necessary will be different if there is no intended capacity (reservoirs) to capture water during short rainfall periods. On the other hand, all the specificities of the spatial type, which vary from country to country, must be respected, as well as the weather

specificities, and also the climate can affect in a very specific way and at different time periods. All these details must equally be considered as important.

It is of the great importance that we have good and accessible data, because if they are not such, answers to the asked questions will not be reliable. It is very important to specify at the outset when we begin measurements who has responsibility for data collection. The reason is that in some of the Mediterranean countries (Portugal), citizens holding wells on their properties consider groundwater, together with wells and property, their property, and do not allow any measurements outside their control conducted from outside. Although the legislation related to these issues has changed, nothing has changed in citizens approach to such important issues.

There are also problems with water availability. For example, when there are droughts or floods. In addition, the part of the water that goes downstream to another country, for which certain agreements have been signed, cannot (if not in accordance with it) be taken for measurement purposes by upstream expert teams. At the same time, the use of water and its upstream pollution can have unprecedented consequences for downstream users. Groundwater availability, in turn, depends on the state's ability to separate the amount needed to measure it.

III. INDICATORS

The importance of indicators has been noted in the 1980s and 1990s. Even then, the importance of using precise indicators was called for. First in the late 1980s (Brutland Commission, 1987). Then, ten years later, principles (Ballagio principles) were proposed that addressed indicators for achieving sustainable development. These are four main principles that are a prerequisite for sustainable development: first of all, establishing clear goals, in line with the vision of sustainable development, then a meaningful and systematic approach focusing on current issues of priority, identifying key issues to which the approach will be chosen to direct, the necessity for establishing continuity in approaching them.

Thus adopted rules are a guide to accession process, which involves the creation and selection of adequate indicators, their interpretation and presentation of results. They are understood in their mutual conditionality, and the need to apply them as a complete and inseparable package in order to achieve the results of the expected quality. It is also intended to work on them for the purpose of their further advancement, both by local communities, national governments, non-governmental organizations, corporations and international institutions.

At the beginning of the 2000s, additional questions (by the OECD)⁵ were proposed to integrate environmental, economic and social aspects of water resource management. These are the following questions: what is the environmental impact of

European Economic Research (ZEW), Mannheim, Germany), Vol.21. Physica.Heidelberg. p.182

³ McKinsey (2010). Managing water strategically: An interview with the CEO of Rio Tinto. McKinsey Quarterly.

⁴ Sullivan C.A., Manes M., Schmidt S., Moors E., Preziosi E., Loubier S., Inman D., Tarnacki K., Wyngaert I. Van den,

Olsthoorn A.F.M., Frbrich J., Blmling B., Koundouri P., Panebianco S., Giacomello, A.M., Gnther D. (2007). `Report on indicators for water stress.` AquaStress Deliverable D2.1-3, Centre for Ecology and Hydrology, Wallingford, UK. p.41

⁵ OECD (2008). Key environmental indicators.Organisations for Economic Cooperation and Development, Paris.

eliminating environmental subsidies for the agricultural sector, what are the environmental effects of implementing an alternative agricultural policy and instruments, such as direct payments instead of market price support, what would be the environmental effects of continuing to apply existing policies in the future, what would be the economic consequences for the agricultural sector, if the environmental targets set were achieved, and which were set as the most important in international documents? It must be understood how valuable it is to set precise indicators, whether for short, medium or long term projects. They are used to monitor and evaluate the quality of project implementation, and to evaluate their effectiveness, but also to obtain a key answer: the extent to which the measures actually taken lead to the achievement of sustainable development.

Here, we have certain principles and requirements that indicators themselves must meet that we can apply during the implementation of short, medium or long-term projects. These would be the following principles: the legitimacy of the measures used, reliability, that measured can be measured regardless of who subsequently makes the measurements, applicability to project objectives or to different needs for information, receptivity to observed situations and their variability through the passage of time, financial efficiency in the sense that it was worth the money invested and the time spent, promptness, or that it was done within the stipulated time, targeting or affecting the quantity, quality, time, the group that is mapped and the location selected.

In the context of water resource management, some experts point out what would be the characteristics of valid indicators, that would be the following characteristics: that they are authentic, scientifically legitimate, easy to interpret, and that they can express tendencies through the passage of time, to warn in advance of irreversible tendencies, that they are susceptible to changes to which they should point out, that they are based on data that is appropriate and whose quality is unquestionable, that they can be updated at regular intervals. Unfortunately, not all indicators have this characteristic, so they are not in line with the money invested, time, capacity. They may be the best possible result under the circumstances, but that is not what is really intended to be measured.

Therefore, it is specified what are exactly the challenges faced with by all those who are trying to establish an indicator framework for successful management of water resources. These would be: appropriate indicators in use, because too many indicators are too complicated, already complex issues, on the other hand, if the number of indicators is too small, they will not have the authenticity or be able to make the necessary connections of the dynamics of the system itself. Then, the problem is the scale, because it is not understood that for the Mediterranean area it is necessary to use a different set of indicators for national, ie local measurements.

In order to avoid the mentioned gap in information, especially when it comes to current measurements in relation to the ones that will be made in the future, it is suggested what this information should provide: to distinguish the causes of pollution, to promote research concerning human health and environmental issues, investigate the environmental impact of leading socio-

economic forces, investigate through indicators how much water contributes to quality of life, approach the future state or future potential, long-term environmental changes, evaluate the effectiveness of the policy and legislation in the aquatic environment.

When it comes to UN Water Monitoring, here the scope of research is voluntarily narrowed down to monitoring initiatives that were global in scope, in relation to the following four dimensions: service, quality, quantity, management . In doing so, the attempt to chart was by itself exempting all national, local, or regional monitoring initiatives, unless they were part of an attempt at systematic, planetary monitoring. Forty-four initiatives were recorded in total, and nineteen were classified as follow-up. Thirteen of them were further classified much narrower, depending on the countries classified, key documents, and the surveys conducted.

So, as we have emphasized on several occasions earlier, water resource management is a very demanding job, which is difficult to achieve in practice. If we have these indicators that are well understood, then we have a good instrumentation. However, some experts believe that there are no indicators available when it comes to managing water resources, that is, not those that would help society manage its water resources in a way that intensifies the sustainability of water use. That is, there are no operational indicators, for that matter.

Deploying water for different purposes is always a political challenge, especially when it comes to a region where water scarcity exists, such as in the Mediterranean. It is necessary to know the hydrological and economic bases that are easy to identify and identify. Having such one piece of information within competitive political discourse regarding water resources is a challenge.

Indicators of hydrological and economic efficiency are very important. However, they will not be tested unless they have an impact on social or political processes, which depend on how water is valued, how it is allocated, how it is managed, then recycled and disposed of. There are a number of useful approaches that allow us to communicate about them.

It has to be said that water security has been achieved in all economies that import net food and virtual water. Almost all the economies of the Mediterranean area fall into these. All the achievements of water security through these, which can be achieved by intensifying sustainable access to water or economies, have been achieved thanks to the diversity within the economy. Diversity within the economy may be fueled by water scarcity, but it is not conditioned by it. It depends in fact on how much human resource improvement has been achieved, and also whether the "synergy of private and public investment" has been achieved,⁶ and whether entrepreneurship has been nurtured and developed.

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⁶ McKinsey (2010). Managing water strategically: An interview with the CEO of Rio Tinto. McKinsey Quarterly. p. 64

Marketing Mix Strategy And Customer Satisfaction: A Case Of Mini Supermarkets In Nairobi County

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Abstract- The competitive environment in which supermarkets are operating today that is not only local but global has necessitated the supermarkets to device strategies for survival. One such strategy is the marketing mix strategy. This study investigated the influence of marketing mix strategy on customer satisfaction in the Mini Supermarkets in the county of Nairobi. The aim of the research was to establish the marketing mix elements most valued by Customers and to determine the relationship between the marketing mix strategies and the satisfaction of customers. The marketing mix strategies included the 7Ps of marketing which are price, process, place, product, promotion, people and physical evidence. The sample size included 100 respondents who were the customers from the selected 20 supermarkets in Nairobi. Data collection for this study was administered using questionnaire. The results of the study on the marketing mix strategy that most influence customers to shop in mini supermarkets in Nairobi County was found to be price followed by place and product respectively. The least influential marketing mix strategy was promotion. On the other hand, process was found to be the most significant element when it comes to what contributes more to satisfaction of customers. It was followed by price and place. Physical evidence was found to be the least significant of the marketing mix elements.. This study was only limited to mini supermarkets in Nairobi County. Replication of the study with all supermarkets irrespective of size could be useful in future researches. Future studies could also focus on other sectors like the hospitality industry.

In this study, marketing mix strategy was used interchangeably with marketing mix elements.

Index Terms- Marketing Mix strategies, Mini super markets, Customer Satisfaction.

I. INTRODUCTION

Supermarkets are among the most important strategic industries in the retailing sector as they play a big role in building the economy and supplying labor market (Joseph et al., 2004). However, supermarkets are experiencing stiff competition both locally and globally hence the need to device a strategy for competitiveness and survival. One such strategy is the marketing mix strategy. Marketing mix strategy involves a set of organized, specific marketing tools which a company utilizes to raise a desired feedback from its planned market (McCarthy and Perreault, 1987). It includes all the activities than an organization can do to increase the demand of the product or service. According to Beckwith, (2001), these key elements of marketing mix strategy include place, promotion product and price, generally applied in the marketing strategy of tangible goods. The service marketing mix on the other hand adds three more elements into the marketing mix, that is process, people, and physical evidence (Chai lee Goi, 2009). In the modern concept, marketing mix extends up to seven elements, which are people, promotion, price, place, process, product and physical evidence. Goi, (2009) notes the need for marketers to manipulate the marketing mix in a competitive environment to ensure that customers are satisfied.

Customer satisfaction is used in marketing to gauge how services along with goods supplied by a firm meets the expectation of a customer or surpasses it. Satisfying customers is important since it enables organizations to attract and keep customers hence enhance their performance. (Kent, 2003). Most supermarkets are involved in retailing of goods. Supermarkets builds customer relations by offering attracting services, good products, ample environment, reduce risks of shopping and managing price fluctuations (Tony and Ogenyi, 2003). For a company to retain its customers, there must be good business relationships, services that promotes loyalty among customers (Armstrong and Kotler, 2003). Nowadays most supermarkets use different kinds of strategies to raise their sales and market growth. Because of this reason, and in these times of high competition, tools such as elements of marketing mix are used to try to gain advantage against the other competitors (Mártinez, 2007).

The connection involving marketing mix strategies and customer satisfaction has been observed in several studies. AlMuala et al. (2012) found strong correlations between elements of marketing mix and customer

satisfaction. The studies reviewing the influences of marketing mix on customer satisfaction responses has not been adequately covered especially in the supermarkets. Mutegi (2013) researched on the competitive strategies adopted by supermarkets in Nairobi, Kenya and found out supermarkets regularly use unique strategies which entails marketing and modernization techniques to enable the company stay competitive in the market for a little extent. A considerable number of researches have argued that marketing mix strategy is a crucial determinant of customer satisfaction Cengiz&Yayla, (2007) on customer satisfaction in shopping malls established that all the 7ps are significant.; Norsyaheera Abd Wahab (2012) on customer satisfaction on Hijab customers established a significant and positive connection between marketing mix and the satisfaction of buyers, but its exact association has remained unclear in mini supermarkets hence the need for this research which sought to find out the influence of marketing mix strategies on customer satisfaction in mini supermarkets in Nairobi county.

Marketing mix is a set of apparatus that administration may employ to impact on its sales (Kotler, 2011). The marketing mix mainly comprises of four key elements that are crucial in ensuring that a product is successful in the market. These key elements are product, price, place and promotion that are practiced in the marketing of tangible goods generally. The service marketing mix on the other hand adds three more elements into the marketing mix, which are people, process and physical evidence. An appropriate marketing mix is crucial for the organizational success. Oloko, Anene, Kiara, Kathambi and Mutulu (2014) did a study to explore the marketing strategies employed by Safaricom Ltd to spur its remarkable growth. The research established a number of marketing mix techniques employed included new market creation, animation, pricing, place (distribution channels), localization of content, brand alliance and use of celebrities and constant promotions resulted to increased revenue and profitability.

There exists a strong relationship between marketing mix strategies and competitiveness. Muchohi (2015) concluded that management of marketing mix strategies to enhance competitiveness is essential in order to produce a variety of relevant product classes; charge competitive prices, ensure visibility in promotion of products, offer efficient processes, and supportive physical evidence. This study focuses on the 7ps of marketing namely price, product, promotion, place, people, process and physical evidence.

Customer satisfaction is the customer's attitude regarding specific products or services which may influence their behavior. When the buyers are contended with some goods and services they tend to buy the more (Ryu, Han and Kim, 2008). The main emphasis of marketing is on detecting and meeting the needs of customers. The business that recognizes forming marketing mix components by acknowledging expectation of the customers receives in return customer loyalty and profit. By firms measuring customer satisfaction, they get knowledge about the customers as well as from the competitors in the market. (Cengiz 2010).

Nam, Ekinci, &Whayatt, (2011) established that long term success of a business is dependent on customer satisfaction. Stronger competitive position, increases market share and profitability results from placing great emphasis on satisfaction of customers. Increased customer satisfaction reduces price elasticity, reduces business costs, prevents breakdown of cost, and minimizes cost of attracting new customers and increase lifetime of the existing customers. (Bayraktar, Tatoglu, Turkyilmaz, Delen, &Zaim, 2012; Torres &Tribó, 2011). In general, satisfaction is explained as the assessment founded on shopping knowledge and the use of a specific product or service for the duration under valuation (Lee, & Back, 2010). Customer's attitude towards products or services that affect their behavior is what is being referred to as customer satisfaction. Satisfied customers will probably buy the same product again and again (Ryu, Han and Kim, 2008). Identifying and meeting customer needs is the key reason for marketing. The businesses should direct all their efforts to meeting customer needs after identifying a target market.

In providing and maintaining an upper hand in completion measurement of customer satisfaction is very important. It is acknowledged that the companies creating modules of marketing mix by recognizing the buyer's anticipations, get in return customer loyalty and high profits.

Satisfaction of customers in the hotel industry is driven by the speediness and nature experienced by customers is transferred and use social media to recommend services experienced in the hotel to their peers, friends and other potential customers of the hotels (Kagongo & Manyasi 2013). Zhang and Pan (2009) in their study established that organizations should not only concentrate on financial measures but also focus on non - financial measures of customer satisfaction that affects future financial position of the organization. In addition the companies that have a higher level of customer satisfaction benefits from higher profits by increasing unit profit instead of increasing sales volume.

This study places much emphasis on customer satisfaction measures of customer loyalty, positive word of mouth, customer retention and referrals.

Major supermarkets within the retail sector in Kenya encounter competition as the greatest challenge. Supermarkets have to employ winning strategies that are unique to specific market in Order to cope with the increasing completion both from within and global (Mithamo and Marwa, 2015). Companies employed strategies to respond through lower pricing of goods than competitors, advertising, strategic location and communication mix.

Mini supermarkets are unique set of supermarkets in that other than being small in size, most of them occupy space of less than five hundred square feet, they serve a large number of the population as they are located in the residential places making them easily accessible to many at convenient time. Most of these supermarkets are <http://dx.doi.org/10.29322/IJSRP.10.03.2020.p99105> www.ijssrp.org

congested inside and have no enough space for customers to move between the shelves, they have less payment points and some with no receipts and machine to read bar codes hence having long queues. They also do not have parking space and good road network for driving customers. Despite the above challenges, these supermarkets are preferred by many customers because of ease of accessibility. The current study focuses on the influence of marketing mix strategy on customer satisfaction in the mini supermarkets in Nairobi County.

There is no consensus on the influence of marketing mix strategy on customer satisfaction as some studies have established positive relationship while others established no relationship at all. AlMualala et al. (2012) have found strong correlations between elements of marketing mix and customer satisfaction in tourism industry. Mohammed et al. (2012) found strong and direct causal paths involving general marketing mix and satisfaction. Some studies in other countries like Nigeria have worked in identifying the effect of market mix on banking industry. For instance, a study by Mohammad (2015) to analyze customer satisfaction using 7ps on retail bank customers in North East Nigeria established that product, process and physical evidence have significant relationship with customer satisfaction but price, promotion, place and people are not significantly related to customer satisfaction. The framework of marketing mix has become suitable marketing model in all industries together with retailing industry, because of the extraordinary effect on marketing practices (Kotler, 2005). However, there seems to be few such studies done on the context of retail industry in Nairobi which is the business hub in Kenya. This research as a result sought to find out the effect of marketing mix strategy on the satisfaction of customers specifically among mini supermarkets in Nairobi.

II. LITERATURE REVIEW

Customer satisfaction has superior power and influence on any organization strategy of marketing. Satisfaction of customers enables the organisation to remain grow and develop in a successful way. Consumers take a very vital part of any company particularly those in the grocery retail segment and many researchers have also put more effort on the significance of consumers. Zairi (2000) cited in Singh (2006) said, consumers are the reasons for what businesses do and instead of them depending on businesses, businesses depend on them. Businesses should retain customers as letting them go will put the business future and security into danger. That is the major purpose why companies nowadays focus more on the satisfaction of consumers and loyalty. According to Hansemark & Albinsson (2004) cited in Singh (2006), satisfaction is an general approach towards a supplier or an expressive response to the variance between what the consumers anticipate and what they actually obtain concerning the satisfaction of a necessity. Kotler (2000) has also explained satisfaction as a person's feelings of happiness, pleasure, delight or frustration which results from comparing a products alleged performance to his or her expectations. Some studies indicate that decision about where to shop precede brand choice (Millan and Howard, 2007). There are several key factors that can influence consumer choice and retailer perception. Purchase knowledge, variety, promotion, price, advertising, and store brand quality, service and modernization are key variables that decide the image of supermarket on the consumers.

Product/ service refers to what a firm or an individual is offering. In marketing mix, product is explained as what is being offered to market for sale that may meet a need. Product may include a physical object, service, place, organization, or even an idea (FakhimiAzar et al., 2011). The market share of a business summarizes its performance and economic profits. Product improvement has considerable effects as it is the main source of differential advantage. Isoboake (2000) while addressing the responses of oil industry players highlighted that many companies were developing new market as well as carrying out market segmentation too.

Noel and Donald (2003) examined the quality of products on Japanese supermarkets in Hong Kong and its impact on the satisfaction of customers and their consumption behavior in future. The aspects of product are revealed to be the outstanding elements in determining customer satisfaction and future consumption behavior. According to Da Silva (2010) consumers buy both brand image and the image of the product or service associated with it. Malls images of their brands should be encouraging, inimitable, and instant and not created but formed. Consumers purchase product/ service and its image.

Wan and Schell (2013) established that customer previous experience and overall evaluation on the consuming experience of the product/ service is used to measure customer satisfaction. They established that an organization offering good quality service satisfies diverse needs of customers. Ray (2009) pointed out that satisfaction of customers is as a result of the customer buying and using the product or service. When the product or service met customer expectations, the customer felt satisfied and vice versa. Abdullah, Abdullah, & Abdullah, (2016) the study intended to establish the connection between the marketing mix components and customer satisfaction in the tourism industry in Malaysia. The results of the research show the existence of positive significance connection among all the 7ps of marketing mix and customer satisfaction. Furthermore the results suggest that tourism industry in Malaysia should consider the importance of marketing mix while designing their marketing strategy.

David (2008) defined the price as the sum of money charged for a product or service or the amount of the values that buyers exchange for the rewards of having or consuming the product or service. Ohei, (2015) in the paper that sought to advise bank retailers on the part of the marketing mix (4P's) framework as an essential tool in satisfying and keeping their consumers in the current improving phase of the worldwide financial catastrophe. Results of the study shows that marketing mix is very important instrument in satisfying and keeping customers of the bank. Price was the most influential aspect that customers relate to most. A review on the determinants of customer satisfaction towards supermarkets in Thai Nguyen city, Vietnam established that positioning constructs, price, product, personal interactions and convenience have a direct impact on the satisfaction of consumers. Price has the most influence on the supermarket, followed by product. The least positive influence is caused by the positioning construct personal interaction. (Reynold and Beauty, 2009).

Marketing mix plays a key role in the performance of any institution. Murangiri (2014) assessed the role of marketing mix on performance of MFIs. Poor pricing strategies result to inflated interest rates that turn away potential clients and reduce the amount of loan demanded.

Promotion is defined by Merriam Webster as the actions taken to furtherance acceptance and increase sales of products or services through advertising, publicity or discounting (Merriam- Webster, 2010). Nowadays, promotion has developed to include co-ordination of all promotional activities (media advertising, direct mail, personal selling, and sales promotion, public relations, packaging, store displays, website design, and personnel) so as to produce a unified, customer-focused message (Ferrell & Hartline, 2008). The main aspect of promotion is advertising which is the one part most visible of an integrated marketing communication program (Ferrell & Hartline, 2008).

Growth of sales promotion is limited by the firm's creativity team. Sales campaigns are normally done in the form of tokens, rebates, samples, loyalty programs, point-of-purchase promotions, premiums, contests and sweepstakes, and direct mail (Ferrell & Hartline, 2008). The most common sales promotion method used by most organisations is the loyalty programs, that compensates customers who buy again and again by using credit cards that customers earn points on every purchase they make. (Cummins, 1998). Supermarkets such as Tesco Lotus have their own customer loyalty programs with their own loyalty credit cards.

The reason for promotion is to spread benefits of using a product or service so that more customers are attracted to buy (Lamb et al, 2009) to gain attention, remind and trying to push the customer towards final action of customer loyalty (Cummins, 1998). Therefore, each organization must customize promotion of their products to suit the market segment and product itself. Some customers are influenced by product characteristics and others are influenced by discount prices (Jager, 2007).

A delivery networks are sets of independent companies taking part in the course of making a product or service get to the consumers. (Armstrong & Kotler, 2006). Kevin et al (2009) established that customers benefit from effective and well managed distribution network. Study by Ferdons and Towfique (2008) showed a significant connection between distribution (place) and customer satisfaction. A recent study by Ataman, Mela, and Van Heerde (2008) established that place (distribution) plays a vital role in building new brands. Wairachu (2000) established that firms should ensure accessibility to their products and services through establishment of convenience stores. Simplicity of accessibility of products and services ensures customers flexibility and perceives the purchase as easy. This perception has an overall effect on company sales that affects its market share.

Lu and Lukoma (2011) established that customers are satisfied by location, staff curtesy and reliability of the supermarket when they investigated the satisfaction levels of buyers in the supermarkets. They reported that additional services are the lowest in rank in customer satisfaction. Because of these results, effect of these attributes on Customer satisfaction must not be ignored.

Human actors take part in the deliverance of services and thus have an effect on the buyer's perception. Use of an appropriate staff and people is a very important component for the provision of service to customers. A research by Cengiz and Yayla (2007) that tested the relationship between marketing mix, seeming value, quality, customer satisfaction and loyalty with positive word of mouth. Akroush (2011) revisited the classification of the services marketing mix of the 7ps. The research established that services marketing mix elements are 5ps in Jordan and not 7ps. There exists a strong empirical evidence to support the traditional 4ps of marketing mix elements and just people from the additional 3ps of marketing mix elements of services.

Due to undetachability character of services, many shareholders take part in the buying and selling who are customers, other customers and organisation's staff (Zeithamlet al., 2006). People cannot be detached from the total service delivery generally. In tourists experience where first class services is required since the service has a direct

effect on the overall consumer satisfaction, staff's appearance, knowledge and attitude should be improved to enhance the tangibility of the combination of product –service (Rodriguez, 2013) In addition, tourism is labor intensive and the tourism experience depends on the tourist's dealings with indigenous communities and well skilled staffs employed in those places (UNWTO, 2007).

Implementation of an effective process is required to create and deliver product elements to customers. A process is defined as the way and order of actions in the performance of a service Mucai, Mbaeh &Noor (2013) on expanded marketing mix and customer satisfaction in non-star hotels in the municipality of Meru established that physical evidence in the hospitality industry has no significant influence but process marketing mix has. The study concluded that organization strategy should be based on core values of discipline that is achievable that is the firm should not try to be all things round to all people. The company needs to specialize in something that it can offer to a specific market with exclusive sense of fulfilment.

Mohammad (2015) found out that satisfaction of customers is not a one off thing. It is continuous hence management need to engage in it. This study on retail bank customers in North east Nigeria used 7ps to analyse the satisfaction of consumers. The research found out that product, process and physical evidence had significant relationship with customer satisfaction but price, promotion place and people had no significant relationship with customer satisfaction. This study established that process is the most influential drive to customer satisfaction while price is the least influential. Customer satisfaction is a pivotal indicator of how well the retail chain store owners and managers in Bangladesh are meeting the expectations of the customers (Rana, Osman, and Islam, 2014).

Physical evidence refers to physical appearance of the premises, security, decorations and ambiance. Physical evidence has perception on customers on how the services are delivered by an organization. If an organization operates in unclean environment, poorly maintained buildings, customers will perceive the service of the organization as inferior and may not even try to experience it. Mucai, Mbaeh and Noor (2013) in the study on the expanded marketing mix and customer satisfaction in supermarkets in Meru municipality established that physical evidence has no significant influence on customer satisfaction. The study concluded that organization strategy should focus on core values of discipline that the firm can achieve.

Physical evidence have effect on the impression customer form about the service they receive from an organization. (Bitner, 2012).Physical evidence that is ambience, background music, comfort of the seating's and service facility physical layout greatly affects customer satisfaction with a service experience. (Bitner, 2012). The outward show of the employees, including how they cloth and grooming may be used as clues (Lovelock, 2006).

Marketing mix strategy and customer satisfaction has been established in several studies. AlMuala et al. (2012) have found strong correlations between elements of marketing mix and customer satisfaction in tourism industry. The connection between marketing mix and customer satisfaction was established to be dependent on the product, price, promotion and place of the local product drug. The study on the effects of marketing mix on customer satisfaction responses has received very limited attention in the marketing industry according to (Me –line et al., 2011). Mohammed et al. (2012) found strong and encouraging causal paths between overall marketing mix and satisfaction.

A considerable number of researches have argued that marketing mix strategy is an important determinant of satisfaction (Cengiz &Yayla, 2007; Hani et al., 2012; Wang et al., 2012 and Semeer, 2009), but its exact relationship has remained unclear in retail industry.

Research carried out by Ganguli, Shirshendu and Kumar, (2008) established important parameters of consumer reliability and satisfaction for the Indian retail supermarket customer. Effort has been made to know the impact of those parameters on loyalty and customer satisfaction. Li Fei, Li Xiang, Mi Bu & Wang Gao (2010) in their study established that Chinese Supermarkets have unique positioning points in the form of Product/ service or price and they can employ any of these marketing mix strategies. Skallerud & Grønhaug (2010) in the study of Chinese food supermarket marketing strategies established some important factors connected to the nature of the supply and demand relationship of food that could be influenced by the positioning strategies of supermarkets.

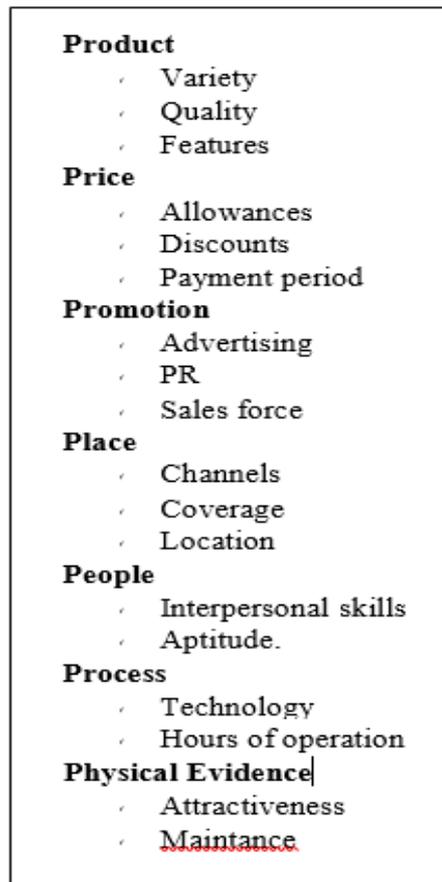
Locally, Hidayat (2014) examined the connection between marketing strategies and financial performance of supermarkets in Nairobi County. The research established that financial performance of supermarkets in Nairobi County is affected by the stock collection period, leverage and fixed turnover ratio. Mathai (2012) in the examination of the connection between management of working capital and retail supermarkets in Nairobi. The study found that relationship between WCM and retail profitability of retail supermarkets do exist. However, the two studies focused on six supermarkets. A study by Nyamao (2012) found out that though more money will be tied into the working capital, retail supermarkets need to invest heavily in the working capital so as to generate more sales

III. CONCEPTUAL FRAMEWORK

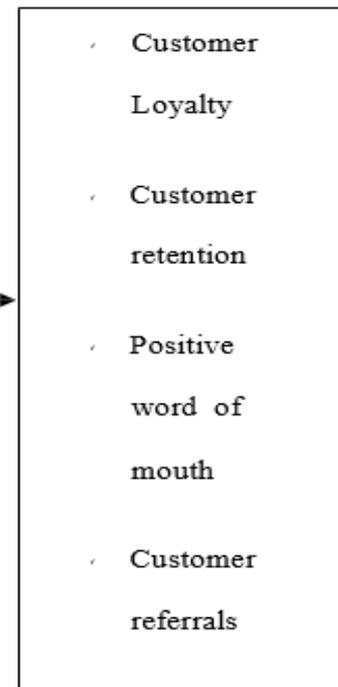
The conceptual framework below represents the relationship between marketing mix strategies and customer satisfaction.

Fig 1 Conceptual Framework

Marketing mix strategies



Customer satisfaction



Researcher(2017)

IV. RESEARCH METHODOLOGY

This study used a descriptive research design to analyze the objectives of the research where the characteristics of the respondents were defined, analyzed the trends in the data and drew comparison between groups of respondents so as to give correct and valid picture of the factors that were significant to the study as well as to determine the direct relationship between the Independent and dependent variables. Previous studies on customer satisfaction that have used the same research designs are (Cuban, 2003; Anglin, 2005; Adegoke, 2014; Adewale, 2014).

The population for this study were customers of the mini supermarkets in Nairobi. The target population of this study comprised of twenty seven mini supermarkets registered by Nairobi City County.

Convenience sampling was used to select the customers for the study. The researcher sought to find out which days and time customers frequently visit the mini supermarkets from the managers.

Data was collected using self-administered semi-structured questionnaires accompanied by an introduction letter informing the respondents who the researcher is and the purpose of conducting the research (see Appendix I and II). The questionnaire was designed to fulfil the research objectives of this study.

The questionnaire had closed-ended questions constructed by the researcher and were divided in to three sections, where five point likert-scale ranging 1=Most valued and 5=Not valued on investigating marketing mix elements most valued by customers. On investigating marketing mix elements and customer satisfaction 1= Strongly disagree and 5= strongly agree.

The data collected was checked for completeness and errors in the entries. It was then analyzed using the Statistical Program for Social Sciences (SPSS), which is the statistical program commonly used in research studies and has also been used in previous research work that have focused on a similar topic. Responses to the demographic section of the questionnaire was analyzed using descriptive statistics and means and standard deviation. The statistical test used is Analysis of Variance (ANOVA), used to test the significance of differences between the means of two groups. The data was then be presented in tables.

The relationship between the independent and dependent variables was analyzed using multiple regression analysis as has been used in previous studies (Higgins, 2005). The equation adopted for this study is,

$$Y = \alpha + \beta_1 + \beta_2 + \beta_3 + \dots + \beta_7, \text{ where;}$$

Y = Dependent Variable (Customer Satisfaction; Referral to others, Brand loyalty, positive word of mouth and return purchase)

α = constant

$\beta_1 - \beta_7$ = Coefficient Variable, Price, place, product, promotion, people, process and physical evidence.

Validity and Reliability

A reliability test was carried out to assess the relationship among the study variables using the Cronbach alpha test. The Cronbach alpha for this study is 0.741. Previous studies that have used this test are (Kinoti, 2012; Wang’onde, 2011; Njeru, 2013; Nguti, 2014).

Reliability Statistics- Customer Satisfaction Test.

Table 1. Overall reliability test.

Overall Reliability Statistics

| | Cronbach's Alpha Based on Standardized | N of |
|------|--|------|
| .762 | .766 | 5 |

Source: Survey Data

Cronbach's alpha was used to test the reliability of the questionnaire. Cronbach's alpha estimates the internal consistency by determining how well the items hang together coherently.

The higher the internal consistency reliability of the data collection instrument the better. According to the results in the above Cronbach's alpha for the questionnaire was 0.762 which depicted a high level of reliability as shown in table 1 above.

Marketing mix elements most valued by customers'

The study carried out descriptive statistics to determine which marketing mix elements was valued most by the customers and the results were recorded in the Table 2 below.

Table 2: Responses on Marketing mix elements most Valued by Customers.

| | N | | Mean | Std. Deviation |
|-------------------|-------|---------|-------|----------------|
| | Valid | Missing | | |
| Price | 80 | 0 | 3.71 | 1.1 |
| Promotion/advert | 80 | 0 | 3.58 | 1.17132 |
| Place/ location | 80 | 0 | 3.48 | .93457 |
| Product | 80 | 0 | 3.37 | .81821 |
| Process | 80 | 0 | 2.05 | 1.05775 |
| Physical evidence | 80 | 0 | 3.162 | 1.35426 |
| People | 80 | 0 | 2.187 | 1.18101 |

Source: Survey Data

From Table 2 above it can be observed that price was valued most by customers in the mini supermarket in Nairobi County with a means score of 3.71 followed by Promotion 3.58, Place 3.48, product 3.37 and physical evidence 3.16.. People 2.188 and process 2.288, were the least valued by customers. The results of the study implies that customers are drawn to a mini supermarket mostly by the price of the products as well as promotion and the outlets location. The people seems not to be of great value to customers. The findings are collaborated by Ubeja (2012) study on the marketing strategy and customers satisfaction c from shopping malls in Sweden. His observation was that customer satisfaction in the shopping mall was largely influenced by price and promotion.

Relationship between Marketing mix Strategy and customers Satisfaction.

To establish the relationship between the marketing mix strategy and customer satisfaction in the mini supermarkets in Nairobi County, the study did a regression analysis as shown in Table 3 below.

Regression analysis

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|--------------------|----------------|----|-------------|--------|-------|
| 1 | Product Regression | 5.190 | 1 | 5.190 | 12.732 | .001a |
| | Residual | 31.797 | 78 | .408 | | |

| | | | | | | |
|--------------------|------------|--------|----|--------|--------|-------|
| 1 People | Regression | 5.787 | 1 | 5.787 | 14.468 | .000a |
| Residual | | 31.200 | 78 | .400 | | |
| 1Price | Regression | 5.877 | 1 | 5.877 | 14.735 | .000a |
| Residual | | 31.111 | 78 | .399 | | |
| 1Promotion | Regression | 3.005 | 1 | 3.005 | 6.898 | .010a |
| Residual | | 33.982 | 78 | .436 | | |
| 1Process | Regression | 10.174 | 1 | 10.174 | 29.598 | .000a |
| Residual | | 26.813 | 78 | .344 | | |
| 1Physical evidence | Regression | 8.175 | 1 | 8.175 | 22.130 | .000a |
| Residual | | 28.813 | 78 | .369 | | |
| 1Place | Regression | 5.064 | 1 | 5.064 | 12.373 | .001a |
| Residual | | 31.924 | 78 | .409 | | |

Source: Survey Data

a. Dependent Variable: customer_satisfaction1

b. Predictors: (Constant), Place, promotion, price, process, people, physical evidence, product

From the Table above all the marketing mix elements are significant and have p values less than 0.05 implying they are predictors of customer's satisfaction.

V. DISCUSSIONS, CONCLUSION AND RECOMMENDATION

The study sought to establish the marketing mix element most valued by the customers in the mini supermarket. Price was valued most by customers in the mini supermarket in Nairobi County with a means score of 3.71 followed by Promotion 3.58, Place 3.48, product 3.37 and physical evidence 3.16. People 2.188 and process 2.288, were the least valued by customers. The results of the study implies that customers are drawn to a mini supermarket mostly by the price of the products as well as promotion and the outlets location. The people seems not to be of great value to customers. The findings are collaborated by Ubeja (2012) study on the marketing strategy and customers satisfaction c from shopping malls in Sweden. His observation was that customer satisfaction in the shopping mall was largely influenced by price and promotion.

The study on determining the most valued marketing mix element by customers in Mini supermarkets established Price was valued most by customers in the mini supermarket in Nairobi County with a means score of 3.71 followed by Promotion 3.58, Place 3.48, product 3.37 and physical evidence 3.16. People 2.188 and process 2.288, were the least valued by customers. This study seems to agree with Muchohi (2015) who concluded of all the marketing mix strategies, price and promotion draws customers to a retailing outlet. The findings are also collaborated by Ubeja (2012) study on the marketing strategy and customers' satisfaction from shopping malls in Sweden who also pointed out that customer satisfaction in the shopping mall was largely influenced by price and promotion. The study results however contrast with Mohammad (2015) who found that product, process and physical evidence were significantly related to customer satisfaction while price, promotion, place and people are not significantly related.

The multiple regression analysis conducted to determine the relationship between these market mix elements and customer satisfaction showed that there is a positive relationship between all the 7ps and customer satisfaction. This suggests that Mini Supermarkets should put an emphasis on all the marketing mix elements in order to ensure customers satisfaction.

The findings showed that customers consider process especially time taken on queuing to make payment and accurate receipting as this contribute highly to their satisfaction. This seemed to agree with the findings by Mucai, Mbaeh and Noor (2013) who observed that the marketing strategy that an organization adopts has a great influence on the level of customer satisfaction. Place has also emerged as a contributor to customer satisfaction. This is because customers want convenience and they would want to shop near their homes. This result seems to agree with Bakar et al., (2010), who observed that customers value convenience in locating a retailing outlet, which ultimately influences the level of satisfaction.

The study concluded that the marketing mix strategy does influence customers satisfaction

This proposes that Mini Supermarkets that bear in mind these issues are more likely to experience an upsurge of customers buying their products. The supermarkets should invest in technology to bring down their cost of operation and sell their products slightly above breakeven prices as this study has shown that mini supermarket customers are sensitive to price and time taken to be served. The study also points out that supermarkets that fail to align its marketing strategy with the customers' needs will suffer the consequences of customer dissatisfaction, leading to erosion of their customer-base.

The study provides a number of recommendations. Firstly the findings of the study indicate that marketing mix strategies affect customer satisfaction in several ways. This provides a strong indication that Mini Supermarkets that incorporate marketing mix strategies in the right proportion in their operations have a high chance of ensuring customer satisfaction thus experiences repeat purchases from them. The management of mini supermarkets should ensure fair pricing; appropriate communication as well as effective processes. This would ensure delivery of quick and accurate services to customers. The location of the outlets should also be strategic to provide convenience to the customers in an era of intensified competition. Given that the study revealed that mini supermarket customers are value prices of products, business organizations should source their products competitively, lower their operational expenses and charge favorable prices if they want to succeed.

This study provides useful insight into the influence of Marketing mix strategies on customer satisfaction in Nairobi, the marketing mix elements that influence customers' decision to shop in Mini supermarkets and the extent to which the Marketing mix elements affect customer satisfaction. However, it should be noted that the study was conducted in one county, whereas, it could be conducted in other Counties.

This research also focused on individual Mini Supermarkets. Future research should focus on all Supermarkets irrespective of size as both mini supermarkets and Major supermarkets alike compete for the same customers. A study on these Major players in the industry will also provide a broader perspective on other Marketing Mix strategy within the retail industry as well as the influence these have on customer satisfaction.

Future study can focus on a different industry like education and health sectors to see if they yield similar results. Future study may also explore alternative research design and analysis methods to see if they will yield similar results. The replication of this study in to other sectors within the retail industry, such as, banks and other firms in the services sector. Moreover, replicating the study to

other countries, especially within the African continent would demonstrate the universality and significance of the relationship of the study herein.

Lastly, since this study was cross-sectional, a future research should consider a longitudinal study to examine the long run effects of the variables on performance.

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Influence Of Local Advocacy Practices On Corporate Governance Performance Public Institutions In Rwanda.

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Abstract: The public bodies' Corporate Governance as leadership and control method involves a set of clear rules and principles (integrity, honesty / sincerity, transparency and responsibility), clear risk management and control mechanisms, elements needed to achieve the purpose of public entities, which is satisfying public needs. The purpose of this study was to evaluate the influence of Local Advocacy Practices on corporate governance performance public institutions in Rwanda. The study adopted a descriptive and explorative design since its main purpose was to explain the of Ethical Integrity practices on corporate governance performance in public institutions in Rwanda. The target population for the study was 214 managers from 10 public institutions in Rwanda. Stratified random sampling technique was used to get a sample of 140 respondents who were selected from the top management and middle managers staff. Data for the study was collected by use of questionnaires, interviews and observation using descriptive and inferential statistics to establish the relationship between the dependent and independent variables. It was expected that the results of the study would assist the top management of the institutions, as well as other stakeholders, to understand the effect of board leadership practices on governance performance in public institutions in Rwanda. Data collected was analyzed through SPSS version 21. Data analysis involved statistical computations for averages, percentages, and correlation and regression analysis. Ordinary least squares (OLS) regression method of analysis was adopted to determine the inferential statistics. The coefficients obtained indicate that the correlation coefficient (R) between the independent variable and the corporate governance performance was 0.811 which is a positive correlation relationship. A coefficient of determination (R^2) of 0.658, which means that this variable alone can explain up to 65.8% of the variations in the dependent variable, corporate governance performance. The findings further confirm that the regression model of Local Advocacy Practices on corporate governance performance is significant for the data $F=156.122$, $p<0.01$) since p-values was 0.00 which is less than 0.05. The study examined the influence of Local Advocacy Practices on corporate governance performance in public institutions in Rwanda, the dependent variable corporate governance performance and the independent variable Local Advocacy Practices, there are other mediating or intervening factors that can affect corporate governance performance that could be researched further for example type of leadership.

Keywords: *Corporate Governance Performance, Local Advocacy Practices, Public institutions in Rwanda.*

1.0 Introduction

Board of directors is depicted and conceptualized variously in literature including the number of independent directors, the tenure of boards, the size of the board and board gender diversity. Gender diversity as an aspect of board composition/diversity is thus an indicator of corporate governance. Lowery, (2008) present gender diversity in the boardroom as the presence of women on the board of directors and term it an important aspect of board diversity. Corporate boardrooms have not realized gender diversity, yet this

scenario is replicated worldwide (Lowery, 2008). In corporate governance circles, board gender diversity refers to the inclusion or presence of female directors in the boards (Sala, 2011). Modern organizations are increasingly approaching board gender diversity as a value-driver in organizational strategy and corporate governance (Thomsen, 2008). The subject also remains an emergent area of concern for public debate, academic research, government considerations and corporate strategy across the societal landscape as well as in the boardroom and top executive positions.

Major corporate scandals happened because of a lack of adherence to good corporate governance structures. The lack of corporate governance was at the root of the financial crisis that took the world by storm, rendering global instability (United States Financial Crisis Report, 2011). According to Othman & Abdul Rahman (2011) and Arjoon (2005), companies lack moral compasses for good governance, thus plaguing society at large—including shareholders and stakeholders—and causing a deterioration in governance systems worldwide. Therefore, it is important to examine corporate governance from a moral stance. Delving into ethics and moral principles is essential to creating a culture of ethics in a business environment that is sure to guarantee a system for effective corporate governance.

A stable legal system and supportive current legislation (which includes not only the constitution and laws, but also the accounting systems or regulations governing the official listing of securities on the stock exchange) are vital factors in the attractiveness of a country. However, these alone are often insufficient to attract investors. Further generally accepted forms of conduct are needed that often extend far beyond the minimal legal framework. Such forms of conduct are laid down in voluntary corporate governance codes of best practice, among others. The corporate governance structures of a country are therefore a further important indicator of the credibility of the economy as a whole and of the financial market in particular.

1.2 Statement of the Problem

The importance of good corporate governance in the 21st century cannot be overemphasized. Thisera (2013) argued that with globalization rapidly increasing the scale of trade and the size and complexity of corporations and the bureaucracies constructed to attempt to control it, the importance of corporate governance and internal regulation has been amplified as it becomes increasingly difficult to regulate externally back on the policy agenda and intensified debate on the efficacy of board composition as a means of increasing corporate financial performance. Geneen (2008) in a study found that among the board of directors of fortune 500 companies, 95% are not doing what they are legally, morally, and ethically supposed to do. It is criticized that (1) the board is a rubber stamp, (2) the board is dominated by CEO, and (3) the board is plagued with the conflicts of interests (Schein, 2008); board responds to the wishes of a controlling shareholders (Jesover & Krikpatrick, 2015). An important question of who will monitor the monitors thus arises. Although it is argued that the shareholders will monitor the board by exercising their ownership right by

appointing and removing board members, shareholders may not be aware of the inside activities of the firm due to information asymmetry.

Previous study has several literature gaps that are filled by this study. Most of the study has concentrated on the relationship between ethical and integrity issues and financial performance. There is therefore clear evidence that the relationship between board composition as a determinant of corporate governance performance have not been studied simultaneously. Therefore, this study sought to fill this gap by critically evaluating influence of Local Advocacy Practices on corporate governance performance in public institutions in Rwanda by answering the research question: Does Local Advocacy Practices have any influence on corporate governance performance in public institutions in Rwanda?

2.1. Theoretical Perspective

This paper discusses the Stewardship Theory upon which the study is anchored

2.1.1 Stewardship Theory

The stewardship theory proposes that agents are trustworthy custodians of resources entrusted to them which makes monitoring obsolete (Davis et al., 2009). This is in contrast with the agency theory which assumes that principals and agents have conflicting interests (Bathula, 2008). In this theory, managers are viewed as stewards. And as stewards, they most likely seek to maximize value for shareholders. Davis et al (2009) argues that by maximizing value for shareholders, the stewards will attain organizational success which in turn satisfies their personal needs. The theory also proposes that autonomy should be given to stewards which in turn lower the cost of monitoring (Donaldson & Davis, 2011).

The theory portends that managers are impelled by non-financial motives such as need for achievement and recognition and intrinsic satisfaction of successful performance. These concepts are well documented in the work of scholars like Herzberg (2016) and McClelland (2011). Daily et al (2013) argue that steward is keen to protect their standing as expert decision makers. As a consequence, the managers run the firms in a manner that maximizes financial performance as this performance impacts on individual performance.

Davis and Donaldson (2011) argue that from the perspective of stakeholder theory, superior performance of the firm was liked to have a large proportion of independent directors (managers) in board since these managers have a better appreciation of the business and can therefore make better decisions. Boyd (2014) and Baysinger, Kosnick & Turk (2011) also support this view. They opine that insider directors (managers), possess superior amount and quality information to make better decisions. This is corroborated by a study conducted by Bhagat and Black (2011) who found that firms with a higher number of outside directors fared poorly in comparison with firms who had less proportion of outside directors.

The stewardship theory considers composition of board of directors, position of the chief executive officer (CEO) and board size as essential elements for ensuring effective corporate governance within any organization, Coleman et.al, (2009). Being a board member local advocacy is stewardship to the public hence stewardship theory

2.2 Conceptual Framework

Independent variables

Dependent variable

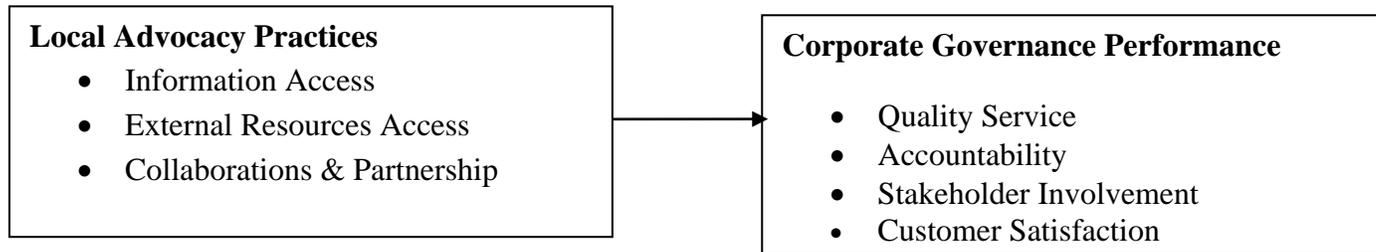


Figure 2.1 Conceptual framework

3.0 Research methodology

The study used a cross-sectional survey research design. Cross-sectional surveys involve data collection from a population, or a representative subset, at one specific point in time and have an advantage over other research designs that only seek individuals with a specific characteristic, with a sample, often a tiny minority, of the rest of the population (Kothari, 2011).

A sample size of 195 respondents was determined from a total population of 378 individuals using the formula by Yamane (1967).

$$n = \frac{N}{1 + N(e)^2}$$

Where n = the desired sample size

e= probability of error (i.e. the desired precision e.g. 0.05for95%confidence level)

N=the estimate of the population size.

$$n = \frac{378}{1 + 378(0.05)^2} = 195$$

Primary data was collected using structured questionnaires which had both close ended and open-ended questionnaires. Structured questionnaires refer to questions which are accompanied by a list of all possible alternatives from which the respondents select the answer that best describe their situation (Mugenda & Mugenda, 2009). Structured questions are easier to analyze since they are in the

immediate usable form (Orodho, 2008). The questionnaires were self-administered. The researcher informed the respondents that the instruments being administered was for research purpose only and the response from the respondents were kept confidential. The researcher obtained an introductory letter from the University in order to collect data from the field and then delivered the questionnaires to the respondents with the help of a research assistant using the drop and pick later method.

4.0 Analysis for Local Advocacy Practices

Regression analysis was performed in order to determine whether the independent variable, Local Advocacy Practices could be reliable for explaining the change in the dependent variable, corporate governance performance. The coefficients obtained indicate that the correlation coefficient (R) between the independent variable and the corporate governance performance was 0.811 which is a positive correlation relationship. Table 1 shows a coefficient of determination (R^2) of 0.658, which means that this variable alone can explain up to 65.8% of the variations in the dependent variable, corporate governance performance.

Table 1: Model summary showing Local Advocacy Practices

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .811 ^a | .658 | .656 | .420123 |

a. Predictors: (Constant), Local Advocacy Practices

The Analysis of Variance (ANOVA) results are shown in Table 2. The findings further confirm that the regression model of Local Advocacy Practices on corporate governance performance is significant for the data (F=156.122, p<0.01) since p-values was 0.00 which is less than 0.05.

Table 2: ANOVA for Local Advocacy Practices

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|---------|-------------------|
| 1 | Regression | 51.431 | 1 | 51.431 | 293.042 | .000 ^a |
| | Residual | 26.811 | 82 | .617 | | |
| | Total | 78.242 | 83 | | | |

b. Dependent Variable: Corporate governance performance

c. Predictors: (Constant), Local Advocacy Practices

The coefficients of Local Advocacy Practices are presented in Table 4.26 which indicate that the model has a significant p-value =.000. The study at 95% confidence interval solved the third research question by indicating that the variable Local Advocacy Practices is statistically significant in the corporate governance performance public institutions in Rwanda.

Table 3: Coefficients of Local Advocacy Practices.

| Model | | Unstandardized | | Standardized | T | Sig. |
|-------|------------------------------|----------------|------------|--------------|--------|------|
| | | Coefficients | | Coefficients | | |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .580 | .205 | | 2.826 | .000 |
| | Local Advocacy Practices(X1) | .793 | .046 | .811 | 17.118 | .000 |

a. Dependent variable: Corporate governance performance

Using the summary of Coefficients presented in Table 3, a linear regression model of the form, $Y = \alpha + \beta X_i$ can be fitted as follows:

$$Y = 0.580 + 0.793X_1 \dots \dots \dots \text{Equation 1}$$

This implied that a unit change in Local Advocacy Practices would increase corporate governance performance by the rate of 0.793.

4.1 Hypothesis Testing for Local Advocacy Practices

Ho3: There is no significant influence between Local Advocacy Practices on corporate governance performance public institutions in Rwanda.

The hypothesis was tested by using multiple linear regression and determined using p-value. The acceptance/rejection criteria were that, if the p value is less than 0.05, we reject the H_{A3} but if it is more than 0.05, the H_{A3} is not rejected. Therefore, the alternative hypothesis is that there is significant influence between Local Advocacy Practices on corporate governance performance public institutions in Rwanda. Results in Table 4.29 shows that the p-value was 0.025. This was supported by a calculated t-statistic of 5.850 that is larger than the critical t-statistic of 1.96. The alternate hypothesis was therefore not rejected. The study therefore adopted the alternative hypothesis that there is significant influence between Local Advocacy Practices on corporate governance performance public institutions in Rwanda.

5.0 Conclusion on Local Advocacy Practices

The findings confirm that there is a statistically significant influence of Local Advocacy Practices and on corporate governance performance of public institutions in Rwanda. A positive increase in Local Advocacy Practices leads to an increase in on corporate governance performance of public institutions in Rwanda. It can be concluded from this study that Local Advocacy Practices were statistically significant in explaining on corporate governance performance of public institutions in Rwanda. The study concludes that Local Advocacy Practices are effective in determining on corporate governance performance of public institutions in Rwanda.

5.1 Areas for further Research

Finally, the present study used data drawn from the same respondents at a multiple country using the same collection method. Self-rating of each public institutions in Rwanda can provide more insight on how board leadership practices is unique and its influence in corporate governance performance in public institutions in Rwanda.

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The Effect of One Hour Bundle Sepsis Management of Sepsis Patients On Lactic Acid and Sofa Scores

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Abstract- Background: Sepsis is a life-threatening organ dysfunction resulting from regulatory disruption of the host response to infection. The Sequential Organ Failure Assessment (SOFA) aims to assess the severity of the disease based on the degree of organ dysfunction serially each time.

Objective: The purpose of this study was to determine the effect of the one hour bundle sepsis management in sepsis patients to lactate level and SOFA scores.

Method: This study is an observational study with prospective cohort data collection to determine the effect of the one hour bundle sepsis management in sepsis patients to lactate level and SOFA scores that carried out at General Hospital Haji Adam Malik Medan.

Results: The highest number of genders was female (14 (51.9%)), the highest occupation was housewife with 12 (44.4%), and the most ethnic group was Batak 17 (63.0%). the average SOFA score at 0 o'clock (T0) was 11.66 with SD value. The mean SOFA score at the 3rd hour was 11.51 with an SD value of 2.53. The median SOFA score at the 24th hour (T1) is 11 with a min-max value of 1-14. The median SOFA score at the 71st hour (T2) is 10 with a min-max value of 5-13, There is no significant difference between the 0th hour - the 3rd hour with a value of $P = 0.294$. There is a significant difference between the 3rd hour - 24th hour with a value of $P = 0.001$ and at 24th hour - 72th hour with a value of $P = 0.001$. There was no significant difference between the 0th hour - 3rd hour with a value of $P = 0.161$. There is a significant difference between the 3rd hour - 24th hour with a value of $P = 0.001$. There is a significant difference between the 24th hour - 72th hour with a value of $P = 0.001$.

Conclusions: There was a significant decrease in SOFA scores and lactate levels after giving one hour bundle at 24 and 72 h.

Index Terms- Sepsis, One hour bundle, Lactate, SOFA score.

I. INTRODUCTION

Sepsis is a life-threatening organ dysfunction resulting from regulatory disruption of the host's response to infection¹. The global incidence between 1995 - 2015 was 437 per 100,000 people per year for sepsis and severe sepsis. Sepsis contributes to one in

two to three mortality rates in cohort studies in hospitals². Data from the Center for Disease Control (CDC) shows that the incidence of sepsis increases $\pm 8.7\%$ every year, from 164,000 cases (83 per 100,000 population) in 1979 to 660,000 cases (240 cases per 100,000 population) in 2000. In America also a developed country, death from sepsis each year reaches 70,000 people. Approximately 500,000 new cases of sepsis have reached 35% of deaths. This death rate tends to rise and now ranks 10th cause of death in the United States³.

Sepsis-related Organ Failure Assessment, which became known as Sequential Organ Failure Assessment (SOFA) was introduced in 1994. The aim is to assess the severity of the disease based on the degree of organ dysfunction serially at all times. The SOFA score consists of an assessment of 6 organ systems namely; respiration, coagulation, liver, kidney, cardiovascular and central nervous system. Each organ has a value between 0 - 4 based on the degree of dysfunction⁴.

According to SSC 2018, the handling of sepsis patients is carried out within the first hour, ie measuring levels of lactic acid, blood culture before giving antibiotics (specific), giving broad-spectrum antibiotics, giving crystalloid 30 ml / kgbb immediately if there is hypotension or lactate ≥ 4 mmol / L, give vasopressors if hypotension is encountered during or after fluid resuscitation to maintain MAP ≥ 65 mmHg.

Lactate is considered as a byproduct of the process of glycolysis in the condition of lipidia. In basal lactate, 0.8 - 1.0 mmol / kg BW / hour is produced continuously by skeletal muscle, skin, brain, red blood cells, gastrointestinal tract, and kidney medulla. Lactate is the most widely used by the liver, kidneys, and heart muscle. The lactate clearance rate can reach a concentration of 320 mmol / L / hr. If production exceeds the rate of clearance will arise hyperlactatemia, but in normal circumstances there is a balance between production and metabolism of lactate⁵. Hyperlactatemia in sepsis results from tissue hypoperfusion, and lactate represents a sign of tissue hypoxia. This occurs because of microcirculation dysfunction that has occurred since the beginning of sepsis and is an early critical stage of tissue hypoxia and organ failure.

II. METHODS

This study is observational with cohort prospective design. The subjects of this study were taken by using consecutive sampling technique which means sample obtained until the sample

size is met. After obtaining approval from the Ethics Committee, Faculty of Medicine, Universitas Sumatera Utara, based on inclusion criteria (Adult patients (18-60 years) with sepsis with a SOFA Q score > 2) and exclusion criteria (Patients / families of patients not willing, sepsis / suspected sepsis with lactate levels < 2 mmol / L, history of kidney disease, cardiac dysfunction, immune system disorders, cancer, immunosuppressant drug therapy and patients with impaired liver function.). Drop out criteria are Patients in the observation period stated withdrawing from the study / withdrawal of informed consent and the patient moved to an outside hospital. 27 samples were collected. All subjects were recorded for their identity after obtaining informed consent and being approved by the medical research ethics commission of the Faculty of Medicine, University of North Sumatra, then anamnesis, physical examination and support are performed on the patient to rule out the inclusion and exclusion criteria. After the sample is found, lactate and SOFA are examined at 0, 3, 24 and 72 hours Then observed whether there are changes in the lactate value and SOFA score. Data analysis was performed using computerization. Statistical tests with T-Paired samples test, Wilcoxon test, ANOVA, and Friedman test. All statistical tests with $p < 0.05$ were considered significant.

III. RESULTS

This study was attended by 27 subjects who met the inclusion criteria. The characteristics of this study were displayed based on age, sex, occupation, ethnic and haemodinamik :

Table 1 Demographic Characteristics

| Characteristics | N (%) | Mean ± SD/ Median, min- max |
|--------------------------|------------|-----------------------------------|
| Age (years) | | 56,8 ± 13,5 |
| Sex | | |
| Male | 13 (48.1) | |
| Female | 14 (51.9) | |
| Occupation | | |
| Lecturer | 1 (3.7%) | |
| Teacher | 1 (3.7%) | |
| Honoror | 1 (3.7%) | |
| Housewife | 12 (44.4%) | |
| Private sector worker | 10 (37.0%) | |
| Entrepreneur | 2 (7.4%) | |
| Ethnic | | |
| Batak | 17 (63.0%) | |
| Jawa | 8 (29.6%) | |
| Melayu/Minang | 2 (7.4%) | |
| Hemodinamik | | |
| Systolic blood pressure | | 90 (70-190) |
| Dyastolic blood pressure | | 60 (40-110) |
| Heart Rate | | 126 (62-154) |
| Respiratory Rate | | 26 (16-31) |
| Total | 27 | |

Data is presented as mean ± SD if normally distributed and presented as median (min-max) if data is not normally distributed.

Based on table 1 above, a total of 27 subjects were found, with an average age of 56.8 years with an SD score of 13.5 years. The male sex are 13 people (48.1%) while the female gender are 14 (51.9%). The most work is IRT (Housewife) 12 people (44.4%). The most ethnic group is the Batak people of 17 people (63.0%). The median value of systolic blood pressure is 90 with a min-max of 70-190, the median value of diastolic blood pressure is 60 with a min-max of 40-110, the median value of heart rate pressure is 126 with a min-max of 62-154 and the median value of respiratory rate is 26 with min-max 16-31.

Tabel 2 Disease Characteristics

| Disease | Frequency | Persentase |
|-------------------------|-----------|------------|
| Pneumonia | 8 | 9,9 |
| Stroke | 5 | 6,2 |
| Lung TB | 4 | 4,9 |
| Sepsis | 27 | 33,3 |
| ARDS | 4 | 4,9 |
| peritonitis | 2 | 2,5 |
| Tetanus | 1 | 1,2 |
| PPOK | 2 | 2,5 |
| CKD | 5 | 6,2 |
| PSMBA | 1 | 1,2 |
| Dm type 2 | 7 | 8,6 |
| MDS | 1 | 1,2 |
| Uremic Encepalopat | 2 | 2,5 |
| Flame Burn | 1 | 1,2 |
| Penetrating Neck Injury | 1 | 1,2 |
| Ruptur Artery Radialis | 1 | 1,2 |
| SGB | 2 | 2,5 |
| Asidosis Metabolik | 5 | 6,2 |
| KAD | 2 | 2,5 |
| Total | 81 | 100,0 |

Based on table 2 above, it is found that the total number of diseases obtained is 81 diseases, where in one sample there are more than one disease. Most diseases were Sepsis with 27 (33.3%) and the least diseases were Tetanus, PSMBA, MDS, Flame Burn, Penetrating Neck Injury and Radial Artery Rupture with 1 each (1.2%).

Tabel 3 Characteristics of Lactic Acid (n=27)

| Characteristics | Mean | SD |
|-------------------|------|------|
| Lactic Acid at T0 | 4,55 | 1,16 |
| Lactic Acid at T1 | 4,54 | 1,15 |
| Lactic Acid at T2 | 4,12 | 1,17 |
| Lactic Acid at T3 | 3,67 | 1,09 |

T0 = Hour to-0; T1 = Hour to-3; T2 = Hour to -24; T3 = Hour to -72

Tabel 4 Characteristics of SOFA Score (n=27)

| Characteristics | Mean | SD | Median | Min. | Max. |
|----------------------------|-------|------|--------|------|------|
| SOFA score at 0 hours (T0) | 11,66 | 2,64 | - | - | - |

| | | | | | |
|-----------------------------|-------|------|----|---|----|
| SOFA score at 3 hours (T1) | 11,51 | 2,53 | - | - | - |
| SOFA score at 24 hours (T2) | - | - | 11 | 5 | 14 |
| SOFA score at 72 hours (T3) | - | - | 10 | 5 | 13 |

Note : T0 = Hour to-0; T1 = Hour t -3; T2 = Hour to -24; T3 = Hour to -72

Data is presented as mean ± SD if normally distributed and presented as median (min-max) if data is not normally distributed.

Tabel 5 Difference in Lactic Acid Levels at 0th hour (T0), 3rd hour (T1), 24th hour (T2) and 72nd hour (T3)

| Biomarker | p-value ^{a)} | p-value ^{b)} |
|---|-----------------------|-----------------------|
| Lactic Acid Levels at 0th (T0) – 3rd hours (T1) | 0,294 | |
| Lactic Acid Levels at 3d (T1) – 24th hours (T2) | 0,001* | 0,001* |
| Lactic Acid Levels at 24th (T2) – 72th hours (T3) | 0,001* | |

a) *T-Paired samples test*, b) *ANOVA Repeated*

Based on table 5 shows the statistical test results of the difference in 3 time groups in the assessment of lactic acid levels. There was no significant difference between the 0th hour - 3rd hour with a value of P = 0.294. There is a significant difference between the 3rd hour - 24th hour with a value of P = 0.001 and at 24th hour - 72th hour with a value of P = 0.001. The statistical test results of the decrease in average lactic acid is P = 0.001, which means there is a significant difference in the average decrease in lactic acid over time

Tabel 6 Difference between SOFA Scores at 0th hour (T0), 3rd hour (T1), 24th hour (T2) and 72nd hour (T3)

| Biomarker | p-value ^{a)} | p-value ^{b)} |
|---|-----------------------|-----------------------|
| SOFA score Levels at 0th (T0) – 3rd hour (T1) | 0,161 | |
| SOFA score Levels at 3rd (T1) – 24th hour (T2) | 0,001* | 0,001* |
| SOFA score Levels at 24rd (T2) – 72th hour (T3) | 0,001* | |

a) *Wilcoxon*, b) *Friedman*

Based on table 6 shows the statistical test results of differences in the 3 groups of time assessment SOFA score. No

significant difference was found between the 0th hour - the 3rd hour with a value of P = 0.161. There is a significant difference between the 3rd hour - 24th hour with a value of P = 0.001. There is a significant difference between the 24th hour - 72th hour with a value of P = 0.001. The statistical test results of an average decrease in SOFA score is P = 0.001, which means there is a significant difference in the average decrease in SOFA score over time.

IV. CONCLUSIONS

From the results of this study conducted to see the effect of one hour bundle sepsis management of sepsis patients on lactic acid and sofa scores at Haji Adam Malik General Hospital, it can be concluded that:

1. There was a statistically significant decrease in SOFA scores after administering one hour bundle sepsis at 24 and 72 hours (p = 0.001).
2. There was a statistically significant reduction in lactate levels after administration of one hour bundle sepsis at 24 and 72 hours (p = 0.001).

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The Implementation of the Balanced Scorecard Model to Improve Amil's Performance in the Amil Zakat Management Organization in Pontianak, Indonesia

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Abstract- The zakat potential in West Kalimantan is IDR 2,104 trillion, but the zakat collected by the BAZNAS of West Kalimantan Province was only Rp 3.7 billion or 0.176% of the total potential in 2018.

Zakat management organizations found in Pontianak, both the 'amil zakat agency and 'amil zakat institutions, including the West Kalimantan National Amil Zakat Agency (BAZNAS) and Al-Mumtaz Peduli Pontianak. These zakat management organizations have representatives in almost all regencies in West Kalimantan.

Organizations that conduct a balanced scorecard analysis into a measurement classified into four perspectives, which were: financial perspective, customer perspective, internal business process perspective, and learning and growth perspective.

Index Terms- Zakat Management Organization, Balanced Scorecard, financial perspective, customer perspective, internal business process perspective, and learning and growth perspective.

I. INTRODUCTION

The zakat potential in West Kalimantan is IDR 2,104 trillion, but the zakat collected by BAZNAS in West Kalimantan Province was only IDR 3.7 billion or 0.176% of the total potential in 2018. The small amount of zakat obtained by zakat management organizations indicates the lack of public trust in zakat management organizations. This also indicates 'amil is still lack of professionalism. Professionalism in zakat management organizations has a very broad and deep meaning. Professionalism in zakat institutions is very important for *muzakki* (people who give zakat) who will pay their zakat.

Being professional in developing zakat management and organization is one of the missions of zakat management organizations. Professional management and accounting can only be applied if one manages zakat as an actual issue. If zakat is only considered as worship to create social piety, we might need professional zakat organizations because when individual piety becomes the only objective, the zakat management should only be done using *the Sufi* system, that when one donates, nobody should recognize the donation.

Organizations that conduct a balanced scorecard analysis into a measurement classified into four perspectives, which were: financial perspective, customer perspective, internal business process perspective, and learning and growth perspective. In strategy mappings, Kaplan divides mapping into 4 perspectives, which are, financial perspective: a strategy in which the short-term and long-term balances contradict; customer perspective: a strategy based on the depreciation proportion values; internal perspective: values made in internal business process; learning and growth perspective: a strategy to balance intangible properties.

The company will gain profit from the integrated and cumulative impact of strategic initiatives, for example, human resources, technology information, distribution, and operation. The company that has strategy mappings can avoid problems such as the lack of human resources, unclear accountability, and lack initiative by assigning an executive to lead each of strategy themes. Strategy themes are divided into several general categories: to build a franchise, increase customer value, achieve operational excellence, and be a good employee. Using these strategies, a company can obtain an accountable and structured report for its business unit.

A strategy may include several changes for the company; it includes improvement for short-term and innovation for long-term changes. Strategy mappings and strategy themes have an objective relationship because in building strategy mappings and strategy themes, a company should separate the planning and manage the key components with the strategy itself. There is cross-operation between in function and unit of business in strategy themes, which will also support the success of the strategy itself. In general, strategy themes depict the trust of the management team to achieve the goal. Strategy themes do not reflect financial results, such as the increase of shareholder value or customer results such as customer retention and higher market share.

Organizations that experience failures in the organization's management system are usually not caused by a lack of ability or effort of a manager. Therefore, we must try to find the reason why organizational performance is low. With a strategy management system, a series of integrated processes and tools are used by organizations to develop strategies, apply them to operational actions and to monitor and improve effectiveness.

There are several Zakat management organizations in Pontianak, both the amil zakat agency and the amil zakat institution, such as the West Kalimantan National Amil Zakat Agency (BAZNAS) and Al-Mumtaz Peduli Pontianak. These zakat management organizations have representatives in almost all regencies in West Kalimantan.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

A. Problem

Based on the background above, the problems of this research are:

- a. How is the financial perspective implementation of a balanced scorecard model at Amil Zakat Agencies in Pontianak?
- b. How is the customer perspective implementation of a balanced scorecard model at Amil Zakat Agencies in Pontianak?
- c. How is the internal business process perspective implementation of a balanced scorecard model at Amil Zakat Agencies in Pontianak?
- d. How is the learning and growth perspective implementation of a balanced scorecard model at Amil Zakat Agencies in Pontianak?

B. Study Design

This research, in the context of writing studies, was conducted using a qualitative research approach. Qualitative research has characteristics, which are: qualitative researchers emphasize more on processes, not results or products; qualitative researchers are interested in meaning; qualitative researchers use main instruments in collecting and analyzing the data, and qualitative researchers involve fieldwork. The author directly contacts the people, background, location, or institution to observe or take notes on the behavior on its natural background and this qualitative research process is inductive, which means the author built the abstract, concept, hypothesis, and theory in detail.

The author used a qualitative research method because (1) the nature of the problem studied, which is to reveal and understand the phenomenon of the strategic management of zakat, and (2) the main objective of this study is to find out or to build a theory. Seen from the location of the data source, this study is categorized into field research. In conducting field research, the author collected data from West Kalimantan BAZNAS management and Al-Mumtaz Peduli as the objects of research. The target of this field research is the implementation of a balanced scorecard.

C. Study Methods

This study used the explorative research method. Explorative research is research that aims to develop knowledge or hypotheses that are still new and provide direction for further research. The use of the explorative design in this study aimed to identify the implementation of the Balanced Scorecard strategy in West Kalimantan Baznas and Al Mumtaz Peduli.

D. Study Location

This study took place in West Kalimantan Baznas and Al Mumtaz Peduli. It is because these agencies have branches all over West Kalimantan province.

III. WRITE DOWN YOUR STUDIES AND FINDINGS

A. LITERATURE REVIEW

A company management system failure is usually not caused by the lack of ability or effort of its manager, so the real reason why the company's performance is low should be found. With a strategy management system, a series of integrated processes and tools are used by organizations to develop strategies, apply them to operational actions and to monitor and improve effectiveness.

A manager should believe that actions taken by members of the organization move the organizations towards the goals. This is a management control function that involves various elements: (1) setting work performance standards; (2) measuring current achievements; (3) comparing this achievement with established standards; and (4) taking corrective action if there is a deviation. Through the control function, managers keep the organization on track.

Strategy implementation requires the company to set annual goals, make policies, motivate employees and allocate resources so that the formulated strategies can be implemented. Strategy implementation includes developing a culture that supports the strategy, creating an effective organizational structure and directing marketing efforts, preparing budgets, developing and empower information systems and link employee performance with company performance.

Strategy evaluation is the final stage of strategic management. Managers will find out whether the strategy cannot go as expected, and strategy evaluation is the main way to obtain such information. All strategies can be adjusted in the future because internal and external factors are constantly changing. There are three activities in strategy evaluation, which are (1) reviewing external and internal factors that build the basis of the current strategy, (2) measuring performance; and (3) taking corrective action. Evaluation is needed because today's success does not guarantee tomorrow's success.

Companies that experience failures in the company's management system, this is usually not caused by a lack of ability or effort of a manager, but must look for the reasons why the company's performance is low. With a strategy management system, a series of integrated processes and tools the company uses to develop strategies, translate into operational actions and monitor and improve effectiveness.

A company management system failure is usually not caused by the lack of ability or effort of its manager, so the real reason why the company's performance is low should be found. With a strategy management system, a series of integrated processes and tools are used by organizations to develop strategies, apply them to operational actions and to monitor and improve effectiveness.

Managers and executives in every company should set a company vision. Vision is a thought that transcends current reality, a condition to be achieved that are never been achieved before. A clear vision is a basis for making comprehensive missions. A vision should be concise, preferably in one sentence and comes from suggestions from as many managers as possible.

A mission is a statement of long-term goals that distinguishes one business from another business. A mission identifies the scope of the company's operations in terms of products and markets. A mission is used to answer the basic questions faced by strategic planners, such as "What is the form of our business?" A clear mission statement reflects the values and priorities of a company.

Vision and mission give managers a unified direction that exceeds personal interests and temporary interests. Vision and mission bring the same sense of expectation among all levels of managers and employees. Vision and mission should always be integrated, emphasizing the values and objectives that can be accepted by all parties outside the company.

Values provide limits in the choice of ways taken in achieving the vision and mission. They are honored by the company in efforts to achieve the vision. Values especially give attention to the norms of service, quality, people and work and guide the management in achieving the goals that have been set. Values also describe the attitudes and behaviors the company desired and prohibit actions such as bribery, harassment, and conflicts of interest. Reaffirming the vision,

mission and values put management in the right mindset in arranging the company's agenda and set the basic guidelines for the company.

The company's strategy is to continuously reassess the scope of the company. This is related to valuable resources in market share, the resources owned by the company are different from the specificity of the company, when exchanged from resources (such as cash, various machine types, and general management skills) for more specialized resources (for example expertise in specific disciplines and the secret formula of a product) and special resources often play an important role in securing competitive advantage.

After conducting external and internal analysis, a company can reveal a series of strategies about the best role of new products and services, new partners, new market segments, customer segments that have made agreements, and these issues will be the focus of the strategy formulation process.

Companies, in planning a strategy, may develop objective strategies, measures, initiative targets, and budgets that guide action and resource allocation. In strategy mappings, Kaplan divides the mapping into 4 perspectives, which are: financial perspective: a strategy in which the short-term and long-term balances contradict; customer perspective: a strategy based on the depreciation proportion values; internal perspective: values made in internal business process; learning and growth perspective: a strategy to balance intangible properties.

Strategies in a company include various changes and increased short-term productivity for long-term innovation. Strategy mappings and strategy themes have an objective relationship. By building strategy mappings and strategy themes, the company can separate the planning activity while managing the key components with strategy. In strategy themes, there are cross-operations between functions and business units, which also support the success of strategy implementation. In general, the strategy themes reflect the management team's trust that must be done to achieve success. Themes do not reflect financial results such as increasing shareholder value or customer results such as higher customer retention and higher market share.

In choosing sizes and targets, companies convert the strategy mappings and themes to sizes, targets, and gaps. Gaps occur due to ambitious vision statements that are articulated during the preparation of strategies and strategy themes will be implemented in a span of 3 years to 5 years. The strategic initiative cannot be decided alone; the strategic initiative is a portfolio of complementary actions in which all parties are involved so it can be successfully applied.

Effective strategies are found in a combination of deliberation and control with flexibility and organizational learning processes. Senior managers can set broad guidelines (for example, only producing products that are high-margin on sophisticated technology or supporting technology-using products). This strategy is not only intentional and sudden, but it is consciously managed so it is used on the company's journey. In the strategy, process management should control the process of forming a strategy with structure designs, staff, and procedures. Both the strategy process and the umbrella strategy appear to be the most prevalent in businesses that require great expertise and creativity, where the executor is permitted to be a formulator because these people are in direct contact with faced situations and have the necessary technical expertise.

Expenditures used to finance the implementation of the strategy require a coordinated portfolio. The traditional budgeting systems focus more on budgeted resources for organizational functions and business units and the responsibilities and performance of units. Strategic investment for initiatives is a cross-function of business units and financing which sets the operational budget. The company sees the need for a theme team to be accountable for the implementation of the strategy theme and the company finances the team's activities with strategic expenditure and supports the theme team from the cross-organization and the theme team performs accountability and feedback on the implementation of the strategies for each theme.

The company, in gaining profits may operate multibusiness and multifunction but it also needs to wire its strategy to individual business strategy and its business unit. Employees should understand the company strategy and they need to be motivated to support the company in succeeding in the strategy.

Companies that have strategy matrices, targets, and portfolio initiatives can develop operational plans that outline actions to achieve strategic goals. Operational planning begins by setting priorities for process improvement, followed by preparing the details of sales plans, resource and operational capacity plans, and capital budget. The company needs to align its improvement process with strategic priorities and funding the resources operationalized by the business must be consistent with the strategic plan. There are several things to be considered in planning operations including improving the quality of key processes and developing resource capacity.

Companies, in improving the quality of key processes objectively from the perspective of strategy mapping, should determine the process of implementing the strategy. The theme of strategy mapping originates in the key processes that are defined in the mapping. Strategic themes that grow through innovation require performance from new products to the development process; the theme is to gain customer loyalties by improving customer management processes. Some customer groups react more sensitively to prices than others, demand different special products and require various amounts of information, support, and services even if their needs are similar to other customers. Access to such information is needed to find out customer's geography, customer's scale or any different activities necessary to reach customers in the best way.

To achieve strategy success, companies may link the operational plan and financial budget strategies to develop resource capacity. According to Hamel, fostering the resource climates is needed: brilliant ideas that can come from anyone, nobody can kill a good idea, a power that spread, a large source of capital. Innovators get expensive rewards for commercially successful ideas. The operational plan has several components including detailed sales predictions, resource capacity plans and budgets for operational costs and capital expenditure.

B. DISCUSSION

a. The financial perspective implementation of balanced scorecard model at Amil Zakat Agencies in Pontianak

The financial perspective is used in strategy mapping because financial measures are very important in providing a summary of the consequences of economic actions taken. Financial performance measures provide direction on strategy, implementation and effect on increasing corporate profits. Financial goals relate to profitability which is calculated by operating profit, ROI (Return on Investment), ROA (Return on Assets) and EVA (Economic Value Added).

In financial perspectives, 3 themes that may encourage the determination of business strategy are mix and growth, cost-saving/ productivity increase, and asset/ strategy utilization. The mix and revenue growth refers to various businesses to expand product and service offerings, reach new costumers and markets, change the product mix to create higher added value, and re-price products and services provided. The income growth measurement, which generally used by business units in both growth and reaping stages, is a market growth rate of sales and market share for targeted region, market, and costumer.

Financial perspectives on West Kalimantan Baznas and al Mumtaz Peduli pay attention to external growth, internal stability and community development. In observing external growth, West Kalimantan Baznas and al Mumtaz Peduli always pay attention to the growth of funds collected, such as zakat funds, donations, endowments, humanitarian funds, and CSR.

West Kalimantan Baznas and al Mumtaz Peduli in paying attention to internal stability always see revenues and expenditures. West Kalimantan Baznas and al Mumtaz Peduli limit their *amil* expenditure to not exceed 1/8 of the total receipt of zakat funds. West Kalimantan Baznas and al Mumtaz Care in building communities pay attention to expenditures related to services, both for *mustahiq* and *muzakki* to improve service quality. West Kalimantan Baznas and al Mumtaz Peduli also pay attention to the expenses used to develop products and programs implemented.

West Kalimantan Baznas and al Mumtaz Peduli in implementing financial perspectives did not calculate the ROI (Return on Investment), ROA (Return on Assets) and EVA (Economic Value Added) because Baznas West Kalimantan and al Mumtaz Cares are not profit-oriented organizations.

b. The customer perspective implementation of balanced scorecard model at Amil Zakat Agencies in Pontianak

In a company, managers can identify customers and market segments and this is called a customer perspective. This perspective consists of the main measures of the company's success from a strategy that is well formulated and implemented. The main measures include customer satisfaction, customer retention, new customer acquisition, customer profitability, and market share in the target segment. Factors driving customer success in certain market segments are important factors, which can influence a customer's decision to change his supplier.

In implementing the customer perspective, West Kalimantan Baznas and al Mumtaz Peduli are very concerned about customer satisfaction, market share growth, and consumer retention. West Kalimantan Baznas and al Mumtaz Peduli have made programs for *muzakki* satisfaction such as customer service excellence, donor service divisions, ID number, personal features such as birthday wishes and *muzakki* reminder to pay zakat. As for *mustahiq*, they serve *mustahiq* who come to West Kalimantan Baznas and al Mumtaz Peduli pretty well and they even embrace them with empowerment and assistance programs.

West Kalimantan Baznas and al Mumtaz Peduli look over the market growth by creating branches and representatives to serve *muzakki* and *mustahiq* closer. West Kalimantan Baznas and al Mumtaz Peduli always try to develop their products and programs for their *muzakki* and *mustahiq* and give the effort to develop their communities. West Kalimantan Baznas and al Mumtaz Peduli also do retention to both their *muzakki* and *mustahiq*. Retention programs for *muzakki* are by providing financial and activity reports every month and publish magazines that consist of the activities carried out by them. They also pay attention to the quality and time service to their *muzakki* to increase trust. Retention programs for *mustahiq* are mostly empowerment and assistance programs, especially for *mustahiq* who are in misfortune or affected by natural disasters.

c. The internal business process perspective implementation of balanced scorecard model at Amil Zakat Agencies in Pontianak

In the internal business process perspective, the executives identify various important internal processes to be mastered well by the company. These processes enable the business unit to provide value proposition which will draw attention as well as maintain customers in the target market segment and also fulfill the high financial benefit. The internal business process measurement is focused on various internal processes that affect the costumers's satisfaction and achieve the company's financial goal. This perspective tries to identify various new processes to be mastered well by the company to achieve both customer and financial goals. In this

process, the company tries to create values by producing, providing, and giving products and services to the costumers with costs below the price paid by the costumers.

In carrying out their internal business process, West Kalimantan Baznas and al Mumtaz Peduli have made procedural operational standards for each division, get ISO, and improved the quality of main business and product innovation. Internal business process perspective is also closely related to fundraising, fund distribution, community building, communication, product development, staff development, customer service, and communication between departments.

West Kalimantan Baznas and al Mumtaz Peduli do fundraising in several ways, such as bank transfer, zakat 'pickup' program, or welcome the *muzakki* to come to their offices by themselves. They also do fund distribution by encouraging *mustahiq* to come to their office and visiting *mustahiq* to do *mustahiq* empowerment.

West Kalimantan Baznas and al Mumtaz Peduli, in building community, also design the Zakat Forum (FOZ) whose members are zakat management organizations. This forum is used to solve problems that arise related zakat as well as a media for the organizations to discuss and communicate as well as coordinate between organizations. West Kalimantan Baznas and al Mumtaz Peduli also do both internal and external communication. Internal communication is done by holding meetings and coordination in the form of weekly, monthly, quarterly, or annual meetings. External communication is done by publishing activity reports through banners, newsletter, bulletin, and website. They also communicate with their branches in all regions.

West Kalimantan Baznas and al Mumtaz Peduli develop their products by always paying attention to the current events that need to be anticipated, such as humanity programs or domestic and foreign disasters. It is one of their prominent features in gaining social funds. West Kalimantan Baznas and al Mumtaz Peduli also develop their employees by conducting training needed by their employees to develop their potential to achieve their visions and missions. This training may be conducted both by internal and external parties. West Kalimantan Baznas and al Mumtaz Peduli also do product innovation. It is done by responding to recent events. Product continuity maintenance is done by holding weekly and monthly evaluations regarding the products and services provided to costumers.

d. The learning and growth perspective implementation of balanced scorecard model at Amil Zakat Agencies in Pontianak

Learning and growth perspectives identify the infrastructure needed by a company to increase growth and long-term performance. The company seems to unable to achieve the customer market and long-term internal process by only relying on technologies and capacities owned by the company at the moment. There are three main sources of learning and growth of a company which is humans (work labor), system, and procedure of the company.

The company can set the objective of the employees using three main general measurements, which are staff competency, technology infrastructure, and climate to act. These three measurements may encourage employee satisfaction, employee retention, and employee productivity.

West Kalimantan Baznas and al Mumtaz Peduli also apply strategies related to learning and growth because as zakat *amil* agencies they need skilled resources to increase the trust of their *muzakki*. It is proven that West Kalimantan Baznas and al Mumtaz Peduli has a good brand image as zakat, infaq, alms, and endowment managers. To develop their employees, West Kalimantan Baznas and al Mumtaz Peduli also conduct training both through internal and external parties. One of the training given to their employees is management training.

Technology that is currently used by West Kalimantan and al Mumtaz Peduli is considered good. For example, they use personal websites to inform their financial reports to the public. Other technology utilizations are collecting funds (zakat, infaq, alms, and endowment) using infaq messages and SMS banking. Their professional work environment and bonding are seen from the satisfying work condition and product produced. West Kalimantan Baznas and al Mumtaz Peduli always try to encourage growth in every region and also improve their performance.

The employees of West Kalimantan Bazanas and al Mumtaz Peduli can have more responsibility to achieve the costumers' goal and the company's internal business process. The employees are no longer only responding to the costumers' demand but proactively anticipating customers' needs as well by providing a wider market for products and services needed. West Kalimantan Baznas and al Mumtaz Peduli can consider the need for employees retraining through two dimensions: type of retraining needed and percentage of work labors that need the retraining.

Information system capability is highly needed to motivate and improve employee skills in achieving the wide targets of the customer and internal business process. First-line employees extremely need accurate and actual information about every connection between the agencies and their costumers. A good information system is a requirement from the employee to sustainably improve the business process through various TQM efforts or re-designing and re-engineering. In working towards learning and growth that is focused on the company climate while encouraging employee's motivation and initiative and still paying attention to the wide access of information for their employees, expecting them to always contribute to West Kalimantan Baznas and al Mumtaz Peduli and are motivated to act for their best interests.

C. CONCLUSION

Based on the explanation in the previous chapters, we can conclude as follows:

1. Financial perspective implementation of Amil Zakat Agencies in Pontianak on balanced scorecard model emphasizes on the external growth in a form of the growth of the received fund, internal stability in a form of balance between

revenue and expenditure, and community building in the form of increased funds for service and product developments.

2. Customer perspective implementation of Amil Zakat Agencies in Pontianak on a balanced scorecard model focus on the customer's satisfaction in a form of rewards and providing ease, market growth by adding branches, product and community development, employee retention by informing their performance and improving time and service quality.
3. Internal business process perspective implementation of Amil Zakat Agencies in Pontianak on balanced scorecard model focus on main business process development by collecting fund distribution and communication, improving product innovation through development and research, maintaining the product sustainability by consistently evaluating products.
4. Learning and growth perspective implementation of Amil Zakat Agencies in Pontianak on balanced scorecard focus on the employee competencies; which provide training and teamwork development, the latest technology and information, also aim for an open and bound work environment.

Suggestion

1. Coordinate with Province Government and Regionally-Owned Enterprise (BUMD) in Provincial level and private parties as well to increase zakat receipt.
2. Use the latest technologies such as infaq SMS and zakat SMS.
3. Cooperate with universities to improve performance quality.

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Validation of Pharmaceutical Care Assessment Questionnaire (PCAQ) by Community Pharmacists - A Preliminary Study.

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Abstract- Background and objectives: Pharmaceutical care is characterized as the direct, responsible provision of medication-related care for the purpose of achieving definite outcomes that enhance patient's quality of life. Pharmaceutical Care Assessment Questionnaire (PCAQ) is prepared based on Pharmaceutical Care assessment by community pharmacists which was developed and validated by Nneoma et.al (2013). This study is to validate the psychometric properties of the Pharmaceutical Care Assessment Questionnaire (PCAQ) in Malaysian Community Pharmacy. The questionnaire consists of two domains which is direct patient care/current pharmacy practice (Part A) and exploring the awareness of pharmaceutical care (Part B). **Method:** Content validity, face validity, construct validity and reliability of PCAQ are evaluated. The questionnaire was content validated by 8 experts in the field consists of hospital pharmacists and lecturer from department pharmacy management. Face validation was conducted among 10 respondents who are community pharmacists. Whereas, from construct validity phase, 30 community pharmacists from Negeri Sembilan took part and 13 of them responded for test retest. Factorial analysis used principal component analysis and Varimax rotation. Reliability of the questionnaire were established with Cronbach's Alpha and test-retest. **Results:** All the question have excellent Kappa value and only one question then with fair Kappa value. The factorial analysis showed a high correlation and communality between the questions and it proves that the questions in the instrument are able to measure the intended study topic. Cronbach's Alpha was 0.921 and 0.686 for Part A and Part B respectively. Wilcoxon non-parametric test result showed no significant difference between test and retest score for all the items. **Conclusion:** The questionnaire is a valid and reliable assessment tool to assess on pharmaceutical care provided by community pharmacists in Malaysia. Further study is required in order to make use of the questionnaire throughout the nation.

Index Terms- Assessment, Community pharmacists, Community pharmacy, Pharmaceutical care, Questionnaire,

I. INTRODUCTION

Pharmaceutical care is characterized as the direct, responsible provision of medication-related care for the purpose of achieving definite outcomes that enhance patient's quality of life. It orders the professionals to dispense medications and to acknowledge responsibility for improving the quality of patients' outcomes (Hepler & Strand, 1990). The importance of pharmacists and community pharmacy for better healthcare services and good pharmacy practice is reported by International Pharmaceutical Federation (FIP). The act of pharmacists that reacts to necessities of the general population who utilizes the pharmacists' services to provide an ideal care which is evidence-based is referred as Good Pharmacy Practice (FIP- WHO Guidelines, 2011). Community pharmacists are the health professionals who are in easy contact with the general public. They legally supply medicines with a prescription or over the counter medications. Other than supplying right medication in right quantity to the right patient, counselling, providing drug information to health professionals, patients and the general public, and participation in health-promotion programmes are part of their professional activities (WHO, 1994). In Malaysia, pharmacy practice varies from one pharmacy to another. Chain-store pharmacies mostly offers a non-professional services whereas a independent pharmacies routinely focus on proficient pharmacy services (Wong, 2001). Currently

in Malaysia, there is no studies on assessment of pharmaceutical care is done. This preliminary study aimed to validate the psychometric properties of the Pharmaceutical Care Assessment Questionnaire (PCAQ) for the purpose of assessment by community pharmacists on provision of pharmaceutical care. In order for practice of pharmaceutical care to be assured for community pharmacists of Malaysia, there is a necessity for a scale to measure pharmacists' activities in their practice sites. This study will be a supportive tool to the Malaysian community pharmacists to evaluate their endeavors in the provision of pharmaceutical care.

II. METHODS AND DATA COLLECTION

1. Drafting of questionnaire

The draft of Pharmaceutical Care Assessment Questionnaire (PCAQ) were prepared based on the existing tool, Questionnaire for Assessing Pharmaceutical Care by Community Pharmacists which was developed and validated by Nneoma et al., (2013). This original questionnaire was developed based on the framework of the Behavioral Pharmaceutical Care Scale (BPCS) by Odedina et al., (1996). A 12 item questionnaire was designed with two domains namely, direct patient care/current pharmacy practice and exploring the awareness of pharmaceutical care. The questionnaire was checked for content, face and construct validity by experts in the field.

2. Inclusion Criteria

Inclusion criteria of experts: The experts included in this study were pharmacists with at least two years practice in hospital setting or lecturer from the department of clinical pharmacy and pharmacy management and Malaysian who can speak English.

Inclusion criteria of respondents: The respondents included in the study were both chain and independent community pharmacists who have registered with the Pharmacy Board of Malaysia and should be in close contact with the patients.

3. Content validity and Face validity

Content validity concerns how much an instrument has a proper sample of items for the develop being measured. An instrument's content validity is essentially in light of judgment of board of experts to assess and record content validity of instruments. The panel comprises of no less than three experts (Polit & Beck, 2004). The questionnaire was content validated by two pharmacists who are practicing at Government Hospital, three pharmacists from KPJ Specialist Hospital and three lecturer from department of School of Pharmacy each from KPJ Healthcare University College (KPJUC), AIMST University and International Medical University (IMU). They assessed the content of each of the domain relevant to the concept of pharmaceutical care.

Face validity is how the instrument looks, on the face of it and as it measures the construct of interest (Trochim, 2001). Face validation was carried out at ten community pharmacies located a Nilai and Seremban, Negeri Sembilan. It gives understanding about how potential the respondents may interpret and respond to the questionnaire. The pilot study generated data were not included in the final analysis.

4. Construct validity: Factor analysis

Construct validity refers to how much the instruments measures the construct developed. It depends on internal structure and external relationship (Rajender, 2011). It is a quantitative value as opposed to a qualitative distinctions amongst "valid" and "invalid" (Parsian & Dunning, 2009). As the indicator comprises of various items, factor analysis is utilized to decide the construct validity. Factor Analysis is a statistical technique used to bunch items into common factors, interpret each factor and outline the items into a little number of factors (Bryman & Cramer 1999). Random things which is not related to construct and should be deleted from the instrument (Munro, 2005). Copies of the questionnaire were distributed to 60 community pharmacists in the state, using an estimation of 63 community pharmacies available in Negeri Sembilan for the year 2011 (Bahagian Perkhidmatan Farmasi, Kementerian Kesihatan Malaysia, 2013). This was decided based on sample size of known population by Krejcie & Morgan (1970). Out of the 60 questionnaire sent out, 30 was completed and included in study. Some of the community pharmacists also refused to participate in the study and that affected the sample size. Questionnaire distribution and data collection was conducted between May and June 2017.

5. Reliability procedure

Reliability is the how much an assessment tool produces steady and consistent outcomes. The advantage of carrying out a reliability analysis is that it empowers a researcher to treat a group of factors on the same subject as a single scale variable. This will diminish the many-sided quality of further analysis and hence the risk of Type I errors is decreased too (Samuels, 2016). The questionnaire was assessed on it's reliability by conducting two procedures which are Chronbach's alpha and Test-retest. Cronbach's alpha is utilized to assess the extent of variance that is systematic or reliable in an arrangement of test scores. Test-retest reliability is assessed by administering the similar test to the similar group of respondents at different point of time. The correlation between the two scores, and regularly between individual questions, demonstrates the soundness of the instrument. In any case, 2 weeks to 1 month is the for the most accepted time interval for retesting (Waltz et al., 2005). Cronbach's Apha was done on the same data collected for factor analysis and test-retest was done by 13 respondents.

III. RESULTS AND DISCUSSION

1. Response Rate

The response rate were 50%, 50% and 43.3% for face validation, construct validation and test-retest respectively. Based on this study's response rate, during further study the sample size can be determined and the probability of the response required by investigator can be estimated.

2. Content Validation

Based on content validation result 11 questions' Content Validity Ratio (CVR) was equal or more than 0.75 and excellent Modified Kappa value which is more than 0.74. Therefore, these questions can be remained in the questionnaire whereas Question 9's CVR was 0.25 and fair Modified Kappa value which is 0.52 which needed to be eliminated. But Question 9 which was about psychological commitment and effort, was remained in the questionnaire for further validity procedures because, based on the comments from the experts and literature review, it is important to make psychological commitment to influence the patient to be compliance to the medication therapy. This is because good medication adherence improves patient's condition which is supported by the study by Ying & Wei (2015) reported that explaining positive outcomes of good medication adherence and encourages patients to do so, improves patient's medication adherence. Details of computation of CVR are shown in Table 1. All question have appropriate Content Validity Index (CVI) except question 9 requires revision because of I-CVI of 0.625. Suitability and understandability of question 9 was tested in face validation. Details of the content validation result are shown in Table 2.

3. Face Validation

Based on face validation results and comments from community pharmacists who have participated, all questions appear simple, understandable and acceptable by the intended targeted respondents.

4. Construct Validation: Factor Analysis

Factor analysis was done based on the data collected from 30 community pharmacists around Negeri Sembilan who practices at independent community pharmacy and chain community pharmacy. Question 7 which was about whether pharmacists heard about concept of pharmaceutical care was not included in this analysis as the answer by respondent was 100% yes. The communality value should be more than 0.5 to be considered for further analysis. All the questions of the questionnaire have scored 1.000 which was more than 0.5, therefore the next step of factor analysis was continued. Details of communality result are shown in Table 3. Factor analysis with principal component and varimax was performed on the 12 question and three factors/ domains emerged. Based on the results obtained it was concluded that question 1 to 6 loaded well with factor (component) 1 whereas question 8, 9, 11 and 12 loaded well with factor (component) 2 and only question 10 loaded to factor (component) 3. Question 10 which about how often pharmacists inquire of patient's satisfaction with their services requires further analysis with bigger sample size to determine whether to be included in factor 2 or to be removed from the questionnaire. This question can not directly excluded as there are studies done in Malaysia on regards of

assessment of pharmaceutical care services provided by a community pharmacy by Sam, Jothy & Parasuraman (2015) and it is one of the criteria mentioned in FIP/WHO Guidelines 2011. The questionnaire was finalized with two domains as question 10 remained in second factor. Details of factor analysis are shown in Table 4.

5. Reliability Study

The reliability of domain 1 (Part A) of questionnaire was 0.921, which indicates that the questions have good internal consistency and reliability. The alpha coefficient of domain 2 (Part B) of questionnaire was 0.686, indicating that the questions have relatively internal consistency as the value is closer to 0.7. Cronbach's value of 0.70 or higher indicates that questions are sufficiently correlated to form a scale (Nunnally & Bernstein, 1994). The corrected item correlation of each component is more than 0.3, this proves that all the questions were to be considered reliable. Details of Cronbach Alpha and Item total statistics are shown in Table 5 and 6 respectively. Wilcoxon non-parametric test output showed no significant difference between test and retest score for all the item, where the P values of all item between the two test is more than 0.05. Details of Wilcoxon non-parametric test are shown in Table 7.

This preliminary study aimed to validate a questionnaire which is reliable for assessing pharmaceutical care rendered by community pharmacists in Malaysia. This questionnaire is the first of its kind to be used in Malaysian community practice setting. Some of the questions requires modification in a way that could fit the Malaysian practice setting. The validated questionnaire will form a reliable work tool for researchers to improve on pharmaceutical care practiced within community pharmacies. There are some limitations related in conducting this study which was small sample size as some pharmacists decline to participate due to tight work schedule. Next, the self administered nature of the instrument may lead to response bias. It is highly recommended for further study to be conducted with larger sample size in different states of Malaysia. The usage of the questionnaire can be widen to be used in hospital pharmacy setting as there were no questions intended specifically to measure activity of community pharmacists.

IV. CONCLUSION

This study validated a questionnaire, a first of its kind to be used by Malaysian community pharmacy setting. The results from the validation process indicate that the questionnaire is valid, reliable and stable over time, and so might be a valuable instrument for assessing pharmaceutical care rendered by community pharmacists in Malaysia. Further study is needed to expand the robustness of the instrument.

APPENDIX

Table 1: CVR of questions and interpretation

| Question | Ne | CVR | Interpretation |
|----------|----|----------------------|----------------|
| 1 | 8 | 1 (≈ 0.99) | Remained |
| 2 | 7 | 0.75 | Remained |
| 3 | 7 | 0.75 | Remained |
| 4 | 8 | 1 (≈ 0.99) | Remained |
| 5 | 8 | 1 (≈ 0.99) | Remained |
| 6 | 8 | 1 (≈ 0.99) | Remained |

| | | | |
|----|---|----------------------|-----------------------|
| 7 | 7 | 0.75 | Remained |
| 8 | 7 | 0.75 | Remained |
| 9 | 5 | 0.25 | Need to be eliminated |
| 10 | 8 | 1 (≈ 0.99) | Remained |
| 11 | 8 | 1 (≈ 0.99) | Remained |
| 12 | 8 | 1 (≈ 0.99) | Remained |

Ne is number of experts evaluated the item essential or agrees with the item and Content Validity Ratio (CVR) = $(N_e - N/2)/(N/2)$. The items with the CVR equals or bigger than 0.75 remained at the instrument and the rest needed to be eliminated.

Table 2: Content Validation Results

| Dimensions of construct of study: Pharmaceutical Care Assessment | Number giving rating of 3 or 4 to relevancy of item | I-CVI | Pc | K | Interpretation | Comprehensiveness of instrument dimension | |
|--|---|-------|-------|------|----------------|---|-------------------------|
| | | | | | | Agree | Proportion of consensus |
| Part A: Direct patient care/Current pharmacy practice | | | | | | | |
| 1 | 8 | 1.00 | 0.004 | 1.00 | Excellent | 8 | 1 |
| 2 | 7 | 0.875 | 0.031 | 0.87 | Excellent | | |
| 3 | 7 | 0.875 | 0.031 | 0.87 | Excellent | | |
| 4 | 8 | 1.00 | 0.004 | 1.00 | Excellent | | |
| 5 | 8 | 1.00 | 0.004 | 1.00 | Excellent | | |
| 6 | 8 | 1.00 | 0.004 | 1 | Excellent | | |
| Part B: Exploring the awareness of pharmaceutical care | | | | | | | |
| 7 | 7 | 0.875 | 0.031 | 0.87 | Excellent | 8 | 1 |
| 8 | 7 | 0.875 | 0.031 | 0.87 | Excellent | | |
| 9 | 5 | 0.625 | 0.218 | 0.52 | Fair | | |
| 10 | 8 | 1.00 | 0.004 | 1.00 | Excellent | | |
| 11 | 8 | 1.00 | 0.004 | 1.00 | Excellent | | |
| 12 | 8 | 1.00 | 0.004 | 1.00 | Excellent | | |
| 12 items | S-CVI/Ave = 0.927 S-CVI/UN = 0.583 | | | | | Agreement on total comprehensiveness=8 | |

I-CVI is item-level content validity index, Pc is probability of a chance occurrence was computed using the formula $Pc = [N! / A! (N - A)!] \cdot .5N$ where N= number of experts and A= number of experts who agree that the item is relevant. Number of experts=8, K(Modified Kappa) was computed using the formula: $K = (I-CVI - Pc) / (1 - Pc)$. Interpretation criteria for Kappa as per guidelines described in Cicchetti and Sparrow (1981) is fair when K of 0.40 to 0.59; good when K of 0.60 to 0.74 and excellent when $K > 0.74$.

Table 3: Communalities

| Questions | Initial | Extraction |
|--|---------|------------|
| 1. Asked patient questions to access actual patterns of use of medication. | 1.000 | 0.858 |
| 2. Asked patient questions to find out about perceived effectiveness of drugs he or she was taking. | 1.000 | 0.696 |
| 3. Asked patient questions to ascertain whether therapeutic objectives were realized. | 1.000 | 0.783 |
| 4. Asked patient questions to find out if he or she might be experiencing drug-related problems. | 1.000 | 0.773 |
| 5. Implemented a strategy to resolve (or prevent) drug related problem | 1.000 | 0.553 |
| 6. Follow up patients to evaluate their progress towards the drug therapy objectives | 1.000 | 0.662 |
| 8. How often do you try to provide pharmaceutical care to your patients? | 1.000 | 0.745 |
| 9. How often do you make psychological commitment and effort required to improve their outcome | 1.000 | 0.627 |
| 10. How often do you inquire of patient's satisfaction with your services in order to evaluate your work | 1.000 | 0.863 |
| 11. How often do you participate in higher educational programs to maintain and improve your competence? | 1.000 | 0.635 |
| 12. How often do you provide general medical information to patients? | 1.000 | 0.745 |
| Extraction Method: Principal Component Analysis. | | |

Table 4: Result of Factor Analysis, Component Matrix of Domain 1 and Domain 2

| Questions | Component |
|--|-----------|
| | 1 |
| 1. Asked patient questions to access actual patterns of use of medication. | 0.926 |

| 2. Asked patient questions to find out about perceived effectiveness of drugs he or she was taking. | 0.834 | |
|--|-----------|-------|
| 3. Asked patient questions to ascertain whether therapeutic objectives were realized. | 0.885 | |
| 4. Asked patient questions to find out if he or she might be experiencing drug-related problems. | 0.879 | |
| 5. Implemented a strategy to resolve (or prevent) drug related problem | 0.744 | |
| 6. Follow up patients to evaluate their progress towards the drug therapy objectives | 0.814 | |
| Extraction Method: Principal Component Analysis. | | |
| a. 1 components extracted. | | |
| Questions | Component | |
| | 2 | 3 |
| 8. How often do you try to provide pharmaceutical care to your patients? | 0.860 | |
| 9. How often do you make psychological commitment and effort required to improve their outcome | 0.648 | 0.455 |
| 10. How often do you inquire of patient's satisfaction with your services in order to evaluate your work | | 0.881 |
| 11. How often do you participate in higher educational programs to maintain and improve your competence? | 0.703 | |
| 12. How often do you provide general medical information to patients? | 0.818 | |
| Extraction Method: Principal Component Analysis. | | |
| a. 2 components extracted. | | |

Table 5: Cronbach's Alpha

| | Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|--------|------------------|--|------------|
| Part A | 0.921 | 0.921 | 6 |
| Part B | 0.686 | 0.704 | 5 |

Table 6: Item total statistics

| | Questions | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Squared Multiple Correlation | Cronbach's Alpha if Item Deleted |
|--------|-----------|----------------------------|--------------------------------|----------------------------------|------------------------------|----------------------------------|
| Part A | 1 | 12.10 | 22.438 | 0.884 | 0.812 | 0.891 |
| | 2 | 12.20 | 25.131 | 0.758 | 0.685 | 0.909 |
| | 3 | 12.60 | 25.283 | 0.825 | 0.692 | 0.901 |
| | 4 | 12.63 | 24.033 | 0.817 | 0.688 | 0.901 |
| | 5 | 12.90 | 26.231 | 0.648 | 0.478 | 0.923 |
| | 6 | 12.57 | 24.875 | 0.727 | 0.662 | 0.913 |
| Part B | 8 | 5.87 | 2.395 | 0.644 | 0.592 | 0.558 |
| | 9 | 6.20 | 2.234 | 0.519 | 0.321 | 0.598 |
| | 10 | 6.13 | 2.878 | 0.190 | 0.279 | 0.743 |
| | 11 | 5.87 | 2.464 | 0.403 | 0.361 | 0.654 |
| | 12 | 5.80 | 2.579 | 0.537 | 0.555 | 0.604 |

Table 7: Wilcoxon non-parametric test result (P values after Re-test)

| Questions | Asymp. Sig. (P value) |
|---|-----------------------|
| 1. Asked patient questions to access actual patterns of use of medication. | 0.317 |
| 2. Asked patient questions to find out about perceived effectiveness of drugs he or she was taking. | 1.000 |
| 3. Asked patient questions to ascertain whether therapeutic objectives were realized. | 1.000 |
| 4. Asked patient questions to find out if he or she might be experiencing drug-related problems. | 0.317 |
| 5. Implemented a strategy to resolve (or prevent) drug related problem. | 0.317 |
| 6. Follow up patients to evaluate their progress towards the drug therapy objectives. | 1.000 |
| 7. Have you heard about the concept of pharmaceutical care? | 1.000 |
| 8. How often do you try to provide pharmaceutical care to your patients? | 1.000 |
| 9. How often do you make psychological commitment and effort required to improve their outcome? | 1.000 |
| 10. How often do you inquire of patient's satisfaction with your services in order to evaluate your work? | 1.000 |
| 11. How often do you participate in higher educational programs to maintain and improve your competence? | 1.000 |

| | |
|---|-------|
| 12. How often do you provide general medical information to patients? | 1.000 |
|---|-------|

Table 8: The finalized questionnaire for assessing pharmaceutical care by community pharmacists

Part A: Direct patient care/Current pharmacy practice

Please indicate how many of your last five (5) patients with chronic conditions, who presented a refill prescription you provided the following activities by ticking the appropriate response.

| Question | The respondent | Very often (4) | Often (3) | Sometimes (2) | Rarely (1) | Never (0) |
|----------|---|-------------------|--------------|------------------|---------------|--------------|
| 1. | Asked patient questions to assess actual patterns of use of medication. | | | | | |
| 2. | Asked patient questions to find out about perceived effectiveness of drugs he or she were taking. | | | | | |
| 3. | Asked patient questions to ascertain whether therapeutic objectives were realized. | | | | | |
| 4. | Asked patient questions to find out if he or she might be experiencing drug-related problems. | | | | | |

Please indicate the activities provided to last five patients of yours you discovered were experiencing drug related problems by ticking the appropriate response.

| | | | | | | |
|----|---|--|--|--|--|--|
| 5. | Implemented a strategy to resolve (or prevent) drug related problem. | | | | | |
| 6. | Follow up on patients to evaluate their progress towards the drug therapy objectives. | | | | | |

Part B. Exploring the awareness of pharmaceutical care

| Question | The Respondent | Yes (1) | No (0) |
|----------|--|------------|-----------|
| 7. | Have you heard about the concept of pharmaceutical care? | | |

| Question | The Respondent | Always (2) | Sometimes (1) | Never (0) |
|----------|---|---------------|------------------|--------------|
| 8. | How often do you try to provide pharmaceutical care to your patients? | | | |
| 9. | How often do you make psychological commitment and effort required to improve their outcome? | | | |
| 10. | How often do you inquire of patient's satisfaction with your services in order to evaluate your work? | | | |
| 11. | How often do you participate in higher educational programs to maintain and improve your competence? | | | |
| 12. | How often do you provide general medical information to patients? | | | |

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Design & Implementation Of Fire Fighting Robot Using Wireless Camera

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Abstract- This paper shows how to overcome from the fire disaster problems. Now a day's fire disaster can occur at any place and anytime with a huge loss of lives, products and materials. As we all know robots are intelligent machines that can be controlled as per need. Robot makes work more easier, save time and save man power. Formerly robots are not much used but now a day's robots are used in many industries for manufacturing, packaging, testing etc. To overcome this loss we can use robot which called as 'Fire Fighting Robot'. With the help of this robot we can save many lives, products and materials. The robot will detect fire and start his work for which it was made. In industries we can use such robots to prevent fire, damage and loss. Instead of human we can use robot so it will become more easier to go closer to the fire. To improve the safety precautions in industries, 'Fire Fighting Robot is essential'.

Index Terms- Remote control, Sensors, Wireless camera, Arduino uno.

I. INTRODUCTION

The purpose of this paper is to develop 'Fire Fighting Robot Using Wireless Camera' to extinguish fire. In this project we have construct a robot which can be controlled using android application to control the actions of robot. The development and conduct of this robot is completely controlled by the programmable Arduino Uno. All types of flag gotten by the arduino uno will be prepared and executed to achieve the mission of the robot. Robot will screen the work zone by performing arbitrary developments, it as an elective medium utilized by people, particularly the fire fighter to battle fire. We have used two arduino uno in this robot. One arduino uno is used to control motor driver circuit. This arduino uno is connected to bluetooth module to communicate between android device and robot. This communication takes place using android application. Which transmit signals to receiving bluetooth module. This bluetooth module gives the input to arduino uno which provides input to the motor driver circuit & starts the motor as per their received input. Another arduino uno is used for water pump to extinguish fire. In this circuit we have used three sensors which is connected to arduino uno. This sensors are digital sensors and used as a input to arduino. We have used relay to control the water pump. The movement of this water pump is 0 to 180° with the help of metal gear servo motor. The movement of the servo motor is controlled

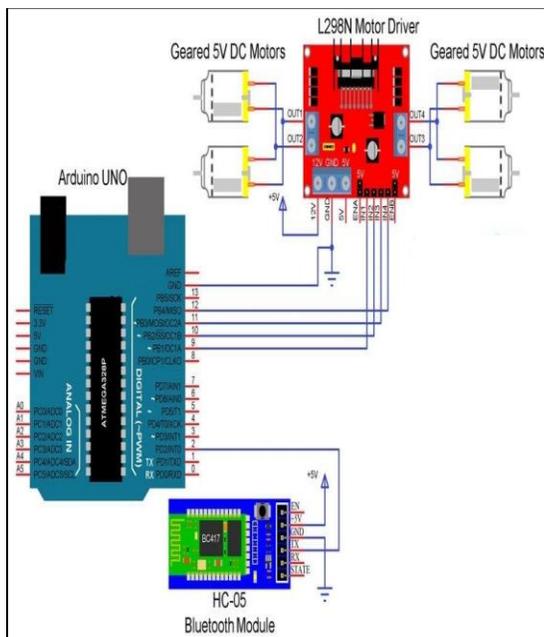
by arduino. The water pump will cover 2 meter range so there is no need to go in fire.

We have used wireless camera for live streaming which will show the live location where the actual fire is, so we can move our robot in that direction. It is the brownie point and plays a important role so the handler can see where the fire is and how much it is. In industries it will be more helpful for saving human lives, materials and products. A fire fighting robot will decrease the need of fire fighters to get into dangerous situations. Further the robot will reduce the load of fire fighters. It is impossible to extinguish fire and rescue many victims at a time of huge disaster. Robot technology can be very efficiently used in such cases to rescue much more victims. Thus robotics makes human life easier and safe as well as save a lot of time(1). The respective objectives for the problem stated above the first objective is to make utilization of robots is one of the elective routes for decreasing fire fighters hazardous life and upgrading fire fighters abilities.

The 'Fire Fighting Robot' is a futuristic robot which is made for security. In case of emergency the 'Fire Fighting Robot' comes in picture. The camera which we used will show live streaming of fire. And our robot will move towards the direction of fire to prevent it. The sensor which we used will sense the fire and then water pump will start to extinguish fire.

II. HARDWARE DESIGN

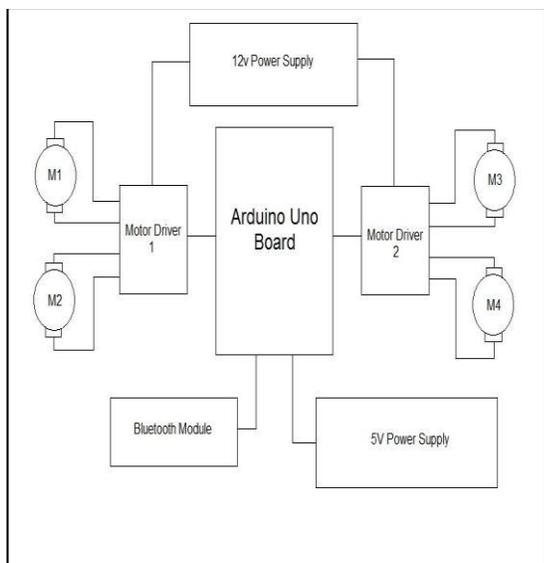
In this section we are presenting the hardware part which we used for this robot.



Above circuit is a driver circuit which is used to drive the robot and this robot is control by android application. As shown in fig arduino uno is used to control motor driver circuit. This arduino uno is connected to bluetooth module to communicate between android device and robot. This communication takes place using android application. Which transmit signals to receiving bluetooth module. This bluetooth module gives the input to arduino uno which provides input to the motor driver circuit & starts the motor as per their received input.

The arduino uno is connected to motor driver and motor driver is connected to DC motors as shown in fig.

Arduino uno and bluetooth module is powered with 5V supply and motor driver is powered with 12V supply.



A. Arduino Uno

The Arduino Uno R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can

be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program. The Arduino has an extensive support community, which makes it a very easy way to get started working with embedded electronics

B. L298N Motor Driver

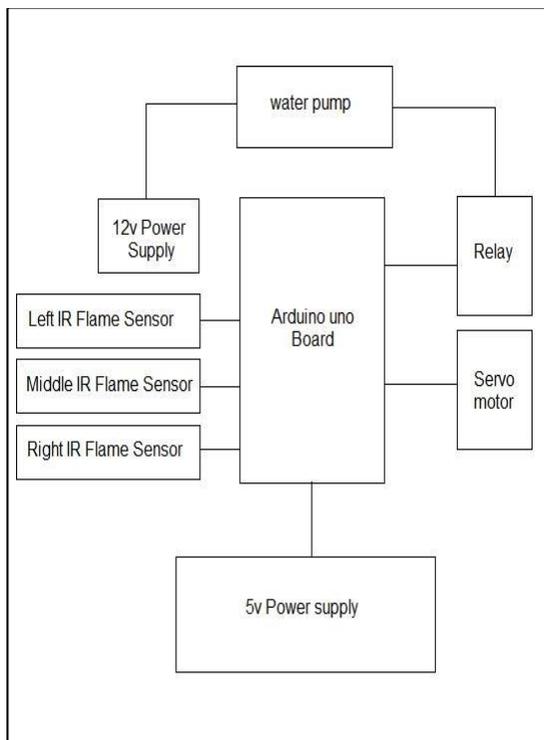
Double H driver module uses ST L298N dual full-bridge driver, an integrated monolithic circuit in a 15-lead Multiwatt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the input signals. The emitters of the lower transistors of each bridge are connected together and the corresponding external terminal can be used for the connection of an external sensing resistor. An additional supply input is provided so that the logic works at a lower voltage.

C. DC motor

A DC motor is a mechanical rotating device which converts electrical energy into mechanical energy. DC gear motor is a combination of DC motor plus a gearbox (motor reducer) in order to reduce the speed (RPM) of the motor, with a corresponding increase in torque. The planetary motor performance is stable and can be used in high torque environments. outer diameter 20mm planetary gearbox is equipped with outer diameter 21mm DC motor, it can be customized with torque, material, shaft, gear ratios,

D. Bluetooth Module

Controlling an Arduino using a smartphone, let's take a closer look at the HC-05 Bluetooth module. Comparing it to the HC-06 module, which can only be set as a Slave, the HC-05 can be set as Master as well which enables making a communication between two separate Arduino Boards. There are several different versions of this this Arduino but I recommend the one that comes on a breakout board because in that way it's much easier to be connected. The HC-05 module is a Bluetooth SPP (Serial Port Protocol) module, which means it communicates with the Arduino via the Serial Communication.



A. Relay

A relay is nothing but a switch which is operated by an electromagnet. The electromagnet requires a small voltage to get activated which we will give from the Arduino and once it is activated, it will pull the contact to make the high voltage circuit

B. Servo Motor

The Servo Motor basically consists of a DC Motor, a Gear system, a position sensor and a control circuit. [The DC motors get powered from a battery and run at high speed and low torque.](#) The Gear and shaft assembly connected to the DC motors lower this speed into sufficient speed and higher torque. The position sensor senses the position of the shaft from its definite position and feeds the information to the control circuit. The control circuit accordingly decodes the signals from the position sensor and compares the actual position of the motors with the desired position and accordingly controls the direction of rotation of the DC motor to get the required position. The Servo Motor generally requires DC supply of 4.8V to 6 V.

C. Flame Sensor

A Flame Sensor is a device that can be used to detect presence of a fire source or any other bright light sources. There are several ways to implement a Flame Sensor but the module used in this project is an Infrared Radiation Sensitive Sensor.

III. RESULT

In today's world fire fighting is a dangerous issue there are many chances of losing. The robot is constructed to extinguish fire and it is fully autonomous. Fire Fighting Robot are ran through many tests like flame detection, running of servo motor, pressure of water pump, transmission and reception of bluetooth module.

The robot is sensing the fire and water pump is extinguishing the fire. Motor driver driving the robot smoothly and as per given directions. Wireless camera is giving live streaming. The robot was successfully accomplished with all the test.

IV. CONCLUSION

Implemented sensors are used to sense temperature so that device itself can protect from heat and focus water pressure on fire. Camera installed on robot will send live video streaming which could be seen on mobile screen through Bluetooth. Water pump will be focussed depending on heat sensed by sensors.

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