International Journal of Scientific and Research Publications

GENERAL INFORMATION:

ONLINE VERSION
http://www.ijsrp.org/e-journal.html

PRINT VERSION (E-book)
http://www.ijsrp.org/print-journal.html

All the respective authors are the sole owner and responsible of published research and research papers are published after full consent of respective author or co-author(s).
For any discussion on research subject or research matter, the reader should directly contact to undersigned authors.

COPYRIGHT
Copyright©2016 IJSRP.ORG

All Rights Reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as described below, without the permission in writing of the Publisher. Copying of articles is not permitted except for personal and internal use, to the extent permitted by national copyright law, or under the terms of a license issued by the national Reproduction Rights Organization.

All the published research can be referenced by readers/scholars/researchers in their further research with proper citation given to original authors.

DISCLAIMER
Statements and opinions expressed in the published papers are those of the individual contributors and not the statements and opinion of IJSRP. We assumes no responsibility or liability for any damage or injury to persons or property arising out of the use of any materials, instructions, methods or ideas contained herein. We expressly disclaim any implied warranties of merchantability or fitness for a particular purpose. If expert assistance is required, the services of a competent professional person should be sought.

Contact Information:
Editor: editor@ijsrp.org
Website: http://www.ijsrp.org
Table of Contents

The Rule of Law, Transitional Justice and Human Rights: Lessons Learnt Following the 2007-2008 Post Election Violence in Kenya, the 2013 and 2017 Elections and the Role of the Judiciary, as the Country Prepares for yet another Election on 26th October 2017 ................................................................. 1

Dr. Scholastica Omondi ........................................................................................................................................ 1

The Exquisite Life of a Dominant Eagle ......................................................................................................................... 15

Saulo A. Alinsunod ...................................................................................................................................................... 15

IP Spoofing & its Detection Techniques ........................................................................................................................... 24

HINNA HAFEEZ, TAYYABA KHALIL .................................................................................................................................. 24

Mapping Trees Outside of Forests Using Remote Sensing ................................................................................................... 27

Md. Abdus Salam and Md. Abu Taleb Pramanik ............................................................................................................. 27

Relationship between Entrepreneurial Knowledge and Strategic Orientation ............................................................... 37

P.G.M.S.K. Gamage, W.M.P.G.C. Weerakoon .............................................................................................................. 37

Learning Plan of SM-3T Teachers in Tule Village, East Melonguane Timur Subdistrict, Talaud Islands, North Sulawesi - Indonesia  ............................................................................................................................. 42

IrmaDjanapaBulow, FientjeOentoe, SanusiGugule and JohannisSenduk ............................................................................. 42

Investigating the effect of Technology Adoption towards the Continuance of Broadband Intention in Malaysia ..................................................................................................................................................... 48

Abdul Rahman Bin Mohamad Saleh, Mustakim Bin Melan, CheSobry Bin Abdullah ........................................................................ 48

Study on the effective factors on the employer, employee relationship for the motivation of associate level employees at ABC hotel, Colombo ........................................................................................................... 59

Pamuditha Harshani Samarasinghe ...................................................................................................................................... 59

Factors Affecting Bank Lending Growth: Cases In Indonesia ................................................................................................... 69

Maulana Yasnur, Augustina Kurniasih .................................................................................................................................. 69

Analysis of Pseudorange-Based DGPS after Multipath Mitigation ...................................................................................... 77

ThilanthaDammalage ..................................................................................................................................................... 77

Evaluation on Satellite Laboratory Network (SLS) in the District of Badulla District of Sri Lanka ............................................. 85

Dr A. M. S. Bandara/ Dr. H. K. M. M. B. Kavisekara / Dr N S Gamagedara .............................................................................. 85

Ethnic identity and Psychological Well-Beingof Adolescents-Refugees: A qualitative study of Ethnic Hazaras in Bogor(Indonesia) ........................................................................................................................................ 98

Dana RiksaBuana, Regina NaviraPratiwi ................................................................................................................................ 98

Compliment and Compliment Responses: A Comparative Study between Dari and English Native Speakers .................................................................................................................................................. 104

Mohammad Akmal Saifi, Syed Sakhi Ahmad Sultani .......................................................................................................... 104
The Impact of the “Internet of Things” On Value Creation for Stakeholders..................................................113
    Dr. A. Seetharaman, Nitin Patwa, A.S.Saravanan, Ashok Anand.................................................................113

The Influence of Time-Varying Property of Market Based Risk on Bank Stock Returns: GLS and GARCH Approach..........................................................124
    Isaac Mwaurah, Prof. Willy Muturi, Prof. Anthony Waititu.................................................................124

Elliptic Curve Digital Signatures and Their Application in the Bitcoin Crypto-currency Transactions.......135
    B. K. Kipkirui.............................................................................................................................................135

Theory on Dimensions.................................................................................................................................139
    Sohom Gupta.............................................................................................................................................139

Optimization of Damper System Design for Pounding of High-rise Buildings........................................153
    Thae Mon Zaw, Kay ThweTun..............................................................................................................153

Effects of Teenage Pregnancy on Academic Progression of Girls in Primary Schools in Ainamoi Sub County, Kericho County.................................................................166
    Edwin Kimutai Maritim, Dr. Viviline Ngeno, Dr. Hellen Sang.............................................................166

The Contribution of Parenting Characteristics on Pupils Academic Achievement in Public Primary Schools in Bungoma North Sub-County, Kenya.......................................................172
    Barasa Alfred Mucha, Jason E. Nganyi, Pamela Buhere........................................................................172

Family Factors and Women Entrepreneurial Motivation in Nigeria: A Survey of Selected Women Entrepreneurs in Kogi State.................................................................183
    Abeh, Aondoseer, Umar Kadiri & Odekina A. Felicia ...........................................................................183

Land Cover Change Analysis with Special Reference to Forests and Paddy Wetlands of Neyyar and Karamana River Basins, Kerala, SW India Using GIS and Remote Sensing..................................................190
    A. Krishnakumar, Revathy Das and Dhanya.T. Dharan........................................................................190

MGNREGA and Its Role in Rural Development.........................................................................................198
    Roshni Pandey...........................................................................................................................................198

Financial Accessibility of Women Entrepreneurs.....................................................................................203
    M.H.J.Chamani, K.M.M.C.B.Kulathunga, T.G.A.H.C.Amarawansa.........................................................203

Evaluation of Home Sanitation System in Tidal Areas , A Case Study of Kemijen Village, Semarang, Indonesia........................................................................................................................................208
    IM. Tri Hesti Mulyani, Etty Endang Listiati, B.Tyas Susanti, Djoko Suwarno............................................208

Nature Of Media Policies Protecting Children Against Harmful Television Content In Kenya................219
    Samson Guantai Raiji.....................................................................................................................................219

Automatic Question and Answer Generation from Course Materials......................................................224
    A.S.M Nibras, M.F.F Mohamed, I.S.M Arham, A.M.M Mafaris, M.P.A.W Gamage......................................224
Feasibility of partial replacement of discarded filamentous green seaweed (Cladophora) with commercial feed in spotted scat (Scatophagus argus) culture. ................................................................. 232
  Nguyen Thi Ngoc Anh, Huynh Ly Huong, Tran Ngoc Hai, Ly Van Khanh ............................................... 232

Dietary Pattern among Coronary Heart Disease Outpatients Attending Ahmed Gasim Hospital at Bahri Locality, Khartoum North. ........................................................................................................... 241
  Somiya Gutbi Salim Mohammed, Nagwa B. Elhag ............................................................................. 241

Economical and Optimal Gas Leakage Detection and Alert System .......................................................... 260
  Abhishek Gupta ................................................................................................................................. 260

Locus of Control and the Acceptance of Dysfunctional Audit Behavior in a Review of Philosophy Semar ................................................................................................................................. 264
  Yoosita Aulia, Arsono Laksamana, Basuki ...................................................................................... 264

Construction of Double Gene Expression Vector ....................................................................................... 270
  K. Mary Manjusha Rani, Dr. Raj Kumar .............................................................................................. 270

A Study of Clinical Profile with High Sensitivity C-Reactive Protein and Lipid Profile in Coronary Artery Disease .......................................................................................................................... 277
  Dr. Mohammad Ghouse Shaik, Dr. Anbazhagan G, Dr. V. S. Mohamed Al Ameen .......................... 277

A comparative analysis and review of OTP Grid Authentication Scheme: Development of new scheme ........................................................................................................................................ 282
  Benedicto B. Balilo Jr, Bobby D. Gerardo, Ruji P. Medina ................................................................. 282

The impact of hill training on middle and long distance athletes: with specific reference to oromia water works athletics club, Ethiopia ........................................................................................................ 287
  Nigatu worku and Dr. Aschenaki Taddese ......................................................................................... 287

Good Governance of Sport Organizations: With Special Reference to Ministry of Sports, Colombo, Sri Lanka ............................................................................................................................................ 299
  Imalka Madhushani, Chamila Wijethisa ............................................................................................... 299

Prevalence of Lower Urinary Tract Symptoms (LUTS) among general population of Central Sri Lanka ............................................................................................................................................ 307
  AUB Pethiyagoda, K Pethiyagoda ........................................................................................................ 307

Sexual Exploitation by UN Peacekeeping Forces: A Feminist Analysis of the Gender and Class ......................................................................................................................................................... 312
  Reham M. El Morally ............................................................................................................................ 312

A Survey in Recent Trends and Techniques in Image Segmentation ............................................................. 319
  Raj Kumar Sah, Pratiksha Gautam, Saniul Ahsan ............................................................................. 319

Computer Password Practices and its Awareness among students - A Case Study at the Jigme Namgyel Engineering College (JNEC) ........................................................................................................ 325
  Jamyang Tashi, Tashi Wangchuk ........................................................................................................ 325
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microbiological Quality of Raw Milk at Selected Chilling Centers in Anuradhapura District of Sri Lanka</td>
<td>328</td>
</tr>
<tr>
<td>H. M. I. G. A. M. K. Senarath and A. M. J. B. Adikari</td>
<td></td>
</tr>
<tr>
<td>DEVELOPMENT OF ALOE VERA (Aloe barbadensisMiller) INCORPORATED DRINKING YOGHURT</td>
<td>334</td>
</tr>
<tr>
<td>W.M.A.S. Wijesundara and A.M.J.B. Adikari</td>
<td></td>
</tr>
<tr>
<td>EXAMINING LEADERSHIP STYLE ON EMPLOYEE PERFORMANCE IN THE PUBLIC SECTOR OF GHANA</td>
<td>343</td>
</tr>
<tr>
<td>Ebenezer Malcalm, Stephen Tamatey</td>
<td></td>
</tr>
<tr>
<td>Determination of Tolerance and Sensitivity of Some Selected Plants to Air Pollution along Major Roads in Obio-Akpor (Port Harcourt) Nigeria Using Air Pollution Tolerance Indices</td>
<td>362</td>
</tr>
<tr>
<td>Udeagbala, T. N.;Agbagwa, I. O.;Tanee, F. B. G.</td>
<td></td>
</tr>
<tr>
<td>Determinant of Executive Remuneration in the Indonesian Banking Sector</td>
<td>379</td>
</tr>
<tr>
<td>Arif Harmano, Lukytawati Anggraeni, Imam Teguh Saptoto</td>
<td></td>
</tr>
<tr>
<td>Impact of Proprioceptive Exercises Post ACL – Reconstructive Surgery</td>
<td>386</td>
</tr>
<tr>
<td>Dr.S.S.Subramanian</td>
<td></td>
</tr>
<tr>
<td>Flexural Strength of Concrete beam using Hospital Waste Ash as replacement</td>
<td>391</td>
</tr>
<tr>
<td>Sabo Bala, Hassan Abba Musa</td>
<td></td>
</tr>
<tr>
<td>Analysis of Customer Churn prediction in Logistic Industry using Machine Learning</td>
<td>401</td>
</tr>
<tr>
<td>Pradeep B, Sushmitha Vishwanath Rao and Swati M Puranik, Akshay Hegde</td>
<td></td>
</tr>
<tr>
<td>Assessment of knowledge and risk factors of hypertension among school teachers in a selected district in North Central Province of Sri Lanka</td>
<td>404</td>
</tr>
<tr>
<td>L.A.D.N.L.Wijayathunge, U.P.K.Hettiaratchi</td>
<td></td>
</tr>
<tr>
<td>A Case Study of the Kithulgala Adventure Base Camp, whitewater rafting: Standards and Risk Management</td>
<td>409</td>
</tr>
<tr>
<td>Aluthge I.M., Liyanage D.L.S.M.</td>
<td></td>
</tr>
<tr>
<td>Factors affecting fairness of Taxation on Category “B” Taxpayers in Tercha City, Dawuro zone, SNNP of Ethiopia</td>
<td>415</td>
</tr>
<tr>
<td>AfeworkAsfawAmele, WondaferahuMulugetaDemissie, EndegTekalegnWolde</td>
<td></td>
</tr>
<tr>
<td>PREVALENCE &amp; MANAGEMENT of HEADACHE &amp; its ASSOCIATED FACTORS among FEMALE UNDERGRADUATE PHARMACY &amp; NON-PHARMACY STUDENT POPULATION of LAHORE COLLEGE for WOMEN UNIVERSITY, LAHORE</td>
<td>424</td>
</tr>
<tr>
<td>Minahil Tahir, Rafia Mubashir, Dr. Fatima Amin</td>
<td></td>
</tr>
<tr>
<td>SEASONAL VARIATION OF PREY DENSITY OF LARGE PREDATORS IN SATKOSIA TIGER RESERVE, ANGUL, ODISHA, INDIA</td>
<td>436</td>
</tr>
</tbody>
</table>

www.ijsrp.org
Bottle Gourd Plant Tendril—Role of Electric Charge in Rapid Contact Coiling

S.P. Dhir

Parikrama: A spiritual walk to celebrate the Agricultural Harvest in Hindu Religious Cities

Ar. Madhavendra Pratap Singh, Dr. Vandana Sehgal

An Examination Factors Influencing Underpricing of IPOs in Financial and Manufacturing Industries on The Indonesia Stock Exchange over The Period of 2011-2016

Muhamad Rexy Aji Mahatidana, Irni Yunita

The Analysis of Influence of Job Stressor upon Performance and Turnover Intention of Broker–Dealer of Equity Securities Companies in Surabaya

Bambang Hadi Santoso, Siti Sulasmii Irawan, Dwi Ratmawati, Sasi Agustin

The Influence of Job Satisfaction, Leadership, and Leader-Member Exchange on the Employee’s Intention to Quit in PT. Pamapersada Nusantara Banjarmasin

Meiske Kristin Lumanauw, Siti Sulasmii

Comparative Analysis of Trading-Volume Activity and Abnormal Return Before and After Stock Split

Sasi Agustin, Bambang Hadi Santoso, Alfian Dody Firmansyah

Effect of Reference Electrode Placement on Measuring CVEMP – Preliminary Study

Prashanth Antony, Deepika Jayachandran, Anitha Selvaraj, Sri Ranjani, Aishwariya

Energy Conservation Opportunities & GHG Reductions in Textile Cluster

Mehjabin Z. Shaikh

THE INFLUENCE OF ORGANIZATIONAL CULTURE WITH EMPLOYEE ENGAGEMENT ON PERFORMANCE

M.R. Hazriansyah, M Syamsul Maarif, Sadikin Kuswanto

Identification, Drymass and Spore Count of Entomopathogenic Metarhizium Fungi from Infected Insects

Nyo Zin Hlaing, Weine Nway Nway Oo

Psychological Health, Conflict Resolution and Marital Adjustment among Married Women

Sehrish Arif

Applying Grey Model and DEA for the Productivity Evaluation of Vietnamese Hydropower Industry

Chia Nan Wang, Xuan Tho Nguyen

Entrepreneurial intentions among undergraduate students in university of Jaffna

Mr. Logendran Mayuran

A Psychological Analysis of Employees’ Stress related to Job Satisfaction in Employees Trust Fund Board

Wasana Hansamali Wijenayaka
Fire Disaster Preparedness and Response among the Residents and Sugarcane Farmers in the Mumias Sugar Belt Zone in Western Kenya

Mukhwana Laura Nasimiyu, Wakhungu, J.W, Omuterema, S

552

Theory of Securitization to Counter Ebola: The Nigerian Approach

Tasew Tafese

561

Sentiment Analysis Algorithm

RUTUL BAKULKUMAR PANDYA

570

STRATEGY TO GROWTH AN EXCELLENCE COMPETITIVENESS IN BROILER CHICKEN BUSINESS

Soerjo Rahardjo, M. Parulian Hutagaol, Anggraini Sukmawati

593

ASSESSMENT OF THE CONTRIBUTION FIREWOOD CONSERVATION STOVE INSUSTAINABLE USE OF WOOD FUEL ENERGY IN EMBU NORTH SUB –COUNTY, KENYA

Janet Wangari Kariuki, and Dr. Jane Mutinda

599

ACADEMIC ACHIEVEMENT AMONG YOUTH OF JAMMU

Neeru Sharma, Meenakshi Anand and Harpreet Kour

606

Study on Domestic Violence in Infertile Women

Dr. Niranji, S, Dr. Jayanthi, Dr. Nishanthini

621

“Book Catcher”: An Automated Navigation Application to help search and find books in a library


625

SaveMORE: An Automated System to Reduce Food Wastage in the Field of Hospitality


647

Stylistics Analysis on Poem “Trees” Joyce Kilmer

Jomel B. Manuel

655

Repair Strategies on Spoken Discourse

"Jervis Canonio, Rachelle Nonato, Jomel B. Manuel"

662

Study of Risk Factors of Mild Cognitive Impairment in Patients with Type 2 Diabetes Mellitus

Modugula S Naga Swetha, Srinivasa S.V, Abhishek Kumar Verma, Prabhakar K

672

Evaluation the Effect of Different Surface Treatment on Shear Bond Strength between Composite Increments

Zuha Ayad Jabber

676

TAX AWARENESS AND PERCEPTION OF TAX PAYERS AND THEIR VOLUNTARY TAX COMPLIANCE DECISION: EVIDENCE FROM INDIVIDUAL TAX PAYERS IN SNNPR, ETHIOPIA

Niway Ayalew Adimasu, Wondwossen Jerene Daare

686
African Partisan Politics and Its Implication to Moral Behavior of the Contemporary Youth, a Case Study of Sokoto Central of Nigeria

Sulaiman Garba Abubakar

Blind Guider: An IT Solution for Visually Impaired People


Microbial Quality and Sensory Assessment of Yogurt Marketed in Akure Metropolis, Nigeria

Adebisi Olabisi O., Oyetayo Victor O., Ajayi Kehinde O.

Determinant of higher education institutions on promoting students entrepreneurship across discipline:
Evidence from Dire Dawa, Haramaya and Adama University

Hailay Aregawi Hagos, Yeshalem Abadi
The Rule of Law, Transitional Justice and Human Rights: Lessons Learnt Following the 2007-2008 Post Election Violence in Kenya, the 2013 and 2017 Elections and the Role of the Judiciary, as the Country Prepares for yet another Election on 26th October 2017

Dr. Scholastica Omondi
Lecturer, Department Of Public Law, School Of Law, The University Of Nairobi, Kenya

Abstract- Transitional Justice is the full range of Judicial and non-judicial processes and mechanisms that assist a society to address past human rights abuses, victims’concerns and accountability, justice and reconciliation, while strengthening the rule of law. This paper adopts the United Nations’ approach to transitional justice that looks at the full range of a society’s attempt to address past human rights violations. The UN approach to transitional justice ensures accountability on the part of the perpetrators, the search for the truth, justice and reparation for the victims. In addition, the approach advocates for the reconciliation of the entire society. Within this context, courts have an important role in ensuring transitional justice by upholding the rule of law, addressing victims’ concerns and punishing offenders, while ensuring that the penal approaches aim at restoring the peace that existed before the conflict.

This paper explores how the Kenyan courts can play an effective role in the transitional justice process, following the 2007/2008 post-election violence that left thousands of Kenyans dead, several displaced and property worth millions of shillings destroyed. The subsequent elections in 2013 left many Kenyans confused and in doubt as to the ability of the supposedly reformed judiciary to effectively handle presidential disputes impartially and independently. The August 2017 Presidential election that was annulled by the Supreme Court has further deepened the political and ethnic divisions in the country. The paper discusses lessons learnt from the 2007, 2013 and 2017 elections and explores mechanisms such as special tribunals, special courts, local courts and traditional methods of justice that the judiciary can utilize in addressing the post-election violence concerns that remain as painful wounds afflicting many Kenyans. Also discussed is the dichotomy of praise and disappointment with the performance of the Supreme Court in the 2013 and August 2017 Presidential dispute resolutions. The lessons learnt may assist the Judiciary in the preparation for any possible violence in the coming elections in October 26th 2017 in Kenya.

The paper concludes that the Kenyan Judiciary, in exercising judicial authority on behalf of all Kenyans, has a constitutional duty to uphold peace, unity, human rights, equality, freedom, democracy, social justice and the rule of law. If the Judiciary asserts its impartiality and independence, remains accountable to the people of Kenya, on whose behalf they exercise judicial authority, and not the political class, the injustices caused by the previous election violence should be addressed to the satisfaction of all affected. In addition, the Judiciary has a duty to ensure that Kenya does not witness any form of election violence ever again.

Index Terms- election, human rights, transitional justice, rule of law, violence

I. INTRODUCTION

This paper focuses on the important role of the judiciary in dispute resolution, against the background of the low levels of confidence in the courts in Kenya, during the period preceding the 2007 general elections and currently high confidence levels following the Supreme Court’s nullification of the August 2017 Presidential election.

According to CIPEV¹, the Kenyan judicial system has for along time been vilified for its failure to effectively discharge its vital function in the democratic governance of Kenya. The report found that of the three arms of government, namely the judiciary, executive and the legislature, the judiciary is least understood and therefore remains a mystery to the citizens who depend on it to settle disputes amongst themselves and with the government. The first lesson therefore is that the Judiciary needs to unravel the mystery that characterizes the institution. One way of doing this is to interact more with the public and conduct public education on the role of the judiciary in dispute resolution. This must be a deliberate effort conducted to cover the entire country. Where necessary, such awareness programs need to be conducted in the language that each community understands best, including the local languages. The exercise must involve the existing administrative structures at the lowest level of government. This will ensure that every Kenyan has an opportunity to understand and ask questions on the important role of the ‘mysterious’ arm of the government. It is important that this role is undertaken by judicial officers, namely judges and magistrates, not support officers. Judicial officers must be seen as the real face of the

judiciary. The judiciary has so far taken steps through its transformative agenda to open up to the public. This includes conducting judiciary open days and engaging the public through the court users’ committees. This is a step in the right direction, however it is not sufficient and public education on the role of the judiciary is a powerful tool that empowers the citizens and enhances their knowledge on the functions of the judiciary. This has the positive effect of enhancing citizens’ participation in the process of dispute resolution that is key in electoral violence management and prevention.

The second lesson learnt is that long before the 2007-2008 post election violence erupted in Kenya, the public confidence and trust in the judiciary had gradually dropped over a long period of time. The low levels of confidence and trust by the public in the courts then, was also attributed to the perception that as an institution, it was not independent, even though some of its members were seen to be independent in their decision making. The CIPEV report concluded that it was due to the public perception of the lack of independence of the judiciary, that “…The leadership and members of the Orange Democratic Movement (a political party whose presidential candidate disputed the presidential election results), refused to submit to the jurisdiction of the courts to resolve the dispute that arose after the 2007 general election, in relation to the Presidential results.”

Public confidence in an institution is so important that all efforts must be geared towards building and maintaining the same. The Judiciary must therefore explore ways of establishing what factors contributed to the gradual decline of public confidence in the institution. Understanding of such factors is important so as to adequately address them. In addition it is the only way of ensuring that the mistakes are not repeated. One of the ways of doing this is through an academic research that shows the nature and trend in public confidence in the Judiciary over the last couple of years, explanations for the same and recommendations to deal with the concerns raised by the research findings. The second way is through frank public engagement that may take many forms.

The third lesson learnt is that a judicial system characterized by delays in the administration of justice and non-transparency in its functions is a ticking time bomb that only requires a catalysts’ reaction to be rejected by the public. This is a recipe for disaster, anarchy and breakdown of the rule of law. The fact that Kenyans resorted to the streets instead of filing the disputed 2007 presidential election in court was a major indictment on the judiciary for failing to play its role in the democratic governance of the country. The CIPEV report noted that violence had been a part of Kenya’s electoral system during the one party rule, increasing after the restoration of the multi-party politics in 1991. Whereas the election violence before 2007 preceded the elections, much of the 2007/8 election violence followed after the elections and affected almost the entire country, in both rural and urban areas. The state security agencies failed to contain the violence, which spread fast in most parts of the country. The CIPEV report found that individual members of the state security took part in gross violations of citizens’ human rights and acts of violence. Although much of the 2007/2008 violence was spontaneous in some parts of the country, it was shocking that the violence was a result of planning and organization in some areas often by politicians and business leaders. In some areas, what began as spontaneous protest of perceived rigged election degenerated into well organized attacks by and against different ethnic communities divided along political party support lines. The big unanswered question is why a disputed presidential election degenerated into ethnic violence that overwhelmed the police due to the massive number of attackers and relative effective coordination of the attacks? Does the criminal justice system work as a system or some uncoordinated group of agencies and bodies that do not appreciate the need to work as a functioning system? Upon the declaration of the incumbent president as the president-elect, opposition supporters protested by demonstrating on the streets in Nairobi, Kisumu and Mombasa, but this was met by heavily armed police force that violated several rights of citizens exercising their constitutional right. At least 24 people are reported to have died including a six months year old, Baby Pendo in Kisumu, and a ten year old girl in Nairobi. No criminal charges have been preferred against the perpetrators. The Attorney General, the chief legal adviser to the government and protector of public interest, who doubles up as a member of the judicial service commission has not discharged his functions in this respect.

There is need for the Judiciary and other criminal justice agencies’ work to be coordinated as the country prepares for the 26th October 2017 presidential elections. Violence related to elections can be addressed only through strict application of the relevant laws, coordinated work of the criminal justice system and eventual punishment of convicted individuals. Coordination includes capacity building of all criminal justice officers, availability of resources, early warning systems and measures, prevention, preparedness, management strategies and mitigation of any negative outcomes amongst other measures. The Judiciary must take the lead in this respect as the arm of government charged with dispute resolution. One way of doing this is through the Judicial Service Commission, whose membership comprises the Attorney General as the chief legal adviser to the government. One of the functions of the Judicial Service Commission is to set up specialized courts. This is discussed later in this paper.

The fourth lesson learnt concerns the presidential powers and the control of the country’s resources and allocation of the same. One argument advanced by the CIPEV report is that since independence, the presidency has been associated with advantages for the president’s ethnic community, due to the immense power that the president held under the old constitution, in terms of appointments to key government positions, whose holders determined other government appointments and resource allocation. Subsequently, the ethnic background of the President and political allegiance to the political party of the president were perceived to determine development in different regions in the country.

---

2 Ibid.
3 Ibid p xiii.

www.ijsrp.org
The big question to be answered is, whether the scenario changed under the new Constitutional dispensation. While appreciating the strengths of the Constitution 2010 in creating a devolved system of government and its benefit of ensuring that all the 47 counties are allocated revenue, it is important to point out that, there still exists glaring inequalities between counties, especially in terms of allocation of resources. The variables and processes used to determine how much resources should be allocated to each county are questionable, not transparent and lack accountability mechanisms. They fail to take into consideration the different levels of development stages each county was at the onset of the devolved system of government. As a result, development inequalities still exist between counties. In addition, development projects controlled and managed by the central government seem to benefit mostly regions of the country that are perceived to support the political party allied to the President. In contrast, areas perceived to be sympathetic to the opposition party are not as developed as areas perceived to support the President.

The Presidency is thus still powerful and determines where development takes place in Kenya. This is more evident since the county governments do not have power to enter into bilateral agreements with donors, but must do so through the central government. The argument is that the county governments are not independent entities, but must operate under the authority of the central government. In effect therefore, not much changed with the new constitution in terms of the President’s control of resources and their allocation, a factor that is proven to make the presidency very competitive, as it is viewed as an important factor and determinant in uplifting the standard of living in Kenya. In this respect, the CIPEV report concluded that:

“...The 2007/2008 post election violence was more than a mere juxtaposition of citizens-to-citizens opportunistic assaults. These were systematic attacks on Kenyans based on their ethnicity and political leanings. Attackers organized along ethnic lines, assembled considerable logistical means and travelled long distances to burn houses, main, kill and sexually assault their occupants because these were of particular ethnic groups and political persuasion. Guilty by association was the guiding force behind deadly revenge attacks, with victims being identified not for what they did but for their ethnic association to other perpetrators. This free for all was made possible by the lawlessness stemming from an apparent collapse of the state institutions and security forces."

The big question is, where was the criminal justice system in the midst of all this? Did the perpetrators not fear being arrested, prosecuted and punished? The 2007/2008 post election violence plunged the country into chaos that replaced the rule of law to an extent that had never before been experienced. The effect was felt far and wide beyond the nation. Many African countries that neighbor Kenya were affected in different ways as some Kenyans sought refuge in those countries while supply of goods and services from Kenya to these countries were interrupted. The violence was not only a Kenyan affair, but an African concern as well. After the declaration of the presidential results following the August 2017 election, another round of post election violence affected the opposition strongholds. Does this have to happen after every five years that Kenyans go to the ballot box? The justice system must uphold the rule of law and protect citizens from electoral violence.

As Kenya prepares for the repeat election in August 2017, many are concerned about the possibility of election violence and the ability of the judiciary to contain the situation. The party primaries preceding the August 2017 election witnessed violent incidences in both major political parties. Unfortunately, the violence is associated with the major political affiliations in the 2007 election in which the incumbent president came from the same ethnic community as the current president, who is defending his seat, having been declared the president in the 2013 election, elected in the August 2017 election, but nullified by the Supreme Court. In all the 2007, 2013, the annulled August 2017 and now October 2017 elections, the main opposition party candidate is the same personality, coming from the same community. Does ethnicity play any role in Kenya’s electoral violence? Cases filed in court in which politicians are accused of inciting their supporters by use of ethnic language meant to incite one ethnic community against another have not been successful, often prematurely terminated or withdrawn. This is a clear indication of the lack of independence and impartiality of the entire criminal justice system, which appears not to be accountable to the people of Kenya, but to the political class.

The National Cohesion and Reconciliation Commission, established under the new constitution did little to reconcile Kenyans following the 2007 post election violence. Majority of Kenyans still bear the pain of past election violence. All agencies involved in the justice sector must work together towards a peaceful Kenya. At the center of this function is the Judiciary that must take its rightful position to ensure that the rule of law prevails. No politician should get away with incitement, hatred or other charges that threaten peace in Kenya. The Judiciary must save the country from acts of impunity by individuals who manipulate the system. Court decisions must be based on the law alone. Those who do not meet the requirements of leadership and integrity as stipulated by chapter six of the constitution should not use the courts to clear them to contest for public offices. Court records are public documents that ought to live the author. Judicial officers who bend the law to serve ethnic or political interests while sacrificing the rule of law and peace in Kenya, will be judged very harshly by history.

The fifth lesson learnt is that Kenya must establish strong institutions and solve its own problems as opposed to looking up to the international community. This is not to say that the international community has no role in Kenya. Far from it, Kenya needs the international community in many ways. However, Kenyans, more than anyone else understand the circumstances that lead to election violence and they know the planners and executors. They are affected directly by election violence. They must therefore take charge of their country and stop any attempts to cause electoral violence, which in any case only serves the interest of politicians. Kenyans must hold their leaders and politicians accountable for their action as envisaged by the Constitution of Kenya 2010.

Had Kenyans believed in their judicial system, there would have been no need to refer the prosecution of the six Kenyans, (Uhuru Kenyatta, then a Deputy Prime Minister and currently the President of Kenya, William Samoei Ruto, then the Minister of

---

5 ibid p xiv.
Agriculture and today the Deputy President, Joshua Arap Sang, then a radio journalist with Kass FM, Henry Kosgey, then a senior opposition leader, Francis Muthaura, then the Cabinet Secretary and Hussein Ali, then the Police Chief, suspected to bear the greatest responsibility for the 2007 post election violence to the International Criminal Court at the Hague. Uhuru Kenyatta, Francis Muthaura and Hussein Ali were perceived to be sympathetic to the then government of President Mwai Kibaki, while William Samoei Ruto, Joshua Arap Sang and Henry Kosgey were supporters of the opposition presidential candidate, Raila Amolo Odinga.

The referral of the six to the Hague only deepened the already existing tension amongst Kenyans, between the supporters of the then incumbent president and the opposition candidate. The country remained tense and divided along the two political alignments. Immediately upon being charged at the Hague, both Uhuru Kenyatta and William Ruto teamed up to contest for the posts of President and Deputy President respectively under one party against the opposition Presidential candidate, Raila Amolo Odinga in the 2013 presidential race. The outgoing president, Mwai Kibaki, supported Uhuru’s presidential bid. Uhuru Kenyatta was declared the winner of the 2013 presidential race amidst claims of rigging. Subsequently, the opposition candidate, Raila Amolo Odinga, filed a presidential dispute petition at the Supreme Court.

Unlike in 2007 when the opposition disputed the presidential election results, but refused to file their complaint in court for adjudication, in 2013, the opposition confidently filed Presidential Election Petition No. 5 of 2013 at the Supreme Court of Kenya, an institution created by the new constitution promulgated in 2010 as a result of reforms following the 2007 post election violence. The setting up of the Supreme Court and the appointment of new judges to fill in the vacancies, and the reformation of the electoral body gave hope to Kenyans about a more transparent, accountable electoral and judicial systems. The Supreme Court was seen and expected to uphold the rule of law, protect the values of the new constitution and ensure that their decision conforms to the values and principles of the new constitution.

At the time of the 2013 elections, the level of public confidence in the judiciary had risen as a result of the constitutional reforms and judicial reforms. As part of the accountability process and procedure, the expectation was that the Supreme Court would ensure that substantive justice is upheld and any procedural defects are cured. Such a procedure has the effect of making the court decision acceptable to all parties to the case, including the loser. Procedural justice and fairness are indeed the hallmarks of a just and fair court decision, for they are the steps that lead to a decision which determine its validity, acceptability and indeed legitimacy. This is important considering that the Supreme Court is the highest court of the land, its decisions are final and binding on the rest of the lower courts. It therefore technically makes law on behalf of the rest of the Judiciary in cases of presidential elections due to the exclusive nature of the jurisdiction.

In its ruling of the Election Petition No. 5 of 2013, the Supreme Court upheld the presidential election results as announced by IEBC, declaring Uhuru Kenyatta as the winner of the 2013 presidential election. Subsequently, Uhuru and Ruto, both being suspects facing charges at the Hague occupied the two most powerful seats in Kenya, controlling all the country’s resources. They were therefore able to mobilize resources towards the Hague trial, including services of the Attorney General, yet they had both been charged in their private capacities and not as President and Deputy President of the Republic of Kenya. This illustrates that despite the new constitutional dispensation, the Presidency in Kenya is still powerful and controls resources and their allocation.

Was there any benefit gained by referring the cases to the Hague? One great advantage was the fear of possible punishment of the suspects if found guilty. By the 2013 election, the feeling of ‘Big Brother is watching’ helped to deter election violence in Kenya as the cases of Uhuru Kenyatta and William Ruto were yet to be determined. Finally, however, all the six Hague suspects’ cases were terminated after a waste of resources, time and energy in the prosecution process. This has left the country as divided as it was when the cases were referred to the Hague. An important concern is that referring the 2007 post election violence suspects for prosecution to the Hague did little in terms of restorative justice for Kenya. Although the government of Kenya has paid monetary compensation to some victims, not all have received the money. In addition, the concept of justice for victims of crime goes beyond financial compensation that only addresses the material loss. What of emotional, psychological, mental, social and other concerns?

The trauma and resulting conflict, hatred and animosity associated with violence are yet to be addressed. As Kenyans prepare for subsequent elections, any associated electoral violence only adds up to the already existing feeling of despair due to the unresolved internal conflict experienced by victims of 2007 violence and the August 2017 violence at an individual and societal level. Left unresolved, this conflict continues to build up like pressure in a ‘pressure cooker’ without a release valve. Such ‘pressure’ must eventually find an escape route, but with destructive results. In this respect, the Judiciary, as the only arm of government tasked with justice administration needs to consider ways of professionally allowing the ‘pressure’ to be released from the ‘pressure cooker’ without any destructive effects. It may take a longer time, but the process is long overdue and should begin as a priority.

It is important to note that there are 44 ethnic communities in Kenya today. Since Independence in 1963, the country has had four presidents. The first was Jomo Kenyatta, the second, Daniel Arap Moi, the third, Mwai Kibaki and the current being Uhuru Kenyatta. The first and the fourth Presidents being father and son respectively, while the first, second and fourth Presidents are from the Kikuyu community. The second president is from the Kalenjin community. The August 2017 presidential race was still largely a competition between the incumbent, President Uhuru Kenyatta and Opposition leader, Raila Amolo Odinga who comes from the Luo community. It is the apparent dominance of the presidency by two communities as against the other ethnic communities that appears to be one of the major sources of discontent amongst Kenyans. Considering the perceived power and benefit associated with being from the President’s community or political alignment, it becomes clear why the Presidential race is a hotly contested seat in Kenya.
The Judiciary cannot ignore political alignments and ethnic tension as it carries out its role in nurturing a young democracy. Statements from the opposition party leaders that if the 2017 presidential election is “stolen” again, they will not go to the courts cannot be taken lightly. Such statement reveals a worrying state of low levels of public confidence in the judiciary. Although members of the Judiciary are Kenyans who belong to specific ethnic communities, in the discharge of their duty and exercise of judicial authority, they must rise above ethnic and political divisions, be impartial and steer the county towards a real and not perceived democracy. This calls for deliberate efforts by the Judiciary to uphold the rule of law and stay true to the allegiance of loyalty to the Constitution of Kenya, protecting the principles and values enshrined therein, for only then, will Kenyans trust the Judiciary again. In this respect, the Supreme Court is commended for upholding the rule of law by nullifying the August 2017 presidential election which was characterized by irregularities and illegalities. The Director of Public Prosecutions must now investigate and prosecute those who carried out the irregularities and illegalities.

As part of public confidence re-building in the institution of the judiciary, all judicial officers, including the Chief Justice, must desist from public pronouncements of whatever nature, in their judicial capacity, except when pronouncing their judgments/rulings. This is important considering the political alignments in the country currently and the ethnic divisions and existing tension. Any public statement by a judicial officer, not made while reading a court decision may be misconstrued to reflect the judiciary’s stand on an issue that may be brought to court for determination. It is also not uncommon for the public to develop perceptions and misconceptions about judicial officers making decisions, based on their ethnic background and political alignments. When this occurs, it erodes public confidence in the judiciary. It goes against the old age principle of law that justice must not only be done, but be seen to be done. This calls for extra care on the part of the judicial officers as they conduct themselves in public or private domain. The greatest responsibility is however, on the Chief justice/deputy, who must act and be seen to be impartial throughout his/her conduct, as the face of the judiciary.

It is now almost ten years since Kenyans experienced the effects of the 2007 disputed presidential election violence, yet no effective deliberate efforts have been undertaken by the Government to help Kenyans come to terms with the negative effects of the violence. Instead, Kenyans have experienced electoral violence yet again after the declaration of the Presidential results on the August 2017 elections. One bitter lesson learnt is that violence is not a solution to any dispute. From the previous discussions in this paper, it is clear that as a country, Kenya has not yet addressed the root cause of the violence that culminated into the 2007 attack on innocent Kenyan by their neighbors and the attack of Kenyans by the police who are paid by their tax to protect them. This is a major concern that needs to be resolved.

During the 2007/8-post election violence, the police received at least 13,416 complaints in relation to the violence, but only 1337 of the cases were taken to court. Victims of known attackers made several reports to police stations, but investigations were never completed and few prosecutions followed. As a result, many victims of the post election violence still bear the emotional and psychological burden of knowing that the perpetrators may never be brought to book, and justice for the victims remains elusive. This is a major concern today since Kenya promulgated the new Constitution in 2010. The period after the promulgation of the constitution witnessed a series of judicial reforms aimed at enhancing public confidence levels in the judiciary. However, the judicial reform measures forgot to address the concerns of the 2007 post election violence victim’s concerns. To the victims therefore, they are a forgotten group of Kenyans with no space in the justice reform initiatives. Although the government resettled some victims commonly referred to as the internally displaced persons (IDPs) in some parts of the Rift Valley, the mere allocation of land and some financial assistance does not, in the absence of holding the perpetrators of the violence accountable, amount to justice. In addition, there still exists IDPs from other parts of the country such as Nyanza and the Coastal regions who were never allocated land or given any financial assistance by the government. Many of such IDPs relocated to their ethnic communities and have struggled to pick up and rebuild their lives without any government assistance. Justice demands that the perpetrators of the violence be held accountable punished and the victims compensated. The process of holding perpetrators accountable cannot occur without putting in place deliberate investigative, prosecutorial, punitive and compensatory measures to ensure a functioning and restorative judicial system. The current judiciary does not have any restorative justice measures, but still operates under the adversarial system of trial. The biggest lesson learnt is that the Kenyan Judiciary is still ill prepared to effectively handle conflicts and disputes in a restorative manner. It is time that the Judicial Service Commission and the Judicial Training Institute considers other approaches to the dispensation of justice aimed at conflict resolution and not merely finding out who is at fault and punishing the defaulter. The CIPEV and Krieglar report had both strongly recommended far reaching reform initiatives that included constitutional reforms. There are more reform recommendations that the judiciary can undertake towards nurturing a young democracy such as Kenya in the transitional period. In the next section the paper discusses the role of the Judicial Service Commission.

II. THE ROLE OF THE JUDICIAL SERVICE COMMISSION IN TRANSITIONAL JUSTICE

The Constitution 2010 created an independent Judicial Service Commission (JSC) whose main function is to promote and facilitate the independence and accountability of the judiciary and the efficient, effective and transparent

6 ibid p 464.

7 Ibid.


administration of justice. This reflects the importance of the JSC in addressing the key concern of lack of independence of the judiciary in the period preceding the 2007 general election as already discussed.

The Judicial Service Commission has a constitutional mandate to ensure that the 2007/2008 and August 2017 post election violence perpetrators are held accountable, victims’ concerns are addressed and the various communities in Kenya are reconciled as part of measures towards transitional justice in Kenya. In order to discharge its constitutional duty of promoting and facilitating effective administration of justice in this respect, the Judicial Service Commission is further obligated by Article 172(e) to advise the national government on improving the efficiency of the administration of justice. One of the ways of improving the efficiency and effectiveness of the administration of justice in post 2007/8 and August 2017 election violence in Kenya is to ensure that all cases relating to the violence are effectively and efficiently investigated, perpetrators held accountable and victims’ concerns are addressed while various communities are reconciled. The Judicial Service Commission must therefore discharge this constitutional obligation by advising the national government to revive the unresolved post election violence cases and take appropriate measures to the satisfaction of all affected.

One of the fundamental constitutional functions of the JSC is to recommend to the president persons to be appointed as judges, while it retains the power to appoint all other judicial officers and prepare and implement programs for their continuous education. In respect to transitional justice, JSC has a role in developing and implementing programs geared towards transitional justice, by incorporating aspects of transitional justice in the administration of justice, especially in cases related to election violence.

In this respect, the Attorney General, who is a member of the Judicial Service Commission has a key role to play. Although appointed by the President with the approval of the National Assembly, the Attorney General is the principal legal adviser to the government and has the constitutional obligation to promote, protect and uphold the rule of law and defend the public interest.10 The Attorney General must therefore correctly advice the national government of the need to ensure that all cases of post election violence, both civil and criminal matters are properly investigated, perpetrators held accountable and victims’ concerns are addressed satisfactorily as per the law. The constitutional obligation of defending public interest implies that the Attorney General must advocate for measures that will ensure that victims, as members of the public, and the 2007/8 and August 2017 post election violence, as a matter of public concern, is effectively and efficiently dealt with in a manner that builds the public confidence in the judicial system. It is about a decade since the 2007/2008-post election violence and almost two months since the August 2017 election violence, yet there are still victims of the violence who are yet to see that justice is done. This is despite the fact that the Kenyan judiciary is perceived to have undergone major reforms to improve its efficiency and effectiveness in the administration of justice. The question that needs to be answered is, is the judiciary as an institution, adequately reformed to ensure justice for victims of the 2007/8-post election violence any other election violence victims? Does the judiciary indeed have a role in transitional justice?

It is worthy to note that although Kenyans had started the process of reviewing the constitution several years’ back, the major push for a new constitution was the aftermath of the 2007/8-post election violence. The Constitution of Kenya 2010 therefore aimed at amongst other concerns, to address issues that may have contributed to the 2007/2008 post election violence and ensure that such violence does not recur. At this point, it is important to appreciate the fact that since the promulgation of the constitution of Kenya 2010, Kenya has had an election in 2013, but like the 2007 election, the presidential results were disputed. However, unlike the 2007 situation, the presidential candidate who disputed the election results submitted to the authority of the courts to determine the dispute, thereby avoiding another violent situation. Interestingly, the presidential candidate who disputed the 2007 election is the same one who also disputed the 2013 presidential election results. The only difference is that in 2013, the public confidence in the judiciary seemed to have risen and there was a lot of trust by the public that the Supreme court, created under the Constitution 2010, with exclusive jurisdiction to determine presidential election dispute, would conduct its proceedings and determine the dispute in a fair and just manner according to the rules of natural justice, guided by the constitution 2010.

The decision of the Supreme Court on the 2013 presidential election dispute11 drew mixed reaction from within the country and amongst legal professionals. It was supported by a section of Kenyans allied to the Presidential candidate who was declared the winner of the 2013 presidential election, while heavily criticized by the presidential candidate who was declared the loser, and his party supporters. Although no violence followed the pronouncement of the Supreme Court decision, the country experienced an unusual uneasiness. The disappointed section of Kenyans whose party presidential candidate lost the election, felt defeated yet again, let down by the Supreme Court on grounds of procedural injustice.

Since Kenyans did not want a repeat of 2007/8-post election violence, they accepted to move on with their lives despite the Supreme Court decision. This paper is not concerned about the merits or the demerits of the supreme court decision, but that without having put in place adequate mechanisms at the national level to address the plight of the 2007/2008 post election violence victims, the 2013 presidential election results brought with it yet another concern about the role of the judiciary in transitional justice. Suffice it to say that the lack of violence following the 2013 presidential election may not totally mean that all is well. To the contrary it could imply negative peace in which the disappointed citizens feel helpless while opting not to engage in any violence. In the absence of any specific measures to address the emotional and psychological stress that can result from such a situation, people are more likely to be prone to violence at the slightest provocation, while mental health diseases are likely to increase.

10 Article 156 (4) (a) and (6) of the Constitution of Kenya 2010.

11 Raila Odinga and Two Others v IEBC and Three Others, Petition no. 5 of 2013(e KLR)
Kenya concluded the August 2017 election in which the Supreme Court annulled the presidential election. The decision was based on irregularities and illegalities. The decision has left the country further divided. A repeat presidential election is due on the 26/10/2017. Will the situation be any different? The process of making a judicial decision must also account for the exercise of judicial authority. In this way, people can understand reasons leading to court decisions.

The last three elections have shown that Kenya as a country is divided on ethnic lines and political party affiliations which is not healthy for a developing country and a young democracy. The Constitution 2010 recognized this fact and set guiding principles that must be followed in its implementation. Transitional justice is therefore core to the path to full recovery of the country from the effects of the 2007/8 and August 2017-post election violence. The judiciary is by far the biggest actor in implementing the Constitution and ensuring that the rule of law and democracy are upheld as key pillars of governance in Kenya. What therefore is the role of the Judiciary in Transitional justice in Kenya? The following section discusses judicial authority and how it is to be exercised within the context of transitional justice under the Constitution 2010.

III. JUDICIAL AUTHORITY, CONSTITUTIONAL PRINCIPLES THAT GOVERN THE EXERCISE OF JUDICIAL POWER AND TRANSITIONAL JUSTICE IN KENYA

The Constitution of Kenya 2010 is the supreme law of the land and must be observed by all persons and state organs, which include the judiciary. The judiciary can only exercise judicial authority as authorized by the Constitution. Any act or omission in contravention of the constitution is invalid. In this respect, any action or omission by the judiciary must be as authorized by the Constitution. Otherwise it is invalid.

In adopting and enacting the Constitution of Kenya 2010, Kenyans expressed their desire and commitment, as provided by the Constitution’s Preamble, to live in peace and unity as one indivisible sovereign nation. Transitional justice aims at ensuring peace in post conflict societies. The Preamble of the Constitution of Kenya 2010 therefore provides the constitutional basis for transitional justice in Kenya, following the 2007/8 and August 2017-post election violence.

The violence negatively affected the well being of many individuals, as families were disrupted or lost their loved ones and breadwinners. Communities turned against each other disrupting their previous peaceful coexistence. In the August 2017, innocent citizens were brutally attacked by members of the police force. The entire nation was subjected to anxiety, fear and apprehension. This explains why in the Preamble, Kenyans committed themselves to the protection of the well being of individuals, families, communities and the nation. The judiciary must therefore exercise judicial authority in a manner that is consistent with the commitment of Kenyans to protect and nurture the well being of its people. The Preamble of the Constitution further recognizes the aspiration of all Kenyans for a government based on the essential values of human dignity, equality, freedom, democracy, social justice and the rule of law, which are guiding principles in transitional justice too.

The Judiciary is part of the government and so must be guided by the above essential values in its administration of justice. In this respect, all Kenyans have a right to justice in respect of the 2007/8 and August 2017-post election violence. They have a right to a judicial process that enables them to know the truth of what happened during the 2007/8- andAugust 2017-post election violence. They have a right to proper investigation of all reported cases under the rule of law. They have a right to hold perpetrators to account for their action or inaction. All victims of the violence have a right to have all their concerns addressed satisfactorily. All Kenyans have a right to mechanisms that will ensure the communities that attacked each other during the 2007/8- and the police that violated the rights of peaceful Kenyans during the August 2017- post election violence are reconciled. Rights cannot exist without duties. It is the duty of the judiciary, as the government arm whose function it is to administer justice, to ensure justice for all, in respect of the 2007/-post election violence. The judiciary has an obligation to discharge this vital function, so that the country can peacefully continue with the development agenda as envisaged in Vision 2030. All those affected by the 2007/8- and August 2017-post election violence have a constitutional right to access to justice from the judiciary, under Article 47 of the Constitution. The judiciary therefore has a pivotal role in transitional justice in post 2007/8-August 2017-election violence in Kenya.

The judiciary exercises judicial authority that is vested in it and derived from the people. The exercise of judicial authority must therefore be in the interest of the people. Judicial administration must have as paramount, the interest of the people of Kenya, on whose behalf judicial authority is exercised. In this respect, Article 159(2) of the Constitution of Kenya 2010 stipulates FIVE fundamental guiding principles that courts and tribunals must observe in the exercise of judicial authority;

15 Kenya National Commission on Human Rights (n 14).
The first principle is that justice shall be done to all, irrespective of status. Victims of the 2007/8-and August 2017-post election violence are yet to find justice. Does their status as victims have anything to do with their elusive search for justice? The judiciary must adopt mechanisms that ensure justice for the victims of the violence.

The second principle is that justice shall not be delayed. Since 2007/8-post election violence, it is almost ten years for victims of 2007/8-post election violence wait for justice. The unexplained delay amounts to a violation of their constitutional right to access justice without undue delay under Article 48 of the Constitution.

The third principle is that alternative forms of dispute resolution, including reconciliation, mediation, arbitration and traditional dispute resolution mechanisms shall be promoted, so long as they do not contravene the Bill of Rights, are not repugnant to justice and morality, and are consistent with the Constitution or any other written law. This principle is very important to transitional justice in Kenya, since it goes beyond the criminal justice prosecution, and provides other mechanisms of addressing concerns arising out of conflict situations. Therefore, where prosecution fails or is not possible, the Constitution provides for other applicable transitional justice mechanisms to conflict resolution. The Kenyan judiciary therefore has more than one option of judicial mechanisms that can be applied to address the concerns arising from the 2007/8 and August 2017-post-election violence and any other election violence.

The fourth principle is that courts must administer justice without undue regard to procedural technicalities. This is important since the concern of victims of 2007/8- and August 2017-post election violence, is the accountability of the perpetrators and community reconciliation as substantive issues, which should not be affected by procedural technicalities. It is well known that courts have often applied procedural technicalities to dismiss cases. The Constitution of Kenya 2010 is very clear that access to justice should not be hindered by procedural technicalities. Where such technicalities arise, they should be cured and the case allowed to proceed to its logical conclusion of substantive issues that are of public concern.

The fifth principle states that, the purpose and principles of the Constitution 2010, namely human rights, equality, freedom, democracy, social justice and the rule of law, must be protected and promoted. Article 10 of the Constitution stipulates the national values and principles of governance that bind all state organs, including the judiciary, in the interpretation of the Constitution 2010 and in the administration of justice. They include patriotism, national unity, sharing and devolution of power, the rule of law, democracy and participation of the people, human dignity, equity, social justice, inclusiveness, equality, human rights, non-discrimination, protection of the marginalized, good governance, integrity, transparency, accountability and sustainable development.

The drafters of the Constitution of Kenya 2010 must have envisaged the pivotal role of the Kenyan judiciary in transitional justice in post 2007/8- election conflicts in Kenya. Indeed, as Kenyans promulgated the Constitution on the 27th August 2010, the excitement at Uhuru Park was an expression of the expectation that all concerns about the 2007/8-post election violence, amongst other issues would be addressed.

The principles of governance and national values as enshrined in Article 10 and the preamble of the Constitution of Kenya 2010, echo the Guiding Principles of the United Nations’ Approach to Transitional Justice. In particular, the following principles are common to both: the rule of law, human rights and accountability. In the next section the paper discusses judicial mechanisms in transitional justice that can be adopted by the judiciary in Kenya.

IV. JUDICIAL MECHANISMS OF TRANSITIONAL JUSTICE IN KENYA AS COMPLEMENTARY TO THE INTERNATIONAL CRIMINAL COURT PROCESS

Article 2 (5) and (6) of the Constitution provides that the general rules of international law and any treaty or convention ratified by Kenya form part of the law of the country. Kenya is a signatory to the Rome Statute 21, which is thus part of the applicable laws. While taking cognizance of the fact that six Kenyans faced trial at the International Criminal Court (ICC) as a transitional justice measure, this paper argues that the ICC process did not, and cannot replace national mechanisms of transitional justice. The ICC process should be seen as complementary, not substitution of the national process of dealing with concerns of the post election violence in Kenya. The ICC is concerned with those perceived to bear the greatest responsibility of the 2007/8-post election violence in Kenya. 22 The ICC cannot therefore deal with all suspected perpetrators of the violence. The ICC cases of the last three Kenyans on trial on the 2007/8 post election violence were terminated. A section of the Kenyan society was satisfied while another section of Kenyans was not satisfied due to ethnic and political party lines along which the country has been divided as already discussed.

A question that may be asked is why Kenya needs transitional justice now, when the country seems to have settled after the 2007/8-post election violence, promulgated a new constitution, undertaken constitutional reforms and conducted an apparently peaceful election in 2013? In answering this question, several factors need to be considered. Firstly, any national debate such as whether or not to conduct a referendum to amend certain parts of the constitution, reform IEBC, remove IEBC commissioners, or any matter of national importance appears to divide the country into two groups, along the two main political alignments and ethnic divisions. The two divisions again appear to be on political party and ethnic divisions as was the case in 2007,2013 and 2017.Such tension is not healthy for the country since the effects of the post election violence have not been fully addressed. Secondly, some of the key institutions created as a result of constitutional reforms, following the 2007/8-post

22 The Prosecutor v Uhuru Muigai Kenyatta, ICC-01/09-02/11; The Prosecutor v William Samoei Ruto and Joshua Arap Sang, ICC-01/09-01/11.

www.ijsrp.org
election violence, namely the (Independent Electoral and Boundaries Commission (IEBC) and the Supreme Court are perceived by a section of the Kenyan society not to have met their expectations. As Kenyans went to the polls in 2013 and August 2017, they were hopeful that the IEBC would conduct the elections through a fair and credible procedure, with the aid of the biometric voter registration machine (BVR). However, the BVR machines reportedly failed on the material day of voting and many polling stations reverted to the manual voting system, a major factor in the disputed 2007 presidential election results. 23

Although the BVR reportedly malfunctioned on the material day of voting in 2013, Kenyans still cast their votes peacefully in the hope that any presidential election dispute would be fairly resolved by the Supreme Court, a new institution created under the constitutional reforms, with exclusive and final jurisdiction on presidential electoral disputes. Although the 2013 voting process was relatively peaceful, almost devoid of violence, the electoral irregularities that characterized the presidential election after the votes were cast left many people questioning the ability of IEBC to conduct another Presidential election in 2017. Indeed this lead to the removal of the IEBC commissioners who conducted the 2013 elections and their replacement with a new team to conduct the 2017 elections.

The Supreme Court, as the highest court of the land, had the greatest opportunity to convince Kenyans and the world that the judicial reforms undertaken after the 2007/8 post-election violence would guarantee all parties appearing before it of procedural justice as guided by the spirit and values of the Constitution and transitional justice. Under such fair procedures that uphold the rule of law, all parties are satisfied with both the procedure and the court decision. It is of utmost importance that both the winner and loser in such a contest agree that the process of hearing was procedurally fair to both parties. The decision would thus be acceptable to both parties. Indeed this is the essence of transitional justice in conflict resolution.

However, without going into details of the merits and demerits of the Supreme Court judgment in the 2013 presidential election dispute, 24 it is important to point out that the court process ignored a fundamental constitutional principle of transitional justice as stipulated by Article 159(2) (d) of the Constitution of Kenya 2010. This is the principle that justice shall be administered without undue regard to procedural technicalities. By failing to admit the applicant’s affidavit on ground of procedural technicality, the Supreme acted ultra vires the Constitution in conducting the court’s proceeding. Within the context of both procedural and transitional justice, such procedural technicalities are curable to ensure substantive justice in the interest of the public. Further, as is the practice in Commonwealth jurisdiction, Kenyans needed to know and understand how the Supreme Court reached its decision. This can only happen where the court outlines the disputed issues, arguments by both parties and the court’s analysis of the evidence presented before it. It is ONLY after such analysis that the court can make a decision, giving reasons as to why and how it arrived at the decision. This is the process through which every court must account to the public how it exercises judicial authority vested in them.

Accountability is a key aspect of transitional justice by all arms of the government. As a result of the Supreme Court’s failure to account to Kenyans how it arrived at its decision in the 2013 presidential dispute, a section of Kenyans allied to the applicant, and other non Kenyans have questioned the independence of the judiciary and its ability to preside over any dispute that could arise in 2017 presidential election. Of course the composition of the bench has since changed as three judges who determined the 2013 presidential election dispute have retired and were replaced.

The annulled August 2017 presidential election has equally left the country divided into two just like the 2013 presidential election decision. The concern for this paper is where do Kenyans who feel aggrieved with the Supreme Court decision turn to for justice? This is particularly worrying considering utterances by the politicians that the will of the people is determined at the ballot box and not by the courts. Transitional justice is therefore very vital in rebuilding Kenya today. The judiciary still has a lot of room to improve and build full public confidence. It is only under such circumstance that its decisions will be acceptable to both losers and winners. This is by far the greatest challenge for the Supreme Court and the entire judiciary.

So far, the ICC played an important function as a transitional justice mechanism following the 2007/8-post election violence in Kenya. It effectively deterred any potential perpetrators of election violence in 2013 election, although the supporters of the Hague suspects then, argued that the ICC was a political court set up to try African leaders only and settle political scores. 25 The decision of the ICC was celebrated by one section of Kenyans while another section remained disappointed. This is despite the various constitutional reforms undertaken after the 2007/8-post election violence. The implication is that the ICC process alone is not adequate as the only judicial mechanism of transitional justice for Kenya, following the 2007/8-post election violence. While recognizing the important role of the ICC as a mechanism of transitional justice, this paper argues that there is need for local/national mechanisms to hold accountable perpetrators who bear different levels of responsibility, for their role in the violence. This is consistent with the principle of accountability under the Constitution of Kenya 2010 and the guidelines on UN Approach to Transitional Justice. Such local mechanisms complement the ICC process and ensure a satisfactory resolution of conflict and other electoral violence concerns. The August 2017-post election violence that violated the rights of innocent Kenyans came against the background of ‘NO BIG BROTHER WATCHING’ since the ICC cases had been withdrawn, unlike in 2013 when ‘BIG


24 Raila Odinga and Two Others v IEBC and Three Others, Petition no. 5 of 2013 (eKLR).


www.ijsrp.org
BROTHER WAS WATCHING’. In the next section, the paper discusses recommendations of optional judicial mechanisms that can be explored by the judiciary in Kenya.

V. RECOMMENDATIONS ON JUDICIAL MECHANISMS OF TRANSITIONAL JUSTICE IN KENYA

The Judicial Service Commission needs to consider the following judicial mechanisms of transitional justice; a special tribunal, special courts, local courts and traditional methods of dispute resolution.

(a) Local Courts

Article 162 of the Constitution of Kenya establishes the local court system in Kenya. The subordinate courts have jurisdiction to try criminal offences as well as civil matters. There are subordinate courts in all counties in Kenya, making them the most suitable institution to deal with disputes. Several offences under Kenya’s domestic law were committed during the 2007/8 and August 2017-post election violence in Kenya. Some offences were committed in the run up to the August 2017 election as at the time of writing of this paper. They include murder, manslaughter, attempted murder, conspiracy to commit murder, grievous bodily harm, robbery with violence, arson, malicious damage to property, theft and related offences, incitement to violence, illegal hunting, illegal possession of firearms, sexual offences such as rape and defilement.26 The local courts can conduct trials with or without the help of the international community. In the former case, specific officers may be identified and trained to handle electoral disputes, election offences as well as criminal cases arising from campaigns and elections. It is important to build their capacity and ensure their competence, impartiality and effectiveness as well as efficiency. In the second option, where there exists a lot of mistrust of the judiciary by the public, leading to low levels of public confidence in the system, the Judicial Service Commission may consider hiring judicial officers drawn from other jurisdictions, to sit with local judges and magistrates, in order to ensure impartiality of the bench. This however must be strictly for the purpose of resolving the electoral violence, crimes and offences, considering that Kenya as a country is largely divided along political and ethnic lines as already discussed in this paper. This proposal in not new in resolving disputes in Kenya. In 2009, the Independent Constitutional Dispute Resolution Court that resolved disputes related to the Constitutional reform process that led to the promulgation of the new Constitution of Kenya 2010, comprised of six judges drawn from Kenya and three drawn from other Commonwealth jurisdictions to. The commissions that investigated the post election violence comprised of experts from Kenya and other jurisdictions.

Apart from the composition of the local courts, there is need to interrogate the system of trial that may be appropriate in resolving electoral violence related disputes. The adversarial nature of the criminal justice process seems to have hindered the progress of investigation and prosecution of many of the cases reported to the police following the 2007 violence. Subsequently, fewer cases were successfully prosecuted while majority of the cases collapsed. On the 20th April 2012, a multiagency Task Force was appointed by the Director of Public Prosecutions to review, re-evaluate and re-examine all cases arising out of 2007/8 and August 2017- post election violence and make appropriate recommendations. Out of the 6081 cases reported to the police for investigation, only 4336 (4118-general cases and 218 sexual gender based violence) cases were reviewed by the task force within the appointment period of six months, which was inadequate. Out of the 6081 cases, only 366 were filed in court for prosecution. Out of the cases filed in court, 138 of them had the perpetrators convicted (held accountable), while in 78 other cases, the perpetrators were acquitted (found not guilty). 77 cases were withdrawn while 52 were still pending before court as at the time when the taskforce compiled its report. In 152 cases, the accused persons were taken to court, granted bond/bail but never appeared in court again and so the courts issued arrest warrants. 3276 cases are still under investigation almost a decade since being reported.

As regards the sexual offences, the task force found that only 368 cases were reported and only 123 had been finalized, convicted 51, acquitted 35, withdrawn 37, pending before court 38, police files open but unable to proceed with investigation of 177 cases. Investigation of sexual violence cases is often characterized by many challenges such as gang rapes in which the victims are unable to identify the attackers with precision. Such cases therefore fail to meet the evidentiary threshold under the adversarial system of procedure in the absence of forensic evidence. The criminal justice system, as it is currently in Kenya, may therefore not ensure justice to all victims of sexual violence in 2007/8 and any other electoral violence. The victims whose perpetrators were acquitted, or the cases cannot be prosecuted are still waiting for justice.

Courts are however limited in handling criminal matters under the adversarial trial procedure. The judicial officer presiding over the case must be an impartial, passive umpire who waits for the parties to collect and present evidence before it. Much of the success in prosecuting criminal cases therefore depends on how equipped the prosecution is and the availability of witnesses to provide evidence in court. Some of the challenges faced in prosecuting the 2007/8-post election violence cases include the following: the number of cases reported in a short time during the violence period was overwhelming to most police stations. Many of the victims who reported the cases became internally displaced by the violence and so could not be easily traced by the police. Some of them were resettled in other areas apart from where the offences occurred.

The police in Kenya still face the problem of inadequate provision of necessary facilities to aid their investigation such as vehicles, and forensic laboratories. Some police stations exceeded their cell holding capacity. As a result, suspects had to be released on police bond only to disappear completely. Some victims were and still are afraid to pursue their cases for fear of revenge attacks by the perpetrators. The crime scenes in some cases were already interfered with, making it very difficult to gather strong evidence. Some offences were not reported immediately due to the violence, and by the time the reports were

26Kenya National Commission on Human Rights (n14).
made, the suspects had escaped. Some crimes committed during the 2007/8 post election violence required special skills to investigate, especially sexual abuse. The police were however overwhelmed by the violence and the few specialists could not adequately handle all the reported complaints. The office of the Director of Public Prosecutions also faces a shortage of prosecutors. These, amongst other factors have greatly affected the ability of the local courts to adequately deal with the 2007/8 post election violence cases.

In order to improve the capacity of the local courts to handle post-election violence cases, there is need to enhance the capacity of the existing prosecutors and investigators while recruiting specialists in investigation and prosecution of certain violence related offences such as sexual assault. The entire criminal justice system must work as a system and address all the challenges mentioned above. Indeed this is the core function of the Commission on Administrative Justice.

Apart from the already discussed factors that limit the local courts’ ability to adequately administer justice in post-election violence cases, the principal domestic law in Kenya is the Penal Code Cap 63 of the laws of Kenya. It does not make direct recognition of gross human rights violations as crimes punishable under the domestic law. Widespread systemic attacks on civilian population causing several deaths were therefore not crimes against humanity, but only murder of several people. In addition, the penal code only recognizes the role and culpability of the executors of the crimes, but not the planner, instigator or financier. This has however now been improved by the passing of the International Crimes Act 2009.

(b) Special Courts

Due to the challenges associated with the local court system, already discussed, the post-election violence cases need special courts to resolve the associated conflicts effectively and efficiently. While perpetrators must be held accountable, the victims’ concerns must be addressed while ensuring that the search for the truth leads to reconciliation of the nation. The nature and sensitivity of the cases require experts in various fields such as prosecution, investigation and cross-examination. Whereas the local courts apply the adversarial system of procedure, the special courts are able to adopt a special procedure that ensures that justice is done to the victims while the suspects are tried through a fair procedure that protects their fair trial rights as guaranteed by Article 50 of the Constitution of Kenya 2010. The Krieger report indeed recommended the establishment of an Electoral Dispute Resolution Court with final jurisdiction to handle electoral disputes. The report did not specify the level of this court in the hierarchy of the court systems. This recommendation needs to be pursued by the Judicial Service Commission.

The JSC must be commended for appointing a committee that recommended the establishment of an International Crimes Division of the High Court.27 Such a division of the High Court has jurisdiction to try crimes under the International Crimes Act, 2009. The committee observed that there is public demand to deal with pending post 2007/8 election violence effectively and efficiently to the satisfaction of all those affected. This paper therefore recommends that the Judiciary should implement the report and establish the special court as a division of the High Court to try many of the cases of gross violations of human rights and crimes against humanity, which could not otherwise be tried under the local courts as already discussed. In establishing the special court, it should be modeled along the ICC. In particular, it should adopt flexible hybrid procedures that protect the rights of suspects to a fair trial while balancing the same with concerns for the victims of the 2007/8 post election violence. The establishment of the special court needs wide consultations with various stakeholders. It must attract specialists in various skills and be free from any form of interference. In this respect, the special court needs independence and should be adequately financed well in advance of its commencement of hearings. Although prosecutorial power, constitutionally vests in the office of the Director of Public Prosecutions, there is need to ensure that the prosecutors attached to the special court are independent. In this respect, prosecutors may be independently hired from the best experts while those from the DPP’s office may be seconded to the court. Of importance is that the Chief Prosecutor be an expert from outside Kenya in order to ensure his/her independence. Indeed, Parliament has the power to enact a legislation conferring prosecutorial powers on anyone else other than the DPP.28 The establishment of the special court therefore remains one of the greatest tasks in institutional reforms in the judiciary towards transitional justice after the 2007/8-post election violence in Kenya. The court would have three specific functions namely: holding perpetrators accountable, addressing concerns of all victims of 2007/8 post election violence and reconciliation of the nation.

(c) Alternative forms of Dispute Resolution (ADR)

The constitutional basis for ADR in Kenya is Article 159(2) (c) which allows courts to use alternative methods of dispute resolution. They include reconciliation, mediation, arbitration and traditional dispute resolution mechanisms. The traditional methods must however, be consistent with the Constitution and any written law. They must not contravene the Bill of Rights under the Constitution. In addition, they must not be repugnant to justice and morality. There is need to integrate ADR into the formal justice system.

The most applicable form of ADR in transitional justice is reconciliation whose goal is it to deal with trauma suffered by victims through forgiveness, public apology and restoration of relationships that existed before the violence.29

Reconciliation was applied with some measure of success in transitional justice in South Africa after the collapse of the apartheid rule.30 Reconciliation, however, must go hand in hand


with forgiveness.\textsuperscript{31} The victims of the violence need to regain some sense of self-worth, esteem and recognition by others first before the process of rebuilding relationships of trust with the perpetrators.\textsuperscript{32} Although forgiveness by the victim is free, it may be conditional or be based upon the attitude of the perpetrator. As an example, victims may demand acknowledgement or confession, accountability and repentance by the perpetrators before they forgive.\textsuperscript{33} Forgiveness is a strong aspect of transitional justice since it is the greatest step by victims in overcoming feelings of revenge, moral hatred, indignation or anger.\textsuperscript{34}

Apart from the religious aspect of forgiving, the emotional stakes make the process one that must be owned by the victim. It therefore requires a change of heart and attitude by the victim about the perpetrator in a spirit of restoration and humanity. Many victims of violence suffer emotional pain that can be overcome by forgiveness when they come to know the truth of the violence by the perpetrators, who open up, acknowledge their wrongdoing and accept responsibility for their role. This calls for a conference type of process that is presided over by skilled judicial officers through an appropriate procedural justice framework.

The adversarial trial procedure applied in criminal proceedings may fail to yield the truth. In such situations, reconciliation becomes a better option in reconciling a divided nation.\textsuperscript{35} Indeed, Section 176 of the Criminal Procedure Code, Cap 75 of the law of Kenya allows courts to reconcile parties in criminal proceedings. This provision may be adopted especially in cases where the victims and perpetrator are known to each other and especially where they live as neighbors. Reconciliation efforts presided over by judicial officers has the force of law in the implementation of the reconciliation outcome. Enforcement of the decision and compliance benefits from legal sanctions.

Public debates and public acknowledgement is another way of reconciliation. Kenyans cannot remain in silence and denial of the fact that the 2007 post election violence divided the country and that the cracks may widen if not sealed in time. There is need to talk about the violence publicly as a form of uncovering the truth through public debates. The debates should be broadcasted to reach all counties in both English and Kiswahili so as to reach a wider section of the public in both rural and urban areas. These debates should encourage public participation and be spearheaded by judicial officers. After all, judicial officers exercise judicial authority on behalf of the people. The modalities of how this can be achieved can be discussed between JSC, Commission on Administrative Justice, and the Commission on National Cohesion and Integration amongst other stakeholders. However, the process must be judiciary driven to restore confidence in the judicial system. Kenya will not be the first country to engage judicial officers in such exercise. In 2004, a series of public debates were conducted with judges and prosecutors of the ICTY, organized by the ICTY outreach office.\textsuperscript{36}

Public debates with perpetrators of the violence will help to reveal what drove them into the violence and lessons learnt from their involvement. Such debates were carried out with former combatants in Bosnia, Serbia and Montenegro. This is a perfect way of involving the perpetrators in peace building initiatives. Photographic exhibitions are also another way of carrying out public discussions on the 2007/8 post election violence. There is need for deliberate efforts to chronicle the 2007/8 post election violence by visiting the various areas affected and preparing a documentary for future generations. In addition, symbolic acts of acknowledgement of responsibility and remorse are part of the healing process. The Kenya government needs to accept responsibility for failing to prevent the 2007/8 violence. There was a government in power at the time of the violence. Such acknowledgement will assist the country in forging the much-needed unity as a nation. The Presidents of Serbia, Montenegro, Croatia and Bosnia-Herzegovina have undertaken such measures.\textsuperscript{37}

Community based reconciliation mechanisms through story-telling, psycho-social support programs, sports and cultural activities that focus on the reconstruction of the social fabric of the community cannot be ignored. This exercise can be carried out by different community based organizations.

(e) Reparation

Any attempts to reconcile the communities must go hand in hand with reparation for victims of the 2007/8- and August 2017-post election violence. While appreciating the government efforts to resettle the internally displaced victims of the 2007/8 post election violence, there are many more victims who are yet to receive any assistance at all. Some victims who lost their property during the violence have received no form of assistance from the government.\textsuperscript{38} The government Of Kenya needs to pay reparations for damages to persons and property of all victims of the violence without any discriminatory treatment as per the national values of the Constitution 2010. This can be done without lawsuits, but through a government program, on the advice of JSC towards an efficient and effective administration of justice.

Traditional methods of justice have been used with a measure of success in may post-conflict societies such as

\begin{thebibliography}{99}
\bibitem{31}Ibid.
\bibitem{32}Ibid.
\bibitem{33}Van Tongeren, “Impossible Forgiveness” (2008) 2 Ethical Perspectives 76.
\bibitem{34}C Roberts, “Forgiveness” (2008) 32 American Philosophical Quarterly 289.
\bibitem{38}Maureen Opondo who was born, raised and worked in Nakuru, now lives in Kisumu, having lost all her property and business during the violence. Nelson Owigi owned an electrical business in Limuru and was the chairman of the Orange Democratic Movement during the election period. He was attacked and lost all his business and had to relocate to his rural home in Kisumu. He is yet to get any help from the government. The victims were interviewed and featured on KTN 9pm news on the 6/10 2014.
\end{thebibliography}
Rwanda’s Gachacha courts, that were however criticized for denying suspects fair trial rights. Traditional methods of justice have the advantage of being presided over by the community’s chosen elders and so the decisions are more acceptable within the community and easy to enforce. The system provides punitive justice to perpetrators, reparation to victims and reconciliation of the communities. The punishments may vary from fines, community labour, public humiliation, physical punishment or whatever the community leaders find as most suitable for the crimes committed. The traditional justice systems view the perpetrator as a member of the community who needs to be reformed as opposed to incarceration. The perpetrator therefore serves the community while repaying for wrong done in the interest of the whole community. Different communities in Kenya have very adequate traditional ways of solving disputes that can be tapped on, by the judiciary. Out of the many cases pending trial, a system needs to be developed to classify the ones that can be subjected to traditional methods of dispute resolution. The methods must uphold human rights, be consistent with any written laws and the Constitution of Kenya 2010. In addition, the methods must not be repugnant to justice and morality. Although very appropriate in resolving the 2007/8 post election violence, Parliament may need to enact a legislation that regulates this form of dispute resolution. This is still a big gap in the application of traditional justice methods in dispute resolution, despite the fact that Article 159(2) provides for the system.

(f) A Special Tribunal

Although recommended by CIPEV report, but rejected by Parliament, a special tribunal remains one of the best options of dealing with the post-election violence of 2007/8 and indeed any future violence of that kind. Special tribunals have worked successfully in post conflict situations in Rwanda (ICTR), Yugoslavia (ICTY) and Sierra Leone. The special tribunals can either be established in the country, as in Sierra Leone or outside the country, as in the cases of Yugoslavia and Rwanda. It is in my considered opinion that it is not too late to engage in discussions on setting up a special tribunal for Kenya to deal with the unresolved concerns of justice and reconciliation on matters of past injustices that may haunt Kenya in future.

VI. CONCLUSION

In concluding the discussions in this paper, the JSC must be commended for a job well done so far. However, a lot more needs to be done to ensure sustainable dispute resolution mechanisms. The special court, Division of the High Court on International Crimes remains the best mechanism of transitional justice for Kenya, followed by reconciliation and the traditional mechanisms of justice. Any mechanism must however ensure that perpetrators are held accountable, victims’ concerns are addressed and the various communities that attacked each other are reconciled.

REFERENCES


AUTHORS

First Author – Dr. Scholastica Omondi- Lecturer, Department Of Public Law, School Of Law, The University Of Nairobi, Kenya.
The Exquisite Life of a Dominant Eagle

Saulo A. Alinsunod
Administrative Assistant II (Senior High)
Department of Education, Province of Cebu, Consolacion District, Cabangahan National High School, Consolacion Cebu Philippines, 6001
saulo.alinsunod@hotmail.com

Abstract: This study featured how Violeta A. Gonzaga, with her consent to divulge her name, succeeded as Public Schools District Supervisor. It aimed to: establish a portrait of her leadership aspects on how she climbed up the academic ladder, describe her routine in managing the public schools of Consolacion Municipality, deduce her qualities on dealing with different challenges in supervising her subordinates and expose her plans that are intended to solve these problems, and introduce her pleasant vision of Educational Leadership. Through a biographical research design, with purposive sampling, Violeta A. Gonzaga was chosen for this study because she is a recipient of an award for Outstanding Public School District Supervisor for School Year 2016-2017 for the first time in Department of Education Province of Cebu, Consolacion District and because of her tenure in Educational Leadership. Interview guides were utilized in gathering her biographic information about her leadership. Violeta A. Gonzaga's educational laurels and triumph destined her to have a successful academic career enrich with passion to serve the public and passion in loving God. With the help of TRIPOD, she was able to execute her different roles effectively and efficiently. She abided the rules and regulations in accordance to the Code of Ethics for Professional Teachers and the Code of Conduct and Ethical Standards for Public Officials and Employees in alleviating the issues of her people. And, her pleasant vision for the different Schools of Consolacion as well as its Administrators is for them to be the champion in executing the Quality Education. A Quality Education that includes harmonious relationship among others.

Keywords: Leadership, Educational Leadership, biography

I. INTRODUCTION

“A true leader has the confidence to stand alone, the courage to make tough decisions, and the compassion to listen to the needs of others. He does not set out to be a Leader, but becomes one by the equality of his actions and the integrity of his intent.”

- Douglas McArthur

Leaders have existed from time immemorial. History can tell how influential they were during ancient civilizations and how important they are in today’s evolving public. Questions as to what best qualities a leader must have to become successful, what leadership styles are the most effective approach in managing people, and what strategies to use in resolving conflicts are broadly discussed.

Eagles have enticed us with their striking leadership character for hundreds of years. They have excessive powerful vision that enables them to see reality over their idealistic views [1]. Leaders who have the personality of an eagle tend to show great administrative skills and work impressively on their own. They require maximum independence in managing themselves and others, and use their leadership skills to become champions [2].

Our complex world demands stalwart leaders who have a sound mind and have the heart to serve. Leadership is not a position but a profession to live by. Leaders are one third born and two thirds made according to Dr. Ronald E. Riggio (2009) [3]. Leadership skills are mostly developed first, in the family second, in the school and lastly, his personal experiences. Proverbs 22:6 states that, “train up a child in the way he should go, and when he is old he will not depart from it.” In a family, parents serve as leaders to their children, when leadership is not properly executed then the children will not grow as what the parents want them to be. Similarly in the school, teachers serve as leaders to their students, when leadership is inappropriately administered, then students will not contribute significantly in creating a strong nation.

Good leadership is the missing piece to complete the political and economic puzzle. Leaders play a vital function in a company, an institution, and in the society. Their job is critical, when exercise right they will become a megahit but when not, it can be their downfall.
Mark Zuckerberg, a Chief Executive Officer, is known by his leadership character as a creative innovator and his love for codes. He invents Facebook.com, the famous social networking website across the globe today [4]. On the other hand, poor leadership may result to bankruptcy just like what happens to Yahoo! when the Chief Executive Officer, Marissa Mayer, takes the lead. She lacks the execution of the basic fundamental skills in running a business; listening, learning, and understanding, thus it results to failure [5].

Ferdinand Marcos, the 10th President of the Philippine Republic, is known to be a decisive and a bold leader. His leadership contributes mostly to Public Infrastructure and Economic Development [6]. On the contrary, during Estrada’s regime, his dishonesty leads to poor governance that evicted him from his position as the 13th President of the Philippines [7].

Understanding one’s leadership may result to an explosion of knowledge beneficial to individuals who are practicing the same role and for aspiring leaders of our future generation. The consequence of learning the skills of leading is for personal development. Replicating the best practices of good administration is necessary in promoting the welfare of the people.

The researcher chooses Violeta A. Gonzaga, with her consent to divulge her name, as the subject of this research because she is a recipient of an award for Outstanding Public School District Supervisor for School Year 2016-2017 for the first time in Department of Education Province of Cebu, Consolacion District. Also, she is known by her activeness in school, in the Catholic Church, and in the community. This research will reveal the secret recipe of her success in climbing the academic ladder through her leadership skills and her inner character.

**REVIEW OF RELATED LITERATURE**

**Leader’s Behavioral Style**

Some renowned Companies have applied behavioral assessment to improve communication on their daily activities. Leaders need to understand one self’s and other’s patterned behavior because it influences what they want, need, and expect. Knowing someone’s preference on how they want to be treated will reduce tension, increases cooperation and trust, and is the success factor in attaining harmonious relationship in the organization.

Although behavioral style is only a one-sided description of our personality, it is quite useful in describing how a person is perceived. The (Dove Owl Peacock Eagle) DOPE Test by Tony Alessandra, An American Speaker who received Ph.D. in Marketing from Georgia State University, will be used to know the Behavioral Style, also known as the Bird Style, of an individual. This assessment will also be the basis in determining the behavioral style of the research respondent. Based from his book, The Platinum Rule, “The key objective of this whole concept is for leaders to understand their own style, be able to quickly and accurately identify the style of others, and adapting so he can treat others the way they wish to be treated.” This serves as leader’s guiding principle in managing his people so he can adjust on how to handle complex personalities in a group. Tony Alessandra (1998) enumerated four behavioral styles or bird styles, namely; The Relater or The Diplomatic Dove, The Entertainer or The Social Peacock, The Thinker or The Wise Owl, and The Director or The Dominant Eagle.

**The Relaters or The Diplomatic Doves** are people who prioritize relationships. They are people pleaser. They are the best person to ask to know how others would feel towards a new project. They are incredible listeners and a team player. When in a group, they always follow all instructions for as long as it will harm no one and will only share their thoughts when called. They hate conflicts. They easily get irritated to insensitive and impatient people. They become indecisive and submissive when stress. In addition, Doves are oversensitive, slow to begin action, and lacks global perspective. Doves prefer to interact to people who are friendly, relaxed and accommodating.

**The Entertainers or The Social Peacocks** are people who prioritize people. They always seek recognition. They are the best person to tap to come up with fun and unique ideas about almost anything. Peacocks are very good at persuasion and entertainment. Because of their creativity, they are inattentive to detail. They are very energetic which causes them to get easily distracted and have a short attention span. They hate work routines and step by step instructions, they prefer to make their own process in doing things instead. They tend to be sarcastic and superficial when stress. Peacocks like to interact to people who are complimentary and animated.
**The Thinkers or The Wise Owls** are people who prioritize task. They are very systematic and highly organize. Owls are very good at planning and always anticipate the pros and cons when implementing a new project. They are in demand to get something done perfectly. They are detail oriented, accurate, and precise which tends to slow their pace when given a task. Owls are perfectionist they do not like their output to be criticized. They are withdrawn and headstrong when stress. Owls like to converse to people who are very informative.

**The Directors or The Dominant Eagles** are people who prioritize goals. They’re fast, decisive, and results oriented. When in a group, they volunteer themselves to be the leader and immediately identify what needs to be done to reach the goal and designate the task among all members accordingly. They like controlling people but hates being taken advantage of. They do not like incompetent and inefficient people. When stress they are very critical and become dictators. They want the job done in a snap. Eagles only accommodate people who are competent and assertive.

**Leader’s Methodology**

One factor that improves employee’s productivity is through his leader’s relationship. “People work best and produce valuable results to others when they feel good about themselves.” says Kenneth Blanchard Ph.D. and Spencer Johnson M.D (2013) [8]. Leaders who know the strengths, weaknesses, coaching preferences, and career goals of his subordinates; Leaders who sets right expectations and realistic goals; Leaders who provide positive, constructive, and corrective feedback; Leaders who ask commitments and is consistent in follow through; are the true champions. Gaining Trust plus Gaining Respect equals Winning Culture.

**Gaining Trust**

Getting to know a person breaks the wall of anxiety. It is the leader’s responsibility to know his people. Knowing employees well leads to a healthy work culture. This is the first step to make them feel good. “Once a leader is able to build a foundation of trust with employees it is the start of honest and open communication and creates a work environment in which everyone feels supported and believes that they have something important to offer.” says Helen Attridge (2014), President of Academy of Leadership Coaching & NLP [9].

**Gaining Respect**

Without proper instructions as to how a certain task should be done, we may end up with a self-standard output. Giving an employee a blueprint of his duties and responsibilities is one way for him to know what is expected from him. People behave based on their worldview. The lack of clear expectations could lead to weltanschauung. According to Kevin Eikenberry (2012), “to create great performance, improve employee satisfaction and engagement, and reduce the incidences of workplace conflict, spend more time on setting clear expectations.” [10].

“It’s tough for employees to meet performance goals when they do not exactly know what’s expected from them.” says Marco Nink (2013). Setting expectation is necessary before even setting realistic goals which is also one of the leader’s duties. Employees know where they are going when they know what they need to achieve [10]. This is the first step in making employees accountable. This opens the leader’s critical duty; to follow through and track employee’s progress and to provide feedback. Follow through and feedback should always go together.

No one likes unrecognized effort especially when an employee has given all his hard work for a particular project. Everyone seeks appreciation for anything that they do [12]. The Toolkit for Managers states that, “being praised makes the person feels good and can help boosting their performance.” Catching someone doing right will encourage them to multiply the things they have done right [13]. That is the magic of positive feedback.

Leaders prefer to have an employee who is trainable rather than an opposer. No one knows everything and everyone knows nothing when it comes to skilled task, which is why neophytes in a company, in an institution, and in an organization must undergo training [14]. If they fail, then it’s not their fault, it is the leader’s fault for not giving constructive feedback and for not doing follow through. If leaders want their employees to do the right thing then they have to show them how it is done the right way. Leaders are role models based from what they project. People do not like repetitive mistakes especially when they know that there is someone checking their progress.
“Accountability improved performance and increased employee’s commitment to work,” says The U.S. Office of Personnel Management [15]. The crucial part of every leader in gaining trust is when he failed to correct and always giving second chances to misbehaviors. Every Leader must set aside his emotions while giving real time corrective feedback it is the success factor of driving his employees’ accountability. These feedbacks allow the Leader to hate the wrong doings, not the person. Corrective feedback also reminds the employee of his commitment and expected outcome during the goal setting.

Leader’s Indispensable Qualities

John C. Maxwell’s (1999) book entitled, The 21 Indispensable Qualities of a Leader, enumerates leaders’ qualities as a tool in becoming the type of leader that people want to follow. People are everywhere, whatever status and position they have and whoever they are, they will be reporting to a leader. Apparently, employees always have complaints to their leaders [16]. These are just setbacks that leaders must overcome. Defeating setbacks can lead to far better results. “The ear of the leader must ring with the voices of the people.” says former U.S.A. President Woodrow Wilson (1905).

Being an effective communicator is a primary quality that a leader must have. Simplicity is the key to effective communication. Gilbert Amelio, President and CEO of National Semiconductor Corp., quoted, “Developing Excellent Communication Skill is absolutely essential to effective leadership. The leader must be able to share knowledge and ideas to transmit a sense of urgency and enthusiasm to others. If a leader cannot get a message across clearly and motivate others to act on it, then having a message does not even matter.” Communication is about how it is being said. Another quality a leader must possess is initiative. The only way a leader recognizes an opportunity is when he knows what he wants. There’s an old saying: “If there is a will, there is a way.” Leaders who have the initiative motivate themselves. They persevere tenaciously because they know their role and they hate themselves being complacent. Problem Solving is also a quality that requires every leader to have. Leaders must anticipate problems because it is sure to happen. Opposer rejects problems and Problem Solvers accept it and do his best to make things better. Albert Einstein (1879 – 1955) quoted, “Insanity: doing the same thing over and over again and expecting different result.” Success is not measured through how tough a problem is but through sanity; uses fresh ideas in dealing with problems because it is new and difficult. These qualities of a leader are the answers to eliminate complaints and the reason why followers inclined to comply [17].

Leader’s Success Factor

There are several researches about knowing the secrets of success. One of them is Richard St. John (2010), author of the book entitled; The 8 Traits Successful People have in Common: 8 to be Great. With his research, he found out that; People are successful because they are passionate of what they do. They are hardworking. They do not focus on everything but one thing at a time. They always push themselves to move forward. They are initiative, They keep on improving not just their work but as well as themselves, They serve and value others, In times of failure and adversity, they persist [18].

Another research was conducted by Catherine Clifford (2017). She enumerated the success factor of the following self-made billionaires: a) Steve Jobs, Chief Executive Officer and Co-Founder of Apple Inc. b) William Henry Gates, commonly known as Bill Gates the Co-Founder of Microsoft c) Mark Zuckerberg, Chief Executive Officer and Founder of Facebook.com d) Richard Charles Nicholas Branson, Founder of Virgin Group and e) John Paul DeJoria, Co-Founder of the Paul Mitchell line of hair products and The Patron Spirits Company. First, they set high but realistic goals. They believe that their dreams will take them to where they want to be. Second, they enjoy the journey of their life. They are fierce enough to face problems, as what the Japanese proverb shared, “Nana korobiyaoki.” This means, they may have fallen seven times but they have risen up eight times [19]. Third, they do not chase two rabbits at the same time because both will escape. They exert 70% focus on their strength, 25 % on new ideas, and 5% on areas for improvement. Lastly, their characters are unique and bring lasting success with people. They inspire others to become like them [18].

Leader’s Gender

There are several studies about who leads better, men or women? This could lead to an endless debate however, depending on the nature of work and the culture of environment, men or women may excel one way or another. Sebastian Bailey (2014) states that, “…different individuals are differently suited in different situations.” Male leaders were more effective in government or in the military while Females succeed in social services and education [20].

There is no need to compare the two because what matters most are their Leadership style, methodology, and character. Men or Women, no one sets out to be a better leader because “leadership knows no gender” according to Adriaan Groenewald (2015).
Leadership is a mixture of character and skills which can be learned and a combination of strengths and traits which can be performed by both sexes.

OBJECTIVES OF THE STUDY

This study aims to establish a portrait of leadership aspects of Violeta A. Gonzaga and how she climbed up the academic ladder. This seeks to answer these objectives: describe her routine in managing the public schools of Consolacion Municipality, deduce her qualities on dealing with different challenges in supervising her subordinates and expose her plans that are intended to solve these problems, and introduce her pleasant vision of Educational Leadership.

RESEARCH METHODOLOGY

This study is a Biographical type of Qualitative Research Design. The research respondent was chosen for this study because of the following criteria: Tenure in Educational Leadership and Outstanding Public Schools District Supervisor Awardee. Violeta A. Gonzaga was the sole solid candidate. The research respondent gave permission to the researcher to conduct the study by signing the consent letter. Both party agreed that personal information would be divulge. The interview questions were created by the researcher and was approved by his Research Mentor, who is currently his Master’s Professor in Philo-Socio Psycho (Foundations of Education) and an expert in the field of research. The interview questions were used as guide during the interview proper. All conversations were recorded using a Tablet Phone.

RESULTS AND DISCUSSION

Stairway to Excellence

Violeta A. Gonzaga is a daughter of a female merchant in Carbon Market, one of the oldest markets in Cebu City Philippines. Her Father is a Government Official that works for twenty years as Barangay Captain in Casili Consolacion, Cebu where she inherited her prowess. Violeta A. Gonzaga started as an educator at St. Joseph Academy, one of the private schools in Mandaue City Cebu where she rendered 15 years of service which paves her way to become where she is right now. She graduated as Cum Laude in Elementary Education major in General Education at Cebu Normal University. She graduated with laurel, Fourth Honorable Mention, on her Secondary Education at Mandaue Gullas Academy, Mandaue City Cebu. She became a public teacher in Consolacion Central School, where she finished her Primary Education. After a year as Public Teacher, she was then promoted to Master Teacher I, three steps higher than a Teacher I (an entry level of a Public Teacher). Her Academic attainment in Educational Management at Manto Memorial Foundation College advanced her to attain Master Teacher II. She managed to climb the academic ladder by the sweat of her brow. After seven years, she was appointed as Principal. At age 60, she served as Public Schools District Supervisor of Department of Education Province of Cebu Consolacion District.

Traits to replicate

Commitment separates the doers from the dreamers [17]. Violeta A. Gonzaga focuses sharply. The sharper she focuses, the sharper she becomes. Without any leader icon, her experiences light up her path in acquiring her wisdom in managing her people naturally because she is committed and focused of what she is doing. She said that Commitment and Focus are vital for a leader to persevere. Once a leader is determined and has a strong will, most likely she would succeed in his undertaking.

The most desirable title a leader wanted to possess is being GREAT. When she leads using her brain alone, she only gains respect. When she leads using her heart alone, she only gains trust. But when she leads using both her brain and her heart, she gains great leadership. She said that a great leader must not only have the intellect but also be considerate to the feelings of others. She quoted, “I am a decisive leader but with a heart”.

TRIPOD Execution

Her efficient and effective way in managing the three Departmentalize Schools of Department of Education Province of Cebu Consolacion District namely; The Department of Public Elementary Schools; The Department of Public Secondary Schools, and The Department of Private Schools, is through TRIPOD; Transparency, Recognition, Integrity, Problem Solving, Organization, and Delegation.
Transparency yields better relationship, better alignment, better solutions, and better engagement [22]. Violeta A. Gonzaga wants all information accessible for all through constant communication. She initiates symposium across all levels; School Heads to Master Teachers to Subject Coordinators, and ensure that each position are align with her goals. More likely she gains her employee’s trust by giving them updates. “Transparent Leadership is the key to fostering a culture of trust between leaders and their employees.” supplemented by Andre Lavoie (2017). Recognition is extremely powerful in driving employees’ productivity, engagement, and loyalty [13]. Violeta A. Gonzaga profiles her people. She knows their strengths. She’s strategic to whom she would tap specially when assigning a specific task. She encourages and supports her people to maximize their potentials. Kristen Delphos (2015) added, “True Leaders see recognition as a skill to hone to improve relationship among employees and bring out the best in them.” Integrity is doing the right thing for the right purpose [24]. Violeta A. Gonzaga projects honesty so that people under her management reflects honesty. For her, to end dishonesty, one must have dignity and must be true with his feelings. “Honesty destroys dishonesty. Integrity is important to everyone, once it’s broken, everything else will be broken”, she quoted. This is supplemented by Michael Ray Hopkin (2012), “Choosing what is right, regardless of the consequences, is the hallmark of integrity.”

One thing that separates winners from whiners is that effective leaders rise to a challenge. Leaders who have better Problem Solving skills demonstrates different qualities; they anticipate problems, they accept the truth, they see the bigger picture, they handle one thing at a time, and they do not give up a major goal when they are down [17]. Violeta A. Gonzaga does not tolerate petty problems, regardless how small, she addresses it immediately. As what John C. Maxwell (1999) says, “Every problem introduces you to yourself. It shows you how you think and what you are made of.” TDK Technologies (2017) defines Organizational Leadership as a dual focused management approach that works towards what is best for individual and what is best for a group as a whole simultaneously. It is also an attitude and a work ethic that empowers an individual in any role to lead from the top to bottom of an Organization [25]. Violeta A. Gonzaga treats every school very special, with unique needs that can’t be compared with others. She lays out her plans for each school levels and guarantees that all schedules must be followed efficiently. One of the most crucial for leaders to succeed is Delegation [26]. Violeta A. Gonzaga makes sure that everyone knows their duties and responsibilities. As much as possible she does not want anyone to be left out. She always empower her people by delegating them a task, and for every task given, she follows through and evaluates. Brett and Kate McKay (2010) added that, “A leader is an executive, a man who manages time, resources, and people. A leader does do everything himself rather he marshals all of these elements on the pathway to success.”

Test of Time

On Morality of Teachers

When asked about her biggest problem that she encountered in her term as educational leader, she narrated,

“One of the biggest problems I had, though it can be fixed but is still rampant as time passes by, is the Morality and Professionalism of Teachers. I address this by holding them accountable by reviewing the professional code of ethics for teachers and make them feel guilty without intruding into their private life.”

The Preamble of the Code of Ethics for Professional Teachers quoted, “Teachers are duly licensed professionals who possess dignity and reputation with high moral values as well as technical and professional competence in the practice of their noble profession, and they strictly adhere to, observe, and practice this set of ethical and moral principles, standards, and values.” Morality is a belief between distinguishing what’s right or wrong [27]. Surbhi S (2015) defines Moral as customs established by group of individuals while ethics defines as the character of an individual. What is moral to people may not be ethical to others. Violeta A. Gonzaga does not condone any misconduct under her management, because for her it is like a virus that would spread rapidly if untreated. She wants to destroy this kind of wrongdoing by reminding the teachers of their oath and give proper sanctions in accordance to the Republic Act No. 6713 (February 20, 1989), an act establishing a code of conduct and ethical standards for public officials and employees, to uphold the time-honored principle of public office being a public trust, granting incentives and rewards for exemplary service, enumerating prohibited acts and transactions and providing penalties for violations thereof and for other purposes.

Futuristic Views

The Reality of Quality Education

Three years more in public service prior to retirement, Violeta A. Gonzaga sees the Schools of Consolacion as well as its Administrators as the champion of executing the Quality Education. She is certain to achieve this vision thru the help of her School
Heads where they serve as the front-line of educational success, may they be in a private school or in a public school. She wants the School Heads to orient their Teachers thoroughly on the usability of the Curriculum Map and the Daily Lesson Plan, observe classes regularly using Situation Task Action Result (STAR) Observation to ensure quality teaching, and mentor them religiously through Post Conference especially those who badly needs technical assistance. Once the School Head is executing this plan properly and wholeheartedly, Quality Education will become reality. A Quality Education that includes harmonious relationship among others with no more factions. To ensure the effectiveness on the delivery of this so called Quality Education, she will conduct a district achievement test and/or district oral verification test per semester as part of her interventions.

“A good quality education is one that provides all learners with capabilities they require to become economically productive, develop sustainable livelihoods, contribute to peaceful and democratic societies and enhance individual well-being. The learning outcome that are required vary according to context but at the end of the basic education cycle must include threshold levels of literacy and numeracy, basic scientific knowledge and life skills including awareness and prevention of disease. Capacity development to improve the quality of teachers and other education stakeholders is crucial throughout the process.” says VVOB, their own definition on Quality Education [29]. School Heads are the most important and active position in the academe who are responsible in monitoring, evaluating, assessing, and coaching Teachers. Teachers serve as model in rendering the quality instruction to students. Students are the determining factor for Quality Education. Quality Education is attained through a collaborative effort where everyone’s distinct functions play a vital role. Violeta A. Gonzaga wants her people to understand that our noble job requires someone who passionately transform the lives of others without expecting a price in return.

**The Secret Recipe to Success**

**Love of God**

There is a mathematical computation explaining Violeta A. Gonzaga’s secret recipe to success and that is through Cryptology. It is the science of encoding or decoding hidden messages [28]. She is well-known by devoting herself to serving God, despite of her hectic schedules she never misses going to church daily to attend mass and pray the rosary may it be in San Narciso Parish, a Catholic Church in Consolacion Cebu Philippines, or in Fatima Chapel, a chapel in Casili Consolacion Cebu where she currently lives. If she is passionate being a public servant, she is also a martyr acolyte of God. She did not marry a man, rather she united with God. In Cryptography, the English alphabet can be represented by the natural numbers; 1 to 26, A as 1, B as 2, and so on and so forth respectively. Decoding her character using addition, the computation of each character below will show how much percentage it impacts her life and which one is the most significant.

```
K N O W L E D G E
11 14 15 23 12 5 4 7 5 = 96%

H A R D W O R K
8 1 18 4 23 15 18 11 = 98%

A T T I T U D E
1 20 20 9 20 21 4 5 = 100%

L O V E O F G O D
12 15 22 5 15 6 7 15 4 = 101%
```

We always strive for perfection. Knowledge and Hard Work bring us close to it while Attitude brings us there but, with Love of God, it brings us beyond greatness. Love is a unique human trait that cannot be comprehended. Just like the human mind that cannot comprehend God [28]. Garry J. Williams (2016) supports that, “No human mind can comprehend God. If God is incomprehensible, then so is his love. While we may and must speak truthfully about his love, we can never fathom it, because it is divine love, as different from our love as his being is different from our being.”

[www.ijsrp.org](http://www.ijsrp.org)
CONCLUSION

Violeta A. Gonzaga aced herself a position in the public service proficiently. Her educational laurels and triumph destined her to have a successful academic career enrich with passion to serve the public and passion in loving God. With the help of TRIPOD, she was able to execute her different roles effectively and efficiently. She abided the rules and regulations in accordance to the Code of Ethics for Professional Teachers and the Code of Conduct and Ethical Standards for Public Officials and Employees in alleviating the wrongdoings of her subordinates. And, her pleasant vision for the different Schools of Consolacion as well as its Administrators is for them to become the champion in executing the Quality Education. A Quality Education that includes harmonious relationship among others.

RECOMMENDATION

Further research may be conducted to each Educational Leaders in other Districts, Provinces, and Cities of Cebu or in the Philippines to get best practices in managing schools, come up a standardize strategy on how to lead school educators, and implement the result to all districts, divisions, regions, and/or schools in the Philippines. The next researcher may check the efficiency and effectiveness of the TRIPOD Execution.

REFERENCES


[26] Brett and Kate McKay, Leadership: The Importance of Knowing How to Delegate, Published on February 23, 2010 from http://www.artofmanliness.com/2010/02/23/leadership-the-importance-of-knowing-how-to-delegate/


IP Spoofing & its Detection Techniques

HINNA HAFEEZ, TAYYABA KHALIL

MPhil Computer Science, Kinnaird College, Lahore.  
hinnahafeezsh@gmail.com

1. BRIEF SUMMARY OF PAPER: IP SPOOFING DETECTION FOR PREVENTING DDoS ATTACKS IN CLOUD COMPUTING [1]

Cloud computing uses different available technologies i.e. grid computing, cluster etc to provide the user with the pooled resources, the main security issues to be addressed in cloud computing are confidentiality, integrity and availability (CIA). DDoS is the main threat facing by cloud computing, DDoS is used to target the availability of services by flooding and consuming network bandwidth to exhaust resources. The most considerable part of DDoS is IP spoofing where the source address is forged to disallow easy traceback. This paper provides methods for detecting IP spoofing one of the effective ways to detect IP spoofing is Host-based OS fingerprinting, it uses active and passive (idle mode) methods to match OS of incoming packets from its database to filter spoofed IP packets. Figure printing method called ANTID (Anti-Dos) is efficient way used in detecting and filtering spoofed packets used in attacks. It was used to filter flooding traffic during DDoS by using Time to Live TTL value of the source packet header. TCP interactive method is also the good way to detect IP spoofing as it uses acknowledgment messages, it doesn’t receive ACK message it detects it as spoof IP source. OS fingerprinting monitors the incoming packets to determine the operating system of the source on which source packets are running, in this approach administration detects outdated OS and loopholes in the network. Vulnerabilities are identified. OS fingerprinting uses two approaches Active and passive. The inactive approach, a special craft packet is sent towards the true source while passive obtains the header features from incoming packets. Nmap and POF are used in this approach Nmap are networking mapping tool, POF analyses TCP/IP packet headers and determine remote host OS.

2. BRIEF SUMMARY OF PAPER: IP SPOOFING & ITS DETECTION TECHNIQUES [2]

This paper is also based on detecting IP spoofing techniques, it explains packet marking, hop by hop tracing, reactive and logging. Packet marking is further in two ways deterministic packet marking (DPM) & Probability packet marking (PPM). Firewalls are also used to prevent the unauthorized user entering in network. In packet marking method trace back data is inserted in the packet which has to be traced. In deterministic packet marking, 16 bit of id in the header and 1 bit of flag information are marked of source router, from this market information we can retrieve the traced information. IN hop by hop approach, if hop by hop program detects any unauthorized packet it sends it to the upstream router and it repeats until it reaches to the last spoofed packet. Logging is the most effective method, in this method, the logging information of internet traffic packet throughout the internet is used and then mining operations are performed to detect the spoofed packet.

a) Based on the papers, some scenarios of attack that may be possible to apply to some component of the cloud.

Components of Could:

Cloud provides the pool of services to the user, cloud computing uses some existing technologies i.e. grid computing, utility computing, cluster computing and distributing computing. Cloud service model is divided into three

- Software as a service (SaaS)
- Platform as a service (PaaS)
- Infrastructure as a service (IaaS)

Cloud can be the private, public or hybrid cloud. The core components of cloud computing using its services are

- Bandwidth
- Routers
- Data packets
- IPs of source and target systems

DDoS Attack:

DDoS is the most important threat in cloud computing, DDoS target the availability trade of C-I-A. As cloud computing provides the pool of services to many users, by DDoS attackers the core service of cloud computing by flooding and consuming the network bandwidth to exhaust services. DDoS
carries out amplification which can either be a direct or reflection attack.

**Figure 1: DDoS Attack in Cloud**

DDoS attack is often characterized by spoofing of source IP address to disguise its identity to disallow easy traceback or deceive the Cloud Provider to enjoy certain service accrued to a trusted host.

1) One possible Scenario:

The attacker creates a network, which contains many systems, then the attacker finds the targeted network’s trusted IPs which are IPs of source systems for spoofing and then starts send data from its source systems, as many systems will start interaction with the targeted network, this heavy traffic of data packets will consume the network bandwidth and server will be down.

With this approach, the **availability**, which is the fundamental of cloud computing can be targeted.

2) Used and targeted components:

The attackers use data packets to consume bandwidth of the network. They use IPs in their attack. Packets travel through network with the help of routers which sort of maps are providing information from where to where data should be sent.

3) Other Related services which can be Target:

Availability is the main targeted C-I-A trade other related trades can be:

- Confidentiality
- Integrity

Once an attacker access IPs of targeted network, the attacker can also access the information from the targeted IPs. Once information is accessed then not only confidentiality, integrity can also be targeted. An attacker can leak the information and can fabricate the information by sending harmful data which can modify the targeted system's internal database.

The information that can be modified by the attacker but with the trusted IP may cause confusion hence affecting the integrity of the data.

b) **CIA Objectives addressed by proposed Techniques:**

**Availability:**

DDoS is the main threat used to target the availability of the services provided by cloud computing, DDoS sends data in bulk to exhaust resources, IP spoofing is the related concept, the attackers try to hide their source IP by spoofing to disallow backtracking. They used forged IPs so that they cannot be traced, for this purpose they used other trusted IPs. Both papers provide different ways to trace the exact source IPs.

Paper 1 mentioned above provides following techniques:

1. Packet marking method
   - a) Deterministic packet marking (DPM)
   - b) Probabilistic packet marking (PPM)
2. Hop by Hop
3. Logging

Paper 2 provides following technique:

1. OS fingerprinting method

Details are given in summary. By using these methods source IP can be detected and can be blocked.

**Confidentiality:**

Techniques provided in these two papers help in detection of source system used in unauthorized access. If someone can access the network’s system IPs he/she can also get the access to the information. By getting this access the confidentiality of the information can be a break and this information can be leaked.

**Integrity:**

If someone can access the internal systems of any network they can also fabricate these systems information by using this access. The provided methods in both papers can identify such harmful accesses and by detecting techniques they can block such accesses to the network and network can be secure.

**Comparison of approaches mentioned in two papers:**

The paper “IP spoofing & its detection technique ”provides networking based techniques, the techniques used in that paper are using routers and packets information in detection. In this paper different techniques which have been discussed are mentioned below out of them the Logging is considered to be the most effective technique of tracing the source IP address of the intruder.

**Firewall**

1. Packet filter firewalls
2. Application-level gateway firewalls and
3. Circuit-level gateway firewall

**Packet marking methods for IP tracing**

- Deterministic packet marking
OTHER METHODS OF IP TRACING

- Hop-By-Hop

- Logging

The paper “IP Spoofing Detection for preventing DDoS Attacks in Cloud Computing” provides techniques for detection and prevention which are OS based. This is more effective and authentic way of detection and prevention. It includes “OS fingerprinting” technique to detect and prevent the DDoS attacks in Cloud Computing. It monitors the incoming packet to determine the OS the source is running on.

It also covers the cases of active and passive i-e when user system is active and the case when it’s idle.

Findings:

On the basis of provided comparison, it is observed the approach used in the paper "IP Spoofing Detection for preventing DDoS Attacks in Cloud Computing “is more reliable and comprehensive, it not only provides the way of detection but also covers the methods of prevention. Both active and passive host-based OS fingerprinting that verifies the true source of an incoming packet by identifying its OS in Cloud Computing environment. Two major scenarios which have been implemented has discussed in the paper which verifies the detection and prevention of attacks.

Conclusion

In this report, we have concluded that, if the techniques are implemented properly the attacks can be detected and also help us to prevent out cloud computing network system from intruders. We have seen that “OS Fingerprinting” and “logging” are most effective techniques.

References:


2: 1Maderi Lavanya, 2P.K.Sahoo PG Scholar, Professor, Dept. of CSE, Sreenidhi Institute of Science and Technology (Autonomous), Hyderabad , “IP spoofing and its Detection Technique “, IJACTA, 2016
Mapping Trees Outside of Forests Using Remote Sensing

Md. Abdus Salam*1 and Md. Abu Taleb Pramanik**

* Principal Scientific Officer, Bangladesh Space Research and Remote Sensing Organization (SPARRSO)
Agargaon, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh

**Senior Scientific Officer, Bangladesh Space Research and Remote Sensing Organization (SPARRSO)
Agargaon, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh

1Corresponding author’s email address: salam2bd@gmail.com

Abstract- Trees excluded from the forest and other wooded lands are defined as “Trees outside forests (TOF)”. TOF are mostly located on farmlands and built-up areas of rural and urban regions. Remote sensing with its unique capability of synoptic viewing, real time and repetitive nature offers a potential tool for monitoring and evaluation of Earth’s natural resources. Forestry is one of the most important disciplines in which remote sensing technology is being used over a considerably long time period from the early stage of its development. Remote sensing technology has been successfully employed in various studies like forest inventory, monitoring of forest cover changes, forest damage assessment. In the present research a study has been undertaken to develop an operational method for mapping and monitoring trees outside of forests by using the freely available moderate resolution satellite remote sensing data in the Barisal Division of Bangladesh excluding the Jhalokati District. Landsat 8 OLI (Operational Land Imager) data of 2016 and Landsat ETM+ (Extended Thematic Mapper) data of the year 2000 have been used for this purpose. A comparison of TOF has also been done in the five Upazillas of Barguna District between the year 2000 and 2016. Driving forces behind the changes of TOF has also been investigated through GPS (Global Positioning System) based ground verification and interview with the people living in the locality.

Index Terms- ‘Madhupur Sal forest’, Landsat 8 OLI, Spectral Behavior, Data Acquisition Time.

I. INTRODUCTION

Major portions of the woody biomass of Bangladesh are contributed by the large number of “Trees outside forests (TOF)” which are planted in the homestead area or common area in the locality. The world has billions of trees that are not included in the Forest Resource Assessment definitions of forests and other wooded land (FAO 2001). If the TOF are not included in national forest inventories then it would underestimate the country-wide biomass and carbon values. Classification and mapping the TOF are carrying the challenges and some extent showing the difficulties also. TOF may be a significant source of timber and non-wood forest products. TOF play an important ecological role as these planted trees and shrubs help to prevent high surface runoff and thus prevent the soil erosion. It also helps to minimize the flooding and works as fence to protect from strong winds. It has been noticed that the forest resources in the state owned forest land of Bangladesh is decreasing at a significant rate. Good news is that the awareness building activities and campaign raised by the government organizations (GOs) and non government organizations (NGOs) and also the aid agencies working in Bangladesh played a significant role to motivate the people for planting trees around the homesteads and the suitable lands outside of forests. The area under such type of plantations is increasing in the recent years. Along with the segregation of a big family to an additional family a new house is being build and the owners are planting trees around their houses. Thus the homestead forests are mainly belonging to the private properties. The important characteristics of homestead forests are species diversity, high yielding and well organized structure. TOF may be termed by other terminology as ‘village forests’ and ‘rural forests’.

www.ijsrp.org
which includes trees on homesteads, road sides, common access lands, community lands, premises of educational institutions and places of worship. These trees are not belonging to the forest or other wooded land category but they are TOF (Rawat et al. 2003). Rawat et al. 2003 also mentioned that TOF resources found in Bangladesh are belonging to the following category: Trees grown in homestead gardens, block plantations, ago-forestry plantations and stripe plantations along road and highways, railways, district council and feeder roads. Sylvander (1981) reported on forest cover mapping including TOF for Costa Rica carried out in 1967 and 1977, as part of a forest inventory project. Using FAO (1974) guidelines five classes, based on tree cover and land use were distinguished and mapped (Rawat et al. 2003). Trees those found in isolated patches, in narrow strips, in areas with sparse or predominantly herbaceous vegetation, or in riparian areas are known as TOF and are a great concern on these trees as they may be the habitat of invasive pests such as the emerald ash borer (Andrew et al. 2012).

Therefore the present study has been undertaken with the aim of developing an operational method for mapping and monitoring trees outside of forests by using the freely available moderate resolution satellite remote sensing data. The following objectives would be taken into consideration:

- Identification of the trees outside of forests;
- Study the changes of TOF in and identify the driving forces behind the changes;
- Generation of data set and statistics;

II. MATERIAL AND METHOD

Study area

Study area is located in Barisal Division of Bangladesh excluding the Jhalokati District. There are six districts in Barisal Division and those are Barisal, Bholo, Barguna, Paturakali, Pirojpur and Jhalokati. Bholo, Paturakali and Barguna are three coastal districts of Barisal Division. Dhaka Division is in the north, Khula Division is in the west, Chittagong Division is in the east and the Bay of Bengal is in the south of Barisal Division. Barisal Division lies in the Ganges (Padma) River delta on an offshoot of the Arial Khan River (Kirtonkhola). Figure 1 shows the study area. The area extends from N 21° 42' 30.44" to N 23° 06' 36.62" and E 89° 48' 13.43" to E 91° 04' 16.14" and is about 242 km away from the capital city of Dhaka. Relatively low land characterizes landscape of the area. The area is fragmented into small patches and intermingled with the neighboring settlements. The climate of this area is tropical.

Figure 1: Location map of the study area.

Figure 2: Temperature and rainfall graph of Barisal.
In Barisal, the average annual temperature is 25.9 °C and the average annual rainfall is 2184 mm (Figure 2). The driest month is January, with 10 mm of rainfall. With an average of 444 mm, the most precipitation falls in July. The warmest month of the year is May, with an average temperature of 30.3 °C. January has the lowest average temperature of the year. The difference in precipitation between the driest month and the wettest month is 444 mm. During the year, the average temperatures vary by 11.1 °C (https://en.climate-data.org/location/31711/).

Data and software used

Various types of data have been used for the present study. Table 1 provides a list of the satellite data and ancillary data that have been used for the present study.

<table>
<thead>
<tr>
<th>Satellite/Sensor</th>
<th>Acquisition Dates</th>
<th>Ancillary data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landsat 7 ETM+</td>
<td>28 February, 2000</td>
<td>As ancillary data, high resolution data from Google Earth and SPARRSO archive, administrative boundary from Survey of Bangladesh were used.</td>
</tr>
<tr>
<td>Landsat 8 OLI</td>
<td>15 January, 2016</td>
<td></td>
</tr>
</tbody>
</table>

Besides these, historical maps and in situ data of this area have also been used. Field photographs acquired by digital camera have also been used. ERDAS IMAGINE and Arc/Info software has been used for data generation and vector layer analysis and management.

Methodology

Cloud-free Landsat 7 ETM+ data of 28 February 2000 has been downloaded from United States Geological Survey (USGS) website. Extraction of different bands data has been done and then layer stacking of has been conducted for making the multi bands images. Bands 1 to 6 were considered for layer stacking. Landsat 7 ETM+ observation of the study area displaying Band 5, 4 and 3 (R, G, B) on 28 February 2000 has been shown in Figure 3. Cloud-free Landsat 8 OLI data of 15 January 2016 has been downloaded from United States Geological Survey (USGS) website. Extraction of different bands data has been done and then layer stacking of has been conducted for making the multi bands images. Bands 2 to 7 were considered for layer stacking. Landsat 8 OLI observation of the study area displaying Band 6, 5 and 4 (R, G, B) on 15 January, 2016 has been shown in Figure 4.
The main target of this study was to mapping trees outside of forest (TOF). On screen digitization has been performed to delineate the TOF and different land cover classes. Global Positioning System (GPS) based ground verification (Figure 5) has also been conducted in different land cover classes to delineate accurately the land cover classes in the study area (Figure 6). Ground photographs have also been taken during ground truthing. The whole methodology of the study has been shown in figure 7.

Figure 6: Shows the colour composite of Landsat 8 OLI image of 15 January 2016 where the location of different land cover classes has been shown.

Figure 7: Shows the whole methodology of the research.
III. RESEARCH FINDINGS AND DISCUSSIONS

Mapping trees outside forests in study area

The map of trees outside of forest (TOF) of the study area has been shown in figure 8. Mangrove and water have also been shown in the map. Statistics has been generated from the analyzed images of the study area and it has been found that the TOF area were 259571.4 ha in 2016 in Barisal Division excluding Jhalokati District. This area is 20% of total study area. Comparisons with total study area in ha and in percentage (%) have been shown in figure 9 & 10 respectively.

Figure 8: Shows the trees outside of forest (TOF) in the study area in 2016.

Changes of tree outside forest (TOF) in Barguna District between 2000 & 2016

The map of trees outside of forest (TOF) in Barguna District has been mapped for the year 2000. Then the comparison has been made between the year 2000 and 2016 (Figure 11 & 12). The area of Trees outside Forests (TOF) area was 18325.90 ha in 2000 in Barguna District. This area is 10.02% of Barguna District area study area in 2000. The area of Trees outside Forests (TOF) area was 37043.90 ha in 2016 in Barguna District. This area is 20.25% of Barguna District area study area in 2016. The total coverage of TOF in the Barguna District increased between 2000 and 2016 is 18325.9 ha to 37043.9 ha and 10.02 % to 20.25 % (Figure 13 & 14).

Figure 11: Shows the trees outside forest (TOF) and other land cover map of Barguna District in 2000.

Figure 12: Shows the trees outside forest (TOF) and other land cover map of Barguna District in 2016.
Summary of the changes of TOF in different Upazillas of Barguna District shown in Table 2. TOF in 2000 and 2016 and their changes in Barguna Sadar Upazilla between 2000 & 2016 have been shown in Figure 18, 19 & 20 respectively.

Figure 13 & 14: Shows the trees outside forests (TOF) changes in Barguna District between 2000 & 2016.

Figure 15: Shows the trees of outside forests (TOF) in Barguna District in 2000.

Figure 16: Shows the trees of outside forests (TOF) in Barguna District in 2016.

Figure 17: Shows the changes of outside forests (TOF) in Barguna District between 2000 & 2016.

Figure 18: Shows the trees outside forest (TOF) in Barguna Sadar Upazilla in 2000.

Figure 19: Shows the trees outside forest (TOF) in Barguna Sadar Upazilla in 2016.

Figure 20: Shows the changes of trees outside forest (TOF) in Barguna Sadar Upazilla between 2000 & 2016.
Trees outside forests (TOF) in 2000 and 2016 and their changes in Betagi Upazilla between 2000 & 2016 have been shown in figure 21, 22 & 23 respectively.

Figure 21: Shows the trees outside forest (TOF) in Betagi Upazilla in 2000.
Figure 22: Shows the trees outside forest (TOF) in Betagi Upazilla in 2016.
Figure 23: Shows the changes of trees outside forest (TOF) in Betagi Upazilla between 2000 & 2016.

Trees outside forests (TOF) in 2000 and 2016 and their changes in Pathorghata Upazilla between 2000 & 2016 have been shown in figure 24, 25 & 26 respectively.

Figure 24: Shows the trees outside forest (TOF) in Pathorghata Upazilla in 2000.
Figure 25: Shows the trees outside forest (TOF) in Pathorghata Upazilla in 2016.
Figure 26: Shows the changes of trees outside forest (TOF) in Pathorghata Upazilla between 2000 & 2016.

Trees outside forests (TOF) in 2000 and 2016 and their changes in Amtali Upazilla between 2000 & 2016 have been shown in figure 27, 28 & 29 respectively.
Trees outside forests (TOF) in 2000 and 2016 and their changes in Bamna Upazilla between 2000 & 2016 have been shown in figure 30, 31 & 32 respectively.

Table 2: Shows the changes of trees outside forests (TOF) in different Upazillas of Barguna District between 2000 & 2016.

<table>
<thead>
<tr>
<th>Name of Upazila in Barguna</th>
<th>Total area (ha)</th>
<th>TOF (2000)</th>
<th>TOF (2016)</th>
<th>TOF changes in 2000-2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area (ha)</td>
<td>(%)</td>
<td>Area (ha)</td>
<td>(%)</td>
</tr>
<tr>
<td>Barguna Sadar</td>
<td>45400</td>
<td>3489.39</td>
<td>10029.55</td>
<td>22.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.69</td>
<td>22.09</td>
<td>6540.16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>187.43</td>
</tr>
<tr>
<td>Betagi</td>
<td>16700</td>
<td>2357.79</td>
<td>5496.44</td>
<td>32.91</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.12</td>
<td>32.91</td>
<td>133.12</td>
</tr>
<tr>
<td>Pathorghata</td>
<td>38700</td>
<td>3323.60</td>
<td>6118.81</td>
<td>15.81</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.59</td>
<td>15.81</td>
<td>84.10</td>
</tr>
<tr>
<td>Amtali</td>
<td>72000</td>
<td>7734.17</td>
<td>12519.42</td>
<td>17.39</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.74</td>
<td>17.39</td>
<td>61.87</td>
</tr>
<tr>
<td>Bamna</td>
<td>10100</td>
<td>1420.95</td>
<td>2879.68</td>
<td>28.51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.07</td>
<td>28.51</td>
<td>1458.73</td>
</tr>
<tr>
<td>Total</td>
<td>182900</td>
<td>18325.90</td>
<td>37043.90</td>
<td>20.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.02</td>
<td>20.25</td>
<td>102.14</td>
</tr>
</tbody>
</table>
Driving forces for tree outside of forest (TOF) expansion in different Upazillas of Barguna District between 2000 & 2016

An attempt has been made to identify the driving forces behind the trees outside of forest (TOF) expansion in different Upazillas of Barguna District. Individual survey and focused group discussion had been conducted during ground truthing. People from different profession, age, sex, literacy, habitat (urban, sub-urban) etc. were considered for addressing the representative sampling. The following tree species were found in the study area namely Rain tree, Coconut, Mahogany, Acacia, Eucalyptus, Mango, Guava etc. The location of TOF were mainly in the homestead, farmland, bund of farmland, roadside, canal side, dam & bund side, community area (school, mosque, temple, church)

- The major drivers of these changes were population growth and household expansion,
- Higher financial returns from forests and forest products compared to alternative land uses,
- Initiatives related to social forestry programs,
- Awareness to the environmental issues and
- Fencing for protecting from natural disasters.

IV. CONCLUSION

Trees outside of forest (TOF) in the study area have been increased as a significant amount of area during 2000 to 2016. The main reason was the population growth and as a result fragmentation of joint family and turned in to new families with their new settlements. Although the cropping land is under tremendous pressure through building the new settlements but the green vegetation are increasing a lot and the equilibrium point is still unknown. An operational methodology for mapping of TOF and generating statistics in this research based on Landsat data. “Trees outside of forest” is a challenging vegetation layer while working on the crop monitoring and landuse mapping. The output of this research may be helpful for the other researcher in those regards.

ACKNOWLEDGEMENT

The research team is grateful to Chairman SPARRSO as the funding required for the research has been allotted from the annual research budget of SPARRSO.

REFERENCES


AUTHORS

First Author – Md. Abdus Salam Ph.D, Principal Scientific Officer, Bangladesh Space Research and Remote Sensing Organization (SPARRSO), Agargaon, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh Email: salam2bd@gmail.com

Second Author – Md. Abu Taleb Pramanik, Senior Scientific Officer, Bangladesh Space Research and Remote Sensing Organization (SPARRSO), Agargaon, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh Email: atpramanik@yahoo.com

Correspondence Author – Md. Abdus Salam Ph.D, Principal Scientific Officer, Bangladesh Space Research and Remote Sensing Organization (SPARRSO), Agargaon, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh Email: salam2bd@gmail.com
Relationship between Entrepreneurial Knowledge and Strategic Orientation

P.G.M.S.K. Gamage*, W.M.P.G.C. Weerakoon**

* Department of Management Sciences, UvaWellassa University
** Department of Management Sciences, UvaWellassa University

Abstract - Despite the importance of entrepreneurial knowledge in encouraging strategic behavior of SMEs, there is a dearth of literature examining this link. A sample of 50 SMEs owner managers in Badulla Divisional Secretariat was investigated with the aim of identifying the relationship between entrepreneurial knowledge and strategic orientation. A structured questionnaire was used to collect data. Overall level of strategic orientation of the studied sample was at a medium level while the entrepreneurial education level was at a high level. The regression model (52.9% R-square) confirmed that entrepreneurial knowledge is a strong predictor (P<0.01) of strategic orientation. This study informs the provincial level policy makers the direction they should take in designing and delivering the training programmes for future entrepreneur development initiatives.

Index Terms - Entrepreneurial Knowledge, Strategic Orientation, SMEs Owner Managers.

I. INTRODUCTION

The strategic behaviors targeting continuous superior performance of the business is known as strategic orientation (Gatignon & Xuereb, 1997) and it motivates and directs on the approach a firm should take in relation to innovation (Murray, 2012). This strategic gesture of small and medium enterprises (SMEs) is encouraged by entrepreneurial knowledge (Hearth & Mahmood, 2013). Moreover, SMEs have their own specific way of operations where demographic, psychological and behavioral characteristics and skills and technical competencies of the entrepreneur have been cited frequently as most influential factors of performance (Mitchelmore & Rowley, 2008).

However, entrepreneurial and strategic management perspectives jointly contribute to explain the strategic orientation needed to achieve and sustain competitive advantages (Esteve, Peinado & Peinado, 2008). Recently researchers has focused on investigating internal moderators of the strategic Orientation and performance relationship (Convin et al. 2006; Lumpkin & Dess 1996; MaMahon, 2001). According to the Esteve, Peinado & Peinado (2008), knowledge level of the managers has identified as internal factor. However, according to the Esteve, Peinado & Peinado (2008), research has not found a moderator effect of the knowledge level of top managers on the strategic Orientation and performance relationship while Hitt & Tyler (1991) and Wiersema & Bantel (1992) found that the type of academic degrees held by executives influenced their strategic decisions.

However, the existing literature has so far provided only limited evidence to support the link between entrepreneurial knowledge and strategic orientation (Matlay, 2008). Further, the effects emanating from entrepreneurial knowledge on performance has poorly been understood (Graevenitz, Harhoff & Weber 2010). Hence, the twin objectives of the study aim to identify the levels of entrepreneurial knowledge and strategic orientation and thereby to identify the relationship between them.

A sample of 50 SMEs owner managers were randomly selected from a list of 397 owner managers registered in Badulla Divisional Secretariat. Data collection was facilitated by a structured questionnaire with 5-point Likert scale statements based on the constructs defined by Vesper (1987) for entrepreneurial education and Venkatraman (1989) for strategic orientation. The pilot study of 15 owner managers informed a high reliability level of the questionnaire with a Conbach’s Alpha value exceeding 0.7 in all the dimensions of the questionnaire. Levels of entrepreneurial education and strategic orientation were analyzed by using mean and graphs. The simple linear regression model presented below was employed to identify the relationship between entrepreneurial education and strategic orientation.

\[ SO = \beta_0 + \beta_1 (EE) + \epsilon \]

Where, \( \beta_0 \) = Constant; \( EE \) = Entrepreneurial Education; \( SO \) = Strategic Orientation; \( \epsilon \) = error term

Accordingly, this study has been investigated the previous research findings, which are related to Entrepreneurial Knowledge (EK) and Strategic Orientation (SO). Secondly, it has been deliberated the result of the study. Then, it has been organized the discussion and conclusion related with the result.
II. RESEARCH ELABORATIONS

Previous research findings, which are related to entrepreneurial knowledge (EK) and strategic orientation (SO) has summarized as follows. Firstly, the definitions of each variable and constructs of them has been revealed.

2.1. Entrepreneurial Knowledge (EK)

Entrepreneurial knowledge describes as the concepts, skills and mentality required by enterprise owner (Anderson & Jack, 2008). It is involving with multidisciplinary such as many skills and technical factors (Wei & Guo, 2010). As cited by Packham et al. (2010), entrepreneurial knowledge and skills can be taught and developed (Gibb, 2005; Kuratko, 2005). According to Vesper (1986), the attitudes and personality traits required for successful entrepreneurship can be transferred through learning. Further, it plays an important role in the process of building entrepreneurial capacity (Hannon, 2006).

According to Packham et al. (2010), there are main objectives for effective EK. As cited by Jones (2010), they are develop wide understanding (Chen et al., 1998; Jack & Anderson), acquire entrepreneurial mind set (Loudon & Smith, 1999) and how to start and operate an enterprise (Solomon et al.; 2002). Further, as cited by Sehhat & Ghanepasand, 2014), knowledge is resulted by experience, skill, culture, personality, emotion (Beijerse, 2000).

However, there is no comprehensive criteria for measurement of entrepreneurship knowledge in organization and most of the researchers’ concentrated on role of knowledge of owners (Sehhat & Ghanepasand, 2014). Most of the knowledge based researches were applied the vesper’s knowledge levels (Shane et al., 2000) and It has been identified as constructs for this study.

**Business General Knowledge**

According to the Vesper, (2004) business general knowledge is able to gain in the classroom. Specially, the knowledge about each functional area of the business and the knowledge of start up the business are the specialized knowledge areas under this knowledge level (Vesper, 2004). Further, the way of stretch the resources, pursue bootstrapping and fundraise and the way of selling vision of the business are concerned under this knowledge. Further, Dierickx & Cool (1989) has been identified General Knowledge as a stock which reflects the background of the entrepreneur.

**Venture General Knowledge**

The content which is included in entrepreneurial course is identifying as venture general knowledge (Vesper, 1986). Further, Information of venture capital, venture plan, intellectual property should be included in this level of knowledge (Vesper, 1986).

**Opportunity Specific Knowledge**

Opportunity specific knowledge is more vital and essential element for entrepreneurs (Ardichvili, Cardozo, & Ray, 2003; Gaglio & Katz, 2001; Shane & Venkataraman, 2000). It is important to start company, business survey related on the particular type of business person wishes to start and the existent knowledge is concerned in this level of knowledge (Vesper, 2004). Further, it can be developed through market experience and it cannot be taught (Vesper, 2004). Therefore, understanding the opportunity identification process represents one of the core intellectual questions for the domain of entrepreneurship (Gaglio & Katz, 2001)

**Venture Specific Knowledge**

Venture specific knowledge is a half of the opportunity specific knowledge which cannot be taught in the class room (Vesper, 2004). Knowledge regarding production of a particular product or service is identified as venture general knowledge (Vesper, 2004). Further, it can be identified as knowledge learned by the entrepreneur during certain activities occurring during the start – up process Friga (2000). According to Dierickx & Cool (1989), venture specific knowledge is identified as specific knowledge flows which reflects the knowledge acquiring through learning.

2.2. Strategic Orientation (SO)

As to Manu & Sriram, (1996) SO is how an organization uses strategy to adapt to and change aspects of its environment for a more favorable alignment. As cited by Bing & Zhengping (2011), SO reflects the strategic directions of firm to create the proper behaviors for the continuous superior performance of the business (Narver & Slater, 1990). According to Hittet al., (1997); Venkatraman, (1989); it is the heart of the strategic management discipline and it is a dynamic capability that represents the organization’s ability to integrate and built internal and external competencies (Zhou, Yim, & Tse, 2005; Teece, Pisano & Shuen, 1997).
SO is consisted with multidimensional constructs (Voss & Voss, 2000). It refers to umbrella term covering different constructs such as market orientation (MO) Entrepreneurial Orientation (EO) and Learning Orientation (LO) (Barney, 1991). As cited by Faryabiet al.,(2002) there are three main views, narrative approach, classificatory approach and the comparative approach has been used for examine the strategic orientation (Venkatraman, 1989).

Most of the strategic orientation dimensions were derived from the Venkatraman’s (1989) and Chan’s (1992) instruments (Hopper, Huff &Thirkell, 2007). Since, Venkatraman’s (1989), Strategic Orientation of Business Enterprise (STROBE) model is selected for this study and the dimensions of selected frame work are further defined as follows as constructs of the study.

**Aggressiveness**

Aggressiveness is the willingness to challenge and perform better than the competitors (Lumpkin &Dess, 1996). It means aggressiveness is more rival focused and aimed at introducing new products, new markets and type of competitive action (Miles & Cameron, 1982). Further, Buzzellet al., (1975) has been explained that aggressiveness seeks first-mover advantage and exhibits a combative posture in exploiting market opportunities. More, aggressiveness exploiting and developing resource more rapidly than the competitors (Clark & Montgomery, 1996). According to the Venkatraman (1989), the procedure of resources allocation which adopted by the organization in its selected market for improving market position at a relatively faster rate than the competitors has identified as aggressiveness.

**Analysis**

Analysis is the tendency of an organization to find out profound for the roots of problems and to generate the best possible solutions alternatives (Venkatraman, 1989). The over role problem solving ability is concerning with the analysis dimension (Miller & Friesen, 1984). Resource allocation decisions and use of appropriate management system decision are relating with this dimension (Grant & King, 1982). More, analysis is the firm’s knowledge building capacity (Bourgeois, 1980). Further, it completes understanding of organizational and environment issues as result of overall problem-solving approach to strategic decision making (Miller & Friesen, 1984). According to the Grant and King (1982); Venkatraman (1989), analysis is the procurement of competitive strategy to achieve anticipated objectives in nature of internal systems.

**Defensiveness**

Defensiveness is behaviors aimed at protecting a firm’s market position through cost reduction and opportunity seeking as to develop with in the market (Venkatraman, 1989). As cited by Chatzoglou et al., (2011) defensiveness is the organization’s ability to maintain prominence within its domain (Morgan & Strong, 2003). Further, strategies that are rigid and conservative as well as a static view on product-market scope remaining existing product without moving to new product has identified as defensiveness (Miller,1989). Further, this reflects the strategies are made by firms to be able to accumulate selected capabilities and skills, and develop composite strategies to outperform less domain focused firms (Hart & Banbury, 1994; Morgan & Strong, 2003). Miller (1989) has been identified defensiveness as strategies that are rigid and conservative as well as a static view on product-market scope remaining existing product without moving to new product.

**Futurity**

Futurity is establishing the future desired state and reached it by processing through business plan (Andrews, 1971; Ansoff, 1975; Grant & King, 1982). It emphasizes on long term consideration against short term consideration of the firm. The view of preparation and positioning in future environmental situations by the organization (Morgan & Strong, 1997). According to the Venkatraman (1989), futurity is sequential considerations included in key strategic decisions, in terms of relative emphasis of effectiveness considerations versus efficiency considerations. The role in reducing corporate anxiety about competitive futures and providing a base to understanding the pattern, form, and extent of potential change in competitive market are the supports which are included in futurity (Courtney et al., 1997).

**Pro-activeness**

Venkatraman (1989), has identified pro – activeness as seeking new opportunities which are related or not related with present line operations, introducing new products and brand fast than competitors and strategically eliminating operations which are in the mature or declining stages of life cycle. Further they has been sated that pro-activeness is central to innovative behavior which reflects a firm’s inertia for exploiting emerging opportunities, experimenting with change, and mobilizing first mover actions (Morgan & Strong, 2003). According to the Miles & Snow (1978), pro-activeness is continuously search for market opportunities, and
experimentation with potential responses to changing environmental trends. Further, initiative adopted by firms to continuously search for developing opportunities is pro-activeness (Slater & Narver, 1993).

Riskiness

Riskiness is extent of risks in decisions of various resource allocation as well as choice of products and markets (Venkatraman, 1989). Risk taking is an important factor in persuading entrepreneurship and this reflects organizational level risk than the individual level risk (Miller, 1987). According to Baird & Thomas (1990), riskiness is combining the entrepreneurial skills of constructive risk taking with opportunistic venture seeking is the objected strategic trait which firm demonstrates. Further, Baird & Thomas (1990) addresses that riskiness is combining the entrepreneurial skills of constructive risk taking with opportunistic venture seeking is the objected strategic trait which firm demonstrates.

III. RESEARCH FINDINGS

The majority of the sample comprised with female entrepreneurs (52%) and owner managers in the age group of 31-50 (72%). The highest education level of 54% of the sample was G.C.E. O/L while 40% had completed A/L. Surprisingly, 84% of the sample had no any professional qualifications.

The average level of overall entrepreneurial education was at a high level (3.9752) and the venture specific knowledge of the entrepreneurs was found to be the highest contribution to this with an average of 4.34. The average of overall level of strategic orientation of the studied sample was at a medium level (3.49) where futurity construct (3.85) was the highest contributor.

The Table-1 summarizes the results of simple linear regression and it confirms that specified regression model explains only 52.9% (R-square) of the total variation of strategic orientation.

The statistically significant (P<0.01) F-test confirms that the model is fitted well [Table -1 (b)]. As per the [Table -1 (c)], entrepreneurial education is a statistically significant (P<0.01) predictor of strategic orientation. Thus, the estimated model can be established as follows.

\[ SO = 0.862 + 0.661EE \]

Accordingly, higher the level of entrepreneurial education, that will be resulted in an increase of strategic orientation by 0.66 per unit.

<table>
<thead>
<tr>
<th>Table -1 – SPSS Output of Simple Linear Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(a) Model Summary</strong></td>
</tr>
<tr>
<td><strong>R</strong></td>
</tr>
<tr>
<td>.727</td>
</tr>
<tr>
<td><strong>(b) ANOVA</strong></td>
</tr>
<tr>
<td><strong>Model</strong></td>
</tr>
<tr>
<td>Regression</td>
</tr>
<tr>
<td>Residual</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td><strong>(c) Coefficients</strong></td>
</tr>
<tr>
<td><strong>Predictor</strong></td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>EE</td>
</tr>
</tbody>
</table>

IV. CONCLUSION

This study was conducted to identify the levels of entrepreneurial education and strategic orientation and to identify the relationship between them based on 50 SMEs owner managers. The majority of the sample (80%) had high level of entrepreneurial education while 62% of sample moderate level of strategic orientation. Entrepreneurial education was found to be a statistically significant predictor of strategic orientation. This study informs the provincial level policy makers the direction they should take in designing and delivering the training programmes for future entrepreneur development initiatives.

www.ijsrp.org
REFERENCES


AUTHORS

First Author – Gamage P.G.M.S.K, Bachelor of Business Management in Entrepreneurship and Management, UvaWelassa University, sewwandikagamage20@gmail.com.

Second Author – W.M.P.G.C. Weerakoon, Lecturer, UvaWelassa University, and reschami@gmail.com.
Learning Plan of SM-3T Teachers in Tule Village, East Melonguane Timur Subdistrict, Talaud Islands, North Sulawesi - Indonesia

Irma Djanapa Bulow*, Fientje Oentoe1), Sanusi Gugule2) and Johannis Senduk3).

*Doctoral Program of Education Management, Manado State University,
1). Faculty of Educational Science, Manado State University, Tondano North Sulawesi, Indonesia
2). Faculty of Natural Science and Mathematics, Manado State University, Tondano North Sulawesi, Indonesia
3). Faculty of Educational Science, Manado State University, Tondano North Sulawesi, Indonesia

Address Campus Graduate Program Manado State University, Tondano 95618, North Sulawesi, Indonesia, www.unima.ac.id

Corresponding author: irmabdtkmanado@gmail.com

Abstract: Bachelor Teaching in Forefront, Outer and Underdeveloped Areas (SM-3T) is a program of graduate service to participate in the acceleration of educational development in forefront, outer and underdeveloped areas for one year under the slogan ‘go forward together to educate Indonesia’. This study aims at analyzing the learning planning program of SM-3T teachers and its implementation in East Melonguane Subdistrict, especially in Inpres 4/82 State Elementary School of Tule. It employed case study, interview and qualitative analysis such learning plan and its implementation. Data were obtained from interviews with SM-3T teachers stationed in the forefront, outer and underdeveloped areas in Tule Village, East Melonguane Subdistrict, Talaud Islands, North Sulawesi Province. It can be concluded that, in general, the learning plan of SM-3T teacher is good; as indicated that before the learning process they made syllabi and Learning Implementation Plan, teaching materials, slideshow materials in accordance with the standards of competence set by the government. It is not only materials that should be prepared in the learning plan, but patience also should be prepared in the process of teaching and learning. The characters of teachers in delivering materials using subtle language accompanied with great care on students may change the characters of students who were rough into soft. Culture can also make the achievement of class control and learning materials possible.

Keywords: Plan, learning, SM-3T (Bachelor Teaching in Forefront, Outer, Underdeveloped).

BACKGROUND

Stretching along 3,977 miles between the Pacific Ocean and the Indian Ocean, Indonesia is one of the largest archipelagic countries in the world. The results of satellite imagery study in 2002 indicated that Indonesia has ± 18,306 islands and ± 16,056 of which are named islands, with a total area of ± 5,193,250 km², land area of ± 1,919,440 km2 and water area of ± 3,257,483 km² (Ministry of Marine and Fisheries, 2016). Geographically, Indonesia consists of large and small islands stretching from Sabang to Merauke and consists of various tribes and cultures, which is not easy for Indonesia to implement development with diverse circumstances. The development, of course, should be adjusted to the circumstance of area in which the development takes place. The development includes physical development and human resources development. However, this study dealt with the development of human resources on the whole through formal education with SM-3T learning program for the forefront, outer, and underdeveloped islands.

The foremost, outer, and underdeveloped areas are areas of concern to the government, particularly in education. Education is a demand for the growth of children, which means that education leads all the forces of nature existing in students so that they, as human beings and members of society, can achieve the highest welfare and happiness of life (Dewantara, 1962). Furthermore, education is any effort of adults in dealing with children to lead physical development towards maturity (Puwanto, 2013). Based on the previous definition of education, the core of education in Indonesia is that the people of Indonesia have self-control, personality, intelligence, noble character, and skills needed by themselves, society, nation and country. This shows that the direction of national education process includes various aspects of human life and society in the life of the nation and state.

Sa’ud (2005) states that various components and elements in the educational process or teaching and learning process must logically prepare or make the following plans: 1) Need for assessment, which is a review of the needs required in various aspects of educational development which serves as base for learning plan activities; 2) Formulation of goals and objectives,
which is a review of planning direction and operational description of the philosophical aspiration of society; 3) Policy and priority setting, which is setting and prioritizing policies and priorities in education plan; 4) Program and project formulation, which is the formulation of program and activity project which serve as an operational component of education planning; 5) Feasibility testing, which is the allocation of funding resources; 6) Plan implementation, which is the implementation of plan in order to realize a written plan into action, aimed at assessing whether a plan is feasible, good and effective; 7) Evaluation and revision for future plan, which is an activity to assess the success rate of planning that serves as a feedback to revise and adjust the plan for improving the next plan.

Based on the opinion of Sa’u’d (2005), this study employed plan implementation, which is to realize a good, effective and efficient learning plan. From several aforementioned formulations about education plan, it can be concluded that the prominent issue in learning is a process to prepare a concept of lesson plan to be implemented. On the other hand, learning plan should also prepare personnel planning or educational personnel, in this case the government should prepare teachers who will be placed in the forefront, outer and underdeveloped under the slogan go forward together to educated Indonesia through SM-3T Teachers program.

In regard to the existence of such forefront, outer and underdeveloped areas, the government creates a program called Bachelor Teaching in Forefront, Outer and underdeveloped areas. This program is a program involving bachelors to participate in the acceleration of educational development in the forefront, outer and underdeveloped areas for one year as a preparation for professional educator, and will be continued with the Teacher Professional Education Program for one year. At the end of the activity, the participants declared pass will be given an educator certificate that can be used as a requirement of professional educator in accordance with their rights and obligations. One of the areas targeted by SM-3T of North Sulawesi is Talaud Islands Regency, which is ± 271 miles from Manado, the capital of North Sulawesi Province. This is what made and motivated authors to conduct a research to review and analyze the learning plan of SM-3T teachers and its implementation in Talaud Islands Regency, particularly in Village Tule, East MelonguaneSubdistrict in Inpres 4/82 Elementary School of Tule.

METHODS AND DATA ANALYSIS

This study employed case study, survey with qualitative descriptive analysis. In regard to the characteristics of the object, a survey method was employed to reveal the actual data during the study. Case study method was used concerning population, and descriptive qualitative analysis was used to analyze data (Yunus: 2010). Data were obtained from interviews with SM-3T teachers stationed in the forefront, outer and underdeveloped areas in Tule Village, East MelonguaneSubdistrict, Talaud Islands Regency, North Sulawesi Province. To catch up with education in those areas, all SM-3T teachers before being stationed in the target area had been given a training consisting of pre-academic condition training which included academic activities, namely: 1) training in carrying out educational tasks on specific or certain conditions, 2) leadership and education management in schools, and non academic environment, including: 1) mental and survival coaching; 2) social skills training; 3) civic education and state defense and, 4) Scouting and First Aid, in the Teacher Training Institute (LPTK) executing SM-3T Program. However, in practice, there were various problems in the implementation of learning plans that had been prepared. Theoretically, such learning plan can help teachers to deliver learning materials and help students to understand the objectives of learning.

Banghart and Trull (1973) state that learning plan is a process of preparing learning materials, using learning media, using learning approach or method, within an allocated time that will be implemented in one semester in order to achieve predetermined objectives.

DISCUSSION

Learning plan is one of the first steps in learning management. This plays an important role in achieving learning objectives. Plan is a set of actions to solve problems, especially social and economic issues in one period of plan, oriented to the future horizons on certain types and levels of plan in the future (Alen, 1974). Accordingly, solving various problems, especially social problems referred to in this study is the learning plan in Inpres 4/82 State Elementary School of Tule Village, East MelonguaneSubdistrict, Talaud Islands Regency, North Sulawesi in one period of plan, or one semester.

Furthermore, Enoch (1995) states that educational plan is a process that prepares a set of alternatives for future activities directed to achieve objectives with optimum efforts and considers the facts existing in economic, social, and cultural aspects of a country. This set of alternatives means tools made to assist in teaching and learning in the form of syllabus, Learning Implementation Plan to achieve predetermined learning objectives. Coombs (1982) argues that educational plan is a rational application which is analyzed systematically and a process of educational development in order that education will be more effective and efficient and in accordance with the needs and objectives of students and society.

Educational plan is intended to prepare all components of education, so that teaching-learning process can be performed well in order to achieve the expected educational targets or to achieve the objectives of national education. It is not easy to achieve the objectives of education because the Republic of Indonesia is an archipelago that stretches from Sabang to Merauke or stretches from 95°East Longitude-141° East Longitude and 6°North Latitude-11°South Latitude. Viewed from this astronomical position, there are still many areas or islands that do not receive education. On the other hand, in order to advance an area, the only way is education, so that education can reach the corners of the country. Therefore, the government under the slogan: go
forward together to educate Indonesia through a program of bachelors teaching to prepare professional educator candidates stationed in the forefront, outer and underdeveloped areas (SM-3T).

Based on the criteria of the Ministry for Development of Disadvantaged Regions, there are ten provinces targeted under the program of Bachelors Teaching in Forefront, Outer and Underdeveloped Areas (SM-3T). Table 1.1.

Table 1.1. Provinces Targeted for SM-3T in Indonesia in 2015

<table>
<thead>
<tr>
<th>No</th>
<th>Province</th>
<th>Regency/Region Targeted for SM-3T</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aceh</td>
<td>Simeulue Regency; Aceh Singkil Regency; Aceh Selatan Regency; Aceh Timur Regency; Aceh Besar Regency; GayoLues Regency; Pidie Jaya Regency.</td>
</tr>
<tr>
<td>2</td>
<td>East Nusa Tenggara</td>
<td>Sumba Timur Regency; Kupang Regency; Flores Timur Regency; Ende Regency; Ngada Regency; Alor Regency; Mangarai Regency; Belu Regency.</td>
</tr>
<tr>
<td>3</td>
<td>North Sulawesi</td>
<td>Talau Islands Regency; SiauTahulandangBiaro Regency.</td>
</tr>
<tr>
<td>4</td>
<td>Papua</td>
<td>Biak Numfor Regency; Wropen Regency; Jaya Wijaya Regency; Lani Jaya Regency; PegununganBintang Regency; Mamberamo Raya Regency; MabeRamo Raya Regency; Yahukimo Regency; Asmat Regency; Mappi Regency; Deiyai Regency.</td>
</tr>
<tr>
<td>5</td>
<td>West Papua</td>
<td>Manokwari Selatan Regency; Raja Ampat Regency; TelukBintuni Regency; Sorong Regency; Sorong Selatan Regency; Tambraw Regency.</td>
</tr>
<tr>
<td>6</td>
<td>Riau Islands</td>
<td>Anambas Islands Regency</td>
</tr>
<tr>
<td>7</td>
<td>West Kalimantan</td>
<td>Sanggau Regency; Landak Regency</td>
</tr>
<tr>
<td>8</td>
<td>North Kalimantan</td>
<td>Malinau Regency; Nunukan Regency</td>
</tr>
<tr>
<td>9</td>
<td>East Kalimantan</td>
<td>Berau Regency; Barat Regency</td>
</tr>
<tr>
<td>10</td>
<td>Maluku</td>
<td>Maluku Barat Daya Regency; Aru Islands Regency</td>
</tr>
</tbody>
</table>


Based on the data in Table 1.1., one of the ten provinces targeted by the SM-3T program is North Sulawesi Province, namely Talaud Islands Regency and SiauTagulandangBiaro Regency. Furthermore, this study focused on East MelonguaneSubdistrict, Talaud Islands Regency, particularly in Tule Village, in which Inpres 4/82 State Elementary School of Tuleis located.

Figure 1.1. Research Site
Figure 1.1 shows the research site in Talaud Islands Regency, particularly Inpres 4/82 Elementary School of Tule located in Tule Village, East Melonguane Subdistrict. In 2016 there was one SM-3T teacher stationed in Tule Village. Before carrying out the teaching and learning process, the teachers make a learning plan as suggested by Uno (2009) that learning plan is a satisfactory way to make teaching and learning activities work well, accompanied with various anticipatory steps in order to minimize gap so that the activity can achieve objectives that have been set. Furthermore, Dageng (1997) states that teaching and learning are efforts to educate students by choosing, determining, developing methods in order to achieve the desired teaching outcomes. The process of activity in the teaching is the core of learning plan.

In the learning plan, the process of preparing the learning tools has become routine tasks done by SM-3T Teachers in Talaud Islands Regency. This can be seen from the learning tools that are already ready before the teaching and learning process begins. Learning tools consist of syllabus and learning implementation plan (RPP) in accordance with competency standards set by the government. Muslich (2007) states that syllabus is one of the products of curriculum and learning development that
contains the learning outlines. Principles of syllabus development are described as follows: (1) Scientific. The entire material and activities contained in the syllabus must be scientifically true and accountable. In order to achieve the scientific truth, experts in their respective fields should be involved in the making of syllabus; (2) Relevant. Scope, depth, degree of difficulty and order of material presentation in the syllabus are appropriate or relevant to the level of physical, intellectual, social, emotional, and spiritual development of students; (3) Systematic. Syllabus components are interrelated functionally in achieving competence; (4) Consistent. There is a consistent relationship between basic competencies, indicators, subject matter, learning experience, learning resources, and assessment system; (5) Adequate. Scope of indicators, subject matter, learning experience, learning resources and assessment system are adequate to support the achievement of basic competencies; (6) Actual and Contextual. Scope of indicators, subject matter, learning experience, learning resources and assessment system take the development of science, technology and the latest art in real life, and events that occur into consideration; (7) Flexible. The entire syllabus component can accommodate the diversity of students, educators, the dynamics of changes taking place in schools, and the demands of society; (8) Comprehensive. The syllabus component covers the entire domain of competence (cognitive, affective, psychomotor). In addition to Syllabus and RPP, it is also important to prepare learning materials, in which SM-3T teachers are very helpful in the learning process in the classroom. The teaching materials consist of teacher books and student books. If there are no books in school, SM-3T teachers can download from the internet. Lesson material is the content given to students during the learning process.

The importance of learning plan, according to Afandi (2009), is the process of determining and utilizing integrated resources that are expected to support activities and efforts to be implemented efficiently and effectively in achieving objectives. Plan is a projection of what is required to achieve valid and valuable objectives. It is often also referred to as a bridge that links the gap between the present state and the future expected state. It deals with determining what to do. Furthermore, Ibrahim (2015) argues that the planning process is an effort made by teacher to prepare himself before the learning is implemented in the classroom. Therefore, the plan made by the teacher should cover all learning objectives that are prepared based on the achievements of indicators established by the government. Teachers should be able to make a good plan, which is reflected in syllabus and learning plan and provides teaching materials needed by students.

It can be concluded that in making the learning plan, SM-3T teachers should make a competency mapping, including spiritual, social, knowledge, and skill competencies. By making a competency mapping, it will be easier to make teaching materials, which will poured out in the learning implementation plan (RPP), so that the learning process will be optimally implemented. Therefore, teachers can prepare in detail what should be delivered during the learning process, meaning that the learning process always pay attention to the competency standards and basic competencies of subjects as established by the government.

In the process of teaching and learning, teachers develop a learning implementation plan with students to achieve the predetermined objectives. The development of the learning implementation is based on learning design, syllabus, Learning Implementation Plan, module, tutorial materials and other forms of pedagogical suggestion. In preparing the learning plan, a teacher is required to: 1) understand curriculum; 2) master teaching materials; 3) implement teaching program and; 4) assess program and results of teaching and learning process. To date, the process of learning implementation still uses system approach, that the learning plan is a integrate unity which has components consisting of objectives, materials, learning experiences and evaluations that interact with each other.

The lesson plan is basically a short-term plan made by a teacher as an educator to develop various actions that will be done by the teacher in the classroom or outside the classroom. However, the implementation of the lesson plans often encounters various obstacles in teaching and learning process as stated by a teacher of SM-3T. "The teaching and learning process or the implementation of the lesson plan face many obstacles: language, characteristics of students, and different culture between teachers and students” (Source: Teacher of SM-3T at Inpres 4/82 Elementary School of Tule)

SM-3T Teachers are mostly from outside Sulawesi Island and generally from Java Island. In terms of language, all of students use local language, while teachers use Indonesian language that is less understood by students. However, a language translator is usually present in the first meeting of the class. On the other hand, students are superactive that they speak loudly, heterogeneous that it is difficult to tame, which lead to the failure controlling the class, especially in delivering learning materials that have been well-planned.

Teaching in Tule Village is very difficult for SM-3T teachers from Java Island at the beginning due to language, characteristics of students and also culture, or characteristics of teachers from Java Island with soft voice and very subtle language. However, such cultural difference can change the characteristics of students who are very rough and speak loudly. It can be concluded that the success of education, especially in teaching and learning process, not only depends on learning tools, i.e. syllabus and RPP, but also cultural aspects, especially the characteristics of the teacher, who are soft and patient. Attention, delivery with smooth and slow sentences accompanied with a great care can change the characteristics of the students who are affected by coastal area environment, such as loud in their speaking, superactive and heterogeneous. As a result, class control and delivery of material can be achieved successfully.

CONCLUSION
1. The results of this study indicate that, in general, the learning plan of SM-3T teachers planning is good, which can be seen from their syllabus and learning implementation plan (RPP), teaching materials, slideshow materials prior to the learning process in accordance with the competency standards established by the government.

2. The results of this study indicate that the learning plan not only should prepare materials, but also patience in the teaching and learning process.

3. The characters of teachers in delivering materials using subtle language accompanied with great care on students can change the characters of students who were rough into soft.

4. Culture can make the achievement of class control and learning materials possible.

REFERENCES


Investigating the effect of Technology Adoption towards the Continuance of Broadband Intention in Malaysia

Abdul Rahman Bin Mohamad Saleh¹, Mustakim Bin Melan²*, Chésobry Bin Abdullah³*
Universiti Utara Malaysia, School of Technology Management and Logistic¹,²,³

msrahman45@gmail.com¹
mustakim@uum.edu.my²
sobry@uum.edu.my³

Abstract: The aim of this paper is to investigate the technology adoption factor towards the continuance broadband intention among the households in Malaysia. Information and communication technology (ICT) is the most efficient way to develop the literacy of knowledge and skills among its users, and broadband is the key factor to spread the ICT infrastructure. By understanding the factor of continuance of broadband intention (CBI), the researcher explores the factors that affect household broadband penetration (HBP) as well. Furthermore, this study will gauge the effectiveness of the Universal Service Provision (USP) projects especially 1Malaysia Internet Center1Malaysia (Pi1M) towards CBI. The findings will provide evidence and suggestions for policy makers and service providers to improve the implementation of USP projects or to suggest any better projects to ensure a sustainable growth of broadband penetration in Malaysia. The study adapted the model of adoption of technology in household (MATH) and satisfaction as the moderating factor that forming a modified in a cross-sectional, survey-based study. The relations among the constructs of the proposed model were then hypothesised according to the literature findings and examined using SMART PLS 3.0. Population and samples of the study were drawn from the users of Pi1M in six regions of Malaysia (northern, central, southern, east coast, Sabah, and Sarawak). Conducted between October and December 2016, the cross-sectional study involved 386 respondents. The findings indicate that control construct is the key factor that has shaped customers’ continuing behaviour intentions towards broadband usage and subscription. At the same time, this study also finds positive association between satisfaction and CBI among Pi1M users. Despite the growing number of studies on intention and adoption of technology, little research has been done on theory-building and the linkage between CBI and the two aforesaid factors: control construct under the MATH model and satisfaction. This study was conducted to fill the gap.

Keywords: Continue Broadband Intention (CBI), Satisfaction, MATH Model, Public telecenters, Smart PLS, Digital divide

INTRODUCTION
In many countries, the policy to ensure the growth of broadband coverage is very important because it serves as the catalyst for internet penetration. Nowadays, broadband affects daily business productivities. The International Telecommunication Union (ITU) estimates in average of a ten-percent increase in broadband penetration especially on mobile broadband technology, which in turn, could increase a country’s total productivity factor by 4.2% in the long run (ITU, 2016). However, only few studies have examined critical technology management especially in terms of broadband penetration in households. Many other initiatives have been introduced by the government to ensure the growth of Household Broadband Penetration (HBP) and reduce the digital divide. One of the key projects is the deployment of 1Malaysia Internet Center or Pusat Internet 1Malaysia (Pi1M) (MCMC, 2014). Pi1M was chosen as the subject of this study due to the significant amount of investment made by MCMC on telecentres types of projects since 2009.

Given the above points, the present research intends to study the impact of Pi1M’s deployment on HBP after years of implementation nationwide. Without prejudice, the key objective of this deployment is to introduce the usage of broadband by improving the broadband internet infrastructure and facilities among the dwellers within a particular area. As explained by Kiran and Vasantha (2016), consumers’ inclination towards a product or services is important in creating purchase intention. However, a study by Aziz et al. (2009) uncovered that MCMC has been facing challenges on how to increase attraction and retain people’s motivation to use the broadband, either in the telecentres or at home. Nevertheless, in some places, telecentres are still seen as places for users to access government’s websites and play games.

www.ijsrp.org
1. The 1Malaysia Internet Center

1Malaysia Internet Center (Pi1M) has now reached eight years of execution and has brought considerable social and financial impacts on the users, especially the rural dwellers. This is precisely the expectations of the Commission who intend to provide broadband services and administrations to underserved zones. The Commission has always endeavoured to move forward the usage of Pi1M every now and then. In 2013, they began presenting Pi1M in urban territories, focusing on underserved areas and poor group, particularly by incorporating the debilitated and the groups who live in Individuals' Housing Project (PPR). Other than providing access to broadband services (MCMC, 2014), Pi1M also offers (1) ICT and entrepreneurship development trainings and (2) other services such as printing, overlaying, and photocopying at very minimum charges. Unfortunately, there is no recent study on the impact of Pi1M on any telecentre deployed by MCMC to the HBP. A study by Aziz et al. (2009) also found that the telecentres have been focusing heavily on introducing the Internet, yet at certain extent, are still seen merely as places where children, teenagers, and youth access government’s websites and play games. Given these points, this study intends to uncover the factors that have influenced the usage and success of public telecentres in order to improve broadband penetration.

1.2 Household Broadband Penetration (HBP)

Household broadband penetration (HBP) is an international index formed by International Telecommunication Union (ITU) with the objective to gauge a country’s broadband penetration rate. Even though HBP in Malaysia for 2015 already surpassed 71% and is on upward trend, the rate in some states has surprisingly dropped significantly (MCMC, 2015) (Figure 1.1). This was notable in states with the lowest HBP, such as Perlis, Negeri Sembilan, and Terengganu, which marked a significant drop of 23% from end of June 2014 to further 39%, but increased to 57.3% at the end of 2016. In contrast, Putrajaya recorded the highest penetration among the states, with 96% of HBP in 2014 and 98.5% in 2015, yet a surprise steep fall to 61.9% at the end of 2016.

As indicated by Prieger (2013), the drop of household broadband penetration may be caused by a few factors, such as (1) the facility being too expensive, (2) low service quality, (3) inadequate service quality, or (4) users’ lacking of exposure to computers. A number of studies were conducted on the initial use and adoption of information system (IS), but only a few focused on broadband penetration in households. In one study, Muraina et al. (2015) uncovered the factors that determine broadband intention. Kim and Malhotra (2005) argue that the adoption and the first use of any technology does not necessarily lead to the desired managerial outcome unless the use continues. Given these points, the present study will provide new knowledge with regard to the continuance of broadband intention model. The study hence set the following objectives:

i. To investigate the relationship between control construct towards CBI among the users of public telecentres in Malaysia.
ii. To investigate the relationship between satisfaction towards CBI among the users of public telecentres in Malaysia.
iii. To investigate the impact of the moderating factor of gender on CBI among the users of public telecentres in Malaysia.

THEORY

2.1 Research Hypotheses

Many studies have provided empirical evidence on the intention to use technology, and several studies have also examined the use of the information system (IS) theories. Nevertheless, the issues have been addressed in different perspectives thus have produced solutions only on certain issues (Muraina, Osman and Ahmad, 2015). As reported by (MCMC, 2015), the complete facilities provided by MCMC in Pi1M and training are for the community to access the broadband internet. Yet self-efficacy and perceived resources are among the important factors that will affect the adoption intentions of household consumers towards broadband (Irani et al., 2009).
Given the above points, this study will focus on the theoretical models of MATH and the IS continuance usage model as a foundation to the research. Developed by Brown and Venkatesh (2005), the MATH model proposes attitudinal, normative, and control constructs to predict people’s intention to adopt technology in a household.

### 2.1.1 Control Construct

In the MATH model, the control constructs consist of facilitating condition (FC), perceived knowledge (PK), and self-efficacy (SE). These constructs are among the major determinants that create individuals’ perceptions towards a behaviour. The acceptance and willingness to use broadband especially in low broadband penetration areas will determine the success of any application or system, especially e-Government websites or portal. Therefore, it is crucial for the government to develop an excellent system, although the success is much influenced by the collaboration between the government and the willingness of the citizens to use the technology (Jayashree et al., 2016). Given these points, the following research question (RQ) and hypothesis are posited:

**RQ1:** What is the effect of control construct towards the CBI among public telecentre users?

**H1:** Control construct will have a positive relationship on CBI.

### 2.1.2 IS Continuous Usage

It is believed that users are viewed as the central part of information system, therefore as suggested by Muraina Lenka, Suar and Mohapatra (2010), the determinant of both satisfaction and dissatisfaction of technology will determine the onward usage. The present study will use the model proposed by Muraina (2015), which suggests that the factor of user satisfaction be a means of measuring the success of information system. Other studies by Jung, Chung, and Leue (2015) mention that satisfaction is a critical measure of the success and effectiveness of an information system. Satisfaction refers to the perceived discrepancy between prior expectation and perceived performance after consumption; dissatisfaction occurs when performance differs from expectation (Chen et al., 2010, p. 30). At the same time, a satisfaction level will evoke the different level of positive feelings and form the behaviour. Given these points, this study will link the following hypothesis to answer the second RQ:

**RQ2:** What is the effect of satisfaction on the CBI of public telecentre users?

**H2:** Satisfaction will have a positive relationship with CBI.

### 2.1.3 Moderator

As suggested by Ooi et al. (2011), future research should include a moderating construct to examine the interrelationship among the adoption factors. Additionally, Rahman and Aziz (2014) mentioned that demographic characteristics (such as age, income, gender, and race) are often assumed to have significant effects on consumers’ perceptions. Nevertheless, the present research focuses on gender due to the simpler analysis on categorical data for the moderating construct, and other demographic variables will need to be assessed further in future research. The research question and hypothesis of moderating effect are as follows:

**RQ3:** What is the moderating effect of gender towards CBI?  
**H3a:** Demographic factor gender will moderate the effect of control construct on the CBI among public telecentre users.  
**H3b:** Demographic factor of gender will moderate the effect of satisfaction on the CBI among public telecentre users.  

Therefore based on the underpinning theory for this research, the following framework (Figure 2.3) is proposed.

![Figure 2-3: The research framework for the continuance of broadband intention (CBI)](image-url)
METHOD

3.1 Measurement Variables

An appropriate research design is crucial in determining an appropriate data collection method, such as type of data, data collection technique, and sampling methodology (Puspitasari and Ishii, 2016). In the present cross-sectional study, the data collection was performed only once in a determined period of time. Twenty-six items in a self-administered questionnaires were used (Table 3.1) and were further divided into two categories: (1) multiple choice questions which capture demographic variables such as age, gender, education, income, and background of broadband usage; and (2) five-point Likert-scale questions which were designed to address issues related to continuance of broadband intentions. The questionnaires were reviewed by six experts in academia and industries and minor improvements were made based on their feedback. A total of 1200 questionnaires were distributed to all the six regions nationwide.

3.2 Research Methodology

Based on clustered sampling, the hardcopy questionnaires were given randomly to the respondents, who are the registered users of the Pi1M, through the centre managers or via email or social media. Weekly follow-ups were made to the Pi1M managers and the questionnaires were then collected every two weeks in a three-month period. In three months, 406 completed questionnaires were received and 20 were excluded due to 20.0% of missing answers. Ultimately a response rate of 36.5% was obtained, which corresponded to that of Chin et al. (2009), and about the same as those in previous studies. The collected data were then analysed using Smart PLS 3.0 for measurement and structural model analysis. Furthermore, Gimpel et al. (2016) also advocated that Smart PLS 3.0 makes minimal demands on data distributions, sample size, and measurement of scales. Also, this study is predictive in nature. The use of PLS path modelling has become appropriate for real-world applications and advantageous for complex models in which the primary and crucial measures for data reliability are successfully performed (Chin and Dibbern, 2010).

Table 3.1: Measurement of Variable

<table>
<thead>
<tr>
<th>Sources</th>
<th>Codes</th>
<th>Researcher’s Modifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Usefulness</td>
<td>PU1</td>
<td>Using broadband internet in public telecentres will improve my performance in managing my personal life.</td>
</tr>
<tr>
<td></td>
<td>PU2</td>
<td>Using broadband internet in public telecentres will improve my performance in performing my work/study.</td>
</tr>
<tr>
<td>(Davis et al., 1992; Hsiao, Chang and Tang, 2016)</td>
<td>PU3</td>
<td>Using broadband internet in public telecentres will increase my productivity in managing my personal life.</td>
</tr>
<tr>
<td></td>
<td>PU4</td>
<td>Using broadband internet in public telecentres will increase my productivity in managing my work/study.</td>
</tr>
<tr>
<td></td>
<td>PU5</td>
<td>Using broadband internet in public telecentres will enhance my effectiveness in managing my personal life.</td>
</tr>
<tr>
<td></td>
<td>PU6</td>
<td>Using broadband internet in public telecentres will enhance my effectiveness in managing my work/study.</td>
</tr>
<tr>
<td>Content Quality</td>
<td>CQ1</td>
<td>Telecentres provides me with various information.</td>
</tr>
<tr>
<td></td>
<td>CQ2</td>
<td>Telecentres provides me with various services.</td>
</tr>
<tr>
<td>Shin, (2009), Liou, Hsu and Chih, (2015)</td>
<td>CQ3</td>
<td>The informations that I can get from a public telecentres are valuable.</td>
</tr>
<tr>
<td></td>
<td>CQ4</td>
<td>The services that I can get from a public telecentres are valuable.</td>
</tr>
<tr>
<td></td>
<td>FC1</td>
<td>Current PC in Public Telecentres is good enough to access the Internet.</td>
</tr>
<tr>
<td>Facilitating Condition</td>
<td>FC2</td>
<td>There is no problem of broadband internet availability in my locality.</td>
</tr>
<tr>
<td>Technology</td>
<td>FC3</td>
<td>My annual household income level is enough to afford subscribing to a broadband internet.</td>
</tr>
<tr>
<td>Venkatesh, 2003; Dvivedi and Jyoti, 2005; Dvivedi, Mustafee, Williams and Lal, 2010</td>
<td>FC4</td>
<td>It is not too costly to purchase a new computer or to upgrade my old computer.</td>
</tr>
<tr>
<td>Facility Conditions</td>
<td>FC5</td>
<td>It is not too costly for me to subscribe or to continue my subscription to broadband internet at its current subscription fee.</td>
</tr>
</tbody>
</table>
Perceived Knowledge

I would be able to subscribe to broadband internet if I wanted to.

I do not have difficulty in explaining why continuing using broadband internet is beneficial.

I know that using broadband internet is different from using other broadband internet connection.

I know the benefits that can be offered from using broadband internet services.

I know the benefits that cannot be obtained if I do not use broadband internet in public telecentres.

I would feel comfortable using the broadband internet on my own.

Learning to operate the broadband internet is easy for me.

I clearly understand how to use broadband internet.

I can use broadband internet proficiently.

I can use broadband internet service freely even though those who teach me how to use the service are not around me.

If I have manual and handbook that explains how to use the broadband internet service, I can use the service without any help.

Table 3.1: (Continued)

<table>
<thead>
<tr>
<th>Sources</th>
<th>Codes</th>
<th>Researcher’s modifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Park et al., 2016)</td>
<td>SE5</td>
<td>I can use broadband internet service freely even though those who teach me how to use the service are not around me.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If I have manual and handbook that explains how to use the broadband internet service, I can use the service without any help.</td>
</tr>
</tbody>
</table>

FINDINGS

4.1 Profile of Respondents

A total of 1200 questionnaires were distributed to twelve telecentres in six regions. Altogether, 406 responses were received hence representing a 33.8% (n=406) response rate. However, 20 samples with 20% missing data were removed from the analysis, leaving 386 responses. Among the respondents, 61% (n=235) were female and 31% (n=151) were male, and 39% (n=149) were in the group of 17 to 24 years old and the least (6%) (n=23) were those between 44 and 55 years of age. In terms of education level, most of the respondents were undergraduate or have higher diploma (35%) (n=136), and postgraduates constituted the second highest (n=83) number of respondents. Diploma holders constituted the least number of respondents (n=27).

4.2 Convergent Validity

The collected data were first analysed on the measurement model using Smart PLS. This step was crucial for evaluating data reliability. As illustrated in Figure 4.1, the latent constructs such as facilitating condition (FC), perceived knowledge (PK), and self-efficacy (SE) which formed the second-order construct (control) were measured. The second-order construct satisfaction, was formed by Content Quality (CQ) and Perceived Usefulness (PU). The second-order construct analysis contains all indicators of its first-order construct where the prediction of the model was made (Lowry and Gaskin, 2014). The first-order construct was qualified to be conceptually explained before the hypothesising of the second-order construct. Following the recommendations by Hair et al. (2014) and Luan and Teo (2009, p.265), measures were deleted due to their unacceptable poor factor loadings on their respective latent variable (less than 0.5). The modified path analysis (Figure 4.1) with a standardised loading of at least 0.5 demonstrates adequate support for convergent validity to ensure that only good items are carried over to the CFA stage of validation. The internal consistency of the model was measured by the instrument’s convergent validity, which consists of composite reliability (CR) and average variance extracted (AVE). The measurements were performed using Smart PLS 3.0.

The convergent validity results as shown in Table 4.1 attest that all the item constructs in the model are above the minimum requirement. Following the recommendations by Nunnally and Bhattarajee (quoted in Jung et al., 2015, p.80), (1) the composite reliability is greater than 0.70; (2) the square root of average variance extracted (AVE) is more than 0.5, and (3) the value of Cronbach’s alpha is greater than 0.70, which satisfies the reliability requirement.
4.3 Discriminant Validity

The discriminant validity was tested using Fornel and Lacker criterion and Heterotrait-Monotrait Ratio (HTMT). Fornel and Lacker criterion was assessed by comparing the correlations construct ($R^2$) with the square root of the AVE for each construct, as illustrated in Table 4.2. A square root of the AVE greater than the correlation indicates an adequate Fornel and Lacker value, which justifies the discriminant validity. Further analysis of HTMT was done to indicate discriminant validity. From the analysis, the HTMT and discriminant validity are valid if the HTMT does not exceed 0.9 as shown in Table 4.3. Otherwise one can conclude the lack of discriminant validity on the measurement model (Sarstedt, Henseler and Ringle, 2011). Therefore as a conclusion, the measurement model demonstrated adequate convergent and discriminant validity.

4.4 Hypothesis Testing

This study utilised standardised estimates for all the hypothesised paths. The findings show that the control factor has positive influence and significant result ($\beta = 0.410, t = 7.720, p < 0.05$) on continuance of broadband intention (CBI). At the same time, satisfaction also has positive influence towards CBI ($\beta = 0.329, t = 6.996$). By using the PLS algorithm analysis, the value of coefficient of determination ($R^2 = 0.460$). As described by Ringle (2009), the value of $R^2 > 0.33$ in the inner moderate. At the same time, the PLS algorithm analysis gave an effect size ($f^2$) of 0.167 for the control construct and 0.09 for satisfaction. Hair et al. (2014) considered the value of $f^2$ between 0.02 to 0.15 as small, and 0.15 to 0.35 as the medium effect on the exogenous latent variable. The summary in Table 4.4 shows that the analysis has answered RQ1 and RQ2, as well as H1 and H1.

Table 4.1: Convergent Validity

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Item</th>
<th>Flooding</th>
<th>Cronbach's Alpha</th>
<th>rho_A</th>
<th>Cmp. Reliability</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBI</td>
<td>BC11</td>
<td>0.787</td>
<td>0.751</td>
<td>0.751</td>
<td>0.836</td>
<td>0.508</td>
</tr>
<tr>
<td></td>
<td>BC12</td>
<td>0.809</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BC13</td>
<td>0.682</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BC14</td>
<td>0.675</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BC15</td>
<td>0.585</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4.1: Modified path analysis
### Table 4.2: Discriminant Validity: Fornell-Lacker Criterion

<table>
<thead>
<tr>
<th></th>
<th>CQ</th>
<th>FC</th>
<th>PK</th>
<th>PU</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CQ</td>
<td>0.885</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC</td>
<td>0.561</td>
<td>0.828</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PK</td>
<td>0.540</td>
<td>0.738</td>
<td>0.775</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PU</td>
<td>0.766</td>
<td>0.619</td>
<td>0.527</td>
<td>0.783</td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.581</td>
<td>0.722</td>
<td>0.670</td>
<td>0.608</td>
<td>0.765</td>
</tr>
</tbody>
</table>

*Note: The diagonal values (bolded) are square root of AVE; off diagonal is correlation among the first order construct*

### Table 4.3: Discriminant Validity: Heterotrait-Monotrait Ratio (HTMT)

<table>
<thead>
<tr>
<th></th>
<th>CQ</th>
<th>FC</th>
<th>PK</th>
<th>PU</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CQ</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC</td>
<td>0.634</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PK</td>
<td>0.664</td>
<td>0.871</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PU</td>
<td>0.896</td>
<td>0.715</td>
<td>0.658</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.666</td>
<td>0.860</td>
<td>0.801</td>
<td>0.718</td>
<td>1.000</td>
</tr>
</tbody>
</table>
Table 4.4: Summary of Result for Hypothesis Testing using PLS Algorithm and Bootstrapping

| Hypothesis Path | Path coefficient (β) | Standard Deviation (STDEV) | T Statistics (|O/STDEV|) | $f^2$ | P Values | Significant |
|-----------------|----------------------|----------------------------|-------------------------|-------|----------|-------------|
| H1 Control -> CBI | 0.410                | 0.053                      | 7.720                   | 0.165 | 0.000    | Yes         |
| H2 Satisfaction -> CBI | 0.329                | 0.047                      | 6.996                   | 0.090 | 0.000    | Yes         |

4.5 Moderating Effect Gender

Following the recommendation of Hair et al. (2014), the categorical variable of gender was dichotomised before executing the analysis using PLS algorithm, which generated the moderated path model (Figure 4.1). As shown in Figure 4.2, female moderates higher than male with anstrengthening effect on the control and satisfaction factors towards CBI following the increase of $R^2$ value to 0.488. The effect size of the moderating factors to control construct also increased ($f^2 = 0.182$) compared to unmoderated. At the same time, a very small moderating effect of gender was noted on satisfaction ($f^2 = 0.093$) after running on moderated model. The overall moderating effect of gender strengthens the effects for both control and satisfaction when the value of $R^2$ improved from 0.460 to 0.488. This finding thus answers RQ3a, H3a, RQ3b, and H3b.
CONCLUSIONS
By adapting the MATH model, the present research investigates the role of some factors towards the continuance of broadband intention (CBI) among users. The results were obtained by using Smart PLS 3.0 and the findings reveal that the second-order construct of control and satisfaction factors are significant. The findings also attest that among the control factors, FC is the most important factor that policy makers and service providers need to focus on in order to ensure the sustainable growth of household broadband penetration in Malaysia. To increase users’ satisfaction, CQ is the area to focus for improvement. Because the deployment of broadband across many countries is a continuing effort, policy makers also need to focus on the quality of the content. This aspect needs to be updated from time to time especially in terms of the benefits of the broadband and what it can offer.

IMPLICATION
This study also finds that gender plays an important role towards CBI because the moderating effect ($f^2$) is significant especially on the control construct. The service provider should start gender-based programs that are developed for a specific or focus group. As pointed by Turk and Trkman (2012), the adoption of new technologies in households is always a complex process, but from time to time, the diffusion of broadband has attracted unprecedented attention in the research and political community.

REFERENCES


Study on the effective factors on the employer, employee relationship for the motivation of associate level employees at ABC hotel, Colombo.

Pamuditha Harshani Samarasinghe
B. A Philosophy and Psychology,
University of Sri Jayewardenepura,
Gangodawila, Nugegoda, Sri Lanka
Pams803@gmail.com

Abstract- Employer employee relationship is the one of the important topics which every organization has to consider. Hotel industry this relationship is very much important because associate level employees do an immense task for the organization. If those employees are unhappy with the employees of the organization their motivation level will decrease and it will directly impact towards the organization productivity. In this research, researchers main objective is to find out the most effective factors for the motivational enhancement of associate level employees. The researcher has used a conceptual framework in order to test the selected variables. The researcher’s sample size was hundred and the sample method was the random sample method. Descriptive statistical methods were used in analyzing the data which was gathered by the researcher. After the data analysis Researchers have found out that communication, Grievance handling as well as the counselling factors directly influencing on the associate level employees motivation. Recommendations were given in order to improve these factors in order to enhance the level of motivation.

Index Terms- Associate level employees, employer, employee relationship, Motivation

I. INTRODUCTION

Employer-employee relationship within an organization is commendable. When the workers have trust towards employers positive results may arise within the organizations. But getting to the point of reciprocal trust and respect can be challenging for many companies. Some business leaders do not understand how to work with their employees in order to run the smooth functioning of the organization. Hard work from both sides of the company is needed, the benefits are worth it. When these relationships strengthen the morale and job satisfaction, high retention rate, less absenteeism, better customer service and higher quality products will be increased.

Today’s world is rapidly moving in order to get a competitive advantage. In order to be competitive both internal and external environments are really necessary. The importance of choosing a topic that emphasizes the employer, employee relationship would be a very effective in order to maintain a good relationship with employers and employees. If the employees are not precede well whole company might in danger. When consider about the hotel industry retain customers as well as gain customers is the challenge which they are facing today. Dissatisfaction of customers may create lots of conflicts. In order to maintain the peace in an organization's employer, employee relationship will affect directly to the organization motivation.

When considering about the hotel, it is very popular with international guests because the hotel offers famous unforgettable dining and special events. Not only that, they are also hospitable. The hotel is located on the edge of Colombo Beach. Staff is around 400 and they have wide varieties of services. They arrange meetings; Dinning, weddings and conference for the customer requirements. They have many facilities include various restaurants, bars, meeting rooms, and the Spa as well as luxury wedding halls.

Mainly this research focus on what are the effective factors of employer, employee relationships which will help for the motivation in associate level employees. By doing this research employers also can get a better understanding about the opinions of their employees and can get a clear evaluation about their associate level employees. Not only employers, employees also get a good chance to express their views about the employer, employee relationship and how it affect for their motivational improvement as well as they can find the most effective factor for the motivational improvement.

II. LITERATURE REVIEW

According to Garry Dessler’s fundamentals of human resource management book he has defined employee relations as following; “Employee relations are the activity that involves establishing and maintaining the positive employee–employer relationships that contribute to satisfactory productivity, motivation, morale, and discipline, and to maintaining a positive, productive, and cohesive
work environment. Whether you’re recruiting employees, managing union organizing campaigns, asking employees to work overtime, or doing some other task, it obviously makes sense to have employees on your side. Most employers therefore endeavor to build positive employee relations on the sensible assumption that doing so beats building negative ones. Managing employee relations is usually assigned to HR, and is a topic the SHRM Knowledge Base addresses”.

A fundamental of human resource management Emerging experiences from Africa Josephaat Stephen Itika has defined employer, employee relationship as follows; “Foot & Hook (2008) has stipulated important rights of the employer and employee in the employment relationship. In this regard, the employer has the right to control work performance, integrate employees in the organization’s structure and management system, and create an environment of mutual trust, confidence and supply of enough and reasonable work. In exchange, the employee is expected to obey lawful and reasonable orders, maintain fidelity and work with due diligence and care. The laws of the land usually govern these relationships and expectations and where breaches are made, leading to conflicts of interests and grievances, legal remedies have to be sought from a court of law”.

According to the workers and the family researcher network they define employee relations as “Employee Relations involves the body of work concerned with maintaining employer, employee relationships that contribute to satisfactory productivity, motivation, and morale. Essentially, Employee Relations is concerned with preventing and resolving problems involving individuals who arise out of or affect work situations.”

Armstrong’s handbook of Human Recourse management 12th edition “Employee relations are basically about how managements and employees live together and what can be done to make that work. There are two views about the relationship. The unitary viewpoint is the belief that management and employees share the same concerns and it is therefore in both their interests to cooperate. This was expressed by Walton (1985: 64) as the principle of mutuality. A similar belief is expressed in the idea of social partnership, which states that as stakeholders, the parties involved in employee relations should aim to work together to the greater good of all”.

According to Armstrong Handbook of Human Resource management book; “the term ‘motivation’ derives from the Latin word for movement (mover). A motive is a reason for doing something. Motivation is the strength and direction of behavior and the factors that influence people to behave in certain ways. People are motivated when they expect that a course of action is likely to lead to the attainment of a goal and a valued reward – one that satisfies their needs and wants. The term ‘motivation’ can refer variously to the goals that individuals have, the ways in which individuals chose their goals and the ways in which others try to change their behavior’. John M Werner and Randy L Desimune state that in their book in human resource development, “motivation has a fundamental internal influence on employee behavior and motivation as one of the most basic element of human behavior”. Terry Mitchel synthesized many definitions of work motivation as, “The psychological processes that cause to shape, direct, and persist of voluntary actions those are goal directed.”

According to Robert Dubin (1970), “Motivation is the complex set of forces starting and keeping a person at work in an organization. Motivation is something that moves the person to action, and continues him in the course of action already initiated.” Buford, Bedeian, and Lindner (1995) states that: “Motivation is a predisposition to behave in a purposive manner to achieve specific, unmet needs.”

III. METHODOLOGY

The type of research that will be used in this study is quantitative research. The researcher examined the phenomenon through the questionnaires that will be given out to respondents for the statistical representation of the findings in the study, interviews with the respondents and a few experts in this field will also be conducted. The questioner based on the following three variables due to the broadness of the topic. The researcher selected independent variable as the communication, counselling and grievance handling and the dependent variable as the motivation.

Conceptual Frame Work

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>Motivation</td>
</tr>
<tr>
<td>Counselling</td>
<td></td>
</tr>
<tr>
<td>Grievance handling</td>
<td></td>
</tr>
</tbody>
</table>
Hypothesis

H₀ - Employer and employee relationship will not affect to improve motivation in associate level employees

H₁ - Employer and employee relationship will affect to improve motivation in associate level employees

Sample size - The total numbers of associate level employees are 400 and the researcher selected 100 sample size in order to analyze the data.

Data collection - The researcher uses the random sample method to which included close ended questions. The Questions were based on Communication, Counselling and grievance handling.

Data analysis - Data analysis was done by using the Excel and researcher has used graphs and tables in order to show the data.

Primary data collection – primary data is gathered through the structured questionnaire.

Secondary data collection - the data to be gathered in using or precious research findings, literature survey of text books, internet, reports and related articles from journals and magazines.

1.1 Communication questions data summary

<table>
<thead>
<tr>
<th>Question Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>45</td>
<td>45</td>
<td>42</td>
<td>44</td>
<td>42</td>
</tr>
<tr>
<td>No</td>
<td>55</td>
<td>55</td>
<td>58</td>
<td>46</td>
<td>58</td>
</tr>
</tbody>
</table>
1.2 Grievance handling questions data summary

<table>
<thead>
<tr>
<th>Question number</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>48</td>
<td>40</td>
<td>70</td>
<td>35</td>
<td>60</td>
</tr>
<tr>
<td>No</td>
<td>52</td>
<td>60</td>
<td>30</td>
<td>65</td>
<td>40</td>
</tr>
</tbody>
</table>

Chart 1.2

Grievance handling average

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.6</td>
<td>49.4</td>
</tr>
</tbody>
</table>
1.3 Counselling questions data summary

<table>
<thead>
<tr>
<th>Question number</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>28</td>
<td>65</td>
<td>45</td>
<td>38</td>
<td>35</td>
</tr>
<tr>
<td>No</td>
<td>72</td>
<td>35</td>
<td>55</td>
<td>62</td>
<td>65</td>
</tr>
</tbody>
</table>

Chart 1.3

IV. FINDINGS

The researcher wanted to identify what are the effective factors in an employer, employee relationship for the improvement of motivation in associates. In order to measure the employer, employee relationship the questions are asked based on the communication, counselling and grievance handling in order to find out what are the most effective factors for the associate level employees motivation.

By analyzing percentages taken from the communication related questions researcher found that overall communication is beneficial for the improvement of motivation. In the table number 1.1 most of the employees have given negative answers about the given questions. This proves that communication is important for their motivation and it will directly effect on the employer employee relationship.

When taking the average of communication also we can see that 43.6 employees have given yes answers and 54.4 given the No answers. This proves that the communication is not in a stable manner according to the averages.

When considering the grievance handling related questions researcher found associate level employees need a proper grievance handling method when analyzing the data.

1.2 table help to identify the importance of grievance handling because management has not taken any action for an immediate
grievance handling. This may effect for the overall performance of the associate level employees.

Positive Average for grievance handling questions is 50.6 and negative average is 49.4. This also reveals that grievance handling process should implement properly because of the dissatisfaction among employees.

Counselling is also should take into consideration because most of the respondents would like to implement a counselling method in order to solve their problems. Table 1.3 data reveals that counselling would be beneficial for the improvement of motivation. Counselling average shows 42.2 for Yes and 57.8 for No answers. However, this shows that need of a counselling method to solve their problems and an average of this variable shows clearly in the chart 1.3.

The researcher would able to find out the effective factors in the employee relationship for the improvement of motivation. Factors such as communication, grievance handling and counselling are very influencing factors for their motivation. Implementing new methods to improve communication, counselling and grievance handling is important.

When considering the data gathered by the researcher, shows that there is a lack of healthy employer employee relationship. Percentages of the given answers show the negative trend which may influence for the future workplace motivation. When people are lacking in enthusiastic or motivation many more problems will arise within the employees and employers.

V. RECOMMENDATIONS

Recommendations for a proper communication

In order to enhance the employer, employee relationship for the motivation researcher found that communication, grievance handling and counselling as the factors affecting to improve motivation. With those findings, communication grievance handling and counselling and communication should be improved. The following recommendations are based on these three factors in order to enhance the employer employee relationship. By implementing those recommendations motivations of associate level employees can be increased.

Listen carefully

Monopolize conversations ay creates workplace problems. Employers should be careful with your words. Listen to subordinates will increase the motivation because they feel that their ideas are worth. This will help your staff members feel that they play an active role in the conversation.

Mindful of Communicating

Verbal and nonverbal communication is effective ways of communicating. Body language will contribute heavily to the effectiveness with which your communication is received. Facial expression while speaking with employees will determine the results of your communication. Rest the arms by your sides, Make eye contact, smile at appropriate and nod your head affirmatively while listening is important.

Create an open dialogue

Let employees keep abreast of company changes, progress and future plans. This can be done by bimonthly or company meeting. In addition, allow employees to participate in this discussion. Encourage problems and opinions and show that all ideas are welcome.

When employees feel they are in the company's leadership position, employees are more likely to communicate well.

Encourage sharing information

Provide an online platform for knowledge sharing. Employees may often read industry news, trends, and provide them with a place to share this information. By having the opportunity to show what they know, employees will be eager to continue to participate in this work. This will not only create more energy and communication behind the purpose, but sharing valuable insights will help businesses

Plan external activities

Create opportunities for employees to meet outside the office. Nothing is more hindering communication than when employees in the company do not really meet each other. Plan a holiday party or a happy time after work. This also gives the staff some expectations, which can promote improved participation and stronger communication.

Communication center

Create a communication center for the staff. Use this central location to allow employees and supervisors to share work-related
information with each other. Encourage staff to frequently check the communication center to keep up-to-date.

Open door policy

One of the biggest hurdles faced by employees is how to communicate with the manager and the CEO. They may not feel comfortable, close to the boss, and because of this concern, many employees may choose to avoid making important points, thus preventing the flow of communication. There is an “open door” policy, your employees at any time can feel anything you notice, which is very useful for your internal communication. It is also a good way to motivate employees in the organization.

Allow your employees to have the opportunity to recharge

Work time may be tired, especially when the mind is considered. When you need to charge, it may be difficult to communicate effectively with others. Have your employees had the opportunity to leave when needed. Whatever it means spending an extra hour of lunch time, or just an occasional personal day, you will get better results and let your employees have the opportunity to restart themselves instead of running too tightly.

Prevent one-way communication

Many companies use top-down communication, which is a classic constant for decades. One-way communication can provide an element of control, but will not give you or any benefit to your employees. On the contrary, allowing communication is a two-way street, as you will see some benefits in the future.

Give praise

The most common mistake of organizing and supervising is that their communication is general and inhuman. They send an email: “good! Direction, team” but admit that this nature does not have the specific meaning of the individual who lag behind to make the project complete. Give little praise may boost the morale of employees.

Recommendations for a proper grievance handling

Quick action - in the event of a complaint, it should be identified and resolved. Managers must be trained to manage complaints effectively and promptly. This will reduce the adverse impact of complaints about employees and their performance.

Acknowledging grievance - manager must acknowledge that the employee's dissatisfaction is the performance of the employee's true and true feelings. The recognition of the manager means that the manager is eager to investigate the complaint fairly without any prejudice. This will create a favorable working environment to reduce the situation of dissatisfaction.

Collect the facts - the manager should collect appropriate and sufficient facts to explain the nature of the complaint. These facts must be kept in order to use these records at the late stage of the complaint.

The reasons for the review of the complaint - the actual cause of the complaint should be determined. Therefore, remedial action should be taken to prevent repeated complaints.

Deaccessioning - an alternative action plan should be considered to manage the complaint. The impact of each action policy on existing and future management policies and procedures should be analyzed, so the manager should make a decision.

Execute and review - the manager should quickly implement the decision to ignore the fact that it may or may not harm the relevant employee. After the implementation of the decision, there must be follow-up to ensure that the complaint is resolved thoroughly and adequately.

Suggestion boxes

Suggestion boxes can be placed in an easy-to-access location for most employees in the organization. Employees can submit anonymous complaints about their dissatisfaction within these boxes. In addition, management's interest is limited to employees' freedom and fairness.

Direct observation:

The human behavior of knowledge is the essential quality of every good manager. From the behavior of employee changes, he should be able to smell the reasons for dissatisfaction. So he will not understand the staff. This method will give general discontent. In addition to the normal daily work, regular interviews with employees, group meetings and collective bargaining is a direct observation of the specific circumstances conducive to the development of grievances.

Deal with complaints effectively
Deal with complaints, spend a lot of time talking to employees; collect their data and pass on all kinds of information. This conversation is most effective and should conform to a clear pattern and follow well-tested rules. Managers must seek to develop their attitudes towards employees and help to enhance their confidence. Management should also be interested in the employee's questions and help with constructive will, not only to gain trust, but also to gain the greatest loyalty and sincere cooperation. Management’s procedures for handling complaints must be clear.

Step ladder procedure

Another policy of setting dissatisfaction is the ladder program. Through this method, various steps can be found to solve the dissatisfaction. The latter procedure is a mechanism for the discontent of historical stuff. As shown below:

Senior Executives: According to this policy, the wrongdoer expressed dissatisfaction with the impartial senior director verbally. The employee's dissatisfaction is analyzed one by one. Here, the supervisor should not be biased in dealing with the complaint. If they are not resolved, the staff cannot be satisfied, then the next step will be taken.
Head of department: in the first step is not satisfied with the circumstances, should take the second step. In which the enemy to the department head to introduce his / her question. The department head's listen to all the questions and take steps to set them up. If resolved, then if not so sad to move to another step.
Appeals Board: The Appeals Board also serves in large organizations. This organization is inherently complex. The conclusion of the complaint is not from the department, but not to the Appeals Board. The Appeals Board must deal specifically with the complaint. Complex types of dissatisfaction are related to this level. Timely solve problems and improve organizational performance.
Senior management: If the grievances are not satisfied with the complaint board solution, then the enemy chief executive. In general, the CEO is facing serious problems. The Chief Executive, through participation in the trade union, represents the decision of the Chief Executive to make a decision as soon as possible through negotiations

Recommendations for a proper counselling method

Hire a professional counselor

Hiring a professional counselor is very important to solve all kinds of problems. Some problems employees do not like to share with their managers. In that situation, hiring a professional counselor would be beneficial. Employees’ mentality can be identified to a professional counselor as well as Psychological injuries and stress-related emotional conditions can be handled via a counselor.

Mentally Healthy Workplace’ training - in-house training

Many programs can be designed in order to enhance the mental health of both employers and employees. Provide information, plans and policies promote early awareness and respond to staff distress. As with any question, the sooner the problem is identified and the better results are taken. If a new psychological problem such as anxiety or depression is properly addressed, it is more likely that the intervention will be effective and the morale and function of the workplace will be maintained and will prevent disability.
Identify the risk of employee mental health

Identify the risk of employee mental health. Rising costs and regulatory requirements have already paved the way for the organization and have made significant progress in identifying and addressing workplace factors that contribute to the physical illness and injury to workers. There are many useful tools to achieve this.

VI. CONCLUSION

The researcher's aim is to find out the effective factors of the employer, employee relationship for the improvement of motivation in associate level employees. The study had been done by the researcher through a structured questionnaire.

A hypothesis which proved through the data analysis part which implies that employer, employee relationship help for the improvement of motivation in associate level employees. In the findings this has been clearly mentioned by the author and the recommendations given in order to enhance the employer employee relationship. With these recommendations it is clear that motivation in associate level employees can be improved from the selected factors.
Appendix

questionnaire

yes

no

Please indicate(x) the level of agreement or disagreement

communication

1. Do your managers tell what they expect by giving feedback and guidance?
2. Do your employers trust you?
3. Do your employers appreciate your work?
4. Do you have opportunities to discuss your problems with your managers?
5. Do you communicate freely with employers?

Grievance handling

6. Do your employers identify your weaknesses?
7. Do you suggestions well accepted by employers?
8. Do you think you need a proper grievance handling method to discuss your problems?
9. Management takes your grievance immediately?
10. Do your managers treat you fairly?

Counselling

11. Is the Decision taken by the top management?

Related to your grievances is satisfactory?

12. Do your employers conduct mental awareness programs?

13. Do you feel stress at times?

14. Do your managers well listen to your problems in daily work life?

15. Do your company have a proper counseling method to solve your problems?

Reference


www.ijsrp.org


AUTHOR

First Author – PamudithaHarshaniSamarasinghe, B.A special in Philosophy and Psychology, University of Sri Jayewardenepura
Factors Affecting Bank Lending Growth: Cases In Indonesia

Maulana Yasnur, Augustina Kurniasih
University of Mercu Buana Jakarta
maulanayasnur@gmail.com, augustina.kurniasih@mercubuana.ac.id

Abstract-This study aims to examine and analyze the effect of Interest Rate, Economic Growth, Funding Growth, Capital Adequacy Ratio (CAR) and Non-Performing Loan (NPL) of Lending Growth Banks. Research data is annual data for 5 (five) years observation (December 2011 until December 2015). The sampling method used was purposive sampling. From a population of 40 Private Commercial Banks and Foreign National listed in Indonesia Stock Exchange (IDX), 30 Banks met the criteria to be the sample. The result showed that Economic Growth, Funding Growth and NPL are having positive and significant influence to Lending Growth Banks. BI Rate and CAR are having positive influence but not significant to Lending Growth Banks. Economic Growth is the most significant variable in influencing Lending Growth Banks.

Index Terms-Lending Growth, Interest Rate, Economic Growth, Funding Growth, CAR and NPL.

I. INTRODUCTION

Bank is a company engaged in the financial sector that collect funds from the public in the form of savings and distribute them to the public in the form of credit or other forms in order to improve the living standards of many people. Bank is also one of backbone of the economy, as it has the intermediary function between the owners of capital and the user of the funds.

Economic development in a country depends on the development of a dynamic and real contribution of the banking sector. When the banking sector collapsed, national economy also deteriorates. Seen in the crisis that has occurred before, such as Indonesian Monetary Crisis in 1997-1998 the global financial crisis in 2008-2009, Greek’s crisis and devaluation of Yuan (China) in 2015 that had an impact on the banking sector in Indonesia.

The economic crisis affects the economic growth and directly affects the banking business. Slowing economic growth could reduce the demand for credit. The total amount of Bank’s Loan in Indonesia in 2015 is IDR 4,058 trillion increases by 10,44% year on year (yoy).
In carrying out its functions, the bank is in dire need of funds. Therefore, every bank is always trying to obtain optimal funding but with a reasonable cost of money. Bank funds come from two main sources, first from the internal funds, such as capital injection or sale of shares, fertilization reserves, retained earnings, and others. Capital owned by a bank is a very important factor for a business development. Capital Adequacy Ratio (CAR) is a ratio used to measure the adequacy of capital owned by a bank. The higher the CAR has, the greater the financial resources that can be used to anticipate potential losses caused by lending.

The other sources of funds obtained from a third party in the form of deposits, savings, time deposits, call money, and others. The third party funds (TPF) collected by bank operations will be used as funds for the lending. The more funds owned by a bank, the greater the chances of the bank to conduct its activities in achieving the objectives such as lending. In taking the decision to distribute loan, the bank must be careful because the decision to distribute the funds in the form of loan is always followed by the risks that may arise.

The risk is the possibility of the interrupted payments, better known as the credit risk in the form of non-performing loans (NPL). An interrupted payment can be caused by two factors: The factors derived from the bank itself and the customer. The interrupted loan repayments can be measured by looking at the number of loans granted by banks with troubled loan repayments made by customers to the bank.

To avoid the high NPL, bank need to consider the efficient allocation of funds such as lending that can provide high returns where NPL rate is not too high. Inefficient allocation of funds led to reduced lending. This occurs because the amount of capital is reduced so that the funds will be disbursed in the next period lessened. These circumstances hamper the bank's operations and lower bank's income.

<table>
<thead>
<tr>
<th>Third Party Funds (IDR Billion)</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAR (%)</td>
<td>16.05</td>
<td>17.43</td>
<td>18.13</td>
<td>19.57</td>
<td>21.39</td>
</tr>
</tbody>
</table>

Source: Indonesia Banking Statistic, 2015

The table above shows that the movement of third party funds (TPF) has increased since 2011 - 2015. CAR has increased since 2011 - 2015 and NPL decrease since 2011 - 2014 but increased again in 2015.

Based on this background, the title of this research is "The Influence of Interest Rates, Economic Growth, (Third Party) Funds Growth, CAR and NPL on the Banking Loan's Growth (Study on National Private Banks Foreign Exchange Listed in Indonesia Stock Exchange Period 2011-2015). Understanding the above descriptions about the importance of knowing what factors can affect the Bank Loan Growth, the problem’s formulations are as follows: (1) Does the BI Rate affect the growth of bank lending? (2) Does economics growth affect the growth of bank lending? (3) Does the third party fund growth affect the growth of bank lending? (4) Does the CAR affect the growth of bank lending? (5) Does the NPL affect the growth of bank lending?

II. IDENTIFY, RESEARCH AND COLLECT IDEA

Shareholder is a person or legal entity who legally own one or more shares in the company. According to Smerdon (2010), Shareholders Theory explained about the relationship between the company's management and shareholders that aim to help management to improve the creation of value for the company by managing its resources to create value added and improve the financial performance of the company.

According to Hartono (2010) the information announcement will give a signal to investors in making investment decisions. If the announcement contains a good-news, it is expected that the market will react positive when the announcement was made. At the time the information was announced and all market participants have received such information, market participants must first analyze and interpret this information as a good signal (good news) or poor signal (bad news). If the announcement interpreted as a good signal for investors, then there is a change in the volume of stock trading.
Lending (loan) definition according to Banking Basic Law (Undang- Undang Pokok Perbankan) No. 14/1967 Chapter 1 Article 1 and 2: Loan is the provision of money or equated with that based on the agreement between bank and the borrower. Borrower is obliged to repay their debts after a certain period of time with the amount of interest that has been determined. Further refined in Banking Basic Law No.7/1992 as amended by Banking Basic Law No.10/1998: Credit is the provision of money or bills can be equated with that based on borrowing agreements to pay off debts after a certain period with the amount of interest.

Loan process is done carefully by the banks with a view to achieving the goals and objectives of the loan. When banks set lending decisions, the targets to be achieved is a safe, effective, and generate revenue loan. Secure in the sense that the bank will be able to receive back the economic value that has been submitted, purposeful intention is that the use of credit must be in accordance with the plan established credit, and generate revenue means the loan must contribute revenue for the bank, the debtor company, and society in general (Taswan, 2006). BI Rate is the interest rate that reflects the attitude of policy or monetary policy stance set by Bank Indonesia and announced to the public (www.bi.go.id). BI Rate announced by the Board of Governors of Bank Indonesia monthly and implemented on monetary operations conducted by Bank Indonesia through the management of liquidity (liquidity management) in money markets to achieve the operational target of monetary policy. Economic growth can be defined as the process of continuously changing economy condition towards a better state for a certain period. Economic growth can as well be defined as the increase in production capacity of an economy that is realized in the increase in national income. The economy is said to be growing if the number of real remuneration to the use of factors of production in a given year is greater than the previous year. The indicators used to calculate the rate of economic growth are: (1) The growth rate of the GDP (Gross Domestic Product) and (2) The growth rate of GNP (Gross National Product) (www.bps.go.id).

Third party funds according to the Banking Basic Law No. 10/1998 are: Funds entrusted by the public to the bank based on deposit agreement funds in the form of demand deposits, time deposits, certificates of deposit, savings, or other similar forms with it. These resources are the most important source of funds for the operations of the bank and is a measure of success if the bank able to finance its operations. The sources of funds are as follows (Banking Basic Law No. 10 of 1998): (1) Demand deposits are deposits which may be withdrawn at any time by check, forms of payment order, or by transfer. (2) Time deposits are deposits that can be withdrawn only at certain times based on the agreement with the bank and Depositors. (3) Savings are deposits that can be withdrawn only under certain agreed terms, but it can’t be withdrawn by check, bank draft, or other instrument that is equivalent to them.

Capital Adequacy Ratio (CAR) is a measure of capital adequacy ratio assessment in the context of the soundness of which is owned by each bank. CAR measured by the ratio between capital equity to Risk Weighted Assets (RWA). Since the crisis period up to the present CAR become the main reference in determining the health of banks (Central Bank Governor’s Decree April 1999), the Governor of Bank Indonesia officially announced the implementation of Indonesian Banking Architecture (API), which is a blueprint on the direction and order of the national banking system in the future. One of the API program is requiring a minimum capital for commercial banks (including BPD) to IDR 100 billion with a minimum CAR of 8% at the latest in 2010. According to Bank Indonesia Circular Letter No. 13/30 / DPNP dated December 16, 2011 CAR formulated as follows:

\[
\text{CAR} = \left(\frac{\text{Capital Equity}}{\text{RWA}}\right) \times 100\%
\]

Credit risk is defined as the risk associated with the possible failure of the client to pay its obligations or the risk that the debtor cannot repay their debts (Ghozali, 2007). Credit risk can arise for several reasons: (1) Possibility of loans granted by banks or bond (IOU) purchased by the bank unpaid. (2) Non-compliance with the obligations, which the banks involved, could be through another party, such as a failure to meet obligations on derivatives contracts. (3) Settlement with the exchange rate, interest rates and derivatives. According to Bank Indonesia Circular Letter (SE Bank Indonesia) No. 6/23 / DPNP dated May 31, 2004 NPL formulated as follows:

\[
\text{NPL} = \left(\frac{\text{Loans in category: Collectable 3, 4 and 5}}{\text{Total Loans}}\right) \times 100\%
\]

The research approach used in this study is a quantitative research method. Quantitative research method can be interpreted as a method of research that is based on the philosophy of positivism, is used to examine the population or a particular sample. This research use causal explanatory approach to obtain clarity or explain phenomenon, explain relationships, examine the influence (causal relationships) between variables, evaluating, and knowing the difference or compare one or more groups or differences in the conditions of one or more groups. The population in this study is National Private Commercial Bank listed on Indonesia Stock Exchange (BEI) in 2011-2015 with the total of 40 banks while the number of samples taken was 30 banks. The data used in this study is a data pool, in the
form of financial statements of each bank that listed on the Indonesia Stock Exchange in the period of 5 years in a row from 2011 to 2015.

Data collection techniques in this study are secondary data from various sources. In order to support this study the authors also do library research. Data analysis techniques in this study are using multiple linear regression analysis that describes the extent to which model variables (independent variables) affect other variables (dependent variable). In this study, the independent variables are the BI Rate, Economic Growth, Growth Third Party Funds, CAR and NPL. And for the dependent variable is lending growth. Multiple Linear Regression models were used performed with SPSS statistical computer. Based on the framework, the mathematical model in this study is:

\[ Y = \alpha + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + e \]

\[ Y = \text{Lending Growth} \]
\[ \alpha = \text{constant} \]
\[ b_1 - b_5 = \text{regression coefficient of each independent variable} \]
\[ x_1 = \text{BI Rate} \]
\[ x_2 = \text{Economic growth} \]
\[ x_3 = \text{Funding Growth} \]
\[ x_4 = \text{CAR} \]
\[ x_5 = \text{NPL} \]
\[ e = \text{error} \]

III. RESULTS AND DISCUSSION

Descriptive statistics data in the study is a tool that is used to give a description of the variables used in the study. The results of descriptive statistics use to explain the magnitude of the highest value, the average value and the lowest value of the variable Loan’s Growth, BI Rate, Economic Growth, Funding Growth, CAR and NPL. These results are presented in Table2.

Table2 Descriptive Statistics Data 2011 - 2015.

<table>
<thead>
<tr>
<th>Variable (%)</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lending Growth</td>
<td>-37.14</td>
<td>479.77</td>
<td>24.93</td>
</tr>
<tr>
<td>BI Rate</td>
<td>5.75</td>
<td>7.75</td>
<td>6.90</td>
</tr>
<tr>
<td>Economic Growth</td>
<td>4.80</td>
<td>6.50</td>
<td>5.80</td>
</tr>
<tr>
<td>Funding Growth</td>
<td>-32.99</td>
<td>358.88</td>
<td>20.10</td>
</tr>
<tr>
<td>CAR</td>
<td>8.02</td>
<td>45.75</td>
<td>16.50</td>
</tr>
<tr>
<td>NPL</td>
<td>0.00</td>
<td>5.45</td>
<td>1.39</td>
</tr>
</tbody>
</table>

Loan has the lowest value of -37.14%, which is the value of Pundi Bank’s Loan Growth in 2015. This is caused by the crisis that occurred in 2015 happened in Greece and China, which have direct impact on Indonesia especially Bank Pundi so the Lending Growth decline significantly. The highest value was 479.77%, which is the value of the loan growth of Pundi Bank in 2011. The increase was primarily due to the transform of the business by laying the groundwork for sustainable growth that covers all aspects. The average value of Lending Growth amounted to 24.93%. This value means that the Lending Growth of data samples during the study period had an average value growth of 24.93%.

The lowest value of BI Rate is at 5.75% which is the value of BI Rate in 2012. The value of this happened because in 2012 showed the stability of inflation tends to be low and the Indonesian economy is growing very well. The highest value of BI Rate is at 7.75%, which is the value of BI Rate by 2014. The reasons for BI consideration in making the decision to make the BI Rate: (1) To anchor inflation expectations and ensuring that inflationary pressures after the increase in subsidized fuel prices remained under control at track of 4 ± 1% in 2015 (2) Preparing for macroprudential policy adjustments in order to expand the sources of funding for banks. The average value of BI Rate is at 6.90%. This value means that the value of BI Rate of data samples during the study period had an average value of 6.90%.

Economic growth has the lowest value of 4.80% which is the value of economic growth in 2015. This occurs because the value of the effects of the economic crisis of Greece and China that have a direct impact on Indonesia Economic Growth. The highest value is at 6.50% which is the value of economic growth in 2011. The thing that makes the value of economic growth are (1) Indonesia has a strong economic fundamentals so as to minimize the impact of the global economic downturn (2) The response policy the right is able to sustain the resilience of the national economy (3) Implementation of monetary and macroprudential policy mix is measured and at the right time has managed to maintain macroeconomic stability and financial system. The average value of Economic Growth amounted to 5.80%. This value means that the value of the sample data Economic growth during the study period had an average value of 5.80%

The lowest value of growth of third party funds amounted to -32.99% which is the value of Third Party Funds Growth of Bank Pundi in 2015. It is caused by the crisis that occurred in 2015 happened in Greece and China, which have direct impact on Indonesia especially Bank Pundi, The highest value growth of third party funds amounted to 538.88%, which is the value of Third Party Funds Growth of Bank Pundi in 2011. The management strategy is underway to expand the network during the year 2011 by build a large number of offices in various regions have succeeded in doubling the number of existing office, from 19 offices concentrated originally only in several large cities until December 31, 2011 Bank Pundi has had 187 offices spread throughout Indonesia. The average value of the Growth of Third Party Fund amounted 20.10%. This value means that the value of the Growth of Third Party Fund of data samples during the study period had an average value growth of 20.10%.

The lowest value of CAR was at 8.02% which is the CAR of Bank Pundi in 2015. The highest value of CAR is at 45.57%
which is the CAR of Bank QNB Kesawan in 2011. QNB Kesawan Bank remains committed to maintaining capital strength, which at year-end 2010 there have been strategic rights issue and effectively in early 2011 had been an additional of capital. The average value of CAR is at 16.50%. This value means that the CAR data samples during the study period had an average value of 16.50%.

The lowest value of NPLs amounted to 0.00% which is the value of the Bank Danamon in 2011 and Bank Bumi Arta in 2012 and 2013. The highest value of NPLs amounted 5.45% which is the value of NPL Bank Jtrust in 2014. This was caused by Bank Jtrust previously as Bank Mutiara conduct Allowance for Assets (PPA), which is largely a legacy of the former Bank Century IDR 1.016 trillion and payment of tax debts in the period 2005-2008 amounted to IDR 110 billion, which is also a relic of the former Bank Century legacy.

The average value of NPL amounted 1.39%. This value means that the value of NPL samples during the study period had an average value of 1.39%. If, based on Bank Indonesia Regulation Number 15/2/ PBI /2013 regarding the Stipulation Status and Actions Continue Monitoring Conventional Commercial Bank said that the Bank is considered to have the potential difficulties endangering its survival if the criteria NPL ratio (NPL) in net terms over 5% of total loans. This shows that on average BUSN Foreign Exchange in Indonesia have a good performance in terms of NPL. Based on normality test using a non-parametric analysis Kolmogorof-Smirnov (K-S) obtained results sig. (2-tailed) of 0.05. It can be concluded that the data were tested for normal distribution has a significant value of ≥ 5%.

Table3. Multicollinearity Test Result.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI Rate</td>
<td>.500</td>
<td>2.001</td>
</tr>
<tr>
<td>Economic Growth</td>
<td>.482</td>
<td>2.076</td>
</tr>
<tr>
<td>Funding Growth</td>
<td>.975</td>
<td>1.026</td>
</tr>
<tr>
<td>CAR</td>
<td>.899</td>
<td>1.112</td>
</tr>
<tr>
<td>NPL</td>
<td>.896</td>
<td>1.116</td>
</tr>
</tbody>
</table>

Multicollinearity test results show that the BI Rate, Economic Growth, Growth of Third Party Funds, CAR and NPL free of multicollinearity indicated by the value of Tolerance > 0.10 and VIF <10. Based on Heteroscedasticity tests conducted showed that the variables tested had a significance of > 5% so that it can be concluded that the variables that were tested did not have Heteroscedasticity. The autocorrelation test results show that the basis for decision-making is a 4-dl <d <4, so that the decisions taken are H0 (no positive autocorrelation). Due to the results show that the presence of autocorrelation between variables, it is necessary to do 'Run Test'. After the 'Run Test' autocorrelation, the obtained sig. (2-tailed) > 0.05, which means H0 failed rejected. Thus, the data used is quite random so that there are no issues of autocorrelation in the data being tested. The results that have been done using classical assumption test results that the variables tested is free from the problem of normality, multicollinearity, heteroscedasticity and autocorrelation.

Table4. The Impact of Interest Rate, Economic Growth, Funding Growth, CAR, and NPL on Lending Growth of Private Commercial Banks and Foreign National in Indonesia Stock Exchange (IDX).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.4959</td>
<td>-1.7948</td>
<td>0.0748</td>
</tr>
<tr>
<td>BI Rate</td>
<td>0.7276</td>
<td>0.3561</td>
<td>0.7223</td>
</tr>
<tr>
<td>Economic Growth</td>
<td>6.3829</td>
<td>2.5546</td>
<td>0.0117</td>
</tr>
<tr>
<td>Funding Growth</td>
<td>1.1899</td>
<td>32.1997</td>
<td>0.0000</td>
</tr>
<tr>
<td>CAR</td>
<td>0.2920</td>
<td>0.9323</td>
<td>0.3528</td>
</tr>
<tr>
<td>NPL</td>
<td>2.6948</td>
<td>2.5282</td>
<td>0.0125</td>
</tr>
<tr>
<td>R-square</td>
<td>0.8840</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>F-value</td>
<td>-</td>
<td>219.962</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Based on Hypothesis Testing Results Table above, the linear regression equation are as follows:

\[
\text{Lending Growth} = -0.4959 + 0.7276 \text{ BI Rate} + 6.3829 \text{ Economic Growth} + 1.1899 \text{ Funding Growth} + 0.2920 \text{ CAR} + 2.6948 \text{ NPL}
\]

Based on the hypothesis test results that the value of Adjusted R² is equal to 0.8802, this means that 88.02% of credit variation can be explained by the variation of the five independent variables BI Rate, Economic Growth, Funding Growth, CAR and NPL while the remaining 11.98% is explained by other causes outside the model. Test Results-F shows that the calculated F value is 219.962 with a significance level of 0.000. The significance level of less than 0.05, thus the regression model can be used to predict the dependent variable Lending Growth or jointly independent variable BI Rate, Economic Growth, Funding Growth, CAR and NPL effect on the dependent variable Lending Growth.

Based on t-test results above, it can be discussed the following hypotheses: (1) H1: BI Rate has significant negative effect in Bank Lending Growth. BI Rate has a regression coefficient of 0.7276 with a significance value of 0.7223 or > 0.05, it means that partially independent variables BI Rate has positive but not significant effect on the dependent variable Bank Lending Growth (the hypothesis is rejected). (2) H2: Economic Growth has significant positive effect on growth in Bank Lending Growth. Economic growth has a regression coefficient value of 6.3829 with a significance value of 0.012 or < 0.05, it means that Economic Growth has significant positive effect on the growth of Bank Lending Growth (the hypothesis is accepted). (3) H3: Third Party Fund Growth has significant positive effect on growth in Bank Lending Growth. Growth in deposits
has a regression coefficient value of 1.1899 with a significance value of 0.000 or < 0.05, it means that in partial Independent deposit growth has significant positive effect on the growth of Bank Lending Growth (the hypothesis is accepted). (4) H4: CAR has significant positive effect in Bank Lending Growth. CAR has a regression coefficient value of 0.2920 with a significance value of 0.353 or > 0.05, it means that in partial Independent CAR has positive effect on the dependent variable Bank Lending Growth but not significant (the hypothesis is rejected). (5) H5: NPL has significant negative effect on growth in bank lending. NPL has a value of regression coefficient of 2.6948 with a significance value of 0.013 or < 0.05, it means that in partial Independent NPL has significant positive effect on the dependent variable Bank Lending Growth (the hypothesis is accepted).

**BI Rate influence on Bank Lending Growth**
The results of this study indicate that an increase or decrease in the BI Rate during the study period did not affect Bank Lending Growth. Although BI on an upward trend, but the number of outstanding loans continued to experience growth despite figures showed insignificant. BI Rate is the monetary policy rate set by Bank Indonesia (as a Central Bank) and announced to the public that in theory if the BI Rate increases will result in bank lending rates will be increased so that the wishes of the people in the use of loan will decrease. However, based on the results of this study indicate that although BI Rate increase or decrease, this does not affect the rate of growth of bank lending. The results of this study strengthen the results of a previous study conducted by Pratt (2010) and Tahir (2015) which states that the BI Rate had no effect on bank lending. Meanwhile, the results of this study have differences with research conducted by Eswanto et al (2016), Tandris et al (2014) and Lucky (2012) which states that the Interest Rate Loans have a negative impact significantly on demand for loans, and vary also with research done by Son (2015) which states that the BI Rate has a significant influence on bank lending.

**Economic Growth influence on Bank Lending Growth**
The results of this study indicate that an increase or decrease of Economic Growth during study period affect the Bank Lending Growth. The higher Economic Growth it will make people’s incomes higher so as to increases the ability of people to use Bank Lending and vice versa. The bank industry, which is part of the country’s financial sector development, will distribute society’s savings to the company in the form of loan creation. It is then expected to stimulate the process of Economic Growth through increased productivity and support economic activity in all fields. The results of this study confirms the results of previous research conducted by Reza (2013), Susanti (2010), and Korkmaz (2015) stating that Economic Growth positive influence on growth of bank lending.

**Funding Growth influence on Bank Lending Growth**
The results of this study indicate that an increase or decrease of Third Party Funds (DPK) Growth during study period affect Bank Lending Growth. The higher DPK Growth collected by banks it will encourage an increase in the amount of outstanding loans and vice versa. Lending a top priority in the allocation of bank funds, this is because the source of funds comes from the community bank so that the bank should be channeled back Funds collected to community in the form of loan. Besides that Lending is the main activity of the bank as a business entity to results in a profit. Experience and capabilities possessed loan also contributed to the courage of banks in lending. The results of this study confirms the results of previous research conducted by Pratama(2010), Putra (2015), Reza (2013), Rejeki (2012) and Binangkit (2010) stating that DPK Growth positive influence on Growth of Bank Lending. While according Eswanto et al (2016) states that DPK Growth is not having influence to Bank Lending Growth.

**CAR influence on Bank Lending Growth**
The results of this study indicate that an increase or decrease of CAR during study period did not affect Bank Lending Growth. CAR which is the ratio of performance to measure the Capital Adequacy of bank owned by the bank can be used as internal factors in determining the level of bank lending. If CAR high, it will increase the financial resources to able to provide Bank Lending Growth, but based on the results of this study indicates that the bank has the car high and low doesn’t affect the rate of Bank Lending Growth. The results of this study confirms the results of previous research conducted by Pratiwi and Hindasah (2014) and Berrospide (2015) stating that CAR is not having influence to Growth of Bank Lending, while according Yuliana (2014), Buchory (2014) and Labonne & Lame (2012) states that CAR is having influence to Bank Lending Growth.

**NPL influence on Bank Lending Growth**
The results of this study indicate that an increase or decrease of NPLs during study period affect Bank Lending Growth. Based on theory and supported by previous research states that higher NPL will encourage a decrease in the number of loans disbursed and vice versa. But the results point to the contrary, where the higher NPLs, Bank Lending Growth will be higher. These things can happen because it is one of the strategy bank, given in accordance with the no 15/2/PBI/2013 which states that if the bank had NPL above 5%, including bank...
supervision of BI and OJK. Therefore, banks try continue to improve its Bank Lending Growth with the expectation that Bank Lending Growth could help to return of the smooth operation of the Bank’s Business or as well as the average value of NPLs of all banks amounted to 1.39% is considered still far below 5%, the bank still continue to improve loan. The results of this study confirms the results of previous research conducted by Yuliana (2014), Rejeki (2012), Putra (2015) and Binangkit (2014) stating that NPL positive influence on Bank Lending Growth. While according Eswanto et al (2016) and Cucinelli (2015) states that NPL negatively influence demand for Bank Lending.

IV. CONCLUSIONS

The conclusions can be drawn through the analysis of data and information gained from this study are as follows: Economic Growth, Funding Growth and NPL are having positive influence to Bank Lending Growth Banks while BI Rate and CAR are not having significant influence to Bank Lending Growth. Economic Growth is the most significant variable in influencing Bank Lending Growth.

V. SUGGESTION

As for the recommendation that can be given through the results of this study are as follows: (1) for the banking industry, based on the results of the research show that the variables that have the highest coefficient of Economic Growth. For the bank management if you want to get your business growth in this case is Bank Lending Growth that must be considered a major focus is on Economic Growth that is being experienced. The bank should be keen to take advantage of the Economic Growth that is happening. When the Economic Growth is improving, it can be used as a good momentum for the business development strategy by implementing relevant strategies and the corresponding ability of the company. In addition the Economic Growth, Funding Growth the greater it will make the greater the amount of Credit Bank that can be channeled. Therefore, the bank must perform Funds optimally. Other variable that influence Bank Lending Growth is NPL. The bank must have a good credit management so that NPL rate can be maintained so that owned Bank Lending Growth would be optimal. (2) For regulators (BI and OJK) this research can be used as consideration in terms of decision-making or policy assessment to assist the banking industry in increasing Bank Lending Growth. (3) For Customers and Investors, this research can be used as an illustration of how the banking system during the period 2011-2015 and can be used for assessing the banking industry in Indonesia. (4) This research is empirical research and there are some limitations some things can be suggested for further research is to deepen the discussion of other factors that influence the Growth of Credit Bank as Inflation, Exchange Rate, Interest Rate, Loan to Deposit Ratio (LDR), Return on Assets (ROA) or Return on Equity (ROE)

REFERENCES

[16] Rejeki, Desi Budi. (2012). “Pengaruh Dana Pihak Ketiga (DPK), Non Performing Loan (NPL) dan BI Rate terhadap Tingkat Penyaluran Kredit Perbankan (Studi pada Bank Umum Swasta Nasional Devisa di Indonesia

www.ijsrp.org


Undang - Undang Republik Indonesia Nomor 14 Tahun 1967 Tentang Pokok - Pokok Perbankan

Undang - Undang Republik Indonesia Nomor 7 Tahun 1992 Tentang Perbankan Sebagaimana telah diubah dengan Undang - Undang Nomor 10 Tahun 1998

AUTHOR

First Author- Maulana Yasnur, Post Graduate, Magister Management, Jakarta Mercu Buana University, Indonesia. Email: Maulanayasnur@gmail.com

Second Author- Augustina Kurniasih, Department of Management, Faculty of Economics and Management, Jakarta Mercu Buana University, Indonesia. Email: augustina.kurniasih@mercubuana.ac.id

Analysis of Pseudorange-Based DGPS after Multipath Mitigation

Thilantha Dammalage

Department of Remote Sensing and GIS, Sabaragamuwa University of Sri Lanka

Abstract- In Differential GPS (DGPS) processing technique the ultimate accuracy of the user location depends on the combined effect of site-dependent errors (i.e. multipath, receiver clock error and etc.), which occur at the points of observation and the reference. Out of which, multipath is recognized as the most dominant and intricate site-dependent error. Previous study by Dammalage et al. (2010) evaluated the possible accuracy improvement of pseudorange-based DGPS positioning by C/A code multipath mitigation at the GPS reference stations applying wavelets transform. In this paper, three factors, which degrade the obtainable accuracy of the proposed multipath mitigation method, are identified and results are presented.

Index Terms- GPS Permanent Reference Station, Multipath, Pseudorange-based DGPS

I. INTRODUCTION

Differential GPS (DGPS) is one of the most popular and comparatively accurate techniques to enhance the GPS positioning accuracies by minimizing most of the common mode errors (e.g. ionospheric, tropospheric, satellite clock errors, and so forth) in a combined operation (Bradford et al. 1996). The extent to which the common mode errors are diminished by DGPS depends on a number of factors, but mainly the separation of the reference and user GPS receivers (Hofmann-Wellenhof et al. 2001). Furthermore, DGPS observation accuracy is highly dependent on the receiver type, which varies with the capability of the carriers (L1 and L2) and/or code (C/A) measurements for position estimation. Accordingly, DGPS technique has been classified into two categories, namely carrier phase and pseudorange-based DGPS, where the accuracies vary from centimeter level to meter level respectively (Han et al.1997).

Moreover, several DGPS processing techniques can also be found, for instance, single difference and double difference which are very common in practice; yet depend on the capability of the receiver and the processing software (Baroni et al. 2005). Irrespective of the processing technique utilized in DGPS, the ultimate accuracy of the user location depends on the residual common mode errors and the combined effect of site-dependent errors (e.g. multipath, receiver and measurement noises) at the reference and the point of observation. Of the latter, the most dominant error has been identified to be the effect of multipath (Xu.G., 2003) and which is defined as the multiple receptions, by a GPS antenna, of one satellite signal due to reflections by surrounding objects (Misra et al. 2004). It has also been found that the error caused by multipath is highly variable in the time domain, showing quasi-sinusoidal oscillations of short periods of several minutes, hence creating complexity in mathematical representations (e.g., Daubechies et al.1990; Ogaja et al. 2007).

Based on the inevitability of multipath, most permanent GPS reference stations are installed through careful site selection and/or augmentation with additional hardware (e.g., choke-ring) so that their differential correction data have minimal multipath effects (Chen et al. 2010; Maqsood et al. 2013). However, in most practical situations, minimal multipath or multipath-free site selection is not an easy task. As a consequence, some residual multipath errors and receiver noises are always remain and degrade the quality of DGPS corrections generated at the reference stations (Fan et al. 2006). By utilizing the double difference DGPS processing method, the bias term of the receiver clock can be completely eliminated (Baroni et al. 2005). Yet, the error terms caused by multipath and receiver noise remain unchanged as single difference DGPS.

II. PSEUDORANGE (C/A CODE) MULTIPATH

Having realized the fact, most of the modern GPS receivers are now employing multipath mitigation algorithms for their position estimations; there by ensure the negative influence of multipath from position estimations. For instance, Multipath Elimination Technology (MET) and Multipath Elimination Delay Lock Loop (MEDLL) are two popular techniques used to mitigate multipath at the receiver signal processing level (Townsend et al. 1994; Chen et al. 2013; ). Unfortunately, these methods are not effective in eliminating combined multipath caused by reference and user stations, on DGPS observations. Moreover, the effect of C/A code multipath error, on pseudorange-based DGPS observations, is more significant due to its magnitude. Which is almost ten times greater than that of the carrier phase measurements (Mertins, 1999) and it could be even about 150m due to the chip length of C/A code (Xu.G., 2003). Notwithstanding, a wide range of GPS receivers, from the low-cost to very expensive, offer pseudorange-based DGPS and commonly practiced by most of the GPS users due to its extended operational distance of several hundreds of kilometers from its reference station while the carrier phase DGPS operations are limited to several tens of kilometers (Dammalage et al. 2006).
In consideration of the merits and appraising the constrain effect of multipath error on C/A code measurements; the study proposed by Dammalage et al. (2010) aims to investigate the mitigation of the multipath effect on pseudorange-based DGPS corrections that are generated by a permanent GPS reference station. Furthermore, the study utilized the carrier phase and pseudorange measurements for the derivation of C/A code (pseudorange) multipath effect \( (M^p) \), which has been formulated by Han et al. (1997), taking advantage of the fact that multipath and receiver noise on carrier phase are negligible compared to those of C/A code based pseudorange measurements. The C/A code multipath based on L1 and L2 frequencies are represented by equations (1) and (2), respectively.

\[
(M^L_1 + \epsilon^L_1) = PR^L_1 - \frac{9529}{2329} \cdot \Phi^L_1 + \frac{7200}{2329} \cdot \Phi^L_2 + K_1 \\
(M^L_2 + \epsilon^L_2) = PR^L_2 - \frac{11858}{2329} \cdot \Phi^L_1 + \frac{9529}{2329} \cdot \Phi^L_2 + K_2
\]

Where; \( \epsilon^L_1 \) and \( \epsilon^L_2 \) represent the noise of receiver and pseudorange measurements of \( PR^L_1 \) and \( PR^L_2 \) respectively. \( \Phi^L_1 \) and \( \Phi^L_2 \) are the carrier phase measurements in meters. K1 and K2 are functions of the multipath on carrier phase which include the unknown integer ambiguities. The multipath effect is considered to be a combination of harmonic signals and can be averaged out to zero over a few hours. Therefore, K1 and K2 can be estimated by averaging over a period of few hours. The result of these code and phase linear combinations give the noise embedded C/A code (pseudorange) multipath residuals and thus it is typically referred to as noisier multipath residuals (Satirapod et al. 2005). An attempt has, therefore, been made to de-noise the results obtained by equations (1) and (2) utilizing Wavelet Transform (WT) for the precise estimation of C/A code based pseudorange multipath error at permanent GPS reference stations. The obvious challenge of WT application in multi-resolution signal analysis is the selection of the best wavelet family and the level of decomposition (Fu et al. 1997, Graps A., 1995 and Mallat S. G., 1989). Consequently, based on several field experiments and analyses, Dammalage et al. (2010) have identified the best wavelet family and the level of de-composition for the said de-noising process. Moreover, they have evaluated the possible accuracy improvement of pseudorange-based DGPS positioning by applying the proposed C/A code multipath mitigation method at the GPS reference stations. However, to further evaluate that fundamental study, this paper aims to investigate the accuracy diminishing factors effecting on C/A code multipath mitigation from pseudorange-based DGPS corrections with the application of proposed mitigation practice. In order to accomplish the said goal, the same data set collected through the field experiment discussed by Dammalage et al. (2010) is utilized for the analyses in this paper as well.

III. FIELD DATA ACQUISITION

Dammalage et al. (2010) has established a field experiment with three known ground controls, adopting two receivers as permanent reference stations and the third as a user GPS. Three days of 24-hour observations with 1 second observation interval were recorded with an artificial signal reflector, made of concrete, wood and metal, at one of the references during day 1, 2 and 3 respectively as illustrated in figure 1(a). Day 4 observations were performed as in figure 1(b) and that has chosen as reference observations, to evaluate the effects of artificial multipath environments. Moreover, they have precisely measured the base-line distances D1, D2 and D3 by an electronic distance measurement (EDM) technique. Based on this known configuration, of GPS receivers and the signal reflectors, the additional multipath introduced by the reflectors was precisely calculated for each segment of the observations.
Analyzing these field data, Dammalage et al. (2010) have concluded that the best wavelet family and the level of de-composition for the precise extraction of C/A code multipath are bi-orthogonal wavelet family and the 8th level of de-composition. Additionally, they have shown that about 60% of accuracy improvement of pseudorange-based DGPS is possible by mitigating the effect of multipath on C/A code at GPS reference stations.

IV. ANALYSIS OF RESULTS

Accuracy and the precision of the C/A multipath residuals with respect to its accuracy and are very important to be considered while utilizing the previous multipath estimations (pre-modeled) for later generation of multipath free DGPS corrections by reference stations. However, the previous study revealed that the positional accuracy of DGPS observations, even after multipath mitigation, is still showing random deviations with time; most probably due to unmolded error terms including multipath. Therefore, this study is focused to investigate the constrains of proposed C/A code multipath estimation methodology presented by Dammalage, et al. (2010). Thereby to further enhance the accuracy and precision of C/A code multipath mitigation for accuracy improved pseudorange-based DGPS positioning. Accordingly, three accuracy diminishing factors, which negatively affected on accurate and precise extraction of C/A code multipath, were identified and discussed herein.

A. Effect of cycle slip
In C/A code (pseudorange) multipath ($M_r$) estimation based on L1 and L2 frequencies, K1 and K2 are taken as a function of the multipath on carrier phase with including the unknown integer ambiguities. In addition, the multipath effect is considered to be a combination of harmonic signals and can be averaged out to zero over a few hours. Therefore, K1 and K2 can be estimated by averaging over a period of few hours (Han et al. 1997), which implies that the occurrences of cycle slip on carrier phase measurements could diminish the accuracy of estimated K value.

For instance, figure 2(a) illustrates the effect of cycle slip on multipath error calculated using equation (1). According to the figure an unexpected drastic change of calculated multipath error, of about 70 meters (change from about -10 m to 60 m), has seen after about 5 hours (between 25,000 and 30,000 seconds) of static observations. It is apparent that a change of such magnitude, even after average out these multipath residuals to estimate the respective K values, obviously creates unrealistic consequence. As a result, figure 2(b) shows the said effect in the final pseudorange multipath residuals. The figure verifies that at the point where the cycle slip occurs, the smoothly changing multipath residuals were changed drastically of about 1.5 meters. Therefore, cycle slip has been identified as one of the main source of accuracy diminishing factors; and once it occurs, which often introduce significantly higher magnitude of pseudorange multipath residuals.

Therefore, this error source and the occurrences have to be identified carefully from the actual multipath variations and essentially filtered out to avoid its effect from accurate and precise pseudorange multipath estimations. Realizing the importance of eliminating the effect of cycle slip before estimating the pseudorange multipath residuals; this research has been extended to minimize the said effect by performing a filtering process to detect and eliminate it from the final multipath calculations. After applying the filtering process (without cycle slip effect) the resulted multipath residuals are shown in figure 2(c).

For instance, pseudorange multipath residuals before and after de-noising for cycle slip and receiver noise errors for satellite PRN 20 and 26 are illustrated in figure 3. The figure provides a clear comparison for the magnitude differences of pseudorange multipath residuals before and after de-noising. Hence, it again confirms that the cycle slip effect should essentially mitigate from the multipath calculated based on equations (1) and (2).
B. Effect of un-modeled linear error component

Other than the effect of cycle slip the study has identified another significant factor, which effects negatively on calculated pseudorange multipath residuals based on the equations (1) and (2). As discussed previously, multipath is an error which forms quasi-sinusoidal oscillations with a period of several minutes and propagates along the zero magnitude of the time series distributions. However, the time series multipath residuals calculated based on equations (1) and (2), are incorporated with un-modeled linear component as illustrated in figure 4. According to the figure, the time series multipath residual errors with the said linear component are represented in red color. The direction of the linear trend is shown with a black double arrow. Therefore, to get the theoretical distribution trend and the actual magnitude of multipath error, the remaining un-modeled linear error terms have to be identified and eliminated. After eliminating the linear component the resulted multipath residuals are illustrated in blue color.

Further, dissimilar magnitudes of these linear distributions for each and every satellite were observed. These different magnitudes imply that the liner trends are not caused by the receiver clock or other receiver dependent bias. Therefore, these remaining un-modeled linear error components, even after DGPS corrections, are predicted to be the effect of satellite clock or orbital parameters. The magnitude differences of these multipath residuals with and without linear components are observed to be significant. Therefore, the un-modeled linear component has also been identified as the other main source of accuracy diminishing factor for the accurate and precise multipath residuals estimated based on equations (1) and (2).

Figure 3: Pseudo-range multipath residuals before and after de-noising for cycle slip and receiver noise errors.

Figure 4: Pseudo-range multipath residuals; before (red) and after (blue) eliminating the un-modeled
B. Effect of observation length

Further analyses were carried out to investigate the effect of observation length on precise pseudorange multipath extraction. Several hours long observations were utilized for the multipath computation and the resulted accuracies were evaluated for the identification of the effect of observation length.

For instance, the time series pseudorange multipath residuals calculated for 1, 2, 3, and 4 hours of observation lengths, with 1 second epoch rate, for three different satellites (PRN 5, 30 and 22) are illustrated in figure 5. Each satellite selected for this illustration is observed with maximum of about 4 hours at GPS station. Further, PRN 5 and 30 are two satellites with comparatively higher multipath effect and PRN 22 is relatively less affected and illustrated in figure 5(a), (b) and (c), respectively. Figure 5(a) and (b) effectively illustrate that when the multipath error is comparatively higher; then the observation length is an important factor to be conceded.

The accuracy of the computed multipath for 3 and 4 hours of observations for PRN 5 is almost similar; because after 3 hours of observations the multipath effect is comparatively low, the influence therefore become very less. However, the similar comparison for PRN 30 reflects significant deviations, due to the influence of comparatively high multipath effect between 3rd and 4th hour of observations. Most of the high multipath error phase is included within 1 and 2 hours for PRN 5 observations; therefore, the multipath residuals are not deviated significantly from 2 and 3 hours computation. However, for PRN 30, the said difference is significant; because its higher multipath error phase is extended well over 2 hours of observation. Moreover, for both satellites the multipath computed based on 1 hour observations are significantly different from all the other observation lengths and comparatively less accurate.

However, the observation length is not a significant factor for satellites which has comparatively less magnitude of multipath effect. For instance, the computed pseudorange multipath residuals for PRN 22, illustrated in figure 5(c), have not shown any significant deviation between each observation lengths. The similar scenario has been observed for all the satellites which have comparatively less magnitude of multipath. Considering the given facts and performing several more comparable analyses, it was found that the best possible accuracy of multipath residuals were obtained when utilizing the satellite full observation period in pseudorange multipath computation based on equations (1) and (2). Moreover, this scenario is highly significant for satellites effect with comparatively higher magnitude of multipath errors.
In order to evaluate the positional accuracy of pseudorange-based DGPS prior to and after multipath mitigation; analyses were carried out by assuming GPS 01 as reference station and GPS 02 as rover. Accordingly, results for the baseline, GPS 01 – GPS 02, with four different (1, 2, 4, and 8 hour) observation lengths with 1 second epoch rate (DGPS processed) are illustrated in Table 1. Accordingly, the Root Mean Square Error (RMSE) is calculated for each observation lengths and illustrated in the table. A clear difference of RMSE is observed for each four different observation lengths. Further, the highest improvement is observed for the 8 and 4 hours observations. However, the improvement is comparatively lesser when the observation length is 1 and 2 hours, which reflects the presented effect of observation length on precise multipath estimation.

<table>
<thead>
<tr>
<th></th>
<th>1 hour</th>
<th>2 hour</th>
<th>4 hour</th>
<th>8 hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>36.7</td>
<td>34.4</td>
<td>22.1</td>
<td>21.8</td>
</tr>
<tr>
<td>Day 2</td>
<td>43</td>
<td>41.5</td>
<td>34.7</td>
<td>30.5</td>
</tr>
<tr>
<td>Day 3</td>
<td>35</td>
<td>34.1</td>
<td>23.8</td>
<td>20.9</td>
</tr>
<tr>
<td>Day 4</td>
<td>37.9</td>
<td>36.7</td>
<td>24.2</td>
<td>21.1</td>
</tr>
</tbody>
</table>

V. CONCLUSION

In this paper, cycle slip, remaining un-modeled linear error terms and observation length, were identified as accuracy diminishing sources of C/A code (pseudorange) multipath residuals calculated based on carrier and code combination. The magnitude differences of pseudorange multipath residuals before and after de-noising for cycle slip have identified as significant. Therefore, the effect of cycle slip should identified and eliminate before estimating the pseudorange multipath residuals. The remaining un-modeled linear error components are predicted to be the effect of satellite clock or orbital parameters due to their dissimilar magnitudes. However, the magnitude differences of the multipath residuals with and without linear components are observed to be significant. Hence, it should identified and eliminate from each multipath residuals. Observation length is also a significant factor for satellites which has comparatively higher magnitude of multipath than less effected one's. By several comparable analyses, it was found that the best possible accuracy of multipath residuals were obtained when utilizing the satellite full observation period in pseudorange multipath computation based on equations (1) and (2).

In this study, these three negatively influencing factors have identification and minimized successfully from C/A code multipath mitigation process. Based on the accomplished accuracy and precision, this study also highlights the potential application of multipath free real-time DGPS corrections at permanent reference stations towards supporting a growing number of high precision GPS applications.

ACKNOWLEDGMENT

Author of this article is highly indebted to the co-authors of previous study Dammalage et al. (2010); specially Professor. ChalermchonSatirapod of Department of Survey Engineering, Faculty of Engineering, Chulalongkorn University, Thailand.
REFERENCES


AUTHORS

First Author – ThilanthaLakmalDammalage, PhD, Department of Remote Sensing and GIS, Sabaragamuwa University of Sri Lanka and thilantha@geo.sab.ac.lk.

Correspondence Author – ThilanthaLakmalDammalage,thilantha@geo.sab.ac.lk, thilantha9@geo.sab.ac.lk, +94714454050.
Evaluation on Satellite Laboratory Network (SLS) in the District of Badulla District of Sri Lanka

Dr A. M. S. Bandara*/ Dr. H. K. M. M. B. Kavisekara** / Dr N S Gamagedara***

*Medical Superintendent/ PGIM Trainee
Base Hospital Mahiyangana/Ministry of Health – Sri Lanka

**Medical Director /Doctoral Trainee
Ministry of Health - Sri Lanka/ London Metropolitan University – United Kingdom

***Consultant Community Physician
Ministry of Health - Sri Lanka

Abstract: The laboratory services play a key role in all aspects of patient management. However, Laboratory services are concentrated in secondary and tertiary care hospitals. The SLS was started in 2006 to optimize laboratory services in the Badulla district by providing certain blood investigations to peripheral hospitals.

A formal evaluation of SLS had not conducted and hardly any scientific evidence on its feasibility, effectiveness. This study aimed fulfilling this requirement.

A descriptive cross-sectional study was carried to evaluate the existing SLS and to determine the factors that need to be considered for its expansion in the district.

It was found that 5 peripheral hospitals out of 63 hospitals received this service in 2006 and increased up to 12 by 2011. More than 70% of hospitals with SLS facilities viewed that having such system was important and help in avoiding unnecessary patient transfers to higher level hospitals. More than 50% of hospitals received their reports three or more days later. 9 hospitals (75%) out of 12 ceased to receive this service by October 2013. 76% of the SLS non-implemented hospitals had heard of this service and all of them requested SLS. Need for SLS was highlighted by smaller hospitals for implementation of NCD screening.

Not receiving reports on time, refusing more samples, delaying payment to minor staff, and inadequate number of minor staff were the main reasons contributed to cessation of SLS. Also, receiving laboratories pointed requesting tests that are not agreed, not receiving extra staff and extra allocation, unsatisfactory specimens and lack of guidelines problems of implementing SLS.

However, it was concluded the importance discussion with all stake holders regrading importance and issues of SLS system in Badulla.

Key words; satellite laboratory service, peripheral hospitals, SLS.

Introduction

Badulla is one of the two districts in Uva province of Sri Lanka with population of 850,000 and population density of 300.7 per km2(Ministry of Health, 2011). The health services in the district are delivered through one Provincial General Hospital, three Base Hospitals, 44 Divisional Hospitals, 15 Primary Medical Care Units and sixteen Medical Officer of Health (MOOH) areas as shown in Table 1.

Table 1: Distribution of hospitals in the district

<table>
<thead>
<tr>
<th>Hospital Type</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provincial General Hospital/ Base Hospitals</td>
<td>4</td>
<td>6.4</td>
</tr>
<tr>
<td>Divisional Hospitals (Type A)</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Divisional Hospitals (Type B)</td>
<td>6</td>
<td>9.5</td>
</tr>
<tr>
<td>Divisional Hospitals (Type C)</td>
<td>36</td>
<td>57.1</td>
</tr>
<tr>
<td>Primary Medical Care Unit</td>
<td>15</td>
<td>23.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>63</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: Office of the regional Director of Health Services - Badulla

As far as the basic health indicators are concerned, the birth rate was 22.4 per 1000 midyear population in 2007 and Infant Mortality Rate was 9.9 per 1000 live births in 2003. The death rate was 5.5 per 1000 midyear population in 2007 and the Maternal Mortality Rate was 27.5 per 100,000 live births in 2002 (FHB, 2007). The first five leading causes of hospitalization were traumatic injuries, asthma and Chronic Obstructive Pulmonary Disease, viral diseases, diseases of gastro intestinal tract and diseases of genitor urinary tract while the first five
leading causes of death were Ischaemic Heart Disease, neoplasm, traumatic injuries, pulmonary heart disease and cardiovascular diseases in the district in 2007 (FHB, 2007).

The laboratory services play a key role in all aspects of patient management such as inward care, outpatient care and clinic care. They are mainly concentrated in tertiary and secondary care hospitals while only a very limited number of investigations are being carried out in divisional hospitals and primary medical care units due to limited resources in the health sector. For example, urine albumin and urine sugar tests are being performed in each level of care compared to Fasting Blood Sugar (FBS) and Full Blood Count (FBC) which are not being carried out in some Divisional Hospitals or any primary care hospital. However, acute case management as well as clinic services such as antenatal clinics and Non-Communicable Disease (NCD) clinics are being conducted routinely at primary care hospitals too. Therefore, certain investigations such as FBS, FBC, Blood Urea, Serum Creatinine (SC), Serum Electrolyte (SE) and Lipid Profile (LP) are important in patient follow up at clinics in all healthcare institutions in the country.

The satellite laboratory service was established in 2006 by the department of provincial health services guided by the director general of the health services to optimize laboratory services in the district of Badulla. The objective of this particular service was to improve patient care in the province by:

- Providing investigation facilities to peripheral hospitals in which those investigations were not possible to be carried out due to limited resources
- Reducing patient transfer from peripheral hospitals to secondary and tertiary care hospitals due to unavailability of such investigation facilities in peripheral hospitals.
- Thereby addressing the health system for accessibility and availability of slandered curative care practices at peripheral hospital.
- Minimize the direct, indirect and out of pocket expenditure of the people in rural underprivileged community.

Only a limited number of blood investigations were offered through this special service to peripheral hospitals. A limited number of specimens from each hospital in a given region and all those collected samples were transferred to satellite laboratories by minor staff with the help of public transport services in the district. The investigations were carried out in pre-identified satellite laboratories and reports were sent back to peripheral health institutions by minor staff, by fax or by emails. It has been planned to implement this service in the district of Badulla as a pilot project and then to expand it to other parts of the province. Further, depending on the feasibility of carrying out such a service it may be implemented island-wide.

Satellite laboratory service was found to be an important service to a middle-income country like Sri Lanka with limited resources in the health sector. It was started in 2006 and a formal evaluation of this satellite laboratory service had not been carried out since its commencement to date except of informal evaluations during district and provincial health reviews. Nearly six to seven years has passed by now since its beginning and therefore it is timely to look into its effectiveness in achieving programme objectives. There was hardly any scientific evidence on its feasibility, effectiveness in patient management and possibility of expanding this service to all peripheral hospitals in the district. Therefore, the present study was planned to determine its successfulness and to identify factors that may help further improve and expand it to other parts in the province as well as the country.

Objectives

General objective

To determine the effectiveness of the existing satellite laboratory network and to determine the factors that needs to be considered for its further improvement and expansion.

Specific Objectives

1. To describe the existing satellite laboratory network in relation to services provided through the network and its coverage.

2. To determine the human resource challenges and managerial constraints with regard to the satellite laboratory network.

3. To describe the factors that needs to be considered in improving and expanding the satellite laboratory network.

Literature Review

Healthcare Delivery Services

Since the inception of mankind, some sort of healthcare delivery service has existed helping man to preserve his health status. In Sri Lanka, the predominant healthcare system has been the traditional ‘Ayurvedha’ system which co-exists to date with other healthcare delivery systems. With the invasion of the Europeans from the sixteenth century, allopathic system was gradually established, and today it is the most popular form of healthcare delivery system in the island (Uragoda, 1977). The curative healthcare institutions, initially instituted to treat the European invaders themselves, expanded in size and numbers and started catering to the locals as well.

Laboratory services

The initial hospitals established were manned by European health staff and consisted of very basic healthcare delivery services with almost no supportive or para-medical service like...
the laboratory service (Uragoda, 1977). With the advancement of science and technology, medical field too progressed and the developments which occurred globally crossed borders into the Sri Lankan medical field as well.

Laboratories were instituted in government administered hospitals in the island towards the latter half of the last century and today, a large proportion of the hospitals have some type of laboratory which provides great support in delivering healthcare services to the people of the country. Recognizing the important role played by the laboratories, the service was expanded and today the service comes directly under a Deputy Director General of Health Services for Laboratory Services.

The laboratory service comprises of many types of services, some of which are, biochemistry, histopathology and hematology. The most basic type of laboratory would have facilities to perform basic biochemical tests while the larger laboratories are able to perform all types of body fluid and tissue analysis. However, the establishment of laboratory service requires many resources including analyzers, material and trained health staff as well as financial allocation to purchase necessary reagents and other consumables which incurs considerable costs.

Worldwide, clinical laboratory services are under pressure to reduce number of tests and cut staff and supply cost due to economic constrains. It has also been highlighted the importance of imaginative strategies to look for solutions such as rationalization of existing services and cost-effective use of available limited resources (McQueen and Bailey, 1993). It has observed that prolonged laboratory turnaround time contributed to prolonged stay in emergency departments. A Satellite laboratory service established in the emergency department had reduced laboratory turnaround time significantly and patient length of stay at emergency department has also reduced as a result (Dhatt et al., 2008). The main policy document of the country; “Mahinda Chinthana; Vision for the future” states that the government aim is to build a healthier nation that contributes to its economic, social, mental and spiritual development. It further emphasize its future aim to have a patient-focused system that provides services to the client (Mahinda Chinthana, 2005). Therefore, expansion of the existing health services to the door step of clients is important in terms of achieving the above objective.

Laboratory services in the health sector in the country play a vital role in curative care services and community health services. The laboratory services in the ministry of health in its mission statement states that it expects to upgrade existing laboratory network in the country and to make available reliable results to all patients in the country (Ministry of Health, 2008). The government of Sri Lanka spends nearly 5% of its total expenditure yearly on health services out of which a significant proportion (3%) goes to laboratory services in the country (Family Health Bureau, 2007). In addition to this expenditure from the line ministry, the provincial councils also spend a significant proportion of their total expenditure on health services. For example Provincial Specific Development Grant (PSDG) in Uva province has spent Rs. 1938 million on providing health service in 2010 and 3285 million in 2013 which is a 70% increase from 2010 to 2013 (Provincial Directorate Health Services, 2014).

Only a handful of research has been conducted and published in the country on laboratory services. Siriwardena, 2005 conducted a survey to assess utilization of laboratory investigations in patient management. And Atapattu 2010 conducted a survey to assess capital, recurrent, and unit cost of laboratory investigations of the provider as well as client side for ante natal mothers.

Yet another research was conducted by Priyantha 2011 for the study of Utilization pattern and availability of laboratory results at medical wards.

Healthcare delivery in Badulla district

Badulla is one of the 25 administrative districts of the country located in the South Eastern slopes of the island housing a population over 800,000 (Department of Census and Statistics, 2012). The principal responsibility of providing government allopathic healthcare services is vested with the Provincial Ministry of Health, Uva province. With the exception of the Provincial General Hospital Badulla all other healthcare institutions in the district are administered by the Provincial Ministry of Health. Headed by the Regional Director of Health Services, functioning under the administrative guidance of the Provincial Director of Health Services Uva province, the provincial healthcare system delivers its health services through 63 curative health care institutions and 16 Medical Officer of Health areas by 2012 (Provincial Ministry of Health, 2012).

Satellite Laboratory Service

Considering the accessibility to healthcare institutions, geographical terrain, low population density, limited resources in the health sector and the government mission of providing good quality laboratory services to the public, the provincial health department of Uva launched a special service called “Satellite Laboratory Service” in the district of Badulla as a pilot project in 2006 (Provincial Ministry of Health, 2008).

The concept of Satellite Laboratory System was initiated by the Provincial Directorate of Badulla identifying focal hospitals which could assist in carrying out biochemical and pathological tests for the smaller hospitals in the region. Provincial General Hospital, Badulla and Base Hospital, Mahiyangnanaya were identified as the focal laboratories at its initial stage (Provincial Ministry of Health, 2008). The smaller hospitals were identified as hospitals which cater to a large population but with limited laboratory capacities and geographically situated along one route of access. The first and second lines of satellite hospitals were identified along the western parts of the district. Divisional Hospitals Haldummulla, Hapatule, Diyatalawa, Bandarawela, Uva Paranagama, springwelly, lunugala, Hopton, Passara and Welimada were expected to send 200 to300 samples for testing
to PGH Badulla three days of the week (Provincial Ministry of Health, 2008). The third line of satellite hospitals were identified along the North Eastern parts of the district where Divisional Hospitals Kandeketiya, Rideemaliyadda, meegahakiula, Uvatissapura, Batalayaya Hebarawa and Girandurukotte, were expected to send samples to Base Hospital Mahiyanganaya (Provincial Ministry of Health, 2008).

An expert panel of administrators, clinicians and public health specialists were consulted to identify the tests under the system and ten biochemical tests were identified at the onset, which were FBS, Blood Urea, Serum Glutamic Oxaloacetic Transaminase, Serum Glutamic Pyruvic Transaminase, Standard Aglutination Test, Serum amylase, Alkaline Phosphatase, SE, LP and Serum proteins. These tests were identified as investigations which could assist much in the diagnosis and management of critical and common illnesses. It was expected that an employee of the most distant hospital would bring the samples coordinating with the other hospitals and bring samples from all the hospitals along the way to the final focal hospital.

Even though a similar type of laboratory service was not seen in other parts of the country before it was implemented in the district of Badulla, this service has now been extended to districts of Monaragala, Rathnapura, Nuwaraeliya and Ampara but expected results were not being achieved. (Ministry of Health, 2012 and RDHS performance reviews).

A formal evaluation of an intervention is mandatory after a certain period of time since its commence in order to assess the effectiveness in terms of achieving its set objectives. It has found in annual district and provincial health reviews that this special laboratory service was cost effective in providing laboratory services to peripheral hospitals in the district although those were not formal evaluations (Provincial Ministry of Health, 2012). To date there has not been any published research conducted on the satellite laboratory service in Badulla or any other district which implements this service.

Global situation on Satellite Laboratory Services

There is only a handful of literature published on satellite laboratory systems in scientific journals. Satellite laboratory service has existed in other countries like the United States of America and the United Kingdom (Johnson, 1994, Wei et al., 2010). Johnson (1994) reported that a satellite laboratory service as a viable solution to the problem of unavailable laboratory test results and it can effectively reduce the number of surgeries delayed and the number of patients who undergo surgery before laboratory test results were available.

Several countries in the Asia had also trialed satellite Laboratory systems and China is one country which has published literature in this field. Contrary to the findings in the West, a research conducted to evaluate satellite laboratory serves in China found it was not sustainable long term. Wei et al., (2010) found in an evaluation of microscopic laboratory service in another study in China, two years after it beginning, that the service was not effective in achieving its objectives and the service was abandoned based on the findings. Therefore, the satellite laboratory service in the district of Badulla merits a formal evaluation at present.

Research methodology

According to the objectives of the study the current study aimed at exploring the current situation, human resource challenges and managerial constrains of the satellite laboratory service, and to identify and describe factors necessary for further expansion of this service.

This was a descriptive cross-sectional study conducted in The district of Badulla. All curative health institutions in the district were considered as the study population for the present study. Health institutions with the satellite laboratory system were the inclusion criteria. Health institutions that provide only preventive care services and no curative care services was selected as the exclusion criteria. All institutions fulfilling criteria was included in the study. Pre-tested interviewer administered questionnaires with close ended and open-ended questions together with desk review guidelines were used as study instrument in this study. The content of the questionnaires was prepared in consultation with team of expert, taking objectives of the study into consideration and also reviewing relevant literature. All questions used pre-coded responses except for few questions which were open-ended. Responses to open-ended questions were coded later by the principal researcher. The questionnaires were pre-tested in a group of hospitals where a similar kind of service was going on in the district of Moneragala. The validity of the questionnaires was assessed with face validity, content validity and consensual validity by a panel of experts including the principal researcher, the supervisor, a medical administrator, a consultant community physician, a senior medical laboratory technician and a senior nurse who was directly involved in this satellite laboratory service.

There were 2questionnaires. First questionnaire was used to collect data from hospitals where the satellite laboratory service was implemented. The second questionnaire was intended on need assessment of such system in other hospitals.

Desk review guidelines

The desk review is a method used to gather data extensively of a condition which is not well known and a selected group of persons go through what is available up to date and review the existing condition to arrive at some conclusions (UNDP, 2008). The guidelines for this review were developed by the principal researcher in consultation with the supervisor. Guidelines regarding the implementing satellite laboratory system in 2006 in Badulla district.

Data collection

Investigators themselves visited all healthcare institutions with prior arrangements. The questionnaires were administered to the medical offices that were in charge of those health institutions.
These medical officers could seek help from other staff who directly involved in satellite service whenever it was required. The medical officers who were in charge were asked to write their answers to open ended questions which were qualitative in nature at the end of the questionnaire administered to peripheral hospitals where Satellite Laboratory System was already implemented.

Data entry and analysis
The investigators themselves handled the entire data entry and statistical analysis process. All questions that were to collect quantitative data were pre-coded for convenience of data entry. A detailed data entry sheet was prepared on SPSS 17.0 software. Questionnaires were screened for completeness at the end of the day during data collection and the required data cleaning was made accordingly. Data entry was carried out simultaneously with data collection directly into the SPSS data sheet the investigators analysis was carried out to find out errors in data entry and necessary corrections were made accordingly. Statistical analysis was carried out using the software package SPSS (version 17.0).

Desk review on satellite laboratory service
A desk review was conducted among a group of people from the satellite laboratory following desk review guidelines. This group consisted of the Director of the hospital, consultant chemical pathologist, consultant microbiologist, consultant hematologist, a medical officer from the medical laboratory department, two MLTs and two minor staff personnel who were directly involved in the satellite laboratory service. The entire desk review was tape recorded with the consent of all participants and later translated carefully into a text by the principal investigator. The analysis of this text took place through the process of sequencing, capturing and coding. During this analysis similar responses were taken together and any response unique to one particular participant was taken separately. Any information that may reveal the identity of the participants was deleted or removed from the analysis.

Ethical considerations
Permission to carry out this study was obtained from the Provincial Director of Health Services and Regional Director of Health Services, Badulla. The objectives of the study were explained and confidentiality was assured to all participants of the study before the beginning of data collection. Informed written consent was obtained from all the study participants. The study participants were informed that they were not going to receive monetary allowances for their participation in the study before getting the informed consent. The electronic version of the data base was password secured and the data sheets were kept under lock and key. Ethical clearance for this study was obtained from the Ethical Review Committee of the University of Colombo.

Results

<table>
<thead>
<tr>
<th>Hospitals Included in the study</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provincial General Hospital</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>District General Hospital</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Base Hospital – Type-A</td>
<td>2</td>
<td>3.7</td>
</tr>
<tr>
<td>Base Hospital – Type-B</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Divisional Hospital – Type-A</td>
<td>2</td>
<td>3.6</td>
</tr>
<tr>
<td>Divisional Hospital – Type-B</td>
<td>6</td>
<td>10.9</td>
</tr>
<tr>
<td>Divisional Hospital – Type-B</td>
<td>29</td>
<td>52.7</td>
</tr>
<tr>
<td>Primary Medical Care Unit</td>
<td>14</td>
<td>25.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The present was conducted in 55 hospitals out of 63 hospitals in the district. More than two third these hospitals was Type C Divisional Hospitals and Primary Medical Care Units (PMCU).

<table>
<thead>
<tr>
<th>Intervention category</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satellite Laboratory</td>
<td>2</td>
<td>3.6</td>
</tr>
<tr>
<td>SLS implemented hospital</td>
<td>12</td>
<td>21.8</td>
</tr>
<tr>
<td>SLS non-implemented hospital</td>
<td>41</td>
<td>74.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>55</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Two hospitals functioned as satellite laboratories providing investigations facilities to peripheral hospitals at the initial stage. These two hospitals were provincial general hospital, Badulla and Base Hospital, Mahiyangnanaya. Twelve other curative care institutions (22%) out of 55 hospitals received this laboratory service at the beginning of this particular service.
The SLS started with 5 (9%) hospitals receiving this service and two other hospitals were added to this service each year since 2006 to 2010 except in 2008. No other hospitals started to receive this service after 2011.

Table 3: Distribution of study hospitals by the implemented year of SLS

<table>
<thead>
<tr>
<th>Year</th>
<th>Number (%) of hospitals started SLS</th>
<th>Cumulative number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>5 (9.4)</td>
<td>9.1</td>
</tr>
<tr>
<td>2007</td>
<td>2 (3.8)</td>
<td>13.2</td>
</tr>
<tr>
<td>2009</td>
<td>2 (3.8)</td>
<td>17.0</td>
</tr>
<tr>
<td>2010</td>
<td>2 (3.8)</td>
<td>20.8</td>
</tr>
<tr>
<td>2011</td>
<td>1 (1.9)</td>
<td>22.6</td>
</tr>
<tr>
<td>SLS-Not received</td>
<td>43 (77.3)</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The SLS started with 5 (9%) hospitals receiving this service and two other hospitals were added to this service each year since 2006 to 2010 except in 2008. No other hospitals started to receive this service after 2011.

Table 4: Distribution of study hospitals by tests received through SLS when the service was begun in each hospital respective year

<table>
<thead>
<tr>
<th>Test</th>
<th>Received from SLS Number (%)</th>
<th>Not received from SLS Number (%)</th>
<th>Total Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBS</td>
<td>7 (58.3)</td>
<td>5 (41.7)</td>
<td>12 (100)</td>
</tr>
</tbody>
</table>

The SLS started with 5 (9%) hospitals receiving this service and two other hospitals were added to this service each year since 2006 to 2010 except in 2008. No other hospitals started to receive this service after 2011.

Table 5: Distribution of methods of transporting specimens and receiving reports through Satellite Laboratory System

<table>
<thead>
<tr>
<th>Method</th>
<th>Yes Number (%)</th>
<th>No Number (%)</th>
<th>Total Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transporting specimens-Minor staff by bus</td>
<td>12 (100)</td>
<td>0 (0)</td>
<td>12 (100)</td>
</tr>
<tr>
<td>Transporting specimens by ambulance</td>
<td>0 (0)</td>
<td>12 (100)</td>
<td>12 (100)</td>
</tr>
<tr>
<td>Transporting specimens by other means</td>
<td>0 (0)</td>
<td>12 (100)</td>
<td>12 (100)</td>
</tr>
<tr>
<td>Receiving reports-Minor staff by bus</td>
<td>12 (100)</td>
<td>0 (0)</td>
<td>12 (100)</td>
</tr>
<tr>
<td>Receiving reports by Ambulance</td>
<td>0 (0)</td>
<td>11 (100.0)</td>
<td>11 (100.0)</td>
</tr>
<tr>
<td>Receiving reports by other means</td>
<td>0 (0)</td>
<td>12 (100.0)</td>
<td>12 (100.0)</td>
</tr>
</tbody>
</table>

* Missing value = 1

All hospitals (100%) that received this service used their minor staff (100%) and public transport facility (100%) to transport specimens and to receive report of investigations through SLS.

Table 6: Distribution by the place where Satellite Laboratory System found to be most useful

<table>
<thead>
<tr>
<th>Most useful place*</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
</table>

www.ijsrp.org
Most of the hospitals (73%) found SLS useful in inward patient management.

Table 8: Distribution of study hospitals by the day of receiving reports

<table>
<thead>
<tr>
<th>Day</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1 (same day)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Day 2</td>
<td>5</td>
<td>41.7</td>
</tr>
<tr>
<td>Day 3</td>
<td>2</td>
<td>16.6</td>
</tr>
<tr>
<td>&gt; 3 days</td>
<td>5</td>
<td>41.7</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>100.0</td>
</tr>
</tbody>
</table>

More than 50% of hospitals received their reports most of the time on third day or after three days of requesting and sending specimens to satellite laboratory.

Table 9: Distribution of study hospitals by current status of SLS

<table>
<thead>
<tr>
<th>Current status</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Going on well compared to its beginning</td>
<td>2</td>
<td>16.7</td>
</tr>
<tr>
<td>Going on with no progress</td>
<td>1</td>
<td>8.3</td>
</tr>
<tr>
<td>Not functioning at all</td>
<td>9</td>
<td>75.0</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Nine hospitals (75%) out of 12 hospitals were no more receiving SLS at the time present study was conducted.

Table 11: Distribution of study hospitals by maintaining a register related to SLS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Yes Number (%)</th>
<th>No Number (%)</th>
<th>Total Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having a</td>
<td>7 (58.3)</td>
<td>5 (41.7)</td>
<td>12 (100)</td>
</tr>
</tbody>
</table>

Only 7 (58%) had a register for recording information related to SLS. However, none of those registers were complete and accurate up to date.

Table 12: Categories of opinions of Hospital staff on existing satellite laboratory service

- ‘Reviewing existing service’
  - ‘Receiving minor staff claims on time’
  - ‘Having no proper method for specimen transfer’
  - ‘Reports getting through fax machine being not clear’
  - ‘Increasing number of days per week for a hospital to receive satellite laboratory service’
- ‘Need of regular monitoring’
  - ‘Poor coordination between public transport service and health service’
  - ‘Delayed and sometimes missing reports’
  - ‘Adjusting according to situations such as screening for Non Communicable Diseases’
  - ‘Need of a having proper guidelines for specimen collection and transfer, and training minor staff on proper handling of specimen’
- ‘Alternative methods’
  - ‘Using internet facilities for receiving reports instead of fax machine’
  - ‘Nominating Base Hospital, Diyathalawa and Base Hospital,’
In a qualitative research, it is important to recognize and document the researcher’s pre-understanding of the phenomenon being studied [12]. It was observed during the data collection for quantitative component of the present study that the officers in charge of the health care institutions were having different opinions regarding this satellite laboratory service. Therefore, it was felt that identifying different opinions of hospital managers is important for policy makers and health managers for further improving the existing service in the district and for exploring the possibility of expanding the service to other part of the country. The entire text was carefully read several times and all possible meaning units were identified. These meaning units were then condensed into a few words to identify and analyze themes as given in the table 12.

Table 13: Distribution of SLS-non-implemented hospitals by their awareness on SLS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Yes Number (%)</th>
<th>No Number (%)</th>
<th>Total Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having heard of SLS</td>
<td>31 (75.6)</td>
<td>10 (24.4)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>Usefulness of having such a service</td>
<td>41 (100.0)</td>
<td>0 (0)</td>
<td>41 (100)</td>
</tr>
</tbody>
</table>

Most (76%) of the curative care institutions where the Satellite Laboratory System was not implemented had heard of Satellite Laboratory System that was going on in the district and all these institutions claimed that having such a service is important in patient care.

Table 14: Distribution of SLS-non-implemented hospitals by investigations being currently done

<table>
<thead>
<tr>
<th>Test</th>
<th>Yes Number (%)</th>
<th>No Number (%)</th>
<th>Total Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBS</td>
<td>20 (48.8)</td>
<td>21 (51.2)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>FBC</td>
<td>2 (4.9)</td>
<td>39 (95.1)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>Erythrocyte Sedimentation Rate (ESR)</td>
<td>2 (4.9)</td>
<td>39 (95.1)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>Urine Full Report (UFR)</td>
<td>2 (4.9)</td>
<td>39 (95.1)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>Blood Urea</td>
<td>1 (2.4)</td>
<td>40 (97.6)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>SE</td>
<td>1 (2.4)</td>
<td>40 (97.6)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>Blood for Malaria Parasite</td>
<td>1 (2.4)</td>
<td>40 (97.6)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>Sputum for Acid Fast Bacilli</td>
<td>1 (2.4)</td>
<td>40 (97.6)</td>
<td>41 (100)</td>
</tr>
</tbody>
</table>

Most of the SLS-non-implemented (49%) had facilities for getting FBS done within their institutions. However, they hardly had laboratory facilities for other basic investigations done within their institutions themselves.

Table 15: Distribution of SLS-non-implemented hospitals by type of investigation that is needed through such a service

<table>
<thead>
<tr>
<th>Test</th>
<th>Yes Number (%)</th>
<th>No Number (%)</th>
<th>Total Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBC</td>
<td>38 (95.0)</td>
<td>2 (5.0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>UFR</td>
<td>30 (75.0)</td>
<td>10 (25.0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>FBS</td>
<td>22 (55.0)</td>
<td>18 (45.0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>ESR</td>
<td>21 (52.5)</td>
<td>19 (47.5)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>LP</td>
<td>18 (45.0)</td>
<td>22 (55.0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>SC</td>
<td>14 (35.0)</td>
<td>26 (65.0)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Blood Urea</td>
<td>13 (32.5)</td>
<td>27 (67.5)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>SE</td>
<td>9 (22.5)</td>
<td>31 (77.5)</td>
<td>40 (100)</td>
</tr>
<tr>
<td>Serum Glutamic Oxaloacitic Transaminase</td>
<td>7 (17.5)</td>
<td>33 (82.5)</td>
<td>40 (100)</td>
</tr>
</tbody>
</table>
The tests that more than 50% of SLS-non-implemented hospitals expected to receive through such a satellite service were FBC, UFR, FBS and ESR.

Table 16: Distribution of SLS-non-implemented hospitals by their opinion on usefulness of SLS in patient management

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Yes Number (%)</th>
<th>No Number (%)</th>
<th>Total Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful in diagnosis</td>
<td>39 (95.1)</td>
<td>2 (4.9)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>Useful in prescribing</td>
<td>38 (92.7)</td>
<td>3 (7.3)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>Useful in monitoring the prognosis</td>
<td>38 (92.7)</td>
<td>3 (7.3)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>Useful in avoiding unnecessary transfer of patients</td>
<td>35 (85.4)</td>
<td>6 (14.6)</td>
<td>41 (100)</td>
</tr>
</tbody>
</table>

Almost all hospitals were in the opinion that having such a satellite laboratory service would be important in diagnosis, prescribing and monitoring of the patient’s prognosis. Majority (85%) felt that it would also be important in avoiding unnecessary transfer of patients to higher level hospitals.

Table 17: Distribution of SLS-non-implemented hospitals by the place where Satellite Laboratory System found to be most useful

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful in inward care</td>
<td>21</td>
<td>51.2</td>
</tr>
<tr>
<td>Useful in clinic care</td>
<td>29</td>
<td>70.7</td>
</tr>
<tr>
<td>Useful in OPD care</td>
<td>35</td>
<td>85.4</td>
</tr>
</tbody>
</table>

* More than one response was considered in this variable

Most of the SLS-non-implemented hospitals were in the opinion that having such a satellite laboratory service would be more useful in clinic care and Out Patient Department care.

Table 18: Categories of opinions of staff (Laboratory in Provincial General Hospital-Badulla) Regarding existing satellite laboratory service

<table>
<thead>
<tr>
<th>‘General’</th>
<th>‘Started in 2006’</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Offering more tests other than those decided at the beginning for SLS’</td>
<td>‘SLS not going on well compared to its beginning’</td>
</tr>
<tr>
<td>‘Using minor staff and return ambulances for sending reports to peripheral hospitals’</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>‘Weaknesses and deficiencies’</th>
<th>‘Receiving requests for other tests other than those initially planned for’</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Unsatisfactory specimens due to not having a history of the patient, not labelling, inadequate specimens, transporting with no cold box, improper collection and improper transport’</td>
<td></td>
</tr>
<tr>
<td>‘Not receiving extra allocations for this service from the ministry’</td>
<td></td>
</tr>
<tr>
<td>‘Not having adequate staff to provide this kind of satellite service’</td>
<td></td>
</tr>
<tr>
<td>‘Not having facilities such as internet at peripheral hospitals for sending reports’</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>‘Suggestions for future’</th>
<th>‘Developing guidelines for this particular service and adhering to them’</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Training all the health staff on how to effectively utilize such a satellite service and on proper specimen collection, labelling, storing and sending them to satellite laboratory’</td>
<td></td>
</tr>
<tr>
<td>‘Strengthening laboratories in other hospitals such as BH-Mahiyangnanaya, BH – Diyathalawa as satellite laboratories to their peripheral hospitals’</td>
<td></td>
</tr>
<tr>
<td>‘Provide extra staff and extra allocations for reagents and other logistics’</td>
<td></td>
</tr>
</tbody>
</table>
| ‘Having proper and regular monitoring and
The text of the desk review conducted among the staff of the satellite laboratory was read carefully and categorized as in table 18. ‘General views’, ‘weaknesses and deficiencies’ and ‘suggestion’ were the main categories identified which were interpreted and discussed under discussion chapter.

Discussion

The present study aimed at evaluating the satellite laboratory service initiated in the Badulla district in 2006. A proper evaluation had not been conducted since its commencement and therefore it was the right time for the evaluation to be conducted.

Laboratory services are an important supportive service in patient management in a hospital. The present study was conducted among 55 hospitals including all the hospitals involved in the satellite laboratory services.

Laboratory facilities at Provincial General Hospital, Badulla and Base Hospital, Mahiyanganaya were initially planned to use as satellite laboratories in 2006. However, only laboratory facilities at Provincial General Hospital, Badulla provided this satellite facility to peripheral hospitals in the district since 2006 to date.

About 22% of peripheral hospitals (Base Hospitals – 2, Divisional Hospitals-Type-A – 2, Divisional Hospitals-Type B – 3 and Divisional Hospitals-Type C – 5) in the district received this satellite service during last seven years (Table 2). Even though this service has started with 5 peripheral hospitals receiving the satellite service only another 7 peripheral hospitals started to receive this service by 2011. Since 2011 no other peripheral hospital newly started to receive this satellite service (Table 3). Therefore, this data showed that the extension of this service has ceased since 2011.

Among 11 tests offered through Satellite Laboratory System only FBS was requested and received by more than half of the Satellite Laboratory System implemented hospitals while only very less number of peripheral hospital requested for testes such as standard Agglutination Test, Serum amylase, Serum bilirubin, Serum protein (table 4). The requirement for testing facilities vary from hospital to hospital and therefore it is important to frequently assess the requirement of peripheral hospitals for testing needs and decide on tests offered through this kind of satellite service.

It was very interesting to see that all hospitals who received the satellite laboratory facility used only their minor staff with public transport services for sending specimens and receiving reports through this laboratory service (Table 5). This is very important in terms of cost-effectiveness of such a satellite service.

More than 70% of hospitals who received satellite laboratory facilities found having such a service was important for inward patient management and every aspect of patient care such as proper diagnosis, prescribing and monitoring prognosis of the patient’s condition. They also found that this particular service was very useful in avoiding unnecessary patient transfers to higher level hospitals only because of not having such testing facilities (Table 6 and Table 7). Therefore it is important to receive reports of requested tests at least on the same day of requesting and sending specimens to satellite laboratory. However, more than 50% of hospitals who requested tests through this service received their reports after three or more days later (Table 8). Using other facilities such as internet and faxing for receiving reports will be important to reduce this delay in receiving reports. Even though the satellite laboratory used faxing for sending reports to peripheral hospitals it was not successful as the reports received through fax machine were not clear enough to read (Table 18). Therefore, strengthening the internet facilities for these health institutions may help to overcome this delay.

The Table 9 shows the current status of this satellite laboratory service in the district by 2013. Accordingly, nine hospitals (75%) out of 12 Satellite Laboratory System implemented hospitals were not receiving this service at the time present study was conducted even though almost all hospitals who received this service found that having such a satellite service was very useful in patient management, particularly for inward care within their health facilities. Not receiving reports on time and some issues related to minor staff such as delay in paying their claims and inadequate number of minor staff were the main issues for those Satellite Laboratory System implemented peripheral hospitals with regards to satellite laboratory service (Table 10). Even though 7 (58%) SLS-implemented hospitals had a register to keep records on Satellite Laboratory System. None of those registers was complete and accurate to date (Table 11). These are not going to be major issues for such a useful service as these issues can be settled easily by having a regular and proper monitoring and an evaluation mechanism for this service in the district.

The Table 12 shows the findings of analysis of opinions of SLS-implemented hospitals regarding collecting and sending specimens to satellite laboratory, receiving reports and the importance of having such a satellite service for patient care in a peripheral hospital. They collectively pointed out the importance of reviewing the service, regular monitoring the service and flexibility of the service in terms of adjusting to changing needs of the peripheral hospitals by increasing number and type of tests offered through this service and looking for alternative methods for sending specimens and receiving reports. This is very important as far as the patient management is concerned because disease pattern and therefore the testing needs of peripheral hospitals is going to vary frequently. Therefore, proper monitoring and evaluation of such a service is important after its implementation in terms of achieving the objectives of such a service.

Most (76%) of the Satellite Laboratory System -non-implemented hospitals had heard of this particular service going on in the district and all of them felt that having such a service for their health facilities too will be useful for delivering patient care within their institutions (Table13). Only very few SLS-non-
implemented hospitals have had facilities for basic tests such as FBC, and UFR other than FBS which was carried ESRout with a glucometer (Table14). FBC, FBS, UFRESR, Blood Urea/SE, LP and SC were the tests that these SLS-non-implemented hospitals expected to receive through such a satellite service (table15). These institutions also think that having such a satellite service is going to be useful for various aspects of patient care including diagnosis, prescribing, monitoring the prognosis and avoiding patient transfers only because of not having such testing facilities (table16). These SLS-non-implemented hospitals also viewed that such a satellite laboratory service is going to be important for Out Patient Department and clinic care as well as inward patient care (Table17). This is going to be important for health managers in the district as well as policy makers and programme managers at national level in terms of exploring the possibility of expanding testing facilities through such a satellite service to clinic and Out Patient Department services as far as Non Communicable Diseases are concerned.

The Table 18 shows the categories of the opinions of the staff from the satellite laboratory. It is evident that the satellite laboratory service is not going on well from their side due to deficiencies and weaknesses as in Table 18. Requesting more tests other than those tests agreed to be provided through this service, not receiving extra staff and extra allocations for this service, receiving unsatisfactory specimens and not having proper guidelines for this service were the main issues identified by the satellite laboratory. These all are managerial issues which can be settled by health managers at Provincial Health Department and negotiating with ministry of health, Colombo. As they have suggested developing proper guidelines and adhering to them, training peripheral staff on each and every aspects of this service, providing extra staff and extra allocations required for this service and having a proper monitoring and evaluation mechanism may help to re-establish this important and useful service to the public who come to peripheral hospitals for their health needs.

Satellite laboratory service has been effectively used in health services in other countries. For example Kimball and Johnson [10] have shown in their evaluation study that satellite laboratory service could reduce unnecessary surgical delays and number of surgeries that underwent without laboratory investigations.

These data collectively showed that having a satellite laboratory service in a district like Badulla which is considered to be rural is going to be important and useful in different aspects of patient care such as inward and Out Patient Department patient management, and clinic follow up. Therefore, it is important to discuss with stake holders in the district and the ministry of health, Colombo the current issues with regard to satellite laboratory service in the district of Badulla and settle those managerial issues to make it function properly and to provide a good quality laboratory service to the public.

Limitations
1. The study was a descriptive cross sectional study that liable to some bias such as recall bias. Pre and post study design could be a better option for this kind of scenario. However, due to non-availability of a proper information system of this service it was not possible to conduct such study design.

2. Costing of this kind of a service is essential in terms of deciding its future expansion to other hospitals and other parts of the country. However it was not possible to consider costing study within the present study due to financial and time constraints.

CHAPTER SIX

Conclusions and Recommendations

6.1 Conclusions

1. Satellite laboratory service was started with five hospitals in 2006 and 12 out of 63 curative care institutions were receiving this service by 2011. No other hospital was started to receive satellite service after 2011.

2. All hospitals who received the satellite laboratory facility used only minor staff with public transport services for sending specimens and receiving reports through this laboratory service.

3. More than 70% of hospitals who received satellite laboratory facilities were in the opinion that having such a satellite service was important for inward patient management and to avoid patient transfers to higher level hospitals only because of not having such testing facilities within their institutions.

4. More than 50% of hospitals who requested tests through this service received their reports three or more days later.

5. Nine hospitals (75%) out of 12 SLS-implemented hospitals were not receiving this service at the time present study was conducted in 2013.

6. Not receiving reports on time and some issues related to minor staff such as delay in paying their claims and inadequate number of minor staff were the main issues for those SLS-implemented peripheral hospitals in relation to satellite laboratory service.

7. The SLS-implemented hospitals collectively emphasized the importance of having such a satellite laboratory service and the need of reviewing the service with regular monitoring and evaluation of the service. They also pointed out the need for flexibility of the service in terms of adjusting to changing needs of the peripheral hospitals by increasing number and type of tests offered through this service.
8. Most (76%) of the Satellite Laboratory System - non-implemented hospitals had heard of this particular service going on in the district and all of them felt that having such a service for their health facilities too will be useful for delivering patient care within their institutions.

9. Only very few Satellite Laboratory System - non-implemented hospitals had facilities for basic tests such as FBC, Erythrocytes Sedimentation Rate and UFR other than FBS, and expecting FBC, FBS, and UFR, Erythrocytes Sedimentation Rate, Blood Urea/SE, LP and SC to be received through such a satellite service.

10. Satellite Laboratory System - non-implemented hospitals also viewed that having such a satellite laboratory service is going to be important for Out Patient Department and clinic care as far as the screening of Non Communicable Diseases in the community is concerned.

11. Requesting more tests other than those tests agreed to provide through this service, not receiving extra staff and extra allocations to continue this service, continuous receiving unsatisfactory specimens and not having proper guidelines for this service were the main issues identified by the satellite laboratory.

1.2 Recommendations

1. Both Satellite Laboratory System - implemented and Satellite Laboratory System - non-implemented hospitals raised the importance and usefulness of having such a satellite laboratory service in a rural district like Badulla. However, no hospital started to receive this service after 2011 and only 3 (25%) out 12 hospitals who were receiving the service continued to receive this service by 2013. Therefore, it is recommended to review the service and settle all those managerial issues to make it function well.

2. Both peripheral hospitals who received the service and the satellite laboratory staff pleaded for having proper guidelines and for a training of peripheral health staff on proper collection, storing and sending specimens to satellite laboratory. Therefore, it is recommended for provincial health managers to take necessary steps for development of guidelines and arranging necessary training for peripheral health staff.

3. All those who involved in this service emphasized the importance of having a proper monitoring and evaluation mechanism for this service. Therefore, it recommended to form a review committee for this service for continuous monitoring and rectify any issues whenever it comes.

4. Divisional Hospital-Sprinvalley and Divisional Hospital-Haldummulla had used a modified vaccine carrier for transporting specimens effectively from their institutions to satellite laboratory.

Therefore, it is recommended to review this method further and use this method of transporting specimens from other hospitals too.

5. It is suggested to improve other laboratories as satellite laboratory to their peripheral hospitals. As laboratories at Base Hospital-Mahiyangnanaya, Base Hospital-Diyathalawa and Base Hospital-Walimada were improved over the years it is recommended to look for the possibility of utilizing these laboratories as satellite laboratories their peripheral hospitals.

6. As provision of extra resources to satellite laboratory is important for having an uninterrupted service it is recommended to provide minimum human resources and extra allocations to satellite laboratory to continue this service.

REFERENCES


10. McQueen MJ and Bailey AJ. Hamilton Health Sciences Laboratory Program: A Provider Developed Model for Hospital, University and Community Laboratory Services. Health Care Management Forum. 1993 Fall; 6(3):35-42.


19. The Web site of Google search, Pub med, Medline and BMJ were used for literature reviewing.

AUTHORS

Dr A M S Bandara – Principal Author
MBBS (Ruhuna), MSc – Medical Administration (Colombo), Medical Superintendent/ PGIM MD Trainee
Base Hospital Mahiyangana/Ministry of Health – Sri Lanka
Hanwella4311@gmail.com

Dr. H. K. M. M. B. Kavisekara – Corresponding Author
MBBS (Peradeniya), MSc – Medical Administration (Colombo), MBA (Cardiff - UK)
Medical Director /Doctoral Trainee
Ministry of Health - Sri Lanka/ London Metropolitan University – United Kingdom
kavisekara@gmail.com, HKK0030@my.londonmet.ac.uk

www.ijsrp.org
Ethnic identity and Psychological Well-Being of Adolescents-Refugees: A qualitative study of Ethnic Hazaras in Bogor (Indonesia)

Dana RiksaBuana*, Regina NaviraPratiwi
*Faculty of Psychology, MercuBuana University, Jakarta (Indonesia)

Abstract- Ethnic identity is a social dimension of identity and Psychological well-being is growing area in this research. However, the relationship between these variables are mainly examined in different context. This study investigated ethnic identity of The Hazaras as adolescent refugees in Indonesia, as well as how it relates to psychological well-being. Ten participants (5 males, 5 females) completed interview with ethnic identity and psychological well-being measures. Results indicated that ethnic identity of male participants tend to have more salient ethnic identity than female participants. Furthermore, ethnic identity and psychological well-being relationship male participants also more salient than female participants.

Index Terms- adolescent refugees; ethnic identity; psychological well-being; The Hazaras: Indonesia.

I. INTRODUCTION

At the end of 2006 there were 9.9 million refugees worldwide, with an even larger 32.9 million persons of concern (UNHCR, 2007). According to the United Nations 1951 Convention on the status of refugees, a refugee is a person who has a well-founded fear of persecution based on race, religion, nationality, membership of a particular social group or political view, which is outside home country, and he/she is unwilling or unable to avail himself/herself of the protection of that country, or to return there, for fear of persecution.

There are three durable solutions outlined by the international governing body for refugees, the United Nations High Commissioner for Refugees (UNHCR): voluntary repatriation; local integration in the country of first asylum; and third country resettlement. Resettlement in a third country is the least common durable solution (less than 1% of all refugees) given the high cost and extreme burden placed on refugees and the host countries (UNHCR, 2003). However, it has been shown to be one of the most effective solutions in bringing protection to refugees and constitutes a significant number of refugees and resources involved in the resettlement countries. According to the UNHCR, through the federal humanitarian programs in 2006, 71,700 refugees were admitted by 15 resettlement countries, with the largest numbers being resettled in the United States, Australia, Canada, Sweden, Norway and New Zealand respectively (2007a). Australia admitted 13,400 of those refugees through their off-shore.

Indonesia is a non-signatory of the Refugee Convention, therefore Indonesia has no obligation to accept asylum seekers and integrate recognized refugees, but based on humanitarian considerations it respects and protects the human rights of those who stay temporarily and thus provides some form of accommodation and basic care for asylum seekers and refugees.

In 2015, Three ships reached Aceh after a long, dangerous trip. Although the Indonesian army had tried to prevent at least one ship from landing by first equipping it with food and fuel and then forcing it back out to sea, eventually these people were allowed to come on land. Not least, because of Acehnese fishermen had ignored the military’s orders and rescued many of these hopeless people. Following a trilateral crisis meeting of the foreign ministers of Indonesia, Thailand and Malaysia, the latter three promised to provide the Hazaras boat people with shelter for a year, provided that all costs would be covered by external agencies and they would be resettled to third countries.

Hazaras is one of the most persecuted ethnic minorities in Asia even in world, as they do not have citizen rights in their home countries. Political persecution, but also extreme poverty, drive them across the borders into southeast Asia country especially Indonesia. Indonesia is not just a transit country for the refugees, but for displaced people from more than 40 countries in South Asia, Africa and the Middle East.

Recently, Indonesia the biggest country in southeast Asia has opted for a humanitarian approach and allowed the UNHCR to receive and handle the Hazaras like other asylum seekers. The UNHCR in Indonesia is working very hard to take care of determining the refugee status determination process and resettlements. But despite all these efforts, they face the consequences of global resettlement fatigue. Refugees in Indonesia are not a resettlement priority. In addition, the refugees who cannot be repatriated to their countries of origin are becoming an increasing burden for Indonesia. Although Indonesia receives international funding to take care of them, it faces increasing social problems with their temporary quasi-integration. Indonesia’s hospitality could thus backfire, if it becomes a magnet for other refugees in the different region, who hope that their treatment in Indonesia would be better than in Thailand or Malaysia (www.insideindonesia.org/shelter-versus-shielded-borders,Pudjiastuti, 2016).

Most of the refugees are children, adolescents, and women, however even though they stay in host country ethnicity...
is still important for how individuals define themselves (Phinney, 1992). Ethnic identity, as an aspect of identity, is an important developmental task for adolescents, especially in plural societies. Ethnic identity has widely acknowledged relationship with psychological well-being across countries (Cokker, 2008).

Ethnic identity is one of the concepts related to the culture. Ethnic identity is not fixed but dynamic understanding of the self and ethnic backgrounds. Identity is constructed and modified when the individual is aware of ethnicity, in a broad sociocultural setting (Phinney, 2003). It thus becomes clear that the individual is part of a culture and entered in a specific ethnic thus have a characteristic such that characterized in ethnic. But individuals also have the authority of themselves in attitude and behavior, whether to highlight and develop such characteristics, able to use them according to the circumstances experienced.

Adolescent refugees need to maintain their origin culture and ethnic, at the same time psychological well-being is also important to develop their feeling of identity. Furthermore, this transition period gives them good opportunity for personal growth and self-development, and also could be positive experience for them (Mendoza et al., 2007; Phinney & Ong, 2007). Both phenomena, ethnic identity and psychological well-being, are interconnected, culture can affect an individual's psychological well-being when people follow what people did around them and people regard the culture around them to be their characteristic (Karasa, et al, 2011). Instead, the individual's personality can be changed by culture environment.

Ethnic identity and their role in psychological well-being will be understood well in the terms of characteristics of the people and responses of receiving society. Ethnic identity is likely to be tough when people have a high desire to preserve their identities and when pluralism is accepted. In the face of real or perceived hostility toward the groups, some people may reject their own ethnic identity; others may assert a pride in their racial group and emphasize solidarity as a way of dealing with intolerant attitudes (Beiser & Hou, 2006).

Several studies in North America found out that refugees’ and immigrants’ acculturation to western society is associated with their ethnic identity and well-being (Barry, 2000; Tsai et al., 2002). Socioeconomic status has been found to be associated with both ethnic identity and stressors associated with ethnic discrimination being compounded by poverty (Myers, 2009). The relevance of ethnic identity to well-being appears to be moderated by personal and social features. Researcher should therefore attend to contextual factors when studying ethnic identity (Syed & Azmitia, 2008; 2010).

The fact described above is one of the problems refugees are faced at. It is well known that many forms of identity, including ethnic identity, become very important during adolescence (Phinney, 1992). Yet, surprisingly, the study examined these theories have been mainly cross-sectional and recently focused on the early or middle adolescence. Moreover, this theory has not been subjected to ethnic identity development rigorous empirical tests. This research focus on each component of ethnic identity and their impact on psychological well-being.

The aim this study is to investigate and describe ethnic identity, psychological well-being and their interconnection for the Hazaras’ refugee adolescents in Indonesia.

Refugees are very special group of people who are faced at the extreme experience of trauma that is not work out yet, therefore Author believe that qualitative study is the most appropriate way to understand this experience and do not harm.

The relevance of this study first of all is connected with the possibility to enhance refugees’ psychological well-being and provide appropriate policies toward refugees.

About the differences in their ethnic identity from local majority. Moreover, the relevance of this study also concern about implementation of multicultural policies in the similar conditions. Therefore, the result of this study may be applied both in theoretical (to extend the existing theory) and practical (to provide and appropriate policies toward refugees’ psychological well-being enhancement and their acceptance in host society) areas.

The current study arises three main research questions:

1. What are the main patterns in ethnic identity of ethnic Hazaras adolescents-refugees in Indonesia?
2. What are the main patterns in psychological well-being of ethnic Hazaras adolescents-refugees in Indonesia?
3. How ethnic identity and psychological well-being of adolescents’ refugees' of ethnic Hazaras in Indonesia are associated?

II. THEORETICAL BACKGROUND

Ethnic Identity and Psychological Well-Being

Developmental and social psychology theories indicated to the importance of psychological feelings (Marcia, 1980; Roberts et al; 1999). Ethnic identity and the components of ethnic identity are taken to act in concert as predictor of psychological well-being (Phinney, 1992; Phinney & Ong, 2007; Roberts et al 1999). Empirical study indicated important role in ethnic identity as predictor of optimal human functioning and social development, positively relate to self-esteem and self-satisfaction (Phinney, 1992). This relation is very important in plural society (Schwartz, Zamboango, Weisskirch, & Rodriguez, 2009). Ethnic identity served as a buffer, when individual withdrawing their group member to distinguish themselves positively in relation to other group (Turner, 1999). According to Rejection Identification Model, individual sustains enhance in group identification when is refused by non-group member (Phinney, 1997).

This relationship has been studied in Africa sub-Sahara. Abubakar et al. (2012) studied relationship between ethnic identity and psychological well-being of two groups of immigrant and local group in Kenya as host country. They found that two ethnic orientations with local ethnic and ethnic identity are important for adolescent psychological well-being. They also found adolescents with prominent ethnic identity has higher psychological well-being. Here, they are considered positive well-being and mental health symptoms and found that strong identity related with positive psychological well-being. So ethnic identity and psychological well-being have essential connections. But a very few data exist about these phenomena relationship in refugees. Thus author review ethnic identity and psychological well-being concepts further and study their interconnection.
empirically in a sample of ethnic Hazaras adolescents-refugees in Indonesia.

III. METHOD

Participants and Procedures

Data were collected from 10 students of Refugee’s school in (5 males, 5 females) as part of this study on ethnic identity and psychological well-being: adolescents at the age 15-18 years old, have been living in Indonesia for 2 years, 8 participants were born and living in Afghanistan and 2 females’ participants were born in Iran and living in Afghanistan. They responded to a depth-interview of ethnic identity and psychological well-being. During data collection, APA ethical guidelines interview were adhered to, and all participants were made aware of their rights before they started.

Sampling Technique

To get complete explanation and deeply from the subjects, this study is using qualitative technique. Therefore, this study only uses small subject (Poerwandari, 2005). Qualitative study tends use small sample because focus to deeply processes (Banister, et al., 2011).

The sample used in qualitative research is generally less (compared to samples in quantitative research) and tend to be taken as purposive rather than randomly because samples were chosen specifically by the aim of the research (Poerwandari, 2005). Sampling as participants based on the draft is purposive sampling, which is a type of non-probability sampling that the sample unit selection based on the consideration or judgment of the researcher about what is considered useful and representative for the research. The strategy used to get a sample is snowball sampling, which is a strategy to get a sample by asking some experts or practitioners relating to the case study on recommendations cases or others who can provide information and so on down obtained samples or case for describe variables being studied.

Method of collecting data

IV. RESULT

Ethnic identity

Individual’s personality can be changed by culture environment. Components of ethnic identity argued to inform identity and in particular ethnic identity (Phinney, 2000), had a limited value in explaining deeply the cultural differences between male and female observed in this research, although the ethnic groups could be expected to show differences on this dimension. It is quite evident that other contextual influences may be more important for ethnic identity salience (Owe et al., 2012; Phinney et al., 2001). Firstly, it seems quite clear that in Middle East country, ethnic group membership is very important for male and female. This may be due to the continued polarized nature of the contexts in which the Male dominate.

The ethnic group membership is generally not threatened within their context in Indonesia as refugees, their ethnic identity is salient (Johnson et al., 2012), but they seem secure in their ethnic identities (Doane, 1997). They salient this may be because they had experience the prejudice and discrimination faced by majority people in native country (Williams et al., 2008).

Ethnic identity and psychological well-being

Ethnic identity seems to functioning in a similar way across different contexts. Even if the construct is tricky, its association with the psychological well-being components for adolescent refugees: ethnic identity is positively associated with life satisfaction and negatively associated with deficient mental health (T. B. Smith & Silva, 2011). Similar to the study by Abubakar et al. (2012), ethnic identity seems to have a stronger association with life satisfaction. This may be especially true in multicultural setting where peoples may experience a sense of threat to their identities, and group membership provides them with a psychological buffer (RIM; Branscombe et al., 1999) that enhances their psychological well-being.
In Indonesia, adolescents may encounter their own culture, including values and beliefs. However, within Indonesia context, ethnic identity would be important for psychological functioning. In the context where ethnic identity faces minimal threat in Indonesia, ethnic identity serves the purpose of reinforcing a sense of relatedness, commitment, and group membership (Phinney et al., 2001).

Transition period give adolescents opportunity for personal growth, self-development and also positive experience (Mendoza et al., 2007). The result of this study showed male and female participants strongly related with personal growth, self-development, and positive experience. The similarities result of ethnic identity generally between male and female they both strongly related with 3 dimensions of self-acceptance and labelling, commitment and attachment, and exploration. The similarities of both between male and female because they have strong self of belonging toward the ethnic group and do care with group membership after they got traumatic event in their native country and in their place right now as refugees they get secure so that they can show up their identity without feeling threatened. 

The differences and similarities of ethnic identity between male and female participants

Ethnic behavior, evaluation and in-group attitude, and values and beliefs. The result showed the differences among 3 dimensions are the difficulties to maintain some values and beliefs for female participants but for male participants still maintain belief because of according to their culture male has higher position than female so that they have to hold the values and beliefs if in the future they will teach their family to maintain beliefs and values and they have to understand pretty well about their beliefs and values. The differences for ethnic behavior the result is male participants tend to be more adaptive in new place than female participants, because male participants more concern to being adaptive than female still want to learn and continue ethnic behavior. Evaluation and in-group attitude the differences between male and female participants, male participants positively related with all coding because of feel responsibility to people from native country and always make sure people always in good condition but for female participants because of less responsibility feeling they do not care with other people condition and sometimes feel uncomfortable with people from native because high of temperament. The main pattern of differences between male and female largely because of the position of male is higher than female. 

The similarities and differences of psychological well-being between male and female participants

Female and male participants similarly only positively related with personal growth, because the tendency to develop themselves and open to new experience strongly related with the participants, because the traumatic event they did not have any opportunity to develop themselves and get new experience.

Positive relations with others, autonomy, self-acceptance, environmental mastery, and purpose in life have different result between male and female participants. Male participants tend to be more responsible with people from native country and more independent because of they put principles that male should be more responsible than female so that for female participants also for female participant they cannot be more independent because of the fact they are female and under family’s control

The relationship between ethnic identity and psychological well-being

The relationship between ethnic identity and psychological well-being have important implication for adolescent refugees. Ethnic identity is necessary for psychological well-being. It is a key to understand the psychological mechanism that influence need to belong to ethnic groups (Baumeister & Leary, 1995). When dealing with people from Middle East, it is a key to understand meaning of ethnic group membership and ethnicity of adolescent refugees.

V. CONCLUSION AND RECOMMENDATION

Ethnic identity from The Hazaras strongly related with the positive relationships with other, autonomy, and environmental mastery. This shows that although the participants have good relationships with others but they still have the ability to be independent in decision making. On the other hand, the environmental mastery shows that The Hazaras strongly related with sense of belonging toward ethnic will increase to make sure psychological function in multiethnic group.

In psychological well-being The Hazaras strongly related with the positive relationships with other, autonomy, and environmental mastery. This shows that although the participants have good relationships with others but they still have the ability to be independent in decision making. On the other hand, the environmental mastery shows that The Hazaras strongly related with sense of belonging toward ethnic will increase to make sure psychological function in multiethnic group.

In the Middle East, ethnic identity serves the purpose of reinforcing a sense of belonging towards ethnic identity. This needs to be done without the promotion of a person's ethnic identity transformed into an intergroup conflict.

Like many cross-cultural studies, we cannot obtain full scalar invariants in our assessment of measurement invariants for ethnic identity (Milfont & Fischer, 2010). We argue that our results from this research have practical and methodological implications. Practically, we argue that more work or learning opportunities are taking into account ethnic and ethical conduct as a barrier. This may give insight into how ethnic identity is conceptualized within the region and how it informs future research on identity theory. Methodologically, although we think that scholars need to take additional action if they want to see the relationship between two variables.

Limitations in this study are related to participants. Firstly, we studied The Hazaras with small participants in qualitative
studies, also the questions were too many. On the other side, The Hazaras are still the asylum seeker status so that influence their answer tend to negatively related to the future. For further research should be directed to use quantitative research with a large number of participants and the status of The Hazaras as permanent resident and get the status of citizenship in a country. Secondly, we do not consider contextual variables in the analysis. In-depth knowledge of aspects such as prosperity, the political climate, or intercultural relationships may also be relevant to understanding the relationship between ethnic identity and psychological well-being. In the other hand, more study is needed to understand the meaning of psychological well-being in the context of the Middle East. In poverty countries, high rates of infectious disease, and conflict-ridden, it may be necessary to understand how persons determine their happiness, self-esteem, and life satisfaction, as this may be very different from Western conceptions. Worrell&Gardner-Kitt(2006) warns against importing the actions of Western identity into different contexts without considering their psychological validity, and we will suggest the same with respect to measures well-being.

In addition, it is important to look deeply at the cultural complexity of the native country. Development perspective argues that the identity crisis (Erikson, 1968) can be resolved between the ages of adolescents (Marcia, 1980). However, the Neo Eriksonian perspective argues that the identity crisis extends into an emerging adult (Schwartz et al., 2005). The complex nature of the cultural dynamic, social, and political (Ong’ayo, 2008) may require longitudinal investigations of identity in general, the role of the psychosocial function context, ethnicity, and ethnic identity. The design of this research, does not allow us to assess the development process of true ethical identity when comparing with adults.

REFERENCES


[25] Poerwandari, Kristi. (2005). Qualitative approach for human behavior Jakarta : Institution of develop measurement and education Faculty of Psychology University of Indonesia


AUTHORS
First Author – Dana RiksaBuana, Faculty of Psychology, MercuBuana University, dana.riksaBuana@gmail.com
Second Author – Regina NaviraPratiwi, reginanavida@gmail.com
Compliment and Compliment Responses: A Comparative Study between Dari and English Native Speakers

Mohammad Akmal Saifi*, Syed Sakhi Ahmad Sultani**

*Kunduz University, Kunduz, Afghanistan  
**Kabul University, Kabul, Afghanistan

Abstract - Communication and interaction with others are important aspects of our lives. While we are interacting with other people, sometimes it happens that we either praise them, or they praise us, which is called compliments. Giving and receiving compliments varies across cultures. Therefore, the present study was conducted to find whether there is any difference in compliment responses between Afghan and American performers on TV talent shows. Data was collected from ten hours of videos of both Afghan and American TV talent shows from which sixty samples of compliment responses (30 of Afghan and 30 of American performers) were randomly selected. The findings of the study revealed that Afghan and American performers responded to compliments in similar manners. In other words, both mostly produced acceptance compliment responses.

Keywords: Compliment, Compliment Response, Dari, Compliment Type

1. INTRODUCTION

A compliment is a ceremonial act or expression as a tribute courtesy, which is also a remark addressed to anyone, implying or involving praise (Oxford English Dictionary, 2010). Wikipedia defines compliment as an expression of merit, encouragement, or congratulation. We sometimes give compliments to others and receive them as well in our everyday situations. Therefore, researchers working with different languages and various fields are greatly attracted by compliments and/or compliment responses. We can take different interpretations out of a compliment in different contexts and participants such as ‘You are beautiful’, if a woman talks to her female colleague, it could function to soothe the conversation although it is understood to mean less than it declares; however, if a woman talks to her male boss, it could interpret to have her purpose. How people respond to the compliment is also deemed important since compliment is a mutual interaction of giving and receiving.

According to Holmes (1995), paying compliments show friendly aspect, and it is one of the most common ways of doing positive politeness. Holmes adds that a compliment is an act of speech that grants credit implicitly or explicitly to someone other than the speaker. He further argues that compliments usually address a person for some good characteristics, possessions, attributes and skills which are valued positively by both the speaker and the hearer. In several studies, compliments are determined as expressive speech acts having multiple functions.

Many studies have been conducted in the field of sociolinguistics, particularly on the use of compliment and compliment responses in different domains and cultures; however, it was difficult to find a comparative scholarly work on the verities of compliments and compliment responses in the Afghan and American TV talent shows. Therefore, this study aims to investigate the similarities and differences among Afghan native speakers and American English speakers using compliment responses.

1.2 Compliment Response

Compliment response is whether you “agree with the speaker” or reject it to “avoid self-praise” (Pomerantz, 1978). Different frameworks of Compliment Response (CR) classification have been given by researchers as the classic frameworks of CR categorization are those suggested by Holmes (1989, 1993). He classified CRs into three main types: Accept, Reject, and Evade. Each type was then divided into smaller categories.

1.2.1 Type 1: Accept

- Appreciation Token: It is a verbal acceptance of a compliment. (E.g. Thanks or Thank you.)
- Agreeing Utterance: The addressee agrees with the complimentary force by means of a response semantically fitted to the compliment (E.g. Yes, I really like it; I know).
- Downgrading: The force of the compliment is minimized or downgraded by the addressee. (E.g. “All is the result of your kind help.”)
1.2.2 Type 2: Reject

- Disagreeing Utterance: Here, the addressee directly disagrees with addresser’s assertion (E.g. No, it was not that good.)
- Question accuracy: In this situation, the addressee might want a repetition or an expansion of the original compliment or question. (E.g. Really?).
- Challenge Sincerity: Although the addressee agrees with the complimentary force, s/he does not accept the praise personally. Rather, s/he impersonalizes the complimentary force by giving impersonal details (e.g. Yes, I bought it from Kabul).

1.2.3 Type 3: Evade

- Shift Credit: This type of response is given when the addressee may choose not to accept the full complimentary force offered by qualifying that praise, usually by employing words such as but, yet, etc. (e.g. Yes, but I like Ahmad Zahir more).
- No Acknowledgement: This type of response is given when the addressee gives no indication of having heard the compliment. That is, s/he employs the conversational turn to do something other than responding to the compliment offered (E.g. Silence.)
- Request Reassurance: The addressee interprets the compliment as a request rather than a simple compliment (e.g. Do you want me to redo it?).

2. LITERATURE REVIEW

Compliments occur, as discussed earlier, in conversations between two people in different contexts. Holmes (1986, p. 485), as cited in Cheng (2003), considers compliments or praises as a “speech act which explicitly or implicitly attributes credit to someone other than the speaker, usually the person addressed, for some good (possession, characteristics, skill, etc.) that is positively valued by the speaker and the hearer.”

There are numerous empirical studies on giving and responding to compliments in different cultures. Besides, many of such research studies have a comparative form where the writers compares the characteristics of using and responding to compliments in their native culture to that in English—mainly the US.

According to Han (n.d.), one of the forerunners in the research area of compliment and compliment responses is Pomerantz (1978). Pomerantz found out that while responding to a compliment, the complimented face two challenges: to agree with the complimenter and to prevent self-praise. As Han puts it, Holmes (1988) criticized Pomerantz for not giving “precise proportion of each type of response” (p. 21). Holmes, based the study in New Zealand, developed the following taxonomy.

<table>
<thead>
<tr>
<th>Table 2.1: Holmes Compliment Responses Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept</td>
</tr>
<tr>
<td>Appreciation token</td>
</tr>
<tr>
<td>Agreeing</td>
</tr>
<tr>
<td>Downinggrad</td>
</tr>
<tr>
<td>Return</td>
</tr>
<tr>
<td>Reject</td>
</tr>
<tr>
<td>Disagree</td>
</tr>
<tr>
<td>Question</td>
</tr>
<tr>
<td>Challenge sincerity</td>
</tr>
<tr>
<td>Deflect/Evade</td>
</tr>
<tr>
<td>Shift credit</td>
</tr>
<tr>
<td>Informative comment</td>
</tr>
<tr>
<td>Ignore</td>
</tr>
<tr>
<td>Legitimate evasion</td>
</tr>
<tr>
<td>Request reassurance</td>
</tr>
</tbody>
</table>
The above-mentioned division of compliment response types has formed the basis of many comparative studies on the compliment types. The taxonomy forms the basis of the present paper as well. There are several empirical researches which have tried to find out whether there is any difference in compliment responses across cultures.

Chen (1993) investigated the similarities in responding to compliments between American English speakers and Chinese speakers. His findings suggested that Chinese speakers produced more rejection responses than American English speakers who produced mostly acceptance responses to compliments. Besides, his study questioned Brown and Levinson’s Politeness Theory. Parallel to Chen’s study, Yu, Fu, and Hou (2007) found out that there is a difference in using compliments and responding to them by Americans and Chinese.

Similarities and differences in responses to compliments by Thai adult students and American native English speakers were studied by Cedar (2006). He interviewed 12 Thai students and 12 native English speakers. A total of 142 compliment responses were extracted and transcribed. The study, like the study conducted by Chen (1993), found that Americans, unlike Thai students, used mostly acceptance and positive elaboration compliment responses.

Nelson, Al-Batal, and Echols (1996) studied the similarities and differences in compliment responses by Syrian and native English speakers. Unlike the previous studies such as Chen (1993) and Cedar (2006), this study found that compliment responses produced by native English speakers contained 50% acceptance, 45% percent mitigation and 3% rejection while the compliment responses produced by Syrians contained 67% acceptance, 33% mitigation, and 0% rejection. Nelson, Al-Batal, and Echols suggested that American and Syrians are very likely to produce more acceptance and mitigation responses when they are being complimented.

There are also a number of comparative studies on the compliment and compliment responses between Persian and English such as Eidi (2013), Shahsavari, Alimohammadi and Rasekh (2014), Boroujeni, Domakani, Sheykhi (2016), Shamsabadi and Rasekh (2014), Shabani and Zeinali and Karimnia and Afghari (2011). All of these studies revealed that there is a difference in responding to compliments by native Persian speakers and English native speakers and that Iranians use more non-acceptance and reassignment response strategies while English speakers use more acceptance responses. The reasons behind this difference as suggested included the absence of linguistic knowledge (Shahsavari, Alimohammadi and Rasekh, 2014), differences in the cultural norms and values (Boroujeni, Domakani, Sheykhi, 2016; Karimnia and Afghari, 2011), native language (Persian) transfer (Shamsabadi and Rasekh, 2014).

3. METHODOLOGY

This study employed a corpora of data which were collected from Youtube. For the purpose of this study, three Afghan TV talent shows namely: Afghan Star, Super Star, and The Voice of Afghanistan, where Afghan young singers express themselves and show their talent in singing, and two American talent shows namely X Factor (singing) and America’s Got Talent (general) were selected. Compliment and compliment responses of Afghan citizens in different episodes from 2014 to 2016 were extracted and likewise for American citizens from 2011 to 2015. There were four judges in each episode, all giving individual compliments to each participant at the end of his/her performance. In a random selection, only one judge’s compliment was selected for each participant. Attention was focused on the judges’ compliments and compliment responses of participants. In total, both Afghan and American shows were watched for 10 hours – 5 hours each. Data were then extracted based on what was deemed as compliment and compliment responses. An overall 90 compliment instances were collected from both shows (50 compliment instances from the American singing talent shows and 40 from the Afghan singing talent shows.) From the total number of collected data, an overall 60 sample compliment and compliment responses (30 from Afghan shows and 30 from American shows) were randomly selected for the purpose of data analysis.

4. FINDINGS

In order to calculate the frequency, mean score of the compliment response types in Dari and English, SPSS (Statistical Package for Social Sciences) was used. From the total number of compliment response instances on Afghan and American Talent TV shows (Dari=30 and English=30, Total N=60), 8 types of compliment responses were found at micro level. These types included appreciation token, agreement utterance, downgrading, qualifying utterance, return, questioning accuracy and ignoring. In both Afghan and American performers’ responses to compliments, appreciation token and ignoring the compliment had the highest frequencies as seen in Table 4.2 below.

Table 4.2: A Comparison of Compliment Response Types by American and Afghan Performers

<table>
<thead>
<tr>
<th>Compliment Type at Macro Level</th>
<th>Compliment Type at Micro Level</th>
<th>Compliment Responses Types in Dari Number</th>
<th>Percentile</th>
<th>Compliment Responses Types in English Number</th>
<th>Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptance</td>
<td>Appreciation Token</td>
<td>20</td>
<td>66.7</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>Agreement Utterance</td>
<td></td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>10</td>
</tr>
</tbody>
</table>
The same compliment response strategy which ge
downgrade.
d less acceptance form than Americans.
Holmes
performs used evasion strategy, 5 ran by Eidi (2013), Shahsavari,
nts of
ny of
:
respons
employed by Afghan and American performers on talent TV shows? and 2) Is there any difference in the use of types of compliments
responses between Afghan and American performers on talent TV shows?

To answer the question, Holmes taxonomy was used as the basis for categorizing the types of compliments. Holmes has divided compliment responses into 12 types which include three major categories: 1) acceptance (appreciation token, agreement utterance, downgrading, qualifying utterance and return compliment), 2) rejection (disagreeing utterance, questions accuracy and challenge sincerity) and 3) evasion (shift credit, informative comment, ignore, legitimate evasion and request reassurance).

From these 12 types of compliment responses at the micro level, Afghan performers on talent TV shows made 5 (16.7%) and 9 (30%) respectively.

From the discussion above, it can be understood that Afghan performers used more appreciation token and return strategies than American performers while American performers used more agreement and evasion compliment response strategies.

5. DISCUSSION

In the present study, efforts have been made to answer one basic question: what are the compliment response strategies employed by Afghan and American performers on talent shows?

To answer the question, Holmes taxonomy was used as the basis for categorizing the types of compliments. Holmes has divided compliment responses into 12 types which include three major categories: 1) acceptance (appreciation token, agreement utterance, downgrading, qualifying utterance and return compliment), 2) rejection (disagreeing utterance, questions accuracy and challenge sincerity) and 3) evasion (shift credit, informative comment, ignore, legitimate evasion and request reassurance).

From these 12 types of compliment responses at the micro level, Afghan performers on talent TV shows made 5 (16.7%) and 9 (30%) respectively.

American performers on the talent shows, from those 12 types of compliment responses in order of the frequency, appreciation token, ignore, return and downgrade.

With a glance at Table 4.2, it can be understood that Afghans use more acceptance strategies (83.3%) than the American performers (66.7%). This finding is unlike of several studies conducted in Asian countries like in Thailand by Cedar (2006), in China by Chen (1993) and by Yu, Fu, and Hou (2007), in Iran by Eidi (2013), Shahsavari, Alimohammadi and Rasekh (2014), Boroujeni, Domakani, Sheykhi (2016), Shamsabadi and Rasekh (2014), Shabani and Zeinali and Karimnia and Afghari (2011). All of these studies found that their fellow citizen (as participants) used less acceptance form than Americans. However, the findings of this study is in line with the findings of Nelson, Al-Batal and Echols (1996) who conducted their study in Syria and found that Syrian used more acceptance forms than Americans.

6. CONCLUSION

To conclude, the present study was conducted to answer two questions: 1) What are the common types of compliment response employed by Afghan and American performers on talent TV shows? and 2) Is there any difference in the use of types of compliments responses between Afghan and American performers on talent TV shows?
The study found that 'appreciation token' and 'ignore' compliment response types were the most common ones not only among Afghan performers but also among American performers. In addition, the present study found that there is no difference in the use of compliment response types between Afghan and American performers.

Due to the small scale (small number of performances) of this study, its findings cannot be generalized. Therefore, there is a need to conduct a similar study in the future using a larger sample so that making generalizations on the use of compliment response types by Afghan and American talent TV shows performers becomes possible.

REFERENCES


www.ijsrp.org
Mohammad Akmal Saifi is a current master student in Teaching English as a Second Language (TESL) at the Faculty of Education, Universiti Teknologi MARA. He received his BA in English Language and Literature at the Faculty of Education, Kunduz University. He was as an Educational Program Manager at Afghan National Association for Adult Education (ANAFAE) project from 2011 – 2015 in Afghanistan. He presently works for Kunduz University, Kunduz, Afghanistan, as an English lecturer. He is interested in doing research in English language teaching (ELT), EFL, Educational Technology, Sociolinguistics, and Adult Education.

Syed Sakhi Ahmad Sultani is a current postgraduate student at the Faculty of Education, Universiti Teknologi MARA. He received his B.A. in English Language and Literature at the Faculty of Foreign Languages and Literature, Kabul University. He is currently a faculty member at the Department of English Language and Literature, Kabul University. His research interest are youth education, in general, women’s education, in particular, Teaching of English as Foreign Language (TEFL), 21st century learning and teaching and finally sociolinguistics.

Email address: sultanisakhi6@gmail.com

Corresponding Author – Mohammad Akmal Saifi
Email address – akmal.saifi9@gmail.com
The Impact of the “Internet of Things” On Value Creation for Stakeholders

Dr. A. Seetharaman *, Nitin Patwa **, A.S.Saravanan ***, Ashok Anand ****

* Dean, Academic Affairs
** Director of Simulations
*** Senior Lecturer, Taylors’ University, Malaysia
**** P G Scholar

Abstract- This study focuses on identifying the factors that influence the adoption of the internet of things that create value for stakeholders. The key factors identified as visibility, security, organization and data management. A survey of various industry participants in America, Asia Pacific/Australia, Europe and Middle East/Africa was performed to check the influence of the above factors in value creation and adoption of the internet of things. ADANCO 2.0 software (PLS-SEM) tool was used to analyse the surveyed data and to construct a structural equation model. The results of the study show that visibility, security, organization and data management create value for stakeholders in the form of business intelligence, integrity and trust, fair and equitable sharing of benefits among negotiating protocols and enhancement of productivity. Study influences the adoption of the internet of things from the point of value creation. This will enhance the competitive edge of businesses and will help in retaining existing customers and in the creation of new customers. As more enterprises adopt the internet of things, there is a scope for research on user experience of the internet of things.

Index Terms- Internet of things, Value creation, Visibility, Security, Organisation and Data Management

I. INTRODUCTION

The internet of things is one of the promising, technological evolutions of the internet. It connects devices and humans. The internet of things opens up new opportunities for enterprises to create value for stakeholders. Internet penetration and web devices are enabling the growth of the internet of things. Interconnected devices provide opportunities for businesses to deliver product-service content over the internet (Borgia, 2014). Estimates suggest that real business opportunity enabled by the internet of things will be worth $7.1 trillion by 2020 (IDC, 2014). Early forms of connected devices like RFID helped to improve operational efficiency (Delen, Hardgrave, & Sharda, 2007). The internet of things will involve many stakeholders like device manufacturers, telecommunication operators, system integrators and users along the supply chain.

The internet of things has enabled monitoring of remote assets without deploying manpower at the site. It has enabled remote monitoring of patients in the healthcare sector (Hussain et al., 2015). Smart cities will be developed based on the internet of things (Lau S.P et al., 2015). The internet of things will help to monitor and improve the efficiency of manufacturing shop floors (Y. Zhang et al., 2014). The internet of things deployed in a retail supply chain enhances visibility for suppliers who can avoid an out of stock situation (Bardaki et al., 2012). Internet of things will enable product-service integration (Young et al., 2011). Many of the above applications depend on the intelligence and real-time visibility provided by the internet of things. But the growth of the internet of things will bring in security, privacy and trust concerns (Sicari et al., 2015).

A literature review on the internet of things shows that the primary focus of earlier studies was on the benefits of the internet of things, as established through vignettes or case studies. Literature research also reveals that visibility, security, organization and data management are the factors that allowed these benefits. This paper builds on the previous research to establish whether the above factors are driving values for stakeholders and influencing the adoption of the internet of things. While analysing the limitations and scope for further research in the previous renowned articles, it is found that value creation by internet of things is an worthwhile area to do an in depth research. This research could be helpful to businesses who want to create new value for their stakeholders or add revenues streams to the organization through the internet of things.

II. LITERATURE REVIEW

There is an existing body of literature that examines the benefits of internet of things. Inherent factors such as visibility, security, organization and data management which are important for the adoption and value creation of the internet of things are cited. Table 1 provides a comparative summary of the findings from extant studies and finding for each variable is discussed with identification of value creation as scope for future research (Identified in six renowned articles on the subject).
Comparative findings from previous studies for the variables used and scope for future research

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Visibility</th>
<th>Security</th>
<th>Organization</th>
<th>Data management</th>
<th>Customer value creation through the internet of things (IOT)</th>
<th>Scope for future research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boosa, Guenterb, Grotea, &amp; Kinderc, 2013.</td>
<td>Organization has visibility of product paths and data associated with it at finer levels. -Owner has the visibility to verify if the product is genuine.</td>
<td>Accountabilities and responsibilities of actors have to be defined and the organization should be aware of this.</td>
<td>Variety and volume of data will introduce system complexity.</td>
<td>IOT provides value to organization in improving the supply chain. It helps to detect counterfeit goods.</td>
<td>Empirical data of accountabilities and responsibilities is presented. More research data is needed to establish these factors on value creation of the internet of things.</td>
<td></td>
</tr>
<tr>
<td>Pang, Chen, Han &amp; Zheng, 2015a.</td>
<td>Visibility of patient’s data can be monitored for necessary action remotely.</td>
<td>Secure handling of health care records is a value of the extended health care system.</td>
<td>Device, hardware, software integrated to deliver the service. This is one of the framework for IOT business model.</td>
<td>Efficient data fusion is highlight of extended health care system.</td>
<td>Delivery of in-home health care services using the internet of things.</td>
<td>Security and privacy of information will create value to stakeholders in the internet of things. This research finding is limited by one case study. Broad research on this dependency has to be established.</td>
</tr>
<tr>
<td>Readiy, Gunasekaran, &amp; Spalanzani, 2015.</td>
<td>Visibility of data from the decentralized warehouse help to arrive at the action.</td>
<td>Self-organization and negotiating protocols between agents based on completion and cooperation was established.</td>
<td>Data from RFID, ambient intelligence, multi-agent system and enterprise resource planning were integrated to arrive at the action.</td>
<td>Improve order fulfillment process. Improve reaction capabilities of decentralized warehouses.</td>
<td>This exploratory research did not comprehend all issues of the internet of things. This research focused on organization and decision support mechanisms enabled by the internet of things.</td>
<td></td>
</tr>
<tr>
<td>Shrouf &amp; Miragliotta, 2015.</td>
<td>Using IOT, energy consumed by production floor is visible.</td>
<td>Framework to support the integration of energy information data into company information technology platform.</td>
<td>Collection of energy information and integrating with existing information technology platform.</td>
<td>IOT delivers energy efficient production practice.</td>
<td>Collection and managing energy data is limited to one case study. More data and research is required on value creation and adoption of the internet of things.</td>
<td></td>
</tr>
<tr>
<td>Bardaki et al., 2012.</td>
<td>Visibility of operations and supply chain. -Consumers value privacy and are apprehensive</td>
<td>Organizational structure must support for successful</td>
<td>Collection, filtering and aggregation mechanism of</td>
<td>IOT helped in better supply chain performance,</td>
<td>Future research has to establish dependency of value creation to</td>
<td></td>
</tr>
</tbody>
</table>
2.1. Value Creation by the Internet Of Things

2.1.1. Retaining existing stakeholders.

Enterprises are looking at innovative solutions to leapfrog competition and retain existing stakeholders. The internet of things will enable new product-service offerings (Cheng, Choi & Yeung, 2012) built on existing product-centric offerings. This provides value beyond a stakeholder’s expectation.

2.1.2. Improve supply chain performance, improve cash cycle, reduce inventory.

The real-time visibility (Yingfeng et al., 2015) enabled by the internet of things will help with monitoring remote assets, improve logistics performance and improve overall supply chain performance (Bardaki et al., 2012). Visibility and monitoring of performance (Jakob et al., 2015) is an important value creation of the internet of things.

2.1.3. Competitive edge.

Enterprises can add value to their existing businesses by building on the core expertise. Hospitals offering remote monitoring of patients’ health (Pang et al., 2015a) are an addition in value to their existing inpatient and outpatient services. The internet of things enables product and service values (David Opresnik & Marco Taisch 2015) that will provide a competitive edge (G. Ray et al., 2004) over competitors. Extracting intelligence (W. Chung 2014) from data and acting on it will create value to organizations.

2.1.4. Implementation of the internet of things within time and budget.

Cost-benefit analysis of the internet of things will be a key factor in a stakeholder’s mind when implementing the internet of things. Standard and scalable platform will create great value for stakeholders (Ray et al., 2014) of the internet of things. Backward integration with existing enterprise platforms will help in reducing the risk (Sanjay Mathrani & Anuradha Mathrani (2013) optimizing resources and the timely delivery of solutions to stakeholders.

2.1.5. Sustenance of the internet of things.

Sustainability is an important value of businesses. New business models and infrastructure like smart cities (Zanella et al., 2014) built using the internet of things have to be sustainable and this is an important value to the stakeholders. An organization framework (Readiy et al., 2015.) with negotiating protocols between the partners and well defined accountabilities of human and device roles will enable a sustainable business model.

2.2. Visibility

Visibility of assets, operation, and the supply chain is one of the key characteristics of the internet of things. The internet of things adds value to enterprises by improving the supply chain (Depeng et al., 2014). It helps to detect counterfeit goods (Boosa et al., 2013). In the healthcare sector, patients’ health status is monitored remotely for necessary action (Sung et al., 2013). It will enable smart cities in future (Fabrice et al., 2015). Real-time information, accuracy of information and product service intelligence are sub variables of the internet of things. In this study, these three sub variables are considered elements of the internet of things that create value for stakeholders.

2.2.1. Real-time information.

In today’s global supply chain, lack of real-time insight of operations and assets (Amy et al., 2015) costs businesses. Visibility provided by interconnected devices helps to understand lead times and reduce slack time for both retailer and supplier. Visibility of retailer behaviour of product handling improves logistics performance (Tsai & Tang, 2012) at the micro level. Interconnected devices provide real-time visibility of the supply chain (Delen et al., 2007) which is an important value delivered to the stakeholders.

2.2.2. Accuracy.

Information accuracy is important for businesses (Chang-Su, Son, & Bourlakis, 2012). Visibility on supplier stock,
inventory and wastage is essential information for competitive operation (Vlachos, 2014). Early forms of the internet of things like RFID has a positive impact on supply chain performance, but accuracy of information was a challenge. The technology advancement achieved through the internet of things will improve the accuracy (Hongju et al., 2013) of information. These benefits are a source of sustainable competitive advantage.

2.2.3. Product-service intelligence.
A customer’s expressed and latent needs (Slater & Narver, 2004) have to be satisfied. Knowledge about customer behavior (M. Garcia-Murillo & H. Annabi 2002) is one of the values brought about by the internet of things. Intelligence on demography and usage patterns of consumers (Evgeny et al., 2015) at the micro level (Winter, 2014) can help businesses customize product-service model (Choi, H.S & Rhee, W.-S. 2014).

H1: The visibility of operations has a significant contribution to value created by business intelligence for stakeholders in the internet of things.

2.3. Security
With the internet of things, sensor devices will proliferate in everyday life. The security of systems (Kuan et al., 2014) and information is important for internet of things. Habits, personalities, and preferences will be tracked and analysed by organizations seeking to sell their products. There will be benefits enjoyed by consumers, but at the same time, governance issues like privacy, legitimacy, and transparency will arise (Weber, 2013). Privacy-preserving savvy access (Banerjee et al., 2014) to the internet of things can deliver value to stakeholders. The security of the internet of things rides on three sub variables—privacy, integrity, and complexity. These sub variables will be of prime importance for driving values for stakeholders and its adoption.

2.3.1. Privacy.
The sensors associated with the internet of things will collect intelligence of the environment and behaviors surrounding humans. The internet of things brings great value to the healthcare industry by monitoring the condition of patients remotely. The data collected on the health conditions of patients must be handled securely (Pang et al., 2015a). There are privacy (Depeng et al., 2014) concerns regarding the early forms of the internet of things like RFID (Bose et al., 2009). Similarly, data collected from the consumers at a retail outlet will include habits of the consumers and their personal choices. Consumers may approve of sharing personal information to obtain some benefits (Bardaki et al., 2012).

2.3.2. Integrity.
Internet of things implementation will involve many partner organizations. The information will flow through these numerous partners. So there are chances that sensitive information may be shared with or without the partner’s knowledge. The trust between the parties (Yan, et al., 2014) will be of paramount importance in driving the adoption of the internet of things. The new micro details of the information brought about by the internet of things will need an integrity information framework. The micro details captured by the internet of things and transacted for various purposes may violate the privacy of the citizens (Winter, 2014) and this remains an issue that needs to be addressed by standards and governance.

2.3.3. Complexity.
The variety of devices connected over the internet will be vulnerable to problems of malware, and viruses (A. Zhang et al., 2014). Proprietary security solutions do not provide a comprehensive solution to the internet of things as the devices and technology associated changes over time and is also wide spread. Standard (José L. Hernández-Ramos et al., 2015) security protocols make the deployment easier and are an important factor for the adoption of the internet of things (Keoh, Kumar & Tschofenig, 2014). Performance (Rashwan et al., 2014) of security solutions also need to be scalable (Ray et al., 2014) to match growth in business.

H2: Security solutions have significant relationship with value created by integrity and trust for stakeholders in the internet of things.

2.4. Organization
The internet of things will involve the role (Harry et al., 2014) of sensors, devices and humans. Organizations need well defined roles and responsibilities (Giuseppe et al., 2014) for sensors and humans. Business ecosystems (Rong et al., 2015) must evolve for the successful growth of the internet of things. Organizational complexities (Philippe et al., 2011) with multiple partners will pose challenges. There are four sub variables impacting the organization framework for the internet of things which are clear accountabilities, negotiating protocol between the partners, value-centric organization, and flexible organization.

2.4.1. Accountabilities.
Organizations gearing to take advantage of the internet of things will need to rethink at the organization’s structure. Organizations should map out the actors and decision makers (Bin et al., 2013) to handle this continuous stream of data. Implementation of early forms of networked devices like RFID needed an organizational structure with accountabilities between the roles of humans and devices clearly defined (Boosa et al., 2013). Accountabilities will support and enhance security of the internet of things (Weber, 2011).

2.4.2. Negotiating protocol.
Different stakeholders have to come together to implement the internet of things as information will flow through different partners. There must be a clear definition concerning who owns the data and who is transacting the data. Negotiating protocol based on competition and collaboration has to be established (Reaydi et al., 2015). Objectives of partners and the overall objective of the value chain will be met effectively only if hierarchal decision protocols are established (Luo, Fang & Huang, 2015).

2.4.3. Value-centric organization.

www.ijrerp.org
Early forms of the internet of things like RFID and POS systems were mostly used in the traceability of items. With the advent of internet of things, value creation to stakeholders and businesses will be beyond traceability (Pang et al., 2015b). To achieve this, organizations must be structured around value. People-centric frameworks enable efficient delivery of healthcare for the elderly (Hussain et al., 2015). Value-centric organization will help stakeholders gain the full benefit of the internet of things.

2.4.4. Flexible organization.

The ambience or performance that is tracked using the internet of things will be real time. This real-time data needs quick decision making and action. Cognitive agility (X. Li et al., 2008) of an organization should be built in (Good, 2014) to deal with this real-time data. When new data points are collected and integrated into an existing enterprise platform (Mumtaz Abdul Hameed et al., 2015), organizations need to innovate, adapt to the new input (Shrouf & Miragliotta, 2015) and should device methods to react to the new inputs.

H3. Organization framework supporting sustainability has a significant contribution by fair and equitable sharing of benefits to value created for stakeholders in the internet of things.

2.5. Data Management

Data management of the internet of things is different from a traditional database. A traditional data type is that of storage and retrieval. Internet of things data is dynamic (Minbo et al., 2015) heterogeneous and streamed in volumes from a variety of devices (Abu-Elkheir et al., 2013). Information framework (Li et al., 2012) to share information and make intelligent decision (Z.X. Guo, et al., 2015) is important. Efficient management of data in smart communities (Monika Mital et al., 2015) will be important. Volume, variety and integration of data are important sub variables impacting data management of the internet of things.

2.5.1 Volume and variety of data.

The internet of things will bring in a continuous stream of data (Christian et al., 2015) from various devices, located in remote locations. Data such as video streaming (Denis et al., 2014) volume will be huge to collect, store and analyze. Data processing has to be modeled and automated to provide accurate information on time (Delen et al., 2007). Harnessing this huge volume of data (J. Fan et al., 2014) will be challenge, but will be important for decision making. The internet of things will collect data through various types of sensors and devices. Data collected from these devices are heterogeneous (Yi et al., 2014). Technology to handle this heterogeneous data and the mining of it is evolving (Gebremeskel et al., 2015). Efficient handling of heterogeneous data for insightful action is of value to stakeholders (Ji et al., 2015).

2.5.2. Data integration.

The variety and volume of data from various devices should be integrated, and insightful information has to be derived for value creation (Amir Gandomi & Murtaza Haider 2015). Innovation in supply chain can be done by harnessing data (Kim Hua Tan et al., 2015). New data from the internet of things has to be integrated with existing enterprise application (Reaidy et al., 2015) to achieve the full benefit of an internet of things. Integration of data and algorithms to analyze (Benjamin et al., 2014) this data will enable the cognitive decision making ability of an organization (Kaur & Sood, 2015).

H4. Data management has a significant influence on the value created by enhancing productivity for stakeholders in the internet of things.

III. RESEARCH METHODOLOGY

The research was developed based on primary data collection and secondary data collection. Secondary data collection was based on a literature review of 75 listed in ISI Thomson Reuters. The core independent variables that created value for stakeholders in the internet of things were identified through the literature review.

3.1. Data Collection

A survey questionnaire was used for the collection of primary data. The survey questionnaire was prepared and piloted with 20 industry experts. Industry experts included participants from various industry sectors who touch base with the internet of things or who are exploring the adoption of this technology in their organization. Personal interviews with some of these experts and their feedback were used to modify and arrive at the final questionnaire. A Likert scale was used to measure indicators. A five-point scale reference, with one indicating strongly disagree and five indicating strongly agree, was used.

The survey was sent to 970 industry participants in America, Asia Pacific/Australia, Europe, Middle East/Africa who were functional experts in various industry sectors. The usable responses of 203 were chosen for the study, out of 241 responses received. The demography of respondents of the survey is detailed below in Table 2:

<table>
<thead>
<tr>
<th>Item</th>
<th>Measure</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>Banking/Financial service</td>
<td>11</td>
<td>5%</td>
</tr>
</tbody>
</table>

Table 2: Demographic breakdown of respondents (n=203)
<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and Beverage</td>
<td>9</td>
<td>4%</td>
</tr>
<tr>
<td>Health care/pharmaceuticals</td>
<td>13</td>
<td>6%</td>
</tr>
<tr>
<td>Industrial/Automation</td>
<td>23</td>
<td>11%</td>
</tr>
<tr>
<td>IT/hardware/software</td>
<td>53</td>
<td>26%</td>
</tr>
<tr>
<td>Retail/Hospitality</td>
<td>11</td>
<td>5%</td>
</tr>
<tr>
<td>Security and public safety</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>20</td>
<td>10%</td>
</tr>
<tr>
<td>Transport/Automotive</td>
<td>22</td>
<td>11%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business unit/Sales &amp; Marketing</td>
<td>14</td>
<td>7%</td>
</tr>
<tr>
<td>Data management/analytics</td>
<td>59</td>
<td>29%</td>
</tr>
<tr>
<td>IT infrastructure/Platform/System/Software/hardware</td>
<td>107</td>
<td>53%</td>
</tr>
<tr>
<td>Supply chain/Operation</td>
<td>23</td>
<td>11%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Role</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing hardware/software for it</td>
<td>16</td>
<td>8%</td>
</tr>
<tr>
<td>Exploring or talking about it</td>
<td>99</td>
<td>49%</td>
</tr>
<tr>
<td>Implementer</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>No role</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Touch base with IOT service flow</td>
<td>55</td>
<td>27%</td>
</tr>
<tr>
<td>User</td>
<td>27</td>
<td>13%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Role in the internet of things</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doing business on internet of things</td>
<td>6</td>
<td>3%</td>
</tr>
<tr>
<td>Has a plan to implement</td>
<td>16</td>
<td>8%</td>
</tr>
<tr>
<td>Has implemented it (including early forms of technology)</td>
<td>58</td>
<td>29%</td>
</tr>
<tr>
<td>Has not thought about it</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>Some conversation about it</td>
<td>119</td>
<td>59%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Americas</td>
<td>5</td>
<td>3%</td>
</tr>
<tr>
<td>Asia Pacific/Australia</td>
<td>146</td>
<td>72%</td>
</tr>
<tr>
<td>Europe</td>
<td>17</td>
<td>8%</td>
</tr>
<tr>
<td>Middle East/Africa</td>
<td>35</td>
<td>17%</td>
</tr>
</tbody>
</table>
IV. DATA ANALYSIS

ADANCO 2.0 was used to analyze the data collected from primary research. ADANCO 2.0 is a structural equation modeling tool. ADANCO was used to build the research framework and test the hypothesis (Ringle, Wende, & Will, 2005). ADANCO uses a composite based modeling approach to test the theories. ADANCO tests the model without imposing a normality condition of the data (Hulland, 1999). A two-step analysis was done. The first step was to assess the quality of measures of the structural model. Reliability and validity of the measures were also performed during this step (Sekaran & Bougie, 2010). The second step was to fit the model, perform path analysis and estimate the model parameters.

4.1. Reliability

The reliability of the model indicates the internal consistency of the constructs. This is assessed by a Cronbach alpha value. Cronbach alpha value greater than 0.6 is a good indicator of reliability (Hair et al., 2012). Jöreskog’s rho known as composite reliability is also an indicator of reliability of construct (Wertz, Linn, & Jöreskog, 1974). Composite reliability values greater than 0.7 are an indicator of reliable and homogenous construct. For this model, the Cronbach value is greater than 0.7, Jöreskog’s rho value is greater than 0.7, and Dijkstra-Henseler’s rho (ρA) value is greater than 0.7. This indicates that the construct is reliable.

4.2. Convergent Validity

Variable indicators are measured by convergent validity. It is a measure of conformity between scores. Convergent validity value is used to test the construct validity. For each construct, average variance extracted (AVE) should be above 0.5 (Barclay et al., 1995). As indicated in Table 3, the minimum AVE value is 0.6175, which is above 0.5 as required. The measurement model satisfies convergent validity requirements.

4.3. Discriminant Validity

Discriminant validity values indicate the degree of discrimination between variables. ADANCO evaluates discriminant validity by comparing the measured value for each variable with other constructs. Square root of the AVE value should be greater than the AVE of other variables (Fornell & Larcker, 1981). Table 4 shows the results of the discriminant validity testing. Square root of AVE is greater than AVE of other variables, so the discriminant validity is proven.

Table 4: Discriminant validity

<table>
<thead>
<tr>
<th>Construct</th>
<th>Visibility</th>
<th>Security</th>
<th>Value creation</th>
<th>Organization</th>
<th>Data mgmt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visibility</td>
<td>0.6938</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>0.0000</td>
<td>0.6663</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value creation</td>
<td>0.4285</td>
<td>0.1326</td>
<td>0.7353</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>0.0259</td>
<td>0.0174</td>
<td>0.3336</td>
<td>0.6175</td>
<td></td>
</tr>
<tr>
<td>Data Mgmt.</td>
<td>0.5927</td>
<td>0.0016</td>
<td>0.4569</td>
<td>0.0827</td>
<td>0.6975</td>
</tr>
</tbody>
</table>

4.4. Structural equation modeling

ADANCO 2.0 is the structural equation modelling (SEM) software tool used to test the hypothesis. Theoretically linear and additive causal models are tested using second generation multivariate analysis tools like SEM. An unknown population can be modelled using bootstrapping methods (Hesterberg et al., 2003). Level of significance is tested using t-Statistic values. The significance levels (p-values) and corresponding t-values (Cowles & Davis, 1982; Neyman & Pearson, 1933).

Four hypotheses were tested in our research. The outcome of the hypothesis testing was tested against the t-values. The results are tabulated in table 5

Table 5: Results of hypothesis testing

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Effect</th>
<th>Path coefficient(β)</th>
<th>Mean value</th>
<th>Standard error</th>
<th>t-value</th>
<th>Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Visibility &gt; value creation</td>
<td>0.412***</td>
<td>0.4125</td>
<td>0.0549</td>
<td>7.4939</td>
<td>YES</td>
</tr>
<tr>
<td>H2</td>
<td>Security &gt; value creation</td>
<td>0.301***</td>
<td>0.3020</td>
<td>0.0370</td>
<td>8.1445</td>
<td>YES</td>
</tr>
<tr>
<td>H3</td>
<td>Organization &gt; value creation</td>
<td>0.405***</td>
<td>0.4075</td>
<td>0.0272</td>
<td>14.9301</td>
<td>YES</td>
</tr>
<tr>
<td>H4</td>
<td>Data &gt; value creation</td>
<td>0.231***</td>
<td>0.2298</td>
<td>0.0550</td>
<td>4.1933</td>
<td>YES</td>
</tr>
</tbody>
</table>

*** indicates 99.99% significance level.
V. RESEARCH FINDINGS

The first hypothesis H1 tests the effect of visibility to value creation by the internet of things. The effect of visibility (7.4939) is highly significant as the t-value indicates the confidence interval more than 99%. Thus H1 (β = 0.412, P < 0.01) is supported. This indicates that visibility of assets and operations have significant contributions to value creation by business intelligence for stakeholders, whereas the earlier study (Zhou, Chong, & Ngai, 2015) found that the supply chain was benefitted by the visibility of operations provided by the internet of things.

The second hypothesis H2 tests the effect of security to value creation by the internet of things. The effect of security (8.1445) is highly significant as the t-value indicates the confidence interval more than 99%. Thus H2 (β = 0.301, P < 0.01) is supported. This indicates that security solutions provided to protect systems and the privacy of information have significant relationship to value creation by integrity and trust for stakeholders in the internet of things, whereas an earlier study (Rodrigo Roman et al., 2013) found that standard security and privacy were important features and challenges of the internet of things.

The third hypothesis H3 tests the effect of organization to value creation by the internet of things. The effect of organization (14.93) is highly significant as the t-value indicates the confidence interval more than 99%. Thus H3 (β = 0.405, P < 0.01) is supported. This indicates that an organization framework supporting sustainability has a significant contribution to the value creation by fair and equitable sharing of benefits for stakeholders in the internet of things, whereas an earlier study found (Shin, 2014) that a socio-technical organization framework helped in sustaining the internet of things.

The fourth hypothesis H4 tests the effect of data management on value creation by the internet of things. The effect of data management (4.1933) is very significant as the t-value indicates the confidence interval more than 99%. Thus H4 (β = 0.231, P < 0.01) is supported. This indicates that data management has a significant influence on value creation by enhancing productivity for stakeholders in the internet of things, whereas an earlier study (Abu-Elkheir, M et al., 2013) found solutions to data management and harnessing the benefits from the internet of things.

All the findings of this study are new contributions to the body of knowledge beyond the earlier findings discussed above regarding each hypothesis. The result of the bootstrapped structural model is shown in Figure 1. The path coefficients are displayed with all paths showing significant correlation between dependent and independent variables.

VI. IMPLICATIONS OF THE INTERNET OF THINGS TO STAKEHOLDERS

The key factors of the internet of things—visibility, security, organization and data management—deliver new values to stakeholders and strongly influence the adoption of the internet of things. Visibility of operations will create opportunities for product-service revenue streams for the enterprises. This will enhance the competitive edge of businesses and will help in retaining existing customers and in the creation of new customers. Standardized security platforms that are scalable will help speed up the adoption of the internet of things, as businesses do not need to worry about the complexity of implementing it, but rather can focus on their business objective. The internet of things will create real-time information which streams continuously. Organizations must be geared up to absorb the information deluge and respond to it. Organizations must be flexible with effective negotiating protocols in place for good decision making. These characteristics of cognitive organization will create new values for stakeholders. The internet of things will create a huge volume and variety of data. Intelligent algorithms to harness this data automatically without human intervention will create value for the stakeholders and hence strongly influence the adoption of it.

VII. LIMITATIONS AND SCOPE FOR FUTURE RESEARCH

This study focused on factors of the internet of things that can create new value for stakeholders and influence the adoption of the internet of things. The study focused on the enterprises and values as perceived by stakeholders. These values are monetarily driven as that is the prime objective of corporations. However,
there is no data on user experience of the internet of things. This could be due to the nascent stage of the Internet of things. As more enterprises adopt the internet of things, there is a scope for research on user experience of the internet of things.

VIII. CONCLUSION

The internet of things will be a natural evolution of the internet. Visibility, security, organization and database management are key factors in creating values to stakeholders and influence adoption of the internet of things. Our research shows that all these factors have equally influenced the adoption of the internet of things. The above factors are the building blocks upon which enterprises will innovate and build differentiating values for their stakeholders. To date, many enterprises are evaluating and waiting to make the first move to harness and deliver unique value, using the internet of things. Eventually it will happen.

REFERENCES


Authors
First Author – Dr. A. Seetharaman, Dean, Academic Affairs, seetha.raman@spjain.org
Second Author – Nitin Patwa, Director of Simulations, nitin.patwa@spjain.org
Third Author – A.S.Saravanan, Senior Lecturer, Taylors’ University, Malaysia, saravanabhava@gmail.com
Fourth Author – Ashok Anand, P G Scholar, Ashok.esg1304@spjain.org

www.ijsrp.org
The Influence of Time-Varying Property of Market Based Risk on Bank Stock Returns: GLS and GARCH Approach

Isaac Mwaurah *, Prof. Willy Muturi **, Prof. Anthony Waititu ***

* PhD Candidate Jomo Kenyatta University of Agriculture and Technology
** Jomo Kenyatta University of Agriculture and Technology
*** Jomo Kenyatta University of Agriculture and Technology

Abstract- In Kenya, the phenomenon of decline in stock returns due to increasing market based risk is triggering concerns on the stability banking sector in Kenya. The risk appetite at the Kenyan banking sector and the speculative nature of investors especially on banking stocks need to be supported with in-depth empirical evidence on the relationship that exist between risk and returns at Nairobi Securities Exchange (NSE). This study sought to investigate the influence of time-varying property of market based risk on bank stock returns at NSE using three model approach of GLS model, Fixed and Random long run and short run panel data estimation and GARCH model. The study used exchange rate and interest rate as exogenous variables, stock return volatility as endogenous variable and bank stock returns as dependent variable. GLS regression established that interest rate is negatively significant on indexed bank stock returns while exchange rate was negatively insignificant on indexed stock returns. Hausman test indicated an efficient random model in long run and held that exchange rate and interest rates are individually and jointly negatively significant on bank stock returns. At the short run, Hausman test indicated that fixed model was efficient and held that the rate of change of exchange rate and rate of change of interest rates was individually negatively insignificant but jointly significant on bank stock returns. GARCH (1,1) model held that for short in the short run, stock return volatility and exchange rate influence indexed stock returns at NSE while interest rate was held insignificant. The study concluded that market based risk determined by the rate of change on interest rate, exchange rate and stock return volatility are significant in influencing on bank stock returns. However, the level of significance depends on time, size of the bank, hedge capacity and ability to adequately respond to changing monetary policies. This research is a spatial extension of the previous researches. Unlike other studies that focus mainly on macro-economic variables, this research focused on exogenous and endogenous variables of market based risk and how they influence bank stock returns with reference to time variation and individual bank characteristic.

Index Terms- Market risk, Stock returns, Exchange rate risk, Interest rate risk, Volatility of stock returns.

I. INTRODUCTION

Investors at the stock market exist to maximize returns. A Stock market is a pillar of investor wealth creation. It drives allocation of resources across different sectors of the economy. Banks, like stock markets, leverage investors objective to maximize wealth through their core function of financial intermediation. However, as banks undertake their core function of resource allocation, they face daunting task of systemic market based risk which if not managed could lead to bank runs thus affecting the economy adversely. Nonetheless, if banks avoid risk to minimize failure rates to zero, they inhibit their economic benefit to promote investor market value and efficient allocation of resources (Greuning & Bratanovic, 2009). To balance the extent of risk is crucial for survival of banks, economy and investor wealth. However, no investor will maximize their returns without engaging in risk. The impact of interest rate risk and exchange rate risk has been observed to be cyclical where systemic effects of market risk triggers emergence of other financial risks (Cheng & Nasir, 2010). Haque and Wani (2015) observed that financial risk exists in an eco-system of systemic risks where external financial risk triggers internal risk during economic recession and internal financial risk triggers external risk during boom. The impact of how market risk influence bank stock returns in Kenya need to be established to balance the uptake of risk in view of maximizing returns for investors at NSE.

Stock return is the measure of shareholder wealth at the stock market. Stock return volatility refers to the uncertainty of returns of the underlying assets due to changes in flow of information concerning the stock into the markets. Negative information increases the variability over varied periods making it difficult for investors to predict stock returns. Stock volatility is characterized by the ups and downs of the stock markets inferred by bull and bear episodes where the stocks prices increases from trough to peak and decreases from peak to trough by huge margins. Bull episodes are evidenced to last longer than bear episodes making it riskier for investors to hold stocks longer at bull phase (Ogilo, 2008). Stock market is a market that facilitates trade of securities from publicly quoted companies and government securities. A stock market form an important entity to the economy, investors and other stakeholders. It’s a backbone of an economy since it promotes efficient capital allocation and wealth creation. Studies shows that stock markets are significant for economic growth (Sobia et al. 2015). Jorion (2007) referred market risk as the uncertainty that a bank may experience due to

www.ijsrp.org
unfavorable movement in price and price determining indicators such as interest rate and exchange rates volatilities which leads to potential financial loss to earnings and capital. Haque and Wani (2015) defined interest rate risk as the sensitivity to capital and income due to variations in interest rates arising from the mismatches of the yield curve or repricing of assets and liabilities. The sensitivity of interest rates that arising due to mis-match of assets and liabilities maturities is established to have adverse effects on stock returns (Ryan & Andrew, 2004). Most studies have associated the direction of influence between interest rates and stock returns to be dependent on regulations and deregulations. Greuning&Bratanovic (2009) described exchange rate risk as the risk arising from mis-matches in value of assets and liabilities denominated in different currencies. The fluctuation of domestic currency over a foreign currency arises due to interest rates differentials between the two countries. These affect the inflation of the two countries and other macroeconomic factors which bear a resultant negative effect on shareholder market value.

Empirical literature remains nascent and contradictory on how financial risk affects stock returns sensitivity. However, Sukcharoensin, (2013) and Syed & Anwar (2012)argued that market risk theoretically and empirically is proven to influence stock returns. Sobia, et al. (2015) established that investors in emerging markets are mere herd and noise traders as they fail to consider external and internal risk in their investment decisions. To maximize wealth, investors require accurate and reliable information on the drivers of stock prices. Maxims of efficient market hypothesis contends that stock prices respond to news released to the markets which could be in the form of financial statements, press briefings or insider information. Market imperfection gravitates the impact of uncontrollable, unknown risk to shareholder market value. Notably, massive loss of investor’s wealth in the stock markets due to market based risk got its epitome during the global financial crisis where systemic risk spiraled from one economy to another by due to sensitivities, volatility and interconnectedness of the world in interest rates and exchange rates (Mouna& Anis, 2015).

In Kenya, investors at the NSE lost Ksh 157 billion in the first half year of 2015 in a bear run that plunged the main market index to a two-year low. According to market data, 48 counters out of 63 lost value with NSE 20 share index falling by 12.7% to 4463 points while absolute investments in this segment fell to Ksh 2.142 trillion (NSE, 2015). In the year of 2015, the stock market performed dismally with the financial sector being the biggest loser while the telecommunications and the agricultural sector proved resilient to the bear run. The banking sector suffered a 12.7% drop to 755 billion in capitalization recording a loss of Ksh 109 billion. Insurance sector shed 20.3% to Ksh 37.5 billion (NSE, 2015). Pension funds reduced their investments in stocks from 30% to 27.1% in first quarter of 2016 due to plunging of the banking stocks due to bad debts and bank failures. The returns of pension firms in Kenya in the past three years reduced by 6.6% (Forbes, 2016).

Financial theory has laid emphasis on risk as a key predictor of stock returns. According to theory of Markowitz (1952), Modern Portfolio Theory (MPT) and Capital Asset Pricing Model (Sharpe, 1964 and Lintner (1965), financial market players are concerned over a given level of risk and upon which they adjust their returns expectations. Ross (1976) with his Arbitrage Pricing Theory (APT) argued that besides beta risk, stock returns are driven by other market based risks to determine expected return on investments. In this regard, this study sought to establish the influence of interest rate risk, exchange rate risk and stock returns volatility on bank stock returns at NSE.

1.1 Statement of the problem

Globalization and web based financial interconnection has precipitated the increase of market based risks affecting investor value in the financial industry. Increased appetite for risk through innovation on financial products as banks strive to survive difficult financial environment is the main cause of concern for deteriorating investor value at the stock market. The state of risk has been heightened by the systemic, cyclical, and contagious nature of market based risk which has led to huge loses and uncertainties on stock portfolios to local and international investors. In Kenya, the phenomenon of decline in stock returns due to increasing market based risk and emerging complex banking operating environment is triggering concerns on the stability banking sector (Machuke, Mwita &Kihoroh, 2014). The unprecedented loses has yielded concerns on whether investors at NSE care about risks when making investment decisions. The risk appetite of the Kenyan banking system and the speculative nature of investors especially on banking stocks at NSE need to be supported with in-depth empirical evidence on time-varying influence of market risk on bank stock returns.

Studies on the influence of market risk on stock returns are yet to provide a substantial causal link. Sobia, et al. (2015) concluded that interest rates and exchange rates hold negative significant relationship with stock returns. Naser et al. (2011) conducted a study to investigate the effect of credit and exchange risk on stock returns of banks in Australia using GARCH family models. The study concluded that credit risk and exchange risk are significantly positive in influencing bank stock returns. Haque and Wani (2015) undertook to examine the relationship between financial risk and financial performance of Indian banks. The study concluded that solvency risk, credit risk and capital risk significantly influenced financial performance while interest rate and liquidity risk was found insignificant. Sukcharoensin (2013) conducted a study to examine the influence of market, interest rate and time varying property of Thai banks stocks returns using GARCH framework. The study also established that interest rate and exchange rate are better predictors of stock returns sensitivity of Thai banks. In the long run, large banks are seen to hedge exchange rate risk and therefore exchange rate risk does not influence the stock return sensitivity

Locally, Koskei (2017) established that exchange rate was negative and significantly related to stock returns using panel data estimation. The study also showed that interest rates is insignificant on bank stock return. The study failed to specify and compare the relationship in both long run and short run. It also failed to estimated time varying property of stock returns. Wawire et al. (2017) established that interest rates and lending rates negatively granger cause stock market returns in the long run. The study failed to estimate panel data for individual banks effects, aggregate effect and time varying property of market risk on stock returns. In general, existing local studies have failed to incorporate time varying effect of stock returns, long term and
short term impact of exchange rates risk and interest rate risk on stock returns. By filling the gap, this study will help to establish the impact of hedging in banks, level information asymmetry and other risk management initiatives. Panel data estimation under long run and short run will help to ascertain on how exchange rate and interest rate affect stock returns at different time for different banks. Local studies have also failed to factor the long run and short run bank individual effects upon which market risk influences stock returns. These omissions form the basis of this study.

No study encountered in Kenya that has jointly considered the influence of market risk on aggregate bank stock returns at NSE, the long run and short run individual bank effects upon which market risk influence bank stock returns at NSE and influence of time varying stock return volatility on bank stock returns at NSE. The above forms the objectives that this study intend to address. Given the justification of study it is imperative to explore the influence of time-varying property of market based risk on bank stock at NSE forms the subject of this study.

II. LITERATURE REVIEW

2.1 Modern Portfolio Theory

Modern Portfolio Theory (MPT) is a finance theory developed in 1950 by Nobel Prize winner Harry Markowitz. It describes an optimal investment decision as one that maximizes the expected return of a portfolio for a given level of risk, or that investment decision that minimizes portfolio risk for a given amount of portfolio expected return. MPT describe investment as a principle of diversification where a collection of individual risky assets will form a portfolio with overall discounted risk for the same expected return. Stocks and bonds move in opposite directions, but a combination of a stock and a bond will yield a portfolio with overall lower risk for a given return.

MPT theory also observed that a portfolio constituted by positively correlated assets result to lower risk. The theory assumes an efficient market with rational risk averse investors; implying that one will only undertake a risky investment only if the returns were commensurate based on individual risk preference. MPT theory defined risk as the volatility of assets prices and the expected return as a collection of weighted asset returns. Harry Markowitz theory (1952) developed a mean variance formulation that combines assets portfolio generate an efficient frontier curve which identifies the optimal portfolio for investment.

Hyde (2007) investigated the sensitivity of stock returns to market risk, interest rate and exchange rates in France, Germany, UK and Italy. The study established that the three risks exhibit a significant influence on excess returns and future cash flows. This empirical study confirms the relevance of modern portfolio theory by aligning the influence of diversified risk on stock returns.

2.2 Arbitrage Pricing Theory

Arbitrage pricing theory (APT) is an asset pricing valuation model that describes stock returns as a function of a series of risk factors. The theory was proposed by Roll and Ross (1976). The theory is an advancement of Capital Asset Pricing Model (CAPM) by Sharpe and Litter that contended that stock returns are a function of beta risk only. Unlike CAPM, APT describes that stock returns is a factor of a series of risk factors ranging from firm and macro risk factors. Compared to CAPM, APT theory is less restrictive in its assumptions. APT theory assumes the markets are perfectly competitive, Investors prefer more wealth to less with certainty and asset returns follow a stochastic process expressed a linear function of n risk factors. APT theory of n risk factor model can be expressed as below:

\[ E(R_{it}) = \lambda_0 + \lambda_1b_{i1} + \lambda_2b_{i2} + \ldots + \lambda_nb_{in} \]

\[ E(R_{it}) = \text{the expected return on asset } i \text{ during a specified period of time}, \quad i=1, 2, 3\ldots n \]

\[ \lambda_0 = \text{the expected return on the asset with zero risk} \]

\[ \lambda_n = \text{the risk premium related to the nth common risk factor; i.e. how responsive is returns of asset i to the nth risk common factor loadings.} \]

Sobia et al. (2015) established that the factor loadings that determine the stochastic process of asset returns over time can be associated with macro and micro economic risk factors.

2.3 Conceptual Framework

A conceptual framework employed by the study discusses the foundation that influence of market risk on stock returns. The dependent variable in the study include bank stock returns while independent variables were exchange rate and interest rate. The study also included time varying property of stock returns as unobserved independent endogenous variable. Figure 2.2 represent the study’s conceptual framework.

![Figure 2.2 Conceptual Frameworks.](www.ijsrp.org)
may also represent the cost incurred to obtain resources for the purposes of lending or investment (Greuning & Bratanovic, 2009). For investors to determine their actual returns, they must therefore factor the variation of interest rates as an expense incurred to obtain capital. It affects the rate of foreign direct investments at the stock market. This study with support from empirical studies considers 91-day treasury bill a measure of market risk (Ryan & Andrew, 2004).

2.3.3 Stock returns
Stock return is the change in capital or wealth due to an investment. The changes could occur due to cash flows such as earnings, dividends or interest or due to negative or positive changes in prices (Mehri, 2015). To determine stock returns the study employed formula applied by Purnamasari et al. (2012) and Predescu and Stancu (2011) in calculating the stock returns:

\[ R_{i,t} = \ln\left( \frac{P_t + Div}{P_{t-1}} \right) \]

Where, \( R_{i,t} \) denote the continuously compounded individual bank stock returns at time \( t \). \( P_t \) is the Stock price at the end of the period, \( P_{t-1} \) is the stock price at the end of the previous period and \( Div \) is the cash dividend during the period. Stock return was computed annually from 2006 to 2015. Logarithmic returns are preferred because they are tractable when handling many sub periods for a long horizon. They are also statistical and conform to normal distribution (Mouna & Anis, 2015). Where, \( R_{i,t} \) denote the continuously compounded individual bank stock returns at time \( t \). \( P_t \) is the Stock price at the end of the period, \( P_{t-1} \) is the stock price at the end of the previous period and \( Div \) is the cash dividend during the period. Stock return was computed annually from 2006 to 2015. Logarithmic returns are preferred because they are tractable when handling many sub periods for a long horizon. They are also statistical and conform to normal distribution (Mouna & Anis, 2015).

2.4 Empirical Review
Having laid pre-requisite theoretical foundation and conceptual framework defining the association of variables of study; the study reviewed empirical evidence on the influence of market risk on stock returns and related studies by various scholars.

2.4.1 Market Risk and Stock returns
Empirical study by Syed & Anwar (2012) provided evidence on the relationship between interest rate and stock returns. It confirmed the existence of significant negative relationship between interest rates and stock returns. In their study on the effects of interest rate, exchange rate and volatilities on stock prices in Pakistan found that exchange rate risk on commercial banks stock returns is significant. They argue that banks will never hedge their individual position perfectly and this exposes them to exchange rate risk.

Ryan and Andrew (2004) conducted a study on market, interest rate and foreign exchange risk in Australian banking sector for the period 1996 to 2001 using GARCH-in-Mean Approach to model stock return volatility on daily Australian stock returns. They concluded that market risk, short and medium term interest rates along with their volatility are significant determinant of bank stock returns. However, it was found that exchange rates and long term interest rates are not significant in influencing Australian bank stock returns.

Hyde (2007) investigated the sensitivity of stock returns to market risk, interest rate and exchange rates in France, Germany, UK and Italy. The study established that the three risks exhibit a significant influence on excess returns and future cash flows. This empirical study confirms the relevance of and modern portfolio theory by aligning the influence of diversified risk on stock returns. Predescu and Stancu (2011) analyzed portfolio risk in the pretext of global financial crisis using volatility models of ARCH and GARCH along three benchmark indexes of USA, UK and Romania. The objective of the study was to establish the uncertainties in the portfolio over time as a result of financial crisis. Modeling of stock returns volatility of the indexes established that portfolio risk was influenced by systemic forces of the financial crisis. The study also established that diversification of the portfolio along the three indexes during the crisis did not reduce portfolio risk.

Sukcharoensin (2013) conducted a study to examine the influence of market, interest rate and exchange rate on time varying property of Thai banks stocks returns using GARCH framework. The study established that market is a factor of stock return sensitivity to large banks than to small and medium Thai banks. The study also established that interest rate and exchange rate are better predictors of stock returns sensitivity of Thai banks. In the long run, large banks are seen to hedge exchange rate risk and therefore exchange rate risk does not influence the stock return sensitivity.

Mouna and Anis (2015) investigated the effect of market, interest rate and exchange rate risk of financial stock returns during financial meltdown using GARCH-in-Mean model. The study was conducted for eight countries within USA, European market and China for the period 2006-2009. The study established that market, interest rate and exchange rate positively and negatively influence the volatility of stock returns in USA, China and Europe economies during the financial crisis.

Sobia et al. (2015) executed a study to investigate the effect of financial risk on the sensitivity of stock returns. The study was conducted during the year 2003 to 2012 based on the data of 115 companies at Karachi Stock Exchange in Pakistan focusing on financial risk at industry level, firm specific level and that of exporting and non-exporting firms. Stock return was used as dependent variable while independent variable of financial risk was represented by interest rate, exchange rate, financial exposure, and total risk. Firm size was employed as a control variable. The study findings concluded that interest rates and exchange rates at industry level and firm level hold a negative significant relationship with stock returns while total risk, growth rate, firm size and financial exposure was insignificant on industry and firm level. Interest rates held a positive significant relationship on stock returns for exporting and non-exporting while exchange rate held a negative significant relation for the same group.

Naser et al. (2011) conducted a study to investigate the effect of credit and exchange risk on stock returns of banks in Australia.
using GARCH family models. The study established that credit risk and exchange risk influence the behavior of stock returns. The study concluded that credit risk and exchange risk significantly positive in influencing bank stock returns and therefore the financial risk was useful tool for investors in return maximization.

Haque and Wani (2015) undertook to examine the relationship between financial risk and financial performance of Indian banks. The study also investigated the influence of financial risk on financial performance of Indian banks. Financial risk was defined as interest rate risk, liquidity risk, credit risk, capital risk and solvency risk. The findings established all financial risk studied depicted a relationship with financial performance. The study concluded that solvency risk, credit risk and capital risk significantly influenced financial performance while interest rate and liquidity risk was insignificant to financial performance.

Koskei (2017) studied effects of exchange rate risk on stock returns. The study established that exchange rate was negative and significantly related to stock returns using panel data estimation. The study also shows that interest rates was insignificant on bank stock return. The study failed to specify short term relationship. It also failed to estimated time varying property of stock returns. Wawire et al. (2017) investigated effects of interest rates on stock market returned. The study held that interest rates and lending rates negatively granger cause stock market returns in the long run. The study omitted the analysis of aggregate influence of interest rates, long run and short run analysis and analysis time varying property of interest rates on stock returns.

III. METHODOLOGY

This study adopted descriptive and correlational research design. Mehri (2015) used descriptive correlational research design in the analysis of effects of financial risks on the relationship between earnings and stock returns.

Target population comprised of all 43 commercial banks licensed by the Central Bank of Kenya and in operation as at 31st December 2015. Accessible population comprised of 11 commercial banks licensed by CBK and listed at NSE. The study assumed stratified purposive sampling technique to objectively select sample elements which best represent the population.

The sample of secondary data comprised of 9 commercial banks listed at NSE from year 2006 to 2015 namely: Barclay, CFC Stanbic, Diamond Trust, Equity, Housing Finance, Kenya Commercial Bank, National Bank of Kenya, National Industrial Credit Bank (NIC) and Standard Chartered. The study dropped the effects of corporate events such as M & A and rights issues around the announcement dates with an event window of ±10 days. This is because corporate events contain temporary effects on stock returns which are not related to market risk (Predescu&Stancu, 2011).

10-year annual secondary data for the period 2006 to 2015 was obtained from Nairobi Securities Exchange and Central Bank of Kenya. Data from Central bank of Kenya was used to show the rate of change of exchange rate between the USD and KSh and the rate of change in 91-day T-bills. Data on Nairobi securities exchange was used to calculate the stock returns for the listed banks. The study incorporated method of data collection based on quantitative and qualitative data collection approaches. Econometric techniques were used to describe the influence of market risk on stock returns of commercial banks listed in Kenya. The data was first subjected to diagnostic test of normality using Jacques Bera test, Breusch-Pagan Godfrey test was used to test non-constant variance where acceptance of the null hypothesis for constant was deemed appropriate, stationary test done using Phillips Perron test where autocorrelation test was done using Durbin Watson test. T-test was used to administer for significance of market based risks on stock returns. The model is as described below

Model Specification

The sensitivity of bank stock returns to exchange rates risk and interest rate risk is established through estimation of below multi-index model:

Full Model Specification

\[
R_{it} = \alpha_0 - \beta_1 FX_{it} - \beta_2 IR_{it} + \epsilon_{it} \]

Where \( R_{it} \) represents Stock Returns at time t; \( FX_{it} \) is the rate of change of Exchange rate between Ksh and USD at time t; \( IR_{it} \) is the rate of change of interest rate for 91-day T-bill at time t; \( \alpha_0 \) is the constant representing the sensitivity of bank stock returns under risk free conditions. \( \epsilon_{it} \) is the error term; \( \beta \) represent the measure of change of stock returns due to 1 unit change in market risk.

GLS model was used to analyze annual secondary data to established the impact of market risk on aggregate/indexed bank stock returns. It is worth noting that the financial data used by the study is characterized by seasonality, temporal effects, and non-stationary. These features make financial data feasible to serial correlation, heteroscedasticity, and non-normality which are the pre-requisites for financial data violating the assumptions of OLS model. It is for this justification that the study resulted on the use of GLS model. GLS models controls for serial correlation, non-constant variance and non-normality and still yields unbiased estimators for the model. Unlike OLS estimators, GLS estimators accounts for the differences in variances of exchange rate, interest rate and stock returns along periods of time (Meshki, 2011). GLS has been extensively used to model macro-economic and financial data. R studio analytical software was used for GLS modeling.

The study also employed panel data estimation using fixed and random effects model to control for specific bank effects on the influence of market risk on stock returns. This guarantees that the overall study is not privy to omitted variable bias due to individual bank effects (Wooldridge 2002). The study presented short run dynamic fixed and random model by lagging stock returns by lag one. This is to establish whether investors use previous investment returns to determine their present investment decision today. To select the model that provides efficient estimators the study conducted a Hausman test to select the preferred model between long run fixed or random and between short run dynamic fixed models against short run dynamic random model. Eviews software package was used for this analysis. Below is the description of long run and short run model specification

www.ijsrp.org
Long run Model Specification
\[ R_{t} = a_{0} + \beta_{1}FX_{t-1} + \beta_{2}IR_{t-1} + \Theta + \epsilon_{t} \] .................................2

Short run Model Specification
\[ R_{t} = a_{0} + \beta_{1}FX_{t-1} + \beta_{2}IR_{t-1} + \Theta + \epsilon_{t} \] .................................3

Where \( R_{t-1} \) represents previous period stock returns lagged by one period, \( \Theta \) represents bank individual effects for heterogeneity to eliminates endogeneity bias. The study also used GARCH (1,1) model to examine the sensitivity of bank stock returns to exchange risk and interest risk exposures using monthly data from 2005 to 2015. The study is anchored on the problem of declining stock price which is an indication a volatile stock market environment. It is due to this fact that GARCH model is employed to model the non-constant residuals and confirm whether they are time varying and conform to a stock return generating process over a long period of time. This confirms whether arbitrageurs can benefit to the mis-pricing in the stock market (Sukcharoensin, 2013). GARCH technique is employed for empirical investigation as follows:

Model Specification
\[ R_{t} = a_{0} + \beta_{1}FX_{t-1} - IR_{t-1} + \epsilon_{t} \] .................................4 (overall mean model before modeling)

Where,
\[ \epsilon_{t}^{2} = \alpha_{0} + \alpha_{1}\epsilon_{t-1}^{2} + \alpha_{2}\epsilon_{t-2}^{2} + \cdots + \alpha_{q}\epsilon_{t-q}^{2} + \nu_{t} \] ...............................5 (residual model equation)

\[ \sigma_{t}^{2} = \alpha_{0} + \Sigma_{j=1}^{q} \alpha_{j}\epsilon_{t-j}^{2} + \Sigma_{j=1}^{p} \beta_{j}\sigma_{t-j-1}^{2} \] .................................6 (conditional variance equation)

Overall model (Mean and Variance equation combined)
\[ R_{t} = \alpha_{0} - IR_{t-1} + \epsilon_{t} \] .................................7 (being GARCH Model after volatility modeling)

Where \( FX_{t-1} \) being change in exchange rate and \( IR_{t-1} \) being change in interest rates are the \( mx1 \) vector exogenous explanatory variables measuring market risk; \( \epsilon_{t} \) represents the unexplained residuals being \( mx1 \) endogenous explanatory variable on stock returns. Equation 4 is an overall model before volatility modeling that represent that stock returns is a linear function of market risk and the error term. The error term of time series is usually non-linear and therefore requires modeling to establish whether stock returns volatility is mean reverting and exhibit a stock return generating process effect. Equation model 5, 6 and 7 indicates GARCH modeling process of the error term. The model show that conditional variance \( \sigma_{t}^{2} \) is linearly dependent on the past behavior of squared error terms \( \Sigma_{j=1}^{q} \alpha_{j}\epsilon_{t-j-1}^{2} \); the ARCH term, and its past values \( \Sigma_{j=1}^{p} \beta_{j}\sigma_{t-j-1}^{2} \); the GARCH term. The parameter \( \alpha_{1} \) indicates the sensitivity of stock returns conditional variance to past values of squared errors where as \( \beta_{1} \) indicates the sensitivity or measures the variance responsiveness to its own past behavior. The sum of \( \alpha_{1} \) and \( \beta_{1} \) measure the persistence of volatility. As \( \alpha_{1} + \beta_{1} \) increase towards one, persistence increases indicating that stock return volatility is time varying, mean reverting and therefore can be used to predict stock returns. In case \( \alpha_{1} + \beta_{1} > 1 \) the conditional variance of the error term is deemed non-stationary and therefore will not converge at their unconditional values as period increases.

IV. DATA ANALYSIS AND DISCUSSIONS

4.1 Descriptive Results
Table 4.1 provides the summary of descriptive statistics of the sample showing mean, standard deviation, skewness, kurtosis, minimum and the maximum of the study variables. The results show that a 10 years’ investment in the banking stocks obtained a monthly average stock return of -0.2% with a deviation of 5.1%. The average monthly rate of change of exchange rate increased 0.3% with a deviation of 2.4% signifying devaluation of ksh against the USD. The rate of change 91-day treasury bills returned a monthly average of 0.4% with a 16.3% deviation. Interest rates held the highest deviation being the highest risk possibility on investor market value. The parameters demonstrated average returns not significantly different from zero giving indications of stationarity of the variables a condition necessary to establish time varying property of stock return.

<table>
<thead>
<tr>
<th>Table 4.1 Descriptive Statistics</th>
<th>Rt</th>
<th>FX</th>
<th>IR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Descriptive</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>-0.002</td>
<td>0.003</td>
<td>0.004</td>
</tr>
<tr>
<td>Median</td>
<td>0.005</td>
<td>0.003</td>
<td>0.001</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.128</td>
<td>0.073</td>
<td>0.527</td>
</tr>
<tr>
<td>Minimum</td>
<td>-0.197</td>
<td>-0.084</td>
<td>-0.630</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.051</td>
<td>0.024</td>
<td>0.163</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.829</td>
<td>-0.424</td>
<td>-0.302</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>4.886</td>
<td>6.550</td>
<td>7.459</td>
</tr>
<tr>
<td>Jarque-Bera</td>
<td>29.171</td>
<td>61.610</td>
<td>93.635</td>
</tr>
<tr>
<td>Probability</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Observations</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
</tbody>
</table>

4.2 Diagnostic Test
Normality test was conducted using JarqueBera test. The test obtained p-values below 5% level of significance for all variables which indicate non-normality. The generalized least square model ideal for modeling data that violate linear assumptions was used to solved the exception of non-normality on estimation of influence of market risk on indexed bank stock returns. For estimating time-varying property of stock returns using GARCH (1, 1) the study tested for stationarity using Phillips Perron test. Results in table 4.2 show all the variables of stock returns, exchange rate and interest rate were stationary. Stationary was determined at a point where PP t-statistic was higher than the critical value with significant p-values which means under such circumstances unit root does not exist. We therefore reject null hypothesis and conclude stationarity exist.
be incorporated in the model.

The study regressed the rate of change of exchanges rate on KES against US (fx) and the rate of change of interest rates on 91-day T-bills (ir). Table 4.5 shows GLS regression results based on the correlation structure of ARMA (1, 1). The regression results on the influence of market risk measured by rate of change of interest rate on aggregate stock returns was found to be negatively significant with a p-value of 0.0219 which is lower than 5% level of significance. The regression results on the influence of market risk measured by rate of change of exchange rate on stock returns was found to be negatively insignificant with a p-value of 0.1265 which is higher than 5% level of significance. This finding on interest rates is in accordance to the studies of Syed (2012) and Anwar and Hooy et al (2004). The findings on exchange rate is similar to findings of Sukcharoensin (2013) who held that in the long run, large banks are seen to hedge exchange rate risk and therefore exchange rate risk does not influence the stock return sensitivity. The study results indicate that excessive risk is negatively related to stock returns. The null hypothesis is therefore rejected that; market based risk does not influence stock returns for banks listed at NSE.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter</th>
<th>Critical Values 1%, 5%, 10%</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stock Returns (Rt)</td>
<td>-8.08</td>
<td>-3.49, -2.88, -2.58</td>
<td>0.000</td>
</tr>
<tr>
<td>Exchange Rate</td>
<td>-7.58</td>
<td>-3.49, -2.88, -2.58</td>
<td>0.000</td>
</tr>
<tr>
<td>Interest Risk</td>
<td>-7.55</td>
<td>-3.49, -2.88, -2.58</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Heteroskedasticity test for non-constant variance for time series data was done using Breusch-Pagan Godfrey test. Test results in table 4.3 shows a p-value of 0.8671 which signify absence for no constant variance. Autocorrelation test of serial correlation on the residual was done using Durbin Watson test which found an appropriate DW parameter of 1.6 which is closer to parameter 2 for zero serial correlation.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1428</td>
<td>0.8671</td>
</tr>
</tbody>
</table>

Pearson correlation test was done to confirm the degree of multi-collinearity amongst the variables. Table 4.4 revealed stock returns are negatively related to exchange rate and interest rates with correlation coefficients of -0.298 and -0.0862. The study notes that relationships between the variables exist although they are low. These findings justify the study use of GLS non-linear model, fixed and random model for endogeneity bias for short run and long run models and GARCH (1,1) model. However, correlation test shows absence of multi-collinearity amongst selected variables which is ideal diagnostic results for modeling.

### Table 4.4: Correlations Matrix

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rt</th>
<th>fx</th>
<th>ir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rt</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fx</td>
<td>-0.298</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Ir</td>
<td>-0.0862</td>
<td>0.044</td>
<td>1</td>
</tr>
</tbody>
</table>

#### 4.3 Regression analysis and hypothesis testing

Hypothesis testing was done using GLS model, Panel data estimation of fixed and random effects model and GARCH model regression of market risk variables on stock returns. The decision criteria were based on probability of entry of 5% where the t-test and p-value was deemed to determine the variables to be incorporated in the model.

#### 4.3.1 Influence of market risk on aggregate bank stock returns

**GLS model**

The study regressed the rate of change of exchanges rate on KES against US (fx) and the rate of change of interest rates on 91-day treasury bills as independent variables against indexed bank stock returns (Ri,a). Table 4.5 shows GLS regression results based on the correlation structure of ARMA (1, 1). The regression results also indicate that the rate of change of interest rates on 91-day T-bills (ir) influences stock returns (Ri,a) with a negative beta coefficient of 1.4279. This means that all factors held constant a unitary increase in rate of change of interest rates will lead to decrease in shareholder market value by 0.2847 while a unitary increase in the rate of change of exchange rate will lead to a decrease in shareholder market value by 1.4279. The constant signifies the risk-free premium; that at zero risk, investors in listed bank will still enjoy stock returns 0.127 times. This is findings are summarized by the model below;

\[
R_{it} = 0.127 - 0.2847IR - 1.4279FX
\]

#### 4.3.2 Individual bank effect on the influence of market risk on bank stock returns: Long run and Short run model

**Fixed and Random Effect Model**

Table 4.6 shows a comparative regression analysis on fixed effects (FE) and random effects (RE) to establish the impact of unobserved individual bank effects upon which market risk influences bank stock returns using panel data estimation. Despite the comparative and mixed findings on long run FE and RE the study employs Hausman test to discriminate the models and establish the model with most efficient estimators. Hausman test reveals a p-value of 0.06 which indicates that we accept the null hypothesis that unobserved individual bank effects (FE) and random effects (RE) to establish the impact of unobserved individual bank effects upon which market risk influences bank stock returns.
effects are uncorrelated with components of market risk denoting that the long run random effect model is desirable for interpretation. The analysis on long run random effects specification indicates interest rates and exchange rate are negatively related to stock returns. The findings show R-square of 0.13 which indicated components of market risk assuming bank individual fixed effects are uncorrelated with the disturbance term jointly determine 13% change in stock returns. Long run random effects shows an F statistic of 6.78 with a p-value 0.000 indicating that components of market risk are individually and jointly significant in influencing stock returns. This is findings of the long run random effect model are summarized by the model below;

\[ R_{it} = 0.128 - 0.222IR - 1.638 \]

4.3.3 Influence of time varying stock return volatility, exchange rate and interest rate on bank stock returns

GARCH model

This section shows a GARCH (1, 1) model to analysis the influence of exchange rate risk, interest rate risk and stock return volatility on stock returns. GARCH (1, 1) is preferred compared to higher order GARCH models in stabilized series since it captures the greatest variability of the dependent variable over a long period of time. Simple GARCH models are preferred as it is characterized with lowest AIC and BIC values (Waititu et al., 2013). Based on this evidence, the study adopted simple GARCH (1, 1) for numerical stability and parsimony. Table 4.7 results indicates \( R^2 = 0.0687 \). This shows that there exists a relative explanatory power of market based risk on stock returns. This implies that 6.87% variation in stock returns is explained by the model \( R_{it} = u - \beta_1 FR_{it} - IR_{it} + \sigma_{it}^2 \). Adjusted \( R^2 = 0.0601 \) is slightly lower than the \( R^2 \)which indicates 6.01% precise explanatory power of endogenous and exogeneous variables on dependent variable.

Table 4.7: Exchange rate risk, Interest rate risk, Stock returns volatility and Stock Returns

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>S. E</th>
<th>Z-Stat</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>fx</td>
<td>-0.344</td>
<td>0.1418</td>
<td>-2.424</td>
<td>0.015</td>
</tr>
<tr>
<td>ir</td>
<td>-0.029</td>
<td>0.0319</td>
<td>-0.911</td>
<td>0.362</td>
</tr>
</tbody>
</table>

Table 4.6 shows the results on short run specification. Hausman test on short run FE and RE reveals a p-value of 0.000 which indicates that we reject the null hypothesis that unobserved individual bank effects are uncorrelated with predictor variables of market risk hence the fixed effect model is desirable for interpretation in the short run. The results also indicate that interest rates and exchange rate are negatively related to stock returns in the short run. The findings on the short run fixed effects model show R-square of 0.78 which indicates that components of market risk jointly determine 78% change in stock returns. Joint effect on short run fixed effects show an F statistic of 20.11 with a p-value of 0.000 indicating that variables of market risk are jointly significant in influencing shareholder market value. This is findings of the short run fixed effect model are summarized by the model below;

\[ R_{it} = 0.1922 - 0.1943 R_{it-1} - 0.2453IR - 3.9576FX + \Theta \]
The model can be interpreted to mean that other factors held constant a marginal increase in foreign exchange risk (FX) would result to a marginal decrease of stock returns \( R_{1,t} \) by 0.3438. Interest rate risk (IR) would result to a negligible marginal decrease of stock returns \( R_{1,t} \) by 0.029. The constant for mean model is not significantly different from zero signifying that NSE investment has no risk-free return. However, there exist high persistence as ARCH and GARCH coefficients increases towards one \( \alpha_t + \beta_t < 1 \) signaling a high sensitivity of bank stock returns to stock return generating process. Positive \( \alpha_t \) and \( \beta_t \) coefficients imply that as risk increases, the expected return also increases. The p-value of \( e_{i,t}^2 = 0.0325 \) and \( \sigma_{i,t}^2 = 0.0000 \) indicate the significance of the influence of stock volatility to expected stock returns. This positive relationship of risk and returns aligns to modern portfolio theory.

4.4 Discussion of findings

GLS regression results shows market risk measured by rate of change in exchange rates on Kes/Usd is insignificantly negative against stock returns. The results are related to the study of Ryan and Andrew (2004) which held foreign exchange is insignificant in influencing stock returns. However, the direction of influence is related to the study of Mouna and Anis (2015) which established exchange rate positively or negatively related to stock returns depending with the period and hedging capacity of the bank. These findings are also related to the study of Sukcharoensin (2013) which established that in the long run, banks hedge exchange rate exposures and therefore exchange rate does not influence stock returns. An increase in the rate of change of kes/usd indicate that Kenya shilling is losing at the expense of USD. This phenomenon is advantageous to net exporters and disadvantageous to net importers. Kenya imports most of its major commodities such as oils, machinery, and major inputs. Devaluation of the shillings therefore results to a slowed economic growth which adversely affects banks transactional income and the economy appetite for credit. The resultant effect is reduced returns on investments.

GLS regression results indicates that market risk measured by rate of change of interest rates on 90 day-T bills is significantly negative in influencing stock returns in the long run. The results are related to the study of Syed & Anwar (2012) which held interest is negatively significant on stock returns. However, the findings are contra to the study findings of Wycliffe and Muriu (2014) who established interest rates are insignificant in determining stock returns alongside macro-economic variables. Short term interest rates on government securities are used by the government to regulate amount of liquidity in the economy due to the long-term effect on other macro-economic indicators. Higher rates attract investment in government securities depriving banks cheap fund to lends. Consequently, investment in government securities deprive the stock market necessary market liquidity to stir the prices of stocks upwards. Analysis of GLS regressions signify that stake holders in the banking industry pay attention change in monetary policies by the central bank of Kenya such as interest rates and exchange rates and how such policies would affect the relationship between market based risk and stock returns.

The results on fixed and random effect model considering individual bank effect upon which market risk influences stock returns indicates market based risk of exchange rate and interest rate are negatively significant on stock returns in the long run under random effect model. Components of market risk (exchange rate and interest rates) are jointly negatively significant on stock returns in the short run under fixed effects; however, they are found individually insignificant on stock returns. These finding implies that bank individual effects bear a significant impact on how of exchange rate and interest rates influences stock returns. This estimation is important since different banks respond to risk and regulatory environment differently. Large banks adopt a wait and see approach monetary policy especially on interest rates to design the balance between loan portfolio and investment in government securities. This decision has a cyclical impact on the stock market and other sectors of the economy thus affecting investor market value directly. Contrary, Banks hedge exchange rate risk long term rendering exchange rate to have a tendency of no impact on stock run in the long run. However, the result signify that some bank could manage to hedge exchange risk completely in the long run (Syed & Anwar, 2012). The findings on individual bank effects could imply that in the short run, the impact of interest rate is insignificant due to the lag upon which the market receives the disclosures and reacts to it. Overall, these findings imply that after controlling for endogeneity bias of unobserved individual bank effect on the influence of market risk on stock returns, investors consider market risk as valuable component in making stock investment decisions both in the long run and in the short run.

GARCH (1, 1) model indicate that market risk influences stock returns on the account of foreign exchange risk and stock return volatility while interest rate risk is found negatively insignificant. Given that GARCH (1,1) is based on monthly data, it follows that the findings are consistent with empirical literature that exchange risk will have an impact on stock returns on the short term and fall irrelevant after banks adapt to necessary hedging strategies. Interest risk will be impactful in the long term when all factors of macro-economic variables have adjusted to interest rate changes. GARCH model also establishes that stock returns volatility is mean reverting implying that loses and gains of banking stocks revolve along the same mean over a long period of time making it possible for arbitrageurs and speculators investors to predict returns.

The findings on high persistence indicated by the variance equation of GARCH model is evidence that stock return volatility is a predictor of stock returns. The influence of volatility of stock returns on stock returns is evidenced by significance of ARCH and GARCH terms and therefore means variance theory holds for this model. It is also an indication that market based risk is contagious, systemic and cyclical. The findings on the significant influence of time-varying property of market risk on bank stock returns conform to findings according to the studies of Mouna and Anis (2015); Wycliffe and Muriu (2014); Sobia et al. (2015); (Syed & Anwar, 2012) and Sukcharoensin (2013). The results met the expectation of the
study and conform to the basics of Modern Portfolio Theory that excessive risk decreases return on investments. Overall indication is that time and bank size are critical upon which market risk bank stock returns at NSE.

V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

5.1 Summary of Findings
The results from GLS regression shows that at the long run, the rate of change in exchange rates on Kes/Usd is insignificantly negative on bank stock returns index while the rate of change of interest rates is significantly negative on bank stock returns index. The long run fixed and random effect regression using panel data estimation to accommodate unobserved individual bank effect for different size and time held that the rate of change of exchange rate and rate of change of interest rates are individually and jointly negatively significant on bank stock returns at the long run. Similarly, the short run fixed and random effect regression using panel data estimation to accommodate unobserved individual bank effect for different size and time held that the rate of change of exchange rate and rate of change of interest rates are individually negatively insignificant but joint regression is held negatively significant on bank stock returns at the short run. GARCH (1,1) regressions held that for short term monthly data, over a long period stock return volatility, exchange rate influence bank stock return index. However, interest rate is held insignificant.

5.2 Conclusion
Market based risk determined by the rate of change on interest rate, exchange rate and stock return volatility are significant in influencing on bank stock returns. However, the significance depends on whether the influence is short term, long term, size of the bank with regards to capacity to hedge and respond to changing monetary policies. Overall, the influence of the exchange rate is concluded negatively significant in the short run than in the long run while the influence of interest rate is concluded negatively significant in the long run than in the short run. Stock return volatility is found to be time varying and stock return generating. This implies that even without focusing on risk, speculators, arbitrageurs, and herd investors, are able to make risk free return with monthly investments held over a longer period of time. This information is helpful to long term investors that they don’t need to sell their portfolio over short term due temporary peaks and troughs. The study concludes that as interest rates increases, investors change investment focus from the equity market to bond markets and related fixed income investments. This variability triggers a momentum that leads to capital outflow from capital market to money market. De-valued Kenya shilling against USD makes imports expensive which reduce transaction and lending business in banks thus reducing profitability. The magnitude of influence is established high on exchange rate than interest rate and stock return volatility taking the three models three models into account.

5.3 Recommendations
Based on findings, conclusions and implications, the study recommends bank top management should ensure that the amount of loans in foreign currency are adequately funded and mitigate foreign exchange exposure that comes with borrowing. Management should also ensure prudent hedging on exchange rate exposures is done on profits from subsidiaries to minimize on translations losses. Bank management should be scaling up the scenario stress test on asset and liabilities to minimize likelihood of unforeseen funding gaps. Central bank of Kenya monetary policy should regulate the Ksh vs USD rate of exchange and control 90-day T-bill rates to tame the volatility of the interest and exchange rates. The government shoulds ensure the level of domestic and external debt are manageable to elevate strain on the countries foreign exchange reserves. Investors and bank managers should interpret periodical monetary policies accurately and promptly to minimise loses in the short run due to volatilities. Since time-varying property of stock returns is established to be mean reverting and stock return generating, speculators, arbitrageurs and herd investors are advised to take advantage of predictable stock returns by investing long term.

5.4 Suggestions for further research
This study is an extention of previous literature in Kenya in two ways. First, the study attempted to represent multiple model to test the influence of interest rate, exchange rate and stock return volatility on stock returns on listed banks in Kenya. Secondly, the study also extends to established how time-varying market based risk affects bank stock returns with respect to time and bank size. Nonetheless, the study is subject to future directions. The study suggest a comparative study to be explored with other sectors sensitive to financial risk such as insurance and bondmarket sector. Further, whereas this study is achored on post global financial crisis and post quantitative easing era, it does not indicate how this compares with pre-global financial crisis and pre-quantitative easing period. A longer sample period could be considered under the new dimension.

REFERENCES

www.ijsrp.org


AUTHORS

First Author – AFFILIATION: Jomo Kenyatta University of Agriculture and Technology, EMAIL ADDRESS: isaac.mwaurah@gmail.com OR isaac.mwaurah@equitybank.co.ke, CONTACT PHONE NUMBER: +254721219324 or +254763219324.

Second Author – AFFILIATION: Jomo Kenyatta University of Agriculture and Technology, EMAIL ADDRESS: mmmuturi2001@gmail.com, CONTACT PHONE NUMBER: +254722802099

Third Author – AFFILIATION: Jomo Kenyatta University of Agriculture and Technology, EMAIL ADDRESS: agwaititu@gmail.com OR agwaititu@yahoo.com, CONTACT PHONE NUMBER: +254733247403 or +254704447775
Elliptic Curve Digital Signatures and Their Application in the Bitcoin Crypto-currency Transactions

Benjamin K. Kikwai

16 October 2017

Abstract- The Elliptic Curve Digital Signature Algorithm (ECDSA), defines a technique for generating and validating digital signatures. We start by reviewing the mathematics behind the Digital Signature Algorithm (DSA) and its elliptic curve analogue (ECDSA). Secondly, we describe how the ECDSA is used in Bitcoin technology.

Bitcoin is a type of crypto-currency that has been in existence since 2009. It was introduced by Satoshi Nakamoto (possibly a pseudonym) in their much cited paper [8]. Its design and distribution is not controlled by any central organization. Despite this, Bitcoin has defied all odds to become a phenomenal currency widely accepted by thousands of merchants worldwide. At the time of writing this article, 1 unit of Bitcoin (1 BTC) has a value of approximately USD 5,500. The internal workings of Bitcoins is based on elliptic curve digital signatures and is not well understood by many people including a large percentage of Bitcoin users. The second part of this article we make give an overview to illuminate how the internal nuts and bolts of Bitcoin works.

Keywords: Elliptic curves, digital signatures, cryptography, blockchains, Bitcoin.

1. Introduction

This article is a short overview of elliptic curves digital signatures and their application in the blockchain technologies. The theory of elliptic curves and their application to cryptography is a much wider subject. The interested readers are encouraged to consult much deeper expositions contained in [1][5].

2. Discrete logarithm problem

Let G be a finite cyclic group generated by $a \in G$ and $x \in G$ be an element. This means that $x = a^n$ for some integer $n$. The integer $n$ is called the discrete logarithm of $x$ to the base $a$. Given the pair $a,n$ the problem of computing $a^n$ in $G$ is generally considered to be an easy problem. On the other hand, given an element $x \in G$ then the problem of obtaining $n$ such that $x = a^n$ is generally a difficult problem. This problem is referred as the discrete logarithm problem (DLP).

In 1976, Diffie and Hellman [1] proposed the public key cryptography whose security relied on the difficulty of the discrete logarithm problem. Since then there has been intense research in finding efficient ways to solve the discrete logarithm problem as well as identifying potential finite groups whose corresponding DLP would be much harder to solve.

Elliptic Curve Cryptography (ECC) was introduced independently by Miller [6] and Koblitz [7]. They proposed a cryptographic system based on the group of points of an elliptic curve defined over $\mathbb{F}_q$ - a finite field of order $q$. One of the reasons for their suggestion was based on the evidence that the elliptic curve discrete logarithm problem was much harder to solve compared to their counterparts over $\mathbb{Z}_p$.

3. Elliptic curves over finite fields

An elliptic curve over $\mathbb{R}$ is a curve in the two dimensional plane whose points satisfy the Weierstrass equation

$$y^2 = x^3 + ax + b. \quad (1)$$

Arithmetics over $\mathbb{R}$ often yields irrational numbers which, due to truncation errors, cannot be stored efficiently in computer memory. This is the reason why it is preferable to work with elliptic curves over $\mathbb{F}_q$ - i.e. a finite field of order $q$ where $q = p^k$ for some integers $p,k$ with $p$ a prime. In this case we are interested in integers that satisfy

$$y^2 = x^3 + ax + b \mod p \quad (2)$$

if $p \neq 2$. If $p = 2$, equation (2) above is usually replaced by

$$y^2 + xy = x^3 + ax^2 + b. \quad (3)$$

Definition 1. An elliptic curve $E(\mathbb{F}_q)$ defined over $\mathbb{F}_q$ consist of the set of points $P_i = (x_i,y_i)$ satisfying equations (2) or (3) above together with an additional point $O$ called the point at infinity.

For practical uses, it is required that the curve be non-singular. This amounts to choosing numbers $a,b$ such that $4a + 27b$ is not congruent to 0 modulo $p$.

Over $\mathbb{R}$, there is a natural geometric construction (cordon and tangent process [1][3][2]) that transforms
In practice, a cyclic subgroup of arithmetics, thus loosing their geometric interpretations. The operations in equations (4) - (11) are performed using the following explicit formulas. Assuming that \( P_1 \neq P_2 \) and \( p \neq 2 \) then
\[
\begin{align*}
x_3 &= \left( \frac{y_2 - y_1}{x_2 - x_1} \right)^2 - x_1 - x_2 \quad (4) \\
y_3 &= \left( \frac{y_2 - y_1}{x_2 - x_1} \right) (x_1 - x_3) - y_1. \quad (5)
\end{align*}
\]
On the other hand, if \( P_1 = P_2 \) and \( p \neq 2 \) then we have the point doubling formulas as follows
\[
\begin{align*}
x_3 &= \left( \frac{3x_1^2 + a}{2y_1} \right)^2 - 2x_1 \quad (6) \\
y_3 &= \left( \frac{3x_1^2 + a}{2y_1} \right) (x_1 - x_3) - y_1. \quad (7)
\end{align*}
\]
If \( p = 2 \) and \( P_1 \neq P_2 \) then equations (4) and (5) are replaced by
\[
\begin{align*}
x_3 &= \left( \frac{y_2 + y_1}{x_2 + x_1} \right)^2 + \left( \frac{y_2 + y_1}{x_2 + x_1} \right) + a + x_1 + x_2 \quad (8) \\
y_3 &= \left( \frac{y_2 + y_1}{x_2 + x_1} \right) (x_1 + x_3) + y_1 + x_3. \quad (9)
\end{align*}
\]
Finally if \( p = 2 \) and \( P_1 = P_2 \) then the addition formulas are given by
\[
\begin{align*}
x_3 &= \left( \frac{x_1^4 + b}{x_1^2} \right) \quad (10) \\
y_3 &= \left( \frac{x_1^2 + y_1}{x_1} \right) (x_3) + x_3^2 + x_3. \quad (11)
\end{align*}
\]
The operations in equations (4) - (11) are performed modulo \( p \) and thus divisions should be interpreted as multiplications by multiplicative inverses. Though the equations above are obtained from a geometrical construction, these equations are evaluated using modular arithmetics, thus loosing their geometric interpretations.

4. Elliptic Curve Cryptosystems

In practice, a cyclic subgroup of \( E(\mathbb{F}_q) \) is used rather than the entire group. This amounts to choosing parameters \( a, b, p, k \) and an additional point \( G \in E(\mathbb{F}_q) \) generating a sufficiently large cyclic subgroup of \( E(\mathbb{F}_q) \). These parameters are shared publicly and are used for generating public keys. For simplicity, we will assume that \( E(\mathbb{F}_q) \) is cyclic generated by a point \( G \in E(\mathbb{F}_q) \) (This is not true in general - see [7] for details). Our assumption implies that any point \( P \) on the elliptic curve can be expressed as
\[
P = nG = G + \cdots + G
\]
where \( n \) is a non-negative integer.

**Definition 2** (Elliptic Curve Discrete Logarithm Problem - ECDLP). Let \( P \) be a point in the cyclic subgroup of \( E(\mathbb{F}_q) \) generated by \( G \). Find the smallest integer \( n \) such that \( P = nG \).

The security of an elliptic curve based cryptosystem relies on the difficulty of the ECDLP. Given an integer \( n \) it’s easy to compute the point \( nG \), while on the other hand if a point \( P \) is of the form \( nG \) for some integer \( n \) then it is computationally infeasible to obtain the integer \( n \). This means that one would require enormous amount of resources to be able to solve the problem. A related and more relevant problem is the Elliptic Curve Diffie-Hellman Problem (ECDHP) stated as follows.

**Definition 3** (ECDHP). Let \( Q, R \) be points in the cyclic subgroup of \( E(\mathbb{F}_q) \) generated by \( G \) such that \( Q = n_QG \) and \( R = n_RG \) for some \( n_Q, n_R \). Determine \( P = n_Qn_RG \).

It is easy to see that if one can solve ECDLP efficiently then one would be able to solve the ECDHP.

We now discuss how the ECDHP is used in generation and verification of elliptic curve based digital signatures. Recall that a digital signature is a cryptographic primitive which is fundamental in authentication, authorization and non-repudiation. Creation and verification of digital signature relies on the concept of a one-way hash function.

**Definition 4.** A hash function \( H \) is a computationally efficient function mapping binary strings of arbitrary length to binary strings of a fixed length.

The hash function \( H \) is required to satisfy the following properties:

- Collision resistance - it should be computationally infeasible to find distinct inputs \( m_1, m_2 \) such that \( H(m_1) = H(m_2) \),
- Pre-image resistance - given an output value \( x \) it should be computationally infeasible to find an input \( m \) such that \( H(m) = x \),
- Second pre-image resistance - given an input message \( m \) it should be computationally infeasible to find another input \( m' \) such that \( H(m) = H(m') \).

4.1. Elliptic Curve Digital Signature Algorithm

In this scenario, Alice needs to send a message to Bob. Alice would digitally sign the message before transmitting it to Bob. Upon receipt, Bob would need to verify that indeed the message is from Alice and not from an impersonator Eve.
It is assumed that an elliptic curve \( E(\mathbb{F}_q) \) and a point \( G \in E(\mathbb{F}_q) \) of order \( l \) have been chosen and made public. For Alice to sign a message \( m \) she needs to choose a random integer \( n_A \) as her private key, compute her public key as \( K_A = n_AG \). The public key is made public by depositing it at a Trusted Authority (TA).

**ECDSA - Message Signing Algorithm:**
1. Alice selects a random integer \( k \) such that \( 1 < k < l \).
2. She computes \( kG = (x_1, y_1) \in E(\mathbb{F}_q) \) and set \( r = x_1 \mod l \). If \( r = 0 \) go back to 1.
3. She computes \( k^{-1} \mod l \).
4. She computes \( s = k^{-1}(H(m) + n_AR) \mod l \), where \( H \) is a publicly available hash function.
5. She sends the signed message \( (m, s, r) \) to Bob.

**ECDSA - Signature Verification Algorithm:** Bob receives the message as \( (m', s', r') \). He will first obtain Alice’s public key \( K_A \) from the TA then use the following procedure:
1. Bob verifies that \( r' \) and \( s' \) lies in the interval \([1, l-1]\).
2. He then computes \( w = s'^{-1} \mod l \) and the message hash \( H(m') \).
3. He then computes \( u_1 = H(m')w \mod l \) and \( u_2 = r'w \mod l \).
4. Finally he computes \( u_1G + u_2K_a = (x_0, y_0) \) and set \( v = x_0 \mod l \).
If the message if authentic i.e. \( (m', s', r') = (m, s, r) \) then we have
\[
k = s^{-1}(H(m) + n_AR) \mod l
= w(H(m) + n_AR)
= u_1 + u_2n_A.
\]
Thus \( kG = (u_1 + u_2n_A)G = u_1G + u_2K_a = (x_0, y_0) \).
Hence Bob accepts the message as authentic if and only if \( v = r' \).

Now suppose that Eve would like to impersonate Alice. She creates a fictitious message \( m \), picks a random integer \( k \), computes \( kQ = (x_1, y_1) \) and chooses \( r = x_1 \mod l \). She also computes \( H(m) \) and \( k^{-1} \). Her task will then be to figure out the correct \( s \) such that when used in the verification procedure it yields \( v \) such that \( v = r \).

But \( s \) depends on Alice’s secret key \( n_A \) and so Eve would have to employ any technique that either gives her the correct \( s \) without \( n_A \) or solve the elliptic curve discrete logarithm problem to obtain Alice’s secret key by using \( Q \) and Alice’s public key \( K_A = n_AQ \). If we assume that Eve has succeed in finding the correct \( s \) then we know that
\[
r = v \equiv H(m)wQ + rwK_A \mod l.
\]
where \( w = s^{-1} \mod l \). Thus \( skQ = H(m)Q + rK_A \).

Letting \( z \) be the inverse of \( r \mod l \) then we have
\[
z(sk - H(m))Q = K_A = n_AQ
\]
This means \( z(sk - H(m)) = n_A = \log_Q(K_A) \) and thus Eve would have solved the elliptic curve discrete logarithm problem.

5. **USE OF DIGITAL SIGNATURES IN BITCOIN**

For the rest of this article, we describe how digital signatures are applied in Bitcoin technology. In a nutshell, the basic concepts of Bitcoin are:

- Bitcoin address - a digital analogue of a physical wallet,
- Transactions - records of transfer of Bitcoins from one address to another address,
- Blockchain - a publicly available ledger of all the transactions that has ever taken place.

The elliptic curve chosen by Satoshi Nakamoto defined by the equation
\[
y^2 = x^3 + 7 \mod p
\]
where \( p \) is the integer
\[
p = 2^{256} - 2^{32} - 977
= 1157920892373161954235709850086879
\]
834671663.

The data above defines an elliptic curve \( E(\mathbb{F}_q) \) of order
\[
q = 1157920892373161954235709850086879
= 7085283756415479704382605163141518
161494337.
\]

Other piece of publicly available data used in Bitcoin is the point \( G = (x_0, y_0) \in E(\mathbb{F}_q) \) - a generator of a cyclic subgroup of \( E(\mathbb{F}_q) \). The coordinates of \( G \) are
\[
\begin{align*}
x_0 &= 55066263022277734369578718895168 \\
y_0 &= 326705100207588169780308513057 \\
&= 04318447127338065924327593890433575 \\
&= 7337482424.
\end{align*}
\]

The hashing algorithm used in Bitcoin is the SHA-256 introduced by the American National Institute for Standards and Technology [3][12][10]. In practice this hashing algorithm is applied twice (denoted by SHA-256²) so as to improve the security of transactions. For our purposes we shall simply represent SHA-256² as \( H \).

5.1. **Bitcoin Addresses**

While handling physical money, one needs a wallet, an account, a pocket e.t.c to temporarily store the money. Similarly in Bitcoin technology, one needs a digital address to hold the digital money. These addresses will look like the following:

12C4GbwvWGihHjda4y8y48he1EGjDAnMDr
To create a Bitcoin address, Alice chooses a private key $n_A$ which is a random integer, computes and publishes her public key $K_A = n_A G$. To generate an address, the public key $K_A$ is hashed with $SHA-256$ and RIPEMD-160 [9, 2] a number of times before being encoded using to Base-58. Note that it is computationally infeasible to obtain the private key $n_A$ given either the public key or the Bitcoin address. This will amount to solving the ECDLP.

5.2. Bitcoin Transactions

Bitcoin transactions are public messages which are digitally signed and broadcasted to the entire Bitcoin network for verification. Assume that Alice has 1.0005 BTC and would like to send 1 BTC to Bob. In layman’s terms Alice would broadcast a message like

Other participants in the Bitcoin network needs to verify that indeed Alice is the owner of the Bitcoin amount and additionally verify that its indeed Alice who has initiated the transaction. All these verifications are done using ECDSA. Specifically, the message will comprise of three main parts:

- **An input**: a Bitcoin address from which Alice received the amount she is about to send to Bob,
- **An amount**: the specified amount in BTC that Alice intends to send to Bob,
- **An output**: a Bitcoin address owned by Bob which is set to receive the amount in BTC.

Alice would digitally sign the broadcasted message which would then be effected if and only if the Bitcoin network is able to verify (ECDSA Verification Algorithm) that the message is indeed authored by Alice.

5.3. The Bitcoin Blockchain

In a nutshell, we can say that the Bitcoin blockchain is a publicly available digital ledger that records the transactions between various Bitcoin addresses. Each transaction in the public ledger is verified by consensus of a majority of the participants in the system. And, once entered, information can never be erased. The blockchain contains a certain and verifiable record of every single transaction ever made.

6. Conclusion

The security of a crypto-system based on elliptic curves derives its security from the computational infeasibility of the Elliptic Curve Discrete Logarithm Problem. It is the difficulty of solving this problem that also assures the Bitcoin network of the security and authenticity of transactions on the blockchain.

![Graphical representation of entries in a Bitcoin blockchain.](image)

**REFERENCES**


Theory on Dimensions

Sohom Gupta

Class X, South Point High School

Abstract- A study of dimensions and hypercubes including ways to calculate faces of different dimensions in a hypercube, along with calculating the maximum numerical value of the respective dimensions present in the structure. To have a different way of viewing dimensions and to take dimensions themselves into algebraic calculations. These include three main topics:

i. Viewing higher dimensions with respect to lower dimensions, and defining actual capacity (bulk) and relative capacity of any dimensional structure.

ii. Calculating number of vertices, faces, edges...... in HYPERCUBES with help of Euler’s polyhedron-polytope formula and forming relations between various dimensional faces in hypercubes.

iii. Max.D-f relations to calculate dimension containing maximum faces in any higher dimensional HYPERCUBE and putting the relations to basic and advanced mathematical operators.

Index Terms- Dimensional Structure: A shape/structure in any arbitrary dimension.

Hypercube: Higher dimensional representation of a regular cube (in 3-D).

MaxD-f: Relations to calculate the numerical value of dimensions which is present in the maximum number in any hypercube.

Capacity: Volume of a structure in any dimension.

Polytope: A dimensional structure in more than 3 dimensions.

I. VIEWING HIGHER DIMENSIONS

Note: Zeroth dimension has always a unitary value. It does not affect the capacity of any dimensional structure.

On Earth, the known dimensions are:

1. Zeroth (0-D)
2. 1st (1-D) where length(l) ∈ +ve
3. 2nd(2-D) where l, breadth(b) ∈ +ve
4. 3rd(3-D) where l, b, height(h) ∈ +ve

We define dimensions geometrically by using axes which are mutually perpendicular to each other.

We define the dimensions from zero where the respective axes are:

1) 0-D is represented by O (Origin- as called in Cartesian plane)
2) 1-D = O * X [X→ ∞]
3) 2-D = O * X * Y [Y→ ∞, Y X ]
4) 3-D = O * X * Y * Z [Z→ ∞, Z X,Y ]
5) So, to imagine 4-D, we consider an axis T such that [T→ ∞, T X,Y,Z]

For viewing higher dimensions from lower dimensions, one has only the axes to perceive the structure that one’s dimension corresponds to. For example like a square can be thought of an array of infinite straight lines, all equal in length. Similarly, a cube can be imagined as a row of infinite squares glued to each other along their faces such that the structure formed (a cube) is perpendicular to their length and breadth.

Q1) How many dimensions can be imagined?
   Ans: In Physics, the string theory mentions that there can be a maximum of 10 dimensions. However, in mathematics, there can be any axis q where q ∈ O, x, y, ... (q-1). So, infinite dimensions can be imagined.

   So now comes the fact on how we see higher dimensions.

   Indicating any dimension viewed by lower dimensions is the maximum length of the ‘perceived’ dimension “less than or equal to” the view frame (dimension).

   This view can be represented as R.View (dimension).
R. View can be defined as,

"The relative view of the ‘perceivable’ dimensions of a ‘hyper-structure’ with respect to the view frame such that the view frame’s dimension is equal to or less than the viewed dimension."

Hence, for any q dimensional object viewed by a g dimensional object

\[
R. \text{View} (q) = \max. |\{g, (g-1), \ldots, (g-g)\}D| V_{g-D}^{fr} \ldots (1.1)
\]

Example;

\[
R. \text{View} (\text{square}) = \max. |(\text{length}), \ldots, (\text{zeroth})| V_{1D}^{fr}
\]

If we can specify the view of higher dimensions, we can also specify their relative capacity (or relative bulk/dimensional volume).

R. Cap is nothing but the:

"Product of the 'perceived' dimensions to specify the relative (partial) capacity of the viewed ‘hyper-structure’ multiplied with an arbitrary constant depending on the geometrical shape of the structure."

\[
R. \text{Cap}(q) = \max. |\{g(g-1) \ldots \ldots (g-g)\}D| q_c V_{g-D}^{fr} \rightarrow \text{constant}(\text{any}) \ldots (1.2)
\]

It is important to note that the ‘D’ is mandatory as without it \(g(g-1)...(g-g) = 0\)

But, due to the ‘D’, signifying dimension, we can reframe the equation as

\[
R. \text{Cap}(q) = \max. |\{gD \ast (g-1)D \ast \ldots \ast (g-g)D\}| q_c V_{g-D}^{fr}
\]

The arbitrary constant varies with the shape of the structure. For example, in case of a square, it is 1, while in case of a sphere; it is \(\pi\) (Since \(4\pi r^2 = \pi * 2r * 2r\) and \(2r=\text{max(length)}\) and \(2r = \text{max(breadth)}\) (noting that the view frame is 2-D)).

Example: Let a cube (3D) of side ‘x’ be viewed along any of its edges by a straight line (1D) such that the length of the line is also ‘x’.

Then, \(R. \text{Cap} (\text{Cube}) = \max (1) D \ast \max (1-1) D \ast q_c V_{1D}^{fr} = x \ast q_c\)

But here for the cube, \(q_c = 1 \Rightarrow \text{the relative capacity is } x \text{ (Answer)}\)

**ACTUAL CAPACITY (A.CAP):**

Actual capacity of any structure is:

"The relative capacity of the structure from its own view frame such that the maximum lengths of the dimension are measured, multiplied by an arbitrary constant".

It can be also expressed as the relative capacity of the respective dimension from a non-zero viewpoint multiplied by the maximum length (relative term to express dimensions) of the dimensions unperceivable by the view frame.

\[
A. \text{Cap}(x) = \max. |x(x-1)(x-2) \ldots (x-n_0 + 1)D| \ast R. \text{Cap}(x)
\]

\[
\ast q_c V_{(x-n_0)D}^{fr} \ldots (1.3)
\]

\[
= \max. |x(x-1)(x-2) \ldots (x-x)D| \ast q_c V_{(x)D}^{fr}
\]

\[
= A. \text{Cap}(x) \max. |(x-x)D| \ast q_c V_{0D}^{fr} = A. \text{Cap}(x) \text{ [Since, } (x-x)D \rightarrow \text{unitary}]\]
II. HYPERCUBES

EULER’S POLYTOPE FORMULA – Euler’s formula states that number of i-dimensional faces in an n-dimensional solid is given by the formula:

\[ 2^{n-i} \binom{n}{i} \]

This is the basis of all functions and calculations for hypercubes.

i) VERTICES IN HYPERCUBES

The number of vertices in a d-dimensional hypercube is given by the formula \( 2^d \).

Now let us give the notation \( V_m \) to the number of vertices in a hypercube of dimension \( m \).

\[ \therefore \quad \frac{V_m}{V_n} = 2^{m-n} \quad \ldots \quad (i) \quad V_m \ast V_n = 2^{m+n} \quad \ldots \quad (ii) \]

\[ (V_m)^p = 2^{mp} \quad \ldots \quad (iii) (V_m)^{\frac{1}{p}} = 2^{\frac{m}{p}} \quad \ldots \quad (iv) \ldots \quad (2.1 \text{ eqns.}) \]

ii) EDGES IN HYPERCUBES

The number of edges in a d-dimensional hypercube is given by the formula \( d \ast 2^{d-1} \).

Let us denote number of edges in a sD hypercube as \( E_s \).

\[ \frac{E_m}{E_n} = \left( \frac{m}{n} \right) \ast 2^{m-n} = \frac{m}{n} \ast \frac{V_m}{V_n} \]

or, \( nV_mE_m = mV_mE_n \) also, \( 2E_m = mV_m \ldots \quad (2.2 \text{ eqns.}) \)

Finally, we can also have an expression \( E_{m+1} = 2E_m + 2^m \)

VERIFICATION:

\[ E_m = m \ast 2^{m-1} \therefore E_{m-1} = (m-1)2^{m-2} \quad \text{or,} \quad 2E_{m-1} = m \ast 2^{m-1} - 2^{m-2} \]

or, \( 2E_{m-1} \ast 2^{m-1} = m \ast 2^{m-1} \); \( 2E_m + 2^m = (m+1)2^m = E_{m+1} \)(verified)

\[ \therefore \quad \frac{E_{m+1}}{E_m} = 2 \left( \frac{m+1}{m} \right) \]

Also, \( \frac{xV_yE_y}{yV_xE_x} = 4^{y-x} \ldots \quad (2.3) \)

iii) OTHER DIMENSIONS IN HYPERCUBES

Similarly we can denote:

i) Faces (\( F_{\text{dimension}} \)):

\[ F_x = 2^{x-2} \ast \frac{x(x-1)}{2} \ldots \quad (i) \quad F_x = 2^{x-y} F_y \frac{x(x-1)}{y(y-1)} \ldots \quad (ii) \]

\[ 8F_x = x(x-1)V_x \ldots \quad (iii) \quad 4F_x = (x-1)E_x \ldots \quad (iv) \ldots \quad (2.4) \]

ii) Cubes (\( C_x \))

iii) Tesseracts (\( T_x \)) And so on.
Generally, we can write the ratio of two different dimensions D and E in two different dimensional hypercubes x and y as:

\[
\frac{D_x}{E_y} = 2^{x-n_d-y+n_e} \cdot \frac{x(x+1) \ldots (x+n_d-1)}{y(y+1) \ldots (y+n_e-1)} \cdot \frac{n_e!}{n_d!}
\]

[D_x – Any dimension’s total face number in x-dimension (same for E_y); n_d, n_e – Numerical value of dimensions D and E (e.g. n_c = 3)]

III. MAX-D FACE RELATIONS IN HYPERCUBES

Another interesting thing comes up when talking about hypercubes.

As noticed, in a cube, there are 6 faces, 12 edges and 8 vertices. Hence the number of edges is the maximum in a cube. However, in a square there are four vertices and four edges. So, both the edge and face in a square are equal and maximum.

Surprisingly, there is a particular pattern to this. If the dimension containing the maximum faces in a structure be represented \(\text{max.D} \) by \( f \), then we would get the following table {3.1}:

| Hypercube of dimension | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | ... |
|------------------------|---|---|---|---|---|---|---|---|---|---|----|----|     |
| 0                      | 0 |   |   |   |   |   |   |   |   |   |    |    |     |
| 1                      | 0 |   |   |   |   |   |   |   |   |   |    |    |     |
| 2                      | 0,1|   |   |   |   |   |   |   |   |   |    |    |     |
| 3                      | 1 |   |   |   |   |   |   |   |   |   |    |    |     |
| 4                      | 1 |   |   |   |   |   |   |   |   |   |    |    |     |
| 5                      | 1,2|   |   |   |   |   |   |   |   |   |    |    |     |
| 6                      | 2 |   |   |   |   |   |   |   |   |   |    |    |     |
| 7                      | 2 |   |   |   |   |   |   |   |   |   |    |    |     |
| 8                      | 2,3|   |   |   |   |   |   |   |   |   |    |    |     |
| 9                      | 3 |   |   |   |   |   |   |   |   |   |    |    |     |
| 10                     | 3 |   |   |   |   |   |   |   |   |   |    |    |     |
| 11                     | 3,4|   |   |   |   |   |   |   |   |   |    |    |     |
| ...                    | ...|   |   |   |   |   |   |   |   |   |    |    |     |

Hence, there is a definite pattern in which the dimensions are in a hypercube.

A) If any dimension M is of the form 3q or 3q+1,

\[
\text{max.D} f[M] = q.
\]

B) If M is of form 3q+2,

\[
\text{max.D} f[M] = q, (q + 1). \ldots \text{(3.1)}
\]

These are the two fundamental relations.

Dimensions belong to whole numbers (non-negative integers); so any dimension is of the form 3q, 3q+1 or 3q+2, where q is any whole number.

The proofs to these functions include Euler’s polytope formula:

i) Consider \( M = 3m \)

a) We have to show that \( \text{Face} (m) > \text{Face} (m+q) \) [such that \( m + q \leq 3m \) and \( m, q \in \mathbb{Z} \) also \( q > 0 \)]

In other words,

\[
2^{M-m} \binom{M}{m} > 2^{M-(m+q)} \binom{M}{m+q}
\]

: We know that \( 2m + 2 > 2m - q + 1 \)

Similarly, \( 2m + 4 > 2m - q + 2; \quad 2m + 6 > 2m - q + 3 \) and so on till \( 2m + 2q > 2m \)

www.ijsrp.org
Multiplying all the inequalities in order of their magnitude, we get:

\[
\frac{(2m - q + 1)(2m - q + 2) \ldots \ldots (2m)}{(2m + 2)(2m + 4)(2m + 6) \ldots \ldots (2m + 2q)} < 1
\]

Taking all the 2’s common from the denominator and changing the products into factorial functions, we get:

\[
\frac{(2m)! m!}{2^q (2m - q)! (m + q)!} < 1
\]

or,

\[
\frac{1}{(3m - (m + q))! (m + q)!} < \frac{2^q}{(3m - m)! m!}
\]

Multiplying both sides by (3m)!

\[
\frac{(3m)!}{(3m - (m + q))! (m + q)!} < \frac{2^q (3m)!}{(3m - m)! m!}
\]

or,

\[
2^{-q} \binom{3m}{m + q} < \binom{3m}{m}
\]

or,

\[
2^{3m-m-q} \binom{3m}{m + q} < 2^{3m-m} \binom{3m}{m}
\]

Substituting 3m by M, we get

\[
2^{M-(m+q)} \binom{M}{m + q} < 2^{M-m} \binom{M}{m} \text{(proved) \ldots \ldots (3.2)}
\]

ii) Similarly, if we consider M = 3m+1

To prove: \[2^{M-(m+q)} \binom{M}{m + q} < 2^{M-m} \binom{M}{m}\]

We have to say that \(2m + 2 > 2m + 2 - q; \ 2m + 4 > 2m + 3 - q\) all the way up to \(2m + 2q > 2m + 1\); then to follow the same steps as in the first case, just to multiply the two terms of the inequality with \(2^{3m+1-m} (3m + 1)!\) and then we can replace 3m+1 with M to prove the result.

For, M = 3m+2, we have a special case, i.e. Face (m) = Face (m+1).

We can see that if we go in the same way as case i and case ii.

\[2m + 2 \geq 2m + 3 - q\]

But, \(2m + 4 > 2m + 4 - q; \ 2m + 6 > 2m + 5 - q; \ldots \text{But} \ 2m + 2q \geq 2m + 2\)

So, it can be clearly seen if q = 1, then \(2m + 2q = 2m + 2\).
Following the steps of simplifying the expression into a combination;

\[
\binom{3m+2}{m} = \frac{1}{2} \binom{3m+2}{m+1}
\]

or,

\[
2^{M-m} \binom{M}{m} = 2^{M-(m+1)} \binom{M}{m+1} \text{ (proved) .... (3.3)}
\]

In this way, we can also prove Face (m) > Face (m-q) [such that m-q ≥ 0]

After this proof is done, it is easier to understand and implement complex Max.D relations and formulae.

But first, let us denote an expression by Ep; and if A is of form B, let us denote it by A \equiv B.

Compound examples include:

\[
i) \max_D f[3q(3q+1)] = \max_D f[3(q(3q+1))] \equiv \max_D f[3M] = q(q + 1)
\]

\[
ii) \max_D f[3q(3q+2)] = \max_D f[3(q(3q+1))] \equiv \max_D f[3M] = q(q + 2)
\]

\[
iii) \max_D f[(3q+2)(3q+1)] = \max_D f[9q^2 + 9q + 2] \equiv \max_D f[3M + 2] = 3q(q + 1), (3q(q + 1) + 1) .... (3.4)
\]

To Note: It is not possible to solve a Max. D – f relation if the variable has no coefficient or if the coefficient cannot be factorized in terms of 3q, 3q+1 or 3q+2.

E.g. Find \[\max_D f[5p + 1]\]

A: This is not possible since \[5q + 1 \equiv 3q_0 + t \ [0 \leq t \leq 2, t \in Z]\]

This is only possible when \[q \equiv 3q_0 + t\].

E.g.2 Find \[\max_D f[p]\].

This is not possible unless we know the form of p and can express it in the form 3q, 3q+1, 3q+2.

But, for these problems, we can say that p is of form 3q, 3q+1 or 3q+2 and show the respective cases.

\[\text{Multiple (or looped) } f \text{ relations can be denoted by } \max_D f[M], \text{ where } t \text{ denotes the number of times Max.D - f relation is to be carried out.}\]

\[
\max_D f[M] = \max_D f[\max_D f[\max_D f[... (t \text{ times}) .... \max_D f[M]]]]] .... ]]
\]

Now, \[\max_D f[3p] = p; \max_D f[9p] = \max_D f[3p] = p\]

Also, \[\max_D f[27p] = p\]

So, a generalization of this will be \[\max_D f[3^t p] = p\]
More precisely, $$\max.D^f[3^t p] = [3^{t-t} p] = p$$
or, $$\max.D^f[3^q p] = [3^{q-t} p]$$ ...

(3.5)

It may be an enquiry as to what will happen if \( t > q \). As a dimension is always a whole number, 3 raised to a negative power may make the result a fraction, which is not acceptable.

Hence, third brackets \([\ ]\) are used to denote dimensions, which in mathematics denotes greatest integral function. E.g.
$$[7.256843] = 7$$

In hypercubes however, there is a bit modification of this rule for dimensions of the form \( 3q+2 \).

If any dimension is represented by \([a_1 a_2 ... a_n b_1 b_2 ...b_n]\), there can be 2 cases.

i) If \( b_1 < 5, b_1 \in Z \), then \( E_p = (a_1 a_2 .... a_n) \)

ii) If \( b_1 \geq 5, b_1 \in Z \), then \( E_p = (a_1 a_2 ... a_n) \), \((a_1 a_2 ... a_n + 1)\)

To note: Here \( 0 \leq a_1, a_2, ..., a_n, b_1, b_2, ..., b_n \leq 9 \) ...

(3.6 eqns.)

For \( \max.D^f[2] = \left[ \frac{2}{3} \right] = [0.6666 ... \infty] = 0,1 \) (verified)

Hence,
$$\max.D^f[1] = \left[ \frac{1}{3} \right] = [0.333 .... \infty] = 0 \) (verified)

Or,

This leads us to Loop Simplification and decimal estimation method.

If, in general, we have

$$\max.D^c^f[A] = \max.D^d^f[B] \text{ provided } c \geq d \text{ and } A \equiv B \equiv$$

3t, we can do a general subtraction of the common loops to get:

$$\max.D^{c-d}_f[A] = [B]$$ ...

(3.7)

Note:

Loop Simplification:

"Loop Simplification is the process of step-by-step simplification by finding out the value of a loop one at a time."

$$\max.D^f[M] = \max.D^f[\max.D^f[\max.D^f[... (t times) \ldots .. \max.D^f[M]]]]] \ldots ]] \) (3.8)

And then clearly we can solve the looped relation.

E.g. Find \( \max.D^3_f[32] \)

This can be rewritten as: $$\max.D^f[\max.D^f[\max.D^f[32]]]$$

$$= \max.D^f[\max.D^f[[10,11]]]$$

$$= \max.D^f[[3, (3,4)]]$$
But, as it is seen, Loop Simplification is a very lengthy process. If the loop is a large number such as 6 or 8, loop simplification will take a lot of space and time. As an alternative to this, we can have the decimal estimation problem.

For this, we need decimal estimation (Refer to 3.6 eqns.).

Decimal Estimation:
(With reference to 3.6 eqns.) “It is an estimation made on a Max.D-f function such that if the decimal value, when estimated to the nearest whole number, gives the lower limit as the answer, the actual answer is the lower limit. In case it tends to the upper limit, both the lower and the upper limits will be the answer and will be separated by a comma representing that both dimensions are maximum in that particular loop of the specified dimension.”

In decimal estimation method, we have:

\[ \max_D f[M] = \left[ \frac{M}{3^t} \right] \ldots \ldots (3.9) \]

Now, we can give examples and then verify it by Loop Simplification method.

E. g. Find \( \max_D f[46] \)

Ans: \( E_p = \left[ \frac{46}{9} \right] = \left[ \frac{46}{27} \right] = [1.703704 \ldots] = 1,2 \ [\text{Since } b_1 > 5] \)

Verification:
\( \max_D f[46] = \max_D f[15] = \max_D f[5] = 1,2(\text{verified}) \)

Another example may include:

Find \( \max_D f[354] \)

Ans: \( E_p = \left[ \frac{354}{3^4} \right] = \left[ \frac{354}{81} \right] = [4.37037 \ldots] = 4 \)

Verification:
\( \max_D f[354] = \max_D f[118] = \max_D f[39] = \max_D f[13] = 4(\text{verified}) \)

Fundamental operations on Max.D-f relations:
Addition (Subtraction requires similar functions):

i) \( \max_D f[3(a + c)] = \max_D f[3a] + \max_D f[3c] \)

ii) \( \max_D f[3(a + c) + 1] = \max_D f[3a] + \max_D f[3c] + \max_D f[1] \)

iii) \( \max_D f[3(a + c) + 2] = \max_D f[3a] + \max_D f[3c] + \max_D f[2] \)

But, \( \max_D f[3(a + c) + 2] \neq \max_D f[3a + 1] + \max_D f[3c + 1] \)

Here we see a constant break. “For any constant break in a Max.D-f relation, provided it is in the simplest form, needs to be added to the sum.”

E. g. \( \max_D f[3(a + c) + 2] = \max_D f[3a + 1] + \max_D f[3c + 1] + \max_D f[2] \)
= a + c + (0,1) = (a + c + 0), (a + c + 1) = (a + c), (a + c + 1) (correct)
To Note: We cannot break non-simplified constants.
E. g. \( \max^D f[3(a + c) + 10] \neq \max^D f[3a + 5] + \max^D f[3c + 5] + \max^D f[2] \)
We can solve this by first simplifying \( 3(a+c)+10 \) into \( 3(a+c+3)+1 \), then following the respective steps mentioned.

If \( a \equiv 3s, \) then \( \max^D f[a + 2] = \max^D f[a] + \max^D f[2] \)
If \( a \equiv 3s + 1, \) then \( \max^D f[a + 2] = \max^D f[a - (1)] + \max^D f[2 + (1)] \)
If \( a \equiv 3s + 2, \) then \( \max^D f[a + 2] = \max^D f[a - (2)] + \max^D f[2 + (2)] \)
If \( a \equiv 3s + p, \) then \( \max^D f[a + 2] = \max^D f[a - p] + \max^D f[2 + p][0 \leq p \leq 3] \)

.....(3.11)
Let this be called the Constant Operation Rule for Max.D-f Hypercubes (COR-HC).

Some proofs:

(Saying that \( n, p, s, t, k \in |I| \))
i) \( (1 + n)^p \equiv 3t + 1 \) if \( n \equiv 3s \)
ii) \( (1 + n)^p \equiv 3t + 1, \) if \( n \equiv 3s + 1, \) and if \( p \equiv 2k \)
iii) \( (1 + n)^p \equiv 3t + 2, \) if \( n \equiv 3s + 1, \) and if \( p \equiv 2k + 1 \)
iv) \( (1 + n)^p \equiv 3t, \) if \( n \equiv 3s + 2 \)

PROOFS:
CASE (i):
\( (1 + n)^p \equiv (1 + 3s)^p = 1 + M(3)[M(n) = \text{multiple of } n] \equiv 3t + 1 \)
CASE (ii):
\( (1 + n)^p \equiv (3s + 2)^{2k} = M(3) + 4^k = M(3) + (3 + 1)^k \\
= M(3) + M(3) + 1 = M(3) + 1 \equiv 3t + 1 \)
CASE (iii):
\( (1 + n)^p \equiv (3s + 2)^{2k+1} = M(3) + 2^{2k+1} = M(3) + 2^{2k} \cdot 2 \\
= M(3) + [M(3) + 1] \cdot 2 = M(3) + M(3) + 2 = M(3) + 2 \equiv 3t + 2 \)
CASE (iv):
\( (1 + n)^p \equiv (3 + 3s)^p = M(3) + 3^p = M(3) + M(3) = M(3) \equiv 3t \\
......(Proofs 3.1) \)

Multiplication:

Two Important theorems:
\( \max^D f[3p] \cdot \max^D f[3q] = p \cdot q = pq = \max^D f[3pq] = \max^D f[3] \cdot \max^D f[3pq] \)
As we can see both \( \max^D f[3pq] \) and \( \max^D f[3] \cdot \max^D f[3pq] \) yield the same result \( pq \), but the pattern of writing is different. In the first case, we eliminate the common coefficient of the variable, while in the next case; we separate one of the coefficients.
Let the first case be called Common Coefficient Elimination (CCEI) and the next case be called Broken Coefficient Separation (BCS).

Hence;
\( \max^D f[3a_1a_2a_3 \ldots a_n] \) (By CCEI)
\( \{\max^D f[3]\}^{n-1} \cdot \max^D f[3a_1a_2a_3 \ldots a_n] \) (By BCS)

Now,
\( \max^D f[3p + 1] \cdot \max^D f[3q + 1] = pq \)
And,

\[
\text{InverseRelation:} \quad \max_f \{A, (A + 1), (A + 2)\}
\]

But at the same time, we can be given

\[
\max_f \{A, (A + 1), (A + 2)\}, \quad \text{i.e. the inverse of } A, \ (A+1), \ (A+2). \ \text{Max.D-f inverse is just the opposite of Max.D-f.}
\]

\text{E.g.} \quad \text{Find } \max_f^{-1} [a_1].

\text{Ans: } 3a_1, 3a_1 + 1

\text{Or, } \max_f^{-1} [a_1, (a_1 + 1)] = 3a_1 + 2

But then what is

\[ \max_f^{-1} [A, (A + 1), (A + 2)]? \]

We have to understand that Max.D-f functions can be at most yielding a result like a, (a+1). So, A, (A+1), (A+2) is clearly [A, (A+1)], [(A+1), (A+2)]. The extra A+1 comes from the fact that only unique values are kept.

Hence the expression simplifies to:

\[ \max_f^{-1} [A, (A + 1)], \max_f^{-1} [(A + 1), (A + 2)] \]

= (3A + 2), (3A + 5)

\text{Or,}

\[ \max_f^{-1} [A], \max_f^{-1} [(A + 1)], \max_f^{-1} [(A + 2)] \]

= 3A, 3A + 1, \quad 3A + 3, 3A + 4, \quad 3A + 6, 3A + 7

At the same time, we cannot solve \( \max_f^{-1} [A, B] \) in the same way if “A” and “B” is not same or adjacent non-negative integers. So, then we have to divide it into two parts:

\[ \max_f^{-1} [A], \max_f^{-1} [B] = 3A, 3B \]

Clearly, it can be understood that the inverse relation yields many results. There is no clear/distinct pre-image of the relation. This accounts for the relation to be more forwardly than backwardly explicit.

\text{Summation of like Max.D-f relations:}

Let us add two Max.D-f relations of dimensions of form \( M (3)+2 \).
In general, let us introduce a new relation here. Let it be called the \( \Psi(\Psi) \) relation.

To Note: 

\[
\Psi_{i=1}^{n} = 1, 2, 3, ..., (n - 1), n
\]

E. g. \( \Psi_{i=p}^{p+4} = p, (p+1), (p+2), (p+3), (p+4) \)

Hence,

\[
\sum_{i=1}^{n} \max.D_f[3a_i + 2] = \Psi_{j=1}^{n} \left( \sum_{i=1}^{n} a_i + j \right)
\]

But can we write the Max.D-f relations as a single relation? Yes we can.

We know that:

\[
\max.D_{-1}^{-1} f[A, (A + 1), (A + 2)]
= \max.D_{-1}^{-1} f[A, (A + 1)], \max.D_{-1}^{-1} f[(A + 1), (A + 2)]
= (3A + 2), (3A + 5)
\]

Or,

\[
\max.D f[(3A + 2), (3A + 5)] = A, (A + 1), (A + 2)
\]

Also, \( 3A + 5 = 3A + [3*2 - 1] \)

Hence;

\[
\sum_{i=1}^{n} \max.D_f[3a_i + 2] = \max.D \left[ \Psi_{j=1}^{m} \left( 3 \sum_{i=1}^{n} a_i + [3j - 1] \right) \right] = \Psi_{j=1}^{n} \left( \sum_{i=1}^{n} a_i + j \right)
\]

As for dimensions of form \( 3k \) or \( 3k+1 \), it is easy to denote their summation.

Hence, the equations for the dimensions are:

\[
\sum_{i=1}^{n} [3a_i] = \max.D \left[ 3 \sum_{i=1}^{n} a_i \right] = \sum_{i=1}^{n} a_i \quad (a)
\]

\[
\sum_{i=1}^{n} [3a_i + 1] = \max.D \left[ 3 \sum_{i=1}^{n} a_i + 1 \right] = \sum_{i=1}^{n} a_i \quad (b)
\]
\[
\sum_{i=1}^{n} \text{max.D}_f[3a_i + 2] = \text{max.D}_f \left[ \psi_{f_{j=1}}^{m} \left( 3 \sum_{i=1}^{n} a_i + \{3j - 1\} \right) \right] = \psi_{f_{j=1}}^{n} \left( \sum_{i=1}^{n} a_i + j \right) (c) \]
\[\cdots (3.13 \text{ eqns.})\]

\[
\sum_{j=3a}^{3(a+n)+2} \text{max.D}_f[j] = 2 \sum_{i=0}^{n} (a + i) + \left( \sum_{i=0}^{n} (a + i) \right), \ldots, \left( \sum_{i=0}^{n} (a + i) + (n + 1) \right)
\]
\[= 2 \sum_{i=0}^{n} (a + i) + \psi_{k=0}^{(n+1)} \left( \sum_{i=0}^{n} (a + i) + k \right)
\]
\[= (n + 1)(2a + n) + \psi_{k=0}^{(n+1)} \left( \frac{(n + 1)(2a + n)}{2} + k \right) \cdots (3.14)\]

- Simplified term of a factorial:

\[
\text{max.D}_f[M!] = \left[ \frac{M!}{3^t} \right]
\]

Can we find \(p\) such that \(3 \leq \text{max.D}_f^p [M!]\)?

Yes, we can.

We know that the total number of “n’s” present in “M!” is given by:

\[
\left[ \frac{M}{n} \right] + \left[ \frac{M}{n^2} \right] + \left[ \frac{M}{n^3} \right] + \cdots + \left[ \frac{M}{n^p} \right] < \text{DE PROLIGNAC'S FORMULA}
\]

Such that “n!” is the largest power of “n” in “M!”

By replacing \(n\) with 3, we get:

\[
\left[ \frac{M}{3} \right] + \left[ \frac{M}{3^2} \right] + \left[ \frac{M}{3^3} \right] + \cdots + \left[ \frac{M}{3^p} \right]
\]

Hence, \(3 \leq \text{max.D}_f[M!] \cdots (3.15)\)

Short formula:

i) Finding Max.D-f for given coefficients:

Given, \(\text{max.D}_f[2n] = q, (q + 1)\), and \(r = 3t + p\) \(\{0 \leq p < 3 ; p \in |I|\}\),

then \(2(n-r) = 3(q+1-3t-p) + (3t+p-1)\)

\(i)\) Hence \(\text{max.D}_f[2(n-r)] = (2q-2t) \{p = 0\}\)

\(ii)\) Or, \(\text{max.D}_f[2(n-r)] = (2q-2t),(2q-2t+1) \{p = 1\}\)

\(iii)\) Or, \(\text{max.D}_f[2(n-r)] = (2q-2t) \{p = 2\} \cdots (3.16)\)
Division of Max.D-f relations (Decimal estimated):

We can show decimal estimation by third brackets “[ ]”.

We can put forward some general division rules:

To Note: \( p \neq 0 \)

\[
\text{Case (i)} \quad \left[ \frac{\text{max.D}_{f}[3p+1]}{\text{max.D}_{f}[3p]} \right] = \left[ \frac{p}{p} \right] = 1
\]

Hence,
\[
\left[ \frac{\text{max.D}_{f}[3p+1]}{\text{max.D}_{f}[3p]} \right] = \left[ \frac{3p+1}{3p} \right] = \left[ \frac{3p + 1}{3p} \right]
\]

\[
= \left[ 1 + \frac{0.3333 \ldots \infty}{p} \right] = \left[ 1 \right] = 1
\]

\[
\text{Case (ii)} \quad \left[ \frac{\text{max.D}_{f}[3p+2]}{\text{max.D}_{f}[3p]} \right] = \left[ \frac{p,(p+1)}{p} \right] = 1, \left[ 1 + \frac{1}{p} \right]
\]

Here, if \( p > 2, \ p \in |l| \) then \( E_p = 1 \) but if \( 0 < p \leq 2 \), then \( E_p = 1,2 \)

\[
\text{Case (iii)} \quad \text{Finally,} \quad \left[ \frac{\text{max.D}_{f}[3p+2]}{\text{max.D}_{f}[3p+1]} \right] = \left[ \frac{p,(p+1)}{p} \right] = 1, \left[ 1 + \frac{1}{p} \right]
\]

If \( p > 2, \ p \in |l| \) then \( E_p = 1 \) but if \( 0 < p \leq 2 \), then \( E_p = 1,2 \)

\[
\therefore \ E_p = 1 \ or \ 1,2 \quad \ldots \ldots (3.17 \text{ eqns.})
\]

Thus, several theories on hypercubes can actually be clubbed into an overall expression of faces in Hypercubes derived from Euler’s Polyhedron (Polytope) Formula.

REFERENCES

1. WIKIA OFFICIAL PAGE
2. “HIGHER ALGEBRA” – Hall and Knight
3. “MATHEMATICS Class XI” – R.D Sharma
4. “AN EXCURSION IN MATHEMATICS” – Modak, Katre, Acharya, Sholapurkar

Bibliography
i. EULER’S POLYTOPE FORMULA – Euler’s formula states that number of i-dimensional faces in an n-dimensional solid is given by the formula:

\[
\text{QUOTE (From 1)}
\]

ii. WIKIPEDIA: “n-cube”, “hypercubes”, “Higher dimensions”.

iii. BASIC MATHS: Basic knowledge on Combinatorics, Factorial functions, Inequalities, Greatest integral function, decimal estimation, partial fractions.

\[
\text{From 2)}
\]

iv. STRING THEORY (www.superstringtheory.com)

v. DE PROLIGNAC’S FORMULA - Total number of n’s present in ”M!” is given by QUOTE .

www.ijsrp.org
AUTHORS

First Author – Sohom Gupta, Class X, South Point High School
Optimization of Damper System Design for Pounding of High-rise Buildings

Thae Mon Zaw*, Kay ThweTun**

* Department of Civil Engineering, Mandalay Technological University, Mandalay, Myanmar
** Department of Civil Engineering, Mandalay Technological University, Mandalay, Myanmar

Abstract - This study describes optimization of damper system design for pounding between existing building and its extension. In this system, passive coupling method is known to be an effective method to reduce undesirable vibrations and structural pounding effects and passive viscous dampers are used by which the existing building is connected to its extension. In this study, pounding Effect between existing building and its extension is studied by non-linear dynamic analysis. Firstly, the required ground motion records are obtained from PEER ground motion database by using input parameters. Secondly, the adjacent two buildings are separately analyzed and the maximum displacements of two buildings at connecting corner points are resulted. Thirdly, required minimum seismic separation gap is calculated by using Squared Root of Sum Squares (SRSS) method. A formulation of the multi-degree of freedom equations of motion for viscous damper-connected adjacent multi-story buildings under earthquake excitation is utilized to calculate the optimal damping coefficient and stiffness of dampers. The effectiveness of viscous dampers as known as optimal damper location is then investigated in terms of the reduction of displacement of adjacent buildings. And then, two buildings connected with selected passive viscous dampers are continuously analyzed for pounding effect by using non-linear time history analysis. Finally, it is observed that the maximum displacements between two adjacent buildings by using dampers are reduced as compared to the case of the independent system if damper properties are appropriately selected.

Index Terms - Maximum Displacement, Non-linear Time History; PEER Ground Motion Database; Seismic Pounding; Viscous Damper

I. INTRODUCTION

To improve the seismic performance of the adjacent buildings, it is necessary to perform sufficient reinforcement in spaces that are already used. In metropolitan cities such as Yangon and Mandalay, these spaces are very limited and are not sufficient. Furthermore, in high-rise buildings, seismic retrofit is much more difficult not only for the above reasons but also because of the difficulties of the construction work and changes in the structural system due to the structural reinforcements. These buildings, in most cases, are separated without any structural connections or are connected only at the groundlevel. Hence, wind-resistant or earthquake-resistant capacity of each building mainly depends on itself. If the separation distances between adjacent buildings are not sufficient, mutual pounding may occur during an earthquake [2]. Seismic pounding is defined as the collision of adjacent buildings during earthquakes. The phenomenon is mostly observed in old buildings that were constructed before the advent and popularity of earthquake resistant design principles. The gap is often seen as a waste of prime real estate by developers and has been reduced in some newer versions. It also seems to unfairly penalize a property owner whose neighbor has already constructed a building at the boundary of their properties, as the new owner will have to provide the gap to accommodate the relative deformation of both buildings.

Three key factors for a good retrofitting method are efficiency, cost and applicability to existing structures. Among the retrofitting methods, passive coupling of adjacent structures is known to be an effective method to reduce undesirable vibrations and structural pounding effects. This study focuses on the prevention of mutual pounding between existing high-rise building and its extension of Palace Medical Centre located in Mandalay, Myanmar. This study discusses the mitigation of earthquake responses of adjacent buildings, separated with a certain distance, by using fluid inertial joint dampers to connect them. Compared with other types of energy dissipaters which can be used as joint dampers to connect adjacent buildings, such as friction dampers, viscoelastic dampers, and yielding metal dampers, fluid inertial dampers have several inherent and significant advantages: linear viscous behavior; insensitivity to temperature changes; small size in comparison to stroke and output force; easy installation; almost free maintenance; reliability and longevity [6]. Furthermore, they can be manufactured less expensively to satisfy different requirements for damper parameters such as the maximum damping force, the maximum operating velocity, the maximum operating displacement, and no
measurable stiffness for piston motions. To the best of the writers’ knowledge, there are no applications of fluid dampers to connect adjacent buildings for reducing earthquake-induced response. The practical details such as how to manufacture the fluid dampers and how to install the fluid dampers between adjacent buildings are beyond the scope of this study.

The multi-degree of freedom equations of motion for fluid damper-connected adjacent multistory buildings under earthquake excitation are first formulated in both the frequency domain and time domain. Because of non-classical damping properties of the damper–building system, a pseudo-excitation algorithm for random vibration analysis in the frequency domain is introduced. An extensive parametric study is then carried out to investigate the effectiveness of joint dampers in terms of the reduction of displacement of adjacent buildings and to determine optimum damper properties to facilitate the integrated design of fluid damper-connected adjacent buildings. The practical details such as how to manufacture the fluid dampers and how to install the fluid dampers between adjacent buildings are beyond the scope of this study. The specific objectives of the study are (i) to choose the optimal damper system design to reduce the pounding effect, (ii) to improve the seismic performance of coupling buildings during earthquakes and (iii) to compare the maximum displacement of two buildings connected with dampers and that of independent system.

II. DESCRIPTION OF CASE STUDY

Mandalay is the second largest city and the last royal capital of Myanmar. It is located at 21° 58’ N and 96° 04’ E and 445 miles north of Yangon on the east bank of Irrawaddy River. The city has an estimated population of 1.3 million and is the capital of Mandalay Region. Mandalay is the main commercial, educational, health and economic hub of Upper Myanmar and considered as the center of Buddhism in Myanmar. In Mandalay city municipal area, there are five downtown townships; Aung Myae Thar San, Chan Aye Thar Zan, Chan Mya Thar Si, Mahar Aung Myae and PyiGyiTagon townships. In this study, the proposed structure is Palace Medical Centre located between 71 and 28x29 streets in Chan Aye Thar Zan Township in Mandalay. This hospital includes existing 7-storeyed RC building and 12-storeyed extension steel building. Both buildings have one normal stair and two elevators. The structural dimensions of two buildings are shown in Table-1. Ground floor plans of the proposed structures are shown in Figure 1 and Figure 2. The required data source is from Mandalay City Development Committee (MCDC).
A. Bits and Pieces together

In this study, 3D models of 12-storeyed steel and 7-storeyed RC buildings are created by using Structural Analysis Program Software to undertake static and dynamic analysis. Firstly, two independent buildings are constructed and designed by non-linear time-history analysis and maximum displacements of both buildings are obtained. Secondly, in order to investigate optimal coefficients of dampers and optimal dampers locations, multi-degree-of-freedom (MDOF) system is constructed to model coupled adjacent buildings. Modeling is to formulate mechanical behavior of structures in terms of mathematical equations. Thirdly, the appropriate stiffness and damping coefficient of viscous damper and suitable damper location are calculated by using equation of motion. And then two adjacent buildings are joined by passive viscous dampers to withstand the pounding effect. The two structures joining with dampers
are designed by non-linear dynamic analysis to withstand the pounding force. In time-history analysis, time series records from Pacific Earthquake Engineering Research Centre-National Geospatial Agency (PEER NGA) Spectrum approximately equaled to Myanmar Earthquake Intensity are used. Finally, the maximum displacements between two adjacent buildings by using dampers are reduced as compared to the case of the independent system. The applied loads considered in this structural analysis and the design codes applied are AISC-LRFD-99, ACI-318-99 and UBC-97. The proposed structures are considered as locating near Sagaing fault and suffering high seismic hazard, seismic zone 4. Soil profile type is S0 and seismic source type is B.

To highlight important characteristics of fluid damper-connected adjacent buildings and to make the problem manageable, some assumptions are necessary at present. Firstly, ground motion is assumed to occur in one direction as shown in figure 4 so that the problem can be simplified as a two dimensional case. Torsional effects due to asymmetric buildings are not addressed here. Each building is modelled as a linear multi-degree of freedom system where the mass is concentrated at each floor and the stiffness is provided by massless walls and columns. Both buildings are assumed to be subjected to same base acceleration and effects due to soil structure interaction is neglected.

B. Time Series Records

In this study, non-linear dynamic behaviours of adjacent buildings are studied by time-history analysis to investigate pounding effect. The required ground motion records approximately equal to Myanmar earthquake are obtained from PEER ground motion database beta version application. The Pacific Earthquake Research Centre (PEER) ground motion database provides tools for searching, selecting and downloading ground motion data. The GMPE is considered to be valid for estimating ground motions from worldwide shallow continental earthquakes in active tectonic regions for magnitudes ranging from 3.3 to 7.5-8.5, depending on source mechanism, and rupture distances ranging from 0-300 km. The PEER-NGA West 2 allows the users three options to define target response spectrum for selecting and scaling of ground motion records: (i) ASCE 7 Code Spectrum, (ii) PEER-NGA Spectrum and (iii) User-defined Spectrum. The responses of proposed buildings are studied for ground motions based on PEER-NGA Spectrum. The “PEER-NGA Spectrum” model creates a target response spectrum using the PEER-NGA ground motion prediction equations (GMPEs). Five empirical models are employed in PGME: Abrahamson-Silva (A&S, 2014), Boore-Atkinson (B&A, 2014), Campbell-Bozorgnia (C&B, 2014), Chiou-Youngs (C&Y, 2014) and Idriss (2014). PEER-NGA spectrum is based on deterministic seismic hazard analysis (DSHA). The resulting hazard statement is basically a scenario. A scenario based assessment computes the response of a building to user-specified earthquake event, which is typically defined by earthquake magnitude and the distance between the earthquake source and the building site Parameters to be used in searching ground motions (based on recent earthquake data 2012 Thabeikkyin Earthquake near the Sagaing fault) are shown in figure 1 and Table 2.

![Figure 3: Strike slip faulting system](image)

C. Multi-degree-of-freedom System

Three major types of modeling are available: single-degree-of freedom (SOF), multi-degree-of-freedom (MDOF), and finite element (FE). Each of them has its own advantages and disadvantages. In general, the more accurate the model is, the more complexity will be involved in the model and its solution. Except for simple SDOF systems, closed-form solutions are almost impossible to achieve. For most cases, MDOF models provide enough information for researchers and engineers to predict the dynamic behavior of buildings.

This study uses a simple MDOF model in order to model the dynamic behaviour of the buildings. Each floor is modelled via a lumped mass which includes the mass of each floor as well as the mass of the walls connecting that floor to the upper floor. Then each mass is connected to the upper and lower mass with a set of linear springs and linear dampers. A linear spring is a mechanical component that
generates a force which linearly depends on the relative displacement at the ends of the spring. And a linear damper is a mechanical component that generates a force which linearly depends on the relative velocity at the ends of the damper. After modeling each structure individually, we may now connect these two structures using linear dampers.

Figure 4 - Schematic dynamic model of two adjacent buildings

D. Mathematical Equation (Equation of Motion)

As shown in Figure 4, buildings 1 and 2 have twelve and seven stories, respectively. The mass, shear stiffness, and damping coefficients for the $i^{th}$ story are $m_{i1}$, $k_{i1}$, and $c_{i1}$ for building 1 and $m_{i2}$, $k_{i2}$, and $c_{i2}$ for building 2. The damping coefficient and stiffness coefficient of the damper at the $i^{th}$ floor are $c_{di}$ and $k_{di}$, respectively. Let $x_{i1}(t)$ and $x_{i2}(t)$ be the displacement of the $i^{th}$ floor of buildings 1 and 2 in the time domain, respectively. Consequently, $\dot{x}_{i1}(t)$ and $\dot{x}_{i2}(t)$ represent the velocity, and $\ddot{x}_{i1}(t)$ and $\ddot{x}_{i2}(t)$ represent the acceleration of the $i^{th}$ floor of buildings 1 and 2, respectively. The governing equation of the system is as follows.

$$M \ddot{X}(t) + (C + C_d) \dot{X}(t) + (K + K_d) X(t) = M g(t)$$

(1)

Where, $M$, $C$ and $K$ are the given mass, damping and stiffness matrices of the buildings, $C_d$ and $K_d$ represent damping and stiffness matrices of the connectors, and $X$ is the displacement vector of the system. Also, $g(t)$ is the ground acceleration during the earthquake. The details are given as follows:

$$M = \text{diag} \{m_{11}, m_{21}, \ldots, m_{i1}, m_{12}, m_{22}, \ldots, m_{i2}\}$$

(2)

$$K = \begin{bmatrix} K_{11} & 0 & 0 \\ 0 & K_{22} \end{bmatrix}$$

(3)

$$C = \begin{bmatrix} C_{11} & 0 \\ 0 & C_{22} \end{bmatrix}$$

(4)

$$K_i = \begin{bmatrix} k_{i1} + k_{i2} & -k_{i2} & 0 \\ -k_{i2} & k_{i2} + k_{i3} & -k_{i3} \\ 0 & K_{i,i} + k_{i1} & -k_{i1} \\ -k_{i1} & k_{i1} \end{bmatrix}$$

www.ijsrp.org
\[
C_1 = \begin{bmatrix}
  c_{11} + c_{21} & -c_{21} & 0 \\
  -c_{21} & c_{21} + c_{31} & -c_{31} \\
  \vdots & \vdots & \vdots \\
  0 & c_{i-1} + c_{i1} & -c_{i1} \\
  -c_{i1} & -c_{i1} & \vdots \\
  \end{bmatrix}
\]

(5)

\[
C_2 = \begin{bmatrix}
  c_{12} + c_{22} & -c_{22} & 0 \\
  -c_{22} & c_{22} + c_{32} & -c_{32} \\
  \vdots & \vdots & \vdots \\
  0 & c_{i-1} + c_{i2} & -c_{i2} \\
  -c_{i2} & c_{i2} & \vdots \\
  \end{bmatrix}
\]

(6)

\[
K_d = \begin{bmatrix}
  K d_1 & 0 & \cdots & 0 \\
  0 & K d_2 & \cdots & 0 \\
  \vdots & \vdots & \ddots & \vdots \\
  0 & 0 & \cdots & K d_7 \\
  \end{bmatrix} \\
C_d = \begin{bmatrix}
  C d_1 & 0 & \cdots & 0 \\
  0 & C d_2 & \cdots & 0 \\
  \vdots & \vdots & \ddots & \vdots \\
  0 & 0 & \cdots & C d_7 \\
  \end{bmatrix}
\]

(7)

\[
X = [x_{11}, x_{21}, \ldots, x_{i1}, x_{12}, x_{22}, \ldots, x_{i2}]^T 
\]

(10)

It is clear that displacement \(x_{i1}\) and \(x_{i2}\) for a set of dampers is highly dependent on the mechanical properties of the damper connectors since damping and stiffness matrices of the connectors, \(C_d\) and \(K_d\) are dependent on \(c_{di}\) and \(k_{di}\). If damping coefficients of the connectors, \(c_{di}\) are optimal, the stiffness of the connectors \(k_{di}\) are small. Moreover, the value of \(x_{i1}\) and \(x_{i2}\) will increase if \(k_{di}\) has a very large value, i.e., rigid connectors. Thus, it is assumed that \(k_{di} = 0\) for all dampers. This simplifies the problem while keeping the final result accurate. Furthermore, it is reasonable to assume that all damping coefficients \(c_{di}\) are equal. Therefore, it is assumed that \(c_{di}\) lies between 0 and \(10^{16}\).[5]

For the time domain analysis, the above equations (1 to 11) can be used for any given time history record of ground motion. For frequency domain analysis of multi-degree of freedom system to optimize the damper system design, pseudo-excitation method can be considered. In this method, the determination of random response of a structure is converted to the determination of response of the structure under a series of harmonic loads, i.e, the so-called pseudo-excitations. Let us assume that the ground acceleration \(g(t)\) is a stationary random process with zero mean of its power spectral density \(S_g(\omega)\) given in equation (16). Considering ground excitation as a series of harmonic loads, one can write displacement, velocity and acceleration vectors in the frequency domain as shown in equation (12 to 14).

\[
X(t) = X(\omega) e^{i\omega t} 
\]

(11)

\[
\dot{X}(t) = \frac{dX(t)}{dt} = i \omega X(\omega) e^{i\omega t} 
\]

(12)

\[
\dddot{X}(t) = \frac{d^2X(t)}{dt^2} = -\omega^2 X(\omega) e^{i\omega t} 
\]

(13)
Substituting equations (11-13) into equation (1)

\[ X(\omega) = [\omega^2 M + (C + C_d) \omega + (K + K_d)]^{-1} \{ M \sqrt{S_g(\omega)} \} \]  

(14)

\[ S_g(\omega) = \frac{1 + 4\varepsilon^2 \omega^2}{1 + (\frac{\omega}{\omega_g})^2 + 4\varepsilon^2 \omega^2} S_0 \]  

(15)

Where, \( S_0 \) = intensity of rock acceleration (m\(^2\)/rad-s\(^3\))

\( \omega_g \) = angular frequency of rock (rad-s)

\( \varepsilon_g \) = damping ratio

<table>
<thead>
<tr>
<th>Site Condition</th>
<th>( S_0 ) (m(^2)/rad-s(^3))</th>
<th>( \omega_g ) (rad-s)</th>
<th>( \varepsilon_g )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft soil</td>
<td>1.574x10(^{-3})</td>
<td>10.25</td>
<td>1.006</td>
</tr>
<tr>
<td>Medium soil</td>
<td>1.076x10(^{-3})</td>
<td>17.07</td>
<td>0.7845</td>
</tr>
<tr>
<td>Firm soil</td>
<td>4.65x10(^{-4})</td>
<td>15</td>
<td>0.6</td>
</tr>
</tbody>
</table>

IV. RESULTS AND DISCUSSIONS

In this study, non-linear dynamic analysis is used to determine pounding between adjacent buildings. Time-history analysis method is used to check the maximum displacements of dependent and independent structures. In time-history analysis, time series records are resulted from PEER-NGA Spectrum. The scaled spectrum of specified record is used for input data of non-liner time-history analysis. In this study, the proposed medical centre neglect soil structure interaction. 3D Model of adjacent buildings connecting with dampers is shown in Figure 5. In this case, four joints such as 969, 949, 656 and 629 at adjacent corners of two buildings are considered as critical points or joints because maximum displacements appear at these joints. The displacements of connecting corners of two adjacent buildings are shown in Figure 10-13 and Table 11-14. The stiffness, damping coefficient, natural angular frequency and total mass of 12-storeyed steel building and 7-storeyed RC building are calculated in Table 3-4. The optimal damping coefficient is selected by comparing minimum gap between adjacent buildings as shown in Figure 6-9 by using displacement function \( X(\omega) \); equation (14).

![Figure 5 – 3D Model of Adjacent buildings connecting with damper](www.ijsrp.org)
Table 3: Calculation of stiffness, damping coefficient, natural angular frequency and total mass of 12-Storeyed steel building

<table>
<thead>
<tr>
<th>Floor of 12-storied Steel Building</th>
<th>Storey Stiffness ki1 (k/in)</th>
<th>Storey mass (k-sec^2/in)</th>
<th>Damping Coefficient,ci1 (k-sec/in)</th>
<th>natural angular frequency ωn (rad/sec)</th>
<th>Total mass,mi1 (kips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>5164.0569</td>
<td>0.749923</td>
<td>6.223057964</td>
<td>4.221517693</td>
<td>289.7702472</td>
</tr>
<tr>
<td>11</td>
<td>7546.4703</td>
<td>0.83212</td>
<td>28.81165967</td>
<td>4.84462755</td>
<td>321.531168</td>
</tr>
<tr>
<td>10</td>
<td>8942.1035</td>
<td>0.841817</td>
<td>29.90335015</td>
<td>5.243151918</td>
<td>325.2780888</td>
</tr>
<tr>
<td>9</td>
<td>9954.2672</td>
<td>0.839023</td>
<td>29.93132219</td>
<td>5.54114041</td>
<td>324.198472</td>
</tr>
<tr>
<td>8</td>
<td>10762.6181</td>
<td>0.840438</td>
<td>29.3429625</td>
<td>5.756885157</td>
<td>324.7452432</td>
</tr>
<tr>
<td>7</td>
<td>11630.0132</td>
<td>0.852395</td>
<td>28.53245387</td>
<td>5.942252447</td>
<td>329.365428</td>
</tr>
<tr>
<td>6</td>
<td>12282.7013</td>
<td>0.865112</td>
<td>27.14704547</td>
<td>6.061669006</td>
<td>334.2792678</td>
</tr>
<tr>
<td>5</td>
<td>12928.2486</td>
<td>0.865671</td>
<td>25.42464218</td>
<td>6.216913918</td>
<td>334.4952744</td>
</tr>
<tr>
<td>4</td>
<td>13603.3027</td>
<td>0.865671</td>
<td>23.32663945</td>
<td>6.377158155</td>
<td>334.4952744</td>
</tr>
<tr>
<td>3</td>
<td>15426.5098</td>
<td>0.964835</td>
<td>21.51267752</td>
<td>6.43263273</td>
<td>372.812244</td>
</tr>
<tr>
<td>2</td>
<td>13953.1532</td>
<td>1.037018</td>
<td>16.70518075</td>
<td>5.900984516</td>
<td>400.7037552</td>
</tr>
<tr>
<td>1</td>
<td>5756.3341</td>
<td>1.097789</td>
<td>7.587050876</td>
<td>3.683791149</td>
<td>424.1856696</td>
</tr>
</tbody>
</table>

Table 4: Calculation of stiffness, damping coefficient, natural angular frequency and total mass of 7-Storeyed RC building

<table>
<thead>
<tr>
<th>Floor of 7-storied RC Building</th>
<th>Storey Stiffness ki1 (k/in)</th>
<th>Storey mass (k-sec^2/in)</th>
<th>Damping Coefficient,ci1 (k-sec/in)</th>
<th>natural angular frequency ωn (rad/sec)</th>
<th>Total mass,mi1 (kips)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>16741.6616</td>
<td>4.404396</td>
<td>27.15454058</td>
<td>3.136444023</td>
<td>1701.858614</td>
</tr>
<tr>
<td>6</td>
<td>22504.6806</td>
<td>5.290679</td>
<td>36.74616764</td>
<td>3.317891361</td>
<td>2044.318366</td>
</tr>
<tr>
<td>5</td>
<td>24720.7375</td>
<td>5.2933</td>
<td>35.15731609</td>
<td>3.476553351</td>
<td>2045.33112</td>
</tr>
<tr>
<td>4</td>
<td>26173.009</td>
<td>5.308738</td>
<td>32.35614872</td>
<td>3.57200964</td>
<td>2051.296363</td>
</tr>
<tr>
<td>3</td>
<td>27496.863</td>
<td>5.336885</td>
<td>28.72117494</td>
<td>3.651565487</td>
<td>2062.172364</td>
</tr>
<tr>
<td>2</td>
<td>25036.436</td>
<td>5.354829</td>
<td>22.37696852</td>
<td>3.478523092</td>
<td>2069.105926</td>
</tr>
<tr>
<td>1</td>
<td>10354.2885</td>
<td>5.557922</td>
<td>10.17560244</td>
<td>2.195762421</td>
<td>2147.581061</td>
</tr>
</tbody>
</table>

Figure 6 – Gap between adjacent buildings for each floor
**Figure 7** – Max; gap diagram between adjacent buildings for corresponding damping coefficient

**Figure 8** – Gap between adjacent buildings for each floor

**Figure 9** – Max; gap diagram between adjacent buildings for corresponding damping coefficient
Table 5: Displacement at Joint 969 according to non-linear time-history analysis without damper and with damper

<table>
<thead>
<tr>
<th>No. of storey</th>
<th>Max; displacement without damper (in)</th>
<th>Max; displacement with damper (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twelfth Storey</td>
<td>39.3242</td>
<td>5.5617</td>
</tr>
<tr>
<td>Eleventh Storey</td>
<td>36.2202</td>
<td>6.1697</td>
</tr>
<tr>
<td>Tenth Storey</td>
<td>33.5260</td>
<td>5.0737</td>
</tr>
<tr>
<td>Ninth Storey</td>
<td>30.3681</td>
<td>4.5369</td>
</tr>
<tr>
<td>Eight Storey</td>
<td>26.7416</td>
<td>3.9496</td>
</tr>
<tr>
<td>Seventh Storey</td>
<td>22.6932</td>
<td>3.3181</td>
</tr>
<tr>
<td>Sixth Storey</td>
<td>19.0043</td>
<td>2.7534</td>
</tr>
<tr>
<td>Fifth Storey</td>
<td>15.1032</td>
<td>2.1658</td>
</tr>
<tr>
<td>Fourth Storey</td>
<td>11.1485</td>
<td>1.5800</td>
</tr>
<tr>
<td>Third Storey</td>
<td>7.8543</td>
<td>1.0803</td>
</tr>
<tr>
<td>Second Storey</td>
<td>5.7945</td>
<td>0.8059</td>
</tr>
<tr>
<td>First Storey</td>
<td>3.7496</td>
<td>0.5159</td>
</tr>
</tbody>
</table>

Figure 10 – Displacement diagram of Joint 969

From this Figure, it can be seen that displacement of proposed structure at Joint 969 with viscous damper is less than that of structure without damper. The average percentage of reduction is 73% at Joint 969.

Table 6: Displacement at Joint 949 according to non-linear time-history analysis without damper and with damper

<table>
<thead>
<tr>
<th>No. of storey</th>
<th>Max; displacement without damper (in)</th>
<th>Max; displacement with damper (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twelfth Storey</td>
<td>39.3447</td>
<td>5.5638</td>
</tr>
<tr>
<td>Eleventh Storey</td>
<td>36.2183</td>
<td>6.1558</td>
</tr>
<tr>
<td>Tenth Storey</td>
<td>33.5183</td>
<td>5.0758</td>
</tr>
<tr>
<td>Ninth Storey</td>
<td>30.3616</td>
<td>4.5389</td>
</tr>
<tr>
<td>Eight Storey</td>
<td>26.7345</td>
<td>3.9515</td>
</tr>
<tr>
<td>Seventh Storey</td>
<td>22.6931</td>
<td>3.3202</td>
</tr>
<tr>
<td>Sixth Storey</td>
<td>18.9982</td>
<td>2.7545</td>
</tr>
<tr>
<td>Fifth Storey</td>
<td>15.0989</td>
<td>2.1665</td>
</tr>
<tr>
<td>Fourth Storey</td>
<td>11.1521</td>
<td>1.5798</td>
</tr>
<tr>
<td>Third Storey</td>
<td>7.87328</td>
<td>1.1005</td>
</tr>
<tr>
<td>Second Storey</td>
<td>5.7874</td>
<td>0.8061</td>
</tr>
<tr>
<td>First Storey</td>
<td>3.7517</td>
<td>0.5156</td>
</tr>
</tbody>
</table>
From this Figure, it can be seen that displacement of proposed structure at Joint 949 with viscous damper is less than that of structure without damper. The average percentage of reduction is 86% at Joint 949.

Table 7: Displacement at Joint 656 according to non-linear time-history analysis without damper and with damper

<table>
<thead>
<tr>
<th>No. of storey</th>
<th>Max; displacement without damper (in)</th>
<th>Max; displacement with damper (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seventh Storey</td>
<td>1.8030</td>
<td>1.0021</td>
</tr>
<tr>
<td>Sixth Storey</td>
<td>1.6856</td>
<td>0.9510</td>
</tr>
<tr>
<td>Fifth Storey</td>
<td>1.5252</td>
<td>0.8704</td>
</tr>
<tr>
<td>Fourth Storey</td>
<td>1.3217</td>
<td>0.7612</td>
</tr>
<tr>
<td>Third Storey</td>
<td>1.0821</td>
<td>0.6278</td>
</tr>
<tr>
<td>Second Storey</td>
<td>0.8346</td>
<td>0.5008</td>
</tr>
<tr>
<td>First Storey</td>
<td>0.6002</td>
<td>0.3617</td>
</tr>
</tbody>
</table>

From this Figure, it can be seen that displacement of proposed structure at Joint 656 with viscous damper is less than that of structure without damper. The average percentage of reduction is 44% at Joint 656.
Table 8: Displacement at Joint 629 according to non-linear time-history analysis without damper and with damper

<table>
<thead>
<tr>
<th>No. of storey</th>
<th>Max; displacement without damper (in)</th>
<th>Max; displacement with damper (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seventh Storey</td>
<td>2.2932</td>
<td>1.4501</td>
</tr>
<tr>
<td>Sixth Storey</td>
<td>2.1609</td>
<td>1.3701</td>
</tr>
<tr>
<td>Fifth Storey</td>
<td>1.9646</td>
<td>1.2506</td>
</tr>
<tr>
<td>Fourth Storey</td>
<td>1.7096</td>
<td>1.0932</td>
</tr>
<tr>
<td>Third Storey</td>
<td>1.4059</td>
<td>0.9034</td>
</tr>
<tr>
<td>Second Storey</td>
<td>1.0672</td>
<td>0.6895</td>
</tr>
<tr>
<td>First Storey</td>
<td>0.6996</td>
<td>0.4548</td>
</tr>
</tbody>
</table>

From this Figure, it can be seen that displacement of proposed structure at Joint 629 with viscous damper is less than that of structure without damper. The average percentage of reduction is 37% at Joint 629.

From time-history analysis, it is clearly seen that the joint displacements of connected buildings are reduced to limitable seismic separation gap. The response of adjacent buildings by using dampers can be reduced as compared to the case of the independent system by seeing the corner joint displacements at adjacent corners of two buildings.

There are four types of damper such as passive, active, semi-active and hybrid dampers. Among them, coupling building method uses passive viscous damper by considering the economic point of view. The adjacent buildings excluding damper connection between them become pounding distances or displacements causing pounding behaviour because joint displacements of two isolated adjacent buildings exceed the minimum separation gap. This separation gap can cause pounding or colliding force between each other. Therefore this study uses coupling building method which two adjacent buildings are connected with passive viscous damper. Joint displacements of connected adjacent buildings are smaller than the required seismic separation gap and so it cannot cause pounding force between two buildings.

V. CONCLUSION

In this study, damper system design for pounding between existing building and its extension was presented through time-history analysis. Firstly the main assumptions were explained and the type of connection such as passive damping system was discussed. The system dependency from various parameters, such as seismic separation was discussed and commented for each type of connecting damper system. Unlike the case of rigid links, coupling two structures with dissipative connections is a very efficient method for the improvement of their seismic behaviour in terms of displacement and response reduction. The behaviour of the system depends on the type of dampers. As an added value, passive viscous connections maintain the dynamic characteristics of the unlinked buildings.
From time-history analysis, it is clearly seen that the displacements between two adjacent buildings by using dampers are reduced as compared to the case of the independent system by seeing the corner joint displacements. The average displacement reduction percentages of adjacent buildings at Joint 969, Joint 949, Joint 656 and Joint 629 are 73%, 86%, 44% and 37% respectively.

ACKNOWLEDGMENT

The author wishes to express her deepest gratitude to Dr. SintSoe, Rector, Mandalay Technological University, for his guidance and advice. The author would like to thank to Dr. Nilar Aye, Professor, Head of Department of Civil Engineering, Mandalay Technological University, for her kind permission, and giving useful comments. The author would like to express grateful thanks to Dr. Kay ThweTun, Professor, Department of Civil Engineering, Mandalay Technological University, for accepting and guiding through the whole period of studying for this paper, thoroughly proof-reading this paper and giving useful remarks on it.

REFERENCES


[2] Optimal Placement and Design of Passive Damper Connectors for Adjacent Structures by Kasa Bigdeli B.Sc. in Mechanical Engineering, Iran University of Science and Technology, Iran, 2007 M.Sc. in Mechanical Engineering, Amirkabir University of Technology, Iran, 2010


[4] “Dynamic response of damper-connected adjacent buildings under earthquake excitation “, Y.L. Xu *, Q. He, J.M. Ko, Department of Civil and Structural Engineering, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong Received April 1997; revised version accepted July 1997


AUTHORS

First Author – Thae Mon Zaw, Mandalay Technological University, thaemonzaw@gmail.com

Second Author – Kay ThweTun, Mandalay Technological University, kaythwetun.pm@gmail.com
Effects of Teenage Pregnancy on Academic Progression of Girls in Primary Schools in Ainamoi Sub County, Kericho County

Edwin Kimutai Maritim*, Dr. Viviline Ngeno**, Dr. Hellen Sang**

* Department Educational Psychology, University of Kabianga
** Department of Education, Administration, Psychology and Foundations, University of Kabianga

Abstract- Teenage pregnancy involves females under the age of 18 and it is interplay of several factors social, biological, economic and psychological. Teenage pregnancy has been widely studied, but attention in relation to Africa has been largely limited to its prevalence. In particular, little work has been done on the effect of teenage pregnancy on academic progression, since the girls’ enrolment in Ainamoi sub-county is fluctuating. Walberg’s theory of educational productivity and Positive and the roots of motivation theory was the theoretical framework that underpinned the study. The study targeted a population of 500 teacher and 100 head teachers from public primary schools in Ainamoi Sub County, Kericho County. A sample of 150 teachers and 30 head teachers were drawn from Ainamoi sub County. The study adopted a descriptive survey research design and adopted a mixed methods methodology. Both open and closed ended questionnaires, interviews and document analysis were used as methods of data collection. Simple random sampling techniques were used to identify respondents to the questionnaires. The findings showed the 33 (0.4%) out of 7609 (100%) became pregnant, 16 (48.5%) of the pregnant girls came back to school while 17 (51.5%) dropped out completely. Findings also revealed that socio-cultural effects of teenage pregnancy which included lack of knowledge by the girls, Peer pressure and the influence of mass media; socio-economic effects of teenage pregnancies especially poverty caused most of the girls to engage in sex. Recommendations included; Teachers and administration should work as a team so that counseling programs of the affected could be developed and used effectively.

I. INTRODUCTION

According to Dania (2010), personal hygiene should be observed throughout life for healthy living. Recognizing hygiene habits for prevention of disease is important for children. In a child-to-child program, child can be an excellent health messenger and health volunteer in their own community. School children can learn easily to cultivate good habits and to mold themselves. Experts’ advice that health education should be a part in school curriculum. All health issues irrespective of their sensitivity can be inculcated in educational programs in methodological and scientific way. It has got preventive, promotive and rehabilitative dimensions. The school children can be an excellent mode to transmit information. Here the researcher hope that they can be messengers of proper hygiene practices to other children, to their parents, to the family and finally to reach out the community.

In developing countries, young children spend much of their lives in the care of their brothers or sisters. Experts observed the need for teaching these older children to provide better care for their siblings. The importance of child-to-child programme is thus stressed. The child to child programme was first launched in 1978, by the Institute of Child Health, London. The main focus of child-to-child programme is activity oriented method of teaching, where emphasis is placed on the development of participatory approach of learning and teaching. In child-to-child programme the health educator may be a primary school teacher or a health worker.

A number of studies concur that many young girls dropped out of school as a result of pregnancy. In Kenya, a study conducted in 1985 estimated that about 10% of female students dropped out of primary schools because they were pregnant. In 1986, 11,000 Kenyan girls dropped out of school because of pregnancy. In Ainamoi Sub County, the girls’ academic progression of teenage girls has been fluctuating over the years. However, whereas there had been issues raised with regard to teenage pregnancy and its subsequent influence on school dropouts (Newman, 2008), the literature available was really not about school girl pregnancy at all, but instead it was on the relationship between school exit and subsequent childbirth.
II. LITERATURE REVIEW

Although pregnancy and motherhood do not always interrupt a schoolgirl’s education, they do introduce a new set of circumstances that influence future decisions related to the girl’s education (Grant & Hallman, 2006:11). According to Panday et al. (2009:27) schoolgirl pregnancy can have a profound impact on the mother and child by placing limits on her educational achievement and economic stability as well as predisposing her to single parenthood.

Bezuidenhout (2008:44) states that an unmarried, pregnant teenager (schoolgirl) finds herself in the midst of a multifaceted crisis characterised by the emotional and physical reality of a pregnancy, the interruption of normal physiological and psychological development, a possible change in education and career pursuits, as well as in parental and kinship support, an increase in medical risks during pregnancy, and premature assumption of the adult role with its associated responsibilities. According to Karra and Lee (2012:4), pregnancy immediately places a teenager at an educational and economic disadvantage. She may now take longer to complete her studies, and may therefore be economically inactive for a longer period of time. She may also fail to complete her education, struggle to find proper employment and may have to make ends meet from a government grant or support from relatives.

In their research Bhana et al. (2010:873) found that the presence of a pregnant girl(s) in a classroom is not only a threat to their own academic achievement but also to the collective academic performance of the class as well as the classroom harmony. In particular, most pregnant schoolgirls are not able to cope with the school’s academic demands. Kramer and Lancaster (2010) in agreement with Lynch (2008) opined that in most African cultures, women are expected to subordinate their needs and desire to those of their children and families. Thus, students with infants have to grapple with the role of motherhood and studentship. As a student mother, the student blends two identities, the role of which conflicts. To be a good student, one needs to be fully committed to the academic demands.

A pregnant schoolgirl missed some classes during the day when she was not feeling well, when the pregnant schoolgirl had to visit a clinic or doctor and during the final stages of her pregnancy, delivery and after the birth of the baby (Bezuidenhout, 2008; Changach 2012). Frequent absenteeism from school results in school girls missing a lot of school work e.g. lessons, assignments, tests, (Bhana, Morrell et al, 2010).

Dhlamini (2009) stated that the future of most pregnant school girls was bleak as indicated by available statistics which showed that a third of pregnant school girls did not complete their schooling. Education played an important role in the future of young people as it prepared them for work and life as an adult. He noted that after the birth of the baby they were saddled with the responsibility of bringing up a child while they were themselves still “children” that were supposed to be in school. The possibility of furthering their studies, in order to qualify for choice career prospects, was remote because of financial constraints and the responsibilities of motherhood. Marteleto and Lam (2008:3) maintain that if a girl returns to complete her schooling after the birth of a child it is because of the support received from her family and being provided with flexible child care options. However, childbearing impedes on most girls’ educational careers.

According to a research done by Vundule, Maforah, Jewkes & Jordaan (2001) in South Africa, the reasons why school girls were not using contraception included ignorance, fear of parents finding out, shyness in going to a clinic, and disapproval from the boyfriend. A study by Jonathan, Klein, & Committee on Adolescence (2005) showed that a school girl pregnancy had been associated with frequent sex without reliable or no contraception, sexual coercion, inadequate communication about matters pertaining to sex between partners, to prove one’s fertility, poor socio-economic conditions and promiscuity. In the following discussions some of the reasons that emerged from the literature received attention. The following reasons for school girl pregnancy were Knowledge about sexuality, Peer pressure, Independence, Media, Poor socioeconomic conditions.

Every individual responded to sexual stimulation, but the teenager (adolescent), because of inexperience, was especially vulnerable as the intensity of the responses was confusing and difficult to understand (Ferguson, 2004). A study that was done in Norway by Macleod, (1999) emphasized that peer pressure sometimes involved exclusionary practices, as when sexually inexperienced teenagers were sent away during the discussion of any sexual matters. The educational stakes were also very high for young parents in the developed countries whereas a high percentage of young mothers drop out of school, which made early motherhood the number one reason for dropping out of school among young girls in these countries. In their research on schoolgirl pregnancy, Marston and King (2006) in South Africa established that lack of authentic knowledge about sexuality issue seemed to be one of the major causes of pregnancies amongst primary schoolgirls. Adequate knowledge about sexuality could only be obtained by education and the family milieu and parents were regarded as the most suitable to inform the child about sexuality issues (Bezuidenhout, 2004). However, in certain cultures sexuality issues were the least spoken about or discussed by members of the family, any sex topic was taboo (Rangiah, 2012). According to Newman (2008) mothers often failed to communicate the ‘facts of life’ to their daughters and information about menarche was acquired from an elder sister, peers or nurses from health departments who visit schools.
The perception by many adolescent concerning friends’ pregnancy, liberal attitudes towards casual sex, the use of alcohol or drugs, fear of hormonal contraceptives and poor school-based sexuality education was associated with schoolgirl pregnancies (Oni et al., 2005). School girls shared a great deal of their lives with the peer group; they went to school with them, participate in sport with them, spend leisure time with them and slept over at their homes (Burger et al., 1994). Matters that could not be discussed with parents in some homes were freely discussed with the peer group, for example personal problems, educators, parents, clothing, the future, sex, contraceptives, drugs, alcohol etc. However, the sexual information that peers had was not always authentic. Thus incorrect information received about sex from the peer group, peer pressure or the need of the teenager to be like her peers all contributed to causing unwanted pregnancies (Bezuidenhout, 2008). Burger et al (1994) maintained that relationships with peers and peer pressure played an important role during adolescence. They spent a lot of time together in groups and the individual had to conform in order to be accepted by the group. The implication was that conformity was either implicitly or explicitly enforced and schoolgirls often engaged in sexual activities to be accepted in their peer group despite the possibility of an unwanted pregnancy (Vundule, et al., 2001). The adolescent schoolgirl conformed even if it meant a contravention of social or parental norms (Bolton, 2003).

Personal independence for the adolescent (schoolgirl) involved leaving the safety of the family environment and orienting into the world outside (Jonathan, Klein, & Committee on Adolescence, 2005). The adolescent must be physically and physiologically prepared to let go of their dependence on their parents (guardians) and to value identification with the peer group rather than attachment to the home and family (Burger, Gouws & Kruger, 2000). Becoming emancipated (independent) and gradually loosening her ties with parents they could not hope to contract adult relationships or develop her own identity and value system and became a member of society in the fullest sense. There were two sides to the independence of the adolescent schoolgirl, on the one hand the adolescent’s readiness to take her own decisions and accept responsibility for them and on the other hand the parents’ readiness to permit this (Very, 1990).

Studies showed that parents were very reluctant to discuss openly and freely issues concerning sexuality and reproductive with their children especially the adolescents with focus on age group 12-17 years (Human Science Research Council (HSRC),2008; Panday et al., 2009). Harrison (2006) said teenagers (adolescents) who experienced physiological and other changes often found it difficult to discuss these experiences with their parents. In need of information, they turn to their peers for guidance or seek information from other sources (e.g. books) to satisfy their curiosity (Panday et al., 2009). Although there were health clinics available to adolescents where they can obtain appropriate information on sexuality matters, many did not use these facilities for fear of being identified as sexually active or the belief that such facilities were only for adult mothers, the elderly and the sick (Bezuidenhout, 2008).

The mass media with its sexualized content was also a contributing factor that perpetuated schoolgirl pregnancies as it gave teenagers easy access to pornographic and adult television programs (Oni et al., 2005). Pornographic material and sexuality information was freely accessible via devices such as computers and cell phones. Devenish, Gillian & Greathead (2004) said teenagers had access to books, films, videos and magazines that are explicit in describing sexuality issues. Many were factually incorrect, creating unrealistic expectations from teenagers and increasing the myth about sexuality issues. In her research (Rangiah 2012) established that adolescent girls who were exposed to sexuality in the media were also more likely to engage in sexual activities. Bezuidenhout (2004) said that “sexually arousing material, whether it was on film, in print or set to music, was freely available to the teenager and such information was often presented out of context of the prescribed sexual norms of that society”. According to Panday et al., (2009) there was no question that television also contributed to sexual activities amongst school children.

In their research on teenage pregnancy Kanku and Mash (2010:567) found that teenage girls may feel the need to prove that they are able to have children before marriage. Although current research indicates a change in the belief that it is important to prove one’s fertility before marriage, this value is still found to be one of the reasons of teenage pregnancy (Masemola, 2008:6).

Wood and Jewkes (2006:111) reported in their research findings that many girls was often pressurised to get pregnant at an early age. Amongst their respondents many girls described the importance of proving fertility in order to attain status and acceptance as a woman. They described it as having a “strong snake in the womb”. Many of the girls also admitted that they fell pregnant because of the pressure put on them by a boyfriend or family members to prove their fertility. According to Macleod (1999:9) a girl’s sexual partner also often wanted to prove his fertility by fathering a child and pregnancy will prove love and commitment.

III. RESEARCH METHODOLOGY

Research Design
A research design is the arrangement of conditions for collection and analysis of data in manner that combines relevance to the research purpose with economy in procedure (Kothari, 2007). The study adopted a descriptive survey research design; as such it was an intensive descriptive analysis of academic progression by teenage mothers. Descriptive survey research study allowed both quantitative and qualitative methods. The adoption of descriptive survey was useful for educational fact finding because it provided a great deal of information.
Study Area
This was carried out in the schools in Ainamoi Sub County. The area was purposively selected because of the presence of teenage girls in primary school hence sufficiency in study population. The Sub County had seven educational zones and 116 primary schools. The sub county lies in latitude of 0.1828°s and a longitude 35.4782°E (Google Maps, 2016).

Target Population
The target population of the study consisted of 100 primary schools within Ainamoi Sub-County.
The study area has a total of 500 teachers of which 144 are males and 356 are females by the year 2010 (D.E.O. Office Kericho). The target population therefore consisted of 500 teachers and among these teachers are 100 head teachers. The study was biased in that the researcher targeted teachers and the head teachers/mistress.

Sample size and sampling procedure
The sample size for the study was arrived at after taking 30 percent of 100 head teachers and 500 teachers as proposed by Orodho, (2009). Stratified sampling technique was used in selecting schools into zones, day and boarding, girls and, boys and mixed schools. Stratified and simple random sampling was used. Then simple random sampling was used to select 150 teachers and 30 head teachers.

Data Collection Instruments
The researcher used questionnaires, interviews as the main tools for data collection instruments.
The research instrument of choice for this study was the written questionnaire. The questionnaires were used because they are able to gather large amounts of data from many subjects very inexpensively. They are also easily administered and analyzed. The target population was also highly literate and therefore unlikely to have difficulties responding to the questionnaire items. The data collected through this study were collected through actual visits to the schools within Ainamoi Sub County. The structured questionnaires were administered by the researcher. The researcher used the class registers and class attendance lists to find out those who had dropped out of school and the reasons for their exit.

Data Analysis
Descriptive statistics including percentages and frequencies were used in analysis. Data was presented in pie charts and tables. Qualitative data was analyzed thematically and the interviews were used to compare and contrast the findings from the questionnaires and there after descriptive discussion was given for the same.

Ethical Considerations
The researcher sought permission from primary schools for data collection purposes. This was facilitated through a letter of introduction from university. The letter also confirmed that the research was solely meant for academic purposes. The researcher also sought permission from the National Commission for Science, Technology and Innovation (NACOSTI) and the School of Education of the University of Kabianga. The researcher also declared that the identity of the respondents was highly confidential. The research also undertook to accept any errors due to omission or commission while compiling the report of the study.

IV. RESULTS

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency (f)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>58</td>
<td>38.7</td>
</tr>
<tr>
<td>Female</td>
<td>92</td>
<td>61.3</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 1, it was revealed that day primary schools in Kericho Municipality have more of female teachers 92 (61.3%) compared to male teachers 58 (38.7%). It was also revealed that Day primary schools gave 150 (100%) participants; there were no participants in the Day/Boarding and Boarding Primary Schools. 22.6% more females than males formed part of the random selected research sample. This frequency distribution of the gender of the participants in the research sample can be substantiated by the following: The statistical data of the Department of Education shows that the (70%) of the teaching staff in schools are females (DoE, 2002:14). Females view teaching as a half-day work that affords them time in the afternoon to attend to their household chores (Duncan, 2011:9). Experience of the teachers was also used to describe the participants. The results of the descriptive statistics are presented in Table 2.
Table 2: Demographic description of participants by experience (n=150)

<table>
<thead>
<tr>
<th>Years</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 years</td>
<td>42</td>
<td>28.0</td>
</tr>
<tr>
<td>4-6 years</td>
<td>38</td>
<td>25.3</td>
</tr>
<tr>
<td>7-10 years</td>
<td>35</td>
<td>23.3</td>
</tr>
<tr>
<td>11 years and above</td>
<td>35</td>
<td>23.3</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Results in Table 2 indicated that 42 (28.0%) of the teachers had been in the teaching profession for one to three years. Another 38 (25.3%) of the teachers had been in the profession for four to six years. Teachers with the experience of seven to ten years were the least with 35 (23.3%) of the teachers. Finally, 35 (23.3%) of the teachers had been in the experience for eleven and above years. This could be explained by the fact that retirement age was increased from 55 to 60 years while recruitment of teachers has been done annually. This gives a representative sample as academic progressions in schools are concerned. The longer the experience the more the teachers understood the pattern of pupils as far as teenage pregnancy and academic progression is concerned.

Table 3: Teenage Pregnancy in Ainamoi Sub County Kericho (n=30).

<table>
<thead>
<tr>
<th>Class</th>
<th>Total number of girls enrolled</th>
<th>Number of pregnant girls</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2175</td>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>6</td>
<td>2069</td>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>7</td>
<td>1205</td>
<td>15</td>
<td>1.2</td>
</tr>
<tr>
<td>8</td>
<td>2160</td>
<td>14</td>
<td>0.6</td>
</tr>
<tr>
<td>Total</td>
<td>7609</td>
<td>33</td>
<td>0.4</td>
</tr>
</tbody>
</table>

The results in the table 3 show that there were a small percentage of the girls in every class. 2 (0.1%) of the girls out of 2175 girls enrolled were reported to have been pregnant in class five, 2 (0.1%) of the girls out of 2069 became pregnant in class six. 15 (1.2%) out of 1205 girls enrolled became pregnant in class seven and 14 (0.6%) of the girls out of 2160 were pregnant in class eight. This implies that in class 5, 6, 7 and eight in public schools in Ainamoi Sub-County became pregnant in the year 2015. According to Panday et al. (2009:21) school girl pregnancy has grown in significance as a social construct and as such represents one of several indicators of burgeoning schoolgirl delinquency, sexual permissiveness and moral decay. In Ainamoi Sub-County, the rate of school girl pregnancy is an escalating epidemic as shown in Table 4.

Table 4: Girls who drop out of School due to teenage pregnancy in Ainamoi Sub County (n=33)

<table>
<thead>
<tr>
<th>Girls who dropped out</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dropped</td>
<td>17</td>
<td>51.5</td>
</tr>
<tr>
<td>Came Back</td>
<td>16</td>
<td>48.5</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>100</td>
</tr>
</tbody>
</table>

The results in Table 4 showed that 17 (51.5%) of the pregnant school girls dropped out of school completely, 16 (48.5%) of the girls came back to school to continue with their studies. These show that, pregnancy of the school girls caused the girls to stop their education or delay the academic progression. This finding concurred with Grant and Hallman (2006:371) who found that only around a third of school girls reenter the schooling system post-pregnancy despite the fact that South legislation allows girls to return to school. This was confirmed by the 21 head teachers who said that pregnant school girls do not receive proper care from the parents hence may perhaps opt for early marriages. From these findings, pregnant school girls were faced with challenges that made them drop out of school. With proper care and support from the parents, some come back to school to continue their education. This finding concurred with Marteleto and Lam (2008:3) who maintained that if a girl returns to complete her schooling after the birth of a child it is because of the support received from her family and being provided with flexible child care options. However, childbearing impedes on most girls’ educational careers.

Table 5: Girls who repeated and those retained in the same class in Ainamoi sub county (n=30)

<table>
<thead>
<tr>
<th>Girls who repeated or retained</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retained</td>
<td>13</td>
<td>81.8</td>
</tr>
<tr>
<td>Repeated</td>
<td>3</td>
<td>18.2</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>100.0</td>
</tr>
</tbody>
</table>
The findings in Table 4.6 indicated that, 13 (81.8%) of the girls who came back to schools were retained in the same class after delivery. 3 (18.2%) of the school girls who came back to continue their education repeated a lower class from where they were. In the findings, 81.8 % of the school girls who came back after (giving birth) were retained in their various classes.

V. CONCLUSION AND RECOMMENDATIONS

The study found that teenage pregnancy influenced academic progression. 33 of the teenagers became pregnant in class 5, 6, 7 and 8. Out of the 33 pregnant girls, all went home for delivery. 48.5% came back to school to continue their studies while 51.5% completely dropped out of the school due to pregnancy and opted to perhaps stay at home or get married to the person(s) responsible for the pregnancy. The study therefore concluded that there were Socio-cultural effects of teenage pregnancy which included lack of knowledge by the girls, Peer pressure and the influence of mass media and this had an effect on academic progression of the girls. Poverty caused most of the girls to fall prey to men who had money therefore enticing them to have sex with them and hence getting pregnant, this had an effect on the academic progression of the girls.

It was recommended that teachers and administration should work as a team so that counseling programs of those affected in schools is developed and used effectively. It seems most school; especially public schools have no counseling support in schools.

REFERENCES


The Contribution of Parenting Characteristics on Pupils Academic Achievement in Public Primary Schools in Bungoma North Sub-County, Kenya

Barasa Alfred Mucha, Jason E. Nganyi, Pamela Buhere

Masinde Muliro University of Science and Technology

I. INTRODUCTION

According to Ngoroga (2006), parents, grandparents, siblings, aunts, and uncles play a major role in the education of their children. Children learn the first essential social, economic, and cultural skills including speech, toiletry, and moral values from their relatives. Girls usually learn behaviors and activities of older females while boys learn and imitate older males. This was because old age was equated to wisdom and indeed traditional education was effective, utilitarian and relevant. The place and duration of education by so-called traditional teachers was well defined so to the curricular age of entry and completion, also the content and methodology used was well marked in these institutions.

As relates formal education system, enrolment figures have always continued to soar up since independence. For instance the figures rose from 897,533 in 1963 to 7.2 million in 2004 (Republic of Kenya, 2007). This means that access, equity and quality pertaining educational services has been compromised due to overstretched facilities as seen in high pupil-teacher ratios, book rations and overcrowding in schools. (Republic of Kenya, 2005). These problems were aggravated by the introduction of Free Primary education (FPE) in 2003.

The introduction of Free Primary Education program in Kenya did not however divorce parents from schools. They remain supportive to the school by sending their children to schools, paying levies and are members of schools board of management (Ondieki, 1989). But since the inception of FPE in Kenya, most parents believe that education is free and so, they do not want to be involved in the education of their children any more (The Kenya National Commission for UNESCO, 2005). The role of parents in the education is very important yet they feel that since their role as fund raises has been taken over by the government, they do not have to participate in schools. But parents need to be aware of their voluntary and meaningful involvement in order to develop their children’s potential for future life. This study sought to establish the contributions made by parenting characteristics on learners academic performance.

II. LITERATURE REVIEW

Parents are the immediate relation of the child. Their financial status does have an important influence on the personality of a child. Belonging to a strong financial background, means that parents can provide the latest technologies and facilities in the best possible way to enhance educational capability of their children.

Parental socio economic factors are of vital importance in affecting pupils’ academic achievement for they are the backbone in producing financial and mental confidence to the pupils. Explicit difference can be observed between these pupils who belong to different financial status. This ensures the acquisition of knowledge and skills that enable the individual to increase their productivity and quality of life. This increase in productivity also leads towards new sources of earning which enhances the economic growth of the country. (Saxton, 2010). The quality of pupil performance remains a top priority for educators. This variable of socio economic status (SES) of parents therefore, contributes effectively to the quality of performance of the learners.

Adams in 1996 stated “low SES has a negative effect on the academic achievement because the basic need of pupils remain unfulfilled and hence they do not perform better academically”. This study of demographic and other related factors affecting pupils’ performance are rooted back in the 17th century up till now, many researches are made basing on this issue (Many, 1985) and that every factor affecting pupils’ education is worthy to be studies but the most important one is the socio economic status. For children of well to do families are said to have better facilities to their avail, they have the opportunity to be admitted in good schools which offer sound base for their future career. Besides other factors, socio economic factors is one of the most researched and debated factor among education professionals that contribute towards academic performance of the pupils (Adams, 1996). On the other hand, pupils who have financial problems are said to face various hurdles and their financial problems distract them from their studies and they fail to get high grades. Consequently, they suffer in finding jobs. The low socio economic status causes environmental deficiencies which result into low self-esteem of the pupils (US Department of Education, 2003). Above and beyond other factors, the significance of parental financial status regarding pupils’ success is prevalent. Professor Charles Desforges, (2003) reported regarding parental factors that one of the major factor was the higher the class, the higher the income and the greater the involvement and the better the academic achievement of the pupils. Laura P. Wamble, (2009) came up with findings that health related factors like nutrition, stress and amount of sleep have greater influence on the pupils academic performance. He stated that not forgetting sleep, too much activity in social area, doing part time jobs and other factors like
stress which lead to lower pupils’ grades. Eneji Ubom Bassey, (2003) proposed after doing research that SES and family type have a major influence on female students and school drop-out. Besides all school programs that are introduced to motivate pupils to raise their academic performance, these two factors still carry a major influence on pupils’ academic achievement. Kaiz U Schnabel, Corine Alfred, Jackline, S. Eccles, Olaf Kotter and Jurgen Beumart (2002) carried out research and came out with the result that SES indicators and pupils’ test scores tended to be constantly correlated and their analysis strongly supported the fact that education system implicitly accept family background on pupils’ academic performance. G.R Menon, Department of education, Karachi University Pakistan (2009) was of the opinion that socio economic element has the most important and unavoidable impact on pupils’ academic achievement. He includes factors like electricity facilities, parental involvement in children’s home assignment and parent-teacher relationship and other variables. Sheikh Eithers Hammudui, researcher, scholar (2009) stated that socio economic status was identified as a strong predictor of academic achievement as a big difference was found between achievement of high, average and low socio economic status of pupils. Prof. Charles Smith (2006) opined that parental involvement is strongly related to family socio class and the more the involvement, the greater the pupils’ achievement. Shoukat Ali of Islamic University Bahawal Bur (2011) proposed that there is a positive relationship between income of parents and pupils academic achievement. Harries (2008) carried out a research on the factors affecting pupils’ academic achievement and came out with the result that “the higher the level of SES, the best the indicator towards the quality of pupils’ academic achievement”.

Ramney and Ramney (2013) opined that “across all socio economic groups, parents face major challenges when it comes to providing optimal care and education of their children”. Sometimes, the basic needs are lacking and parents must place as top priority: housing, food, clothing and medical care. These without financial base cannot be met. A child’s parental level of education is an important predictor of his or her educational and behavioural outcome, (Davis-Kean, 2005). Dearing MC Courtney and Taylor, 2002; Dancan Brooks and Kuon and Klebonor, 1997). The majority of the research on the way in which parental education shapes the child’s outcomes had been conducted and found out long term effects on the child’s education and occupational success.

A parent’s education level would predict the quality of family interaction patterns during childhood that are linked more direct to the child’s development of academic success and achievement. In the general social learning and social cognitive framework, (Bandura, 1986), behavior is shaped through observational and direct learning experiences which then leads to formation of interlined cognitive scripts, values and beliefs that guide and maintain behavior over time. Thus for instance, a child is exposed to parents who models achievement oriented behavior e.g. obtaining advanced degrees, reading frequently, encouraging work ethics and providing opportunities in the library and museum trips, after school enrichment programs, educational books and videos etc. which provide the guiding belief that achievement is to be valued and anticipated. This belief in turn promotes successful outcome across the development including high school graduation. The pursuit of high school learning and the acquisition of high prestigious occupation, not surprisingly, there are positive relations between parental level of education and parents’ expectation for their children to succeed (Davis-Kean, 2005) suggesting that more highly educated parents actively encouraged their children to develop high expectations of their own.

Jacqueline & Eccles and Pam-Keane Davis (2005) stated that the relation of parents’ education and their children’s academic performance rests upon quite some specific beliefs and behaviours. Parent’s educational qualification is linked with their language competence in the manner in which parents communicate with their children. As a mother shares closer bond with her children than the father, so mothers education is more important. On the other hand, education is necessary for fathers are the breadwinners and SES rests upon their shoulders. Karshen (2005) says that pupils whose parents are educated score highly on standardized test than those whose parents are not educated. Educated parents can better communicate with their children regarding school work activities and information being taught at school.

According to Project Appleseed (2007) (which followed Joyce L. Epstein’s (1995) theoretical model of parents/school/community relationships) parenting aims to help all families establish home environments that will be able to support children as students. Parents can show involvement by establishing appropriate guidelines for their children: talk with them at home about their interests, activities and their friends and explain their hopes and goals to their children. Monadjem (2003:28) indicates that parenting includes; supervision and provision of a home environment that enables children to become responsible, self-confident, self-reliant persons with socially acceptable behaviour and who are able to learn. In practice, schools can encourage parental involvement by recognizing programs that offer family support to assist families with child rearing skills, health and nutrition and giving tips for creating conditions that sustain learning at every stage, grade and level. The most basic involvement of the parent is meeting the children’. Home visits to help families of pupils, understand schools as well as enable schools to understand families are essential (Epstein & Sheldon, 2005). Schools also provide information through documents, workshops, videotapes or classes to all the parents. Schools must show respect for the diversity of cultures, beliefs, values, needs and goals as well as other courses for parents (Project Appleseed, 2008). Moreover, parents must also supply school-related needs to their children. Furthermore, to enable families to share information about culture, children’s talents and needs with schools, all information for and from families must be clear, usable and linked to children’s success in school (Epstein, 1995).

Epstein & Sheldon (2005) have named the benefits of parenting for pupils, parents and teachers as follows: for pupils, respect for parents is created and the awareness that family supervision is ongoing becomes obvious, positive personal qualities, behaviour, beliefs and family values develop. Management of time for home chores, homework and other activities becomes possible. Awareness of the importance of school is created and attendance improves. Parents have an awareness of their own and other people’s challenges in parenting. They feel support from the school and other parents
parenting greater confidence and understanding of parenting, child and adolescent development and how to change home conditions for their children to learn as they proceed through school. Teachers also gain an understanding of families’ backgrounds, cultures, concerns, goals, needs and views of their children.

Similar benefits have been identified by other researchers on parenting programs. Innes (1999:6) found that there is a positive relationship between parents who provide school based learning materials and books for their young children at home and learner achievement. In addition, the Australian Council for State Schools Organization, ACSSO (2006) observed that improving the home environment increased pupils’ school achievement, parents’ confidence to consult teachers and their understanding of their children and it resulted in closer relationships between parents and teachers. Such improvement in the home environment has lasting effects (Project Appleseed, 2007:7).

Monadjem (2003:30) found that a positive parenting style was more important for children’s reading achievement, reduced learning difficulties to the extent to which parents were involved at school. She adds that parenting moderates the impact of parent involvement by influencing the extent of parent-child interaction. England and Collins (2008) also observed that the expected graduates had higher levels of parent involvement in middle childhood, more supportive parent/child relationship in early adolescence and higher levels of social competence with adults than expected drop-outs. Georgiou (2005) found that anxious parental pressure on the child relates negatively to children’s achievement, while pupils whose parents adopt an authoritative parenting style, accept, nurture, encourage and are emotionally responsive to their children had positive achievements. Children whose parents attribute their achievement to the child’s own effort have been found to have better academic results than those whose parents attribute their achievement to luck, ability or other people (Georgiou, 2008).

Zellman and Waterman (1998) observed that parenting enthusiasm motivated parental rather than child behaviours enabling parents to see themselves as effective teachers of their own children and possibly leading to other positive child outcomes such as a more positive attitude to school. Home supervision and modeling the child’s learning encourages the child to read at home, limits its time to watch television resulting into positive child outcomes. (Peterson and Ladkey, 2007).

Bailey (2006) notes that parenting impacts student learning outcomes for children as they complete home-learning activities. Ingram, Wolfe and Liebman (2007) suggests that schools having low learner achievement could benefit from focusing parent involvement efforts on building parenting capacity and encouraging learning at home activities. A survey by King, Kraemer, Benard and Vidourek (2007) showed that parents prefer authoritative parenting style and were interested in receiving training in parenting which developed feelings of efficacy and closer relationships inside the family and which will in turn, influence the achievement of the children. The foregoing suggests that pupils succeed academically, socially and emotionally when their parents are involved in their education or social activity to become more well-rounded and balanced individuals. Pupils realize their parents are concerned in their education, and that remaining and succeeding in school is worthwhile (High school completion Rate Task Force Report Recommendation 11, 2004).

### III. Methods and tools

This study adopted a survey research design. Survey research design was ideal for this study because it is used to investigate population by selecting samples to analyze and discover occurrence, it provides numeric description of part of the population, it describes and explain event as they are and as they will be. This design was selected because it is economic to be used, provides rapid data collection and it is easy to understand a population from a part of it that was provided. The researcher used a descriptive data analysis technique where statistical methods were used by quantifying the respondents views and expressing them as frequencies and percentages at 0.05 level of significance. In this level the researcher was 95% confident that any difference noticed were due to parental related factors and not as a result of chance only 5% cases were due to chance (Oso & Onen, 2008). The sample size was 187 pupils. Questionnaires were used to collect data.

### IV. Findings and discussion

The study sought to establish the nature of people the pupils were staying with after school.

<table>
<thead>
<tr>
<th>Table 4.1: Persons staying with pupils</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Girls</strong></td>
</tr>
<tr>
<td>Staying with</td>
</tr>
<tr>
<td>Mothers</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>Boys: Staying with</td>
</tr>
<tr>
<td>Mothers</td>
</tr>
<tr>
<td>23</td>
</tr>
<tr>
<td>Guardians</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>47</td>
</tr>
<tr>
<td>42</td>
</tr>
</tbody>
</table>

Source: Research data 2017

From the table, 4.1 above, those pupils who were staying with mothers alone accounted for a quarter those who were staying with fathers alone accounted for less than one eighth of the total those who were staying with guardians accounted for about a quarter while both parents accounted for half of the total. This means that majority of the pupils are staying with both parents and this means that the two parents were providing enough resources to meet the needs of their children in school. On whether the pupils had siblings or not, the data gathered revealed the following: the girls who had siblings were 91 and that with no siblings was 1 while boys who had siblings were 86.
and those without siblings were 9. The results were as shown in table 4.5 below.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>91</td>
<td>1</td>
</tr>
<tr>
<td>Boys</td>
<td>86</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>177</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: Research data 2017

From table 4.2, girls with siblings accounted for over half of the total boys with siblings accounted for over a quarter. Girls without siblings were only less than an eighth while boys without siblings accounted for less than one eighth. This means that majority of both girls and boys had siblings meaning that they shared resources from their parents. This led to stressing the available resources.

Table 4.3: pupils with siblings by number:

<table>
<thead>
<tr>
<th>Siblings By Number</th>
<th>0</th>
<th>1-2</th>
<th>3-4</th>
<th>5-7</th>
<th>Above 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>3</td>
<td>41</td>
<td>39</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>Boys</td>
<td>12</td>
<td>39</td>
<td>38</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>80</td>
<td>77</td>
<td>40</td>
<td>3</td>
</tr>
</tbody>
</table>

From the table 4.3 above, pupils who had no siblings accounted for less than one eighth those with 1-2 siblings accounted for about a quarter and those with more than 7 siblings less than one eighth. The above data shows that majority of households in Bungoma North have more than one child. This makes it hard for parents to provide relevant resources for their school children. On the class positions the pupils held the previous term, data collected revealed the following: that both girls and boys competed favorably as almost on equivalent number of girls held positions 1-5, 6-11, 12-17, 18-23 etc. Also both similar number of girls held positions from 24 onwards and so the table below:

Table 4.4: Previous class positions by gender:

<table>
<thead>
<tr>
<th>Class positions</th>
<th>1-5</th>
<th>6-11</th>
<th>12-17</th>
<th>18-23</th>
<th>Above 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>28</td>
<td>26</td>
<td>13</td>
<td>07</td>
<td>21</td>
</tr>
<tr>
<td>Boys</td>
<td>37</td>
<td>15</td>
<td>11</td>
<td>09</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>41</td>
<td>24</td>
<td>16</td>
<td>33</td>
</tr>
</tbody>
</table>

Table 4.4 above shows that girls who held positions 1-5 accounted for less than a half the total 6-11, less than half of the total position 12-17, about one eighth, 18-23 were less than one eighth while those who were above position 23 accounted for less than a quarter. For the boys, those who held positions 1-5 accounted for about a half, 6-11 were less than a quarter, 12-17 were about one eighth, and 18 – 23 were less than an eighth while those who were positions 23 and above accounted for about one eighth. The above data reveals that there is favorable competitions between boys and girls in Public Primary Schools in Bungoma North Sub-County.

On the total marks obtained by both girls and boys, data revealed the following: That over half of the pupils get between 250-350 marks only a few get between 150 and 200 marks while a few boys and girls get above 350 marks as shown in the table below:

Table 4.5: Range of mark scores by boys and girls:

<table>
<thead>
<tr>
<th>Range of scores</th>
<th>&lt;150</th>
<th>150-200</th>
<th>201-250</th>
<th>251-300</th>
<th>301-350</th>
<th>Above 350</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>4</td>
<td>13</td>
<td>25</td>
<td>24</td>
<td>20</td>
<td>13</td>
</tr>
<tr>
<td>Boys</td>
<td>1</td>
<td>08</td>
<td>30</td>
<td>25</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>21</td>
<td>55</td>
<td>49</td>
<td>32</td>
<td>27</td>
</tr>
</tbody>
</table>
From the table 4.5 above Girls who got below 150 marks accounted for less than an eighth, 150 – 200 were one eighth, 201 – 250 were a quarter, 251 – 300 were a quarter, 301 – 350 were less than a quarter while those who got 351 marks and above were, one eighth Boys on the other hand had those with <150 marks as, less than a quarter 150 – 200 were about one eighth 201– 250 were, over a quarter, 251 – 300 were over a quarter, 301 – 350 were, about one eighth, while those with over 351 marks were, over one eighth. The above statistics shows that the sub-county has just an average performance with some pupils getting less than 200 marks out of the total 500 marks.

On whether the pupils improved from the previous term, the data collected showed the following: That majority of the pupils both girls and boys improved making about three quarters of the total number of pupils while those who went down or dropped both girls and boys were about a quarter of the total number of pupils who participated in this research.

Table 4.6: pupil’s improvement or drop in performance by gender.

<table>
<thead>
<tr>
<th>Pupils by gender</th>
<th>Improved</th>
<th>Dropped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>57</td>
<td>16</td>
</tr>
<tr>
<td>Boys</td>
<td>48</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>105</td>
<td>34</td>
</tr>
</tbody>
</table>

From the table 4.6 above, girls who improve on the previous term’s performance accounted for over half the total while those who dropped accounted for about a quarter of the total. As for the boys who improved were over half the total while those who dropped were over a half a quarter of the total. On those who improved or dropped by marks and by gender, the following data was collected:

Table 4.7: Range of marks for the girls.

<table>
<thead>
<tr>
<th>Girls</th>
<th>1-10</th>
<th>11-20</th>
<th>21-30</th>
<th>31-40</th>
<th>41-50</th>
<th>Over 51</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved</td>
<td>9</td>
<td>12</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Dropped</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4.7 above reveals that more than half of the girl respondents improved by between 1-30 marks and only about a quarter of the girl respondents dropped by between 1-20 marks. From the above table, the data showed that more than half of the boy respondents improved by between 1-40 marks while the same respondents who make up less than a quarter dropped by between 1-20 marks.

On the reasons why the pupils improved, this research gathered the following data: that the pupils had good preparations by working hard, that they set goals which they focused on, that they completed the syllabus in time, that they always attended all lessons to receive teachers guidance, that they were supported by their parents in terms of guidance, revision materials and other resources that they held regular class discussions, had enough revision material provided by parents, received teachers guidance through consultations, used timetable and honored them and that they were disciplined throughout their studies. On the reasons why the pupils dropped, the following data was gathered: That they lacked enough resources for revision, lacked parental guidance, had wrong company, they lacked understanding they lacked time for revision among other reasons.

How the family socio-economic status of the parents affects pupils academic achievement in public primary schools in Bungoma North Sub-County.

The first objective of the study was to find out how family socio-economic status of the parents affects pupils academic achievement in public primary schools. The study first established the socio-economic status of the parents. The summary of the results were as discussed below;

The researcher sought to know whether the pupil’s parents were alive or not. Data collected from the field showed that over three quarters of the parents were alive and less than a quarter of them were not alive. The results indicated that 135 parents were alive while 4 were dead. The study further showed parent’s highest level of education attained. Data collected from the field indicated that more than half of the parents had attained a certificate level of education, a quarter of them had attained Diploma level while there was none who had attained Degree level of education. The study further established the professional training of the both parents i.e. mother and father. Data collected showed that almost half of the total number of parents had not attained any professional training. Less than a quarter of them had attained apprenticeship training. Slightly a quarter of the mother parents had professional certificate training. Those who had Diploma Professional Training were less than a quarter of the total population of the parents while there were just few parents with Degree training. On the father’s professional training, the following data from the field was collected. These who were not trained were only slightly above a quarter of the total number of parents. Those who had had Apprenticeship Certificate were less than a quarter of the total population. Those with Certificate Training were about a quarter of the total while those with Diploma Training were about a quarter and lastly those with Degree Training were less than a quarter.
On whether the pupils’ parents were working or not, the researcher gathered the following data from the field: That those who were not working were slightly above a quarter, those who were working part time were also slightly above a quarter so to those who were working on full time basis. On the present situation of the parents, the researcher learnt from the collected data that parents who were on age retirement were slightly above a quarter of the total number of parents. Those in early retirement were less than a quarter of the total population. Those who never worked in their life were almost half the total population and those who were exclusively house wives and or house husbands were less than a quarter of the total parents. From the results, quarter of the parents had already left employment due to retirement almost another quarter left due to early retirement, nearly half of the parents had never worked in their life and the remaining little fraction were either house wives or house husbands. This made the household income to be very difficult indeed.

The study established how long the parents worked over a quarter of the parents had never worked in their life, a quarter of them had worked for over 21 years, less than a quarter had worked for between 16-20 years, another group of less than and one eighth had worked for between 11 – 15 years. About one eighth had worked for between 6 – 10 years and lastly about a quarter of the population of parents had worked for between 1 - 5 years. From the above table therefore, majority of the class eight parents had not worked then those who had worked for over twenty years and were almost retiring, then followed by those who were young because had only worked at most five years and lastly those who had been in employment between ten and fifteen years.

The study further established the class eight parent’s last titles held before coming out of employment. There were those who were just farmers, teachers, doctors, nurses, agriculturalists and other employments. From the results one quarter of the parents worked in various sectors of the economy. They were followed by those who worked in the Agricultural sector, followed by those working as Teachers, followed by Engineers of various kinds Jua Kali artisans etc, then doctors and lastly nurses.

The study also sought to know the parents’ last position held. Statistics from the field indicated that some parents had retired or lasted held positions as: Laborers, unskilled workers, trained on the job, self-employed and other. From the results, majority of the parents just trained on the job, followed by those parents who were self-employed, then those from various other employments not listed, followed by laborers and finally those who worked as unskilled. The study established the parents’ other sources of income apart from employment. There were those who received income from pension from former employers, others from self-employment while there were those who did not receive any earnings at all. From the table above, three quarters of the parents earned their living from self-employment, less than a quarter got income from other sources while only an eighth got pensions from their former employers. The researcher sought to know the parents Socio-Economic status from class eight class teacher on whether the class teachers meet with parents, statistics from the data gathered showed that all class teachers had usually met with parents.

On the occasions when class teachers met with their parents, class teachers reported meeting with parents on occasions like Annual General Meeting (AGM), Class Eight Class Meeting, Academic Days, during release of monthly examinations, at the beginning and end of the term and during sensitization meetings etc. On the majority gender that attends the above meetings; all the class teacher’s reported that it was the female gender always. On the reasons why the female made up of majority of those parents who normally attend class eight meetings, the class eight class reported reasons as: Men’s fear of responsibilities, men were often drunkards, male being committed elsewhere, male being employed away from home, male being ignorant of value of education, female closeness to their children, female being single mothers and attitude of social roles that only allowed women to attend as part of their role.

The first objective of the study was to examine how socio-economic status of the parents affect pupil’s academic achievement in public primary schools in Bungoma North Sub-County. The aggregate mean score of academic achievement were regressed against the aggregate mean score socio economic status of the parent and the results recorded in Table 4.8.

### Table 4.8: Goodness of fit Analysis of socio economic status and pupil’s academic achievement

<table>
<thead>
<tr>
<th>Sample size</th>
<th>R (Beta)</th>
<th>R Square</th>
<th>Adjusted R²</th>
<th>Std. Error of the Estimate</th>
<th>p. value</th>
</tr>
</thead>
<tbody>
<tr>
<td>220</td>
<td>.591</td>
<td>.315</td>
<td>.233</td>
<td>0.102.0003</td>
<td></td>
</tr>
</tbody>
</table>

From the results in table 4.8 above, socio-economic factors have a statistically significant effect on pupil’s academic achievement (β = 0.591 and p-value = 0.0003). The results in table 4.12 above show that house parents’ socio economic status had a statistically significant positive effect on pupil’s academic achievement (β = 0.591 and p-value = 0.003). The results indicate that there is a statistically significant positive association between parent’s socio-economic status and pupil’s academic achievement since the Karl Pearson’s r value of 0.591 is statistically significant and positive.

A chi-square test of association (correlation coefficient) was carried out to determine the association between parental
socio-economic status and pupil’s academic achievement. The study established out a Chi-square, \( \chi^2=67.922, \text{DF}=1, p=0.001 \). The results were statistically significant since \( p<0.05 \). This implied that parental socio-economic status has a significant difference on the pupil’s academic achievement. The study therefore rejected the first hypothesis and concluded that there is a significant difference in parental social-economic status and pupils academic achievements.

How parental level of education affects pupils’ academic achievement in public primary schools.

The second objective of this study was to how parental level of education affects pupils’ academic achievement in public primary schools. From a total 20 class eight teachers who participate, 6 said parents were difficult to make any called for payments in their children’s school. 7 said, some were forced to participate but they only paid reluctantly but 8 class teachers said that parents were willing to pay for any called for item to be paid for. The results revealed that less than a half of the parents are willing to pay for any requirement, others of almost equal number though paid but only if coerced while almost similar number did not make any efforts to participate at any cost.

The study established some of the things which the parents were made to pay for: monthly examinations, firewood for their children’s lunch, boarding fees, latrines, desks, field trips food (Maize and Beans), remedial fee, teachers’ welfare and kitchen utensils etc. The study further established whether parents supported school programs. Those who said parents supported school programs were more than a half the total number while those who said that they did were less than a half. The researcher also sought to know the Socio-economic status of the parents. The economic status of the parents was classified as; high, middle and low status. From the results there were zero parents in the very high status, less than half in middle status while we had similar number of parents high and middle status which was less than a half but slightly above a quarter of the total. The study further established the level of education of the class eight parents. Data collected showed that more than half of the parents had only had primary education level. A quarter had attained secondary education level and there were no parents with Diploma or Degree education. From the results, there were zero parents engaged as business people, zero number engaged as working class, 8 said parents are self-employed while 12 said the parents are either housewives or house husbands. From the results more than half of the parents are either housewives/husbands, about half are in self-employment but there were zero working class parents and zero Business parents.

The study further established things that parents did for their school children. The things they did included: acting as role models, helped in homework, were supportive, discussed school issues, cooperated with school administration, corrected/guided their children, attending school functions, bought/provided revision resources, accompanied children on school trips and visiting schools. From the results, it was evident that majority of the parents did what their children’s school required except that most of them were not willing to buy revision materials and were not willing to accompany their children to field trips. Moreover, the study sought to know from the pupils their parents did for them. Some of the things the parents did for them included: Buying all materials, giving guidance and encouraging in studies, checking and helping the homework, attending school visits and academic days, supporting school programs, accompanying them on trips, participating in school management boards and providing expert knowledge as resource persons.

The results showed that most parents take an active role in the education of their children. The researcher then wanted to know from the pupils some of the essential things that their parents bought for them in lieu of their studies. From the data collected, those who said that parents bought them materials were 133 while those who said their parents did not buy them anything in terms of materials were 55. This was over half the total and over a quarter of the total respectively. On those parents who gave guidance and encouragement in studies, the statistics showed the following: those who said “Yes” were 175 and those who said “No” were 15. This meant that majority of the parents accounted for over half the total guided and encouraged their children in studies while less than one eighth parents did neither guide nor encourage their pupils with class work.

On the checking and helping their children with homework, the pupils reported that those who were guided and helped in homework were 132 while those who did not were 30. This accounted for over half the total while those who did not accounted for about one eighth of the total. The researcher also sought to know from the pupils, those pupils whose parents visited them in school and attended academic days. Data showed that those who attended academic days and visited their children were 162 while those who did not were 30. This accounted for over half the total and less than a quarter of the total respectively. The study established from the pupils whether their parents supported school programs. Data collected revealed that 139 said the parents supported school programs. 50 pupils said that their parents did not support school programs. From the results about nearly three quarters of the pupils said their parents supported school programs. About a quarter said their parents don’t support the school programs and only about 4 pupils did not know what to say. The researcher then sought to know from the pupils whether their parents accompanied them to school tours. Data collected showed that 64 pupils had their parents accompanying them to school trips, 115 pupils said that their parents never bothered to accompany them while 13 pupils did not say whether their parents accompany them or not. From the results three quarters of the parents were said not to have been accompanying their children on trips, about a quarter accompanied them while only a small fraction did not say whether their parents accompanied them or not. On whether the parents participated in School Management Boards, the data collected showed that 64 pupils said their parents participated in being elected as Board of Management Members. 114 pupils said their parents did not participate while 13 pupils did not say whether their parents participated or not.

From the results, half of the parents of the children did not participate in Management of Schools as opposed to the Policy Ministry of Education which mandate parents to be members of the school Management Boards. Only about one quarter participated as Members of the Board while a small fraction of the total did not say whether their parents participated or not.

Data collected showed that 99 parents provided expert knowledge to schools as resource persons while 85 pupils said
their parents did not while only 7 pupils did not know what to say. From the results a half of the parents offered expert knowledge to schools as resource persons. About half again did not offer their expert knowledge to schools. A small fraction remained in doubts as to whether their parents participated or not. Table 4.13 show the summary of the results discussed above.

A chi-square test of association (correlation coefficient) was carried out to determine the association between parental level of education and pupil’s academic achievement. The results indicated a chi-square value ($\chi^2=127.602$, DF=1, $p=0.003$). This implies there is a statistically significant positive association between parental level of education and pupil’s academic achievement since $p<0.05$. This implied that parental level of education has a significant difference on the pupil’s academic achievement. The study therefore rejected the second hypothesis and concluded that there is a significant difference in parental education level status and pupils academic achievement.

**Parenting and effects on Academic Achievement.**

On whether the majority are single or two parent families, data revealed that: Majority of the class eight parents which is more than half are two Parent families while less than a quarter of them are single families i.e. 16:4 which is equivalent to over half the total and about a quarter of the total respectively. On the families that co-operated in participating in the education of their children, the following data was gathered: Three quarters of the two family parents were said to be co-operative while a quarter of the total respondents said that Single Parents co-operated. These accounted for three quarters of the total of the Two Parents who co-operated and only about a quarter Single Parents are said to co-operate.

On the Mother only or Father only, the following data was revealed from the field. Mother only families accounted for all Single Parent families. Father only families, it was said are rare and that this was because fathers are abusers of drugs and this reduced their lifespan. On the reasons for there being single families of only one category i.e. Single Mothers, various reasons were given among which were; Deaths, divorce, separation, getting children out of wedlock, Hiv/Aids, disaster, male deserting elder wives after remarrying, mother’s closeness to their children, men running away from their responsibilities, the nature of employment for men normally away from home, men’s negative attitude towards education, and early pregnancies.

On problems in children from single families, data revealed that; most of the experience some of the following problems; Lack of material support for education and that the most hit are girls, that, they lacked balanced parental love and guidance, that most of them live in abject poverty, that most of them played truancy, lacked basic needs like food, clothes and medical care.

On the gender of children who have problems with school, it was revealed that majority of those who get more problems are girls with reasons that they do get more problem as they undergo physical changes. This is the time that they needed parental care and material provisions. They made up more than half the total participants i.e. over half the total while those who said male gender accounted for over a quarter of the total.

On the children who are more negatively affected by the absence of only one parent, data revealed that majority of those affected are girls, that some are left in the home where they act as mothers for their other siblings, some are abused by their step fathers who come in to console their mothers while some suffer for lack of essential provisions as they undergo emotional and physical changes. They made up about over half the total while others said that the most affected are boys who are often neglected by their step fathers. They made up about a quarter of the total.

The researcher also sought to know from the class eight pupils, the type of families they came from. Data gathered revealed that over half of the pupils came from Two Parent (TP) families, about one quarter of the total number of the children were staying with guardians while less than a quarter of the total number were staying with single parents. This is shown in the table below.

<table>
<thead>
<tr>
<th>Family Type</th>
<th>T.P</th>
<th>S.P</th>
<th>Guardian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>142</td>
<td>19</td>
<td>26</td>
<td>188</td>
</tr>
</tbody>
</table>

The researcher sought also to know from the pupils the person they were staying with at the time. Data gathered revealed that over half of the pupils were staying with their two parents. Over a quarter were staying with guardians, about a quarter were staying with single fathers.

<table>
<thead>
<tr>
<th>People they stay with</th>
<th>T.P</th>
<th>Mother only</th>
<th>Father only</th>
<th>Guardian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>120</td>
<td>29</td>
<td>03</td>
<td>40</td>
<td>192</td>
</tr>
</tbody>
</table>

From the above data, it is single mothers that are taking care of the children alone as a result of deaths of fathers, divorce or children were born out of wedlock. Father only parents are as a result of deaths of mothers, divorce or separation. The guardians on the other hand are taking care of orphans resulting from deaths through Hiv/ Aids.

The researcher again sought to know from the pupils whether their parents supported school programs or not. From the data gathered, 169 pupils said that their parents supported school programs while 50 pupils said that their parents did not support school programs. From the above data therefore, those parents who supported school programs accounted for over half the total while those parents who did no support school programs accounted for a quarter respectively.

The researcher also sought to know whether school parents accompanied their children on school tours and trips to learning areas. From the data collected, 64 pupils said their parents accompanied them on trips and tours to learning areas while 115 said their parents were never willing to accompany them. This meant that those pupils whose parents accompanied them on tours and trips made up over a quarter while those whose parents did not accompany them on trips and tours was over half of the total.
On their parents participation in School Management Boards, data gathered showed that 64 pupils said their parents did not participate 114 said their parents were willing to participate in School Management Boards. This meant that only over a quarter were willing to participate in the running of the school as Management Board members while over one quarter of the total the members are not willing to participate. The researcher also sought to find out whether class eight parents provided expert knowledge as resource persons to schools. 99 pupils said their parents provided expert knowledge to school while 85 pupils said their parents did not. From the above data, it means those who offered expert knowledge accounted for over half the total while those who did not accounted for over one quarter of the total respectively.

The researcher again sought to know from the pupils the type of family that they came from. From the data collected, those pupils who said they came from Two Parents (TP) families were 142, those from Single Families (SP) were 19 while those who stayed with guardians were 26. From the above data, it meant that those who came from Two Parents families accounted for over half, those from Single Parent (SP) families accounted for about an eighth of the total while those who stayed with guardians accounted for less than a quarter respectively.

The researcher also sought to know the person the class eight pupils were staying with at the time of research. The data collected showed that 120 pupils were staying with the Two Parents (TP), 29 pupils were staying with only their mothers, 3 were staying with their fathers alone, while 40 pupils were staying with their guardians. From the above data those pupils who were staying with Two Parents accounted for over half the total those who stayed with mothers alone accounted for less than an eighth, less than an eighth were staying with fathers alone while those who were staying with guardians accounted for about a quarter of the total respectively.

The researcher also wanted to know from the pupils some of the essential learning resources that their parents provided and those they did not. From the data collected, this was shown in the table below;

<table>
<thead>
<tr>
<th>Text Books</th>
<th>Exercise Books</th>
<th>T.V Sets, Computers</th>
<th>Pens, Rubbers</th>
<th>Pencils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>113</td>
<td>62</td>
<td>166</td>
<td>28</td>
<td>08</td>
</tr>
</tbody>
</table>

From the table 4.11 above, over half of the pupils were provided with text books, over three quarters of the pupils were provided with exercise books, less than one eighth had T.V sets and Computers provided by their parents while over three quarters of the pupils were provided with pens, pencils and rubber etc. The results further reveal that 108 pupils reported that their parents lacked money to provide them with such resources. This was over half of the pupils out of 191 who participated. 81 reported that their parents had the money. This was about half the total who participated, 58 pupils reported that they could not be provided with those resources because their parents were not there. 86 pupils reported that their parents were not able to provide these resources, 50 pupils reported that their fathers alone could not provide them with those essential resources, 91 pupils reported that fathers though single parents and alone could just provide for these essential resources, 27 pupils reported that guardians were just not willing to provide these essential resources to them. However, 111 reported that guardians were caring and provided for their welfare, 81 pupils reported that their parents were not able to provide for their essential resources. 56 pupils however, reported that their parents were able to provide them with these essential resources.

From the study 81 pupils reported that the provision of such resources enabled them to do well in their studies, 90 pupils reported that lack of these resources made them not to do well in their studies, those who did not know what to say were only 07. Further 183 pupils reported that they had two parents while 05 pupils reported having only one parent. From the above data, it means that children with Single Parents accounted for less than an eighth of the total while those pupils with two parents accounted for only over half the total. The researcher also sought to know the gender of pupils from Single Parents that performed well in class work. From the data collected, those who said the boys did well were 104 while those who said the girls did well were 81. From the above data over half of those children from single parents who did well in class work were boys and less than half the total number who did well were girls. The researcher also sought to know from class eight teacher information about class eight Single Parents. Data collected revealed that 17 teachers said their parents were Two Parents families while 3 teachers said theirs were Single Parents.

From the above data over three quarters were two parent families while less than a quarter were single families. The researcher again sought to know from class eight class teachers those parents who co-operated with the School Administration. Data collected reported that over half the Single Parent families do co-operate while only a quarter of the parents from two parent families co-operated. The researcher again sought to know about Mother only families and Father only families. Mother families were 20 making 100% of the single families.

The researcher also sought to know from teachers the reasons for existence of these single families which were made up of single mothers only. Teachers gave among reasons as; Natural death, death accruing from Hiv/Aids, divorce, separation, early pregnancies and male parents who work away from their homes as reasons for existence of majority single parents. The researcher also wanted to know from the teachers some of the problems with children from Single Parents. Data collected showed that problems with children from such families included; truancy, lack of basic learning resources, poverty, lack of

[www.ijsrp.org]
material support, lack of balanced parental love and guidance. The researcher then sought to know from the teacher among children from Single families, the gender that was most affected with problems. Data collected indicate as follows: boys were 03, girls were 11 while both boys and girls were 06.

From the above data over half of the gender that is affected by single parenting problems were female gender, about a quarter said both gender are affected while less than a quarter said the boys were affected. On those who were negatively affected by the absence of one parent, data collected showed that 6 said boys were affected while 14 teachers said girls were affected. From the above data, almost three quarters of the girls are affected by the absence of one parent while only a quarter of the pupils who are affected by the absence of one parent are boys.

V. CONCLUSIONS AND RECOMMENDATIONS

It was established parenting plays a key role in learners scores at school. Although government support cannot be underscored, parents involvement is learning cannot be ignored.

There is need for a new policy in the Ministry of Education that is meant to check and regulate the number of children each parent needs to have in order to save parents from straining and stretching schools available resources. The researcher suggests that a new policy on parental participation be generated and put in force to ensure that every parent participates in the education of his/her child. There is need for the Kenyan government to formulate a uniform school program for Public Primary Schools to ensure uniformity in school activities in all primary schools in the country in course of the year to realize uniform parental participation.

REFERENCES


AUTHORS
First Author – Barasa Alfred Mucha, Masinde Muliro University of Science and Technology
Second Author – Jason E. Nganyi, Masinde Muliro University of Science and Technology, jnganyi@mmust.ac.ke
Third Author – Pamela Buhere, Masinde Muliro University of Science and Technology
Family Factors and Women Entrepreneurial Motivation in Nigeria: A Survey of Selected Women Entrepreneurs in Kogi State

Abeh, Aondoseer, Umar Kadiri & Odekina A. Felicia

Department of Business Management, Federal Polytechnic, Idah, Kogi State, Nigeria

Corresponding Author: itabson@gmail.com

The study investigated the impact of family factors on women entrepreneurship in Kogi State, North Central Nigeria. The family is a source of finance and human resources, social and cultural values, and role modelling. While studies have shown that family background is one of the numerous determinants of entrepreneurial intention, we know little about the influence of family factors on entrepreneurial intentions in Nigeria, particularly among women. Data for the study were collected through primary source. The study surveyed women entrepreneurs in three Local Government Areas, (LGAs); (Lokoja, Okenne and Kabba) of Kogi State. 340 questionnaire were administered to women entrepreneurs who were sampled through Yaro Yamane while Bourley’s proportion allocation formula was used to determine samples for the various LGAs. The sample was arrived at using stratified sampling in the first instance, and simple random sampling was done afterwards to get the required respondents. The study adopted the use of tables, simple percentage and mean in the presentation of data while the Pearson Correlation was used in the test of hypotheses. Findings revealed moderate positive coefficient of correlation between desires to be closer to the family; participation in family business; desire to leave legacy to family members; desire to support family members and women entrepreneurial motivation. More and more women are starting new business, whether micro, medium or large scale, motivated by mostly family factors and survival in a male predominant societies, and women entrepreneurs are creating employment opportunity and generating income. It was recommended that there should be improvement in societal encouragement of women’s participation in economic issues, nation building, innovation and productivity.

Keywords: Family, Factors, Women Entrepreneurship

Introduction

The economic reform introduced by the various governments in the developing countries that began in the 1980s leading to loss of public sector employments and reduction in income pushed many people to become entrepreneurs in developing countries. Eijdenberg and Masurel (2013) state that people in developing countries are more driven by poverty, survival, and lack job to become entrepreneurs while in the developed economy entrepreneurial activities stem out of desire to seize an opportunity and innovation to start a business. The prevailing harsh socio-cultural factors coupled with high poverty rate and unemployment propel a high rate of entrepreneurial activities in developing countries of world. Socially imposed challenges have indeed continued to hamper development and growth of women entrepreneurs in developing nations.

Entrepreneurial motivation is a function of a variety of factors irrespective of the gender involved. The classification of these factors by researchers is based on a number of variables and construct. A close examination of the factors will reveal that the categorizations are contingent upon environmental circumstances surrounding the writer at the instance. The classification of these factors varies from author to author. For instances, Bartol and Martin (1998) classified these factors into (i) Personal characteristics, (ii) Life-path circumstances and (iii) Environmental factors. While Sexton and Vasper (1982); Hisrich and Brush (1986) and Gelin (2005) findings classified these factors into push and pull factors. The results of their findings revealed that most women under their study cited push factors as their major motivation into business. These factors include; factors of gender bias, frustration and boredom in their previous jobs, and cultural practices, while pull factors include; independence, autonomy, financial and family security.
Venturing into entrepreneurship as a woman presents the omni-challenges of undertaking business activities effectively and at the same time attempting to satisfy all other social expectations (Schaefer, 2003). These challenges may include malevolent sexism which in the words of Eden et al (2012) engenders the full Machiavellian manipulation of economic factors aimed at exploiting and relegating women politically. Considering the various challenges and obstacles facing women entrepreneurs, particularly in Nigeria such as gender discrimination, family pressure, cultural beliefs, capital inadequacy, unavailability of the required infrastructure, shortage of manpower to mention but few, someone may quickly conclude that women are usually discouraged from venturing into enterprise development. But today, the story is a different one; women are starting and growing businesses at an unprecedented rate, because more than ever before, women are forced into alternative avenues of generating income for the family with greater number of them setting up businesses as a result of chronic poverty, corporate glass ceiling and high unemployment (Madichie, 2009). This study therefore, seeks to assess the relationship between family factors and women entrepreneurship in Kogi State, North Central Nigeria.

Objectives

The general objective of the study is to investigate the influence of family factors on the growth of women entrepreneurship in Kogi State, Nigeria.

Hypotheses

HO₁: The desire by women to stay closer to their families does not have significant relationship with performance of women entrepreneurship in Kogi State.

HO₂: The participation of women in family businesses does not have significant relationship with performance of women entrepreneurship in Kogi State.

HO₃: The desire by women to leave a legacy for family members does not have significant relationship with women entrepreneurial performance in Kogi State.

HO₄: The need to support one's family does not influence performance of women entrepreneurship in Kogi State.

Conceptual Clarification

Entrepreneurship is a process that involves a willingness to rejuvenate market offerings, innovate, risks taking, trying out of new and uncertain products, services and markets towards exploring new business opportunities (Wiklund and Shepherd, 2005). It attracts both men and women who are interested in profitable inter-industry relationship. Women entrepreneurship is the process where women organise all the factors of production, undertake risks, and provide employment to others. The definition of women entrepreneurship has never been differentiated on the basis of sex and hence could be extended to women entrepreneurs without any restrictions (Grafisk, 2001). A woman entrepreneur is a person who is an enterprising individual with an eye for opportunities and an uncanny vision, commercial acumen, with tremendous perseverance and above all a person who is willing to take risks with the unknown because of the adventurous spirit she possesses Allen, Minnit & langouitz (2006). Thus, a woman entrepreneur is one who starts business and manages it independently and tactfully, takes all the risks, faces the challenges boldly with an iron will to succeed. Women entrepreneurship is an economic activity of those women who think of a business enterprise, initiate it, organise and combine the factors of production, operate the enterprise and undertake risks and handle economic uncertainty involved in running a business enterprise. The Nigerian women entrepreneur is described as “aged 41, well-educated, married with children, grew up in an entrepreneurial environment, has previous work experience of about eight years, runs a small business that has been operating for about nine years and of which she is likely to be the sole or majority owner, prefers to have her family members as partners or employees, has her first attempt at starting a business, uses mostly her own savings as start-up capital, was motivated by personal factors when she decided to become an entrepreneur, faced start-up problems such as labour, financing and economic problems but today, faces increasing economic, labour and cost problems, rates her business as “moderately successful” and attributes the success of her business to three qualities, that is, quality of product/service, quality of human resource and her own personal qualities” Allen, et al (2006).

Family Factors and Women Entrepreneurship
Researchers such as Taylor (1988); Fierman (1990); Zellner (1994); Gelin (2005) reported that flexibility to manage their
dual responsibilities and for a more balanced life as the major factors why women leave paid job to start their own
businesses. A review of literature reveals various push and pull factors as motivators for business start-ups or alternatively,
positive and negative factors as discussed by Muhammad and Basheer (2012). Push or negative factors are associated with
the necessity that forces a woman into pursuing her business plans. These factors can include economic necessity and the
need for a flexible work schedule, reflecting the family caretaking roles that is still expected from a woman (Orhan and
Scott, 2001; Alstete, 2003).

There is now a growing phenomenon of dual – income family structure due to economic challenges in the country: the
result of this is the quest and desire by middle and low income women to build wealth through entrepreneurship. The
growing awareness, participation and relevance of women entrepreneurs in our society have had a positive influence on
entrepreneurial activities (Chinonye, 2008; Ogunleye, 2004). In Nigeria, women play a major role in the trade and service
sectors of the economy with the major motive of supplementing their family income since they are profitable ventures that
require minimum capital (Onyeka, Akonjuobi and Anuebunwa, 2004; Fakayode, Rahji, Ayinde and Nnom, 2011).

Being self-employed can thus be chosen because it offers flexible work arrangements, and enables women to balance work
and family activities. Staying small may be then a deliberate choice of the woman to be able to combine these activities
(Kevane and Wydick, 2001). Kevane and Wydick also argue that the reason for low profitability is because women run their
businesses in a subsistence-oriented manner and to complement their husbands’ income in supporting the family. They thus
tend to diversify their activities by creating several small businesses rather than investing in the growth of an existing one
(Kevane and Wydick, 2001; Nichter and Goldmark, 2009).

In Nigeria, different spending priorities also define the amount each gender reinvests in its business, as females are known
to devote a higher share of their earnings to the welfare of children. Fafchamps et al. (2011) find that only the in-kind grants
lead to an increase in the firm’s profit, a result particularly robust in female-owned firms. Cash grants seem to be spent on
household expenses and transfers rather than invested in the business. In the short-run, a successful female-run business
may be beneficial for the household, in terms of nutrition or health, but from a strict efficiency point of view, female entrepreneurs may not reinvest sufficient amounts in their business to accumulate enough capital which would allow them to raise their profitability.

Methodology

The study surveyed women entrepreneurs in three Local Government Areas, (LGAs) of Kogi State; (Lokoja, Okene and
Kabba). The target population of the study comprised of women entrepreneurs in Kogi State. Published documents that
contains information on the number of women entrepreneurs in agricultural, manufacturing, trade and service sectors in the
State were obtained from the State’s membership directories of Nigerian Association of Chambers of Commerce, Industry,
Mines and Agriculture (NACCIMA), Nigerian Association of Small and Medium Enterprises (NASME), Nigerian
Association of Small Scale Industrialists (NASSI) and other related associations. Two thousand, two hundred and fifty
(2,250) women entrepreneurs which form the sampling frame were extracted from these lists. 340 women entrepreneurs
were sampled through Yaro Yamane while Bourley’s proportion allocation formula was used to determine samples for the
various LGAs. The sample was arrived at using stratified sampling at first to categorized businesses in (i) new venture
enterprises, (ii) stabilizing enterprises and (iii) stabilized enterprises. Disproportionate sampling was carried out to select the
representatives of the categorized enterprises. Finally, simple random sampling was done to get the required respondents.
320 responses were recorded representing 94.12% of the sample size. The study used survey design that involved
descriptive and inferential statistics in the process of addressing the research objectives. The respondents were required to
select from a 5-point Likert scale questions which included a category of strongly agreed (5), agreed (4), neutral (3),
disagreed (2) and strongly disagreed (1). The use of questionnaire was necessary in order to enable objective and precise
response to the research questions. A statistical model of ranked correlation coefficient was used to test the hypotheses of
this study. Women in business were classified into agriculture, manufacturing, service and trade sectors.

Results and Discussions

Table 1 reveals that the service sector of the economy was most attractive to women entrepreneurs with 143(44.7%) of
respondents followed by trading which represented 79(24.7%), while agriculture represented 63(19.7%). However,
35(10.9%) of respondents indicated manufacturing as the nature of their businesses. This analysis implies that majority of
women entrepreneurs 143(44.7%) in Kogi State own and operate businesses that are service oriented.
Table I: Nature of the Business

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural</td>
<td>63</td>
<td>19.7</td>
<td>19.7</td>
<td>19.7</td>
</tr>
<tr>
<td>Trading</td>
<td>79</td>
<td>24.7</td>
<td>24.7</td>
<td>44.4</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>35</td>
<td>10.9</td>
<td>10.9</td>
<td>55.3</td>
</tr>
<tr>
<td>Service</td>
<td>143</td>
<td>44.7</td>
<td>44.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>320</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Survey, 2013

Impact of Family Factors on Performance of Women Entrepreneurship

Providing answers to the influence of family as an entrepreneurial factor for women in Kogi State, table II shows that staying closer to the family is a dominant factor that drives women in business with a highest mean of 3.9438. This is closely followed by a mean score of 3.8688 for a desire to stay around and support the family financially and otherwise. Similarly, some respondents indicated the fact that their choice of business is due to the fact that their family members; parents or other relatives, have being involved in such businesses at one point or the other. This has a mean score of 3.6750. The desire to leave legacy for the family members has the least mean score of 3.6156. This analysis implies that the tendency to stay close to the family with 3.9438 mean score has the greatest potential of motivating women entrepreneurs in Kogi State.

Table II: Family Factors and women entrepreneurship

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I started this business because I wanted to be closer to your family</td>
<td>320</td>
<td>1.00</td>
<td>5.00</td>
<td>3.9438</td>
<td>1.24315</td>
</tr>
<tr>
<td>This type of business is peculiar to my family members</td>
<td>320</td>
<td>1.00</td>
<td>5.00</td>
<td>3.6750</td>
<td>1.33226</td>
</tr>
<tr>
<td>I want to leave a legacy for my family members</td>
<td>320</td>
<td>1.00</td>
<td>5.00</td>
<td>3.6156</td>
<td>1.31273</td>
</tr>
<tr>
<td>I ventured in business in order to support my family</td>
<td>320</td>
<td>1.00</td>
<td>5.00</td>
<td>3.8688</td>
<td>1.06892</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2013

Performance of Women Entrepreneurship in Kogi State

Table III shows different perceptions women entrepreneurs held about reasons for better performance or otherwise of their businesses. There are six prominent dimensions of performance; many of them believed that their business is growing due to hard work, personal input, competence, special marketing and financial skills. Most of the women entrepreneurs believed their hard work resulted in expansion (growth) as shown in the mean score which is the highest at 3.8938. This is closely followed by efficiency in cost that resulted into huge savings with a mean score of 3.7812. Other performance items that follow include increased income with a mean of 3.7281, improved competitiveness in the market place with 3.6500 mean and increased financial investment with the least mean score of 3.3938. This analysis implies that among the performance dimensions used, business expansion is perceived as the dominant index of high level performance among women entrepreneurs in Kogi State.
Table III: Women entrepreneurial performance

<table>
<thead>
<tr>
<th>Statement</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>My business financial investment has so much improved.</td>
<td>320</td>
<td>1.00</td>
<td>5.00</td>
<td>3.3938</td>
<td>1.39005</td>
</tr>
<tr>
<td>Due to my cost consciousness (financial skill), my company has saved a lot of money.</td>
<td>320</td>
<td>1.00</td>
<td>5.00</td>
<td>3.7812</td>
<td>1.26030</td>
</tr>
<tr>
<td>Our competitiveness in the market is improving.</td>
<td>320</td>
<td>1.00</td>
<td>5.00</td>
<td>3.6500</td>
<td>1.28018</td>
</tr>
<tr>
<td>My business has expanded greatly since I started.</td>
<td>320</td>
<td>1.00</td>
<td>5.00</td>
<td>3.8938</td>
<td>1.01769</td>
</tr>
<tr>
<td>My business profitability has increased.</td>
<td>320</td>
<td>1.00</td>
<td>5.00</td>
<td>3.4406</td>
<td>1.39959</td>
</tr>
<tr>
<td>My personal income has increased.</td>
<td>320</td>
<td>1.00</td>
<td>5.00</td>
<td>3.7281</td>
<td>1.24612</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2013

Correlation Coefficient between family factors and growth of women entrepreneurs

Summary of correlations in table IV indicates a positive relationship between family factors and performance of women entrepreneurship. The extent of the correlation coefficient shows r=0.57, 0.38, 0.47, 0.35 for closeness to the family, peculiarity of family business, leaving a legacy for family members and family support respectively. This relationship shows positive correlation between family factors and performance of women entrepreneurship in Kogi State. The factor that indicates the strongest correlation is the desire to be close to the family, r=0.57. This is not surprising because women are known to be home cares and builders. This is followed by leaving a legacy to the family with r=0.47. This is particularly so as revealed by researchers that “glass ceiling” prevents women from great achievements when they work for others. The next ranked variable is r=0.38 for the peculiarity of the business with family business activities from which experience was obtained. Supporting the family as an entrepreneurial factor ranked forth with coefficient correlation of r=0.35.

Table IV: Summary of Pearson Correlation Coefficient between family factors and growth of women entrepreneurs

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 I started this business because I wanted to be closer to your family</td>
<td>.58</td>
<td>.65</td>
<td>.47</td>
<td>.57*</td>
<td></td>
</tr>
<tr>
<td>2 This type of business peculiar to my family members</td>
<td></td>
<td></td>
<td></td>
<td>.32</td>
<td>.38*</td>
</tr>
<tr>
<td>3 I ventured in business in order to leave a legacy for the family</td>
<td></td>
<td>.63</td>
<td></td>
<td>.47*</td>
<td></td>
</tr>
<tr>
<td>4 I ventured in business in order to support my family</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.35*</td>
</tr>
<tr>
<td>5 Growth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

The moderate results of the study substantiate reports that Nigerian women are mostly found in service and trade sectors of the economy since they are profitable venture that require minimum capital (Onyeka, 2004; Fakayode, 2011). The results
also corroborate the findings of Taylor (1988), Fierman (1990) and Zellner (1994) that flexibility of women to manage their dual responsibilities (family and business) has a major impact on women to start businesses. The results also support reports of Gelin (2005), Muhammad and Basheer (2012) that “pull and push” factors include amongst others, family caretaking roles and desire to feed ones family.

Conclusion
Several studies demonstrated that frequently cited drives for women entrepreneurial activities are financial freedom, support for family, independence and self satisfaction. A number of factors can be traced to family expectations. This research showed the various ways the family impacts women entrepreneurial growth and development by providing women with the necessary impetus that drive their businesses. Areas of motivation through the family factors include the desire to stay close to the family, the zeal to provide financial support to ones family, doing business that is peculiar to the family members, especially ones parents and the desire to leave a legacy for ones offspring or children. Family factors do not simply impede entrepreneurial practices as is perceived majority due to numerous commitments but also encourage women to actively participate in establishing and managing businesses in other to support the family. There is the need for public policies and programs for the preparation of women that desire establishing and running businesses for whatever reason; family or otherwise. It should be noted that the groundwork for women entrepreneurs is a strategy within the social, economic and political context to kindle women entrepreneurial development in Kogi State in particular and Nigeria in general. The study results signifies that any entrepreneurial model that fall short of addressing women's family expectations as key drivers for entrepreneurial activities needs further investigation.

Recommendations
Based on the above, the following important recommendations are made;

(i) There should be societal encouragement of women’s participation in economic issues, nation building, innovation and productivity
(ii) Women should understand that they play important role in nation building, they should therefore be prepared to start up entrepreneurial initiatives whether they are supported or not. This will help in building up their self-confidence and self-esteem which are important factors in taking the risks involved in starting and growing entrepreneurial ventures.
(iii) Programmes for the development of women entrepreneurship should recognize the traditional gendered role of women that contributes to the double burden of responsibilities. Governments are encouraged to ensure that capacity building in entrepreneurship is complemented by access to social programmes to relieve the burden.
(iv) To cope with the multiple roles as wives, daughters, mothers and economic drivers, women entrepreneurs should choose the type of businesses that will help them accomplish these roles.

References


Land Cover Change Analysis with Special Reference to Forests and Paddy Wetlands of Neyyar and Karamana River Basins, Kerala, SW India Using GIS and Remote Sensing

A. Krishnakumar¹, Revathy Das¹ and Dhanya.T. Dharan²

¹ESSO- National Centre for Earth Science Studies (NCESS), Ministry of Earth Sciences
Govt of India, Akkulam, Thiruvananthapuram-695011, Kerala
²Scientific Response to Environmental Developmental and Human Arenas(SREDHA), Palayam, Thiruvananthapuram-695033, Kerala

Abstract- Understanding the rate of land use changes in time and space and to find out the drivers behind this, is very useful in preparing the model for regional spatial pattern of the area and future prediction of implications of the changes for sustainable development, especially in a state like Kerala having low per capita land, high population density and limited resource availability. Owing to the population explosion and poor management of land use, the natural resources in the State are being degraded at alarming rate. The study is an attempt to derive useful information for the river basin management by analyzing land use/land cover change in the study area on a time scale. Since remote sensing data provides detailed and cost effective information with respect to spatial distribution of vegetation types and land use, the data of different periods were used for this study. Land use change with special reference to forests and paddy wetlands in Neyyar and Karamana river basins of Thiruvananthapuram district during the respective periods of 1905-2000 and 1968-2013 were analyzed through Survey of India toposheets and LISS imageries using Geographical Information System. The detailed analysis has revealed that the area under forests and paddy drastically decreased from 33% to 7% and 10% to 2% respectively. Encroachment and infrastructure development in the highlands are the root cause of deforestation in the study area. Expansion of built up areas by reclaiming the paddy wetlands, resulted in the drastic decrease in paddy wetland category.

Index Terms- Forest, Paddy wetlands, Land Use change, RS, GIS

I. INTRODUCTION

Global increase in population and the depletion of natural resources are driving extensive changes in land use that alter biodiversity patterns and ecosystem function and hence caused for the irreversible loss of the forests and wetlands (Aronson et al, 2010, Foley et al, 2005, Grimm et al, 2008 and McKinney, 2006). Currently, fresh water resources in several parts of the globe is facing severe crisis in availability due to unsustainable water use aggravated by the unpredictable and unforeseen changes in the climate realm triggered by deforestation. The climate change coupled with urbanization and rampant alterations in land use made most of the world’s fresh water flow regimes under severe pressure and change. River banks and its associated landforms act as pioneer sites of human settlements and cradles of civilizations all over the world, and now they were among the foremost natural systems facing the ensuing pressures of development. Degradation of river basins consequent to resource depletion is one of the major environmental problems of Kerala that need immediate attention and corrective measures.

Forests and Wetlands referred to the respective ‘lungs’ and ‘kidneys’ of the landscapes, but are continuously exploited unscientifically in search of profits and means of subsistence. These ecosystems play a central role in functioning of the biosphere, provide various environmental services by regulating climate, hydrological and biogeochemical cycles and directly and indirectly contribute to socio-economic development. By acting as a sink for greenhouse gases, forests and wetlands help to mitigate the effects of climate change. However, through agriculture, urban and suburban development, much of the forest and wetland resources have been lost and with them many of the important functions that they provide also adversely affected. In Kerala State, the forest and wetland ecosystems have assaulted various adverse changes with growing demands, creating crisis in the environment. Studies done by Menon and Bawa (1998), Jha et al (2000) revealed that substantial conversions of forests take place in Kerala in the past were done for agricultural expansion, plantation development and for various other developmental activities.

Knowledge of extent of land utilization is essential for any land use planning to avoid any adverse consequences in future. Land Cover is an important input parameter for a number of agricultural, hydrological and ecological models, which constitute necessary tools for development, planning and management of natural resources.
in the territory. Such planning also requires the knowledge of land diversions over a period of time. Analyzing spatio-temporal characteristics of land use is essential for understanding and assessing ecological consequence of development and thus helps for decision making process. Remote Sensing (RS) and GIS are powerful tools which have revolutionized our understanding of approach to the earth’s resources and environment and their management (Long et al., 2007. Guler et al., 2007). Remote sensing data provides detailed and cost effective information with respect to spatial distribution of vegetation types and land use.

The land use change is significant due to various physical and socio-economic factors and the land use pattern of an area is directly related with the level of techno-economic advancement, nature and degree of civilization of its inhabitants (Whyte, 1961). Land use changes in any region are mainly related either with the external forces and the pressure built up within the system. The spatio-temporal changes in land use in the river basin have a direct influence on its hydrological realm and affect in many ways such as change in total run off, flooding in low lying areas etc. (Wilk and Hughes, 2002). The National Forest Policy (1988) envisage bringing one-third of the geographical area of the country under forest cover to maintain ecological balance and environmental stability. The forest cover of India has been estimated to be 637 Km$^2$ and 19.39% of the geographic area of the country (Mahajan and Panwar, 2005). Followed by forests, agriculture is the most dominant land use in India. Deforestation and conversion of water logged wetlands into built-up area affect the water retention capacity of soils of the river basins (Nikhil and Azeez, 2010). High rates of wetland conversions were mostly occurred by the push of population growth resulted in the reclamation of these ecosystems for various developmental activities (Turner et al., 1993). The present study deals with land use mapping with special reference to degradation of forest and paddy wetlands in Neyyar and Karamana river basins of Kerala State using remote sensing data, topographical maps, and ground truth studies applying GIS and Remote Sensing techniques. It is an attempt to derive useful information for the river basin management by analyzing land use/land cover in the study area spatially and temporally.

II. STUDY AREA

The information on land-use and land-cover patterns, their spatial distribution and changes over time-scale are the pre-requisite for making development plans. The present study area falls under the catchment areas of Neyyar and Karamana rivers in Thiruvananthapuram district, Kerala State, SW India, comprising the highland, midland and lowland regions with different terrain conditions. The Neyyar and Karamana river basins lies between $8^\circ15'$ to $8^\circ45'$ North latitudes and $76^\circ50'$ to $77^\circ20'$ East longitudes, and occupy a total area of 1199 sq.km (Fig.1). The Neyyar river originates from Agasthya hills of Western Ghats at an elevation of about 1860 m above msl and flows into the Arabian Sea. The total watershed area of this river is 497 Sq.Km. The general elevation ranges from 750 m in the upper region, 60 m in the middle region to less than 2 m in the lower region. The Karamana river originates from

![Fig.1 Location map of the study area](image-url)
Chemmunjii mottai (Nedumangad hills) of Western Ghats at an elevation of about 1717 m above msl and flowing about 66 Km and merges into the Arabian Sea near Thiruvallom. The total basin area of this river is 702 Sq.Km.

III. MATERIALS AND METHODS

The study uses two sets of data which includes topographical maps (SoI) and remote sensing (IRS) imageries. Terrain data sets were prepared from IRS LISS P6 111 (2013) images based on geology, geomorphology, drainage network, drainage density, slope, relative relief, soil thickness, land-use and rainfall. Land use maps of forested lands of 1905 (1:63360), 1968 (1:50000) and 1980 (1:25000) were extracted from the Survey of India (SoI) toposheets and the data regarding natural forest cover of the study area (2000) were traced out from IRS P6 LISS-11 images.

Areal distributions of paddy fields were traced out from the SoI toposheets (1968), imageries of IRS LISS-11 and IRS LISS-111 of 1989 and 2013 respectively. All the maps were digitized following uniform scale and overlaid in GIS platform (Arc GIS 10.1).

Prepared the land-use maps and overlay operations were conducted for the detailed analysis of the variation in areal extension of forests and paddy fields over the years. The land use/land cover information is obtained by map to map comparison, since it gives complete details of land use/land cover change detection.

IV. RESULTS AND DISCUSSION

Forest is a renewable resource and contributes substantially towards economic development and they play a major role in enhancing the total quality of the environment. According to various related reports on deforestation in India, the large-scale alterations of forested lands happened after the independence interms with that almost all types of landforms were undergone the phase “development”. During this phase, the term conservation of ecosystems and species was practically unheard and the natural areas particularly the forests and wetlands experienced wide spread conversions and modification (www.iipsenvis.nic.in). Menon and Bawa (1998) reported an annual decrease of 0.57% forest cover in Western Ghats region during 1920 to 1990. Prasad et al (1998) estimated a decline of ~ 0.90% of natural forest cover in Kerala annually during the period 1961 to 1988. Thus, wide scale alterations of natural landuse happened in lowlands, midlands and highland areas of the State.

The terrain system of Neyyar and Karamana basins extends from Western Ghats to the Arabian coast cutting across all major physiographic divisions identified in the State. The terrain condition has been influenced by three main processes namely, marine/estuarine, fluvial and denudational. Based on slope characteristics and morphogenetic attributes, 5 terrain units inclusive of water bodies, have been identified. While, the coastal plains host three natural wetland systems (Veli lake, Akkulam lake and Panathura kayaal), the highlands contain three important man made water bodies – the Neyyar, Peppara and Aruvikkara reservoirs. Landform controlled by marine/estuarine processes cover about 26% of the study area. Coastal plain exhibit evidences of paleo-sand ridges/strand lines. Between Kovalam and Vizhinjam, pocket beaches are well developed and are known for its tourism potential. Another feature is that the floodplains could not be marked as continuous phenomena along the rivers under study. Field investigation indicates that the rivers are incising (cutting down) its own floodplains. Neyyar and Karamana rivers are not joining the sea through the parallel running backwater system, instead form distributaries and merges with the Arabian Sea. Emergence of marine terraces can also be marked in close examination. Meanders in midland and highland regions are believed to be structurally controlled. Gently undulating terrain covers the maximum area. Alternate valleys/basins and hills characterize this unit. Altitudinally, this unit lies below 100 m contour. Although this unit has been grouped under denudational category, the area often exhibits gradational features as well. Infact, rolling nature is due to alternate valleys and denudational low hills.

The Agasthyamalai is the important peak in the river basins. Parts of highly undulating terrain, mountain land as well as hilly terrain are highly susceptible to erosion. Isolated hills are structurally controlled in nature.Fig.2 shows the different terrain groups in the study area. Secondary data on existing terrain nature/conditions were listed in Table 1.

The present study indicated that the density of virgin forests in the Western Ghats, which is known for its rich biodiversity, has been decreasing over the years. The forest ecosystem of the study area once known for its plethora of plant and animal species is now subjected to drastic deterioration consequent to unscientific and improper exploitation for various resources.Fig.3 shows the trend of deforestation in Neyyar and Karamana basins during the period 1905 to 2000. Table 2 shows the extent of forests in Neyyar and Karamana river basins during different periods.
Table 1 Terrain system of Neyyar and Karamana river basins (Area shown in Sq. Km)

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Parameters</th>
<th>Neyyar Area</th>
<th>Neyyar Percentage</th>
<th>Karamana Area</th>
<th>Karamana Percentage</th>
<th>Total (Neyyar + Karamana) Area</th>
<th>Total (Neyyar + Karamana) Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mountains and hilly terrain</td>
<td>80.40</td>
<td>16.18</td>
<td>48.90</td>
<td>6.97</td>
<td>129.30</td>
<td>10.78</td>
</tr>
<tr>
<td>2</td>
<td>Highly undulating terrain</td>
<td>38.72</td>
<td>7.79</td>
<td>118.07</td>
<td>16.82</td>
<td>156.79</td>
<td>13.08</td>
</tr>
<tr>
<td>3</td>
<td>Moderately undulating terrain</td>
<td>59.09</td>
<td>11.89</td>
<td>111.26</td>
<td>15.85</td>
<td>170.35</td>
<td>14.21</td>
</tr>
<tr>
<td>4</td>
<td>Gently undulating terrain</td>
<td>281.0</td>
<td>56.66</td>
<td>291.12</td>
<td>41.47</td>
<td>572.15</td>
<td>47.72</td>
</tr>
<tr>
<td>5</td>
<td>Coastal plain</td>
<td>37.76</td>
<td>7.6</td>
<td>132.65</td>
<td>18.90</td>
<td>170.41</td>
<td>14.21</td>
</tr>
</tbody>
</table>
Table 2 Extent of forest area in Neyyar and Karamana basins at different periods

In 1905, area under natural vegetation in the two basins was estimated as 32.7% (Neyyar=34%, Karamana=31.6%). This has come down to 22.5% in Neyyar basin and 18.8% in Karamana basin by 1968. In 1980, it was again diminished into 13.7% and 14.1% respectively in the basins. In 2000, the forested areas were 10.2% and 6% in the respective basins and extent were about 51 Sq.Km in Neyyar basin and 41 Sq.Km in Karamana basin. It was observed that about 76% of natural forest cover has been lost in Neyyar and Karamana basins during a time span of 95 years. Previous studies made in the forested areas support their findings. Ramesh et al (1997) found that the in Agastyamalai region of Neyyar basin; the annual rate of deforestation was 0.33% during the time interval from 1920 to 1990. Jha et al (2000) estimated changes in forest cover between 1973 to 1995 in Western Ghats and reported a loss of 25.6% forest cover over 22 years. Studies by George and Chattopadhyay (2001) revealed that extensive conversion of forestlands to plantations, infrastructure development such as roads, hydroelectric and irrigation projects, and other institutional amenities led to deforestation in Kerala. The encroachment of local people residing nearby areas and planters also aggravated the rate of destruction of forests in the study area (Krishnakumar, 2002). This can be attributed to increase in plantations and agricultural areas in the highland regions. The construction of Peppara dam (Karamana river) and Neyyar dam (Neyyar river) also imposed destruction of the forest wealth. Studies show that the Neyyar and Peppara reservoirs are considerably silted up due to the decrease in vegetative cover in its provenance zone (Suresh Babu et al, 2000). However, if proper afforestation programme has not taken up in the degraded area, the problem will remain unsolved, affecting the net freshwater availability and normal climatic conditions.
Table 3 Extent of paddy wetlands in Neyyar and Karamana basins (total area: 1199Sq.Km) at different periods

<table>
<thead>
<tr>
<th>Year</th>
<th>Total area of Paddy wetlands in the basins (Sq.Km)</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968</td>
<td>115.98</td>
<td>9.8</td>
</tr>
</tbody>
</table>

As per the studies of Nair (1994 & 1998), substantial part of money received in the form of remittance in Kerala has been invested for building constructions over the years. The exponential increase in the number of households created the utilization of all available lands including paddy lands by filling and reclamation. Further, a considerable portion of the farmers sold their land, since paddy cultivation becomes a non-profitable avocation. Chattopadhyay (1991) reported a decline of paddy wetland area in Thiruvananthapuram city from 9.6% (1976) to 5% (1991). Paddy lands in several areas of Thiruvananthapuram district were reclaimed disregarding its environmental significance. According to Sindhu and Divya (2011), built-up area in Thiruvananthapuram City was only 13.93 km² in 1967, and it increased to 59.87 km² in 2008. On the other hand, paddy area reduced from 25.8 km² to 1.52 km² during 1967 to 2008. Even though, the Government of Kerala has enacted law (Kerala Paddy Lands - Wetlands Conservation Act, 2008) against the reclamation of paddy lands, the land reclamation activities are continuing regularly at several places in the basins to meet the ever increasing human requirements and thus adversely affecting the ecological balance. Hence stringent measures have to be taken for controlling the reclamation activities for the sustainable development.

V. CONCLUSION

As per the transformation of socio-economic set up and variations in environmental conditions, the highly dynamic land use system also affected by various changes and leading to environmental degradation issues. Degradation of natural resources is one of the major issues in a state like Kerala, which has brought about indelible and irreparable land use and ecological changes, leading to impairment of its vital functions. In the present study, spatial and temporal changes of forests (1905-2000) and paddy wetlands (1968-2013) in Neyyar and Karamana basins of Thiruvananthapuram district, Kerala State were quantified using Geographical Information System (GIS) and Remote sensing (RS) techniques. Drastic depletion of forests and wetland areas in the river basins have been noticed during the study periods as stated above with the supportive data generated. Land use changes in any region are mainly related either with the external forces and the pressure built up within the system. As part of urbanization, Thiruvananthapuram district
has witnessed reclamation of paddy wetlands in extreme. Hence for this assessment, Neyyar and Karamana basins were taken together for the spatio-temporal changes. Population increase, encroachment, agricultural expansion, construction of dams and other infrastructural developments are the major factors influenced for the land use/land cover changes in Neyyar and Karamana basins of the state. Expansion of built up areas as part of urbanization have been noted as the main reason for the drastic changes in paddy land conversion. With the advancement of remote sensing techniques and supporting system like GIS, we can have better understanding of the land use/land cover change dynamics similar to this, and such data can be used as decision supportive data for future planning and development.

REFERENCES


AUTHORS

First Author – A. Krishnakumar, ESSO- National Centre for Earth Science Studies (NCESS), Ministry of Earth Sciences of India, Akkulam, Thiruvananthapuram-695011, Kerala

Second Author – Revathy Das, ESSO- National Centre for Earth Science Studies (NCESS), Ministry of Earth Sciences of India, Akkulam, Thiruvananthapuram-695011, Kerala

Third Author – Dhanya.T. Dharan, Scientific Response to Environmental Development and Human Arenas(SREDHA), Thiruvananthapuram-695033, Kerala, drakrishnakumar@gmail.com
MGNREGA and Its Role in Rural Development

Roshni Pandey
Research scholar at MPISSR Ujjain

Abstract- It is hard to think development of a any nation without the development of its rural economy, neglecting of rural development means neglecting of overall development of nation. The real development of India lies in the economic betterment of people lives in rural India for which government needs to make strong economic policies and better implementing strategies. National Rural Employment Guarantee Act (NREGA) enacted by legislation of India on 25 August 2005 and it was renamed as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) on 2nd October 2009 on the birth anniversary of Mahatma Ghandi. The act aims to remove the extreme poverty and at making villages of country self sustaining through productive assets creation. The Mahatma Gandhi National Rural Employment Guarantee Act. (MGNREGA) was enacted in India with the various multiple objectives of providing employment in a rights-based framework, addressing rural poverty, checking migration, and building rural infrastructure. As such, every year around 15–20 percent of households in India overall and 30 percent in rural India receive some form of employment share under the MGNREGA programme. MGNREGA enshrines the legal right of one hundred days of paid employment to any rural household, on employees demand. Though its scope is nationwide, there have been wide inter-state as well as inter-district variations in the achievement of the objectives of the MGNREGA Act. In this paper we will study how MGNREGA is a beneficial and effective scheme for the development of rural India. Also provide some important suggestions have been proposed to make this scheme more powerful, fruitful and valuable.

Index Terms- Employment, poverty, infrastructure development, asset creation

I. INTRODUCTION

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is an employment guarantee scheme enacted by legislation on August 25, 2005. MGNREGA was originally known with the name NREGA which abbreviated as National Rural Employment Guarantee Act. The UPA government added “MG” (Mahatma Gandhi) to it and becomes MGNREGA. MGNREGA is a social security employment act which guarantees employment to the poor rural people in India. Most important fact about MGNREGA is that it is considered as a right of a rural Indian citizen to work for minimum 100 days in a year if he/she is willing to work and job should be provided to him/her by authorities in his own area and also within a given time-frame (within 15 days) otherwise state government is liable for pay Unemployment allowance. Wages are also well defined in the scheme. The agenda is to provide 100 days of employment to all adults in the every village to do unskilled manual work. Each applicant apparently gets allocated work within the his own area to build roads, ponds, wells etc. Only labour-intensive tasks i.e without machinery are preferred like creating infrastructure for social benefit like water harvesting, drought relief and flood control etc. Basically villagers had to do such work only which is not economically productive or so it seems by the nature and organization of it. The main implementing empowered agencies are Gram Panchayats and it has accountability towards Gram Sabah. Gram Panchayats are also have power to make plans by suggestions for gram Sabah. Job cards are also issued by Gram Panchayats and wages are deposited to the bank accounts of employees. One significant and unique fact about MGNREGA is that it has provided a fair opportunity to people from rural India to earn their own income without any discrimination of caste, gender and Sex. Most remarkable feature of NREGA is that it pays women the same as men, something that was virtually unimaginable in rural India.

II. OBJECTIVES OF PAPER

1. To study the role of MGNREGA in economic development of rural India.
2. To study the impact of MGNREGA in employment generation of rural India
3. To study the role of MGNREGA in asset creation and infrastructural development of rural India.

III. RESEARCH METHODOLOGY

The paper is based on secondary data. The data has been collected from internet, articles, newspapers, reports, magazines etc. Graph and percentile method has been used to analyze the data.

The Role of MGNREGA in Economic Development of Rural India:-

The economy of India is the sixth-largest in the world measured by nominal GDP and the third largest by purchasing power parity (PPP). The country is classified as a newly industrialised country, and one of the G-20 major economies, with an average growth rate of approximately 7% over the last two decades. India is also known as an agricultural country, as most of the population of villages depends on agriculture. Agriculture forms the backbone of the country’s economy. The agricultural sector contributes most to the overall economic development of the country and therefore the need of development programmes in rural India is substantial. The government of India initiated many employment generating programmes to address development in rural area. The mahatma
Ghadi national rural employment guarantee scheme one the of major flagship initiative which enhances the rural development and employment opportunity at rural area, Mahatma Ghadi national rural employment guarantee act aims at to enhance livelihood security in rural areas by providing at least 100 days of guaranteed wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work. This scheme was promoted by Man Mohan Singh government now continued in NDA under Narandar Modi. Budget 2017 allocated Rs. 48000 Cr. Rural Development has different aspect covering long term and short term aspects. Certain activities like sanitation, agriculture, road, electricity, health facility, skill development, market linkage, awareness about basic facilities, digital inclusion etc. Rural population gets wages if drought like situation erupts so it should be continued to stop migration to cities and for rural mass uplift it is necessary. Labour-intensive tasks like creating infrastructure for water harvesting, drought relief and flood control are preferred in MGNREGA which helps the economic development in rural areas. The MGNREGA provides wages to rural employees against work done for the development of rural areas the various works for the economic development of rural areas are done through MGNREGA are as follows.

2. Drought proofing, including afforestation and tree plantation.
3. Irrigation canals including micro and minor irrigation works.
4. Irrigation facilities for landowners by households belonging to SC/ST or to land of beneficiaries of the INDIRA AWAA AS YOJANA.
5. Renovation of traditional water bodies, including desiting of tanks.
6. Land development
7. Flood control and protection of works, including drainage of water-logged areas.
8. Rural connectivity to provide all weather roads.
9. Any other work, which may be notified by the Central government in consultation with the state governments.

By these development works the MGNREGA has provide main role in infrastructure development in rural areas of India. There is a visible change in development in rural areas of India by MGNREGA like the development of roads, development of irrigation canals, development of housing in rural areas etc.

To study the impact of MGNREGA on employment generation in rural India

Our country has completed more than sixty years of independence but poverty in rural India continues increase day by day. The country cannot achieve its goal of reach the goal of economic development unless and until these two problems are completely eradicated. Therefore, since independence, employment generation programmes in India have been continuously redesigned to generate productive employment and additional income. In the seventies, the policy makers of India used the approach of rural development and rural employment programme to remove the rural poverty. In the last phase of nineteen seventies, Government had created three major anti-poverty programmes namely Integrated Rural Development Programme (IRDP), Rural Landless Employment Guarantee Programme (RLEG P), and National Rural Employment Programme (NREP). Moreover, the Indian Government had made different types of schemes under different names and purposes to give partial employment to the rural India to support their family economy like Food for Work, Ensured Employment Scheme, Jawahar Rojgar Yojana, Sampoorna Gramin Rojgar Yojana, Rashtriya Sram Vikash Yojana etc. But these programmes have not proved so much successful. due to their because the main reason behind that is inability to provide sufficient employment as per the demand and at the minimum wages. The limitations of these employment programmes created the need for making some other sort of employment model with the potential to provide employment and to reduce household poverty in rural India. In order to achieve this objective the government of India introduced The Mahatma Ghadi National Rural Employment Guarantee Act (MGNREGA) in 2006 that guaranteed 100 days of employment in a year to every rural house of rural India. Mahatma Ghandi National Rural Employment Guarantee Act (MGNREGA) 2005 seems to be an advanced and radical scheme which directly provides a right to employment. Through MGNREGA, the Government was committed to providing employment to every rural family which demands such work and whose adult members volunteer to do such work, such work was to be provide at the minimum wage rate and, as far as possible, with a radius of five kilometre of the village where the applicant resided. Failure to provide such wage employment within 15 days of the receipt of the application entitled the applicant to receive unemployment allowance. Starting with 200 districts across the country in Phase-1 during 2006-2007 MGNREGA was extended to an additional 130 districts in Phase-2 during 2007-2008. From 1 April 2008 onwards MGNREGA covered the whole of rural India. MGNREGA was the main plank of the Eleventh Five Year Plan of poverty eradication. The graph below correlates the state rural the state rural poverty figures (2009-2010) with the average number of households provided employment (during 2009-10, 2010-11, 2011-12). At an aggregate level there appeared to be a correlation between the number of rural poor in a state and the number of households given employment under MGNREGA. There were, however, some notable exceptions to this. States like Andhra Pradesh, Chhattisgarh, Rajasthan, Tamil Nadu and West Bengal seem to have made greater utilisation of MGNREGA as compared to the poverty levels in these states. At the sometime states like Bihar, Maharashtra, Odisha, and Uttar Pradesh seem to be relative laggards in utilization of MGNREGA funds when compared to their poverty levels.
Analysis of state-wise releases made by the ministry showed that four states (Andhra Pradesh, Madhya Pradesh, Rajasthan and Uttar Pradesh) accounted for 50% of the total expenditure made under the scheme. It was also seen that three states, viz. Bihar, Maharashtra and Uttar Pradesh accounted for 46% of the rural poor but utilized about 20% of the funds and consequently only 20% of total households were provided employment under the scheme. This indicates that there was little correlation between poverty level in a state and the implementation of MGNREGA.

To study the role of MGNREGA in asset creation and infrastructural development of rural India.

The two basic objective of Mahatma Ghandi National Rural Employment Guarantee Act (MGNREGA) are to provide 100 days of wage employment to every household in need of it and to create durable assets to strengthen the livelihood resource base of the rural poor. In this context, the act and the operational guidelines prescribe a number of conditions for the works to be taken up:

- The ratio of wage to material costs should not be less than 60:40 (paragraph 9 schedule 1 of the Act).
- The list of priority-wise permissible works which can be taken up under MGNREGA should be as indicated in the Act (Paragraph 1B of the schedule 1 of the act)
- Use of contractors and machinery are not allowed (Paragraph 11 and 12 of the schedule 1 of the act)
- Allotment of at least 50 percent of the works to GPs for the execution (section 16(5) of the act)
- Administrative and technical sanction for all works to be obtained in advance, by December of the previous year (Para 6.4.1 of the operational guidelines)

According to Para 6.1.3 of the operational guidelines, the maintenance of assets created under the scheme including protection of afforested land was to be considered as permissible works under MGNREGA. Test check of records revealed that 56916 plantation works amounting to Rupees 25.19 crore in 202 GPs, one block and five districts in nine states of Andhra Pradesh, Bihar Gujarat, Jharkhand, Kerala, Manipur, Mizoram, Rajasthan, and Uttar Pradesh were rendered wasteful due to non-maintenance of plants. The Physical inspection of plantation works corroborated the audit findings. The ministry stated (November 2012) that it had circulated to all the states ‘muzaffarpur model of roadside plantation’ for implementation under MGNREGA vide an advisory dated 10 September 2012 in the said model, aged, widowed, handicapped and women job card holders of adjoining village who acted as Van Poshaks, were employed in raising and looking after the roadside plantations under MGNREGA. This gave the villagers a sense of belonging and ownership and where was no need of physical fencing around the plants. The survival rate of these plantations was also high. Further the states were asked to find out the reasons for non-complete works and to take required measures to ensure their completion. The creation of durable assets was an important objective of the scheme as listed in the act. Further operational guidelines also provide for maintenance of assets created under the scheme. However, it was seen that assets created for 3,91,951 works amounting to 6,547.35 crore in 148 GPs in two states and one UT of Mizoram, West Bengal and Pondicherry and all test check units in three states, Gujarat.
Kerala and Tamil Nadu were not of durable nature. The works included construction of boribands, earthen roads, etc. The ministry stated November 2012 that the durability and quality monitoring of assets created under MGNREGA were emphasised in the new draft operational guidelines. Further, the ministry had asked the states to effect convergence of MGNREGA with other programmes to enhance the durability of assets. States were asked to deploy independent state quality monitors to assess the quality of assets to ensure their durability. These SQMs would comprise retired chief engineers and executive engineers.

### Annex-8E

**Details of Infructuous expenditure on work**

(Refer to paragraph 8.5)

<table>
<thead>
<tr>
<th>SL No.</th>
<th>Name of State</th>
<th>District</th>
<th>Block</th>
<th>GP</th>
<th>No. of work Infructuous</th>
<th>Nature of work executed</th>
<th>Amount ($ in crore)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Assam</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>Plugging the breach caused in the Pullbam ring bund by engaging job card holders</td>
<td>0.08</td>
<td>Work was left incomplete as the ring bund was washed away in flood.</td>
</tr>
<tr>
<td>2.</td>
<td>Bihar</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>20</td>
<td>Plantation work</td>
<td>0.13</td>
<td>Plantation was removed by flood control department for widening of river embankment.</td>
</tr>
<tr>
<td>3.</td>
<td>Chhattisgarh</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>7</td>
<td>Wells on the land of the 10 beneficiaries</td>
<td>0.03</td>
<td>The works executed had collapsed.</td>
</tr>
<tr>
<td>4.</td>
<td>Gujarat</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>Deepening of pond</td>
<td>0.34</td>
<td>On joint physical verification it was observed that pond did not have inlet and outlet and therefore, deepening of pond did not add to storage capacity of pond. Hence, expenditure incurred was infructuous.</td>
</tr>
<tr>
<td>5.</td>
<td>Kerala</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>Construction of contour bund</td>
<td>0.37</td>
<td>Work did not exist physically.</td>
</tr>
<tr>
<td>6.</td>
<td>Punjab</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>Renovation of pond</td>
<td>0.02</td>
<td>Due to non maintenance of pond, jungle weed had grown up again and therefore expenditure incurred on renovation of pond was rendered infructuous.</td>
</tr>
<tr>
<td>7.</td>
<td>Rajasthan</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>4</td>
<td>Construction of canals</td>
<td>0.08</td>
<td>Canals were constructed without connecting them with source of water.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>9</td>
<td>Construction of anicut check dam, kuchi dam, etc.</td>
<td>0.01</td>
<td>Works were executed without ensuring sufficient catchment area and wrong selection of site, etc.</td>
</tr>
</tbody>
</table>

Total: 16 | 44 | 2.36 |

Source: Union Government (civil) Ministry of Rural Development

### IV. CONCLUSION

The above evidence and observations unambiguously indicate that the role of the MGNREGA on overall poverty reduction and development of rural India is visible. The act and the operational guidelines require the states and the panchayati raj institutions to monitor the implementation of the scheme in a variety of ways Gaps in the envisaged monitoring mechanisms were noticed in a large number of states. There were significant shortages in verification of works by state officials. Quality monitors and vigilance and ineffective to large extent as social audit units had not been established. There were deficiencies in the approval and release of funds by the ministry. The ministry needs to take decisive steps to ensure proper implementation of the scheme. It needs to focus on developing intensive monitoring and evolution systems. An analysis of releases made to states for the period under review and poverty data showed that three states Bihar, Maharashtra and Uttar Pradesh had 46 percent of the rural poor in India, but accounted for only about 20 % of the total funds released under the scheme. This would indicate that the poorest of poor were not fully able to exercise their rights under MGNREGA.

### REFERENCES

1. Role of MGNREGA in Rural Employment: A review, Santosh Kumar, lecturer in sociology, Govt. P.U Collage Karnataka, international journal of economics and business review, ISSN 2347-9671.
2. Role of MNREGA to Eliminate Poverty From India, Dr. Vikas Kumar, Assistant Professor, Department of Commerce, Govt. Raja (P.G.) College, Rampur, October 2014 Vol. IX No. 2 ISSN: 0973-4503 RNI : UPENG 2006/17831.
4. Impact of MGNREGA on Socio-Economic Development & Women Empowerment Kartika K T (Guest Lecturer In Govt.Arts And Science College, Tanur, Department Of Commerce And Management, Calicut University, India) IOSR Journal of Business and Management (IOSR-JBM) e-ISSN: 2278-018X, p-ISSN: 2319-7668. Volume 17, Issue 7.Ver. II (July. 2015), PP 16-19
5. Report of comptroller and auditor general of India on performance audit of MGNREGA.
6. [http://www.nrega.nic.in/misreport.htm](http://www.nrega.nic.in/misreport.htm)

### AUTHORS

First Author – Roshni Pandey, Research scholar at MPISSR Ujjain, 9479598647, Roshnipandey961@gmail.com
Financial Accessibility of Women Entrepreneurs

(WITH SPECIAL REFERENCE TO WESTERN PROVINCE WOMEN ENTREPRENEURS)


* Department of Management Sciences, UvaWellassa University
** Department of Management Sciences, UvaWellassa University
*** Department of Management Sciences, UvaWellassa University

Abstract- Most of the women entrepreneurs are not willing to take financial aids from formal financial institutes due to lack of access and it has been a major barrier to the development of the sector. Hence, this study is focus to find the factors which affect on women entrepreneurs’ access to finance. Then, the study conducted through firms which have been registered under Colombo, Gampaha and Kaluthara district’s Chamber of Commerce and Industry. A structured questionnaire was designed and administered to collect the data. The results from the study reveal that women entrepreneurs’ access to finance is highly affected by the firm characteristics, and policies and procedures. Therefore, formal finance institutes, should more close to women entrepreneurs’ firms, should reduce their processes and pre requirements when issuing credit and the repayment procedures should also be easy to women entrepreneurs’ firms.

Index Terms- Women Entrepreneurs, Formal Financial Institute, Access to finance

I. INTRODUCTION

Entrepreneurship has traditionally been defined as the process of designing, launching and running a new business, which typically begins as a small business, such as a startup company, offering a product, process or service for sale or hire, and the people who do so are called 'entrepreneurs' (Casson M, 2005). There are two terms as male entrepreneurship and female entrepreneurship and both entrepreneurs possess the characteristics required for effective performance as entrepreneurs (L. Sexton, 2008). Moreover he stated that negative attitudes toward women entrepreneurs are still exist and women entrepreneurs are less willing than male entrepreneurs to become involved in situations with uncertain outcomes (risk taking) and have less of the endurance or energy level needed to maintain a growth-oriented business.

Empowerment of women entrepreneurship is supposed as an effective vehicle to uplift the socio economic welfare of women, their families, and the country as whole (Amarasiri, 2002). As a result of 30 years conflict situation in Sri Lanka, women lost their male relatives in struggle, and forced to take a responsibility of their family in order to look after their children, aged parents and their male relatives (Fernando, 2006). As a result, the scale and growth of women’s entrepreneurship has attracted considerable attention from academics, practitioners and policymakers.

According to the (Fletschner and Kenny 2011), they observed that Most women business owners surveyed reported that limited access to capital was one of the key challenges they faced when they first launched their businesses, and still it is the top obstacle they faced when continuing to innovate and grow their businesses. Hence, the objectives of the study aim to identify the financial accessibility of women entrepreneurs.

A structured questionnaire was designed and administered to collect the data and the sample consisted from 100 women entrepreneurs. Data collection was facilitated by a structured questionnaire with 5-point Likert scale statements based on the constructs defined by (Mbugua, et al., 2014) and (Tolulope, et al., 2015). The pilot study of 19 women entrepreneurs informed a high reliability level of the questionnaire with a Conbach’s Alpha value exceeding 0.726 in all the dimensions of the questionnaire. Financial accessibility of women entrepreneurs were analyzed by using mean and graphs. The simple linear regression model presented below was used to identify the impact between financial accessibility factors and women entrepreneur’s’ access to finance

\[
AF = \beta_0 + \beta_1 EC + \beta_2 FC + \beta_3 ABI + \beta_4 PP + \varepsilon
\]

Where, \(AF\) = Access to Finance; \(\beta_0\) = Intercept Parameter; \(\beta_1\) = Slope Parameter; \(EC\) = Entrepreneur’s characteristics; \(FC\) = Firm characteristics; \(ABI\) = Access to business information; \(PP\) = Policies and Procedures; \(\varepsilon\) = Standard Error

www.ijsrp.org
Accordingly, this study has been investigated the previous research findings, which are related to financial accessibility factors and women entrepreneurs’ access to finance. Secondly, it has been deliberated the result of the study. Then, it has been organized the discussion and conclusion related with the result.

II. RESEARCH ELABORATIONS

Previous research findings, which are related to financial accessibility factors and women entrepreneurs’ access to finance has summarized as follows. Firstly, the definitions of each variable and constructs of them has been revealed.

2.1. Financial accessibility factors

Entrepreneur’s characteristics

Entrepreneurial characteristics have profound consequences for running a business. Previous research, in particular has explored how the managerial education affects the access to credit. For example, (Kumar, A., and Francisco, M, 2005), found a strong education effect in explaining access to financial services in Brazil. They also found that graduates had the least difficulties raising finance from banks. Education affects entrepreneurs’ motivation (Smallbone, D. and Wyer, P, 2000).

Previous researchers have found positive relationships between previous management experience and business growth, and therefore better placed in accessing finance. Literature emphasizes the positive effect of past experience on small business growth by proposing that owner-managers with previous experience are more likely to avoid costly mistakes than those with no prior experience. Prior entrepreneurial experience increases the chances of an entrepreneur starting a new business due to expertise in spotting opportunities (Kim, P., Aldrich, H. and Keister, L., 2006).

Entrepreneurship embodies liability of newness (Zimmerman, M.A. and Zeitz, G.J., 2002). A financial institution will hesitate to lend money to an entrepreneur that seems too young. Younger entrepreneurs are considered more risk-taking, thus investments in young entrepreneurs are associated with high risk (Rai, S.K., 2008)

Firm characteristics

Firm characteristics affect women entrepreneurs’ ability to access external finance. The size and age of the firm were identified as important variables under this category. Firm size is one of the most important variables in literature related to access to credit. Numerous studies have discussed that small and medium-sized enterprises are financially more constrained than large firms (Carpenter, R. E. and Petersen, B.C, 2002).

Policies and procedures

(Davidsson, 1989) noted that an unfavorable tax system, complicated rules and regulations can heavily hamper small firms’ growth. A study done by International Finance Corporation (IFC; 2013), based on responses of more than 45,000 firms in developing countries, found that the top obstacles to their operations are a poor investment climate, especially red tape, high tax rates, and competition from the informal sector, and inadequate infrastructure, especially an insufficient or unreliable power supply.

Access to business information

(Ntakobajira, 2013) exploring performance of SMEs concludes that access to business information services affected the performance of business to a great extent and that access to finance affected performance of SMEs because it limited the entrepreneurs' ability to take advantage of opportunity as and when they arose. The study further concludes that technology affected the businesses to a very great extent by facilitating communication with external parties.

2.2 Financial Accessibility for women entrepreneurs

Access to finance is the ability of individuals or enterprises to obtain financial services, including credit, deposit, payment, insurance, and other risk management services (Demirgüç-Kunt, A., Beck, T., & Honohan, P., 2008). Broader access to finance is likely to affect growth through many channels.
It is associated with greater firm innovation and dynamism, entrepreneurship, more efficient asset allocation and being able to exploit growth opportunities. Access to finance promotes firm entry and growth of incumbent firms to a larger size, makes it possible to choose more efficient forms of legal organization, and allows firms to operate on a larger scale (PRR, 2006).

According to (ToluiopeBewaji, et al., 2015), for measure the access for finance they used such five various forms of loans as commercial bank, non-bank financial institutions, business line of credits, Credit cards or any other sources that firm had access to. As (ToluiopeBewaji, et al., 2015) cited, a lot of minority entrepreneurs did not receive funding from banks or the government; they used personal savings and there is a dissonance between the number of minority entrepreneurs and the access to funding from public institutions. As cited by (Chen, et al., 1996) women often have fewer opportunities than men to gain access to credit for various reasons, including lack of collateral, an unwillingness to use household assets as collateral, small amount of credit requested by women which are not profitable for formal financial institutions to deliver and negative perceptions of female entrepreneurs by loan officers.

As cited by (ToluiopeBewaji, et al., 2015), ethnic minority entrepreneurs, age, education, immigrant status, prior industry experience, and prior entrepreneurial experience are used to their study and the study highlighted that education and experience are highly influence for capital access. According to (Kira.A.R, 2013), two determinant factors; the firm characteristics and Owner manager characteristics used to investigate on access to debt financing by SMEs in Tanzania. The study further illustrated the main two dimensions into nine variables as size, location, industrial sector, business information, age, incorporation, collateral, education, and Experience. The Study Findings are provided mostly influence factors as firms management’s education, experiences of the industry and business operations; furthermore, firm’s location, industry, size, age, incorporation, and availability of collateral and business information are noticeable factors that impact firm’s access to debt financing.

According to (Ambreen Kausar, 2013), he identified seven factors which are influence to microcredit’s demand as Interest rates, limited access and non-availability of information, transaction cost, economic condition, gender differences, credit worthiness, and government policies.

### III. RESEARCH FINDINGS

Overall model is significant to measure formal financial dimensions with women entrepreneurs’ access to finance. Although, the first dimension (entrepreneurs characteristics) is significant and has a weak positive relationship. Therefore, within Sri Lankan context, formal financial overall model could valid in financial accessibility measurements. Moreover, when measuring the women entrepreneurs’ access to finance, the model can be used. Therefore, entrepreneurs’ characteristics, firm characteristics, access to business information, and policies and procedures could be adopting as supporting dimensions to measure women entrepreneurs’ access to finance.

Multiple regressions used to identify the impact of the formal financing dimensions on women entrepreneurs’ access to finance. It measured each formal financing dimensions impact on the women entrepreneurs’ access to finance. Firstly, consider the entrepreneurs’ characteristics, while it increased by one unit women entrepreneurs’ access to finance was increased by 0.144. Furthermore, according to the information was given by the analysis, when firm characteristics were increased by one unit women entrepreneurs’ access to finance was increased by 0.302. It can be identified that when access to business information increased by one unit women entrepreneurs’ access to finance was increased by 0.128. It can be identified that when policies and procedures increased by one unit women entrepreneurs’ access to finance was increased by 0.240. These four dimensions have good impact on the women entrepreneurs’ access to finance. Firm characteristics and policies and procedures are the best influencing dimensions on the women entrepreneurs’ access to finance.

Correlation coefficient was used to identify most and least important formal financing dimension factors that influence to the women entrepreneurs’ access to finance. Among four formal financing dimensions policies and procedures has high correlation with women entrepreneurs’ access to finance.

**Correlation Analysis**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Pearson Correlation</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC</td>
<td>0.420</td>
<td>0.000</td>
</tr>
<tr>
<td>FC</td>
<td>0.669</td>
<td>0.000</td>
</tr>
<tr>
<td>ABI</td>
<td>0.739</td>
<td>0.000</td>
</tr>
<tr>
<td>PP</td>
<td>0.554</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: Based on the analyzed data
Multiple Linear Regressions

<table>
<thead>
<tr>
<th>Model</th>
<th>β</th>
<th>Std. Error</th>
<th>T – Value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.618</td>
<td>0.309</td>
<td>2.002</td>
<td>0.048</td>
</tr>
<tr>
<td>EC</td>
<td>0.144</td>
<td>0.061</td>
<td>2.374</td>
<td>0.020</td>
</tr>
<tr>
<td>FC</td>
<td>0.302</td>
<td>0.055</td>
<td>5.545</td>
<td>0.000</td>
</tr>
<tr>
<td>ABI</td>
<td>0.240</td>
<td>0.066</td>
<td>3.628</td>
<td>0.039</td>
</tr>
<tr>
<td>PP</td>
<td>0.128</td>
<td>0.061</td>
<td>2.097</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: Based on the analyzed data

Model summary

<table>
<thead>
<tr>
<th>Figure</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>R Square</td>
<td>.680</td>
</tr>
<tr>
<td>Adjusted R Square</td>
<td>.666</td>
</tr>
<tr>
<td>Std. Error of the Estimate</td>
<td>.18828</td>
</tr>
</tbody>
</table>

Source: Based on the analyzed data

Analysis of Variance (ANOVA)

<table>
<thead>
<tr>
<th>Model</th>
<th>Degree of freedom</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>4</td>
<td>7.148</td>
<td>1.787</td>
<td>50.407</td>
<td>.000</td>
</tr>
<tr>
<td>Residual</td>
<td>95</td>
<td>3.368</td>
<td>.035</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td>10.515</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Based on the analyzed data

IV. CONCLUSION

A structured questionnaire was designed and administered to collect the data in order to identify the women entrepreneurs’ access to finance and the sample consisted from 100 women entrepreneurs. The majority of the sample had high level of impact of policies and procedures to access to finance. Formal financial institutes should reduce their processes and pre requirements when issuing credit. Since, it has to be fulfilled a huge process most of the women entrepreneurs reject formal finance. As examples guarantors and mortgages have to be fulfilled when taking a loan from a formal financial institute. It is very difficult to women entrepreneurs to find these. There is not such long and difficult process to take loan from informal finance. Therefore, majority of women entrepreneurs turn to informal finance to fulfill their financial needs. Hence, it should reduce the requirements which want to accomplish when issuing a loan.

REFERENCES


**AUTHORS**

First Author – Chamani M.H.J, Bachelor of Business Management in Entrepreneurship and Management, Uva Welassa University, janithachamani@gmail.com.

Second Author: Kulathunga K.M.M.C.B, Senior Lecturer, Uva Welassa University, maduranga99a@gmail.com

Third Author – T.G.A.H.C. Amarawansha, Lecturer, Uva Welassa University, hirusha.chathuri@yahoo.com

www.ijsrp.org
Evaluation of Home Sanitation System in Tidal Areas, A Case Study of Kemijen Village, Semarang, Indonesia

IM. Tri Hesti Mulyani*, Etty Endang Listiati*, B.Tyas Susanti*, Djoko Suwarno**

*Faculty of Architecture and Design,
**Faculty of Engineering
Soegijapranata Catholic University, Semarang, Indonesia

Abstract- The northern city of Semarang is experiencing severe flooding due to rising sea level. This is one effect of global warming as well as land subsidence because of groundwater exploitation. One of the areas affected by the flood is Kelurahan Kemijen Semarang where the house and the environment is always inundated. Efforts made by residents to overcome this problem is to elevate the neighborhood road. However, it poses a new problem for the poor because they cannot raise the floor of their houses so that the floor surface is below the road surface. The other problem is sanitation problem because in principle the area is designed for dry environment.

The residents who cannot raise the floor make an effort focusing on sanitation so the “biological activities” and bathing can still take place when the house is submerged in water. There are two kinds of effort that they make: 1) increasing the position of septic tank without raising the floor of bathroom and closet holder. However, this does not work optimally. 2) Increasing the bathroom floor and closet holder and raising (and connecting) with septic tank. It seems the second effort is more optimal to face the sanitation problem temporarily.

In the research, it took six houses as the sample (10% of the population), which experience the worse condition of the tidal. The research used qualitative description analysis method. The result of the research shows some solutions to the sanitation problems of bathrooms/toilets performed by the residents, both individual and collective solution, as the adaptation efforts to flood.

Keywords: home sanitation, Kemijen, tidal flood,

I. INTRODUCTION

Climate change and global warming have led to rising sea levels. According to the International Panel On Climate Change (IPCC) report, the average global surface temperature increased from 0.3 to 0.6 °C since the late 19th century, and up to 2100 the earth's temperature is predicted to rise around 1.4 - 5.8° C (Dahuri, 2002 and Bratasida, 2002 in Syah AF). Rising global surface temperature causes melting ice in the north and south poles of the earth so that there is a sea level rise. It is estimated that in 1999-2100, sea level rise was about 1.4 to 5.8 m (Dahuri, 2002 in Syah AF). On the other hand, exploitation of groundwater use has led to a land subsidence (Marsudi in Pryambodo DG, 2012). Both are the causes of tidal flood. Tidal flood is caused by sea water tides so that the water inundates the land (the center of Indonesian geography study). Tidal floods have hit several coastal areas in Indonesia, such as Sumatera, Kalimantan, Sulawesi, Bali, Papua, and Java. The coastal cities of Java with tidal floods are: Jakarta, Subang, Tasikmalaya, Pangandaran, Probolinggo, Pacitan, Banyuwangi, Jember, Trenggalek, Malang, Tulungagung, Lumajang, Gresik, Tuban, Pamekasan, Surabaya, Kulon Progo, Bantul, Pekalongan, Cilacap, and Semarang (Republika.co.id, June 7, 2016). Semarang city experiences land subsidence due to excessive groundwater exploitation resulting in tidal floods in some parts of the region as seen on the map of the Spatial Plan of Semarang in 2010-2030 below.
Some areas in North Semarang and East Semarang have the land subsidence of 4-8 cm per year (the part of map with the colors from yellow to dark brown). The other data from the results of land subsidence research in Semarang area by the Geodetic Scientific Group of the Earth Science and Technology in 2008, 2009, 2010, 2011, 2012 and 2016 using Global Positioning System (GPS) technology and Interferometric Synthetic Aperture RADAR (InSAR) obtained the data as follows (Andreas H, 2016):
The red color in the figure shows the acceleration or the rapid land subsidence per year that occurred in the North and North East of Semarang City. The land subsidence in this section has reached about 1 m since 2008. Yellow color shows the subsidence with constant value per year. The land subsidence in this section was about 20 cm. Green color means no land subsidence. According to Ismanto A et al (2009), the land subsidence in North Semarang and part of West Semarang was 4.1-12 cm/ year.

From both maps above, the Northern and Eastern areas of Semarang are included in the areas with a high rate of land subsidence and are vulnerable to tidal floods as seen on the map below.

Figure-3: The comparison of the land subsidence maps in North and East Semarang.
Source: Referring to the Government of Semarang City in 2010-2030 and the Geodetic Scientific Group of the Earth Science and Technology of ITB.

The areas of North and East Semarang which are vulnerable to tide can be seen in table below.

<table>
<thead>
<tr>
<th>No</th>
<th>Lokasi Kecamatan</th>
<th>Luas (ha)</th>
<th>Sebaran (Kelurahan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kecamatan Tugu</td>
<td>257,20</td>
<td>Mangunharjo, Mangkang Wetan, Randugarut, Karanganyar dan Tugurejo</td>
</tr>
<tr>
<td>2.</td>
<td>Kecamatan</td>
<td>237,19</td>
<td>Tambakharjo, Tawangmas</td>
</tr>
<tr>
<td>3.</td>
<td>Kecamatan Barat</td>
<td>22,95</td>
<td>Kauman, Kranggan, dan Jagalan</td>
</tr>
<tr>
<td>4.</td>
<td>Kecamatan Tengah</td>
<td>508,28</td>
<td>Panggung Lor, Bulu Lor, Bandarharjo, dan Tanjung Emas</td>
</tr>
<tr>
<td>5.</td>
<td>Kecamatan Utara</td>
<td>44,15</td>
<td>Kemijen</td>
</tr>
<tr>
<td>6.</td>
<td>Kecamatan Timur</td>
<td>377,68</td>
<td>Terboyo Kulon, Trimulyo, dan Terboyo Wetan</td>
</tr>
<tr>
<td>7.</td>
<td>Kecamatan</td>
<td>73,23</td>
<td>Tambakrejo, Kaligawe, dan Sawah</td>
</tr>
<tr>
<td>8.</td>
<td>Kecamatan</td>
<td>18,12</td>
<td>Gayamsari, Besar</td>
</tr>
<tr>
<td></td>
<td>Semarang Selatan</td>
<td></td>
<td>Kemijen</td>
</tr>
</tbody>
</table>

Kemijen Village is one of residential areas routinely struck by tidal flood. The village consists of 11 RWs with the borders that can be seen in the figure below.
Community efforts

Environmental street elevation.
Street elevation is useful for people's access to daily activities. However, it caused a new problem for the poor/low income people because they could not raise their houses so that the floor surface was lower than the street level.

Government Efforts
Semarang city government provides pumps to reduce puddles by dumping inundated water into nearby river (pumping system). The system is capable of reducing inundation in some areas of Kemijen. Tidal puddles cause sanitary problems which are principally designed for dry areas (not inundated). The purpose of the research was to evaluate home sanitation system in tidal areas.

II. COLLECT IDEA

This research completes some previous researches which have been done before. One of the studies related to Kemijen is a research on identification of sanitation system which is suitable to the sanitation problems in Kelurahan Kemijen Semarang (Tri Hesti Mulyani & BPR Gandhi, 2014). This study examined alternative sanitation systems that was suitable to be applied in areas which suffered from flooding.

In addition, research related to social factors in Kelurahan Kemijen has also been done by Andi Suriadi, et al (2018), and Ananto Bangkit Pradana and Mussadun (2014). Both of these social researches concluded that, the slum environment conditions did not make the citizens of Kemijen wanted to move. They wanted to stay there, even if they realized that the environment was not good to be resided. This was due to the ease access to the workplace as well as, the level of security, the connection to the environmental organizations and relationships with the family and neighbors that has been closely intertwined so far.

The study relates to the type of house desired by the citizens of Kemijen has been investigated by Pribadi SB et al (Module vol 11, no 2, August 2011) which revealed that the percentage of residents related to the type of house that they wanted to build as follows: 1) 42.75% wanted a house on stilts, 2) 20.75% wanted the house floating and 3) 36.50% wanted a house which was elevated with the pile of soil.

While the other research showed that efforts by the Kemijen residents in relation to deal with environmental conditions indicated that the majority of residents created dams as a barrier (52.94%) whereas people with sufficient economic capabilities would then bought pumps and people with higher economic capability raised the floor (35, 29%) (Adityo Sestionurjaya et al, 2016; Kenana Aufa D. And
Nanny Y, 2016). In relation to floor elevation, the main priority of elevation was the bedroom (29.4%) and the bathroom (11.76%), considering the bathroom always created problems when the water and dirt appeared on surface due to the rob.

III. RESULT AND DISCUSSION

Now it is the time to articulate the research work with ideas gathered in above steps by adopting any of below suitable approaches:

A. Method

The research method used was observation and interview. The observations were made in detail on the areas which were still inundated. The most heavily inundated areas were in RW-IV of Kemijen village. The interviews were conducted to the Village Head and the residents of the houses who were sampled. The number of homes in the study area was 55 houses, and the study took six houses as the samples. The sanitation solutions conducted in six cases were further assessed/ discussed using a reference of ideal sanitation system.

B. Result and discussion

Kemijen Village, Semarang, consists of 11 RWs, and six out of the eleven RWs had successfully overcome the problem of tide. The solutions undertaken to overcome it were by:
- Environmental street elevation
- House floor elevation performed by most houses, on average once in five years
- suctioning water using pump and discharged to Banger river.

The other five RWs have not been able to solve the tidal problem and one of the most severe was RW IV. RW-IV consists of 2 RTs inhabited by 72 families in 55 houses. The severe condition occurred because there were still many houses with the floor height which was the same as or lower than the street level. The condition did not change significantly although the effort to raise the floor of the houses had been performed. In addition, the non-functioning of environmental channels due to very high sedimentation rate also exacerbated the sanitary conditions in this area as shown in the figure below.

Figure-5: Sediments in the environmental channel in Kemijen
Source: Mulyani TH, Semarang 2017

This condition caused flood and sanitation problems that disrupted the health of the residents. The handling of tidal puddles and disposal of wastewater from bathrooms and washing activities were performed collectively by the residents. The effort made was by draining the liquid waste in the channel to the pond located in front of the houses of the residents using the electric pumps as shown in the figure below.

Figure-6: the picture of the pump and the sketch of pumping collective solution in RW-IV of Kemijen
The effort was made because the position of the environmental channel is much lower than and pond waterfront. Without the pump, water cannot flow into the dump.

Figure-7: the scheme of the positions of environmental channel, pump, and retention pool in RW-IV of Kemijen
Source: Mulyani TH, Semarang 2017

In this study, the samples taken were 10% of home population (six houses). The samples consist of two categories:
- The houses that had been able to overcome tidal flooding (1 sample).
- The houses that had not been able to overcome tidal flooding (5 samples)

The number of the house samples that had not been able to overcome tidal flooding was taken more because most of the houses in the area were in this condition. The next discussion focused on the solution efforts made by the residents in the bathrooms and toilets in overcoming the problem of flood/tide, while the problem of gray water was handled collectively using the pump as mentioned above.

The detailed condition of the six house samples and the adaptation effort on the sanitation system can be seen in the following descriptions:

1. Mr. Mahdi’s house
   The house is categorized as the one that had been able to overcome tidal flooding consisting of two units; one unit was used for residential house and one unit for boarding house. The house had been partially raised with a floor height of 1.5 m higher than the street level for the boarding house, while in the residential house, the floor height was still the same as the environmental street level.
   The sanitation issues were resolved by:
   Raising the bathroom floor surface and connecting septic tank to approximately 1.5 m higher than the environmental street level. The resident’s solution scheme can be seen in the following figure.

Figure-8: the solution scheme of the floor raising for homes and the sanitation for bathrooms and toilets
Source: Mulyani TH, Semarang, 2017

By doing this, when puddle of flood/tide occurs, bathroom still can be used by the residents of boarding house and homeowners.

2. Mr. Timbul’s House
The house belongs to the category of the house that had not been able to overcome flood/tide because the floor of the house was 60 cm lower than the street level. The sanitation issues are solved by raising the bathroom floor level and connecting the septic tank to about 1.5 m high from the floor surface of the house. Therefore, when the house is flooded, the bathroom can still be used. The solution scheme can be seen in the following figure.

Figure-9: the solution scheme of raising the sanitation of bathroom/toilet
Source: Mulyani TH, Semarang, 2017

3. Mr. Bambang Susilo’s house
The house belongs to the category of house that had not able to adapt to flood/tide. The height of the floor surface was 60 cm lower than the street level, and there was no change in the height of the bathroom and toilet. Therefore, it can not be used when the house is struck by flood/tide. The solution made by the resident in the conditions was to evacuate to another place. The scheme of the sanitary condition is as follows:

Figure-10: the solution scheme of raising the septic tank
Source: Mulyani TH, Semarang, 2017

4. Mrs. Hanifah’s House
Overall, the condition of this house was very apprehensive because most of the houses had been destroyed. One-third of the building that can still be occupied was optimized by elevating the rear floor for bedroom and bathroom so that when flooded it still can be used. The height of the floor surface of the front house (living room) was under the street level. The sanitation problems were solved by elevating the bathroom at the back to 1.50 m higher than the living room floor. The solution scheme performed on the bathroom part is as follows:
5. Mrs. Kartupi’s House
The condition of the house was very severe because the building was almost drowned. The buried part of the house was about 3 meters and the height of the inner space was left only about 160 cm. The floor surface of the house was 80 cm lower than the environmental street.
With the floor position of the house which was 80 cm lower than the street level, the house had the highest flood/ tide. To reduce the flood/ tide water, suction was performed by pumping individually and flowed to the environmental channel as shown in the following figure.

The sanitation problems in the bathroom and toilet had no solution because the height was still the same as the surface of the house floor (lower than the street level). Thus, when flooding, the bathroom and toilet could not be used. The scheme of the sanitary conditions can be seen in the following figure.
6. Mr. Suyanto’s House
Around the house, there was no sewerage, so the water was inundated in the yard of the house. The floor height of the house was slightly lower than the main street (Komodor Laut Yos Sudarso Street). The sanitation problems in the bathroom and toilet had no solution because the surface of the floor was slightly lower than the main street. Therefore, when flooding, the bathroom could not be used. The scheme of the sanitary conditions can be seen in the following figure.

The sanitation system in the toilets in most homes in the study sites used the conventional wet systems using water for drainage (Hans Van Bruggen in Darwati S, 2007). The type of the closet used was squat closet as shown in the following picture.
Figure-15: Squat Closet

With a wet system, it demands smooth flow of water for flushing. The system can work well when the closet is in a dry position (not inundated by flood/ tide). The red lines in the Figs. 8-11 and 13-14 show the elevated street surface positions in order not to be inundated by flood/ tide. In the case of the houses number 3, 5, 6, the closet position was under the surface of the street (below the red line). It means that it will be inundated during the flood/ tide, so the closet could not be used because the flushing water could not flow.

In the case of the houses number 1,2,4, the position of the closets was raised and the septic tank hole was connected upward. It was intended that in flood/ tide the flushing water can still flow smoothly to the septic tank.

The comparison of squat closet position with street surface and flood/ tide water positions in the six cases of the houses can be seen in the following diagram:

Diagram-2: the position of squat closet against the street surface and the position of flood/ tide water

<table>
<thead>
<tr>
<th>House 1</th>
<th>House 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solving the sanitation problem of bathroom and toilet</td>
<td>Solving the sanitation problem of bathroom and toilet</td>
</tr>
<tr>
<td>Not solving the sanitation problem of bathroom and toilet</td>
<td>Not solving the sanitation problem of bathroom and toilet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>House 3</th>
<th>House 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solving the sanitation problem of bathroom and toilet</td>
<td>Solving the sanitation problem of bathroom and toilet</td>
</tr>
<tr>
<td>Not solving the sanitation problem of bathroom and toilet</td>
<td>Not solving the sanitation problem of bathroom and toilet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>House 5</th>
<th>House 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not solving the sanitation problem of bathroom and toilet</td>
<td>Not solving the sanitation problem of bathroom and toilet</td>
</tr>
</tbody>
</table>
IV. CONCLUSION

The solutions to the sanitation problems of bathrooms/toilets performed by the residents as the adaptation efforts to flood/tide were:
- the collective solution in the scale of RT performed to dispose liquid waste (grey water) and the puddle of flood using pumps. The water was flown to the lands of PT. KAI which has been inundated into ponds.
- The individual solution performed by each house to solve the sanitation problems of bathrooms and toilets. The solution was by raising the floor surface of bathrooms and the position of the closets was higher than the street level. It was aimed to be able to use the occupied space although it was flooded.

ACKNOWLEDGMENT

The writers delivered a great gratitude to the Head of Village and the entire managers of Kemijen Village for the permit and assistance given to the researchers to collect the data in the research location. The writers also thanked Mr. Puji, Mr. Timbul, and Mr. Kusri as the public figures of Kemijen who had willingly been the informants of the research. The scheme of Penelitian Unggulan Perguruan Tinggi (the Superior Research of Higher Education) was funded by KEMENRISTEKDIKTI (the Ministry of Research, Technology, and Higher Education) in 2017.

REFERENCES


AUTHORS

First Author – IM.Tri Hesti Mulyani, Lecturer on Ecological Architecture, Dept of Architecture, Faculty of Architecture and Design, Soegijapranata Catholic University, email: mulyani@unika.ac.id.
Second Author – Etty Endang Listiati, Lecturer on landscape Architecture and Behaviour Architecture, , Faculty of Architecture and Design, Soegijapranata Catholic University, email: etty@unika.ac.id.
Third Author – B.Tyas Susanti, Lecturer on Antropology, Faculty of Architecture and Design, Soegijapranata Catholic University, email: santi@unika.ac.id
Fourth Author- Djoko Suwarno, Lecturer on Civil Engineering, Faculty of Engineering, Soegijapranata Catholic University, email: dj.suwarno@unika.ac.id

Correspondence Author – B.Tyas Susanti, santi@unika.ac.id, contact number +62 813 262 79547
Nature Of Media Policies Protecting Children Against Harmful Television Content In Kenya

Samson Guantai Raiji

Department of Media Studies, College of Human Resource development, Jomo Kenyatta University of Agriculture and Technology

Abstract

Mass media content in Kenya more so broadcast is largely free to air with regard to radio and television. It is this aspect of free media content access that continues to pose a challenge with regard to specific content exhibited and the possible resultant long term effects to audiences. The most affected of these audience categories are the children who are in their formative stages and apparently do not have the necessary mental capacity to discern and distinguish media content’s reality and fiction. With the possibility of exposure to unregulated media content that is age inappropriate, there is likelihood that this will cause harm to them. This study therefore sought to understand the nature of Kenya’s media policy protecting children against harmful television content. It encompassed on Establishment (where they are found), Enactment (how they are enforced and practiced; self regulation, sanctions or normative) and Responsibility (who is charged with the mandate). It involved children media policy implementing stakeholders; government agencies, Media Owners Association, media policy experts, television stations, and parents within Nairobi County. A total of 474 respondents were involved in this study. They were sampled using non-probability sampling method as the researcher hoped to involve some respondents according to their perceived usefulness to the study. Purposive sampling was therefore used. Self administered questionnaires were administered to the parents selected for the sample, while structured interviews were conducted with the other respondents identified. Key informant interviews were conducted to seek information on how existing children media policies are implemented. The study found out that there is little to no knowledge of the nature of media policies protecting children against harmful television content. It therefore was concluded that the public does not participate in media policy processes; that there is less involvement and expectation to participate in media policy. Most respondents thought that the enactment of Media Policy was largely self-regulatory. Government agencies are seen to have the most responsibility in implementing media policy. This is a contradiction in view as self-regulation involves less government control over the operations and content by television. The study recommends civil education and participation in matters media policy. This study suggests further research in other areas of the nation (geographical), a possible review of implementation theory and finally a review in sections of the media policy process in the Kenyan context.

Index: Harmful Television Content, Implementation, Media Policy, Nature of Policy

INTRODUCTION

Policy and legal framework of child protection in Kenya is embodied in the following legal Acts and regulations: the Constitution; the Children Act; the United Nations Convention on the Rights of the Child (UNCRC); the African Charter on the Rights and Welfare of the Child (ACRWC); Adoption Regulations; charitable children institution regulations; the National Children Policy; the Orphans and Vulnerable Children (OVC) policy; general education Policies; and child participation guidelines. Other Acts include: the Sexual Offences Act; the Counter Trafficking in Persons Act; the Persons with Disabilities Act; the Penal Code; the Criminal Law (Amendment) Act of 2003; the Domestic Violence (Family Protection) Act; the Refugee and Displaced Persons Act; and general labour laws, including the Employment Act.

The 2009 Kenya National Bureau of Statistics National Census report, indicates middle income families especially in major urban centers have access and consume mass media services on daily basis. A casual look at a typical middle level social-economic family category in Nairobi is likely to exhibit certain characteristics generally associated with mass media consumption patterns. The same report indicates that out of the Nairobi’s six million inhabitants, about 5 million have access to at least one type of media as represented by about 1 million households.

Mass media content in Kenya more so broadcast is largely free to air with regard to radio and television. However, print and
internet sources are not. Other than a few subscription broadcast media such as Dstv, Zuku and World Space Radio etc, the rest of broadcast media is free as long as the gadgets have been accessed and powered. Out of Kenya’s over one hundred FM radio stations and 19 television stations, nearly 90% are accessed in the capital city where as, less than 10% are accessed in farfetched regions in the northern parts of the country(Media Council of Kenya Annual Report 2013).

It is this aspect of free media content access that continues to pose a challenge with regard to specific content exhibited and the possible resultant long term effects to audiences and society. The most affected of these audience categories are the children who are in their formative stages and apparently do not have the necessary mental capacity to discern and distinguish media content’s reality and fiction (Charren, 1980).

In the midst of these concerns are the various media policy guidelines in place and bodies that regulate various aspects of media industry operations such as the Ministry of Information Communication and Technology and Communications Authority of Kenya (CAK), Media Council of Kenya, Media Owners Association, Editor’s Guild of Kenya, Film Censorship Board of Kenya. Ironically, other than general consumer associations such as the Consumer Rights Watch, there is no known consumer body that looks specifically into the media consumer concerns in Kenya. At the core of these concerns is the whole issue of media policy implementation. Coupled with this is the issue of general audience protection, more so children as a vulnerable group of consumers of generally free and easy to consume television content. In a country with high urbanization tendencies and its resultant outcomes such as weakening of social bonds, cultural erosion and biases towards foreign tastes and trends, the concern here therefore is the ineffective media content control especially television with its powerful audio visual effects that may increase the already known negative tendencies (Charren, 1980).

Children form a large percentage of the Kenyan population. With the possibility of exposure to unregulated media content that is age inappropriate there is likelihood that this will cause harm to them. They are likely to exhibit violence and other aspects that are deemed socially wrong in their immediate environments. The results of viewing harmful media content are known. There have been numerous studies on media effects; Ill Effects (Barker and Petley 1997), Media Effects (Bandura 1977), Children and Television (Charren 1980), Cognitive Effects of Mass Media (Baran 2009), and Media Effects Advances in Theory and Research, among others, that have pointed to this fact that children exposure to inappropriate and harmful television programs have presented socially unacceptable behaviour.

Media content control is present and documented and stakeholders are mapped out as well as their roles in ensuring that the control mechanisms are put in place. This study seeks to expose the gap that exists between the already established mechanisms for content control and the actual effective implementation. The most carefully crafted policy that is widely accepted by those it affects can flander because of improper implementation (Eccles,2006). The question here therefore is what might be happening to the media content control mechanisms that are in existence? Who is responsible? What is it that might have gone wrong and what are the possible remedies.

RESEARCH ELABORATIONS

This research focused on media policy stakeholders. These included the Media Owners Association, the Media Council of Kenya, parents, and media houses as the implementers of the policies, Communication Commission of Kenya, and any other agency concerned with media policy as well as children rights and welfare. With virtually all households in urban Kenya owning and accessing a variety of media, and most media houses and media policy agencies being in urban Kenya; Nairobi city was the focal point of this study.

Theoretically, this study was founded of the Theory of Implementation with complements from Cultivation theory. This is because the study was looking at the implementation of media policy in Kenya as well as the media effects of television viewing amongst children.

Descriptive research design was used as it offered the researcher the discretion to determine and report the way things are. Kothari (1990).The population for this study was all media houses with television bandwidth, all government agencies involved in media policy, all other agencies involved in child protection, media law and policy experts as well as parents.

Non probability sampling was employed. This method of sampling aims to be theoretically representative of the study population by maximizing the scope and range of variation of the study (Kombo et al 2011).This study was based in Nairobi County owing to its centrality and as a hub of policy and media activities; the media policy hub because most media policy agencies and all television media houses are headquartered in Nairobi.

FINDINGS

In a free- to- air media environment coupled with weak implementation of the already existing media policies, the Kenyan
children find themselves at the mercy of media operators who apparently rate profit motivation more than moral social values. With a relatively apathetic media public too, the situation is not bound to get any better unless long term workable solutions are sought. In line with its social concerns, the Kenyan government has over the years formulated and legislated broad media policy guidelines and specific clauses against indecent media content. These are embedded in the Film and Stage Plays Act (1980), the Kenya Broadcasting Corporation Act 1998), the Kenya Communications Act(1998) and the Media Act (2009/10). This study looked into the Establishment, Enactment and Responsibility of media policies protecting children against harmful television content. Out of the 370 respondents 300 believed that children media policy is enshrined in the law of the land. This represents 82% of respondents. It formed the basis of discussion on how parents interact with law and what they view as their role in the policy process that concerns television content for children. 12% and 6% thought that Children media policy is established in books and in the constitution respectively.

“......anything policy stems from the government and therefore the lawmakers who represent us know what is good for society, that is why we have elected them...” says one respondent. This is a general sentiment amongst the parents. They view policy as an act of government and so they do not see much of media policy apart from when the government is exchanging with the legislators on various issues. As Mbeke (2008) observes the African parent/guardian believes that generally media law is found largely in the constitution of Kenya. He points out that laws governing the media in Kenya are fragmented and exist in different sections of civil and criminal laws. The three sources of press law in Kenya he posits are; the Constitution of Kenya, the Statutory Law; and the Common Law. The Constitution of Kenya is the supreme law of Kenya and guarantees the right to freedom of expression. Media policy and law does not only exist in written form, it must be integrated in the spheres where media operations are envisaged, Magarian (2007). Media practitioners, professional or otherwise must endeavour to understand the consequence of media activity in society and government. He points out that media policy should be both oral and written. His observation therefore draws a point of focus as to how to integrate media policy to the extent that it becomes a part of the oral traditions of media practitioners.

On a follow-up question on their interaction with the law, one respondent stated that “...the law is there to be followed and not to be questioned much because the people who came up with it were representatives of institutions concerned.” Most parents admit that they have had no interaction with media policy, they remark that they can only be sensitive about what their children are exposed to on television. “…I don’t think I have ever seen a document that guides this field but I know something exists, I take care of my children’s television consumption hoping that they will be safe that way....” remarks a respondent.

On matters concerning children media policy enactment, 290 respondents said that self regulation is used in children media policy providing a sharp contrast from those who believed that its enactment was sanctional and normative. Only 8% believed that the enactment is sanctional, with 12% seeing it as normative. The study gathered that the 290 accounts for 78% of respondents who believed in self regulation; this therefore infers that a majority of parents believe that media houses are largely able to undertake the enactment of the children media policy.

Respondents thought that self regulation is what is in place and it is adhered to for the reason that media houses are obliged to follow through with these policies. One respondent remarked “television stations are in business and going against the codes and policies set will only attract bad results for them, they must regulate themselves.” This therefore should not be confused to their understanding that policy is established in law.

“Regulation-of-self encourages the media to bring television programs that will be interesting to the children but not harmful to their development....” says a respondent. There is a general acceptance that self regulation is practiced across the board with only 8% being of the opinion that sanctions are at play. “…television is notorious for inappropriate content and therefore sanctions have been put in place to ensure that there is sanity in the industry”

Self regulation has three components, namely; legislation that is defining appropriate rules, enforcement, such as initiating actions against violators and finally adjudication, that is, deciding whether a violation has taken place and imposing an appropriate sanction (Campbell 2007). Thus, the term “self-regulation” means that the industry or profession rather than the government is doing the regulation. However, it is not necessarily the case that government involvement is entirely lacking. Instead of taking over all three components of regulation, industry may be involved in only one or two. For example, an industry may be involved at the legislation stage by developing a code of practice, while leaving enforcement to the government or the government may establish regulations, but delegate enforcement to the private sector. Sometimes government will mandate that an industry adopt and enforce a code of self-regulation (Culnan 1998).

Bullock et al (2001) observes that often times, an industry will engage in self-regulation in an attempt to stave off government regulation. Alternatively, self-regulation may be undertaken to implement or supplement legislation.
A follow up question was posed as to the adequacy or inadequacy of these measures. 49% of the respondents thought the enactment measures were adequate while 51% viewed them as inadequate. Most of those who thought the enactment measures are adequate claim that a regulatory body would be sufficient since it can oversee all the operations of media houses especially those concerned with implementing children media policy. Those with the view that the enactment not sufficient, said that there are many other factors at play other than having policy and calling for children media policy implementation for example creating awareness on issues concerning children media content and policy.

Jordan (2008) argues that self-regulation is an attractive alternative to direct government regulation because the state “cannot afford to do an adequate job on its own.” They acknowledge, however, that self-regulation will only result in a net reduction of cost if the costs to industry are lower than the government’s cost savings. Other voices against self regulation (Magarian 2007, Campbell 2007) question whether companies will use that expertise to the benefit of the public, suggesting instead that they are more likely to employ their expertise to maximize the industry’s profits. Other criticisms are directed against self-regulation itself. Leaving regulation to the industry creates the possibility that industry may subvert regulatory goals to its own business goals; or as one article put it, “self-regulators often combine—and sometimes confuse—self-regulation with self-service.” Self-regulatory groups may be more subject to industry pressure than government agencies. It is also unclear whether industry has the power to enforce adequate sanctions. At most, a trade association may punish noncompliance with expulsion. Whether expulsion is an effective deterrent depends on whether the benefits of membership are important.

Without adequate incentives to comply, “bad actors” will be unlikely to comply, and the “good actors” that do comply will be placed at a competitive disadvantage (MacCarthy 1995). He argues that where a company can make greater profit by ignoring self-regulation than complying, it is likely to do so, especially where noncompliance is not easily detected by the consumer or likely to harm the particular company’s reputation. Like cartels, self-regulatory frameworks may unravel because of cheaters. On the other hand, when enforcement actions are taken, concerns are raised about the exercise of unreviewable discretion. Another problem with self-regulation is that it can facilitate anticompetitive conduct (Perritt 2000).

On the issue of whose responsibility it is to implement children media policy, government and government agencies were seen to possess the mandate and machinery to undertake this role. 298 respondents favoured government and its agencies, this accounted for 80% of the respondents. There was a sharp contrast in view that parents, media owners and society should be responsible, this generated only 11%. 6% were of the opinion that everyone in society and government as well as media should be responsible for the implementation of children media policy. A gap was thereby established with the question; how then would the media be considered self regulating if the government is expected to undertake this responsibility?

Finch (2009) argues that not only could media consumption be regulated and controlled, but also the state and commerce were often interested in more effective regulations and better surveillance over individual users. This is itself a nerve wrecking task but where children are involved the supervision of persons charged with that responsibility in their immediate environments can easily install and implement these sanctions. According to Campbell (2007) an industry may be involved at the legislation stage by developing a code of practice, while leaving enforcement to the government or the government may establish regulations, but delegate enforcement to the private sector. Sometimes government will mandate that an industry adopt and enforce a code of self-regulation

CONCLUSION

Data revealed that respondents see implementation of children media policy as a responsibility of the government and its agencies. Other stakeholders are also seen to play a part but it is very minimal. This points to the need for government and other concerned parties to come up with a sensitization on the role of all stakeholders in the implementation of media policy in this case that which protects children against harmful television content. There is a sharp contrast in the view that children media policy implementation should be self regulatory and that the government should indeed take the responsibility in ensuring implementation of the same. On the one hand data analyzed from the respondents favoured self regulation as a way of enactment of implementation and on the other, government is seen as the one charged with the responsibility of ensuring that children media policy protecting them against harmful television content is upheld. This discrepancy is possibly a pointer to the possibility of an existing gap in the understanding of stakeholder roles and the various expectations from the said stakeholders.
REFERENCES


C. R. Kothari, *Research Methodology*, Jaipur, India 1990, Ch. 6


H. Henry, Jr. Perritt, Regulatory Models for Protecting Privacy in the Internet; Privacy and Self-Regulation in the Information Age, 2000, pp 110

M. J. Culnan, A Methodology to Assess the Implementation of Effective Self Regulation for Protection of Privacy; Gortetown.edu 1998


S. Balkam, “Content Ratings For The Internet And Recreational Software; Privacy And Self-Regulation In The Information Age” Washington, USA 2001


AUTHOR

Raiji Samson G., Master of Arts, Mass Communication and Journalism, CoHReD, JKUAT, Nairobi

Email: sraiji@yahoo.com
Automatic Question and Answer Generation from Course Materials.
A.S.M Nibras, M.F.F Mohamed, I.S.M Arham, A.M.M Mafaris, M.P.A.W Gamage
Sri Lanka Institute of Information Technology

Abstract – This paper presents a Question and Answer Generating System based on the approach of Natural Language Processing. As an examiner needs to ask suitable and good questions and prepare correct answers. The potential benefits this system may assist examiners meeting appropriate questions and answers. When a text input is given, this system deeply analyzes the text content and generates a set of questions and suitable answers. This system functionally divided into four main steps namely, identifying key phrases and words, forming proper question, validating generated questions and Find answers for validated question. When analyzing text, a named entity recognizer and a part of speech are applied on each of these sentences to extract necessary information. Also classify the sentences based on their subject, verb, object and preposition for determining the possible type of questions to be generated. Once questions are generated, for the further accuracy, system using a custom developed algorithm for validating the questions. Then, suitable answer for the question will be generated. This paper provides an overview of Question and Answer Generation and a discussion on possible approaches found in the recent research as a guide to the development of an automated system.

Key words: Natural Language Processing, Natural language tool kit, Part of speech tag, Named entity recognition, Information extraction

1. Introduction
Exams plays an important role in teaching and learning process at all level of education. Proper assessment activities help to sustain learners’ interest in learning the domain knowledge [1]. Traditionally conducting exam is the successful method to identify and improve the knowledge of the student. Exam is an easy tool to regularly assess a student’s capability. Exams promote competition among students. They work harder to improve their knowledge and skills. In this way, they learn more. The important task of conducting exam paper is preparing questions and answers. Preparing questions manually is very difficult task. Examiner has to go through the whole context and come up with questions. According to our studies, most examiners saying that this is very time-consuming task and as a human, they can be a chance to omit some important content.

Based on these problems we have come up with a solution “Automated Question and Answer Generation System”. This system is using Natural language processing approach to analyze the text sentence by sentence and generate all possible questions. These questions will be validated by considering various English grammar factors. Once questions are validated, answers for the relevant question will be picked from the text input. From the user’s perspective, user has to input text material, all possible questions with answer will be generated and user has to pick relevant questions from the list.

2. Related Works
There are some Question Generation systems are implemented by many researchers. The main flow of all projects is analyzing the text materials and generating different type of questions such as essay type questions, Multiple Choice Question(MCQ), gap-fill multiple choice questions

I. Revup: Automatically generating questions from educational texts
RevUp is Automatically generates gap-fill multiple choice questions from online text. The system analyzes online text and finds most important sentences, then select the main gap-phrase from the selected sentences and choose distractors that are semantically and syntactically similar to the gap-phrase and have contextual fit to the gap-fill question [4].
II. Question Generation as a Competitive Undergraduate Course Project

Some groups of students in Carnegie Mellon University (USA) created Question and Answer Generation projects for them under graduate Natural Language Processing course. Each group tried with different techniques of Natural Language Processing (NLP) such as Language Modeling, Part of Speech Tagging, Named Entity Recognition, Parsing etc. And they allowed for students to use any programming language and any existing NLP components to complete their projects [3]. They created command line interface for question generation program.

When we compare our Automatic Question and Answer Generating System with the above-mentioned systems, our system has some additional functions to generate good quality question without having grammar errors. The first described system generating gap fill questions not WH questions and they not generate answers for the questions. But our system generates WH questions and generating answers as well. And, the both above described projects are not validate the generating questions. So that questions may have grammatical errors. But our system validates the generated systems and add ranking for the questions. And we generate answers for the questions which gets high rank.

3. Methodology

A collection of several methods and approaches are been used in the research to provide an accurate and effective of results. This section describes the approaches that has been used in this system. For the better understand, this has divided into four sub sections and explained.

![Figure:01 – Question Generation Architecture](image)

![Figure: 02 – Answer Generation Architecture](image)

I. Filtering the text content and identifying the key phrases, words that should be used to generate appropriate questions.

The entry point of the system is this stage. When user input text content in order to generate questions and answers, the text content will be put into the process of Information Extraction. Information Extraction is the task of automatically extracting structured information from unstructured and/or semi-structured documents. In most of the cases this activity concerns processing human languages texts by means of Natural language processing. The goal of Information extraction is to identify the Named entities such as the names of persons, organizations, location, date, time...etc. There are several steps to identify the named entities [2]. First step is sentence segmentation. Here, text content will be tokenized into sentence and proceed to next step word tokenization. Here sentences are further tokenized into words and proceed to next step Part of speech tagging. A part-of-speech tagger, or POS-tagger, processes a sequence of words, and attaches a part of speech tag to each word. For English language, there are set of universal part-of-speech tags available for example, ADJ – adjective, ADV- adverb, DET – determiner, NOUN – noun, PRON – pronoun, VERB – verb …etc. So, when we tokenize sentence into words, our system can map these words with respective part of speech tag using Natural language tool kit. The basic technique here we used for entity detection is Chunking, in simple sentence, Chunking is a term referring to the process of taking individual pieces of information (chunks) and grouping them into larger units. In our system, we use part of speech tags as chunks and group them by
using custom grammar. Grammar is defining with regular expressions.

\[
\text{sentence} = [(\text{"the"}, \text{"DT"}), (\text{"little"}, \text{"JJ"}), (\text{"yellow"}, \text{"JJ"}), (\text{"cat"}, \text{"NN"}), (\text{"ate"}, \text{"VBD"}), (\text{"the"}, \text{"DT"}), (\text{"rat"}, \text{"NN"})]
\]

\[
\text{grammar} = \"NP: {<DT>?<JJ>*<NN>}\"
\]

With the help of this grammar, we can group each piece into a large whole set, there we can avoid unnecessary words from the input text content. At the end of this chunking process, we can get the NP-Noun Phrases of the text. Final step of Information Extraction is to identify the Named Entities. We have to find suitable named entity for these noun phrases. We can achieve this with the help of approaches of Natural language processing. Each noun phrases are marked with respective named entities. For the better accuracy, grammar will be construct much better in order to identify all possible noun phrases. These named entities will be matched with relevant noun phrase and stored. Similarly, verbs with its tense will be identified with part of speech tag and custom written grammar (using Regular expressions). The important factor in verb is identifying tense. Different grammar will be used for different types of verb tense. All these different grammars are based on different part of speech tags. These are the set of part of speech verb tags. VB – Verb base form, VBD – past tense, VBG – present participle, VBN – past participle, VBP – non 3rd person singular present, VBZ - 3rd person singular present. From these part of speech tags system can understand the tense of the verb.

Once system identified all these parts of speech tag, noun phrases, named entities, verbs with its tense all of these information will map with the relevant sentence of the source text content and pass it the step 2 of the process.

II. Forming proper questions using the identified key phrases from the context.

In “Automation of question generation from sentences” [6] system, By using syntactic information they simplify the process by extracting elementary sentences from the complex sentences. In the next phase, based on the sentences subject, verb, object and preposition they classify the sentences to determine the possible type of questions that will be generated.

In “Using Automatic Question Generation to Evaluate Questions Generated by Children” [7] system, they have worked on the syntactical parse tree that is created for each sentence. Grammar based approach could be more time consuming, but their algorithm works on the parse tree for each sentence. They feed into their system questions from the Web Questions dataset [8] which creates a rule by itself used to generate the questions.

In our proposed approach, the question generation component takes as input a declarative sentence and produces as output a set of possible questions. It looks for the answer phrases that may be targets for WH-movement and converts them into question phrases. In the current system, answer phrases can be the following.

- Noun phrases (e.g. Mahinda Rajapaksa)
- Prepositional phrases (e.g. in 2007)
- Subordinate clauses (e.g. that Mahinda Rajapaksa was the 6th Sri Lanka President)

The system does not generate questions from all of the phrases of these types. There are certain constraints on the set of possible answer phrases. Also, note that the system does not generate questions about verb phrases (e.g., What happened to Mahinda Rajapaksa in 2007?). From the possible answer phrases, the system generates questions with the following question words: Who, what, where, when, whose, and how many.

The system could be extended to detect and transform other types of phrases to produce other types of questions (e.g., how, why, and what kind of) since the transformation from answer to question is achieved through a composition of general-purpose rules. This would allow, for example, the addition of a relatively simple rule to generate what kind of questions by building off of the existing rules for subject-auxiliary inversion, verb decomposition, etc. The system also generates yes-no questions, as discussed below.
each sentence, many questions may be produced: there are often multiple possible answer phrases in a particular sentence, and multiple question phrases for each answer phrase. For example, from “John met Lecturer”, we generate “Who met Lecturer?” “Who did John meet?” and “Did John meet Lecturer?” This question generation component aims to over generate grammatical, though not concise or specific, questions. The transformation rules in this component, which encode a substantial amount of linguistic knowledge, are applied in the following order:

1. Mark phrases that cannot be answer phrases, due to WH-movement constraints.
2. Select an answer phrase, and generate a set of question phrases for it.
3. Decompose the main verb.
4. Invert the subject and auxiliary verb.
5. Remove the answer phrase and insert one of the question phrases at the beginning of the main clause.
6. Post-process to ensure proper formatting.

Figure: 03

Figure 03 illustrates the question generation process. We use the term “question phrase” to refer to the phrase at the start of a question that includes a WH word (e.g., who, how many). There are two important special cases. First, when generating yes-no questions, there is no answer phrase to remove nor question phrase to insert. Second, when generating questions for which the answer phrase was the subject of the declarative sentence, decomposition of the main verb and subject-auxiliary inversion are not necessary. The subject is removed and replaced by a question phrase in the same position (e.g., John met Lecturer becomes Who met Lecturer?). Additionally, the main verb may need to be altered to agree with the question phrase if the subject is a first- or second person pronoun.

Marking Unmovable Phrases
A set of Tregex expressions is used to mark the phrases in an input tree which cannot be answer phrases due to constraints on WH-movement. Each parse tree subject to a movement constraint is renamed by extracting the node’s current label and adding a special prefix marker (“UNMOVABLE-“) to its label. Then, in the following step of answer phrase selection, these nodes are skipped so that the system does not generate questions for them.

Generating Possible Question Phrases
After marking unmovable phrases, the system iterates over the possible answer phrases, generating possible questions for each one. To generate the question phrases, the system annotates the source sentence with a set of high level semantic types using the super sense tagger. For a given answer phrase, the system uses these high-level semantic tags along with the syntactic structure to generate a set of one or more possible question phrases, each of which is used to generate a final question sentence. Recall that answer phrases can be noun phrases (labeled “NP”), prepositional phrases (labeled “PP”), or subordinate clauses (labeled “SBAR”).

Decomposition of the Main Verb
In order to perform subject-auxiliary inversion, if an auxiliary verb or modal is not present, the system decomposes the main verb into the appropriate form of do and the base form of the main verb. It then modifies the tree structure of the verb phrase accordingly. For example, John saw Lecturer becomes John did see Lecturer before transformation into Who did John see? Rather than *Saw John Lecturer? If an auxiliary verb is already present, however, this decomposition is not necessary (e.g., John has seen Lecturer could lead to Who has John seen?). In such cases, the main verb phrase includes the auxiliary verb and a nested verb phrase containing the base form of...
the main verb. The system identifies main verbs that need to be decomposed with the Tregex expression.

Subject-Auxiliary Inversion
The system performs subject-auxiliary inversion either when the answer phrase is a non-subject noun phrase or when the question to be generated is a yes-no question. For example, if generating questions from the sentence Burr shot Hamilton, subject-auxiliary inversion would be performed when generating

Removing Answers and Inserting Question Phrases
In the next step, the system removes the selected answer phrase, and for each possible question phrase generated from the answer phrase, it inserts that question phrase into a separate copy of the current tree to produce a new candidate question. The question phrase is inserted as a child of the “SBARQ” node under the root node (as shown in Figure 3), following any leading sentence-level adjunct phrases. Note that if the question is a yes-no question, then this step is not necessary. If the answer phrase is a prepositional phrase, then only the object of the preposition is moved. This leads to questions such as What is the building near? which we judged to be more natural than questions such as Near what is the building? The only exception is where and when questions, for which the preposition is also removed (e.g., to generate Where did John run? rather than in where did John run? from the input sentence John ran in the park.).

Post-processing
Some additional post-processing mechanisms are necessary to ensure proper formatting and punctuation. Sentence-final periods are changed to question marks. Additionally, the output is de-tokenized to remove extra whitespace symbols (e.g., spaces preceding punctuation symbols).

III. Validating Generated Questions and Ranking them by focus on Linguistic Factors
The Question Generation function will generate more than one question from a content. So, the function may be generating wrong questions. But the system should give the good meaningful questions for the user. So, the system should validate the generated questions.

There are several stages to validate the generated questions. Such as,

1. Check the correctness of added auxiliary verbs.
2. Check the correctness of used WH word.
3. Check other grammatical errors.
4. Add ranking according to the identified errors.

We have implemented algorithms for the above validate stages with the usage of Natural Language Processing.

Check the correctness of added auxiliary verbs
Auxiliary (or Helping) verbs are used together with a main verb to show the verb’s tense or to form a negative or question. The most common auxiliary verbs are have, be, and do. If we look of common WH questions, the first word will be the WH word, the second word will be the auxiliary verb and the third word will be pointing the human or object.

For example;

What did you watch on TV last week?

Here, the second word is the auxiliary verb(did). The auxiliary verb depends on noun (the third word). If the noun represents human (like, I, you, we) or noun plural then the auxiliary should be do, did, have etc. otherwise the auxiliary verb should be does, did, has etc.

So according to this concept, our implemented algorithm will tokenize the question into words using NLTK [1] and it will check the noun and the auxiliary verb whether the auxiliary verb is correctly added or not.

Check the correctness of used WH word.
WH-question is a term in generative grammar for a question that is formed with an interrogative word (what, who, whom, whose, which, when, where, why, or how) and that expects an answer with information other than "yes" or "no". The WH word of a question depends on the noun and the verb/auxiliary verb of the question. So, when we check whether the added WH
word is correct or not, we should analyze the noun and the verb of the question.

Based on this common English grammar rule, our implemented algorithm first tokens the question into single words and store it into an array and it will tag the tokens by using POS tag [1] and filtered out each word of the question as type of grammar such as NN (noun singular), NNS (noun plural), VBD (verb past tense) etc. [1]. But there is no any grammar rule to find the WH word of the question. Because some questions may be grammatically correct if we added different WH words.

For example;

a) What is that?

b) Who is that?

c) Where is that?

Here, the questions a, b and c are grammatically correct and give correct meanings as well. There for there is no any grammatical rule in English. So, we have implemented a common set of rules to check the suitable WH word of the question. The rule may not be support for all the WH questions, but we can check most of the common simple WH questions. Our Automatic Question and Answer Generating System will generate simple WH questions.

**Rule 1**

If the last word of the question is noun(NN) or noun plural(NNS) and the auxiliary verb of the question is Verb, non-3rd person singular present(VBP) or Verb, past tense(VBD) or “Does” then the most suitable WH words are “What”, “Why” and “When”.

For example;

a) What do we wear on our foot?

b) Why does student go to school?

c) When did you last see a doctor?

**Rule 2**

If the last word of the question is noun(NN) or noun plural(NNS) and the auxiliary verb of the question is Verb, 3rd person singular present(VBZ) then the most suitable WH word is “Who”.

For example

a) Who takes care of animals at the zoo?

**Rule 3**

If the last word of the question is verb(VB) then there is a high probability for the WH word to be “Where”

a) When did you go on your last vacation?

According to the above three rules we have implemented an algorithm to check and compare with the added question’s WH word whether it is correct WH word or not.

**Check other grammatical errors**

Other than the Auxiliary Verb and WH word, there may be some other grammatical errors in the generated questions. Such as, there may be wrong verb/auxiliary verb added to the question when we check it with the noun.

For example;

a) What did you watched on TV last week?

b) Why do we has teeth? =>

In the example a, the verb is in past tense but auxiliary verb is “did”. So, the verb should be in present simple(watch). And in the question b, there is a Personal Pronoun (we). So, helping verb should be “have”. To check these kind of grammar errors of the question we use Language Check module which is available in python. Using that module, we check the question and find out the grammatical error and it will suggest some suitable words for replace the error. We take those suggestions and find out most suitable word to replace the error and we display the question without those errors.

**Add ranking according to the identified errors.**

According to the above three methodologies to find out the errors in the question, we add rankings for those questions. We add ranking out of 10. If a question has only the auxiliary verb error then we reduce 3 out of 10. If a question has only the WH word error then we reduce 4 out of 10. And if a question has other grammatical mistakes then we reduce 3 out of 10. Likewise, the ranking will be reducing according to the available mistakes. If a question gets 10 out of 10 then the question does not have any errors. That will be a good question. And that question will be passing to the other section to find out the answer.
IV. Generating Suitable Answers for the Questions

The answer generation component takes two inputs that are declarative sentences and the list of questions. With the help of both inputs the most suitable answer will be generated.

First step the type of the question has to be identified in order to decide the way of analyzing the sentences. The system reads the questions one by one and parsing the questions to the Stanford parser and identify the initial labels. By analyzing the initial labels, we can determine the type of the question whether that is a binary question or 'WH' questions.

Binary questions represent only yes or no questions. Which means these kinds of questions can be answered with yes or no.


Extract the keyword sentence

Then have to invert the subject in the question and also have to remove the question word to convert the question to its predicate format. Because the predicate format is more likely to be present in the declarative sentences.

Once the format is converted to its predicate format can use the co-sine similarity checking for all the sentences similar to the converted sentence. The highest matching sentence will be retrieved to generate the answer.

Process the answer generation

The final task of generating the answer is to extract the exact answer from the highest matching sentence so as to be able to present the answer like” Maithripatha Sirisena” to the question “Who is the current president of Sri Lanka?”

The algorithm has been applied to the answer extraction task is based on answer type pattern extraction.

In the pattern extraction methods for the answer generation we use the information about the expected answer type together with regular expression patterns. For example, as I mentioned the above example in that case the answer type is a HUMAN.

We run the answer type or named entity tagger on the particular candidate sentence and return the entity which is labeled with the type of HUMAN.

In the following examples, the underlined named entities are extracted from the sentence.

“How tall is Pidutalagala Mountain?”
The height of Pidutalagala Mountain is 2524 meter.

“Who is the current president of Sri Lanka?”
Maithripatha Sirisena is a Sri Lankan politician who is the 7th and current president of Sri Lanka.

But this is not suitable for some questions such as DEFINITION questions, those questions may not have a particular named entity type. Then instead of using answer types we use hand written regular expression patterns to generate the answer.

These patterns are also useful in cases in which a passage contains multiple examples of the same named entity type. Figure 1.1 shows some patterns from [01] for the question phrase (QP) and answer phrase (AP) of definition questions.

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;QP&gt; as &lt;AP&gt;</td>
<td>What is autism?</td>
<td>developmental disorders such as autism</td>
</tr>
<tr>
<td>&lt;QP&gt;, a &lt;AP&gt;</td>
<td>What is a caldera?</td>
<td>the Long Valley caldera, a volcanic crater 10 miles long</td>
</tr>
</tbody>
</table>

Figure: 03 - Some answer-extraction patterns for definition questions [5]

4. Future Work

This system has fulfilled the fundamental problem that has raised during the research study. Still there are some limitations exists due to lack of time duration and other considerable issues. During the testing, system has performed as we expected. But there are paths where this research work can be extended. The main and important problem that we have faced during this research was accuracy of the results. Since we are dealing with human language, there may be lack accuracy due to complex of the user input. Accuracy can be improved in the future. Other than the accuracy, this research work is done for English language using the approach of Natural language processing. This approach supports other language like French, German, Dutch, Russian, Spanish…etc. As a future work, this research can be extending to other above-mentioned languages as well.
References


Feasibility of partial replacement of discarded filamentous green seaweed (Cladophora) with commercial feed in spotted scat (Scatophagus argus) culture

Nguyen Thi Ngoc Anh, Huynh Ly Huong, Tran Ngoc Hai, Ly Van Khanh
College of Aquaculture and Fisheries, Can Tho University, Can Tho city, Vietnam.

Abstract - An 60-day feeding experiment was conducted to investigate the effects of partial replacement of discarded filamentous green seaweed (Cladophora) with commercial feed on the growth performance and feed efficiency of spotted scat (Scatophagus argus). Triplicate groups of fish with initial body weight of 3.31 -3.39 g were reared in the 250 L plastic tanks at salinity of 5 g L⁻¹. Results showed that growth rate of fish in the alternate feeding regime, 1 day commercial feed and 1 consecutive day dried or fresh green seaweed were not significantly different (p>0.05) from the control group received single commercial feed. However, significant decrease in growth performance was observed in fish fed the fresh or dried green seaweed as solely diet. Application of the combined feeding regimes, the cost of commercial feed could be reduced up to 44.63% without hindering the growth of spotted scat as well as water quality was better than using solely commercial feed. Carcass analysis revealed that the lowest and highest crude lipid contents in fish fed commercial feed and green seaweed, respectively while protein and ash contents was not affected by the feeding treatments. These findings illustrated that the discarded fresh and dried Cladophora can be used as a feed to partially substitute commercial feed for S. argus culture.

Index Terms – Cladophora, Scatophagus argus, growth performance, feed cost, carcass composition

I. INTRODUCTION

Seaweeds or marine macroalgae are an important component of global aquaculture, occupy approximately 20% of the total world marine aquaculture production by weight, with an annual value of US $6.7 billion in 2013 (FAO, 2017). In the Integrated Multi-Trophic Aquaculture (IMTA) system, seaweed can be used as an extractive component to remove inorganic nutrients and mitigate potentially adverse environmental impacts from aquaculture activities (Kim, et al., 2017). Seaweeds are rich in minerals, nutrients and bioactive compounds (Kasimala, et al., 2015), and the main food for many herbivorous fishes (Tolentino-Pablo et al., 2008; Siddik and Anh, 2015). Moreover, partial replacement of costly protein sources in animal feeds with seaweed protein could improve feed quality and reduce the feed cost (Kumar and Kaladharan, 2007).

Seaweeds are both cultivated (aquaculture) and harvest from natural populations on a year-round basis from marine environments, river mouths, lagoons and ponds. However, natural seaweed stocks have become inadequate to meet the industrial requirements; several economically important species have been cultivated and developed dramatically in Asia (Kim, et al., 2017). Similar to Asian countries, the seaweed in Vietnam is widely used for food, medicine and industry, obtained useful extracted substances such as agar, alginates and fucoidan, but a large amount of seaweeds from natural resources (Tityavov, et al., 2012). Cladophora belongs to family Cladophoraceae is one of the largest and most common filamentous green algal genera, having a worldwide distribution (Leliaert and Boedeker, 2007). This genus is a good source of protein, amino acid, minerals and pigment, and essential fatty acid, which can be a suitable food for fish (Khantrairong, and Traichaiyaporn, 2009). Field surveys revealed that Cladophora is abundant throughout the year in the improved-extensive shrimp farms in the Mekong delta of Vietnam. However, excessive growth of green seaweed in these farms have caused negative impacts on water quality, shrimp yield and farmer income. In response to these problems, they are removed and discarded from farms by shrimp farmers (Anh et al., 2016). There are over 600,000 hectares of shrimp farming in the Mekong Delta, the area under improved extensive shrimp culture is nine times that of semi-intensive/intensive shrimp (Kam et al., 2012). This indicates large quantities of green seaweed as discarded-product from the shrimp farms are available year round in the region. They have high nutritional values, and have been investigated as a dietary ingredient or direct food for the giant gourami fish Osphronemus goramy (Anh et al., 2013) and co-cultured with white leg shrimp Litopenaeus vannamei (Anh et al., 2014a).
The spotted scat (*Scatophagus argus*) is widely distributed throughout Indo Pacific basin. This species is valuable brackish water aquarium fish and an important food fish in South-east Asia (Sivan, and Radhakrishnan, 2011). This species is the omnivorous fish, as macroalgae and detritus dominated in the gut contents of the fish (Sivan, and Radhakrishnan, 2011; Gupta, 2016). In Vietnam, *S. argus* distribute along the coastal areas, is the potential species for aquaculture in the Mekong delta because they feed on a low trophic level, are easily cultured and highly adaptable to a wide range of environmental conditions and can be applied in poly-culture with other species or integrated aquaculture system (Ut and Dinh, 2016). In practice, fish feed is the most expensive operating cost item accounting for over 50% of production costs; therefore, any management interventions to reduce feed input costs will have a significant bearing on the sustainability of aquaculture operations (Rana, *et al*., 2009; Rana and Hasan, 2013). The purpose of this study was to evaluate the effect of commercial feed replacement with fresh or dried green seaweed (*Cladophora* sp.) as a food source on growth, feed utilization and carcass composition of *S. argus* in laboratory conditions. These works could provide importantly scientific information for further research to apply for field conditions that may encourage farmers using locally discarded green seaweed as food source for fish and contribute to reduce feed costs, improve their profits.

I. MATERIALS AND METHODS

Experimental feeds and fish

Fresh filamentous green seaweed, *Cladophora* (Cl) was obtained from the improved-extensive shrimp farms in Ca Mau province, Vietnam (this seaweed is ordinarily removed and discarded from these farms by shrimp farmers when it is abundant), and cleaned with seawater to eliminate dust and organisms attached to seaweed in order to maintain the quality. Dried Cl was achieved by air-drying a thin layer of biomass until reaching moisture content about 12%. Both fresh and dried *Cladophora* were stored in the fridge, and cut with scissors into small pieces (±2 mm) for feeding the spotted scat. The commercial feed (CJ F-8002), floating form with particle size of 2 mm, is produced by CJ VINA AGRI Company, Long An province, Vietnam. Proximate composition (% of dry matter) of commercial feed, fresh and dried green seaweed was analyzed by the standard methods of AOAC (2000). Nitrogen-free extract was estimated on a dry weight basis by subtracting the percentages of crude protein, lipids, crude fiber and ash from 100%. Nutritional composition of experimental feeds is presented in Table 1.

<table>
<thead>
<tr>
<th>Composition</th>
<th>Moisture</th>
<th>Crude protein</th>
<th>Crude lipid</th>
<th>Ash</th>
<th>Crude fiber</th>
<th>NFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial feed</td>
<td>10.79±0.18</td>
<td>30.16±0.16</td>
<td>6.08±0.12</td>
<td>15.32±0.13</td>
<td>5.79±0.15</td>
<td>42.66±0.31</td>
</tr>
<tr>
<td>DCl</td>
<td>12.42±0.43</td>
<td>14.63±0.17</td>
<td>1.18±0.08</td>
<td>26.72±0.27</td>
<td>15.68±0.13</td>
<td>41.79±0.32</td>
</tr>
<tr>
<td>FCl</td>
<td>86.59±0.64</td>
<td>14.82±0.22</td>
<td>1.41±0.13</td>
<td>25.98±0.33</td>
<td>15.49±0.37</td>
<td>42.32±0.62</td>
</tr>
</tbody>
</table>

DCl: Dry *Cladophora*, FCl: Fresh *Cladophora*; NFE, nitrogen-free extract

Wild fingerlings of spotted scat (*Scatophagus argus*) were purchased from a reliable provider in Tien Giang province. Before starting the feeding trial, they were first reared in a 2-m³ tank for 10 days in order to acclimate the fish to the laboratory conditions and to get them acquainted with the feeding method (alternative feeding between commercial feed and dried or fresh green seaweed).

Experimental design

Feeding trial was conducted in the experimental hatchery of the College of Aquaculture and Fisheries, Can Tho University, Vietnam. The fresh and dried green seaweed *Cladophora* were used as a direct feed to replace commercial feed in an alternate feeding approach for the spotted scat (*Scatophagus argus*) juveniles for 60 days. Feeding regimes were run in triplicate tanks and each day fish were fed either commercial feed or *Cladophora*. Seven treatments included (1) single commercial feed daily as a control treatment (CF), (2 and 3) single dried or fresh *Cladophora* everyday (DCl or FCl) and 2 alternative feeding regimes where (4 and 5) 1 day commercial feed and 1 consecutive day dried or fresh *Cladophora* (1CF_1DCl and 1CF_1FCl) and (6 and 7) 2 consecutive days dried or fresh *Cladophora* (1CF_2DCl and 1CF_2FCl).

Culture system

The 250-L plastic tanks were filled with 200 L brackish water at salinity of 5 g L⁻¹. Each tank was provided a feeding tray and a continuous aeration. 20 uniformly sized fish with initial individual weight of 3.19-3.45g were placed in each tank. Fish were fed twice a day at 8:00 and 17:00 hours. The initial feed ration was 5% of the biomass, but this was adjusted daily based on the
presence or absence of residual feed. Uneaten green seaweed was collected and dried in the oven until constant weight. For commercial feed, the number of pellets (per gram) was determined before the feeding and the uneaten pellets were collected and counted after 1h feeding. The water exchange rate was approximately 50% of the tank volume every week.

Water quality

Daily water temperature and pH was measured at 7:00 and 14:00 hours using a thermo-pH meter (YSI 60 Model pH meter, HANNA instruments). The concentrations of TAN (NH₃/NH₄⁺) and NO₂⁻ were determined every week using a spectrophotometer according to American Public Health Association (APHA, 1998).

Growth performance and feed utilization

To estimate the growth performance during the experimental period, initial and final as well as intermediate samples were taken to measure average individual fish weight. Sampling was conducted at a 20-day interval. Ten fish in each tank were randomly sampled and weighed in groups using an electronic balance with an accuracy of 0.01 g and then the fish was returned to the original tanks. At the end of the feeding trial, experimental fish was individually weighed and the survival was determined.

Weight gain (WG), daily weight gain (DWG), specific growth rate (SGR), total feed intake, feeding rate, feed conversion ratio (FCR), protein efficiency ratio (PER) and survival were calculated using the following equations:

\[ \text{WG (g)} = \text{Final weight} - \text{Initial weight} \]
\[ \text{DWG (g day}^{-1}) = \frac{\text{(final weight} - \text{initial weight})}{\text{days of culture}} \times 100 \]
\[ \text{SGR (% day}^{-1}) = \frac{\text{([In final weight} - \text{In initial weight])}}{\text{days of culture}} \times 100 \]
\[ \text{Total feed intake (g fish}^{-1}) = \frac{\text{Total feed supplied} \text{ - Total feed remaining}}{\text{(Initial number of fish} + \text{Final number of fish})/2} \times 100 \]
\[ \text{Feeding rate (% BW day}^{-1}) = \frac{\text{Feed intake (g fish}^{-1} \text{day}^{-1})}{\text{(Initial body weight} + \text{Final body weight})/2} \times 100 \]
\[ \text{FCR} = \frac{\text{Total feed intake (dry weight)}}{\text{Weight gain (wet weight)}} \]
\[ \text{Protein efficiency ratio} = \frac{\text{Weight gain}}{\text{Protein intake}} \]
\[ \text{Survival ( %)} = \frac{\text{Final number of fish}}{\text{Initial number of fish}} \times 100 \]

Proximate composition of fish carcass

At termination of experiment, 5 fish were randomly collected in each tank for the removal of viscera, bone and skin and the samples were kept at -25°C. Fish carcass samples were analyzed for moisture, crude protein, crude lipid and ash according to the methods described by the Association of Official Analytical Chemists AOAC (2000).

Statistical analysis

All percentage values were normalized through a square root arcsine transformation before statistical treatment. Data for all measured parameters were analysed using SPSS for Windows, Version 16.0. Variations from dietary treatment were compared by one-way ANOVA. The Tukey HSD post hoc analysis was used to detect differences between means, and significant differences were considered at *p*<0.05.

III. RESULTS AND DISCUSSION

Water quality

Water quality parameters in the experimental tanks are given in Table 2. Daily water temperatures ranged from 26.8 to 28.8°C, and water pH remained within the range of 7.4–8.0. Generally, water temperature and pH were similar among feeding treatments. According to Macahilig et al. (1988), the spotted scat is highly tolerant of changes in temperature, salinity and pH. Hence, these parameters are within the suitable range for development of *S. argus* juveniles. The mean concentrations of TAN and NO₂⁻ in all feeding treatments varied in the ranges of 0.41-0.95 mg L⁻¹ and 0.48-1.15 mg L⁻¹, respectively.
These parameters tended to increase with the culture period in which the highest values were found in the control group, received single commercial feed (CF) everyday, followed by the group fed alternative 1 day commercial feed and 1 consecutive day dried or fresh seaweed (1CF_1DCl and 1CF_1FCl) and 2 consecutive days dried or fresh seaweed (1CF_2DCl and 1CF_2FCl), while the lowest levels of TAN and NO$_2^-$ were observed in the group fed solely dried or fresh seaweed (DCl or FCl). Statistical analysis indicated that the contents of TAN and NO$_2^-$ in the control treatment were significantly higher than in other treatments ($p<0.05$). These results showed that the water quality in the culture tanks was much better with solely CI feeding regimes than in the tanks with only CF. Moreover, the contents of TAN and NO$_2^-$ in the culture tanks was increased with increasing the amount of commercial feeds used. This indicated that the rearing tanks could be maintained better water quality in case of combined feeding of commercial feed with green seaweed than single commercial feed.

### Table 2 Water quality parameters in experimental tanks

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Temperature (°C)</th>
<th>pH</th>
<th>TAN (mg L$^{-1}$)</th>
<th>NO$_2^-$ (mg L$^{-1}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7:00 am 2:00 pm</td>
<td>7:00 am 2:00 pm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CF</td>
<td>26.8±0.4</td>
<td>28.7±0.5</td>
<td>7.4±0.4</td>
<td>7.9±0.5</td>
</tr>
<tr>
<td>DCl</td>
<td>26.8±0.4</td>
<td>28.8±0.4</td>
<td>7.5±0.3</td>
<td>8.0±0.3</td>
</tr>
<tr>
<td>FCl</td>
<td>26.8±0.4</td>
<td>28.7±0.3</td>
<td>7.5±0.4</td>
<td>8.0±0.4</td>
</tr>
<tr>
<td>1CF_1DCl</td>
<td>26.9±0.5</td>
<td>28.8±0.5</td>
<td>7.5±0.3</td>
<td>7.9±0.3</td>
</tr>
<tr>
<td>1CF_1FCl</td>
<td>26.9±0.5</td>
<td>28.8±0.4</td>
<td>7.5±0.3</td>
<td>7.9±0.3</td>
</tr>
<tr>
<td>1CF_2DCl</td>
<td>26.8±0.4</td>
<td>28.7±0.6</td>
<td>7.5±0.3</td>
<td>7.9±0.3</td>
</tr>
<tr>
<td>1CF_2FCl</td>
<td>26.8±0.4</td>
<td>28.8±0.6</td>
<td>7.5±0.2</td>
<td>8.0±0.4</td>
</tr>
</tbody>
</table>

Means in the same column with different superscripts are significantly different ($p<0.05$).

The present observations are consistent with previous researchers. They found that significant decrease in TAN and NO$_2^-$ levels in the culture tanks received single gut weed (Enteromorpha sp.) as direct feed or alternate feeding with gut weed and pellet feed compared to the tanks received only pellet feed in Tilapia culture (Siddik et al., 2014) or in herbivorous fish (Anh et al., 2013; Siddik and Anh, 2015). Although the contents of TAN and NO$_2^-$ in the CF treatment was much higher than in other treatments, these factors are still in the tolerable range for growth of $S$. argus juveniles because this species is highly adaptable to a wide range of environmental conditions (Gupta, 2016).

### Survival and growth

Table 3 showed that the survival of experimental fish was not significantly different among treatments ($p>0.05$), varying in the range of 88.3-93.3%. This result is in a agreement with the study of Siddik, et al. (2014) who used gut weed (Enteromorpha sp.) as a feed for tilapia (Oreochromis niloticus) or for herbivorous fish (Siddik and Anh, 2015), and Anh et al. (2013) utilized green seaweed as a feed for the giant gourami (Osphronemus gourami), they found that survival of fish was not affected by the feeding treatments.
Mean values in each column with different letter are significantly different from each other (P<0.05).

Figure 1 indicated that individual weight of experimental fish was affected by the feeding regimes from day 20 onwards. At day 20, the mean weight of fish was 5.02-7.23 g, in which the lowest and highest values were observed in the single commercial feed and solely green seaweed treatments, respectively, while the combined feeding regimes gave intermediate values. This tendency was more pronounced at day 40 (6.44-9.63 g) and day 60 (8.05-12.18 g).

Figure 1: Growth curve of spotted scat received different feeding regimes

There was high variation in the final weight, weight gain (WG), daily weight gain (DWG) and specific growth rate (SGR) of experimental fish in the different feeding treatments. Growth rate of the fish received alternative feeding regimes of 1 day commercial feed and 1 consecutive day dried (1CF_1DCl) or fresh green seaweed (1CF_1FCl) were comparable (p>0.05) to the control group (CF). When fish received 2 consecutive days with green seaweed (1CF_2DCl and 1CF_2FCl), their growth was significantly lower (p<0.05) than the control. Additionally, the lowest growth rates were observed in the group fed only on dried or fresh green seaweed (DCl or FCl) which was significantly different from other treatments. Overall, fish fed fresh seaweed showed a better performance than the ones fed dried seaweed. However, at the same alternate feeding regime between commercial feed and green seaweed, no significant difference (p>0.05) was observed between the dried and the fresh seaweed forms (Table 3).

Previous study reported that seaweeds have been shown to be a source of minerals and nutrients in fish diets and the main food for many herbivorous fishes (Tolentino-Pablico et al., 2007). Moreover, efficiency of using seaweed as feed for the cultured species may be variable depending on the feeding habits, age and the species of both seaweed and fish (Cruz-Suarez, et al., 2008; Siddik and Anh, 2015). In the present study, difference in growth performance of the spotted scat could be related to feeding habit of the species. Gandhi (2002) found that filamentous green seaweeds (Enteromorpha compressa and Ulva spp.) dominated the gut contents in Sargus fish of size above 100-200 mm in total length. Other studies also detected a large proportion of algae and detritus in the stomach of Sargus indicated omnivorous fish (Sivan, and Radhakrishnan, 2011).

These results are in accordance with the study of Siddik et al. (2014) who reported that growth performance of Tilapia in the alternate feeding treatments, 1 day commercial feed and 1 consecutive day fresh or dried gut weed (GW) were not significantly different from the group fed solely commercial feed (CF). Whereas significantly reduced growth was observed in fish fed the fresh or dried gut weed as single diet. Similar observation was reported by Anh et al. (2013) for the giant gourami (Osphronemus gourami).

In our results, differences in growth performance of fish could be related to different nutritional value between commercial feed (CF) and green seaweed (CI) i.e. CF contains 30.16% crude protein and 6.08% lipid, while DCI and FC1 had average crude protein and lipid of 14.63-14.82% and 1.18-1.41%, respectively (Table 1). Generally, fish require diets containing 30 to 55% of crude protein and 5 to 10% lipid to meet the needs for optimal growth. Protein requirements usually are lower for herbivorous fish and omnivorous fish than they are for carnivorous fish (NRC, 2011). Therefore, fish received only green seaweed or 1 day commercial feed and 2 consecutive days seaweed did not meet nutrient requirements for growth.

Feed utilization
The average total feed intake was between 13.47 and 17.94 g fish⁻¹ with the lowest values found in the DCl and FCl treatments, which was statistically different (p<0.05) from the other feeding treatments. Mean feeding rate varied from 3.86 to 4.68 %BW day⁻¹, in which significantly larger percentages were observed in the spotted scat fed the 1CF_2DCl and 1CF_2FCl diets; the other two treatments (DCl and 1CF_1DCl) showed intermediate values. The lowest feeding rate was found in the CF group but it was insignificantly different (p>0.05) from the FCl and 1CF_1FCl treatments.

Table 4 Feed utilization of spotted scat *S. argus* fed different feeding regimes over 60 days

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Total feed intake (g fish⁻¹)</th>
<th>Feeding rate (%BW day⁻¹)</th>
<th>Feed conversion ratio (FCR)</th>
<th>Protein efficiency ratio (PER)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF</td>
<td>16.83±1.38b</td>
<td>3.86±0.16a</td>
<td>1.91±0.02a</td>
<td>1.74±0.02a</td>
</tr>
<tr>
<td>DCl</td>
<td>13.47±0.36a</td>
<td>4.22±0.17bc</td>
<td>2.88±0.18e</td>
<td>2.38±0.15de</td>
</tr>
<tr>
<td>FCl</td>
<td>13.51±0.42a</td>
<td>4.07±0.02ab</td>
<td>2.63±0.09de</td>
<td>2.57±0.08e</td>
</tr>
<tr>
<td>1CF_1DCl</td>
<td>17.36±0.13b</td>
<td>4.27±0.08bc</td>
<td>2.20±0.08bc</td>
<td>1.99±0.06e</td>
</tr>
<tr>
<td>1CF_1FCl</td>
<td>17.05±1.26b</td>
<td>4.04±0.23abc</td>
<td>2.04±0.11ab</td>
<td>2.16±0.11bc</td>
</tr>
<tr>
<td>1CF_2DCl</td>
<td>17.94±0.45b</td>
<td>4.68±0.11d</td>
<td>2.56±0.06d</td>
<td>1.88±0.03cd</td>
</tr>
<tr>
<td>1CF_2FCl</td>
<td>17.68±0.22b</td>
<td>4.47±0.03cd</td>
<td>2.39±0.03d</td>
<td>1.99±0.02bc</td>
</tr>
</tbody>
</table>

Means in the same column with different superscripts are significantly different (p<0.05).

With respect to the use of fresh or dried green seaweed a single feed, feed conversion ratio (FCR) of DCl and FCl were significantly higher (2.63-2.88) than using solely commercial feed (1.91) and alternative feeding treatments except the 1CF_1FCl group. Additionally, application of alternative feeding regime, FCR showed in-between values, varying in the range of 2.04-2.56. However, protein efficiency ratio (PER) were best in DCl and FCl groups (2.38 and 2.57), and significantly (P<0.05) different from the control (1.74) and other groups except the 1CF_2DCl treatment.

The analysis of feed cost revealed that the highest quantity of commercial feed and feed cost were observed in the fish fed on single CF. When applying the alternative 1 day commercial feed and 1 consecutive day dried or fresh green seaweed (1CF_1DCI and 1CF_1FCl) diet, the feed costs are being reduced with 38.85% - 44.63%. Nevertheless, in the alternating feeding regime of 1 day commercial feed and 2 consecutive day dried or fresh green seaweed (1CF_2DCI and 1CF_2FCl), the expenditure of feed was decreased from 46.86% to 49.51% (Table 5) but the growth performance of the fish was negatively influenced (Table 3).

Table 5. The expenses of commercial feed in culture of the spotted scat received alternative feeding regime of commercial feed and green seaweed

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Quantity of commercial feed (CF) used for fish growth (kg CF/kg fish)</th>
<th>CF cost for fish growth (USD/kg)</th>
<th>Reduction ratio of CF cost compared to control treatment (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF</td>
<td>2.14±0.03</td>
<td>1.46±0.02</td>
<td>-</td>
</tr>
<tr>
<td>1CF_1DCI</td>
<td>1.31±0.04</td>
<td>0.89±0.03</td>
<td>-38.85±1.73</td>
</tr>
<tr>
<td>1CF_1FCl</td>
<td>1.18±0.07</td>
<td>0.81±0.05</td>
<td>-44.63±3.18</td>
</tr>
<tr>
<td>1CF_2DCI</td>
<td>1.14±0.06</td>
<td>0.78±0.04</td>
<td>-46.86±2.95</td>
</tr>
<tr>
<td>1CF_2FCl</td>
<td>1.08±0.04</td>
<td>0.74±0.03</td>
<td>-49.51±1.72</td>
</tr>
<tr>
<td>DCl</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FCl</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Price of commercial feed was 0.68 USD kg⁻¹

Similar results were reported by Siddik *et al.* (2014), the FCR and PER values of tilapia varied in the ranges of 1.29 -4.73 and 1.44 to 2.59, respectively, and the cost of the combined feeding regimes of CF and GW could be decreased with 41% without
hampering the growth of fish. Also, when alternate feeding of CF and fresh or dried GW were applied for herbivorous fish, the FCR of CF were reduced from 26.1 to 43.0% in spotted scat, from 32.7 to 44.2% in red tilapia, and from 48.2 to 57.8% in giant gourami, correspondingly (Siddik and Anh, 2015). Another study of Anh et al. (2014b) found that gut weed can be used as partial replacement with pellet feed for stocking the spotted scat that can contribute to reduce the feed cost and improve water quality.

According to Rana, et al. (2009), in a context of increasing feed and production costs in aquaculture, feed utilization efficiency is of utmost importance as feed expenditure is typically greater than 50% of total production cost. Hence, alternate feeding with high and low-protein commercial pellets could be effective in reducing feed conversion ratio. The growth rates of striped catfish (Pangasianodon hypophthalmus) fingerlings fed 30% protein pellets for 7 days and then fed on 18% protein pellets for the next 3 or 5 days were not significantly different when compared with those fed only 30% protein diets all of the time. Other investigations revealed that alternate feeding has shown promising results, and farmers who have adopted the schemes have noted a positive impact on reducing production costs (Rana and Hasan, 2013; Romana-Eguia, et al., 2013). Additionally, mixed feeding schedules using high and low-protein diets were proved to be useful for omnivorous and herbivorous fish, such as common carp, catla, rohu, Nile tilapia. This method obtained better FCRs and significant savings on feed costs (Bolivar, et al., 2006; Rana and Hasan, 2013).

Carcass proximate composition of the spotted scat is presented in Table 6. There were not significant differences (p>0.05) in moisture, crude protein and ash contents among the experimental groups, varying in the ranges of 76.67-79.27%, 17.20-17.57% and 2.48-2.86%, respectively. However, crude lipid in their carcass showed a significant change. The lowest content was detected in treatments DCl and FCl (1.17% and 1.32%) while the highest level was observed in treatments CF (3.90). When combined feeding of CF and DCl or FCl were applied, the lipid contents showed intermediate values (1.73-2.31%). The current results coincided with the study of Ibrahim et al. (2007) who reported that fat content were significantly decreased with increasing Azolla meal percentage in the diets and commercial feed showed highest level of fat content in fish, and other components did not change compared to the control diet. Similar results were reported for tilapia (Siddik et al. 2014) and for the spotted scat (Anh, et al. 2014b). These authors confirmed that the carcass lipid contents of experimental fish were decreased with increasing in seaweed frequency while the protein and ash contents of fish carcass did not obviously change.

Table 6: Proximate composition (% of wet weight) of fish carcass fed different feeding regimes

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Moisture</th>
<th>Crude protein</th>
<th>Ash</th>
<th>Crude lipid</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF</td>
<td>76.67±1.72a</td>
<td>17.46±0.58a</td>
<td>2.61±0.36a</td>
<td>3.90±0.19a</td>
</tr>
<tr>
<td>DCl</td>
<td>78.95±1.87a</td>
<td>17.54±0.53a</td>
<td>2.86±0.40a</td>
<td>1.17±0.04a</td>
</tr>
<tr>
<td>FCl</td>
<td>79.27±1.59a</td>
<td>17.57±0.64a</td>
<td>2.56±0.43a</td>
<td>1.32±0.04ab</td>
</tr>
<tr>
<td>1CF_1DCl</td>
<td>77.85±1.09a</td>
<td>17.35±0.86a</td>
<td>2.75±0.41a</td>
<td>2.19±0.19ad</td>
</tr>
<tr>
<td>1CF_1FCl</td>
<td>77.91±1.53a</td>
<td>17.47±0.63a</td>
<td>2.48±0.33a</td>
<td>2.31±0.18d</td>
</tr>
<tr>
<td>1CF_2DCl</td>
<td>77.04±1.41a</td>
<td>17.20±0.47a</td>
<td>2.78±0.46a</td>
<td>1.68±0.05bc</td>
</tr>
<tr>
<td>1CF_2FCl</td>
<td>77.26±1.04a</td>
<td>17.38±1.04a</td>
<td>2.64±0.45a</td>
<td>1.73±0.06bc</td>
</tr>
</tbody>
</table>

Means in the same column with different superscripts are significantly different (p<0.05).

In Mekong delta of Vietnam, filamentous green seaweeds (Cladophora spp.) have been found abundantly in the improved-extensive shrimp farms. These seaweeds usually over grow and outbreak in the shrimp farms and they are periodically removed and discarded by farmers (Anh et al., 2016). The herbivorous spotted scat (S. argus) is mainly fed on seaweeds and aquatic plants that could contribute to minimize excessive development of green seaweeds. Furthermore, the availability and abundant year-round of green seaweeds are economical for fish culture for a maximal production/cost ratio with applying an alternate feeding regimes commercial feed and green seaweeds shows economical and environmental sustainability. The results of the present study illustrated that the discarded green seaweeds (Cladophora spp.) in dried and fresh forms could be used in combined feeding with commercial feed to reduce feed costs and maintain better water quality for spotted scat culture. In this way, farmers can maximize the use of on-farm resources without additional cost for feeds.

ACKNOWLEDGEMENTS

This study was funded by the Ministry of Education & Training, Vietnamese Government for scientific research. The authors would like to thank Tran Thi Hang and Nguyen Thi Bao Ngoc for their help during our experiment.
REFERENCE


AUTHORS

First Author – Nguyen Thi Ngoc Anh, College of Aquaculture and Fisheries, Can Tho University, Can Tho city, Vietnam. Email: ntnanh@ctu.edu.vn

www.ijsrp.org
Second Author – Huynh Ly Huong, MSc student, College of Aquaculture and Fisheries, Can Tho University, Can Tho city, Vietnam. Email: hlhuong1402@gmail.com.

Third Author – Tran Ngoc Hai, College of Aquaculture and Fisheries, Can Tho University, Can Tho city, Vietnam. Email: tnhai@ctu.edu.vn.

Fourth Author – Ly Van Khanh, College of Aquaculture and Fisheries, Can Tho University, Can Tho city, Vietnam. Email: lvkhanh@ctu.edu.vn.

Correspondence Author – Nguyen Thi Ngoc Anh, College of Aquaculture and Fisheries, Can Tho University, Can Tho city, Vietnam. Email: ntnanh@ctu.edu.vn, Contact No.: +84-292-3834307
Dietary Pattern among Coronary Heart Disease Outpatients Attending Ahmed Gasim Hospital at Bahri Locality, Khartoum North

1Somiya Gutbi Salim Mohammed, 2Nagwa B. Elhag

1Associate professor, Department of Epidemiology, College of Public & Environmental Health, University of Bahri, Khartoum North, Sudan.
2Assistant professor, Department of Food Hygiene and Safety, College of Public & Environmental Health, University of Bahri, Khartoum North, Sudan.

Abstract: Coronary artery disease is the most common type of heart disease and the leading cause of death worldwide. Diets high in saturated fatty acids and cholesterol increase the risk of CHD by raising LDL cholesterol levels. In contrast, individuals consuming diets high in fruits, vegetables, whole grains, and unsaturated fatty acids appear to have low risk of CHD due to the presence of antioxidants, folic acid, B-vitamins, omega-3 fatty acids, and others. The objective of this study, to assess of the dietary pattern among Sudanese coronary heart disease outpatients who attending Ahmed Gasim Hospital at Bahri locality, Khartoum North during the period from July 2013 to April 2014. The study was case finding hospital based, Sample size was 72 respondents attended the hospital during the period of July 2013 to September 2014 and they selected by convenience sampling. Results revealed that 50% of the respondents at the age group of ≥50 years with high body mass index of 30.6% and 38.9% for overweight and obese respectively. High cholesterol and triglycerides level were recorded among the respondents (22.2%), (11%) respectively, 26.4% with low density lipoprotein cholesterol while 59.7% with low level of high density lipoprotein cholesterol. However, 76.4% of the patients consumed high dietary fats, 12.5% consumed saturated fats, consumption of 61.1% of sodium was demonstrated among the respondents and 33.3% of them consumed less than 2000Kcal per day. Low dietary fibers intake, high dietary protein and low carbohydrate consumption among the respondents were found to be 52.8%, 63.9%, 65.3% respectively. Respondents’ age was positively correlated with HDL-C (R=0.284**, P=0.015), and LDL-C level (R=0.377**, P=0.004). Results exhibited that the body mass index was positively correlated with high density lipoprotein cholesterol (R=0.280**, P= 0.003) and the dietary fat was correlated with cholesterol and high density lipoprotein cholesterol (R=0.312* P= 0.022), (R=0.351* P= 0.011) respectively. Significant correlation was also found between consumption of foods contain niacin with HDL-C (R=0.421*, P=0.02); and foods contain vitamin c with LDL-C (R=0.322, P=0.035). The study concluded that, there were relationships between some dietary components and coronary heart disease. Effective awareness should be raised among Sudanese population for healthy dietary intake to reduce the risk of coronary heart disease.

Keywords: dietary components, coronary heart disease, LDL, HDL Cholesterol

Background:
Coronary heart disease (CHD) is one of chronic disease often begin by atherosclerosis that occurs due to the deposition of fatty fibrous substance mainly cholesterol in the inside lining of the arteries wall, where it causes plaque accumulation resulting in the narrowing of arteries and increases the risk of Myocardial Infarction (MI) and ischemic stroke (McGill et al., 2010). Dietary pattern has emerged as an alternative and complementary approach to study the relationship between diet and the risk of CHD. Instead of looking at individual nutrients or food, pattern analysis examines the effects of overall diet (Millenet et al., 2011). This disease is mostly caused by improper eating or eating too much fat or sugar. Some foods increase the risk of CHD while others may play as protective
agent against it (Moreira, 2009). Generally, foods containing saturated fatty acids (SFA’s) should be restricted to reduce the risk of CHD (Patty et al., 2010).

Certain amount of high quality protein supply, sufficient vitamins, minerals, and enough complex carbohydrates may protect against CHD (Krauss et al., 2000.). Previous study recommended that, more consumption of fruits and vegetables with less consumption of meats, especially red meat or non-lean meats may protect against CHD (Krausset et al., 2000) Globally, An estimated 17.7 million people died from CVDs in 2015, representing 31% of all global deaths. Of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million were due to stroke (WHO,2015). Out of the 17 million premature deaths (under the age of 70) due to no communicable diseases in 2015, 82% are in low- and middle-income countries, and 37% are caused by coronary heart disease. In African regions, the proportions of death from CHD accounted 9.2% of the total deaths in 2012 (Wael et al,2012). In developing countries, the problem of CHD and its related diseases is caused by diet shifts, such as changing from simple and traditional diet to a diet that depends on processed foods, foods from animal sources, fats and sugars. This shift is due to internationalization and commercialization of food trade (Khalil, 2012).

Sudan like the other developing countries had high prevalence of CHD but epidemiological data concerning dietary intake and CHD are scarce (Khalil and Al Zain, 2012). According to the recent statistic in 2011, CHD deaths in Sudan reached 39,326 or 10.67% of total deaths. (Khalil & Al Zain 2012). Worldwide Sudan ranks number 24 among the countries with high prevalence of CHD. The statistics surveillance found that CHD was the top of 20 cause of death among Sudanese populations. In Sudan, the dietary consumption was one of the main risk factor stated by (Khalil & Al Zain, 2012).

**Justification:**

Coronary Heart Disease (CHD) is the leading cause of death among adults in developing countries. It is also called Coronary Artery Disease (CAD) (Khalil, Al Zain, 2012). Diet plays an important determinant role of chronic diseases risk including heart disease. Much of the focus from last century was concentrating on the contribution of diet especially dietary fat to heart disease (Haskell, 2003). Nowadays, coronary heart diseases is widely spread in Sudan accompanied with remarkable change of dietary pattern, this drew the researcher attention to assess the dietary pattern among CHD Sudanese outpatients.

**Objective:**

To assess the dietary pattern among Sudanese coronary heart disease outpatients who attended Ahmed Gasim Teaching Hospital in Bahri locality at Khartoum North.

**Research Methodology:**

Cross-sectional case finding type was used in the present study. The study area was Ahmed Gasim Hospital at Khartoum Bahri locality. Study population included outpatient diagnosed with CHD in both males and females. The sample size was 72 respondents attended the hospital during the period of July 2014 to September 2015 were selected by convenience sampling. Weight and height were measured to calculate the body mass index, 24 recall hours was done to identify the dietary pattern among the patients with coronary heart disease.
Results:

Table 1. Respondents' Demographic Characteristics.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>43</td>
<td>59.7</td>
</tr>
<tr>
<td>Female</td>
<td>29</td>
<td>40.3</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-40 Years</td>
<td>4</td>
<td>5.6</td>
</tr>
<tr>
<td>41-50 Years</td>
<td>9</td>
<td>12.5</td>
</tr>
<tr>
<td>&gt; 50 Years</td>
<td>59</td>
<td>81.9</td>
</tr>
</tbody>
</table>

Table 2. Respondents' BMI.

<table>
<thead>
<tr>
<th>BMI /kg/m²</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18.5</td>
<td>6</td>
<td>8.3</td>
</tr>
<tr>
<td>18.5-24.9</td>
<td>16</td>
<td>22.2</td>
</tr>
<tr>
<td>25-29.9</td>
<td>22</td>
<td>30.6</td>
</tr>
<tr>
<td>30-34.9</td>
<td>20</td>
<td>27.8</td>
</tr>
<tr>
<td>&gt;35</td>
<td>5</td>
<td>6.9</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3. Respondents' blood lipid profile classification.

<table>
<thead>
<tr>
<th>Cholesterol/mg/dl</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal &lt; 200</td>
<td>9</td>
<td>12.5</td>
</tr>
<tr>
<td>Border line 200-239</td>
<td>47</td>
<td>65.3</td>
</tr>
<tr>
<td>High ≥ 240</td>
<td>16</td>
<td>22.2</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TGs/mg/dl</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal &lt; 150</td>
<td>5</td>
<td>7.0</td>
</tr>
<tr>
<td>Border line 150-200</td>
<td>59</td>
<td>82.0</td>
</tr>
<tr>
<td>High &gt; 200</td>
<td>8</td>
<td>11.0</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LDL-C/mg/dl</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal &lt;130</td>
<td>3</td>
<td>4.2</td>
</tr>
<tr>
<td>Border line 130-159</td>
<td>50</td>
<td>69.4</td>
</tr>
<tr>
<td>High ≥160</td>
<td>19</td>
<td>26.4</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HDL-C/mg/dl</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High risk &lt; 60</td>
<td>43</td>
<td>59.7</td>
</tr>
<tr>
<td>Moderate risk 90-70</td>
<td>27</td>
<td>37.5</td>
</tr>
<tr>
<td>No risk &gt; 90</td>
<td>2</td>
<td>2.8</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4. Correlation between respondents' age and lipid profile.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cholesterol</th>
<th>TGs</th>
<th>LDL-C</th>
<th>HDL-C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>P</td>
<td>R</td>
<td>P</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5. Correlation between BMI and blood lipid profile.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cholesterol</th>
<th>TG</th>
<th>LDL-C</th>
<th>HDL-C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>P</td>
<td>R</td>
<td>P</td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>_</td>
<td>_</td>
<td>_</td>
<td>_</td>
</tr>
</tbody>
</table>

Results in Table 1 shows the distribution of the respondents by age and sex. More than half (59.7%) of them were male and 81.9% of the respondents were at the age 50 or more. According to the classification of the body mass index among the respondents, almost one third (30.6%) of them were overweight, 27.8% were obese class I, 22.2% enjoyed normal-healthy weight, 8.3% were undernourished, 6.9% were at grade II obese and only 4.2% of the respondents had morbid obesity (Table 2). However, this findings showed that the respondents' cholesterol, TGs and LDL-C were at the border line to the cut-off points (65.3%, 82.0%, and 69.4%) respectively, while 59.7% had low level of HDL-C (Table 3). Significant correlation was detected between age with LDL-C (R=0.377**, P=0.004) and HDL-C (R=0.284*, P=0.015). BMI was also correlated with HDL-C (R=0.280**, P=0.003).

Table 6. Respondents’ Macronutrients.

<table>
<thead>
<tr>
<th>Energy/ Kcal</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2000</td>
<td>24</td>
<td>33.3</td>
</tr>
<tr>
<td>2000 - &lt; 2500</td>
<td>14</td>
<td>19.4</td>
</tr>
<tr>
<td>2500 - &lt; 3000</td>
<td>12</td>
<td>16.7</td>
</tr>
<tr>
<td>≥ 3000</td>
<td>22</td>
<td>30.6</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Carbohydrate/ g</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 250</td>
<td>47</td>
<td>65.3</td>
</tr>
<tr>
<td>250 - &lt; 300</td>
<td>13</td>
<td>18.1</td>
</tr>
<tr>
<td>300 - &lt; 350</td>
<td>7</td>
<td>9.6</td>
</tr>
<tr>
<td>≥ 350</td>
<td>5</td>
<td>7.0</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fibers/ g</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>38</td>
<td>52.8</td>
</tr>
<tr>
<td>20 - &lt; 30</td>
<td>21</td>
<td>29.2</td>
</tr>
<tr>
<td>30 - &lt; 40</td>
<td>9</td>
<td>12.5</td>
</tr>
<tr>
<td>≥ 40</td>
<td>4</td>
<td>5.5</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proteins/ g</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 75</td>
<td>19</td>
<td>26.4</td>
</tr>
<tr>
<td>75 - &lt; 80</td>
<td>3</td>
<td>4.1</td>
</tr>
<tr>
<td>80 - &lt; 85</td>
<td>4</td>
<td>5.6</td>
</tr>
<tr>
<td>≥ 85</td>
<td>46</td>
<td>63.9</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>100</td>
</tr>
</tbody>
</table>
Con. Table 6. Respondents’ Macronutrients.

<table>
<thead>
<tr>
<th>Fats/ g</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 65</td>
<td>12</td>
<td>16.7</td>
</tr>
<tr>
<td>65 - &lt; 70</td>
<td>3</td>
<td>4.1</td>
</tr>
<tr>
<td>70 - &lt; 75</td>
<td>2</td>
<td>2.8</td>
</tr>
<tr>
<td>≥ 75</td>
<td>55</td>
<td>76.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cholesterol/ mg</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 200</td>
<td>23</td>
<td>31.9</td>
</tr>
<tr>
<td>200 - &lt; 250</td>
<td>6</td>
<td>8.3</td>
</tr>
<tr>
<td>250 - &lt; 300</td>
<td>4</td>
<td>5.6</td>
</tr>
<tr>
<td>≥ 300</td>
<td>39</td>
<td>54.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Saturated Fats/ g</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 15.5</td>
<td>4</td>
<td>5.5</td>
</tr>
<tr>
<td>15.5 - &lt; 20</td>
<td>21</td>
<td>29.2</td>
</tr>
<tr>
<td>20 - &lt; 25</td>
<td>38</td>
<td>52.8</td>
</tr>
<tr>
<td>≥ 25</td>
<td>9</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 7. Correlation between dietary fat consumption and blood lipid profile levels

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cholesterol</th>
<th>TGs</th>
<th>LDL-C</th>
<th>HDL-C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>P</td>
<td>R</td>
<td>P</td>
</tr>
<tr>
<td><strong>Total fats</strong></td>
<td>0.312*</td>
<td>0.022</td>
<td>_</td>
<td>_</td>
</tr>
</tbody>
</table>

Table 8. Respondents’ micronutrients consumption.

<table>
<thead>
<tr>
<th>Niacin/ mg</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>20 - &lt; 25</td>
<td>33</td>
<td>46</td>
</tr>
<tr>
<td>25 - &lt; 30</td>
<td>24</td>
<td>33</td>
</tr>
<tr>
<td>≥ 30</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vitamin C/ mg</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 60</td>
<td>28</td>
<td>39</td>
</tr>
<tr>
<td>60 - &lt; 65</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>65 - &lt; 70</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>≥ 70</td>
<td>41</td>
<td>57</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vitamin E/ mg</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>47</td>
<td>65</td>
</tr>
<tr>
<td>20 - &lt; 25</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>25 - &lt; 30</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>≥ 30</td>
<td>21</td>
<td>29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Con. Table 8. Respondents’ micronutrients consumption.

<table>
<thead>
<tr>
<th>Sodium/ mg</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2400</td>
<td>4</td>
<td>5.6</td>
</tr>
<tr>
<td>2400- &lt; 2900</td>
<td>10</td>
<td>13.8</td>
</tr>
<tr>
<td>2900 - &lt;3400</td>
<td>14</td>
<td>19.5</td>
</tr>
<tr>
<td>≥ 3400</td>
<td>44</td>
<td>61.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Potassium/ mg</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3500</td>
<td>63</td>
<td>87.5</td>
</tr>
<tr>
<td>3500- &lt; 4000</td>
<td>4</td>
<td>5.6</td>
</tr>
<tr>
<td>4500 - &lt; 5000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>≥ 5000</td>
<td>5</td>
<td>6.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calcium/ mg</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1000</td>
<td>53</td>
<td>73.6</td>
</tr>
<tr>
<td>1000- &lt; 1500</td>
<td>8</td>
<td>11.1</td>
</tr>
<tr>
<td>1500 - &lt; 2000</td>
<td>3</td>
<td>4.2</td>
</tr>
<tr>
<td>≥ 2000</td>
<td>8</td>
<td>11.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Magnesium/ mg</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 400</td>
<td>59</td>
<td>81.9</td>
</tr>
<tr>
<td>400- &lt; 450</td>
<td>4</td>
<td>5.6</td>
</tr>
<tr>
<td>450 - &lt; 500</td>
<td>2</td>
<td>2.8</td>
</tr>
<tr>
<td>≥ 5000</td>
<td>7</td>
<td>9.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Zinc/ mg</th>
<th>Frequency</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 15</td>
<td>38</td>
<td>52.8</td>
</tr>
<tr>
<td>15 - &lt; 20</td>
<td>8</td>
<td>11.1</td>
</tr>
<tr>
<td>20 - &lt; 25</td>
<td>9</td>
<td>12.5</td>
</tr>
<tr>
<td>≥ 25</td>
<td>17</td>
<td>23.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Iron/mg</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 18</td>
<td>33</td>
<td>45.9</td>
</tr>
<tr>
<td>18 - &lt; 23</td>
<td>14</td>
<td>19.4</td>
</tr>
<tr>
<td>23- &lt; 28</td>
<td>7</td>
<td>9.7</td>
</tr>
<tr>
<td>≥ 28</td>
<td>18</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>72</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 9. Correlation between niacin, vitamin C intake and blood lipid profile

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cholesterol</th>
<th>TGs</th>
<th>LDL-C</th>
<th>HDL-C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>P</td>
<td>R</td>
<td>P</td>
</tr>
<tr>
<td>Niacin* Lipid Profile</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Vitamin C* Lipid Profile</td>
<td>–</td>
<td>0.322*</td>
<td>0.035</td>
<td></td>
</tr>
</tbody>
</table>

Results in Table 6 reveals that 33.3% of the respondents consumed foods containing less than 2000 kilocalories per day while the rest consumed an equal or more than 2000 kilocalories. With respect to the dietary carbohydrates and fibers intake, results reveal that 65.3% of the respondents consumed foods containing less than 250 gram of dietary carbohydrates and 52.8% of them consumed less than 20 grams of dietary fibers per day. The daily consumption of dietary protein among 63.9% of the respondents was equal to or more than 85gram and 76.4% of them consumed foods with equal or more than 75gram of dietary fat. Among 54.2% of the respondents the dietary cholesterol consumption was equal or more than 300 milligram and saturated fat while food with saturated fat...
was consumed by 52.8% of the respondents (20 to < 25g). Except of dietary fat, no significant relationship was detected between the intake of food macronutrients and lipid profile of the respondents. Dietary fat intake was positively correlated with cholesterol level (R=0.312, P=0.022) and with HDL-C, (R=0.351, P=0.011) (Table 7).

However, results demonstrated that 46% of the respondents consumed foods contain niacin, 57.0% consumed foods rich in vitamin C, 65.0% consumed less dietary vitamin E, 61.1% consumed food of equal or more than 3400 milligram of sodium or more and 87.5% consumed less than 3500 milligram of potassium. Consumption of dietary calcium was less than 1000 milligram among 73.6% of the respondents, 81.9% consumed less than 400 milligram dietary magnesium, 52.8% consumed foods with less than 15 milligram of zinc and 45.9% of the respondents consumed foods containing less than 18 milligram of iron (Table 8). Significant correlation was found between vitamin C and LDL cholesterol(R=0.322*,P=0.035) and niacin with HDL (R=0.421*,P=0.02). (Table 9).

Discussion:
Socio demographic data and lipid profile
In the present study 59.7% of the respondents were males and 40.3% were females. It is clear that the disease was more abundant among males than females. Previous study revealed that at younger age, the relative risk of hypercholesterolemia is lower in women than men (Francisco,2013). Regarding the age and coronary heart diseases, results showed that 81.9% of the respondents' age was more than 50 years old and the age was found to be positively correlated with HDL-C level LDL-C level. This indicates that, the risks of CHD increase gradually with the increase in age in both males and females. Some CHD risk factor such as the increase in LDL-C is higher in older people than in younger people and the principal reason for the rise in the risk with age, is that age is a reflection of the progressive accumulation of coronary atherosclerosis which reflects the exposure to the atherogenic risk factors both known and unknown (Liu,2012). During menopause, total cholesterol and low-density lipoprotein (LDL) levels rise by 10 and 14% respectively and lipoprotein (a) increases from 4 to 8%, whereas high-density lipoprotein (HDL) cholesterol levels remain unchanged (Millen, et al., 2011).

Body mass index and coronary heart disease
Regarding the BMI of the respondents, one third of them were overweight, while the 38.9% were classified as obese. With the respect to the relationship between anthropometric measurement and coronary heart disease, the present study revealed that HDL-C correlated positively with BMI. These findings were in conformity with results of studies which found that BMI was strongly correlated with HDL-C (Fujihara,2017,). Despite the fact that many epidemiological studies showed that general obesity is associated with low risk of HDL-C. The increase of HDL-C among the groups in the present study may be due to factors other than obesity, however some anthropometric indices such as waist circumference if used may give different an accurate results. The results also showed that although respondents were under medications, the majority of them were at the border line for high blood cholesterol, TGs and LDL-C, and with low level of HDL-C. These findings can be attributed to many factors such as the increase of body mass index and their intake of high caloric foods. High lipid lead to the development of coronary heart disease such as myocardial infarction and stroke(Robert,2013).

Respondents' intake of macronutrients
Considering dietary pattern of macronutrients, 33.3% of the respondents consumed less than 2000 Kcal/day Coronary heart disease patients should take food rich in energy beside physical exercise to prevent the weight gain and maintain healthy body weight. A previous study demonstrated that the high consumption of food rich in energy was related to the increase of coronary heart
As for carbohydrates intake, 65.3% of the respondents consumed foods with less than 250 gram of dietary carbohydrates. Dietary carbohydrates are the main source of energy in diet. Consumption of high dietary carbohydrates especially those with high glycemic index appear to influence the risk of developing CHD through the increase of TGs level and reducing the level of HDL-C in the blood (Robinson, 2010). Low carbohydrates diets with low dietary fat had beneficial effect on heart. They regulate dyslipidemia which consider is an important risk factor of heart disease (Patty et al., 2010). Low consumption of foods containing dietary fiber were also observed among half of the respondents. This finding may attributed to their low intake of fruits and vegetables. (James et al., 2010).

The study revealed that (63.9%) (Table 6) of the respondents consumed high protein diet ≥ 85g. High protein diet with low carbohydrates had been found to have positive effect on the reduction of serum TGs and improve HDL-C in the blood (Layman et al., 2008). Replacing animal proteins with plant proteins may protect humans from CHD. Evidence from an epidemiological study showed that there was a strong correlation between consumption of animals' proteins and CHD (Renata, et al., 2010).

The present study revealed high dietary fat intake among respondents (75gram). Intake of food with low amount of dietary fat is requiring for CHD patient to avoid lipoproteins abnormalities. More than half of the participants consumed foods containing high dietary cholesterol. Excessive intake of dietary cholesterol associated with the risk of atherosclerosis and CHD (Lands & William, 2005).

It was observed that more than 52.8% and 12.5% of the respondents consumed foods containing high saturated fats. Excessive amounts of saturated fat increase the blood cholesterol which is the risk factor of CHD (Schwingshackl & Hoffmann, 2012).

**Respondents' intake of micronutrients**

The result demonstrated that 46% of the respondents take moderate amount of niacin (20 - < 25). Niacin is an important vitamin that reduced LDL-C and TGs levels in the blood; Significant correlation was found between the consumption of foods rich in Niacin and HDL-C. (Lukasova et al., 2011). Evidence from a previous study demonstrated that people with high cholesterol levels who consumed foods rich in niacin had a lower risk of first heart attack and stroke (Lukasova et al., 2011).

Regarding vitamin C consumption, significant correlation was detected between the consumption of foods containing vitamin C and LDL-C. Vitamin C is the one of the important antioxidant, that helps in reducing the amount of lipid in the body. It is the predominant plasma antioxidant. This vitamin scavenges plasma free radicals and prevents their entry into LDL-C particles. Vitamin C regenerates active vitamin E and increases cholesterol elimination from the body. (Wang et al., 2014). Despite that, 57.0% of patients consumed foods that containing vitamin C but they had coronary heart disease. This may be attributed to the wrong method of preparing food that containing vitamin C which is known to be very sensitive to slicing during preparation, heat and high cooking temperature that contribute to its severe reduction in the food (Pendre et al., 2012).

As for vitamin E, 65% of the respondents consumed less dietary vitamin E. Vitamin E is an antioxidant agent that prevent the oxidation of LDL-C. Epidemiological studies suggested that, people with heart disease who consumed foods rich in vitamin E had relatively fewer atherosclerotic plaques and low rates of death from heart disease (Saremi, Arora, 2012).

Concerning sodium dietary intake, results revealed that 61.1% of the respondents consumed food containing high sodium. High dietary sodium intake damage the blood vessels walls over a time, causing scarring and narrowing of blood vessels that promotes hypertension which is the major CHD risk factor, causing the build-up of fatty plaque where eventually block arteries (Afridi et al., 2010). Consumption of potassium was low as showed by 87.5% of the respondents. Potassium is extremely important for proper heart functions and muscles contraction. It is also controls the muscular fuel supply. Potassium deficiency in the diet affects all muscles,
leading to muscles’ weakness that including heart muscles (Shils, 2011). Low consumption of food containing dietary calcium was predominant among the respondents. Calcium reduces the total cholesterol, LDL-C and prevents blood clots. It is essential for muscle’ health. Calcium deficiency correlates with higher level of cholesterol, a major risk factor of heart disease (Umesawa et al., 2006).

Consumption of magnesium was very low among the respondents (81.9%) (<400mg) Magnesium decreases heart disease risk and sudden death and has very strong effect in the prevention of blood pressure. A diet should be high in magnesium, potassium, and calcium and low in sodium and fat to reduce the risk of coronary heart disease (Afridi et al, 2010).

More than half of the participants consumed foods contain less than 15 milligram of zinc. Zinc is important for heart health; it affects the level of lipid profile in the blood. Low serum zinc increases LDL-C and decreases the level of HDL-C. Evidence from epidemiological study revealed that, low serum concentration of zinc is associated with CHD (Little et al., 2010). Regarding Iron consumption, the result demonstrated that 45.9% of the respondents consumed foods contain low iron. Iron has an important role in carrying oxygen in the blood and contributes in the process of lipid per-oxidation. Low amount of iron on the diet cause anemia and affect heart health. Some experimental data supported the role of iron in the process of lipid per-oxidation and formation of atherosclerotic lesions (Emanuela et al., 2013).

Conclusion:

The present study showed, among the coronary heart disease outpatients, the majority were males, their age above 50 years. Significant association between some of dietary pattern and coronary heart diseases Nutrition education and awareness are needed among Sudanese populations regarding the health risk associated with CHD such as the type of diet, obesity and physical inactivity, education and health education should be undertaken to curb the disease.

References:


Renata Micha, Sarah K. Wallace, Dariush Mozaffarian. Circulation. Author manuscript; available in PMC Red and processed meat consumption and risk of incident coronary heart disease, stroke, and diabetes: A systematic review and metanalysis2011 Jun 1. Published in final edited form as: Circulation. 2010 Jun 1; 121(21): 2271–2283. Published online 2010 May 17. doi: 10.1161/CIRCULATIONAHA.109.924977


Economical and Optimal Gas Leakage Detection and Alert System

Abhishek Gupta, Assistant Professor

Department of Electrical Engineering,
Dr.B.R.Ambedkar Institute of Technology, Port Blair, A & N Islands.

Abstract: Safety plays a vital role in today’s life therefore it is important to implement a secure, reliable and speedy safety system which responds rapidly to avoid any accident before it occurs. The purpose of this work is to design an economical and effective alarming system which detects the leakage of Liquefied Petroleum Gas in the vicinity where it is put into service. The proposed system is designed and implemented to meet the health and safety standards for the gas bank of Hotel Management Department of Dr.B.R.Ambedkar Institute of Technology, Port Blair, Andaman & Nicobar Islands. The proposed system is tested and the results are verified by producing an early warning signal under the less severe condition and activate a high pitched alarm during the leakage of LPG and provide a safeguard to the users.

Index Terms: LPG gas sensor, Proteus, IC-555, Sensor module

I. INTRODUCTION

LPG (Liquid Petroleum Gas) has become the most essential commodity for our daily life. It is a smokeless fuel used for cooking and heating purposes in residential, agricultural and commercial application. It can serve as a fuel for cooking, central heating and to water heating and is a particularly cost effective and efficient way to heat odd grid homes. Increase in the demand of the use of LPG and natural gas for energy which is environment friendly has replaced the oil and coal due to their environment disadvantage. Even though, LPG and natural gas are ecofriendly fuels as they are pollution free and are derived from fossil fuel sources. LPG gas is mainly includes 60% of butane (C6H13) and 40% of propane (C3H8), which is an odorless gas. If leakage of such gas takes place then it mingling into air and replace oxygen which can cause suffocation and ignition can cause terrible fires and devastating explosions. To make LPG gas odorant Ethyl Mercaptan is added. Though, most of the people can’t smell the odor of such gas. Therefore, due to gas leakage major accidents took place all around the world and causes both human injuries and financial losses. To stay away from such situation an effort is made to develop an uncomplicated, reliable and economical technique to detect the LPG leakage.

From a survey during the period from “2010” to “2106” it can be found that 17% of fire accidents are due to LPG leakage. There is a necessity of safety systems that provides safety assurance and takes safety measures in the absence of users. Commonly it is ignored as an absolute need for safety but since there are risks from these, there should be a safety system installed for worst case scenarios.

In this work, an attempt has made to design and fabricate a safety device for detecting LPG and natural gas that avoid any accident from the leakage. The proposed device examines the level of LPG and Natural gas as well as the other gases which are composed of propane and butane concentrations in the air and activates the audible alarm when it exceeds the threshold value.

II. BLOCK DIAGRAM OF A DEVELOPED SYSTEM

![Functional Block Diagram of a System](image1.png)

![Functional Block Diagram of a Power Supply](image2.png)

Block Diagram Description:

MQ-6 LPG Sensor:

MQ-6 gas sensor is a simple gas sensor suitable for detecting propane and butane gas present in the vicinity around the gas sensor. MQ-6 can detect the leakage of gas in the atmosphere.
when the concentration level of the leaked gas is from 200 to 1000 ppm. MQ-6 sensor is highly sensitive for combustible gas such as Propane, Butane and LPG. The output of a sensor is analog, therefore need a driver circuit. It has fast time response, log life and low cost.

MQ-6 sensor is a 6 pin device used with sensor module, operate on 5 Volts DC which is derived from a Zener based power supply, allows determining when a pre-set LPG gas level has been reached or exceeded. The module uses MQ-6 sensor to sense LPG leak. The MQ-6 can detect gas concentrations anywhere from 200 to 10000 ppm in the atmosphere; its output turns high and produces a signal for further circuitry to activate.

**Sensitivity Control Circuit Based on IC 555 Timers:**

IC 555 timer is one of the most versatile IC and is used as a monostable and astable multivibrators, dc-dc converters and toxic gas alarm and many others. The device is available as an 8-pin DIP (Dual-In-Line Package). The IC-555 is a monolithic timer circuit that can produce accurate and highly stable time delays or oscillation, reliable, easy to use and low cost. In this work 555 works as a square wave oscillator and can provide time delay in the circuit by varying duty cycle from 50% to 100%.

**Transistor Driver Control Circuit:**

The operation of a transistor depends upon the selection of quiescent point in any of the three regions i.e. active, saturation and cut-off region. Depending upon the transistor biasing, transistor can act as an amplifier (quiescent point stable in active region) as well as a switch (quiescent point stabilizes in saturation (ON) region and in cut-off (OFF) region).

In this work, SL100 transistor is used which is a general purpose, medium power NPN transistor. The transistor acts as an switch, providing a fixed 9 V DC supply through power supply to operate in the desired region of its output characteristic graph. SL100 transistor is biased in such a way that the presence of signal from pin-3 of IC-555 at base remains the transistor in ON-state and in the absence of base signal, the transistor turns OFF.

**Audio Indicator:**

Depending upon the application, the audio indicator output may be local, remote or a combination. In this work, solenoid based siren alarm, which is a local alarm which do not include monitoring is used, though may produce sound which may be useful for the people to evacuate during any hazardous condition.

**III. SYSTEM OPERATION**

**Circuit Diagram:**

![Circuit Diagram of IC-555 Based System](image)

The designed and fabricated Gas Leakage Detector circuit operates on 9 volts DC power supply or through a battery. MQ-6 gas sensor module drives through a 5 volts DC which is provided by Zener Diode, which converts 9 volts into 5 volts and works as a simple voltage regulator circuit. Interfacing with the sensor module is done through a 4-pin SIP header.

Whenever, the concentration level of leaked gas increases above the threshold level of the 200ppm butane (LPG), the OUT pin of the sensor module goes high. The OUT pin of the gas sensor is connected to the pin-4 (i.e. RESET) of the IC-555, which is wired as an Astable multivibrator, which works as a toned generator.

The pin-3 (i.e. OUTPUT) of the IC-555 is connected with the transistor SL100 and LED through a current limiting resistor of 1KΩ and 560Ω respectively. As pin-3 of IC-555 is connected at the base of the transistor and is sufficient enough to drive the transistor in saturation region (i.e. ON-state). As the transistor is turned ON, the buzzer, which is connected at the collector terminal through a 9 volt DC supply, alarm sounds to alert the user for gas leakage and the LED glows. The pitch of the buzzer can also be changed by varying preset VR (10K).

When the concentration level of the leaked gas decreases below the threshold level, the OUT pin of gas sensor goes low and the transistor again drive in the cut-off region (i.e. OFF-state) and LED gets off.

In this way the change of concentration can be tracked and circuit operates as per the requirement.

**IV. SOFTWARE & HARDWARE IMPLEMENTATION**

The complete system is designed and simulated using Proteus design software package. Figure 4 & 5 depicts the prototype design of the proposed gas leakage detection system which consists of a MQ-6 gas sensor, buzzer, LED and accessory circuitry for sensitivity adjustment.

www.ijsrp.org
In software simulation, a test pin is connected to the MQ-6 gas sensor, which is zero which means the sensor is not sensing (0 for OFF state and 1 for ON state). Since the sensing condition is not given yet, both the speaker and LED are in OFF state.

The sensor’s sensing condition which is given through the test pin and here both the LED and speaker are in ON state. The simulation represents the sensing condition of the system.

The proposed system works well with power drawn from a constant DC power supply.

V. TEST AND RESULTS

The testing of the proposed system was carried out using a lighter as a replicate of a LPG gas source. The lighter was held at a long distance to imitate low level concentration and was gradually brought closer to the gas sensor to imitate high level gas concentration.

The proposed gas leakage detector showed an excellent performance and provides satisfactory results regarding the gas leakage for the period of testing. The cost of the proposed system is Rs. 375/- which is very less in comparison to the other commercially available gas leakage detector.

The test was carried out several times and the result was the same in almost all of the cases. The sensor takes some time around 1.5 to 2 minutes to get heated and ready to the sense the gases. The sensing time is almost immediate once the sensor is ready to sense. Once the concentration of gas reduces below 30% of the threshold value then the buzzer goes off automatically.

The results are summarized below as follows:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Test Condition</th>
<th>LED</th>
<th>Buzzer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No gas leakage</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Low level gas leakage</td>
<td>Glow</td>
<td>Sound</td>
</tr>
<tr>
<td>3</td>
<td>High level gas leakage</td>
<td>Glow</td>
<td>Sound</td>
</tr>
</tbody>
</table>
VI. CONCLUSION

An economical gas leakage detector system was proposed, designed, fabricated and installed in the gas bank of Hotel Management Department of Dr.B.R.Ambedkar Institute of Technology, Port Blair to meet the safety requirement, which is presented in the paper. The test results are obtained using butane based lighter as a replicate of a LPG gas source. The test result verify the effective and efficient operation of the prototype by detecting low and high gas leakage levels and alert the user by providing an audible alarm warning signal. The cost of proposed system is significantly low and is much less than the cost of gas leakage detector commercially available in the market.

ACKNOWLEDGMENT

The author would like to thanks the Principal & H.O.D. (Electrical), Dr.B.R.Ambedkar Institute of Technology, Port Blair for providing support time to time for installing the LPG Gas Detector in the Hotel Management Department of the Institute.

REFERENCE


AUTHOR

Abhishek Gupta, Department of Electrical Engineering, Dr.B.R.Ambedkar Institute of Technology, Port Blair, Andaman & Nicobar Islands, abhishekgspn@gmail.com
Locus of Control and the Acceptance of Dysfunctional Audit Behavior in a Review of Philosophy Semar

Yoosita Aulia *, Arsono Laksamana **, Basuki ***

* Student of Doctoral Program Accounting Science Airlangga University, Surabaya, Indonesia
** Department of Accounting, Airlangga University, Surabaya, Indonesia
*** Department of Accounting, Airlangga University, Surabaya, Indonesia

Abstract- This article describes about the acceptance of dysfunctional behavior by the auditor in performing the audit process is reviewed by fisosofis Semar. Philosophical Semar is only in the world of mythology, but the story is a worthy example Semar for mankind, because in addition to the figure of Semar laden mystery, it is also a symbol of the perfection of life. Semar personally saved a lot of character; began the female characters, male characters, the children's character, the character of the adults or the elderly, expression of joy and a sad expression mixed into one. Semar is the real picture, that of a character, including the auditor must constantly keep, love and live life itself, life that comes from the Supreme Life. If life is preserved, nurtured and loved, then life will evolve to the top and fused to the Source of Life, manunggaling kawula lan Gusti. Based on the meaning symbolized and embodied in Semar, then only through Semar, Semar together and in Semar, people will be able to develop their life to reach perfection and united with his Lord.

Semar describe personal characteristics in the form of Locus of control, where each auditor has a personal character that is different, so they also have a passion to work are different too. Auditor with the character of an internal locus tend to be more successful in completing the work than the external nature, they tend to have the spirit of the organization and the work is higher, so it has a higher job satisfaction, and are not easily changed jobs. Auditors who could cite Semar figure is not expected to perform acceptance dysfunctional behavior.

Index Terms- Philosophical Semar, acceptance dysfunctional behavior, locus of control, organizational commitment, performance, and Turnover Intention.

I. INTRODUCTION

One of the puppet characters of the most popular in the Java community is Semar. Semar is a leader who often revered for its success in advancing the nation. This figure is much used as a symbol of an ideal leader, who has a humble nature, like helping others, not greedy, do penance, reduce eating and sleeping, and other behavior. This is an interesting thing, because human nature in Javanese mythology often symbolized by the nature and character of the figures in the world of puppetry, that what is happening in the world of puppetry will happen in the real world, as if what is portrayed in the story of puppets, describe the real state either already happened or will happen. In real life, Semar is a symbol that gives clues about the life, the life and problems. Semar instructions are simple, because he was a servant or slave, but because the character of semar is good hearted and advisors of the all-wise Pandhawa, the audience watching wayang shall take into account the advice and teaching Semar and its instructions, which have been considered as an example of Java.

Semar Badranaya is a character in the Javanese wayang clown who had a more major role than the baboon puppets (wayang figures from the origin of India). Punakawan is a typical character in the Indonesian puppets. They symbolize human nature. The characters indicate a variety of roles, such as advisors of the knights, entertainers, social critics, clowns and even a source of truth and wisdom. In Javanese wayang character punakawan consist of Semar, Gareng, Bagong, and Petrul. In the wayang kulit, Semar is Pandhawa maid, but she was highly respected by his master. Semar usually be consulted by Pandhawa in making decisions on issues that are considered serious and urgent. As the oldest clown, Semar had no desire to hold temporal power worldly power as well as most humans. This is because power is generally able to change the character, situation once can harm. Semar can achieve its goals effectively by giving an example, as a method of teaching without intending to master other people or property. Java community believe that Semar is a derivative of a god in the myth of the most powerful.

As the puppet characters which have many advantages personal nature, many Javanese people who are interested in the world of puppets, making Semar as the ideal figure that should be a role model in life everyday. Semar presence in real life is often eagerly awaited given the state of the country today that increasingly chaotic, misery and oppression by the strong against the weak increasingly rampant, moral and ethics no longer be ignored, the leaders who only think of personal wealth regardless of the circumstances people are increasingly oppressed by policies issued. In connection with the story Semar, the globalisasi era like today, every auditor is required to perform his duties in a professional manner, so that the audit reports produced can be qualified. Quality auditor's work is closely connected with the integrity, performance, commitment, timeliness of completion of the work, the adequacy of the examination of evidence, independence attitude towards clients, and so on, because Semar always teach traits that good and trustful, not indulgence. Based on the figure of Semar as a symbol that can be trusted, so that the auditor is expected to follow the example of the figure of Semar, so that the results of the audit can be a reference for those who need and accountable.

www.ijsrp.org
Studies on acceptance of dysfunctional behavior has a lot to do. Study the influence of individual differences on acceptance of the auditor's dysfunctional behavior has been carried out by Donnelly (2003) found the cause of the auditor perform such deviations are the personal characteristics which form the locus of external control (external locus of control), the desire to stop working (turnover intention) and the level of performance private employees (self rate employee performance) that are owned by the auditors. Their results suggest that there is a positive relationship between external locus of control and the desire to stop working with the level of acceptance of deviant behavior in the audit as well as a negative association between the level of the employee's personal performance with the level of acceptance of deviant behavior in the audit.

Research related to performance factors that performance can affect the behavior of the performance audit irregularities. Individuals who perform work under the standards set are more likely to commit acts of irregularities since they see themselves not able to survive in the work through their own efforts. So deviant behavior is seen as a necessity in situations where an organization or individual objectives can not be achieved through measures or general ways that often do. The desire factors to stop working also considered as a deviant behavior may affect the auditor.

II. THE SIGNIFICANCE AND BENEFITS OF PHILOSOPHY
SEMAR IN ACCOUNTING

Meaning of the characters in the puppet Semar is one of the most powerful among other puppet characters. There are no figures that can beat Semar so all honor. In fact, Batara Guru who controlled the Three Realms universe, no longer has absolute power in its capacity as Mahadeva. Semar has no desire power and assert themselves on the merits. A reliable auditor who can site the figure of Semar, will always work hard, competent, honest and responsible, but he will not be arrogant with the expertise and skills of his audit.

Semar persona views of the function and its role is as a driver, helper, nurse, and licensor path of goodness, truth, and justice. Semar is the guardian of the world balance for the earth, the sky, and everything in it can work for the common welfare. Suggestions and advice delivered without coercion and demands, in fact, Semar preferring to nurture, educate, develop, mature, protect, and improve everything in accordance with the character of noble fosterage. Semar also a guardian who has a duty as servants or maids at once simple caregivers, honest, and do not have the intention worldliness for its own sake. From the nature of emptiness that lies its miracle. Throughout the truth and justice remain upright, then Semar role as folk. If the opposite occurs: justice and truth are not upright, tyranny (kezhaliman) rampant, and leaders to act arbitrarily, it would have protested vehemently Semar way. Semar is Abdi once Rulers Throughout the Ages.

The existence of the characterization of Semar will provide spiritual values that can transform into a knowledge of accounting in which God's foundation. As a consequence, the accountant will generate accounting analysis that have truth value, and reduce the acceptance of dysfunctional audit behavior, so that the financial statements may indicate values such as honesty, responsibility, discipline, speed and accuracy, fairness, vision, empathy and gratitude. This is because behavioral accounting is not separated from human behavior.

Behavioral accounting is part of the accounting discipline that examines the relationship between human behavior and accounting systems, and behavioral dimensions of the organization in which humans and accounting system was and acknowledged. Accounting behavioral is a study of the behavior of accountants and non-accountants who are affected by the functions of accounting and reporting, the accounting behavioral part of the disciplines of accounting that examines the relationship between human behavior and accounting systems, as well as the dimensions of behavioral organization in which humans and accounting system was and acknowledged. The success of an accounting information system can not be separated from human behavior as users and those who respond.

Semar philosophy of the story is a symbol of understanding or conception of the divine aspect of the properties, which reads: Semar (pralambang ngelmu unseen) - kasampurnaning starch. Bojo sira arsa mardi Kamardikan, ajwa samar sumingiring dur-kamurkan Mardika means "independence of spirit and soul," meaning that under no circumstances was colonized by lust and worldly, so it could be perfect to death is not tarnished by sin. The true of Java man in cleansing the soul (ora kebenda ing kadonyan ora samar marang bisane sirna durka murkamu) means: "the test of energetically character will be able to control and direct the passions into a force toward the perfection of life". Auditor with Semar spirited is expected to be able to reduce the acceptance of dysfunctional audit in his work.

III. ACCEPTANCE OF DYSFUNCTIONAL BEHAVIOR AUDIT
(ACCEPTANCE DYSFUNCTIONAL AUDIT BEHAVIOR)

According Donnelly (2003) and Kartika and Provita (2007: 5) states that the auditor's actual dysfunctional behavior shown by the attitude of the auditors in the conduct of the audit dysfunctional. Dysfunctional Audit Behavior is a reaction to the existing environment. There are some of the dysfunctional behavior that compromises the quality of audit, namely: underreporting of time, premature sign off, altering / replacement of the audit procedure. Underreporting of time causes poor personnel decisions, covering the needs of budget revision, and generate unknown time pressure for audits in the future. Premature sign-off (PMSO) is a condition that indicates the auditor to stop one or more of the required audit in the audit procedure without replacing the other step.

Based on the description of The Acceptance of Dysfunctional Audit Behavior, then figure Semar is a mystery, the secret of the Creator. The secret will be hidden to those who are selfish, greedy, envious, spiteful, arrogant, and conceited. The secret will be opened for those who are patient, sincere, noble mind, and humble. And the person who was awarded the Secret, or Semar, his life will be successful to the top of eternal happiness and glory. Semar as a waiter serving the people is manifest, selflessly, to practice their religion in accordance with the oracles. Semar walk facing up meaning: "on the way a human child, Semar gave exemplary embodiment that always looked up (the Khaliq) merciful and compassionate people". The cloth of Semar Parangkusumorojo: Dewonggowantah

www.ijsrp.org
embodied (to lead the men) in order memayuhayuning bawono: meaning to hold justice and righteousness in the earth. In connection with this figure of Semar, an auditor obliged to refrain from the attitude or actions which could lead to dysfunctional behavior that could harm yourself or the company.

Semar teachings Bojo sirar asa mardi Kamardikan, ajwa samar sumingkiring dur-kamurkan. Mardika means "the independence of spirit and soul," that under no circumstances was colonized by lust and worldly, so it could be perfect that death is not tarnished by sin. The true of Java man in cleansing the soul (ora kebanda ing kadonyan ora samar marang bisane sirna durka murkamu) means: "the test of energetically character will be able to control and direct the passions into a force toward the perfection of life".

IV. LOCUS OF CONTROL

Semar is not a man and not a woman, its right hand up and its left hand to the back. Right hand up meaning: "As a private Semar’s figure to say the symbol of the Single Supreme", while its left hand means "total surrender and absolute as well as a symbol of knowledge that is neutral but sympathetic", Semar domicile as lurah karangdempel - (karang = barren; dempel = firmness of soul). Based on a review of philosophical Semar, character internal Locus of control is highly visible and should be followed by an auditor. Semar known to be very wise and prudent, and responsive to change. Semar has high integrity who are willing to risk everything in order to maintain its mission from the Almighty. Semar’s attitude that always work hard reflected speech utterance which means it’s better trying to escape and find food even though the result are less than doing nothing. It will taste immortal (Mbergegeg, ugeg-ugeg, hmel-hmel sak dulito, lanngeng ae). Semar always had a passion in guarding and fighting for truth values. Semar angry when they see their dishonesty and injustice everywhere. Semar is not easily discouraged and steadfast in his efforts, sumeleh, obedient and leaning on the Almighty. Humans as servants was try and success depends on the power of God Almighty.

According Puji (2005), Donelly (2003), Hyatt & Prawitt (2001) and Robbins (1996) defines the locus of control as the nature of the belief that one is capable of controlling the surrounding environment, both internal and external. Locus of control affects the acceptance of dysfunctional audit behavior and actual dysfunctional audit behaviors, job satisfaction, organizational commitment and turnover intention. The theory of locus of control classify individuals whether included in the internal or external locus of control. Locus of control both internally and externally is the degree to which an individual expects that reinforcement or the results of their behavior depending on their own behavior or their personal characteristics. Those who believe they can control purposes is said to have an internal locus of control, while looking at their lives are depending on their own behavior or their personal characteristics. Those who believe they can control purposes is said to have an internal locus of control, while looking at their lives are depending on their own behavior or their personal characteristics.

The view of life according to the internal and external Locus of Control is very different. Someone who has an internal locus of control believe can control their own purposes, see the world as something that can be predicted, and the behavior of individuals played a role in it. Individuals with an internal locus of control is identified more rested their hopes on themselves and also prefers skills than just a favorable situation. Individuals who have an external locus of control will see the world as something that can not be foreseen, as well as in achieving the objectives that individual behavior will not have a role in it. Individuals with an external locus of control were identified more rested hopes to rely on others, their lives tend to be controlled by forces outside themselves (such as luck), as well as more searching and selecting favorable conditions. Not found the nature of external locus of control in the person of Semar.

In a review of Philosophy Semar, where according Javanologist: Semar = Haseming Samar-Samar (Phenomenon literal meaning of the life of the Guidance). Semar is not a man and not a woman, his right hand pointing upwards and to the back of his left hand. Meaning: "As a personal character, Semar will say the symbol of infinite Single". His left hand means "total surrender and absolute as well as a symbol of neutral scientific but sympathetic". Auditors should follow the example of the figure of Semar in character locus of control that emphasizes independence in upholding truth and honesty though influenced by the external environment does not support them.

4a. Organizational Commitment

Based on the story of Semar is told that in the nature Sunyaruri Batara Semar betrothed with Dewi Sanggani, a daughter of Sanghyang Hening. They have ten children, namely Batara Wungkuam or Sanghyang Bongkakan, Batara Siwah, Batara Wrahaspati, Batara Yamadipati, Batara Surya, Batara Candra, Batara Kwera, Batara Tamburu, Batara Kamajaya, dan Dewi Sarmanasiti. Batara Wungkuam has child called Semarasanta. Semarasanta has black skin and short body. He is ordered to descend into the world live in the Pujangkara hermitage. He assigned to serve Resi Kanumanasa in the Saptaarga hermitage.

The story begins when Semarasanta chased by two tigers. He ran to Saptaarga and helped by Resi Kanumanasa. The two tigers were purified (cleaned of unseen things) by Resi Kanumanasa and turned into two beautiful angel, the older goddess named Dewi Kanestren, and the younger named Dewi Retnawati. Dewi Kanestren being the wife of Semarasanta and Dewi Retnawati being Resi Kanumanasa’s wife. Since then Semarasanta serve in Saptaarga and called Janggan Semarasanta.

As a servant, Janggan Semarasanta is very loyal to his master. He always advocated to behave simply by abstaining, praying, reducing sleep, and meditating in order to achieve glory. Only the Resi, Pastors, and Knight that have a strong desire to behave simply, have unyielding spirit, humble, and strong and noble act nurtured by Janggan Semarasanta. It can be said that Janggan Semarasanta was a blessing in disguise. Anyone who attended, his life will reach the pinnacle of success that brings lasting happiness inner and outer. In the puppet story, there are seven strong cuddly by Janggan Semarasanta, namely; Resi www.ijsrp.org
Manunamana up to six offspring, Sakri, Sekutrem, Palasara, Abiyasa, Pandudewana and Arjuna. If he is angry with the gods, Janggan Semarasanta become incarnate by his grandfather namely Batara Semar. If seen physically, Semarasanta is a dwarfman that ugly and black, but actually he was a person god named Batara Semar or Batara Ismaya, because Batara Semar was not allowed to dominate the direct nature of the world, then he uses Semarasanta’s body as a dripping medium (live and blends), so that eventually Semarasanta name is rarely mentioned, he is better known by the name of Semar. Semar tale can be applied in the field of behavioral accounting, which is about organizational commitment. As an auditor must have the soul of patience and loyal to the company. Although in the fields are highly variable conditions of the company.

According Agustini (2005: 11), Porter (1974) and Donnelly 2003); defining organizational commitment as the power of the individual and his involvement in a particular organization. Organizational commitment can be viewed as the result of an important work on the level of individuals associated with the work of others such as employee absenteeism, turnover, work effort (effort), and performance (organizational commitment has implications for individuals and organizations).From the point of view of the individual, organizational commitment makes a person more able to choose the acceptance of extrinsic rewards such as bonuses and awards and also the intrinsic rewards such as job satisfaction and a better relationship with coworkers. From an organizational perspective, higher employee commitment which will reduce delays, absenteeism and turnover, as well as improving the quality of business and employee performance. This in turn will affect the overall performance of the organization.

Organizational commitment is characterized by: (1) the trust and acceptance of the goals and values of the organization, (2) willingness to seek individual towards achieving objectives, (3) a strong desire to maintain the organization's members. Individual commitments are reflected in the persistent work even under stressful conditions. The results showed that individuals who have organizational commitment will work better than those not committed. This invention will tend to have a high influence on behavior of reduction audit quality (RAQ) than auditors with high organizational commitment.

Organizational commitment is strongly influenced by several factors related to the working environment. First, individuals who are more satisfied with their supervisors, a fair performance award and someone who felt that their organization cares about their well-being will have higher organizational commitment. Individuals who feel have a high organizational commitment would have low absenteeism and low turnover. Second, high commitment, lack of a tendency for them to look for other positions actively. Organizational commitment is also associated with effort and performance. Employees who are highly committed to the company, they will try hard and will have a better performance.

In connection with this organizational commitment of this, Semar respect to the common people more than honor the gods leader. Body, character and quality is high level, but its manifestations is very populist. Semar easy to cry when he saw the human suffering in his servants, that's why Semar puppet always watery eyes. Semar is more able to cry for others rather than crying for himself. Semar does not care and does not think of himself, but just think of the suffering of others. Semar as a descendant of the gods should master the 'upper world' and in charge of everything, but he choses only as servant, not rich and powerful. Semar is a reflection of a good leader who saw that he led from the perspective of the people they lead. The true leader, according semar philosophy is paradoxical. A leader is a master at the same waiter, rich but not tied to wealth, said in fairness to decide which one is right and wrong. Old teachings about political power comes from Hastabratra and mythologized within semar. Semar can get along with anyone, both superiors and subordinates, it is indicated that Semar is a servant / maid who also manifest as a god, even the ruler of the gods, Semar love the young and respect to elders (tresno marang kawulo mudo lan bekti marang sedulur tuo). This shows the spirit of the organization, in the symbol Semar puppet. Soul of organizational commitment can be grown from the leader’s attitude who can be hopeful and an example for leads in the company.

4b. Performance

The discussion about performance in this paper can be evaluated based on the stories of Semar. Semar's hair "kuncung" (jarwadasa / ancient Javanese proverb) meaning: "akuning sang kuncung" = as a personable waiter. Semar as a waiter serves people manifest people selfless to practice their religion in accordance with the oracles, and Semar walk facing up meaning: "the way a human child realization he gave the example that always looked up (the Khaliq) merciful and compassionate people ".In connection with this review, the auditor in performing job responsibilities must still see itself as a personal waiter for the company where he worked. He had to work earnestly, although the level of seriousness of each auditor is different, but he should have a loyal nature and performing well.

According Mangkunegoro (2004), T.B. Sjafri Mangkuprawira (2007), Dessler (2000: 41), and Robin (2003: 226); performance expressed as the overall success rate of a person during a certain period in carrying out the task compared with a range of possibilities, such as the standard of the work, the target or targets or criteria that have been determined in advance and have been agreed. Performance may involve abstract behaviors (supervision, planning, decision making). In connection with the supervision, Semar gave guidance and transmit the experience to the young (tresno marang kawulo mudo). It’s like those found in the Semar’s foot advice regarding the order of life for humans, while in terms of decision making, Semar always give simple instructions, as a Pandhawa’s adviser, especially when Pandhawa take decisions on issues that are considered serious and urgent.

Performance involves the degree to which members of the organization complete the task that contribute to the objectives of the organization, including the dimensions of quality and quantity. Performance is the success achieved in executing a job. The measure of success can not be identified at all, over the results achieved by an individual according to the size of the force in accordance with the work performed. Rate the auditor’s performance is very important to do if an organization wants to reposition or promotion. Performance can be divided into two, namely the performance of individuals and organizations. Individual performance is the employee's performance in terms
of both quality and quantity based on the standard of work that has been determined, while the performance of the organization is a combination of individual and group performance so that performance of the organization depends on its employees.

Assessment of the performance of employees is a tool which is useful, not only to evaluate the work alone, but also to develop and motivate all human resources in the organization. Basically, performance assessment can be considered as a tool to verify that the individuals have met the performance standards that have been set. People would like the job, if they are motivated for the job, and psychologically that the work performed is significant, there is a sense of responsibility for the work performed and their knowledge of the work; so that the work will increase motivation, satisfaction and performance.

4c. Turnover Intentions

According to a review in the story of Semar in Javanese called dempel = firmness of soul. Semar’s hair is shaped like a tuft of hair that is meaningful akuning sang kuncung, which is as personable waiter who manifest to serve humans. In addition, their teachings Mituhu on the story of Semar; means docile obedient and disciplined. The advice of Semar’s foot regarding the order of life in this mortal nature: Eling Lan Bektimarang Gusti Kang Murbeng amudi, means that humans are aware of themselves that he will always remember and praise of the Almighty God, in which the one God has given the opportunity for humans to live and work in this beautiful nature. "Percoyo lan Bekti Marang Utusane Gusti": means that human beings should respect and follow the teachings of the Messengers of Allah in accordance with the teachings of each, where all concepts of the Messenger of Allah is advocated kindness, so that "Setyo marang Khalifatullah utowo Penggede Negoro": means that as man who lived in an area, then it was obligatory to respect and follow all the regulations issued by a good and wise leader. Based on this Semar story is told so that we can always adjust to the organization, through fair policies, both for the employees and leaders, and did not make it easier to move the work (turnover intentions), despite the various pressures on the company. Similarly, the auditor, based on to the philosophy of Semar, should give a lot of good role model. The auditor is expected to behave in accordance with the standards and regulations, so that their turnover intention symptoms due to fear of sanction given the irregularities that do can be eliminated.

According to Mayer (1993), Lee and Mowday (1987); defining turnover intentions as the willingness to self awareness and consideration to leave the organization. Turnover intention is the attitude held by the organization's members to resign from the organization or in this case of a public accounting firm as an independent auditor. Employee turnover (withdrawal) in the form of turnover has become an interesting research material in various problems, such as personnel matters (HR), behavioral, and management practitioners. Turnover intention was also influenced by the skill and ability, where the lack of ability of the auditor to reduce the desire to leave the organization that remained in the firm even though he was eager to move the work.

Before the turnover happens, there is always a behavior that preceded it, that is the intention or the intensity of the turnover, there are at least two drivers of intensity, the intensity to seek and intensity to get out. The main and best predictor of turnover is the intensity for the exit. The intensity and behaviors to look for generally preceded by intensity to exit (turnover). The main factor is the intensity of satisfaction, interest is expected on the current work and interest expected from or in alternative employment or other opportunities.

Auditors were dissatisfied (low satisfaction) and considered to have a poor performance (poor performers) by his boss, tend to have a high turnover rate. But otherwise, the employee who has the high performers (both are satisfied nor dissatisfied) will not leave his job because they are given strong inducements to not get out of the place of work, for example by being given a raise and a promotion. Inducement can remove dissatisfaction and decrease the desire to move to another place of work. It can be seen from different turnover rates between high performers and low performers. Additionally, Turnover intentions affected by the conflict in the organization or profession.

V. CONCLUSION

Based on some thoughts and considerations regarding the figure of Semar then be formulated as follows:

Philosophical about Semar that it is only in the world of mythology, but the story is worthy of a queen Semar taulan for mankind, because in addition to the figure of Semar laden with mystery, it is also a symbol of the perfection of life. Semar personally saved a lot of character; began the female characters, male characters, the children's character, the character of the adults or the elderly, expression of joy and a sad expression mixed into one. Semar is a real picture, so that an auditor must constantly keep, love and live life itself, the life that comes from the Supreme Life. If life is preserved, nurtured and loved, then life will evolve to the top and fused to the Source of Life, manunggaling kowula lan Gusti. Semar describe the personal characteristics of auditors in conducting their work responsibilities, especially the picture of the values of goodness and truth in life, including work and struggle.

Semar persona that describe the personal characteristics in the form of Locus of control, where each auditor has a personal character that is different, so they also have a passion to work are different too. Auditor with the character of an internal locus tend to be more successful in completing the work of the external nature, they tend to have the spirit of the organization and the work is higher, so it has a higher job satisfaction, and are not easily changed jobs. Auditors who could exemplify the life of Semar is not expected to do during their acceptance of dysfunctional behavior implementing his job responsibility.

REFERENCES


www.ijsrp.org


**AUTHORS**

**First Author** – Yoosita Aulia, Student of Doctoral Program Accounting Science Airlangga University, Surabaya, Indonesia yoosita.aulia@gmail.com

**Second Author** – Arsono Laksamana, Department of Accounting, Airlangga University, Surabaya, Indonesia arsono-l@feb.unair.ac.id

**Third Author** – Basuki, Department of Accounting, Airlangga University, Surabaya, Indonesia basuki@feb.unair.ac.id
Construction of Double Gene Expression Vector

K. Mary Manjusha Rani, Dr. Raj kumar

1. Department of Biotechnology, Sreenidhi Institute of Science and Technology, Yammampet, Hyderabad-501301, Andhra Pradesh, India
2. Institute of Biotechnology, Sr.Nagar, Hyderabad.

Abstract - Recombinant vectors are valuable tools in the biopharmaceutical industry with a number of novel vectors being emerged every day. The aim of this project is to design a novel double gene bacterial expression vector where the two genes can be controlled individually. The double gene expression vector contains two independent transcriptional units. (a) The first transcriptional unit comprises sequences for the osmotic regulated promoter, restriction site for insertion of polypeptide and a transcription termination and (b) The second transcriptional unit comprises sequences for the T7 promoter, MCS for the insertion of polypeptide and a transcriptional termination sequence. The double gene expression vector (pUB-S-X-T7) was constructed by ligating the ClaI and PvuII fragment (4000bp) form the pUB-S plasmid and ClaI and Scal fragment (1000bp) from pUB-T7 plasmid. The presence of two independent transcriptional units was confirmed by colony PCR.

Index Terms - PCR amplification, T end cloning vectors like pGEM-T ,expression vector ,pUB-S plasmid, Taq DNA Polymerase,pUB-S-X plasmid.

I. INTRODUCTION

Over the past few decades the rapid progress in biotechnology has made it possible to improve the expression of recombinant proteins. However, the current plasmid design still limits the controlled expression of multiple genes. Controlled expression of multiple genes is a useful approach for various purposes: 1. Selection of transgenic offspring with a marker gene, 2. Examination of relationship between two gene products. For eg. Many proteins exert their functions through Protein: Protein interactions. Three-dimensional structures of protein complexes usually provide a wealth of information regarding the action mechanism of constituent proteins. Protein complexes may be obtained by simply mixing individually purified proteins. However, expression of some proteins requires a binding protein for folding and stability, 3. Overcome the toxic effect of the recombinant protein on the host cell by co expression of the other second protein (Restriction modification system), 4. Genetic switches which permit the control of individual gene activities quantitatively and specifically will greatly facilitate the study of gene function in vivo.

Several strategies of multiple gene expression were tried in Bacteria, Mammalian and Plant cells (Table 1). However all these approaches suffer form advantages as well as disadvantages. Off these methods co-transformation with linked transgenes in single vector is a conventional and reliable approach in most of the cases. However, this approach is technically demanding. The lack of unique restriction cloning sites, loss of direct selection, as well as the relatively low efficiency of ligation of insert into larger vector. In order to overcome these problems a novel expression vector was developed with unique restriction sites and two different inducible promoters to control the expression of both the genes.

The current project is aimed at development of double gene bacterial expression vector with two independent regulated transcriptional units. The transcriptional unit I contains the (a) lac promoter, , (b) Multiple cloning site and rrnB/T1 and rrnB/T2 transcriptional terminators. The transcriptional unit II consists of (a) ProU promoter, an osmotic regulated promoter which expresses transgenes in the presence of high salt (Nacl) concentration, (b) Multiple cloning site (MCS) and (c) rrnB/T1 and rrnB/T2 transcriptional terminator. Cloning of BglII-Methylase under the control of Lac promoter and BglII-Endonuclease under the control of ProU promoter the expression of both the genes can be controlled independently. Expression of Methylase ahead of endonuclease will protect the host cell and facilitates the production of BglII restriction endonuclease.

II. MATERIALS AND METHODS

METHODS

2.1: ISOLATION OF PLASMID USING MINI PREP KIT:

For the isolation of plasmid DNA single colony of bacteria was seeded in 10ml of LB media containing 100ug/ml Amp. Cultures were incubated in an orbital shaker (REMI) at 37°C and 200 rpm. Eighteen hours following incubation plasmid was isolated using UB-Plasmid Mini Prep Kit. Briefly, 1.5ml of culture was centrifuged at 13,000 rpm for 30 sec and media was discarded without disturbing the pellet. Bacterial pellet was resuspended with vortex in Solution 1 (100ul). Solution 2 (200ul) and Solution 3 (150ul) were then added to the cells suspension in sequence with gentle mixing of sample after each addition. A fluffy precipitate is formed. DNA binding buffer (450ul) was added to the lysate and centrifuged at 13,000 rpm for 30 sec. Clear lysate was transferred into a fresh eppendorf tube. DNA binding matrix (DBM) (10ul) was added to the clear lysate and incubated at room temperature with mixing. Samples were centrifuged at 13,000 rpm for 30sec and clear solution was discarded without disturbing the pellet. DBM was washed once with wash buffer (500ul) and centrifuged at 13000 rpm for 30 sec. Wash buffer was discarded without disturbing the pellet. DBM was resuspended in Elution buffer (50ul) and incubate at room temperature for 2min. Sample was centrifuged at 13000 rpm for 30 sec and elute was transferred in to a fresh eppendorf tube and stored at -20°C.
2.2: PURIFICATION OF PLASMID USING DESALTING KIT:
Restriction digestion, PCR samples were routinely purified using UB-Desalting Kit. Briefly, Equal volume of desalting buffer was added to the sample to be purified. DBM (10ul) was added to the sample and incubated at room temperature for 2min. Samples were centrifuged at 13000 rpm for 30 sec and clear solution was discarded without disturbing the pellet. DBM was washed with wash buffer (200ul) and centrifuged at 13000 rpm for 30 sec. Wash buffer was discarded without disturbing the pellet. DBM was resuspended in elution buffer (50ul) and incubated at room temperature for 2 min and then centrifuged at 13000 rpm for 30 sec. Elutes were collected in a fresh eppendorf tube and stored at -20°C.

2.3: GEL EXTRACTION:
DNA fragments separated on 1-2% agarose gels were purified using UB-Gel extraction kit. Briefly, the desired band was excised form the gel using scalpel and placed in an 1.5ml micro centrifuge tube. 3 volumes (300ul/100mg gel) of DNA binding buffer (G1) was added to the gel and incubated at 37°C for 5 min. Once the gel is completely melted DBM (10ul) was added to the sample and incubated at room temperature for 2min. Samples were centrifuged at 13000 rpm for 30 sec and G1 was discarded without disturbing the pellet. DBM was washed with wash buffer (500ul) and centrifuged at 13000 rpm for 30 sec. Wash buffer was discarded and DBM was resuspended in 20-50ul of elution buffer and incubated at room temperature for 2 min. Samples were centrifuged at 13000 rpm for 30 sec and elute was transferred into a fresh microfuge tube and samples stored at -20°C.

2.4: RESTRICTION DIGESTION:
Restriction digestion was setup according to the manufacturers specifications. The usual reaction setup was given below.

<table>
<thead>
<tr>
<th>Reaction components</th>
<th>Reaction volumes (20ul reaction)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 x reaction buffer</td>
<td>2ul</td>
</tr>
<tr>
<td>Template DNA</td>
<td>5ul</td>
</tr>
<tr>
<td>Enzyme</td>
<td>1ul</td>
</tr>
<tr>
<td>H2O</td>
<td>12ul</td>
</tr>
</tbody>
</table>

2.5: LIGATION:
50-100ng of DNA was routinely used to ligate with 1-5 U of T4-DNA ligase in 10 µl reaction volume under the reaction conditions specified by the manufacturer. The ratio of vector to insert was maintained between 1:3 and 1:5 for efficient ligation of insert with the vector. The reaction was routinely carried at 4°C overnight in 10 µl reaction volume in 1.5 ml Eppendorf tube. Ligated samples were transformed into JM109 (Promega Corporation, Madison, WI) as described.

2.6: TRANSFORMATION:
Routinely, 2.5ul of DNA samples were transformed into 50ul of calcium chloride competent cells by heat shock method. Briefly, competent cells were quickly thawed in the palm of the hand. 2.5 ul of DNA was added to 50ul of competent cells and incubated on ice for 30 min. Following ice incubation cells were heat shocked at 42 °C for 90 sec and iced for 2 min. LB Media (800ul) was added to the cells and incubated at 37°C for 40min and 200ul was plated on the LB/Amp plate.

2.7: Colony-PCR:
Colony-PCR on recombinant clones was carried out according to the protocols given by sambrook and russe (Sambrok russel). Reaction was often carried out in 20ul reaction volumes using a single bacterial colony as a template, 50 pmol of O-X-Scr primers in the presence of 200mM dNTPs, 2mM MgCl2 and 1 x concentration of PCR buffer and 1u of Taq. The reaction was carried out in a 0.2 ul PCR tube in a gradient PCR. The PCR program was as shown in (Table 4-3). Following PCR amplification PCR samples were separated on 1-2% agarose gel in TAE buffer (pH-8).
2.8: AGAROSE GEL ELECTROPHORESIS:

DNA separation was routinely done in 0.8 to 1% agarose gel in 1 X TAE electrophoresis buffer pH 8.3 (2 mM Tris-Acetate/0.05M EDTA). Agarose gels were cast in 1 X TAE buffer containing 0.5 μg/ml of ethidium bromide. DNA samples were mixed with 1/6 volume of 6 X loading dye (Usha Biotech Pvt Ltd, Hyderabad, AP, India) and subjected to electrophoresis under controlled voltage of 5V/cm. Appropriate DNA size markers (1 kb or 100 bp DNA ladder) were run alongside the samples to estimate the size of DNA fragments. The DNA was visualized in an UV transilluminator and gel documentation system (syngene).

III. RESULTS

3.1: Isolation of pUB-S-X and pUB-T plasmids:

pUB-S-X (Figure 5-6) and pUB-T7 (Figure 5-2) were isolated using Ultra Pure Plasmid Purification kit (Usha Biotech) using the method described in section (4.2.1). Plasmid was eluted in 50ul of elution buffer. Two micro litres of each plasmid was run on 1% agarose gel in TAE buffer (Method 4.2.8). The plasmids were found to be of good quality which was represented by the appearance of plasmid with out any shearing (Figure 5-1).

3.3: Isolation of T7-MCS-Termination sequences from pUB-T7:

pUB-T7 (Figure 5-2) is a bacterial expression plasmids. The recombinant gene that were cloned in this plasmid were under the control of a T7 RNA polymerase promoter. The induction of these genes occur in the presence of T7 RNA polymerase. For the construction of double gene vector T7 Promoter-MCS-rnb/T1 and rnb/T2 were isolated by sequential digestion of pUB-T7 Plasmids using CalI and ScaI enzymes. pUB-T7 was 1st digested with CalI as described in the method (4.2.4), the reaction was setup as shown in (Table 5-1). Two micro litres of the digested sample was analysed on 1% agarose gel as shown in method (4.2.8).

The presence of single linear band at 4.7 kb in Figure 5-3 indicated that CalI digestion is complete. The digested plasmid was purified using the method described in (4.2.2) and was eluted in 10ul of double distilled water.

<table>
<thead>
<tr>
<th>Components</th>
<th>20ul reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>pUB-T7</td>
<td>10ul</td>
</tr>
<tr>
<td>10 x Buffer (NEB-3)</td>
<td>2ul</td>
</tr>
<tr>
<td>CalI (2u/ul)</td>
<td>1ul</td>
</tr>
<tr>
<td>H₂O</td>
<td>7ul</td>
</tr>
</tbody>
</table>

Table 3.4: CalI digestion of pUB-T7

Figure 3.2: Analysis of Mini-Prep Plasmid: Lane-1 (pUB-S-X) and Lane-2 (pUB-T7)

Figure 3.3: Restriction digestion of pUB-T7 using CalI: Lane-1 (Supercoiled pUB-T7), Lane-2 and 3 (2ul of digest) and Lane-4 (1kb ladder).
Table 3.6: Scal digestion of pUB-T7-CalI

<table>
<thead>
<tr>
<th>Components</th>
<th>20ul reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>pUB-T7</td>
<td>10ul</td>
</tr>
<tr>
<td>10 x Buffer (NEB-3)</td>
<td>2ul</td>
</tr>
<tr>
<td>Scal (2u/ul)</td>
<td>1ul</td>
</tr>
<tr>
<td>H₂O</td>
<td>7ul</td>
</tr>
</tbody>
</table>

Figure 3.7: Restriction digestion of pUB-T7-CalI using Scal: Lane-1 (1kb ladder), Lane-2 (supercoiled pUB-T7) and Lane-3 (Double digested pUB-T7).

Figure 3.8: Analysis of Gel Extracted 1000 bp ClaI-PvuII Fragment

Table 3.11: ClaI digestion of pUB-S-X plasmid

<table>
<thead>
<tr>
<th>Components</th>
<th>20ul reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>pUB-T7</td>
<td>10ul</td>
</tr>
<tr>
<td>10 x Buffer (NEB-3)</td>
<td>2ul</td>
</tr>
<tr>
<td>ClaI (2u/ul)</td>
<td>1ul</td>
</tr>
<tr>
<td>H₂O</td>
<td>7ul</td>
</tr>
</tbody>
</table>

The presence of single linear band at 6.1 kb in (Figure 5-7) indicated that ClaI digestion is complete. The digested plasmid was purified using the method described in (4.2.2) and was eluted in 10ul of double distilled water.

3.9: Isolation of pUB-S-X back bone:

pUB-S-X (Figure 5-6) is a bacterial expression plasmids. The recombinant gene that were cloned in this plasmid were under the control of a ProU an osmotic regulated promoter. The promoter gets activated in the presence of increasing concentrations of NaCl. For the construction of double gene vector pUB-S-X was used as a back bone which carries the complete transcriptional unit (ProU-X-G-X- rmb/T1 and rmb/T2) for salt inducible expression and slectable marker gene (Ampicillin) and bacterial origin of replication (ColE1 Ori). The back bone was isolated by digesting pUB-S-X Plasmids using CalI and PvuII enzymes. pUB-S-X was 1st digested with CalI as described in the method (4.2.4), the reaction was setup as shown in (Table 5-3). Two micro litres of the digested sample was analysed on 1% agarose gel as shown in method (4.2.8).

Following digestion of pUB-S-X with Cl CalI. The linear plasmid was digested with PvuII as described in the methods (4.2.4), the reaction was setup as shown in (Table 5-4). Double digested pUB-S-X CalI-PvuII was separated on 1% agarose gel as described in the method (4.2.8). The presence of multiple bands in (Figure 5-4) indicated the PvuII digestion was complete. 4000 bp fragment in (Figure 5-8) was gel extracted according to

www.ijsrp.org
the method described in (4.2.3), DNA was eluted in 10ul of H₂O. The gel extracted samples was analysed on 1% gel as described in (4.2.8). The presence of band at 4 kb in Figure 5-9 indicated the presence of pUB-S-X CalI-PvuII plasmid in gel extracted sample.

Table 3.13: PvuII digestion of pUB-S-X-CalI

<table>
<thead>
<tr>
<th>Components</th>
<th>20ul reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>pUB-T7</td>
<td>10ul</td>
</tr>
<tr>
<td>10 x Buffer (NEB-3)</td>
<td>2ul</td>
</tr>
<tr>
<td>PvuII (2u/ul)</td>
<td>1ul</td>
</tr>
<tr>
<td>H₂O</td>
<td>7ul</td>
</tr>
</tbody>
</table>

![Figure 3.14: Restriction Digestion of pUB-S-X-CalI with PvuII: Lane-1 (1kb ladder), Lane-2 (supercoiled pUB-S-X) and Lane-3 (CalI and PvuII digested pUB-S-X plasmid)](image)

Ligation of pUB-S-X (PvuII/CalI) and T7-MCS-Termination sequences (CalI/ScaI) fragments:

pUB-C-X (Clai-PvuII) fragment and T7 transcriptional unit (T7-MCS- rnb/T1 and rnb/B2) were ligated according to the method described in (4.2.5). The ligation reactions were setup as shown in Table 3.16: Ligation reaction

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Backbone vector (pUB-S-X-CalI-PvuII)</th>
<th>Insert (T7-MCS-rnb/B1 and rnb/B2)</th>
<th>T4 Buffer</th>
<th>T4 enzyme</th>
<th>H₂O</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 ul</td>
<td>6 ul</td>
<td>1ul</td>
<td>1ul</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>2 ul</td>
<td>-</td>
<td>1ul</td>
<td>1ul</td>
<td>6ul</td>
</tr>
</tbody>
</table>

Transformation of ligated samples into JM109 competent cells:

2.5ul of ligated samples in Table 5-5 were transformed into 50 ul of JM109 competent cells. Transformation was carried out as described in (4.2.6). Following transformation 200 ul of transformed culture was plated on LB-Amp plates and incubated overnight at 37°C. Eighteen hours following incubation at 37°C, 3 colonies were observed in LB-Amp plate with Sample-1 in (Table 5-5). The transformation observations were shown in Table 3.17: No. of surviving colonies following transformation in JM109 cells using the ligated samples.

<table>
<thead>
<tr>
<th>Ligated sample</th>
<th>No. of colonies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Analysis of pUB-S-X-T7 clones using colony PCR:

pUB-S-X-T7 has got two rnb/B1 and rnb/B2 sequences one on the sense strand and the other on the antisense strand. Prime O-X-Src (Table 4-1) was designed to anneal to the rnbBT1 and rnbBT2 sequence. Use of this primer to amplify pUB-S-X-T7 DNA will give a band at 2300 bp. However, in pUB-S-X and pUB-T7 this prime does not amplify. The three clones in the (Table 5-6) were analysed by O-X-Src primer using the method described in (4.2.7). PCR master mix was prepared as shown in (Table 5-7) and 20 ul was aliquoted in to tube 1-6 shown in (Table 5-8).

Table 3.18: PCR master mix

<table>
<thead>
<tr>
<th>Components</th>
<th>For 7 reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 x PCR buffer</td>
<td>14 ul</td>
</tr>
<tr>
<td>10mM dNTP mix</td>
<td>5.6 ul</td>
</tr>
<tr>
<td>25mM MgCl₂</td>
<td>11.2 ul</td>
</tr>
<tr>
<td>O-X-Scr Primer (1:20 diluted)</td>
<td>14 ul</td>
</tr>
<tr>
<td>Taq (3u/ul)</td>
<td>2.5 ul</td>
</tr>
<tr>
<td>H₂O</td>
<td>92.7 ul</td>
</tr>
<tr>
<td>Total</td>
<td>140 ul</td>
</tr>
</tbody>
</table>

Table 3.19: PCR Reactions

<table>
<thead>
<tr>
<th>Sample no.</th>
<th>Master mix</th>
<th>Template</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20 ul</td>
<td>A pinch of bacterial colony (Clone 1)</td>
</tr>
<tr>
<td>2</td>
<td>20 ul</td>
<td>A pinch of bacterial colony (Clone 2)</td>
</tr>
</tbody>
</table>
Following PCR amplification 5ul of each PCR sample was analyzed on 1% agarose gel in TAE buffer as described in (4.2.8). Sample 1-3 (Lanes 2-4 in Figure 5-10) gave a band at 2300 indicating that the recombinant clones are a result of ligation of pUB-S-X (CalI-PvuII) and T7-MCS-rrnB/T1-rrnB/T2 (CalI-ScaI) fragments. The possibility of non-specific amplification was ruined by the lack of bands with samples 4-6 (Lanes 5-7 in Figure 5-10). Glycerol stock was prepared for clone-1,2 and 3 for use in further analysis.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>20 ul</td>
<td>A pinch of bacterial colony (Clone 3)</td>
</tr>
<tr>
<td>4</td>
<td>20 ul</td>
<td>1ul of pUB-S-X</td>
</tr>
<tr>
<td>5</td>
<td>20 ul</td>
<td>1ul of pUB-T7</td>
</tr>
<tr>
<td>6</td>
<td>20 ul</td>
<td>-ve</td>
</tr>
</tbody>
</table>

**IV. DISCUSSION**

Recombinant expression plasmids are valuable tools in life science research and bio-pharmaceutical industry. With the rapid progress in biotechnology a number of expression plasmids have been developed for the last few decades. However, the current plasmid design still limits the controlled expression of multiple genes. Controlled expression of multiple genes is a useful approach for the production of restriction endonucleases which demand the expression of restriction endonuclease and methylase simultaneously. A double gene expression vector with two independently regulated transcriptional units have been developed by cloning T7 promoter-MCS-rrnB/T1 and rrnB/T2 into the pUB-S-X plasmid which already had a ProU Promoter-X-GX-rrnB/T1 and rrnB/T2 transcriptional unit. The cloning of one transcriptional unit into the other plasmid is achieved by restriction digestion and ligation (Section 5.2, 5.3, 5.4 and 5.5). The recombinant double gene expression vector was analyzed for the presence of both the transcriptional units using colony PCR. The appearance of 2.5kb fragment following colony PCR indicated that the T7 promoter-MCS-rrnB/T1 and rrnB/T2 was successfully ligated into pUB-S-X plasmid. The lack PCR amplification in pUB-S-X and pUB-T7 using the same primers indicated that the result of amplification is due to the presence of both the transcriptional unit.

**V. CONCLUSION**

Double gene bacterial expression vector pUB-S-X-T7 was constructed and was analyzed for the presence of both the transcriptional units (PorU-X-G-X-rrnB/T1-rrnB/T2 and T7-MCS-rrnB/T1-rrnB/T2). With the use of the double gene expression vector two recombinant proteins can be expressed independently with the use of two different inducing agent NaCl for ProU promoter and T7 RNA polymerase for T7 promoter.

**REFERENCES**


AUTHORS

First Author – K.MaryManjushaRani, Department of Biotechnology, Sreenidhi Institute of Science and Technology, Yammampet, Hyderabad-501301, Andhra Pradesh, India, manjusha.kora@gmail.com.
Second Author – Dr. Raj kumar, Institute of Biotechnology, Sr.Nagar, Hyderabad
A Study of Clinical Profile with High Sensitivity C-Reactive Protein and Lipid Profile in Coronary Artery Disease

Dr. Mohammad Ghouse Shaik,*, Dr. Anbazhagan G**, Dr. V. S. Mohamed Al Ameen***

* Post Graduate, Department of General Medicine, Meenakshi Medical College Hospital And Research Institute, Kanchipuram, Tamilnadu, India
** Professor, Department of General Medicine, Meenakshi Medical College Hospital And Research Institute, Kanchipuram, Tamilnadu, India
*** Assistant Professor, Department of General Medicine, Meenakshi Medical College Hospital And Research Institute, Kanchipuram, Tamilnadu, India

Abstract - BACKGROUND: Coronary artery disease (CAD) is the leading cause of death in India and worldwide. CAD is most commonly due to atherosclerosis of the coronary arteries. Empirical evidence suggests that inflammation plays a critical role in all stages of atherosclerosis. Of the potential risk factors, high sensitivity C-reactive protein (Hs-CRP), is one of the downstream vascular inflammatory marker and most promising. It is considered to be the most robust tool with test characteristics desirable and subservient for clinical use.

AIMS AND OBJECTIVES: To evaluate the significance of Hs-CRP as one of the most reliable marker in CAD. To study the role of lipid abnormalities as a risk factor in CAD. To evaluate the lipid profile in comparison with the Hs-CRP value in CAD.

MATERIALS AND METHODS: The study was conducted on 100 subjects attending medicine OPD divided into two groups, 50 subjects having CAD manifested as acute coronary syndrome and the other 50 subjects are healthy control.

RESULTS AND CONCLUSION: In the present study, Serum Total Cholesterol, Serum Triglycerides, Serum Hs-CRP and the mean values of BMI were significantly higher among the cases and there exists a significant positive correlation between them.

I. INTRODUCTION

Coronary artery disease (CAD) is the leading cause of death and disability in India and the leading cause of death worldwide. Although CAD mortality rates worldwide have declined over the past four decades, CAD remains responsible for about one-third or more of all deaths in individuals over age 35[1,2]. CAD accounts for 20% of all deaths in the South Asian region (SAR).

CAD is most commonly due to atherosclerotic occlusion of the coronary arteries. Earlier, atherosclerosis was considered to be a bland condition associated lipid storage that reduces the arterial lumen. It is now believed to be a chronic inflammatory condition that starts at a very young age.

Evidence of inflammation in atherosclerotic lesions has been noted from the earliest histologic observations and inflammation is central to understanding the pathogenesis of atherosclerosis[3-7]. Macrophages that have taken up oxidized LDL release a variety of inflammatory substances, cytokines, and growth factors[8,9]. Among the many molecules that have been implicated are: monocyte chemotactic protein (MCP)-1[10,11], intercellular adhesion molecule (ICAM)-1; macrophage and granulocyte-macrophage colony stimulating factors[12,13]; CD40 ligand; interleukin (IL)-1, IL-3, IL-6, IL-8, and IL-18[14,15,16]; and tumor necrosis factor alpha[17,19].

Lipid abnormalities play a critical role in the development of atherosclerosis[9,20-26]. Several epidemiologic studies conducted in countries around the world showed an increasing incidence of atherosclerosis when serum cholesterol concentrations were above 150 mg/dL (3.9 mmol/L). High levels of LDL cholesterol[20-26] are particularly important risk factors for atherosclerosis[21]. HDL, in contrast to LDL, has putative antiatherogenic properties that include reverse cholesterol transport, maintenance of endothelial function, and protection against thrombosis. There is an inverse relationship between plasma HDL-cholesterol levels and cardiovascular risk.

Of the potential risk factors presently available, high sensitivity C-reactive protein (Hs-CRP), is one of the downstream vascular inflammatory marker and is among the most promising. It consistently associates with the increased risk of atherosclerotic cardiovascular disease independent of cholesterol level[28,29], although genetic data do not support its function as a causal risk factor. It has been considered as a useful marker to identify individuals with increased vascular inflammation[27-30]. Thus, Hs-CRP is considered to be the most robust tool with test characteristics desirable and subservient for clinical use.

Serum levels of lipids have proven among the most potent and best substantiated risk factors for atherosclerosis in general and CAD in particular. The uptake of oxidized LDL –derived cholesterol by subintimal macrophages characterizes the formation of the atherosclerotic plaque, initiating a local inflammatory reaction. Dyslipoproteinemias constitute a major risk factor for atherosclerosis and CAD, and their proper recognition and management can reduce cardiovascular and total mortality rates.

II. PATHOPHYSIOLOGY

Atherosclerosis is responsible for almost all cases of coronary artery disease (CAD). This insidious process begins with fatty streaks that are first seen in adolescence; these lesions

www.ijsrp.org
Multiple factors contribute to the pathogenesis of atherosclerosis, including endothelial dysfunction, dyslipidemia, inflammatory, and immunologic factors, plaque rupture, and smoking. The endothelium forms an active biologic interface between the blood and all other tissues. The single layer of continuous endothelium lining arteries forms a unique thromboreistant layer between blood and potentially thrombogenic subendothelial tissues. The endothelium also modulates tone, growth, hemostasis, and inflammation throughout the circulatory system. Endothelial vasodilator dysfunction is an initial step in atherosclerosis and is felt to be caused principally by loss of endothelium-derived nitric oxide. Most widely accepted theory of atherosclerosis states that the process represents the body's attempt to heal in response to an endothelial injury.

The hsCRP has been noted to have opsonizing properties, increasing the recruitment of monocytes into atheromatous plaque and also inducing endothelial dysfunction by suppressing basal and induced nitric oxide release. The hsCRP per se has also been found to increase the expression of vascular endothelial plasminogen activator inhibitor-1 (PAI-1) and other adhesion molecules and alter LDL uptake by macrophages. However, interventions that directly inhibit hsCRP would have to be evaluated before conclusively establishing hsCRP as a direct contributor to the atherosclerotic process.
T-wave inversion ≥0.1 mV in two contiguous leads with a prominent R wave or R/S ratio>1

V. CORONARY ARTERIOGRAPHY

Coronary arteriography remains the gold standard for determining the presence of obstructive CAD. It is used to detect or exclude serious coronary obstruction. It is indicated in patients with chronic stable angina despite medical therapy, patients with symptoms to rule out or confirm CAD, patients with high risk of sustaining coronary events.

VI. MATERIALS AND METHODS

The study was conducted on 100 subjects attending medicine OPD and divided into two groups, 50 subjects having coronary artery disease as manifested as acute coronary syndrome and the other 50 subjects were age and sex matched healthy control.

Study design: Observational Case control study.

Inclusion Criteria: Patients presenting with chest pain in whom the diagnosis of coronary artery disease was confirmed by clinical presentation and investigations like
• Characteristic electrocardiogram (ECG) changes
• Positive treadmill test
• Positive Echocardiographic findings
• Positive Trop T

Exclusion criteria:
Confounding factors which could interfere in the biochemical analyses of study subjects and alter the results like
• Smoking
• Diabetes mellitus
• Active inflammatory diseases
• Nutritional deficiencies

Statistical Methods:
For each parameter mean and standard deviation was calculated. The value of p<0.05 was taken as significant. The qualitative variables were compared using χ2 test. The statistical software system SPSS version 22 for windows was used for analysis. Univariate and bivariate correlation was made using Kendall’s tau method to confirm the significance of variables with Hs-CRP and lipid profile.

VII. RESULTS AND ANALYSIS

Table 1: Age distribution of cases and controls

<table>
<thead>
<tr>
<th>Age in years</th>
<th>No of cases</th>
<th>No of controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-40</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>41-50</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>&gt; 50</td>
<td>26</td>
<td>27</td>
</tr>
</tbody>
</table>

In the present study mean age of cases was 51.24 ± 7.89, mean age of control was 52.18 ± 7.36. The minimum age was 33 for cases and 37 for control. The maximum age of cases and controls were 69 and 68 respectively. Majority of cases were > 40 years of age.

Table 2: Gender distribution of cases and controls

<table>
<thead>
<tr>
<th>SEX</th>
<th>CASES</th>
<th>CONTROLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>FEMALE</td>
<td>34</td>
<td>34</td>
</tr>
</tbody>
</table>

The number of males included in the study was 16 (32%) and the number of females was 34 (68%). The female preponderance was due to application of the exclusion criteria (cigarette smoking).

Table 3: Distribution of cases & controls based on S.Total cholesterol

<table>
<thead>
<tr>
<th>S.Total cholesterol (Mg/dl)</th>
<th>CASES</th>
<th>CONTROLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 180</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>180 – 199</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>200 – 239</td>
<td>19</td>
<td>7</td>
</tr>
<tr>
<td>&gt; 240</td>
<td>10</td>
<td>2</td>
</tr>
</tbody>
</table>

Total cholesterol was estimated for all study subjects, 36 cases as compared to 22 controls had S.TC > 180Mg/dl, of which 10 cases were > 240Mg/dl.
Table 4: Distribution of cases & controls based on TGL

<table>
<thead>
<tr>
<th>TGL (Mg/dl)</th>
<th>CASES</th>
<th>CONTROLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 150</td>
<td>28</td>
<td>35</td>
</tr>
<tr>
<td>150 – 199</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>200 - 500</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>&gt; 500</td>
<td>NIL</td>
<td>NIL</td>
</tr>
</tbody>
</table>

In this study, 22 cases as compared to 15 controls had TGL > 150Mg.

Table 5: Distribution of cases & controls based on Hs-CRP

<table>
<thead>
<tr>
<th>Hs-CRP (mg/L)</th>
<th>CASES</th>
<th>CONTROLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>7</td>
<td>36</td>
</tr>
<tr>
<td>1 – 3</td>
<td>37</td>
<td>14</td>
</tr>
<tr>
<td>&gt; 3</td>
<td>6</td>
<td>NIL</td>
</tr>
</tbody>
</table>

In this study, 37 cases had Hs-CRP in the range of 1 – 3mg/L and 6 cases were > 3mg/L as compared to the control group which had 36 subjects with values < 1mg/L and 14 in the range of 1 – 3mg/L.

Table 6: Correlation between risk factors, lipid profile and Hs-CRP.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>Hs-CRP</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.CHOLESTEROL</td>
<td>&lt; 0.001</td>
<td>HS**</td>
</tr>
<tr>
<td>TGL</td>
<td>&lt; 0.005</td>
<td>S*</td>
</tr>
<tr>
<td>HDLc</td>
<td>&gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>LDLc</td>
<td>&lt; 0.005</td>
<td>S*</td>
</tr>
<tr>
<td>VLDLc</td>
<td>&gt; 0.05</td>
<td>NS</td>
</tr>
<tr>
<td>BMI</td>
<td>&lt; 0.001</td>
<td>HS**</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2 tailed)
* Correlation is significant at the 0.05 level (2 tailed)

VIII. DISCUSSION

In this study 50 patients diagnosed as coronary artery disease by ECG, Echocardiogram, and cardiac enzymes who satisfied the inclusion and exclusion criteria were taken as cases and 50 age and sex matched controls satisfying the exclusion criteria were taken as controls. Cardiac and clinical profile was assessed in both groups and correlation was made between clinical profile, lipid profile and Hs-CRP.

Lipid Profile in CAD

The mean value of T.cholesterol was high in cases as compared to controls, and was statistically significant, p<0.001. Comparing HDLc, LDLc, VLDLc and TGL between cases and controls, there was no significant correlation except for LDLc which was statistically significant p<0.002.

Hs-CRP in CAD

In this present study 43 cases had Hs-CRP> 1mg/L as compared to 14 controls. Among the 43 cases, 6 had Hs-CRP values > 3mg/L. The mean Hs-CRP levels was higher among cases compared to control, and it was statistically significant (p<0.001). This data suggests a strong correlation between high Hs-CRP and CAD.

Lipid profile and Hs-CRP in CAD

In the present study, there was a significant correlation between Hs-CRP and T.Cholesterol (p<0.001), TGL (p<0.005), LDLc (p<0.004) and VLDLc (p<0.007). There was no statistically significant correlation of Hs-CRP with HDLc.

IX. CONCLUSION

1. In the present study Serum Total Cholesterol, Serum Triglycerides, Serum Hs-CRP and the mean values of BMI were significantly higher among the cases.
2. There exists a significant positive correlation between Serum Hs-CRP and parameters of lipid profile namely, Serum Total Cholesterol, LDLc, VLDLc, and Triglycerides.

REFERENCES


AUTHORS

First Author – Dr. Mohammad Ghouse Shaik, Post Graduate, Department of General Medicine, Meenakshi Medical College Hospital And Research Institute, Kanchipuram, Tamilnadu, India Ph: 9100694444 Email: dr.house402@gmail.com

Second Author – Dr. Anbazhagan G, Professor, Department of General Medicine, Meenakshi Medical College Hospital and Research Institute, Kanchipuram, Tamilnadu, India Ph: 9443542947 Email: anbubs888.ag@gmail.com

Third Author – Dr. V.S. Mohamed Al Ameen, Assistant Professor, Department of General Medicine, Meenakshi Medical College Hospital and Research Institute, Kanchipuram, Tamilnadu, India Ph: 9994206920 Email: al2303@gmail.com
A comparative analysis and review of OTP Grid Authentication Scheme: Development of new scheme

Benedicto B. Balilo Jr.*, Bobby D. Gerardo**, Ruji P. Medina*
*Technological Institute of the Philippines, Quezon City, Philippines
**West Visayas State University, Iloilo City, Philippines

Abstract - Grid authentication factor is about XY coordinate lookup system. The random cell in the grid carries the correct combination of numbers and letters in the cell. An example of grid authentication scheme is the bingo card. Bingo card is a less secure alternatives because of the scheme it used (the three digits) which is fewer than most random OTP schemes making it exposed to threats. However, grid authentication is one of the interesting authentication scheme that can be explored to maximize the random generation of codes with mathematical computation and algorithmic scheme. This study aims to compare the different grid authentication scheme to determine which of these schemes provides better performance, complexity, saves memory resources and gives quality key generation.

Index Terms: grid authentication, one time password

I. INTRODUCTION

One-Time Password (OTP) is a modern authentication scheme which offers accuracy, security and confidentiality. OTP Two-Factor Authentication is considered as one of the promising methods in any web-enabled information system. Currently, there are many schemes have been developed to safeguard and protect confidential information. However, they differ from functional properties, methods and materials used. Each of which has unique approach in handling risks and attacks [1]. Grid authentication factor is about XY coordinate lookup system. The random cell in the grid carries the correct combination of numbers and letters in the cell. An example of grid authentication scheme is the bingo card. It is a less secure alternatives because of the three digits used fewer than most random OTP schemes and can be photocopied making it exposed to threats [2]. However, grid authentication is one of the interesting authentication scheme that can be explored to maximize the random generation of codes with mathematical computation and algorithmic scheme.

The increasing popularity and application of OTP served as the greatest motivation of this research study. Though there is no best approach to secure authentication, this study will analyze and compare the different approaches OTP for grid authentication to determine which of these schemes provides better performance, saves memory resources and gives quality key generation. Accordingly, the results generated by OTP is unique considering its complexity and randomicity.

II. RELATED WORKS

The one time password (OTP) is a security layer that increases the security level for authorization and authentication. The user presents something or in possession like mobile phone, PIN or uses fingerprint to establish connection or access to the computer system. OTP is just one of many authentication schemes use to authenticate valid user.

Authentication can be performed in many ways. The importance of selecting an appropriate authentication method is considered as the crucial decision in designing secure systems. It may be viewed as simply presenting credentials and authenticating the connecting party but failure to authenticate can compromise the network and the resources are vulnerable to misuse [3]. To identify the user, a computer system or application will require authentication. Authentication is the process of establishing or making access to computer network, making purchases online, transferring accounts through bank website or perhaps visiting social media sites involve a method called authentication: [4][5] defined, authentication as the process of verifying the identity of a user, tracing the origins of an event, or ensuring that the information comes from a trusted site. It is the act of confirming the truth or genuineness of an attribute or entity. It establishes the authenticity or proves genuineness. Authentication is classified into three factors: owner factor typically takes the form of a one-time token key from an external source, knowledge factors takes no additional hardware needed to provide the secret codes. Password, pass phrase, identification PIN and challenge response are examples of something you know factor, and inheritance factors; these tends to be the strongest and hardest to crack because this factor uses fingerprint, retinal pattern, signature, face, and voice. But, the deployment of this type of technology is expensive and does not translate easily to all the ways we all access resources [6].

User authentication is one of the fundamental procedures to ensure secure communications and share system resources over an insecure public network channel. Especially, the purpose of the one-time password is to make it more difficult to gain unauthorized access to restricted resources [7]. Social engineering, phishing, brute force attacks, shoulder surfing, keystroke logging, eavesdropping, and dictionary attacks are among the many threats to authentication.

The traditional username and password has shortcomings giving for the OTP to be introduced to increase the level of security. OTP are passwords which are valid only once for an authentication. Its main advantage is that the user is free from impersonation and the password will not be reused. The core of

www.ijsrp.org
Lamport’s scheme requires that client cooperates and agrees to use a common sequencing algorithm to generate a set of expiring OTP, and validate client-provided passkeys included in each client-initiated request [8]. Nowadays, the use of One-Time Password is a common authentication scheme to many companies, organizations and institutions. The implementation of two-factor authentication method reduced the cost associated with multiple passwords, enhancing the user experience while increasing productivity, increasing security around a single point of access, and simplifying auditing and compliance. While, others have benefited from customer confidence, regulations and best practices, threat prevention and fraud prevention [9]. Nonetheless, these authentication techniques contain weaknesses and gap. While there is no appropriate or best design for specific problems, every application has its own specific strength and vulnerabilities, but the development of a two-factor authentication is already a landmark and as added feature is a serious improvement in protecting information.

There are many studies conducted relative to the application of the different methods with the inclusion of OTP as added features to authentication. The SMS, Transparent Token, email or printer token achieved a two-factor authentication. SMS and Email are both in active attack but SMS has higher in terms of passive attack. But, in terms of ease of use and portability they are both high. The major advantage of email is in terms of cost, user can use the available email account without cost to the organization.

There are different techniques or schemes involved in the generation of OTP. These includes random number generation, timestamp, keyboard manipulation, location, IP address or a combination of the different parameters (like biometric characteristics + pseudorandom numbers).

III. ANALYSIS OF DIFFERENT GRID AUTHENTICATION SCHEME

The start of letter labeled columns (bingo card) have generated interest to card bingo players community. The game started in 1500 Italy in a lottery game called lo Giucco del Lotto d’Italia. The game was modified into 2 versions – a 12-card and a 24-card set [10]. Several varieties of cards have been developed, tested and played. The U.S. style (5x5 grid for 75-ball Bingo) and U.K. style “Housie”--90-ball are the known modern bingo card game [11].

Bingo cards are interesting and attractive because it is easy to implement and they do not require a chip or internal mechanism compared to smart cards and token. It offers flexibility, ease of use, they are cheap, easy to produce and easy to replace. However, this have drawbacks like dependent on number of cells, combinations become stale and just like with old and weak password eventually can be cracked [2].

5x5 Bingo card scheme

The 5x5 bingo card (also known as American bingo card) is the most popular and commonly played numbers format. The card contains 25 squares, arranged in 5 vertical and 5 horizontal rows. Figure 1 shows the sample 5x5 bingo card scheme. The numbers are randomly generated from specified column range.

The middle square of the card is a “free space”. The columns of the card are labeled with the letters “B.I.N.G.O”. The rows are labeled with numbers between 1 and 75, allowing to generate 5.53x10^26 possible number arrangements. The column B includes numbers between 1 to 15, column I has numbers 16 to 30, column N has numbers 31 to 46, column G has numbers 46 to 60 and column O has numbers 61-75 [10]. The generated codes is purely a combination of numbers from 1 to 75 with specific column range. This makes the scheme simple and easy to predict numbers which an attacker can simply apply brute force attack to predict the next round of numbers.

Entrust Grid card scheme

The Entrust-patented grid card is a credit card-sized authenticator consisting of numbers and characters in a row-column format. A user is presented with authentication challenge when they log in to a restricted network, application, cloud service or site. The challenge presents the user with coordinates such as A2, A3 and E1. The user refers to their unique grid card to provide the information from the requested cells: P52 (Figure 2).

Each grid card is unique and carries a serial number, so every user can be uniquely identified and authenticated. Each time a user is asked to authenticate they are presented with a different challenge requiring them to validate via a different set of grid coordinates. The coordinate request changes for each authentication challenge. An enhanced version of the grid card was released with enhancement on the generation of 2-pair values (like H3, I5, A6). The grid consists of approximately 50 values (5*10) with combination of uppercase characters and numbers. A total of 36 (26 uppercase letters + 10 numbers (0-9)) values formed the entropy of the seed [13]. These gives the scheme the limit in generating the entropy aside from fixed-size length of grid card.
Other form of grid scheme
The grid that has 16 squares marked A to P and numbers corresponding to the letters used in ICICI card [12].

The user simply look into the card and with the corresponding letters fill-in the blank space. Similar with mentioned scheme, this is simple and easy to brute force because of the limited numbers/characters involved in the process.

IV. RESULTS AND DISCUSSIONS
A. Development of new grid scheme
The usual bingo card scheme consists of single number in a square. An improvement in the values was used in 2-pair value grid scheme with assigned row-column mapping sequence (Figure 4).

The 2-pair value grid scheme is an algorithmic process where it used the concept of random number generation, attribute-based and string manipulation technique. The Lamport formula was adopted in generating the 2-pair codes. That is, additional parameters was added to the initial seed such as string of characters, numbers, date and timestamp. Using the formula given, the initial seed captures the current OTP and integrated as part of the next OTP to be generated. The letter g as the initial seed and letter b represents the OTP to be generated.

\[ b=g, b_1=(b(g+otp_1), b_2=(b_1(g+otp_2)), \ldots, b_{n+1}=(b_{n+1}(g+otp_n)) \]

This method was considered to be free from brute force and dictionary attack as the applied algorithmic pattern used the combination of randomized code to generate the initial seed of the OTP. The XY values will be randomly chosen together with the assigned pair of codes. These will be mapped out into the 4x4 matrix schedule. The user is require to complete the challenge process given by the XY pattern like sc and cd that intersect the code uW. These patterns of code will be grouped to form the initial seed (i.e. scduW), and the center four (4) characters will be the final OTP codes.

In this approach, a new algorithmic OTP is applied to increase the level of security for users. It makes use of table sequence schedule send to user with successful advantage over the printed OTP mechanism like BINGO scheme.

B. Runtime performance
The algorithm fixed-length table schedule selected the number ranging from 1 to 4 in two separate randomization process. From the table schedule, each cell element has its own corresponding XY-axis coordinates.

Figure 5 shows the summary of randomly selected XY-axis values generated by the algorithm. The date, time, OTP codes, XY-axis and origin (value where XY-axis intersect---in order to complete the OTP codes) was provided as parameters in dealing with the simulation process.

<table>
<thead>
<tr>
<th>#</th>
<th>BINGO card scheme 1</th>
<th>BINGO card scheme 2</th>
<th>Proposed algo</th>
<th>BINGO card scheme 1</th>
<th>BINGO card scheme 2</th>
<th>Proposed algo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>825314765</td>
<td>D1-h;F1-W;C4-o</td>
<td>A8ai23</td>
<td>0.262</td>
<td>0.824</td>
<td>0.252</td>
</tr>
<tr>
<td>2</td>
<td>524414871</td>
<td>E3-w;F2-f;C5-c</td>
<td>S4gv59</td>
<td>0.239</td>
<td>0.829</td>
<td>0.088</td>
</tr>
<tr>
<td>3</td>
<td>518444774</td>
<td>D5-4;D3-T;E2-d</td>
<td>qOpiBJ</td>
<td>0.340</td>
<td>1.490</td>
<td>0.729</td>
</tr>
<tr>
<td>4</td>
<td>423364662</td>
<td>E3-k;B4-5;E3-k</td>
<td>s1EJ4</td>
<td>0.740</td>
<td>1.328</td>
<td>0.521</td>
</tr>
<tr>
<td>5</td>
<td>1327315669</td>
<td>A2-Y;E1-J;B2-b</td>
<td>Wun9vC</td>
<td>0.382</td>
<td>0.808</td>
<td>0.139</td>
</tr>
<tr>
<td>6</td>
<td>629454768</td>
<td>A3-t;B5-0;C5-W</td>
<td>wJMe7</td>
<td>0.501</td>
<td>0.698</td>
<td>0.861</td>
</tr>
<tr>
<td>7</td>
<td>1027355470</td>
<td>F4-0;C4-O;E5-D</td>
<td>57V3V5</td>
<td>0.704</td>
<td>0.926</td>
<td>0.093</td>
</tr>
<tr>
<td>8</td>
<td>1030414964</td>
<td>A4-c;B4-d;B5-m</td>
<td>H8yGoI</td>
<td>0.271</td>
<td>0.618</td>
<td>0.489</td>
</tr>
<tr>
<td>9</td>
<td>216434763</td>
<td>E5-y;C1-m;F1-M</td>
<td>E7r23</td>
<td>0.644</td>
<td>0.961</td>
<td>0.231</td>
</tr>
<tr>
<td>10</td>
<td>816345873</td>
<td>C4-C;E5-l;A2-d</td>
<td>EIsBF0</td>
<td>0.677</td>
<td>0.629</td>
<td>0.545</td>
</tr>
</tbody>
</table>

Average | 0.476 | 0.911 | 0.394
The result shows that the XY-axis coordinate 1:1 was never selected throughout the entire simulation of the algorithm. This was the consideration in the inception phase of the study as this will produce a redundant two-pair value which may be a possible hint for guess attack and an easy to obtain brute force attack. With the in-placed statements in the, XY-axis 1:1 will be bypassed from the selection. The deployment of this segment allows the generation of OTP values to be reliable, free from some form of attacks (like guess attack, dictionary and brute force attack) which is one of the primary goals of this study.

Table 1 shows the summary comparison of runtime performance between BINGO-like scheme and proposed OTP scheme. Same language was applied in the development of the scheme. The system was executed ten (10) times to record the time and computed the average.

As a result, the proposed OTP scheme recorded the fastest to generate the codes (0.394 msec) while 0.476 msec and 0.911 msec recorded for the BINGO-like scheme. The proposed OTP scheme produced a combination of numbers and characters (lowercase and uppercase letters) while the BINGO-like scheme generated numbers or single character only. With 0.517 msec difference, the proposed OTP scheme managed to generate somewhat complex OTP values compared with BINGO-like scheme.

V. CONCLUSIONS AND RECOMMENDATIONS

The new algorithmic OTP scheme provided a new level of security for users, it allows the pair of codes to be randomly generated and mapped out in matrix. It made use of XY schedule send to user with successful advantage over the other Bingo-like card scheme.

The results were conclusive that the proposed OTP authentication scheme proved to generate a randomize XY-axis taking advantage for OTP values to be complex. The effect of restriction in 1:1 value allowed the system to be free from brute force attack and dictionary attack.

The performance of the algorithm is conclusive that the proposed algorithm proved to be faster and posed advantage over traditional authentication and OTP printed scheme as this incurred cost in printing the OTP codes and limited key generation parameters.

VI. REFERENCES


Benedicto B. Balilo Jr., received the B.S. degree in Computer Science from Dynamic Computer Centrum, Legazpi City, Philippines in 1994. He is a recipient of BU-UC MIT offshore program under CHED FDP II scholarship grant earning his Master’s degree in Information Technology (MIT) in 2015 and Master in Business Administration from Aquinas University in 2012. Also, he earned units in Master in Information System in UPOU and Bachelor of Laws in Aquinas University, Legazpi City. He is a 3-termer Municipal Councilor of LGU Sto. Domingo, Albay from 1998-
2007 and former Regional BOD of PCL and NMYL of the Province of Albay. Currently, he is a recipient of CHED FDP II scholar for the program Doctor in Information Technology (DIT) at Technological Institute of the Philippines (TIP), Quezon City, Philippines. He is presently working his research in information security. He is a faculty member of Bicol University, Legazpi City, Philippines with a rank of Assistant Professor III. He is the PSITE (Bicol Region) Regional President and a member of Philippine e-Learning Society (PeLS), NMYL, PCL and Association for Computing Machine (ACM-Student).

Bobby D. Gerardo is currently the Vice President of Administration and Finance of West Visayas State University, Iloilo City, Philippines. His dissertation is “Discovering driving patterns using rule-based intelligent data mining agent (RiDAMA) in distributed insurance telematic system”. He has published 54 research papers in national and international journals and conferences. He is a referee of international conferences and journal publications in IEEE Transactions on Pattern Analysis and Machine Intelligence and IEEE Transactions on Knowledge and Data Engineering. He is interested in the following research fields: distributed systems, telematics systems, CORBA, data mining, web services, ubiquitous computing and mobile communications.

Dr. Gerardo is a recipient CHED Republica Award in National Science Category (ICT field) in 2010. His paper entitled “SMS-based automatic billing system of household power consumption based on active experts messaging” was awarded best paper on December 2011 in Jeju, Korea. Another best paper award for his paper was “Intelligent decision support using rule-based agent for distributed telematics systems,” presented at the Asia Pacific International Conference on Information Science and Technology, on December 18, 2008. An excellent paper award was given for his paper “Principal component analysis mechanism for association rule mining,” on Korean Society of Internet Information’s (KSII) 2004 Autumn Conference on November 5, 2004. He was given a university researcher award by West Visayas State University in 2005.

Ruju P. Medina is Dean of the Graduate Programs and concurrent Chair of the Environmental and Sanitary Engineering Program of the Technological Institute of the Philippines in Quezon City. He holds a Ph.D. in Environmental Engineering from the University of the Philippines with sandwich program at the University of Houston, Texas where he worked on the synthesis of nanocomposite materials. He finished his MS in Environmental Engineering from the Mapúa Institute of Technology, graduating Summa Cum Laude. He obtained his Bachelor’s degree in Chemical Engineering from the University of the Philippines in Diliman, Quezon City. His research interests include urban mining, electronic wastes, and nanomaterials. He counts among his expertise environmental modeling and mathematical modeling using multivariate analysis.
The impact of hill training on middle and long distance athletes: with specific reference to oromia water works athletics club, Ethiopia

Nigatu worku and Dr. Aschenaki Taddese

* Nigatu worku, Addis Ababa University, Ethiopia
** Dr. Aschenaki Taddese, Addis Ababa University, Ethiopia

Abstract- The purpose of this study was to investigate the effect of 12 weeks hill training on the performance of middle and long distance athletes. The study used a longitudinal and controlled quasi experimental design. To test the hypotheses pre and post filed tests were conducted on VO₂ max, Resting heart rate, SE, race performance improvement, consistency of the improved performance and status of injury. Thirty two athletes divided randomly in to control and experimental group (n=32;18.8 ±3 years, 51.3 ± 5.2 kg, 1.68 ± 0.05 m) and passed through 12 week of intervention with two session of 40’ - 60’ hill workout a week to the commutative of 16 - 24 hours. During week 0, 6, 12 each subject complete three assessment testses, two records and additional three tests for experimental group at week 16, to assess the consistency of performance. Although the subjects were similar in all aspects prior to the pre-test was performed;12 minute cooper test (VO₂ max ), resting heart rate (mean of three 15 sec. Rhr. count x 4), speed endurance (300 m anaerobic threshold test), race time records (from 4th to 16th weeks) and injury report records (from 2nd to 12th week) were administrated. The intervention group show significant improvement in VO₂ max, resting heart rate, speed endurance at week 6 (p=0.00, α=0.05) and 12 (p=0.00, α=0.05) and race time but the developed performance at week 16 have showed insignificant change. The control group showed insignificant change at either time points. There were no significant change in injury records between and within groups (p=0.381, α=0.05). The study demonstrated that 12 week of hill training can significantly improve VO₂ max, Rhr., speed endurance and race performance in club level middle and long distance athletes and the developed performance is consistent over four week period and hill training by itself was not cause of athletic injury.

Index Terms- hill training, Vo2 max, Resting heart rate and speed endurance

I. RESEARCH DESIGN AND METHOD

Quasi experimental design was used to investigate the effects of 12 week hill training intervention on endurance, speed endurance, VO₂ max and resting heart rate was applied in club level middle and distance runner (800m – 10,000m). A two group repeated measures (pre - during - and post-test) design was used. After eight weeks of off-season, subjects were randomly divided in to two groups. The two group consists of intervention group (endurance and hill training group n= 16; 18.8 ± 3 years, 51.3 ± 5.2kg, 1.68 ± 0.05m) and control group (only endurance training n = 16; 19 years, 52+1.3kg, 1.69 ± 0.03m). Prior to the start of the research all athletes and coaches were instructed not to deviate from their normal (800m - 10000m) endurance training. It is known that the control group did not employ any strength training as a part of their normal training program. The endurance training volume and intensity was controlled.

In addition to the endurance training, hill training was given twice per week thought out the study period (week 1 - 12). All the hill training sessions were provided by experienced coaches of the club.

II. SAMPLE AND SAMPLING TECHNIQUE

Thirty six competitive club level distance athletes (800m - 10,000m) participated in this study. However, due to the selection for national and international cross country competition, thirty two subjects (n = 16; 16; 18.8 ± 3 years, 51.3 ± 5.2 kg, 1.68 ± 0.05m as experimental) and (n = 16; 19 years, 52± 1.3kg, 1.69 ± 0.03m as a control group) completed the study. The preliminary information assures that the subject didn't have any strength training with in the past five month (July – November 2016). All subject were taken from Oromia water works sport club.

III. DATA COLLECTION INSTRUMENTS

During week (0, 6, 12) each subject completed two assessment days. VO₂ max, speed, and endurance. Resting heart rate taken at one of the days early in the morning while all subjects were on their bed. All VO₂ max, speed endurance and resting heart rate were under taken at the same time and date to avoid diurnal variation on the performance. There were 48 hours between each testing days.
To control the effects of diet and physical readiness, each subject was asked to consume habitual diets and avoid vigorous exercise 24 hours prior to assessments. For resting heart rate assessment subjects were oriented to stay on their bed until their heart rate count was conducted.

### Table 1. Dependent Variables and their Respective Tests

<table>
<thead>
<tr>
<th>No</th>
<th>Criterion Variables</th>
<th>Test Item</th>
<th>Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cardio-respiratory Endurance (VO₂ max)</td>
<td>Cooper’s 12 minutes Run</td>
<td>Meters /12min</td>
</tr>
<tr>
<td>2.</td>
<td>Resting Heart rate</td>
<td>Heart beat per minute</td>
<td>Beat/minute</td>
</tr>
<tr>
<td>3.</td>
<td>Speed endurance</td>
<td>300m anaerobic threshold</td>
<td>Second</td>
</tr>
<tr>
<td>4.</td>
<td>Race performance</td>
<td>Race performance records</td>
<td>Meter/second</td>
</tr>
<tr>
<td>5.</td>
<td>Acquired performance consistency</td>
<td>Tests comparison</td>
<td>-</td>
</tr>
</tbody>
</table>

### IV. DATA ANALYSIS

The collected data in this study was analyzed depending on the type of data collected. First, data from pre, during and post-test results of the experimental group was analyzed to see whether the athletes attended in planned and implemented hill training program improved their performance or not. Second, data from the Control group test was analyzed to compare and verify the validity of hill training method, if it brought significant impact on the improvement and consistency of the long distance athletes’ performance. The study was also measured whether hill training helped athletes to maintain their performance for longer duration or not. Finally, data recorded for injury report was analyzed to check if hill training minimized the risks of athletics injuries. Independent variables were defined in terms of the different interventions (experimental vs. control) and the three measurement points (pre-test vs. mid-test vs. post-test). All data set were presented as mean ± standard deviation or percentage change. Descriptive (percentage, average, mean and median) and inferential statistics (graph, histogram and bar charts) was used to analyze the club’s variation and performance change within and between athletes. To test for differences between groups at week zero, an independent t-test was used. For each group, measurement values are recorded at before, during and after. Experimental training method and difference between groups compared using a one-way repeated measure ANOVA was used. The level of significance was set at P ≤ 0.05. IBM SPSS Statistics version 20 software was used for all statistical analysis.

**The importance of hill training methods on improvement of athletes VO2 Max level.**

The mean weight value of subjects of normal training method (control) of this study was 51ml/kg/m and the mean distance was 3573m before test was conducted. Similar pre measurement was found for treatment group with hill training, which was almost equivalent figure, was recorded. Although the subjects were similar in all aspects prior to the test was performed, significant difference in VO₂ max was resulted after hill training was systematically applied. Hill training was measured after it was implemented in three methodological periods and the initial value of athletes were different (p=0.00, α=0.05).

**Figure 1. VO2 max value with respective distance covered during four tests**

Vo2 max show progressive increment during the intervention and slight decrease four week after intervention.
A. Distance value for all tests; B. VO$_2$ max value of all tests of the hill training groups.

![Graph A](image1.png) ![Graph B](image2.png)

**Figure 2: the pre-test value of distance covered for VO$_2$ max test and VO$_2$ max value**

The hill training group showed significant improvement and the control group has showed insignificant change which indicates that hill training has positive effect on the improvement of VO$_2$ max value.

**Table: T-test for testing the difference in VO$_2$ max among groups**

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VO$_2$ pre test</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>4.500</td>
<td>1</td>
<td>4.50</td>
<td>.67</td>
<td>.41</td>
</tr>
<tr>
<td>Within Groups</td>
<td>199.37</td>
<td>30</td>
<td>6.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>203.87</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VO$_2$ test2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>180.50</td>
<td>1</td>
<td>180.50</td>
<td>20.48</td>
<td>.00</td>
</tr>
<tr>
<td>Within Groups</td>
<td>264.37</td>
<td>30</td>
<td>8.813</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>444.87</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis of paired t-test shows that there was significant progress ($p=0.00$, $\alpha=0.05$) in the attainment of VO$_2$ max in hill training from than normal method.
All of the subjects in treatment group were seen showing change in first post test and middle stage test. The test for attainment of the improved VO2 max shows there is consistency of VO2 max value. The VO2 max value of the control group show similar result.

Table 3: Paired Samples Test to analysis the progressive improvement of VO2 max in the treatment group

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1 vo2 pre test - vo2 test1</td>
<td>2.750</td>
<td>1.342</td>
<td>.335</td>
<td>-.3465</td>
<td>-2.035</td>
<td>8.199</td>
</tr>
<tr>
<td>Pair 2 vo2 test2 - vo2 test3</td>
<td>.625</td>
<td>.500</td>
<td>.125</td>
<td>.359</td>
<td>.891</td>
<td>5.000</td>
</tr>
<tr>
<td>Pair 3 vo2 test1 - vo2 test2</td>
<td>1.500</td>
<td>1.211</td>
<td>.303</td>
<td>-.2145</td>
<td>-.855</td>
<td>4.954</td>
</tr>
</tbody>
</table>

The impact of hill training on the resting heart rate of the athletes

Similar to VO2 max The magnitude of resting heart rate was similar in all athletes of the study. Although after hill training was implemented and tested there was a significant change for experimental subjects (p=0.00, α=0.05) while no change was recorded when measurement of the heart rate checked for normal groups without the hill training implemented (p=0.141, α=0.05).
Table 4: Independent Samples Test to analysis the change in resting heart rate

<table>
<thead>
<tr>
<th></th>
<th>t</th>
<th>D</th>
<th>Sig.</th>
<th>Mean</th>
<th>Std.error</th>
<th>95% confidence</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre Rhr.</td>
<td>1.510</td>
<td>30</td>
<td>.141</td>
<td>1.381</td>
<td>.952</td>
<td>-506</td>
<td>3.381</td>
<td></td>
</tr>
<tr>
<td>Post Rhr. 2</td>
<td>9.222</td>
<td>30</td>
<td>.00</td>
<td>-9.938</td>
<td>.969</td>
<td>-10.917</td>
<td>-6.958</td>
<td></td>
</tr>
</tbody>
</table>

The hill training method improves the resting heart rate even after a few training sessions and the progress is evident from the table below, which depicts complete transformation of the athletes physiological stability and better condition through every stage of the test conducted.

Table 5: Paired Samples Test of step wise tests for checking impact of hill training method on resting heart rate of athletes of different event

<table>
<thead>
<tr>
<th></th>
<th>Paired Differences</th>
<th>t</th>
<th>df</th>
<th>Sig. (2tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Std. Deviation</td>
<td>Std. Error Mean</td>
<td>95% Confidence Interval of the Mean</td>
</tr>
<tr>
<td>Pair 1</td>
<td>pre RHR - Post 2 RHR</td>
<td>8.813</td>
<td>5.767</td>
<td>1.019</td>
</tr>
<tr>
<td>Pair 2</td>
<td>Post 1 RHR - Post 3 RHR</td>
<td>8.688</td>
<td>3.459</td>
<td>.865</td>
</tr>
</tbody>
</table>

Resting heart rate

Resting heart rate value have no difference before the intervention, but the hill training group result show 21% decreases in count values while the control group change only 6% which was very little. This result indicates that resting heart rate improved with hill training method.
Significance of hill training on the improvement of speed endurance

The data from pre test shows that athletes were not different in their speed endurance. This pattern was completely inverted when the groups were treated in different training technique, the group with hill training workout showed significant upgrade in the speed endurance they scored before. But for the athletes in normal training techniques were show no difference that means they only attain their pre tested speed.

Table 6: Pre hill workout test showing the level of variation among groups of training experiment

<table>
<thead>
<tr>
<th></th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t</td>
</tr>
<tr>
<td>Pre. Speed End.</td>
<td>.65</td>
</tr>
</tbody>
</table>

The value of speed endurance test show progressive decrease, in the same manner resting heart rate improved significantly during and after intervention. The resting heart rate and speed endurance show direct relation in this study.
The tests among the experimental group to check if there is progressive improvement showed significant change in all test stages (table 12).

The influence of hill training on the race performance of the athletes
Data was used to predict the persistence of the performance attainment after hill training was used as a new improved system of coaching. Performance prediction showed that the effectiveness of hill training in boosting physiology and race performance of an athlete. Although it is true for any method of training, hill training should be used systematically to keep up with the rate of change.

The hill training (experimental groups) have shown a significant decrease in their race time. The result indicate that all athletes improve their race time significantly after the intervention. As seen on (figure 6) the post result of experimental group indicate dramatic change in race performance while the control group show little change in race performance.

**Consistency of acquired performance**

The result indicates that physiological and physical quality of the athletes have improved by hill training program given in 12 weeks of intervention and additional test was conducted to see the consistency of the developed performance. This was evident from the result in increased mean frequency value, where the distribution of test measurements for different parameters are indicated high for all subjects and test conducted (Figure 7 A, B. speed endurance value during intervention show 41.5± 2 and after four week 42.4± 1.9 which show the values were found similar four week after hill method. This change in performance were found consistent . In the same manner the vo2 max level of the tests during the intervention and four week after the intervention have been compared and show insignificant change(figur 7 C, D the VO2 max value during intervention shows the mean value 73 ± 3.4 and the test result after four week also show similar mean value 72.4 ±3.3). this result show the consistency in vo2 max level. In addition the heart rate value was computed by its during and after four week test value which similarly show insignificant difference (Figure 7, E,F  General the result of all the three performance indicative variables have shown similarly insignificant change value which lead us to conclude that the performance of the athletes showed consistency.
Figure 7: The impact of hill training on performance consistency

Implication of hill training on the risks of athletic injuries
Table 9: Athletes injury report result

<table>
<thead>
<tr>
<th>INJURY REPORT</th>
<th>No of athletes</th>
<th>Injury re difference</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>16</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Control</td>
<td>16</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>6</td>
<td>26</td>
</tr>
</tbody>
</table>

This research found that the presence of hill training is not a cause of athlete injury. Analysis of variance for injury resulted insignificant deference (12.5% and 25%) among treatment and control subjects respectively.

![Figure 8: Comparison of injury report of the groups](image)

The study shows that hill training has no significant effect on the athletic risks of injury. There is no change is observed on experimental group that indicate carefully planed and implemented hill training could not be the cause of athletic injury.

V. DISCUSSION

The aim of this study was to investigate the effect of a twelve week hill training intervention on key physiological and physical performance indicators, vo2 max, resting heart rate, speed endurance, race performance, the consistency of the developed performance and status of athletic injury in competitive club level middle and long distance runners. The main finding of this study was that hill training can significantly improve vo2 max, Rhr, speed endurance, race performance and the finding also show that the is the consistency of developed performance over 4 week period in competitive distance runners. Interestingly, the improvements in VO2 max, speed endurance and race performance were attained without significant changes in risks of athletic injury status. These results strongly support the application of hill training on the distance running athletes; demonstrating that to optimize endurance performance, strength training should be a vital component in the physical preparation of distance runners.

Vo2 max: - The maximal oxygen uptake (VO2max) has been suggested to be the single most important physiological capacity in determining endurance running performance. Radovanovic (2009) define Vo2 max as one of the most objective measures that can be used to assess aerobic or cardio-respiratory endurance is maximum oxygen consumption. The VO2max value is a direct indicator of the ability to supply the energy for muscle contractions during the process of anaerobic exercise.

Athletes can generally improve their absolute VO2max values by 15 to 20% and their relative values by 20 to 40% (Maglischo, 2003). A high VO2 max is indicative of an enhanced ability of the aerobic systems to provide energy to the working muscle.
As explained by Beattie (2014), VO2max and resting heart rate are accepted as the two most important performance indicators for distance running. The enhancement in VO2max may therefore have been related to an increased training intensity rather than an increase in training volume (Midgley et al., 2007) and Shaw (2014) showed that VO2 max represents the ability of a runner to translate energy production at a cellular level into running locomotion. An economical runner will use less energy for a given workload and spare vital reserves for maximal and supra-maximal stages of competition (i.e. a sprint finish). In this study, the hill training group displayed a significant (p=0.000, α=0.05) improvement in VO2 max from week 0 to week 12. These improvements in VO2 max occurred with additional significant improvements on resting heart rate. The control group showed no significant (p= 0.41, α=0.05) change in VO2 max throughout the 12 weeks.

Resting heart rate: - RHR is dictated by a complexity of factors such as volume and intensity of endurance training, nutrition and environment (Barnes, 2015). These results are evidence for effect of the application of hill training on the distance running athlete of various events; explains that to optimism race performance, hill training could be an optional method in the physical preparation of athletes for competition.

RHR represents the ability of a runner to translate energy production at a cellular level into running locomotion. It is better achieved by a systematic use of training methods such as hill workouts. This effect of hill training method can be maximized through management of intensity of endurance training. In this study, the effect of hill training in all event and in all test scenario of test group displayed a significant change for experimental subjects (p=0.00, α=0.05) improvement and showed considerable consistency while insignificant change(p=0.141,α=0.05) was recorded when measurement of the heart rate checked for normal groups without the hill training.

Speed endurance: - Hill running is 'speed work in disguise'. It can be used in place of grueling track workouts to improve your anaerobic efficiency (Jack Daniels,1998, pg. 179), it is almost as effective in building aerobic power as track interval training and by improving VO2 max, boost running economy and buffer anaerobic (Lactate) threshold significantly improve speed endurance. Many scientific studies indicate that the lactate threshold (anaerobic threshold) is one of the best predictors of distance running performance. A faster threshold speed indicates that the athlete may perform at this speed for a fairly long period of time (possibly up to a marathon) without experiencing undue fatigue. It was found that when highly-trained distance runners added a weekly 20 min run at the lactate threshold the speed at which the threshold was reached increased after 14 weeks of such training (Sjodin et al.,1982).

Speed endurance and VO2max have strong associations with both middle- (r = 0.71) (Ingham, 2008) and long-distance (r = 0.89 – 0.94) (Noakes,1990) performance in elite running populations. These relationships are most likely due to vVO2 max & speed improving VO2 max, boost running economy and buffer anaerobic (Lactate) threshold significantly improve speed endurance. Many scientific studies indicate that the lactate threshold (anaerobic threshold) is one of the best predictors of distance running performance. A faster threshold speed indicates that the athlete may perform at this speed for a fairly long period of time (possibly up to a marathon) without experiencing undue fatigue. It was found that when highly-trained distance runners added a weekly 20 min run at the lactate threshold the speed at which the threshold was reached increased after 14 weeks of such training (Sjodin et al.,1982).

Speed endurance and VO2max have strong associations with both middle- (r = 0.71) (Ingham, 2008) and long-distance (r = 0.89 – 0.94) (Noakes,1990) performance in elite running populations. These relationships are most likely due to vVO2 max & speed improving VO2 max, boost running economy and buffer anaerobic (Lactate) threshold significantly improve speed endurance. Many scientific studies indicate that the lactate threshold (anaerobic threshold) is one of the best predictors of distance running performance. A faster threshold speed indicates that the athlete may perform at this speed for a fairly long period of time (possibly up to a marathon) without experiencing undue fatigue. It was found that when highly-trained distance runners added a weekly 20 min run at the lactate threshold the speed at which the threshold was reached increased after 14 weeks of such training (Sjodin et al.,1982).

Speed endurance and VO2max have strong associations with both middle- (r = 0.71) (Ingham, 2008) and long-distance (r = 0.89 – 0.94) (Noakes,1990) performance in elite running populations. These relationships are most likely due to vVO2 max & speed improving VO2 max, boost running economy and buffer anaerobic (Lactate) threshold significantly improve speed endurance. Many scientific studies indicate that the lactate threshold (anaerobic threshold) is one of the best predictors of distance running performance. A faster threshold speed indicates that the athlete may perform at this speed for a fairly long period of time (possibly up to a marathon) without experiencing undue fatigue. It was found that when highly-trained distance runners added a weekly 20 min run at the lactate threshold the speed at which the threshold was reached increased after 14 weeks of such training (Sjodin et al.,1982).

Reduction of risk of injury: The improvement of VO2 max, strength, speed endurance, vVO2 max and running economy results on significant improvement on race performance and it was consistent with proper training and follow up method. This study showed that hill training have insignificant effects on the risks of athletics injury which is 12.5% or 2 athletes out of 16 for the experimental group while 25% or 4 athletes out of 16 report injury. From this result it is possible to conclude that hill training was not the cause for athletic injury specially achilis tendon , heel knee and hamstring so it could not be the fear for coaches to include hill training in their training plan and provide for their athletes.

VI. Summary

The main finding of this study demonstrated that 12 weeks of hill training can significantly improve speed endurance qualities, as well as physiological markers of resting heart rate and VO2max ability of club level distance runners. Therefore, the research hypotheses significant changes in VO2 max, resting heart rate, speed endurance, race performance and consistency of performance is accepted; the research hypothesis for a reduction of athletic injury status is rejected. Interestingly, the improvements in speed endurance were attained without significant changes in risks of injury. A significant improvement was gained through the 12 week period, and it maintained over four week period as programming shifted towards hill free training. However, within the control group, physiological, physical and important strength quality of running remain unchanged throughout the study period. Upon consideration of the limitations of current research, I believe that if more quantitative scientific research proved the effectiveness of the current training methods, it could be used for the country level. This study showed that in distance runners those who do not perform strength training, hill training can be considered as solution, especially club level coaches should consider including hill workouts in their training method. More over for distance runners who are already on pick may need to place a greater emphasis on keeping the performance consistence. A general strength orientated hill training program is an appropriate and efficient method for improving both strength and speed endurance ability in distance runners. Well planned hill training program can significantly improve VO2 max, resting heart rate, speed endurance and race performance of middle and long distance athletes. Hill training has no negative effect on the risks of athletic injury. To enhance the performance of middle and long distance events athletes, the coaches have to include hill training workouts in their training plan. Hill is not the cause of athletic injury.
REFERENCES


AUTHORS

**First Author** – Nigatu worku, Addis Ababa University, Ethiopia
**Second Author** – Dr. Aschenaki Taddese, Addis Ababa University, Ethiopia
Good Governance of Sport Organizations: With Special Reference to Ministry of Sports, Colombo, Sri Lanka

Imalka Madhushani, Chamila Wijethisa

Lecturer, Department of Sport Science and Physical Education, University of Kelaniya

Abstract- This particular study titled “Good Governance of Sport Organizations: With Special Reference to Ministry of Sports, Colombo, Sri Lanka”. Governance is a critical component of the effective management of any type organization in the world. The purpose of the study is to identify the perception and awareness about good governance of sport organizations in Sri Lanka. This study was thoroughly undertaken by the researchers by focusing on the problem, what are the attitudes of sports dispositions who are responsible for develop sports activities, to implementing good governance in the particular organization. The qualitative research approach has used in this study. The deliberate sampling method used to select sample area and sample has selected through the Multi Stage Sampling methods. Basically, semi structured interview method used to collect data from each personalities in selected organization. Five elements emerged in response to the question about what constitutes good governance such as voice & accountability, political stability & lack of violence, effectiveness, corruption and rule of law. The analysis has done by using Atlas.ti qualitative data analysis software and analyzed data was presented through the network analysis. The findings have mentioned that there is lack of awareness about good governance of particular sample and employer's attitudes are different about implementing good governance of sport organizations in Sri Lanka.

Index Terms- Sport Organization, Good Governance

I. INTRODUCTION

All organizations have a management structure which can determine relationship between the different responsibilities and authority to carry out different tasks. The relation between organizational theory and sports has usually presented sports as an interesting field in which to illustrate organizational phenomena(Gómez, Opazo, &Martí, 2008). “A sport organization is a social entity involved in the sport industry; it is goal-directed, with a consciously structured activity system and a relatively identifiable boundary” (Slack, 1997, p. 5). Governance research attracts attention of researchers both in corporate and in nonprofit sector and the importance of governance issues is perceived in sport [organization] (Cornforth, 2012, Speckbacher, 2008). The National sport organizations (NSOs) play a significant role for sport in every country. They are the highest authorities representing any particular sport in their countries with large impact (Král, 2014). NSOs are responsible for the rules of a particular sport, state sport representation, redistribution of public resources to sport, and the development of sport. The role of NSOs slightly differs in particular countries but their governance structure is the same in all countries (Hums and MacLean, 2009). Governance has been variously defined as “the management of society by the people”, Albrow, M. (2001) “the exercise of authority or control to manage a country’s affairs and resources”, Schneider, H. (1999) or as a complex system of interactions among structures, traditions, functions (responsibilities) and processes (practices) characterized by three key values of accountability, transparency and participation. Good governance relies on good board management, and transparent and open board elections, resulting in an appropriate mix of professionals with specialized governance skills and those who represent specialized interests in the organization (Brown 2002).

There is a considerable body of literature examining governance in sporting organizations (Zink, Shaw, & Lynch, 2015) has huge gap to fulfill in every country. In considering the Sri Lankan Context, has identified that there is a lack of leadership across the administration sector, and strengthening governance is seen as one way to strengthen leadership. Therefore, this study aims to address this gap by illustrating the governance mapping in particular organizations.

Basically, this research has examined current situation of good governance in sport industry Sri Lanka. Moreover the researcher took better knowledge about Cornforth’s seven governance theory to identify the each governance classification of the organization to develop governance structures and give insight into the relationship between governance and leadership within these organizations. The purpose of this paper is to demonstrate, through the lens of governance, how to create the governance mapping through the perception about good governance of particular personalities in national sport organizations in Sri Lanka

II. LITERATURE REVIEW

Davies (2007, 48) defines governance as ‘the processes and mechanisms for coordinating activities’. This definition is useful because it refers to the mechanisms of governance, such as ensuring governance boards are well organized, with good record keeping, induction and succession policies. Davies’ (2007) definition also refers to the processes or the ‘doing’ of governance, such as policy-making, engagement with stakeholders and monitoring changes in the social and political environment.

Despite the importance of governance ((Zink, Shaw, & Lynch, 2015)), Wells (2012) notes that despite the widespread
recognition that non-profit organizations need to be well governed, the principles of good governance are largely drawn from the corporate sector. Fighting corruption, raising accountability and promoting transparency are increasingly perceived as being indispensable to the notion of good governance. (Roberts, 2010).

Despite the lack of studies has been noticed in many papers, there has not been done much research in the area of governance structure (Král, 2014) There is no universal framework how to analyse or describe governance structure. In general, governance structure is a part of organizational structure and thus, elementary dimension of organizational structure may be applied (Daft, 2010, Robbins and Coulter, 2004, Slack and Parent, 2006).

The complexity of this sector raises questions about which governance models might be appropriate to enable organizations to fulfill their mandate. Cornforth (2003) presents a useful overview of seven governance theories of the most commonly used governance practices in non-profit organizations. The researcher has used this overview to frame this study as it enabled us to organize the data and provided a analysis of the governance practices of the organizations in this study.

III. METHODOLOGY

“Policy-oriented research is designed to inform or understand one or more aspects of the public and social policy process, including decision making and policy formulation, implementation, and evaluation” (Seadle, 2010). A study tends to be policy oriented research using qualitative research approach. In this study the researcher has used deliberate sampling method due to reason of method involves purposive or deliberate selection of particular units of the universe for constituting a sample which represents the universe (Kothari, 2004). In addition the researcher has used the Multi Stage Sampling methods for purpose of the interview particular sample. The sample community represent different, population in accordance their employee level diverse. Sample community had been selected from ministry of sports in Sri Lanka, and it divided to main divers as Top, Middle and Low levels. “Both secondary (literature review and desk research) and primary data were gathered”[for this study] (Oshani & Wijethissa, 2015). This study was used interview, as a main techniques to gather data. This method of collecting data is usually carried out in a structured way where output depends upon the ability of the interviewer to a large extent (Seadle, 2010). When using semi-structured interviews, the researcher may encourage an informal conversation covering certain themes and questions (Seadle, 2010). These questions may vary from one interview to the next, and the order in which questions are asked may vary also. Research questions were aimed to get the data about how is the governance in sport organizations and how are the employees understanding the governance process. The interview guide consist seventeen semi structured interview questions to catch out employer’s attitude about implementing good governance of sport organizations. The interview questions were design accurately to identify the voice & accountable, political stability/lack of violence, effectiveness, corruption, rule of law. Basically, the researcher has used the coding method which was developed based on the Coding Manual for Qualitative Researchers, to process the data which was collected through the interviews. The interview tapes were professionally transcribed and reviewed for accuracy and transcribed data were transference in to coding sheet which developed by researcher. The coding was both focused (using the initial code scheme) and open (allowing themes to emerge from the data). One set (included 30 coding sheet) was nominated as TRS1 (transcribed set 01) and other set nominated TRS2 (transcribe set 02). At the end of coding scheme the researcher collected all coded transcripts such as TRS01 and TRS 02 for comparison and review. The codes for each transcript were compared and discussed if there was a difference of opinion between the two researchers. Afterwards transcripts were reviewed additional codes were noted and shared with the two researchers. Then coded data corrected as needed. According to the Mp3 format Audio tape interview (without Transcribed) were imported to Atlas ti qualitative data analysis software for coding data by using software. In this stage researcher were adapted so called procedure (manual coding) to organize data around the concept by using software. Software was used to create super codes and families. The codes were scanned again, this time to search for patterns within codes. The analysis parts of this study have been done by using Atlas ti qualitative data analysis software. Analyzed data was presented in network view to identify the perception of good governance and it categories of particular sample.

The review of literature provides various theoretical arguments to form the basis of the research. According to the literature review the conceptual model has taken, five independent variables and one independent variable. Having taken the relationship between those variables and dependent variable into account, the following conceptual model was constructed.

The results shows three types of data through the analysis in this study. Basically the research has done the demographic analysis to find out employees demographic factors. Second type of data analysis was identifying the good governance by level wise employers of sport organizations. Third type of data analysis was the implementing good governance according to employers ‘attitudes of sport organizations.

According to the data, there were 8 male participants and 4 female participants included in this study. In general 16.66% participants were low than 30 years old, 25% participants were between 31-40 age group, 25% participants were between 41-50 age group and 33.33% participants were more than 50 years . According to the education level of the participants, 50% of sample have university degree, 8.33% of Diploma level, and 41.66% in secondary level. In considering the service period of the sample, 41.66% of the sample have service period between 10 years, 13.3% percent of the sample have service period between 11-20 years, 16.66% percent of the sample have service period between 21-30 years, 25% percent of the sample have more than 31 years’ service period.

In the second part of the analysis, the researcher focused to identify the perception about good governance among three levels of employees in particular sport organization. According to that the top level employees, two respondents were identifying correctly good governance and also two respondents were not identifying the concept of good governance. The most of middle level employees, were identified the concept of good governance.
A respondent couldn’t tell that what the concept of good governance is. All of respondents of low level do not know about good governance and no one before learnt concept of good governance.

In the third part, the researcher selected several factors to identify the implementing good governance according to employers’ attitude of sport organizations. The researcher in this study identified five main factors that influence organizational good governance such voice and accountable, political stability/lack of violence, effectiveness, anti-corruption, rule of low. According to quantitative analysis of this parts the top level employers have positive attitude to implement good governance in this organization based on five particular main factors.

In the third part, the researcher selected several factors to identify the implementing good governance according to employers’ attitude of sport organizations. The researcher in this study identified five main factors that influence organizational good governance such voice and accountable, political stability/lack of violence, effectiveness, anti-corruption, rule of low. According to quantitative analysis of this parts the top level employers have positive attitude to implement good governance in this organization based on five particular main factors.

According to attitude of middle level employee’s implementing good governance is most times make negative effects in organization. The network view of these factors was shown below in figure 2.

According to attitude of low level employee’s implementing good governance is most times make positive effects in organization. The network view of these factors was shown below in figure 3.
Figure 1: Identify the Good Governance by employers of Sport Organizations

Source: Survey data (2015)
Figure 2: Top level employees attitude of implementing good governance.

Source: Survey data (2015)
Figure 3: Middle level employees attitude of implementing good governance.
IV. FINDINGS AND CONCLUSION

According to the findings, the Top, Middle & Low level employers haven’t same knowledge about good governance of sport organizations in Sri Lanka. Basically, Middle level is the most conscious level about good governance of sport organizations in Sri Lanka. Furthermore, Low level is the lowest conscious level about good governance of sport organizations in Sri Lanka. According to top level employee’s attitudes for all affective factors of good governance such as voice & accountable, political stability/lack of violence, effectiveness, anti-corruption and rule of low implementing as positively sport organizations in Sri Lanka.

According to middle level employee’s attitudes for some affective factors of good governance such as political stability/lack of violence and anti-corruption implementing as positively and some affective factors of good governance such as voice & accountable and effectiveness implementing as negatively, the rule of low also not implementing correctly sport organizations in Sri Lanka. According to low level employee’s attitudes for some affective factors of good governance such as political stability/lack of violence, effectiveness, anti-corruption and rule of low implementing as positively and one of affective factor of good governance such as voice & accountable implementing as negatively sport organizations in Sri Lanka. Consideration of study findings it can be said that Top, Middle & Low level employers haven’t same knowledge about good governance of sport organizations in Sri Lanka and Top, Middle & Low level employers attitudes are different about implementing good governance of sport organizations in Sri Lanka.

REFERENCES


www.ijsrp.org


AUTHORS
First Author – Imalka Madhushani, Lecturer, Department of Sport Science and Physical Education, University of Kelaniya
Second Author – Chamila Wijethissa, Lecturer, Department of Sport Science and Physical Education, University of Kelaniya, chawijethissa@gmail.com
Prevalence of Lower Urinary Tract Symptoms (LUTS) among general population of Central Sri Lanka.

AUB Pethiyagoda*, K Pethiyagoda**

*Department of Surgery, Faculty of Medicine, University of Peradeniya, Sri Lanka
**Department of Community Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka

Abstract - The International Prostate Symptom Score (IPSS) and uroflowmetry are routine investigations used by urologists in the assessment of LUTS. The aim of this study is to assess the prevalence of LUTS among general population of Central Sri Lanka. A descriptive cross-sectional study consisted of patients who attended the Out Patient Department (OPD), Teaching hospital Peradeniya Sri Lanka, who did not complain of urinary symptoms. In our study population most common lower urinary tract symptoms were urgency and nocturia. Least common symptom was straining. The average value of total IPSS was 2.12. Hence, the general population of Sri Lanka is having mild LUTS.

Index items - Lower Urinary Tract Symptoms (LUTS), International Prostate Symptom Score (IPSS), uroflowmetry,

I. INTRODUCTION

Lower urinary tract symptoms (LUTS) are a quiet common medical problem, with the increase in elderly population, it affects the quality of life of elderly people considerably. (1)

The symptoms can be categorized into two types such as storage or irritative symptoms and voiding or obstructive symptoms. Storage or irritative symptoms such as increased frequency of urination, urgency of urination, painful urination and excessive passage of urine after retiring to bed in the night (nocturia). Voiding or obstructive symptoms such as poor stream (not improved by straining), hesitancy (worsened if bladder is very full), terminal dribbling, incomplete voiding, overflow incontinence (occurs in chronic retention) and episodes of near retention. (2)

The causes such as benign prostatic hyperplasia (BPH) with bladder outflow tract obstruction (BOO), detrusor muscle weakness and/or instability, Urinary tract infection (UTI), chronic prostatitis, urethral stricture, urinary stones, Malignancy: prostate or bladder, neurological disease (e.g. multiple sclerosis, spinal cord injury, cauda equina syndrome) and IgG4-related prostatitis. (3)

The International Prostate Symptom Score (IPSS) and uroflowmetry are routine investigations used by urologists in the assessment of LUTS. IPSS is an internationally used questionnaire to assess severity of LUTS. (4) The scale for each symptom ranges from zero (symptom never present) to five (symptom always present). The seven symptoms are incomplete emptying, frequency, intermittency, urgency, weak stream, hesitancy and nocturia. (5)

Uroflowmetry has become a universal investigation that affords urologists a simple and non-invasive way of measuring and recording the urinary flow rate throughout micturition. (6)

According to the literature the association of LUTS and its significant impact of quality of life shows that higher the physical activities and higher the education level the prevalence of LUTS is lower. (6) The Long-term physical activity such as an occupation of an individual has a major influence on risk factors of lower urinary tract symptoms. (7) As an example; a cross-sectional representative sample of 30,377 men 45 to 79 years old in Central Sweden who completed a self-administered life-style questionnaire, including International Prostate Symptom Score questions, physical activity currently and recalled at age 30 years (work/occupation, walking, inactivity and exercise) and demographic data. A total of 6,905 men (23%) who scored 8 or more points on International Prostate Symptom Score questions were considered to have moderate or severe lower urinary tract symptoms. The results suggest that physical activity in young and late adulthood may be associated with a lower risk of moderate and severe lower urinary tract symptoms. (8) Hence there should be a relationship between the occupation and LUTS.
II. PATIENTS AND METHOD

A descriptive cross sectional study consisted of patients who attended the Out Patient Department (OPD), Teaching hospital Peradeniya Sri Lanka, who did not complain of urinary symptoms. The sample size was 280. Both male and female patients were studied under the age group of 25 to 65(mean age 61.55±13.56) during a three month period (20.02.2016 to 20.05.2016) by using systematic random sampling method. The patients who have done same occupations for more than two years were enrolled in this study. These patients were clinically evaluated with IPSS questionnaire by trained doctors.

The severity of LUTS was assessed by IPSS. Patients’ demographic details, IPSS data were entered and evaluated using the statistical package for social sciences (SPSS) with one way ANOVA.

III. RESULTS

The study population included 280 patients between 25 to 65 years. Mean age was 49.35±14.43 years. There were 117 male patients and 163 female patients.

In our study population most common lower urinary tract symptoms were urgency and nocturia which were present in 14.35% and 14.14% of the study population. Least common symptom was straining which was seen in 0.2%. Other symptoms were poor stream 1.28%, increased frequency 5.0%, and incomplete voiding 5.85% and intermittency 2.21%.

The average value of total IPSS was 2.12. Hence, the general population of Sri Lanka is having mild LUTS. The highest value of IPSS was 17 and lowest was 0.

![Figure01- Prevalence of LUTS symptoms among the population](image)

<table>
<thead>
<tr>
<th>Age range</th>
<th>Presentation (%)</th>
<th>Severity of LUTS(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Male</td>
</tr>
<tr>
<td>20-30</td>
<td>10.54</td>
<td>51.6</td>
</tr>
<tr>
<td>30-40</td>
<td>18.70</td>
<td>49.69</td>
</tr>
</tbody>
</table>

www.ijsrp.org
Lower urinary tract symptoms (LUTSs) are prevalent worldwide. An estimated 45.2% of the 2008 worldwide population aged ≥20 years are affected by at least one LUTS.\textsuperscript{(11)} Large-scale population-based survey has reported that LUTS prevalence increases with advancing age up to 60% at the age of 60 years.\textsuperscript{(12)} Thus this has become an important medical concern in both adult and elderly population. In the same this condition has acquired a broad medical concern as LUTS has a significant impact of quality of life. Because of these reasons LUTS have been subjected to many studies to assess its various aspects including epidemiology, etiology, clinical evaluation and treatments. Evaluation and treatment of LUTS for the general population have incurred significant costs to the healthcare system.\textsuperscript{(13)}

Lifestyle-related risk factors include a raised Body Mass Index (BMI) with obesity in females doubling the risk of development of all major subtypes of urinary incontinence (UI) across all age groups. Pelvic floor (PF) health is an important component of an individuals’ overall health; symptoms of dysfunction are a costly health burden. PF dysfunction affects people of all ages and both genders with a higher prevalence consistently reported in older people and females. According to the results of our study, prevalence of LUTS was higher in females than male population. And severity of LUTS showed a steady increase with age in females in contrast to reduction in the severity of LUTS between the ages of 30 to 50 in males.

Other investigated associations for females include menopause and oral oestrogen use during the postmenopausal period, both linked to an increased incidence of UI \textsuperscript{(7)}. It can be also concluded from our study which shows higher severity of LUTS among females. Genetic considerations and surgical procedures may affect pelvic tissue integrity and subsequently the development of symptoms of PF dysfunction.

Quantification of the impact of symptoms of PF dysfunction in workforce groups requires a measure of workforce-related outcomes. ‘Work productivity’ depends on where employees are at work but unable to perform at their usual or expected level \textsuperscript{(7)}. In an internet survey of 2,876 male and 2,820 female workers in the United States (US), overactive bladder (OAB) was associated with lower levels of work productivity \textsuperscript{(8)}. Urinary urge incontinence (UUI) has been associated with substantial personal and employer economic burden \textsuperscript{(10)}. Further, UI increased an individual’s risk of work disability in a US follow-up study of 4511 of women aged between 54–165 years enrolled in the ‘Health and Retirement Cohort’ \textsuperscript{(9)}. These findings indicate the potential impact of PF dysfunction in a workforce. Knowledge of symptom prevalence, associations and impact will assist in informing policy for worker health promotion and determine gaps in knowledge to direct future research. No such review of literature was currently available.\textsuperscript{(3)}

Nocturia has been proven to have a negative impact on the quality of life and sleep quality in general elderly population. However, there are limited studies on the quantitative effect of nocturia on sleep quality and daytime dysfunction, specifically in patients with lower urinary tract symptoms. One of the study said that, in patients with lower urinary tract symptoms, nocturia number increased with age and was significantly correlated with poor sleep quality. Nocturia plays an important role in patients younger than 65 years in daytime dysfunction.\textsuperscript{(14)}

The International Continence Society defines nocturia as the need to void one or more times during the night, with each of the voids preceded and followed by sleep. Nocturia has the following two main causes: increased nocturnal urine volume and vesical instability.\textsuperscript{(14)} As one of the most common complaints in patients with lower urinary tract symptoms (LUTS), nocturia is reported to negatively affect the quality of life and quality of sleep.\textsuperscript{(15,16)} Since its prevalence and severity increase with age. \textsuperscript{(17)} The negative effect of nocturia on the elderly requires more attention. Jensen et al. reported that 25% of falls experienced by older individuals occur during the night and 25% of these occur when the individual is waking up to void.
In another study conducted to investigate the prevalence of LUTS in adolescents and effects of psychotropic substance use. They found that Lower urinary tract symptoms are prevalent in the general adolescent population. It is important to obtain an accurate history regarding psychotropic substance use when treating teenagers with lower urinary tract symptoms. In our study, we did not include this aspect in the questionnaire.

V. CONCLUSION

Most common lower urinary tract symptoms were urgency and nocturia. Least common symptom was straining. The general population of Sri Lanka is having mild LUTS. There was a steady increase of LUTS with advancing age in females.

References

13. YH Tam, FHKAM (Surgery); CF Ng, FHKAM (Surgery); YS Wong, FHKAM (Surgery); Kristine KY Pang, FHKAM (Surgery); YL Hong, MSc; WM Lee, MSc; PT Lai, BN Population-based survey of the prevalence of lower urinary tract symptoms in adolescents with and without psychotropic substance abuse. Hong Kong Med J 2016 Oct;22(5):454–63 | Epub 12 Aug 2016


AUTHORS

**First Author** – AUB Pethiyagoda, Consultant genito-urinary surgeon/ Senior lecturer, Department of Surgery, Faculty of Medicine, University of Peradeniya, Sri Lanka. Email: pethiya@yahoo.com. Telephone: 094773079078

**Second Author** – K Pethiyagoda, MSc in community medicine & PhD in occupational health, Senior lecturer in community medicine, Department of Community Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka. Email: Kalyaniq33@gmail.com

**Correspondence Author** - AUB Pethiyagoda. Email: pethiya@yahoo.com, Alternate Email: aubp@pdn.ac.lk, Contact number: 094773079078
Sexual Exploitation by UN Peacekeeping Forces

A Feminist Analysis of the Gender and Class

Reham M. ElMorally*

*School of Public Policy, University College London

Abstract- The following paper will be divided into three parts. The first part will define Peacekeeping operations; defining peacekeeping operations with regards to the UN resolutions and agreements, as well as discuss the evolution of peacekeeping missions and their personnel. The second part will tackle the scope of the problem regarding sexual exploitation by UN peacekeeping forces where both sides of the same coin will be represented; the victim and the perpetrator. The third part will present the UN-led solutions to put an end to sexual exploitation committed by UN peacekeeping forces. Lastly, a conclusion and recommendations to eradicate sexual exploitation by UN peacekeeping forces will be presented.

Index Terms- UN, Peacekeeping, Sexual Exploitation, Gender, Class, Exploitation, Women, Children

I. INTRODUCTION

“In order to escape accountability for his crimes, the perpetrator does everything in his power to promote forgetting. If secrecy fails, the perpetrator attacks the credibility of his victim. If he cannot silence her absolutely, he tries to make sure no one listens.”

~Judith Lewis Herman, Trauma and Recovery: The Aftermath of Violence — From Domestic Abuse to Political Terror,(1997)

“When ma asked me to go to the stream to wash plates, a peacekeeper asked me to take my clothes off so that he can take a picture. When I asked him to give me money he told me: no money for children only biscuit.”

This citation is from a young lady in one of the refugee camps in the nations of the Mano River Sub Region in West Africa where United Nations High Commissioner for Refugees (UNHCR) and Save the Children UK (SCUK) did an examination about asserted sexual misuse and mishandle by peacekeepers in 2002. While their report had eminent media scope and open clamor, the claims about peacekeeper's association in sexual wrongdoing had been a topic of discussion since the 1990s. Judith Lewis Herman stated that perpetrators attempt to promote secrecy and silent the attention given to a topic, which could explain why sexual exploitation by UN peacekeeping forces took almost a decade in order to be set as a critical agenda topic in the UN. Sexual Exploitation by UN peacekeeping forces, if one would analyze it from the perspective of a post-colonialist or socialist, is only a reflection of the existing gender stereotypes and reinforced by racial and class discrimination where the perpetrator is subconsciously exercising their belief that women/children are inferior to men, and those of the “third world” of inferior status than one is.

The UN defined Sexual Exploitation in 2003 as by the Secretary General's Bulletin “Special measures for protection from sexual exploitation and abuse” (Doc ST/SGB/2003/13) as “any actual or attempted abuse of a position of vulnerability, differential power, or trust, for sexual purposes, including, but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another. Similarly, on the other hand, he considers sexual abuse as “the actual or threatened physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions”. Henceforward, the UN Secretary General has divided the definition of sexual exploitation into two categories: exploitation and abuse, each mutually inclusive. The main focus of this paper is to fully investigate whether there is a correlation between sexual exploitation by peacekeeping forces and gender and class discrimination. These definitions, supposedly, criminalize the act of sexual violence, exploitation, and abuse or any sexual relation, regardless of age or consent of the person, for that matter, seeing that the peacekeepers mission is to protect and not to perpetrate or cause further distress for the victims who are at a disadvantage and the power distribution in the relationship would be unequal (Stern, 2015). This problem is a problem without a passport because, as defined, it has grown beyond the capability of individual states to manage the problem, which in turn required an international organization such as the United Nations had to intervene to find a solution for the problem.

The following paper will use a feminist theoretical framework in analyzing the issue at hand. The reason Marxist feminism is the most appropriate framework to use is mainly due to its bottom-up approach to policy matters, i.e. the framework draws on the social dynamics to explain the subsequent policies that emerge out of the society-government relationship (Raico, 1992). While other frameworks, such as realism, liberal institutionalism, and neo-realism are top-down approaches, meaning that they are state-centric approaches, analyzing the public sphere as a government-society relationship believing that government decisions are reflected in the society and not the other way around. The issue at hand is a social issue which requires policy modification and special attention to it, henceforward a Marxist approach where power differences between the sexes are investigated based on their economic status to explain sexual violence, exploitation, and abuse by one sex (Raico, 1992). Unlike liberal feminism, which
is inherently imperialistic, due to the idea that one group of women, mainly those inhibiting the global north, know what “all” women need and should want without appropriating cultural differences or including the differences in needs in the equation, making liberal feminism an imperialist and discriminatory paradigm where one, supposedly, possesses better knowledge of what is needed to achieve gender equality (Whol, 2014).

The following paper will be divided into three parts. The first part will define Peacekeeping operations; defining peacekeeping operations with regards to the UN resolutions and agreements, as well as discuss the evolution of peacekeeping missions and their personnel. The second part will tackle the scope of the problem regarding sexual exploitation by UN peacekeeping forces where both sides of the same coin will be represented; the victim and the perpetrator. The third part will present the UN-led solutions to put an end to sexual exploitation committed by UN peacekeeping forces. Lastly, a conclusion and recommendations to eradicate sexual exploitation by UN-peacekeeping forces will be presented.

II. EMERGENCE AND EVOLUTION OF PEACEKEEPING

Peacekeeping Operations have risen at the beginning of the Cold War when a bipolar atmosphere ruled the international realm. The hegemonic powers, the United States and the former Society Union and their acquisition of satellite/client states led to a series of proxy wars. Coupled with the rapid process of decolonization and the increasing numbers of newly independent states, an alternative to fulfilling the mission of the United Nations, providing global peace and security, had to be created due to the constant vetoing, i.e. blocking, of UN resolutions to block the Collective Security System to end the Cold War. Peacekeeping emerged as an alternative to the security dilemma and as a measure to deal with conflicts and post-independence instability in order to hinder them from developing into major wars (Ndulo, 2009). When the United Nations Truce Supervision organization (UNTSO) in 1948, which was directed to peacekeeping in the Middle East, after the declaration of the State of Israel had led to tension in the region between Israel and its neighbors. This tension called for a UN-led force, the peacekeepers, to ensure that an Armistice Agreement between Israel and its Arab neighbors would be upheld.

The scope of operations by peacekeeping forces was detailed in Virginia Fortna’s book “Does Peacekeeping Work” where she stated that there are four-levels of operations on which the peacekeepers function: 1) Observation Missions; typically unarmed aggregate of civilians and military personnel who monitor and uphold the ceasefire, withdrawal of troops, and any other stipulations in the ceasefire agreement. 2) Traditional Mission; lightly unarmed military forces who serve as a buffer-zone and report anomalies and hostilities. 3) Multidimensional Missions; where lightly armed military and police personnel act as supervisors and observers to ensure that post-conflict zones gradually slide into a state of peace and stability. And lastly, 4) Peace Enforcement Missions; civilian and military personal who were deployed under Chapter VII of the UN Charter by the United Nations Security Council to “prevent the outbreak of conflict or the spill-over of conflict across borders; Stabilize conflict situations after a ceasefire, to create an environment for the parties to reach a lasting peace agreement; Assist in implementing comprehensive peace agreements; Lead states or territories through a transition to stable government, based on democratic principles, good governance and economic development.”(UN Peacekeeping Operations). There are currently 16 Peacekeeping operations around the world which can all be found in the “Zeid Report” (Doc A/59/710). It is important to note that all UN peacekeeping personnel are regarded as “international actors serving the UN” (Salya, 2014).

Many UN Peacekeeping operations could be considered to have been successful, such as the peacekeeping operations in Cambodia, El Salvador, Guatemala, *inter alia*, Mozambique, and proof of that is the fact that Peacekeeping has been awarded the Novel Peace Prize in 1988. However regardless of their success in maintaining peace and security, they have definitely failed to fulfill their humanitarian role, seeing that the nature of UN peacekeepers is strictly militarily, the military based training of soldiers without training in the attitude required, ranging from sensitivity to appropriate amounts of empathy in order to be able to approach the society they are stationed in, was lacking. The rigid military based training has led to a problem, where a detachment and a form of dehumanization of the subjects they are overseeing has accumulated, in turn leading to the sexual exploitations and abuse we will later discuss.

III. SEXUAL EXPLOITATION AND ABUSE: THE SCOPE

Peacekeeping Operations have risen at the beginning of the Cold War when a bipolar atmosphere ruled the international realm. The hegemonic powers, the United States and the former Society Union and their acquisition of satellite/client states led to a series of proxy wars. Coupled with the rapid process of decolonization and the increasing numbers of newly independent states, an alternative to fulfilling the mission of the United Nations, providing global peace and security, had to be created due to the constant vetoing, i.e. blocking, of UN resolutions to block the Collective Security System to end the Cold War. Peacekeeping emerged as an alternative to the security dilemma and as a measure to deal with conflicts and post-independence instability in order to hinder them from developing into major
other stipulations in the ceasefire agreement. 2) Traditional Mission; lightly armed military forces who serve as a buffer-zone and report anomalies and hostilities. 3) Multidimensional Missions; where lightly armed military and police personnel act as supervisors and observers to ensure that post-conflict zones gradually slide into a state of peace and stability. And lastly, 4) Peace Enforcement Missions; civilian and military personal who were deployed under Chapter VII of the UN Charter by the United Nations Security Council to “prevent the outbreak of conflict or the spill-over of conflict across borders; Stabilize conflict situations after a ceasefire, to create an environment for the parties to reach a lasting peace agreement; Assist in implementing comprehensive peace agreements; Lead states or territories through a transition to stable government, based on democratic principles, good governance and economic development.” (UN Peacekeeping Operations). There are currently 16 Peacekeeping operations around the world which can all be found in the “Zeid Report” (Doc A/59/710). It is important to note that all UN peacekeeping personnel are regarded as “international actors serving the UN” (Salya, 2014).

Many UN Peacekeeping operations could be considered to have been successful, such as the peacekeeping operations in Cambodia, El Salvador, Guatemala, inter alia, Mozambique, and proof of that is the fact that Peacekeeping has been awarded the Nobel Peace Prize in 1988. However regardless of their success in maintaining peace and security, they have definitely failed to fulfill their humanitarian role, seeing that the nature of UN peacekeepers is strictly militarily, the military based training of soldiers without training in the attitude required, ranging from sensitivity to appropriate amounts of empathy in order to be able to approach the society they are stationed in, was lacking. The rigid military based training has led to a problem, where a detachment and a form of dehumanization of the subjects they are overseeing has accumulated, in turn leading to the sexual exploitations and abuse we will later discuss.

IV. FACTORS CONTRIBUTING TO SEXUAL EXPLOITATION

Regrettably, there are a variety of factors that affect the issue of exploitation and abuse. I will go through some of them by analyzing them from the perspective of the victims and the perspective of the perpetrators. However, for clarity purposes, it should be mentioned that sexual exploitation and abuse are considered to be inevitable, yet not exclusive, outcomes of the lack of law enforcement and the breakdown of the state into a war-zone or conflict territory. In war-torn states, women, unfortunately, are the primary subject to sexual exploitation and abuse, seeing that they have become part of the “new war strategy” in which rape and sexual violence are commonly used in wars, especially civil wars, to terrorize, distort, and cause fragmentation within communities on the nuclear level (UNICEF, 2016). Sometimes, women who have been subject to “Systematic rape is often used as a weapon of war in ‘ethnic cleansing’” because it “erodes the fabric of a community in a way that few weapons can. Rape's damage can be devastating because of the strong communal reaction to the violation and pain stamped on entire families. The harm inflicted in such cases on a woman by a rapist is an attack on her family and culture, as in many societies women are viewed as repositories of a community's cultural and spiritual values” (UNICEF, 2016). Nonetheless, it should not be assumed that sexual violence and exploitations are natural outcomes of wars, rather it should be noted that they are evitable political and economic actions perpetrated by social and gender inequality (Martin, 2005). Furthermore, it is worth noting that perpetrators can include local communities such as teachers, police personnel, and sometimes even family members. However, the data supports that children have been subjugated to abuse and exploitation by members of international organizations (Csaky, 2008).

a) The Victims: Local Population

Firstly, Save the Children UK establishes that among the victims are children, young women, and adult women. Orphaned children and children who lost their parents are more exposed to sexual exploitation since the parents are the primary defenders for children (Csaky, 2008). Subsequently, not being a piece of a family could be the principal contributing variable.

Secondly, victims are emphatically impacted by the condition of their neighborhood after ceasefire has been established. They live in degraded destitution, so they have an absence of income opportunities and an ensuing failure to meet fundamental survival needs. They are additionally presented to a high unemployment rate. Therefore, prostitution in such situations at times turns into the main income for some families (Ndulo, 2009). The report of UNHCR and SCUK affirms that in West Africa the association of children and women in sexually exploitative connections has turned into a system for survival for the severely damaged families. However, this is not an invitation nor an excuse for peacekeepers to exploit and abuse locals whose vulnerability and need forced into performing drastic measures for survival purposes.

Thirdly, difference in power relationships between the locals and the peacekeepers could also encourage further exploitation and abuse by peacekeepers. Peacekeepers are at a significantly powerful position in the states they are deployed to, where the locals are at an obvious economic and social disadvantageous position in relation to the peacekeepers. This unequal power dynamic between locals and peacekeepers encourages those who are already exploiting their position to get their way or what take advantage of the dire the economic situation for their personal gain.

b) The Perpetrators: UN peacekeepers

A few peacekeepers don't have any hindrance to submitting sexual manhandle. The principal contributing factor to their impunity is mainly a result of the fact that they enjoy impunity from the local authorities in which they are stationed and this impunity can be waived, even by the Secretary General of the UN (Rawski, 2002). “The UN does not have the power to criminally prosecute its officials or peacekeepers, but it can lift their immunity from prosecution where they are serving. It also can fire or suspend peacekeepers and send them home to face justice” (Farley, 2004). However, if it were to be waived by the SG, under which law would these peacekeepers be prosecuted? Whose side is to be believed, the peacekeepers, the trained UN official, or the victim, traumatized by war and conflict? What if the law of nation of the peacekeeper does not prosecute criminal actions committed outside their territories, who will hold the perpetrators accountable?

www.ijsrp.org
Secondly, a hyper-masculine and chauvinistic peacekeeping atmosphere has been fostered, which aggravates the factors contributing to the dilemma. For centuries the military has been a male-dominated occupation, and the lack of proper zero-tolerance trainings, coupled with the notion that men are superior to women, have all filtered through to give peacekeeping personnel a sense of being better or even entitled to act upon their superiority through exploitation and abuse. Although some efforts have been made to increase the presence of women in peacekeeping forces, the ratio of males to females has not even reached a critical mass (Simic, 2010). Unfortunately, the fact that there are as many bystanders as perpetrators is even more concerning, especially drawn on the issue of membership and communal brotherhood to the peacekeeping force that some peacekeepers fear being outcasts or being labeled as the “whistle blowers” (Martin, 2005).

Thirdly, conflicts usually arise in developing countries, where a culture of “silence” has been fostered and lead to an under-reporting of sexual abuse. Paul Higate argued in his paper that some peacekeepers perceived the situation to be so bad that they did not believe they could make it any worse by their individual actions (Higate, 2004). The culture of silence, in addition to the hyper-masculinity of the institution and the impunity of the perpetrators all filter to the increasing phenomena of sexual exploitation.

V. SOLUTIONS PROPOSED BY THE UN

The following passages will address the different attempts by the UN to control and end sexual exploitation by UN staff members. The focus of this part will be on efforts by the UN to establish and pass preventive as well as enforcement measures resolutions in order to eradicate the entire process. Firstly, this part will investigate the preventive measures that the UN has tried to take in order to stop sexual abuse and exploitation by peacekeeping forces. The second part will focus on enforcement measures the UN has adopted to put an end to sexual exploitation and abuse.

a) Preventive measures

Preventive measures are not common for the UN seeing that it is a problem-oriented institution that pursues mechanisms to solve an existing issue without further investigating and exploring the root of the problem and why it persists to exist or for that matter to see why it has occurred to begin with, i.e. solution-oriented approaches (Betrad, 1995). The efforts of the UN however are admirable. The UN adopted a zero-tolerance policy in which it stated “The United Nations, and I personally, are profoundly committed to a zero-tolerance policy against sexual exploitation or abuse by our own personnel. This means zero complacency. When we receive credible allegations, we ensure that they are looked into fully. It means zero impunity.” (UN, 2003). However, the attempts by the UN and especially the Secretary General have failed to hold perpetrators criminally accountable for their sexual exploitation. Nonetheless, efforts to combat sexual exploitation and abuse by UN peacekeeping forces continued. Two documents were publicized by the Department of Peacekeeping Operations in 1996: “Ten Rules: Code of Personal Conduct for Blue Helmets” and “We Are United Nations Peacekeepers” (UNCDU, 2016) which both were later incorporated into the Memorandum of Understanding (MoU), which should have made them binding where it stated: “It is recommended that the General Assembly decide that those standards should be incorporated into the model memorandums of understanding between the United Nations and troop-contributing countries and that the model memorandum of understanding should require that troop-contributing countries issue those standards in a form binding on their contingent members (Doc A/59/710, paragraph 25).”

Despite the efforts of member states, the problem persisted to exist, where although the document was legally binding, stats would need to individually ratify the agreement for it to come into force. Awareness raising campaigns and training were also part of the UN’s effort to stop the wrongdoings of peacekeepers, however evidently this was not successful, otherwise a criminal prosecution of the perpetrators would have occurred by now. Indeed, the problem lies in the patriarchal structure of the peacekeeping force, and how the peacekeepers possess a sense of entitlement and superiority attitude when being delegated by their states to maintain peace and security. Here one can observe an principal-agent problem (Gailmard, 2010). Where states (principals) delegate peacekeeping forces (agents) to carry out peacekeeping missions. However, due to budget constraints, monitoring the agents have become more or less difficult which in turn led to agents developing an independent agenda from their principals (agent’s slippage) (Elsig, 2010).

b) Enforcement measures

Usually, when sexual exploitation cases emerge, enforcement measures more often than not prosecute the perpetrator, if the allegations against them is true. In the case of sexual exploitation by UN peacekeeping forces, the UN General Assembly adopted the Secretary General’s Bulletin in order to effectively and fairly investigate sexual exploitation cases (Doc A/RES/57/306, paragraph 10). However, once more we are faced with the issue of legality and as a fact, the UN General Assembly resolutions do not have any legally binding power, only resolutions passed by the UN Security Council under Chapter VII have a binding enforcement power, and international legal prosecution for defectors (Öberg, 2006). Furthermore, the UN established a Conduct and Discipline Unit that records the number of cases brought forth against UN personnel and forwards those to the Investigations Division of the Office of International Oversight Service to carry out a thorough investigation. However, due to the lack of access to information or the allocation of victims in conflict zones, the cases are usually dismissed (Laville, 2015).

Deferral of the perpetrators to their member states for them to be criminally held accountable for the sexual violations they have committed is also an option. However, very few states actually have the legal capacity or humanitarian conscious to carry out criminal prosecution against their own nationals (HRW, 2014). States rarely have laws enacted that criminalize extraterritorial violations of human rights and international law, which further complicates the process of bringing perpetrators to justice (Steffen, 2010). The patriarchal nature of countries in which peacekeeping forces were deployed helped in the process...
of normalizing the actions of peacekeepers and reinforce the idea that “they cannot make the situation any worse for women” (Barss, 2000).

VI. CONCLUSION

This essay attempted to test the hypothesis of whether the United Nation’s efforts to combat sexual exploitation and abuse by peacekeeping forces were in fact successful or not. Having discovered that cases of sexual exploitation had only gained attention in 2003, after almost 50 years of peacekeeping operations had been initiated, shortcomings of the United Nations to ensure that its mission of maintaining peace and security on a global, and here, on a domestic level were to be observed, seeing that the protectors, the peacekeepers, delegated by member states of the United Nations became the threat for the individual security of women in conflict zones.

The paper was analyzed through a Marxist feminist perspective, seeing that it is the most appropriate one to be employed in analyzing the issue of sexual misconduct based on the hypothesis that it was motivated by gender inequality and class discrimination, where other theoretical frameworks had fallen short on analyzing a social issue due to their state-centric nature of analyzing international and transnational phenomenon such as sexual exploitation.

The research found evidence to support the hypothesis that gender and class discrimination had in fact hindered the process of realizing the mandate set out by the UN and verbalized in the UN charter, where sexual misconduct was a force of deepening insecurities for already vulnerable societies torn apart by war and conflict. The research supports that administrative and comprehensive cooperation to end exploitation and misconduct were lobbied for, however under the circumstance of the UN charter and the fact that only a handful of resolutions are passed on to the security council in order to be passed under chapter VII making the resolution legally binding to the member states who sign it were observed. This in turn has undermined the mandate set forward to peacekeeping operations and led many skeptics and societies to fear peacekeepers instead of welcoming them. Consequently, many societies and states torn apart by conflict regressed to attempting to internally solve the issue and discouraging any peacekeeping operation from being initiated in their countries.

Efforts by the UN covered preemptive and enforcement issues which may have been successful if an agent-slippage had not occurred; where the agents (peacekeepers) diverted, but also even established, their own independent agendas that were sometimes conflicting to those set forth by their principals (member states). An institutional as well as administrative deficit could therefore be witnessed in the pragmatic sense. The disconnection and distance of the member states from the realities occurring on the grounds, i.e. conflict zones, had delayed and aggravated the misconduct, which could have been prevented if a free flow of information and a careful monitoring process had been instigated.

Peacekeepers are categories as UN staff members, which gave them impunity against all kinds of criminal prosecutions in their host countries. Furthermore, if a well-established system of accountability had been put forth in individual countries holding perpetrators criminally liable for extraterritorial human rights violations and misconduct, then peacekeepers’ attitudes and consequentially behaviors and actions could have been altered. It is, in my opinion, the notion of “carelessness” by the nation states’ legal systems that gave peacekeepers a sense of superiority over the subjects there were assigned to protect. In turn, the carelessness of the international system coupled with the lack of accountability and hyper-masculinity of the patriarchal international environment have filtered through to make children, young girls, and women, the primary targets of viscous actions.

The UN’s response to this problem was implementing a zero-tolerance policy after the recommendations Prince Zeid’s recommendations in 2005. However, due to the fact that international institutions do not have an enforcement strategy or the capacity to criminally prosecute individuals, it became counter-effective to instigate this policy. However, it should be stated that the UN has held many training session and awareness programs, especially for peacekeepers in order to try and lessen the issue from reoccurring.

Gender and class discrimination coupled with a system where accountability and enforcement are limited to one organ all assisted in the continuation of the sexual violations by peacekeeping forces. The researcher therefore recommends that resolutions passed from the UN General assembly should be referred to the UN Security Council and passed under Chapter VII of the UN Charter in order for it to have legal grounds and therefore perpetrators can be held accountable for their actions. Moreover, the researcher proposed that a grass-root approach to ending gender discrimination should be adopted on an international scale by International organizations with the assistance on Non-Governmental Organizations, who, in the field of field-work, possess more information regarding societal needs, therewith eliminating the chance of imperialist approaches to the problem.

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.
ACKNOWLEDGMENT

I would also like to extend my appreciation and affection to the three people whose support from the beginning of my academic career has been unprecedented and notable. Dr. Sean McMahon, my academic godfather and friend, your leadership and guidance throughout my academic career is why this work was possible. Dr. James Sunday, my chosen father figure and friend, your passion for the discipline is inspirations energy truly has affected how I write. Yehia Mekawi, my partner, your support, encouragement and assistance has tremendously affected this project, I cannot thank you enough. “We are unknown to ourselves, we men of knowledge - and with good reason. We have never sought ourselves - how could it happen that we should ever find ourselves? It has rightly been said: “Where your treasure is, there will your heart be also”; our treasure is where the beehives of our knowledge are”. Thank you.

REFERENCES

[22] UN Peacekeeping Operations: Principles and Guidelines - “Capstone Doctrine”, Part I, Chapter 2 (2.3 and 2.4).

AUTHOR
Correspondence Author – Reham M. ElMorally, r.morally.16@ucl.ac.uk/relmorally@aucegypt.edu
A Survey in Recent Trends and Techniques in Image Segmentation

Raj Kumar Sah*, Pratiksha Gautam*, Saniul Ahsan**

*CSE, A P Goyal Shimla University, H.P, India
**CSE, Khulna University, Bangladesh

Abstract- Splitting up an image into multiple segments in order to change the representation of an image into something that is more meaningful and easier to analyze is known as image segmentation. For image segmentation many algorithms and techniques have been developed. This paper analyses different segmentation techniques to reduce the computational complexity of processor in the field of image segmentation, we are specially focusing on Mean Shift Algorithm. The composition of segmentation methodologies proposes for digital image processing is explained briefly. Various techniques are mentioned in this paper that are applied in very advance mission of identification of object or region image.

Index Terms- Finding modes, Image segmentation, Image processing, Space analysis & Object tracking, Visual tracking.

I. INTRODUCTION

Dividing images into multiple parts is the sole objective of image segmentation, and it is basically used to detect objects or other pertinent information in digital images. In other words, we can say that image segmentation is a process that prepares an image to be understandable to computers. Figure 1 shows an example of image segmentation.

![Input Image (left) and Segmented Image (right)](image)

We used mean shift algorithm for image segmentation. Mean shift is a multi-used tool for feature space analysis that provides solution for many vision tasks. We have chosen mean shift over the other method, because mean shift procedure inherits an interesting property, its path towards the mode follows a smooth trajectory, the angle between two consecutive mean shift vectors being always less than 90 degrees which provides a smooth result for image segmentation. However, it is observed that the full process of mean shift algorithm is very time consuming. To decrease the run time of the algorithm we have used the multicore programming system [1], [2].

II. DIFFERENT METHOD OF IMAGE SEGMENTATION

A. CLASSIFICATION.
   1. Histogram-Based Methods
   2. Edge Detection Methods
   3. Region Growing Methods
   4. Clustering.

1) Histogram-Based Methods
   In image segmentation technique, histogram-based methods are very efficient because generally it iterates the pixels through one pass technique. In this technique, a histogram is produced from all the pixels in the image and the high and low points from the histogram are then locates the segments in the image [4], [5].

2) Edge Detection Methods
   Edge detection is a well-proportioned field by itself in image processing. There is a sharp adjustment of intensity at the region boundaries. So, region boundaries and edges are submerged together.
In image segmentation, edge detection is considered as the base technique. The edges, calculated by edge detection, are sometimes separated. For segmenting an object from an image it is necessary to have closed boundaries [5].

3) Region Growing Methods
In this process image and a set of seeds are taken as input. The objects that are to be segmented are then marked by the seeds. The regions are gradually grown by each iteration analyzing all unassigned adjacent pixels to the regions. [5], [6].

4) Clustering
In image segmentation process clustering is needed to find the neighboring data. Cluster analysis or clustering is the assignment of the objects into clusters which makes the objects from a particular cluster more similar to themselves by differing themselves from the objects of other clusters. This similarity between the objects of the same cluster often assessed according to a distant measure. For statistical data analysis, clustering is an often-employed technique. Moreover, this technique is used in many fields including machine learning, data mining, image analysis, pattern recognition, and bioinformatics. It is the process to divide data elements into diverse clusters or classes so that items of a same class areas become as similar as possible; on the other hand, items of the different classes become dissimilar according their disparity. Different measures of similarity could be used to place items into classes depending on the nature of the data and the purpose for which clustering is used. Similarity measure determines how the clusters are to be formed. It is to say that there are different types of clustering techniques which are described below [5], [11], [12].

A. K-Means Clustering Algorithm
K-Means clustering method is a widely used method for clustering analysis. The main target of K-Means algorithm is to find the best distribution of \( n \) entities in \( k \) groups, so that the total distance between the group's members and its corresponding centroid, is minimized. Generally, the target of the algorithm is to partition the \( n \) entities into \( k \) sets \( S_i, i=1, 2, ..., k \) in order to minimize the within-cluster sum of squares [6].

B. Fuzzy C Means Clustering Algorithm
Fuzzy C means clustering is a group of algorithms for cluster analysis in which the distribution of data points to clusters is "fuzzy" in the same sense as fuzzy logic. In fuzzy clustering every point has an amount of acceptance to clusters rather than acceptance absolutely to just one cluster. The, credibility on the bend of a cluster may be in the cluster to a bottom amount than credibility in the centermost of cluster [6].

C. Hierarchical Clustering Algorithm
Building a hierarchy of clusters is a well-known method of clustering which is known as Hierarchical clustering. In the first step, it is built by constructing a distance matrix where the numbers in the i-th row and j-th column indicates the distance between the i-th and the j-th elements. After that, as the clustering progresses, the clusters are merged, that is, rows and columns are merged so that the distances are updated. Above-mentioned procedure is a common means of implementing the Hierarchical clustering [6].

D. The Mean Shift Algorithm
Feature space is considered as an empirical probability density function by Mean shift. When a set of points is the input then these points or input are considered as sampled from the underlying probability density function by mean shift. Dense regions can be present in the feature space, and when it happens they both correspond to the local maxima of probability density function. Mean shift is associated with the peak, close at hand, of the data set’s probability density function. At this stage, it shifts, and it shifts the window centre to the mean and repeats the algorithm as long as it converges. And then, after each iteration, it is considered that the window shifts to a denser region of the data set. At the high level, we can specify mean shift as follows [2], [3], [9].

- Define a window around each data point.
- Compute the mean of data within the window.
- Shift the center of the window to the mean and repeat till convergence, i.e., the center of the window no longer shifts.
III. IMAGE SEGMENTATION USING MEAN SHIFT

For the identification of different discrete objects within an image, Common Vision Processes are used. These processes convert a single-pixel representation of the image data into geometric descriptors, and these geometric descriptors, also known as objects, represent groups of pixel elements; they also take different forms: points, lines, regions, polygons, or other unique representations [4].

There are two basic divisions of segmentation techniques: edge-based and region-based. Edge-based segmentation technique is, for the most part, used to look for image discontinuities; and is generally concerned where changes of gray-level intensity occur in the image. The basic postulation is that changes (of gray-level intensity) occur in the data on the verge of objects and interests. The output of this technique can be X and Y gradient two images that are used to represent edges found, one in the direction of X and another in the direction of Y.

On the other hand, Region-based segmentation is used to look for resemblance between adjacent pixels. Moreover, Pixels with similar attributes are clustered into distinctive and unique regions with the assumption that each and every region should represent one object of interest. In this process of assigning similarity, for grouping them accordingly, gray-level intensity is used as the most common means. Moreover, apart from gray-level intensity, there are other possibilities in this case, such as variance, color, and multispectral features. But commercial vision systems largely use a region-based segmentation scheme which is based on pixel intensity values.

Figure 2: The steps in Mean Shift Algorithm using mass as an example [9]
All these segmentation techniques take it for granted that the objects of interest have uniform shading; they also presuppose that a considerable and constant gray-level change occurs between the objects of interest and the background. Nevertheless, these assumptions have proven erroneous in many vision applications; as a result, these techniques are considered fragile; so that they require controlled conditions or human supervision [3], [4].

Two stages are combined in mean shift image segmentation. Defining a kernel of influence for each pixel is the first stage. This kernel formulates measure of intuitive distance between pixels, whereas distance engulfs spatial as well as color distance.

Manually selecting the size and shape of the kernel can create satisfactory results on general image segmentation. Despite that satisfactory result, it is more helpful to determine local bandwidth with the aid of Parzen windows for imitator local density. In the second iterative stage of the mean shift procedure, for each pixel a mean shift point is assigned, \( M(x_i) \), initialized to harmonize with the pixel. So, mean shift points are iteratively moved upwards along the gradient of the density function defined by the sum of all the kernels as long as they reach a stagnant point (a mode or hilltop on the virtual terrain defined by the kernels). The pixels associated with the set of mean shift points that transfer to the (approximately) same stationary point are considered to be members of a single segment [5].

IV. EXISTING APPROACH TO IMAGE SEGMENTATION

Image segmentation is a long challenging problem in computer vision. To cope with the upgraded system and technology there are many procedures of image segmentation invented, which has pave the way in computer vision. Some of them are described below.

1. Normalized Cuts and Image Segmentation
   This is an original and innovative approach to solve the perceptual grouping problem in vision. This approach focuses on extracting the global impression of an image eliminating and skipping the local features and their consistencies in the image data. This process proposes a new global criterion for segmenting the graph, also known as the normalized cut, as it considers image segmentation as a graph partitioning problem. The normalized cut criterion measures both the similarities within groups and dissimilarities between different groups [21].

2. Efficient Graph-Based Image Segmentation
   This method involves an efficient segmentation algorithm. In spite of this algorithm’s flaw of making greedy decisions, it produces segmentations to satisfy global properties. Basically, this algorithm is applied to image segmentation, and it uses different kinds of local neighborhoods in constructing the graph. It also illustrates the results with both real and synthetic images. Moreover, it runs in time nearly linear in the number of edges. Above all, it is fast in practice. A salient feature of this method is its ability to preserve details in low-variability image regions and its ability of ignoring detail in high-variability regions [14].

3. Contour and Texture Analysis for Image Segmentation
   This method offers a valid and versatile algorithm for partitioning grayscale images into disjoint regions of coherent brightness and texture. As natural images have both textured and non-textured regions so in this method the cues of contour and texture differences are exploited simultaneously. Each of these cues has domain applicability and for this to assist cue combination a gating operator is used. Attaining a local measure of how probable two close-by pixels belong to the identical region, spectral graph theoretic framework of normalized cuts is applied to find partitions of the image into regions of coherent texture and brightness [22].

4. Adaptive Perceptual Color-Texture Image Segmentation
   The knowledge of human perception with an understanding of signal traits in order to segment natural scenes into semantically uniform regions is merged in this approach. It is formulated from two types of spatially adaptive low-level feature. The first describes the local color composition in terms of spatially adaptive dominant colors, and the second elucidates the spatial features of the gray scale component of the texture. These two provide a straight-forward and effective characterization of texture that the proposed algorithm uses to obtain precise and accurate segmentations [23].

5. Image Segmentation by Data-Driven Markov Chain Monte Carlo
   This approach of image segmentation branches into three aspects. First of all, it designs an effective and well-balanced Markov chain dynamics that is to explore the solution space and makes the split and merges process reversible at a middle level vision formulation. Hence, it achieves a optimal solution globally independent of initial segmentations. Secondly, it recommends a mathematical principle for computing multiple distinct solutions to incorporate intrinsic ambiguities in image segmentation. Thirdly, it utilizes data-driven or bottom-up technique (such as clustering and edge detection) to compute important proposal probabilities [24].
6. Iterated Graph Cuts for Image Segmentation

This method originates from the sub-graph and encompasses the user labeled foreground/background regions and works iteratively to label the surrounding un-segmented regions. In iterations, only the local neighboring regions and the labeled regions are involved in the optimization so that interference from the unknown regions can be radically reduced. To heighten the segmentation efficacy and robustness mean shift method is applied to partition images into homogenous regions; and then it implements the proposed iterated graph cuts algorithm by taking each region (instead of each pixel) as the node for segmentation [25].

V. EXISTING APPROACH TO PARALLEL MEAN SHIFT ALGORITHM

A number of parallel mean shift approaches could be found in literature. Several mean shift-based segmentation algorithms are well-known for their superior performance against the classical approaches. Some of these approaches are described briefly.

1. Parallel Mean Shift for Interactive Volume Segmentation

This system presents a parallel dynamic mean shift algorithm on the basis of path transmission for medical volume data segmentation. At first, the algorithm translates the volume data into a joint position-color feature space subdivided homogeneously by bandwidths, and secondly clusters points in feature space in parallel by iteratively finding its peak point. By iterating it develops the convergent or similarity rate by updating data points dynamically by the use of path transmission; besides, it lessens the amount of data points by collapsing overlapping points into a single point. Using an NVIDIA GeForce 8800 GTX card for interactive processing, the GPU implementation of the algorithm segments 256×256×256 volume in 6 seconds. This GPU implementation of the algorithm is many times faster (grossly hundreds time) than its CPU implementation [3].

2. High-Resolution Image Segmentation Using Fully Parallel Mean Shift

Fully parallel mean shift is an approach that follows a bottom-up approach first. First, using a nonparametric clustering the image is decomposed; then, similar classes or groups are joined by merging algorithm that uses color, and adjacency information to obtain consistent image content. A parallel version of the mean shift algorithm works concurrently on multiple feature space kernels that make up the core of the segmented. This system was first applied on a many-core GPGPU platform to experiment and observe the performance gain of data parallel construction. The accuracy of segmentation had been assessed on a public benchmark, and it was proven performing well among other data-driven algorithms. A numerical analysis confirmed that as the utilized processors number increases, the segmentation speed of the parallel algorithm gets better. This is obviously indicating the scalability of the scheme. This improvement keeps its marks also on the real life high-resolution images [2].

3. A Scalable RC Architecture for Mean-Shift Clustering

FPGA, field-programmable gate array architecture centers on creating scalable hardware architecture that should be fine-tuned to the computational requirements of the mean-shift clustering algorithm. FPGA can efficaciously cluster hundreds of pixels autonomously by efficiently parallelizing and mapping the algorithm to reconfigurable hardware. In this process, each pixel benefits from its own pipeline and each pixel can move independently of all other pixels towards its respective cluster. A speedup of three orders of magnitude can be achieved by using mean-shift architecture [19].

4. Image Object Tracking System Using Parallel Mean Shift Algorithm

This implementation of parallel mean shift algorithm is a real-time image object tracking system empowered with PTZ cameras. Mean shift algorithm is efficient for real-time tracking, because it is fast and stable in performance. Nevertheless, in the image tracking system for PTZ cameras the speed is not satisfactory according to the expectations. That is why the system is structured on the basis of parallel mean shift algorithm which uses the color image distribution of detected images.

5. Mean Shift Parallel Tracking Using GPU

This particular approach uses K-Means clustering to partition the object color space. It facilitates us to represent color distribution with a few numbers of bins. All key components of the MS algorithm are mapped onto GPU on the basis of this compact histogram. Six kernel functions make up the resultant parallel algorithm involving the parallel computation of the candidate histogram and calculation of the mean shift vector. An experiment on publicly available CAVIAR videos asserts that the proposed parallel tracking algorithm achieves larger speedup as well as its tracking performance is comparable to that of traditional serial MS tracking algorithm [20].
VI. CONCLUSION

We have tried to compare various image segmentation techniques and compared it with Mean Shift Algorithm. We have taken following four parameters Histogram-Based Methods, Edge Detection Methods, Region Growing Methods Clustering. And found that Mean Shift Algorithm is better in Finding modes, Image segmentation, Image processing, Visual tracking, Space analysis & object tracking.

REFERENCES


AUTHORS

First Author – Raj Kumar Sah, M.Tech, A P Goyal Shimla University, H.P, Shimla, India, errazks@gmail.com

Second Author – Pratiksha Gautam, M.Tech, PHD*,Assistant Professor, A P Goyal Shimla University, H.P, Shimla, India,pratikshamtech20@gmail.com

Third Author –Saniul Ahsan, B.Sc. Engineer, Khulna University, Bangladesh, saniul.ahsan.12@gmail.com.
Computer Password Practices and its Awareness among students - A Case Study at the Jigme Namgyel Engineering College (JNEC)

Jamyang Tashi*, Tashi Wangchuk**

*Department of Information Technology, Jigme Namgyel Engineering College, Royal University of Bhutan

Abstract- This paper examines the current password practices and its awareness among the students in Jigme Namgyel Engineering College (JNEC), Royal University of Bhutan. Password is the most common methods or approaches for users to validate themselves when login into any computing devices and social networking sites. The study was aimed at learning the student’s best password practices in real life scenario with the theoretical background and principles in one’s mind.

The study was conducted in the college distributing the survey questionnaires to 280 students and at the same time total of 120 password hashes were collected from the students’ personal computers. The study has found that 78% of the respondents were aware of the best password practices and policies in setting up the strong password in protecting the one’s data in the personal computers or any of the websites but when it comes to the usage, respondents choose the passwords which are easy to remember that contradicts the fact that they were aware of the password policies.

Index Terms- Best password practices; password cracking; password policy awareness

I. INTRODUCTION

Password is a string of characters used to authenticate when the user attempts to log on to the computer system or any computing devices such and laptop, palmtop, smart phone etc. The passwords are being used in order to prevent unauthorized access to any resource available with the user’s computers or devices. As long as there are resources and devices of interest, there are unauthorized users making attempts to gain access to those resources and devices. Such important resources and devices have to be protected with strong passwords to avoid unauthorized access. published research work also provides a big weight-age to get admissions in reputed varsity. Now, here we enlist the proven steps to publish the research paper in a journal.

Similarly, the many of the computer user possess lots of information that should maintain the confidentiality, integrity and availability of their data at all times of their needs. In order to do so, the user must be aware of the best password practices and password policies. A strong password is defined as a password that is difficult to guess in a short period of time either through human guessing or the use of specialized software (Rao, Jha, & Kini, 2013). The passwords can be guessed and cracked in several ways. Using all the possible combination of characters, symbols, numbers ensures the strong password for the system but then it is still possible for users’ to crack the password. The users’ passwords can be cracked using cracking techniques which will yield character string that can have the same encrypted hash like the target password would have (Scarfone & Souppaya, 2016).

The user uses the passwords for protecting their data and information in the personal computers. The user also uses passwords for emails, social networking sites, and mobile devices in order to protect the identity and the information the one possess in the computer system or in the network. However the study has found that 61% of users reuse the same password on multiple accounts and also 44% of users change their password only once a year or less (CSID, 2012).

The changing of passwords on a regular basis is recommended in general to avoid the passwords being compromised. The users’ passwords being known to others or getting compromised is the risk if the same password is being used for longer period of time. The users are found changing the passwords only when they are being forced to do so. Mandated password changes are a long-standing security practice designed to periodically lock out unauthorized people who have learned someone else’s passwords (Ingelsant & Sasse, 2010).

The main purpose of the study was to meet the following objectives:

i. To study the awareness of the best password practices of JNEC students.

ii. To study the implementation of the best password practices in the users’ personal computers while creating or choosing the passwords.

II. LITERATURE REVIEW

According to the study conducted by Helkala and Bakas (2013) in “National Password Security Survey”, users own multiple user accounts where the user provides the usernames and passwords to authenticate and authorize to the systems but it is found that the same username and password is being used in multiple accounts in which it breaches the security policy and the best password practice. It is easy for an attacker or unauthorized user to guess the password of account if same
Many similar studies had been carried out to protect the confidential data and secure the information being compromised. The study has found that more secure forms of authentication to be built such as special key cards, fingerprint identity, facial detection and retinal scanners are being introduced which provide simple and direct means of protecting a system or user account. However, using the passwords for accessing the system remains to be simpler and cheaper means of authentication. (COISPP, 2009).

Having strong passwords helps to lower the probability of guessing and cracking. The strength of the password is determined by the number of characters used and its complexity in which the user need to create a password using the combination of upper-case and lower-case, numeric and special characters. If the password is complex and having minimum of eight characters long, it will be difficult to guess and crack by the hackers. Even if the password gets compromised, the time taken to crack will be prolonged (Scarfone & Souppaya, 2016).

The study found that 18 to 24 year-old users used the complex passwords to protect their user accounts, however this group agreed to having reused the same password in multiple user accounts as they felt it was easy for them to remember (CSID, 2012).

Helkala, K., & Bakas, T., H., 59% of the respondents mentioned that they got awareness and guidance on selecting a good password in which 28% of these respondents got awareness from the newspapers or websites, 22% from work place, 9% from academic learning and remaining from friends and colleagues. From all respondents, 6% did not remember whether they got awareness or not and rest 35% did not get any awareness and guidance on the password best practices and password policies.

Hitachi ID Systems, (2015), the duration of the same password being in use without changing increases in which the passwords will be known by friends, coworkers in an organization, or even be guessed leading to compromise of passwords. In order to avoid the passwords being compromised in long run, organizations enforce users to change their passwords on regular basis not exceeding 90 days.

In order to protect the data of the users, security of password policies is being designed, developed, implemented and at the same time, it is also found that the password policies are breached by the people only. It seems that currently hackers pay more attention to human factors than security designers do. The passwords are mainly compromised through social engineering technique which exploits users’ lack of security awareness (Adams & Sasse, 1999).

The study also found that with the ever increasing of the use of information technology, there are also ever increasing number of user who uses the technologies for the daily activities. When too many user accounts are created on the computing system and websites, the user either tries to use the same password to the multiple accounts or they use different password but those are easy to remember which can be easily compromised to the hackers. Similarly, when user uses different password for the different account, then user tend to write down on the piece of paper, books or any sort of bits as it is hard to remember which also leads to the compromising the password to unauthorized users. (HKSAR, 2008)

Brute-force attack and dictionary attacks are most common types of attack besides using the key loggers. No matter how strong the password the user has set, the hackers uses computer program or a script login with possible password combination of symbols, numbers and characters. The more complex password, the intensity of the time spent for the cracking is longer. Dictionary attack is the most common attack where the password easily gets compromised since user uses the plain dictionary works. It is found easy for hackers and unauthorized people to guess within the short span of time. (Dinei, 2010)

III. METHODOLOGIES

The study was carried out in Jigme Namgyel Engineering College (JNEC), Royal University of Bhutan in the year 2017 as it is the tertiary education where students have knowledge of the use of information technology and every students do have one or other user account with any of the computing device or websites. The study was carried out broadly using the two different methods. Paper-based survey questionnaires were distributed to 280 students randomly irrespective of the courses, gender and department that the students are studying and the data were collected accordingly. The questionnaire was adapted from the National Password Security Survey: Results, 2013. The data collected through the questionnaires were analyzed using Microsoft excel and the results were brought down in the form of percentages.

Other method used in this study was a total of 120 encrypted Windows Operating System password hashes were also collected randomly from student’s personal computers of the students that too was irrespective of the gender, the course that they study and department etc. And those hash files were taken to the system where Kali Linux Operating System was installed. There the hashes are tried brute force for at least eight hours using John the Ripper tool that is inbuilt with the Kali Linux OS.

IV. RESULT AND DISCUSSION

The total of 280 questionnaires distributed to the students responded the survey questionnaires and interestingly the study have found that 78% of the respondents were aware of the best password practices. Respondents were aware that weak password may lead to the breached the security of the

www.ijsrp.org
computer and user account. At the same time, study has found that although the respondents were aware of the password policies and best practices they still prefer to keep password simple. About 40% of the respondents uses the same password for multiple accounts because they find it is easier to remember single password. The study also found that 36% of the respondents never change the passwords while 31% of the respondents changes passwords on the monthly basis.

![Fig 1. The frequency of password change attempts made by the respondents.](image)

While coming to the habit of sharing password within the families and friends, 32.86% of the responded that they have at least shared their passwords with to either family members, friends among which family members was highest. The study also found that other 67.14% responded that they keep password up to themselves not sharing to anybody.

![Fig 2. Percentage of respondents sharing passwords](image)

The total of 120 encrypted password hashes collected from the students’ personal computers, about 56.66% of the hashes were cracked within 8 hours of time which indicates that the users have not used strong password to protect their personal computer system which is otherwise called weak passwords as per the password guiding policy. From the number of cracked password hashes, the study has found that 41.18% of the passwords were either person’s names or non-dictionary word (in lowercase), followed by either personal phone numbers or only numbers less than 8 digits (29.41%), dictionary word (14.71%) and alpha-numeric (14.71%). While coming to the phone number being used as the password for the personal computers or any of the user accounts on the websites, it is easy for hacker or disgruntle user get hold of the system.

![Fig 3. Percentage of the types of passwords used](image)

V. CONCLUSION AND RECOMMENDATION

The study was conducted in Jigme Namgyel Engineering College (JNEC) and all respondents were aware of the best password practices and they are also aware that weak password on their system or any account may lead their data and information prone to an attacker. In real life situation and practicality, respondents preferred to use the simple passwords because it was easy for them to remember. The respondents feel that they like to choose the password which are not complicated but those are prone to an attack. The study clearly states that the theoretical knowledge on the best password practices is not being implemented practically and this kind of study reminds the users and the respondents about security measures to be taken up in protecting the confidentiality of the information, integrity of the information and availability of information at all times of their needs. The similar kind of studies can be conducted in colleges and tertiary educational institution where the usage of the information technology is intense and accordingly, users of the information technology will have an opportunity to reflect upon their knowledge and actions to protect their information and data in the personal computers, social networking sites and so on.

www.ijsrp.org
Microbiological Quality of Raw Milk at Selected Chilling Centers in Anuradhapura District of Sri Lanka.

H. M. I. G. A. M. K. Senarath and A. M. J. B. Adikari*

Department of Animal and Food Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura, Sri Lanka.

*Corresponding author:
A.M.J.B. Adikari, Senior Lecturer, Department of Animal and Food Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura (50000), Sri Lanka
Cell: 0094-71-8262001
Fax: 0094-25-2221614
Email: adikari2000@yahoo.com

Abstract

Milk easily undergoes microbial contamination and spoilage because it is a rich biological fluid which contains all necessary nutrients for animals. This study was carried out to evaluate the microbiological quality and safety of cow milk at different sampling points; selected chilling centers, milk transportation vessels and farmers in Anuradhapura district of Sri Lanka. A total of 11 chilling centers were selected for the study and classified them as low and high risk centers. Total 80 samples were tested for total bacterial count/standard plate count (SPC) and total coliform count (TCC) and analyzed by using Poisson Regression in GENMOD Procedure in SAS. Descriptive statistics of standard plate count and total coliform count data were obtained using Minitab 17. Results revealed that higher microbial counts for SPC and TCC were observed in chilling centers, transportation vessels and farmers with compared to the standards. The SPC and TCC showed a significant difference (p<0.05) between low and high risk chilling centers, low and high risk farmers, chilling centers and transportation vessels and chilling centers and farmers. In conclusions, microbial contamination occurs at every point of milk handling as expected. The contamination of milk is started at the farmer level and leads to poor quality milk. Thus, proper awareness programs should be carried out effectively to educate the dairy farmers on clean milk production.

Index Terms- Raw milk, Chilling centers, Bacterial count, Coliform count

1. INTRODUCTION

Milk is almost complete food for offspring of mammals. It contains a balanced form all the necessary and digestible elements for building and maintaining the human and animal body. In addition, it contains immuno-globulins which protect the newly born against a number of diseases [1]. The dairy industry plays an important role in the current society. Milk is a complex biological fluid by its nature and a good growth medium for many microorganisms [2], [3]. Bacterial contamination of raw milk can originate from different sources like air, milking equipment, feed, soil, faeces and grass [4], [3]. Because of that, it has become an important vehicle for the transmission of milk-borne pathogens to humans. It is impossible to avoid contamination of milk with micro-organisms therefore the microbial content of milk is a major feature in determining its quality [2], [3]. As result of microbial activity, the quality of milk deteriorates and if low quality milk is used for processing, poor quality milk products would be resulted. Therefore, good quality as raw material can produce high quality milk products [5]. The dry zone has become one of the highest milk collecting agro ecological zones in Sri Lanka. According to one of the leading milk processors in Sri Lanka, raw milk collected in Anuradhapura district has shown the higher total bacterial count in milk. It is
very important to maintain the microbiological qualities of raw milk during the entire processing flow. Hence, the aim of this study was to evaluate the microbial contamination of raw milk at farmer level, milk chilling centers and milk transportation vessels and also to identify the root cause of contamination and to suggest possible hygienic expedients to minimize the bacterial load of the raw milk.

2. METHODOLOGY
This study was carried out at selected chilling centers in Anuradhapura district located in North Central Province, Sri Lanka. Milk samples were collected from 11 chilling centers, 63 farmers and 03 transportation vessels from their front and rear parts. When milk samples were collected, bottles with 60 ml of volume were taken airtight. The sample bottles were placed in a sample case or iced box and transported to the testing laboratory immediately after sampling. The storage temperature after sampling was reached as quickly as possible and maintained between 0 and 4 °C. Samples were examined within 5-6 hours of collection. All the samples were pre heated to room temperature placing in a water bath before testing.

**Standard Plate Count (SPC)**
The total bacterial count was measured by adding 1 ml of milk sample into sterile test tube having 9 ml of 0.1% peptone solution. It was thoroughly mixed and serially diluted up to 1:10⁻⁷ [6], [7]. Each analysis was made in triplets using 1: 10⁻⁵ and 1: 10⁻⁶ serial dilution. One ml diluted sample was pour plated using 15-20 ml of Standard Plate Count Agar which was prepared according to the guidelines given by the manufacturers and sterilized by autoclaving at 121 °C for 15 minutes. The plated samples were allowed to solidify and then incubated at 30 °C for 48 hours under aerobic condition. Colony counts were made using the colony counter [6], [7].

**Total Coliform Count (TCC)**
One ml of milk sample was added to sterile test tube having 9 ml of 0.1% peptone solution and thoroughly mixed. It was serially diluted up to 1:10⁻⁷. Each analysis was made in triplets using 1: 10⁻⁵ and 1: 10⁻⁶ serial dilution. One ml diluted sample was pour plated using 15-20 ml of MacConkey Agar medium which was prepared according to the guidelines given by the manufacturers and sterilized by autoclaving at 121 °C for 15 minutes. The plated samples were allowed to solidify and then incubated at 30 °C for 24 hours under aerobic condition [6], [7]. Colony counts were made using the colony counter and the number of microorganisms (colony forming units) per ml of milk was calculated using the following formula [8], [7].

\[
\text{Count} = \frac{S_k}{(n_1 + 0.1n_2)} \times d
\]

Where,
- \(S_k\) = sum of all colonies counted (between 10 and 300)
- \(n_1\) = number of plate from the lowest dilution used for computing the count,
- \(n_2\) = number of plates in the next dilution factor used for computing the count,
- \(d\) = reciprocal of the dilution factor of the lowest dilution used for computing the count corresponding to \(n_1\).

**Data Analysis**
Standard plate count and total coliform count data were analyzed using Poisson Regression in GENMOD procedure in SAS. Descriptive statistics of standard plate count and total coliform count data were obtained using Minitab 17.
3. RESULTS AND DISCUSSION

Table 1: Descriptive statistics of Standard Plate Count (SPC) of the tested milk samples

<table>
<thead>
<tr>
<th>Group</th>
<th>Acceptable standard value $\log_{10}$CFU/ml</th>
<th>Mean $\log_{10}$CFU/ml</th>
<th>St. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk chilling centers</td>
<td>5.48</td>
<td>6.80</td>
<td>± 0.97</td>
<td>6.073</td>
<td>8.658</td>
</tr>
<tr>
<td>High risk chilling centers</td>
<td>5.48</td>
<td>7.39</td>
<td>± 0.78</td>
<td>6.837</td>
<td>8.737</td>
</tr>
<tr>
<td>Total chilling centers</td>
<td>5.48</td>
<td>7.07</td>
<td>± 0.89</td>
<td>6.073</td>
<td>8.737</td>
</tr>
<tr>
<td>Transportation vessels</td>
<td>5.48</td>
<td>7.08</td>
<td>± 0.37</td>
<td>6.390</td>
<td>7.438</td>
</tr>
<tr>
<td>Low risk farmers</td>
<td>5</td>
<td>6.54</td>
<td>± 0.72</td>
<td>5.214</td>
<td>7.826</td>
</tr>
<tr>
<td>High risk farmers</td>
<td>5</td>
<td>6.53</td>
<td>± 1.38</td>
<td>0.000</td>
<td>8.308</td>
</tr>
<tr>
<td>Total farmers</td>
<td>5</td>
<td>6.53</td>
<td>± 1.19</td>
<td>0.000</td>
<td>8.308</td>
</tr>
</tbody>
</table>

(Sources of standard values: [9]; [10]; [11])

The table 1 shows the descriptive statistics for Standard Plate Count (SPC) of the tested milk samples. This revealed that higher total aerobic bacterial count in all the sample groups ranging from $6.53 \pm 1.38 \log_{10}$CFU/ml to $7.39 \pm 0.78 \log_{10}$CFU/ml with respect to the acceptable standard value. The maximum number of SPC was found in high risk chilling centers ($8.737 \log_{10}$CFU/ml) while the minimum was recorded in transportation vessels ($7.438 \log_{10}$CFU/ml). It showed the actual risk status. Further, the mean number of SPC increased from farmer level to transportation vessels which reflected the contamination of raw milk occurred at each and every handling point and resulted poor hygienic quality of raw milk.

According to [7], the overall mean total bacterial count of milk was $7.58 \pm 0.09 \log_{10}$CFU/ml. The present study showed the lower values compared to above. The average total plate counts of milk samples from farmers, dairy cooperatives and hotels were $6.88 \pm 0.31 \log_{10}$CFU/ml, $7.10 \pm 0.79 \log_{10}$CFU/ml and $7.54 \pm 0.26 \log_{10}$CFU/ml, respectively as per [12]. According to [13], the overall mean total aerobic bacterial count was $6.67 \log_{10}$ CFU/ml. [11] also reported that bacterial count ranged from $7.36 \pm 0.17$ to $7.88 \pm 0.13 \log_{10}$ CFU/ml of raw cow’s milk. However, values reported by the present study were lower than previously reported.

Table 2: Descriptive statistics of Total Coliform Count (TCC) of the tested milk samples

<table>
<thead>
<tr>
<th>Group</th>
<th>Standard value $\log_{10}$CFU/ml</th>
<th>Mean $\log_{10}$CFU/ml</th>
<th>St. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk chilling centers</td>
<td>1.69</td>
<td>4.02</td>
<td>± 3.40</td>
<td>0.00</td>
<td>8.65</td>
</tr>
<tr>
<td>High risk chilling centers</td>
<td>1.69</td>
<td>5.84</td>
<td>± 3.54</td>
<td>0.00</td>
<td>8.83</td>
</tr>
</tbody>
</table>

www.ijsrp.org
The table 2 shows the descriptive statistics for Total Coliform Count (TCC) of the tested milk samples. The higher total coliform count was observed in chilling centers, transportation vessels and farmers with compared to the standards. The coliform risk was higher in transportation vessels (6.22 ± 0.66 Log_{10}CFU/ml) and low risk farmers (6.14 ± 0.97 Log_{10}CFU/ml).

[7] reported that the overall mean coliform count of milk was 4.49 ± 0.11 Log_{10}CFU/ml. [12] also reported the average coliform counts were 5.57 ± 0.22 Log_{10}CFU/ml at farm level, 5.63 ± 0.56 Log_{10}CFU/ml for dairy cooperative and 5.37 ± 0.19 Log_{10}CFU/ml for hotels. The values reported by the present study were similar to those of previously reported values. The coliform count (5.87 ± 1.99 Log_{10} CFU/ml) at farmer level in the present study was far lower than the values reported by [13] who reported coliform count ranged from 7.18 ± 0.14 to 7.46 ± 0.14 Log_{10} CFU/ml of raw cow’s milk.

The table 3 shows the comparison of SPC and TCC data in different sampling groups. SPC and TCC were significantly differed (Pr>ChiSq<.0001) between low and high risk chilling centers, low and high risk farmers, total farmers and total chilling centers, total chilling centers and total transportation vessels. This revealed that microbial contamination was occurring at every stage of milk handling.

4. CONCLUSIONS AND SUGGESTIONS

The quality of milk produced in the study area is poor because of high load of total bacterial count (SPC) and total coliform count (TCC) of the tested milk samples with respect to the international standards. The high load of bacterial count indicates the microbial contamination at every point of milk handling. To minimize the microbial contamination and to produce good quality milk, good health status of animals, hygienic practices during milking, storage and transportation should be maintained. Bulk milk quality checking should be done routinely. Proper standards should be established. Proper awareness programs should be initiated to educate the dairy farmers and milk producers.
ACKNOWLEDGMENT

The authors want to thank all the academic and non-academic staff members of the Faculty of Agriculture Rajarata University of Sri Lanka and to Mr. D. Liyanarachchi of the selected dairy producing company for his valuable coordination throughout the study period. To all the staff members of the selected dairy producing company for providing the required samples on time during the research. Authors are grateful to all the people we have met along the way and have contributed to the development and success of this research.

REFERENCES


AUTHORS

First Author - Senarath HMIGAMK, Lecturer, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura, Sri Lanka, anjali.m.senarath@gmail.com

Second Author - Adikari AMJB, Senior Lecturer, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura, Sri Lanka, adikari2000@yahoo.com

Correspondence Author - Adikari AMJB, adikari2000@yahoo.com, +94-(0)71 8262001
DEVELOPMENT OF ALOE VERA (*Aloe barbadensis* Miller) INCORPORATED DRINKING YOGHURT

W.M.A.S. Wijesundara and A.M.J.B. Adikari*

Department of Animal and Food Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura (50000), Sri Lanka

*Corresponding author: A.M.J.B. Adikari, Senior Lecturer, Department of Animal and Food Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyanlkulama, Anuradhapura (50000), Sri Lanka

Cell: 0094-71-8262001
Fax: 0094-25-2221614
Email: adikari2000@yahoo.com

ABSTRACT

The present study investigated the possibility of developing a novel drinking yoghurt incorporated with Aloe Vera juice and evaluated its sensory quality parameters. The experiment was conducted as Complete Randomized Design with four replicates. Juices of Aloe Vera was extracted using cold extraction method and drinking yoghurt prepared by incorporating pasteurized Aloe Vera juice with four levels (10%, 15%, 20% and 25%) and compared with the control (0%). Developed product was stored at 4 °C for 20 days. Nutritional and physicochemical properties of the developed products were analyzed. Sensory evaluation was done with 33 untrained panelists using nine point hedonic scales. Titratable acidity and pH of the developed products were tested at 0, 4, 8, 12, 16, 20 days and microbial counts (Total coliform, yeast and mold) were tested at 0, 5, 10, 15, 20 days of storage. Parametric data were analyzed using one way Analysis of Variance in SAS (Ver. 9.0) and sensory data were analyzed by Friedman test in MINITAB. Results revealed that brix values were significantly different (\(p<0.05\)) among treatments. Protein, ash and dry matter contents were not significantly different (\(p>0.05\)) among treatments. However, Fat content among treatments differed (\(p<0.05\)) significantly. Sensory analysis revealed that the drinking yoghurt incorporated with 15% of Aloe Vera juice had the best sensory qualities. Titratable acidity and pH showed the significant difference (\(p<0.05\)) among developed products. The significant interaction was observed between treatment and storage time on pH and acidity for the developed products (\(p<0.05\)) and it was within the acceptable range up to 16 days of storage period at 4\(^\circ\)C. Yeast and mold counts were within the recommended values of Sri Lanka Standards Institute (SLSI) up to 15 days of storage. In conclusion, 15% of Aloe Vera juice can be incorporated to produce drinking yoghurt with the best sensory attributes and the same can be stored up to 15 days at 4 \(^\circ\)C without any quality deterioration.

Keywords - Aloe vera, Drinking yoghurt, Storage, Sensory quality

1. INTRODUCTION

The demand for the fermented dairy products such as curd, set and drinking yoghurts is growing up due to its numerous health benefits. These products provide and preserve nutrients, different flavors, aromas and textures, enhance organoleptic properties and increase economic value [1]. Yoghurt is a coagulated milk product obtained by lactic acid fermentation through the action of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. Yoghurt drinks are categorized under stirred yoghurt which contains low viscosity due to high agitation after formation of fermented coagulum [2][3]. The use of herbal products has been growing rapidly in the general public. Aloe vera has a long history of providing lots of health benefits, and is one of the most frequently used herbal treatments throughout the world. Out of 400 species of Aloe, most popular and widely used species is *Aloe barbadensis* Miller [4], commonly referred as Aloe Vera. Processing of Aloe Vera leaf pulp has become a large industry in the world. In the food industry, it is used as a source of functional foods such as yoghurt and as an ingredient in other food products,
for the production of gel-containing health drinks and beverages [5]. Today, consumer demand is moved towards the health and nutrition. Therefore, fortifications of food products with various functional ingredients have been used to fulfill above requirements [6]. If the probiotic products are fortified with the herbal additives then the formulated products can be unique and provide more health benefits. Therefore, the main objective of the study was to produce Aloe Vera incorporated drinking yoghurt and to get functional properties of both Aloe Vera and milk by including in to one product while satisfying the interest of consumers.

2. MATERIALS AND METHODS

Manufacturing of Aloe Vera incorporated drinking yoghurt, sensory tests, chemical analysis and microbial analysis were carried out at Dairy Science Laboratory, Department of Animal and Food Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka. Bacterial culture was provided by J.L. Morison Son. Fresh cow milk samples were collected from Dairy farm of Faculty of Agriculture, Rajarata University of Sri Lanka.

**Extraction of Aloe Vera gel and preparation of juice**

Aloe Vera gel was extracted using cold extraction method and juice was prepared. Freshly harvested Aloe Vera leaves were dipped into 500ppm potassium meta-bisulfite (KMS) solution and washed thoroughly with tap water and kept for flash cooling to 5°C for gel stabilization. Treating after bactericide the Aloe Vera leaves was cut vertically into two halves and gel was separated using stainless steel knife, allowed to settle for 12 hours and then finally homogenized using mixer grinder and enzymatically treated with 1% pectolytic enzyme at 50°C for 20 minutes. Then it was filtered and pH was adjusted to 3.0 by adding Citric acid and Ascorbic acid to control browning and improve flavor. Further it was deareated, pasteurized, flash cooled and stored [7].

**Preparation of Aloe Vera incorporated drinking yoghurt**

Fresh cow milk was standardized up to 2.5% fat level. Then milk was pasteurized at 80°C/30 min. While heating, sugar (10%) and gelatin (0.25%) was added. Then the milk was cooled and starter culture was inoculated at 45°C (3g for 100kg) and incubated for about 4 hrs. until pH drops to 4.6. Coagulum was then immediately broken with the help of high speed home scale electric blender while adding of Aloe Vera juice with different levels (Table 1). Finally, yoghurt drink was refrigerated at 4°C.

**Table 1: Different Formula used for the development of Aloe Vera incorporated yoghurt drink**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yoghurt (W/V)</th>
<th>Aloe Vera Juice</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>90%</td>
<td>10%</td>
</tr>
<tr>
<td>T2</td>
<td>85%</td>
<td>15%</td>
</tr>
<tr>
<td>T3</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>T4</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>T5</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>

**Physicochemical analysis of drinking yoghurt made with Aloe Vera juice**

The pH and acidity of the samples was measured at 4 days intervals during storage period up to 20 days using a pH meter (sensION+PH1, Hach, USA). Acidity was estimated by titration with 0.1% NaOH. Total solids, total soluble solids (brix value), crude protein, ash and fat of the developed yoghurt were estimated according to AOAC[8] procedure.
\textbf{Microbiological analysis of developed drinking yoghurt}

The developed drinking yoghurt samples were analyzed for undesirable (Total coliform, yeast and mold) microorganisms at 5 days intervals using pour plate methods. Required amount of culture media (PDA for yeast and mold, Macconkey agar for Total coliform) was taken and sterilized by autoclaving at 121°C for 15 min. One milliliter of drinking yoghurt was added in to 9 mL peptone water and mixed to make up 10\(^{-1}\) dilution. One milliliter from 1\(^{\text{st}}\) dilution was transferred in to the 2\(^{\text{nd}}\) dilution tube with 9 mL peptone water and prepared 10\(^{-2}\) dilution. This process was repeated up to 10\(^{-5}\) dilution. One milliliter samples from each and every dilution were transferred in to the petri dishes and 15mL of prepared media was poured into each and allowed to solidify at ambient temperature. Then dishes were inverted and transferred in to the incubator (For coliform count request 37 ± 1°C for 24 hours and yeast and mold request normal room temperature for 4-5 days). Colony counter was used for the enumeration of microorganisms.

\textbf{Sensory evaluation of developed drinking yoghurt}

Sensory evaluation was done with 33 untrained panelists along with ballot paper prepared as nine-point hedonic scale. Sensory qualities such as appearance, taste, odor, color and overall acceptance were evaluated. The samples were given three digit random numbers and placed in plastic cartons. These were served in random order to panelists.

\textbf{Data Analysis}

Treatment was arranged according to Complete Randomized Design (CRD) with four replicates. Parametric data was analyzed by one way Analysis of Variance (ANOVA) in Statistical Analysis Software (SAS) ver. 9.0 [9]. Mean separation was done by using Tukey’s Studentized Range Test (TSRT). Sensory evaluation data were analyzed by Friedman non-parametric test in MINITAB software package with 95% confidence interval. Microbial data were presented by comparing with SLS 824: part 2: 1989 yoghurt standards. Statistical significance was declared at \(P < 0.05\).

3. \textbf{RESULTS AND DISCUSSION}

\textbf{Nutritional properties of Developed Aloe Vera incorporated drinking yoghurt}

Protein, ash, dry matter and moisture contents of drinking yoghurts prepared with different percentages of Aloe Vera juice were not significantly different from control (Table 2, \(p>0.05\)). The drinking yoghurt incorporated with 20\% Aloe Vera juice showed numerically highest dry matter content but highest ash content was observed in 10\% Aloe Vera incorporated drinking yoghurt. Numerically, highest protein content was observed in 15\% Aloe Vera juice incorporated drinking yoghurt. Jenness [10] reported that difference in animal breed, weather, type of feed, age of animal, stage of lactation are the major reasons of changing composition of raw milk and those changes may be affected on the nutritional composition of prepared drinking yoghurt. But fat percentage was significantly higher (\(p<0.05\)) in control treatment and 10\% Aloe Vera juice incorporated drinking yoghurt than other treatments. The observed fat % in the study was significantly different (\(p<0.05\)) among treatments. The highest fat percentage was reported in the control and 10\% Aloe Vera juice incorporated drinking yoghurt. Fat percentage was gradually decreased with the increasing level of Aloe Vera incorporation in drinking yoghurt. The lowest fat percentage was observed in drinking yoghurt incorporated with 25\% Aloe Vera. Reduction of yoghurt percentages while increasing Aloe Vera juice percentages in drinking yoghurt can be the reason for the changes in fat percentages.

| Table 2: Fat, protein, ash and dry matter (DM) contents in developed Aloe Vera incorporated drinking yoghurt |
Data are presented as means±SE

Means within the same column with different superscripts are significantly different ($p<0.05$).

**Physicochemical properties of developed Aloe Vera incorporated drinking Yoghurts**

Brix values of treatment drinking yoghurts were significantly different ($p<0.05$). Brix value decreased while increasing Aloe Vera juice percentage in drinking yoghurts. The brix value of milk drinks ranged from 13.26 to 26.30 (Figure 1). Brix values of treatment drinking yoghurts in this study agreed with above finding [11].

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Fat%</th>
<th>Protein%</th>
<th>Ash%</th>
<th>Dry matter%</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (10%)</td>
<td>3.45±0.14$^{abc}$</td>
<td>2.70±0.25</td>
<td>2.157±0.39</td>
<td>26.83±2.10</td>
</tr>
<tr>
<td>T2 (15%)</td>
<td>2.91±0.24$^{abcde}$</td>
<td>3.01±0.10</td>
<td>1.517±0.19</td>
<td>25.79±2.16</td>
</tr>
<tr>
<td>T3 (20%)</td>
<td>2.59±0.04$^{bd}$</td>
<td>2.95±0.37</td>
<td>1.455±0.31</td>
<td>29.29±2.02</td>
</tr>
<tr>
<td>T4 (25%)</td>
<td>2.76±0.22$^{bc}$</td>
<td>2.7±0.04</td>
<td>1.205±0.45</td>
<td>24.75±1.76</td>
</tr>
<tr>
<td>T5 (0%)</td>
<td>3.62±0.02$^c$</td>
<td>2.78±0.14</td>
<td>0.787±0.14</td>
<td>28.05±3.63</td>
</tr>
</tbody>
</table>

**Figure 1: Brix values of developed Aloe Vera incorporated drinking yoghurts**

pH value in each developed Aloe Vera incorporated drinking yoghurts were significantly different ($p<0.05$) among treatments and also with the storage (Figure 2). Initial pH value of Aloe Vera juice incorporated drinking yoghurts were significantly lower ($p<0.05$) than control drinking yoghurt. During the storage period, pH of yoghurt gradually decreased in all treatments. According to the standard of SLSI normally pH value of drinking yoghurt ranged between 4.6-4.2. In this study pH value of developed drinking yoghurts were varied between SLSI standard up to 16th day of storage. The final pH values of developed treatment drinking yoghurts ranged between 4.0-4.1 after 20 days of storage time may be due to post acidification. Lactic strains have the
ability to ferment lactose into lactic acid. With the time accumulation of lactic acid which was produced by lactic acid bacteria and other living organisms can be the reason for reduction of pH value [12] (Figure 2).

Figure 2: pH variation in developed Aloe Vera incorporated drinking yoghurts with storage period

Titratable acidity of developed Aloe Vera incorporated drinking yoghurts were significantly different ($p<0.05$) among the treatments and it was increased during the storage period (Figure 3). Initial titratable acidity value of Aloe Vera juice incorporated drinking yoghurts were significantly higher ($p<0.05$) than control. Highest initial titratable acidity value was reported in 25% of Aloe Vera juice incorporated drinking yoghurt. Higher acidity values observed for developed Aloe Vera incorporated drinking yoghurts compared to control drinking yoghurt is in agreement with findings of [13] on Aloe Vera gel enriched dahi and Shin, Lee [14] on Aloe Vera gel enriched yoghurt. Authors [15] reported that the titratable acidity was increased with the storage period. It happened due to the microbial activity during storage. Titratable acidity of developed Aloe Vera incorporated drinking yoghurts were increased with the Aloe Vera juice percentage in drinking yoghurt and during the storage period. This is in agreements with other studies [13, 16] indicated that Aloe gel polysaccharides have a simulative effect on the metabolic activity of dahi microorganisms.
Microbiological analysis of developed Aloe Vera incorporated drinking yoghurts

Yeast and mold counts were increased with the storage (Table 3). According to the Sri Lanka Standards [17], yeast and mold counts in drinking yoghurts were in acceptable range within 15 days of storage (< $10^3$ cfu/1mL). During first 10 days, the yeast and molds were not developed in the treatment drinking yoghurts. Yeast and molds were shown in samples up on 10th day of storage. The highest yeast and mold counts were observed in control drinking yoghurt up to 15th day of storage. From 15th day onwards, yeast and mold counts were exceeded the acceptable limit in all treatment levels and highest count was reported in drinking yoghurt prepared with incorporating 20% of Aloe Vera juice.

In the yoghurt drinks, lactic acid produced by the starter culture bacteria prevents the growth undesirable microorganisms. Several metabolic products produced by these bacteria have antimicrobial effects including organic acids, fatty acids, hydrogen peroxide and relatively small diacetyl. Soomro concluded that the combination of specific *Lactobacillus* and *Propionibacterium* strains used in normal starter cultures to inhibit the growth of yeasts, molds, *Bacillus spp* and *Clostridium*. This is resulted due to bio preservation activity of *Lactobacillus acidophilus* in drinking yoghurts. Increasing the yeast and mold count of drinking yoghurt samples due to increment of acidity (Table 3) and reduction of oxygen during fermentation process may offer proper conditions for growth of yeasts and molds. Total coliform counts were zero for all treatments during storage period of 20 days (table 4), probably due to good hygienic practices adapted during manufacturing process.

Table 3: Yeast and mold count during storage period

<table>
<thead>
<tr>
<th>Treatment</th>
<th>0 day</th>
<th>5 day</th>
<th>10 day</th>
<th>15 day</th>
<th>20 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (10%)</td>
<td>Nil</td>
<td>Nil</td>
<td>$3.2\times10^4$ cfu/1mL</td>
<td>$8.70\times10^4$ cfu/1mL</td>
<td>$1.56\times10^5$ cfu/1mL</td>
</tr>
</tbody>
</table>

Figure 3: Titratable acidity variation in developed Aloe Vera incorporated drinking yoghurts with storage period
Table 4: Total Coliform Count during storage period

<table>
<thead>
<tr>
<th>Treatment</th>
<th>0 day</th>
<th>5 day</th>
<th>10 day</th>
<th>15 day</th>
<th>20 day</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (10%)</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>T2 (15%)</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>T3 (20%)</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>T4 (25%)</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>T5 (0%)</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>

Figure 4: Sensory Evaluation analysis of Aloe Vera incorporated drinking yoghurt
**Sensory qualities of developed Aloe Vera incorporated drinking yoghurt**

The results of sensory tests for the color, taste, odor, texture and overall acceptability of developed drinking yoghurt are shown in Figure 4. The panelists were able to differentiate a significant difference ($P < 0.05$) for color, taste, texture and overall acceptability among different types of yoghurt. A higher average rank values for color (118), taste (144), texture (130) and overall acceptability (143.5) were observed in drinking yoghurt developed by incorporating 15% Aloe Vera juice. However, odor did not differ significantly among developed drinking yoghurt ($P = 0.67$). Therefore, the level of incorporation of Aloe Vera juice had an influence on the sensory properties of developed yoghurt samples. Drinking yoghurt developed from adding 15% Aloe Vera juice showed the best sensory qualities with the highest score for overall acceptability.

**Shelf life of developed Aloe Vera incorporated drinking yoghurt**

Shelf life of the developed drinking yoghurt was 15 days. According to the yoghurt standard SLS 824: part 2: 1989 [18], pH value should not be more than 4.2 in yoghurt. pH value was not in acceptable range after 16 days of production and also titratable acidity was exceeded acceptable limit. According to the pH variation, product could be stored up to 16 days.

**IV. CONCLUSIONS**

Aloe Vera incorporated drinking yoghurt can be developed by incorporating 15% of Aloe Vera juice to 85% of yoghurt with acceptable sensory and nutritional qualities. Developed 15% of Aloe Vera incorporated drinking yoghurt can be stored 15 days in refrigerator at 4°C with acceptable limit of yeast and mold count and without any quality deterioration.

**REFERENCES**


AUTHORS

First author – W.M.A.S. Wijesundara, B.Sc., Department of Animal and Food Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura (50000), Sri Lanka. Email: <anushyamali12194@gmail.com>

Second author- A.M.J.B. Adikari, PhD, Department of Animal and Food Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura (50000), Sri Lanka. Email: <adikari2000@yahoo.com>

Correspondence Author- A.M.J.B. Adikari, PhD, Department of Animal and Food Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura (50000), Sri Lanka. Email: <adikari2000@yahoo.com>, +94 (0)71 8262001
EXAMINING LEADERSHIP STYLE ON EMPLOYEE PERFORMANCE IN THE PUBLIC SECTOR OF GHANA

A CASE OF GHANA ATOMIC ENERGY COMMISSION

Ebenezer MalcalmPh.D
emalcalm@gtuc.edu.gh

Stephen Tamatey
sptamatey@gmail.com

Abstract: This study examines leadership style on employee performance in the Public Sector of Ghana. The research used mixed method approach with descriptive linear regression method to determine the effect of leadership styles on employee performance. The full range leadership styles of transformational, transactional and laissez faire were considered with employee performance of In-Role Performance (IRP) and Organizational Citizenship Behavior (OCB). The population of the study is comprised of all the 921 staffs of the Ghana Atomic Energy Commission (GAEC). Simple random sampling as well as purposive and convenience sampling techniques were used in this research. Three questionnaires were used to collect data on leadership style and employee performance both quantitatively and qualitatively. SPSS software was used to calculate simple linear regressions to test the hypothesis. Themes were also developed from the interview transcriptions. The results from both analysis show that all the leadership styles do not have any effect on employee performance. However, the leaders were found to be exhibiting a mixture of transformational and transactional leadership attributes.

Keywords: Transformational Leadership, Transactional Leadership, Laissez Faire Leadership, In-role Performance, Organizational Citizenship Behaviour, Public Sector.

Introduction

In contemporary times, the employees of organizations are classified as the human capital, and are therefore the most important asset of every organization. The basic step that must be taken by any organization to meet its goals and accomplish its objectives is to maintain and cater for the needs of the human beings. Making the employee satisfied and fulfilled should be the most important objective of the organization. The management of an organization also plays a crucial role in human development and the organization achieving its objectives and goals.

History tells us that, all the major and significant developments and breakthroughs in science and technology, arts and industry were as a result of the presence of a leader (Shafie, Baghersalimi, and, Bargi, 2013). Vigoda-
Gadot (2006) opined that, leadership determines the extent of successes and failures of organizations. Charlton (2000) also argued that the performance of organizations and employees was as a result of positive influence through effective leadership. That is, effective leadership plays an instrumental role in ensuring that employees are attracted, maintained, trained and motivated to perform to accomplish the goals and objectives of the organization. The achievements and performance of the organization is eventually due to the collective performance of the employees.

Bass (1997) then opined that, for any organization to survive in a dynamic and competitive business environment, it has to adopt the best leadership styles. Because employees’ perception of leadership style greatly affects the performance and commitment of the employee to achieving the organization’s goals (Jaskyte, 2004). Thus, the leadership styles of the leaders and managers can either motivate the employees to increase and improve his/her performance or discourage employees from putting in their best. Due to this, Turner and Muller (2005) emphasized that for efficiency purposes, more emphasizes should be placed on an effective leadership style, one that positively affects employees’ performances, effectiveness and productivity. Robbins (2003) then concluded that, the main role and responsibility of a leader is to develop the capacity to direct people with a shared vision to achieve common goals. The main objective of this study is to find the best leadership style that will lead to effective and efficient exploitation of resources so that the performance of the employees would be properly improved in order to achieve organizational goals.

**Literature Review**

There have been several assertions and propositions on leadership by various schools of thought. The subject leadership has evolve over the years with several literature in an attempt to find the best leadership style that lead to effective and efficient exploitation of resources so that the performance of the employees would be properly improved in order to achieve organizational goals. From the great man theory, through the traits, style, contingency and situational leadership theories, scholars have tried to give a definite definition and meaning to
the concept of Leadership. Jaques and Clement (1991) defined leadership as a procedure where the leader shows the way and carry the followers along with charisma, competence and productivity. Mcswain (2010) also defined leadership as a capacity, which means that the leader must have the capability to listen, observe and use his proficiency to motivate all the followers at the various levels of decision taking through constant dialogue, which will make the employees and followers feel valued and part of the system because their views, values, visions and opinions are factored into key decisions. In line with these definitions, Tandoh (2011) discovered that, the focus of current leadership theories has shifted from individualities to the situations whereby the leadership recognizes the importance and need to relate to the followers based on a particular situation and context. Schermerhorn, Hunt and Osborn (2000) also described leadership to be an interactive inspiration that get followers and subordinates to achieve the objectives and targets of the leader or the organization. The current theory and study of the core concept in the field of leadership concentrates on transformational and transactional leadership. Burns in 1978 first introduced this concept and was later developed by Bass and Avolio to include the “full range model of leadership” (Burns, 1985; Bass and Avolio, 1993).

According to Burns (1978) the influence where by the leader creates a cost-benefit relations with his followers is called the transactional leadership and the influence where the leader maintains an emotional excitement with the followers is called the transformational leadership. The main trust of the full range of leadership theory is that, for any organization to attain its objectives, goals and vision, there must be a definite and mutually acceptable relationship between leaders and their followers.

**Transformational Leadership style**

Dvir, Dov, Avolio, and Shamir (2002) made it clear that the transformational leader employs more inspirational tactics to influence their follower’s goals and ambitions through providing them with self believe. Yulk (2006) also stated that, transformational leadership makes sure the relationship between the leader and the follower is mutually beneficial. Transformational leaders lead by example through showing their charismatic behavior which inspires, motivates, stimulates the intellectual capability and arouse the admiration of their
subordinates, as well as considering the needs of their followers individually. According to Bass and Avolio (1993), the behavioral traits exhibited by the transformational leader are classified into four characteristics. These behaviors are idealized influence followers, inspirational motivation, intellectual stimulation and individualized consideration.

**Transactional Leadership style**

Bass (1985) perceived the transactional approach as cost-benefit process between leaders and followers. Transactional leadership transpires when the leader depends on the appropriateness of the behavior or performance of the follower to either punish or reward him. The transactional leadership has three components, comprising of contingent reward, management by exception (active) and management by exception (passive).

**Laissez faire Leadership style**

Mullins (2006) described the laissez-faire style as a situation where the subordinates are left on their own to work. The leader does not interfere in the subordinates activities even though he makes himself available for consultation when the need be. According to Asare (2012) the leader delegates his responsibility to take decisions to the subordinates and also gives them all the authority and control to go about their actions and accomplishments.

**Employee Performance**

Tandoh (2011) asserted that, the performance of the employee is what leads to the survival and success of the organization. The study adapted the in-role performance and organizational citizenship behavior (OCB) as key indicators of the employee performance. MacKenzie, Podsakoff and Fetter, (1993); and Organ, (1988a) agreed that both in-role and organizational citizenship behavior are the ingredients of employee performance that influence organizational effectiveness.

**Empirical Literature**
In quite recent times, research studies conducted on the effect of leadership style on employee performance by (Sharfie, Baghersalimi and Barghi 2013; Puni, Ofei and Okoe, 2014) confirmed that employee performance is greatly influenced by leadership styles. Moreover, (Al-Hussami, 2008; Bin Ahmed & Sam, 2013; Bycio, Hackett & Allen, 1995; Chen & Chen, 2010; Dhammika, Emery & Baker, 2007; Vogoda-Gadot, 2007) further suggested that transformational leadership has a higher positive effect on employee job performance.

According to Duncan (2014) several researchers have found out that the blend of both the transformational and transactional leadership styles will be the best leadership style in today’s ever changing world. Due to some dominant contextual operations, the kind of leadership style may differ in context. In this regard, this study focused on examining the leadership style on employee performance in the Public Sector of Ghana.

![Conceptual Framework designed by the Researchers](www.ijsrp.org)
Research Hypothesis

1. $H_1$: Transformational leadership style has effect on employee performance at Ghana Atomic Energy Commission.

2. $H_2$: Transactional leadership style has effect on employee performance at Ghana Atomic Energy Commission.

3. $H_3$: Laissez faire leadership style has effect on employee performance at Ghana Atomic Energy Commission.

Methodology

Mixed method (quantitative and qualitative) design was utilized in this study. Descriptive regression method was used in this research to quantitatively determine the relationship and effect of the predictive variable (transformational, transactional and laissez faire leadership styles) on the dependent variable (employee performance). Themes were also developed from interviews of participants as qualitative basis and used to corroborate the quantitative results.

All the 921 staff at Ghana Atomic Energy Commission formed the population of the study. Out of this population 87 composed the leadership and 834 are subordinates. Both probability and non-probability sampling techniques were used to select the participants.

Simple random sampling was used to select 30 leaders that assessed the performance of their subordinates and 30 subordinates who also assessed the leadership style of their superiors. Convenience and purposive sampling strategies was used to select 5 leaders that were interviewed. These leaders are the Directors of the institutes.

The research instruments are three questionnaires;
1. Leadership Style questionnaire: The Multifactor Leadership Questionnaire (MLQ 5X) developed by Bass and Avolio was used. It is 45 questions measuring the transformational, transactional and laissez faire leadership styles. The questionnaire adapted the Likert 5-point scale of responses, which ranges from “not at all, to, frequently, if not always” (Bass and Avolio, 1995).

2. Employee Performance questionnaire: This questionnaire was developed by William and Anderson in 1991. The scale contains 21 questions describing the in-role performance and extra role performance (organizational Citizenship Behavior). A 5-point Likert scale ranging from “bad to excellent” was adapted.

3. Interview Questionnaire: This questionnaire is researcher made based on the key thematic areas of transformational, transactional and laissez faire leadership style and the in-role and organizational citizenship behavior for the employee performance assessment. The researcher used open ended questionnaire to gather more qualitative data that is used to corroborate the results that is obtained from the quantitative data.

Findings

The study sought to find out whether employee performance is affected by the leadership style of the leaders in the Public Sector of Ghana. The Statistical Package for Social Scientists (SPSS) version 23.0.0 was utilized to analyze the data. The analysis was done in two parts. The first part involved using simple linear regression test to analyze the quantitative data. And the second part involved using the themes developed to analyze the qualitative data.

Quantitative analysis;

Simple linear regression was of SPSS was used to determine the effect of the transformational, transactional and laissez faire leadership styles on employee performance. This was done by testing the hypothesis of the study.
1. \(H_1\): Transformational leadership style has effect on employee performance at Ghana Atomic Energy Commission.

### Table 1

**Model Summary for Transformational Leadership**

<table>
<thead>
<tr>
<th>Model</th>
<th>(R)</th>
<th>(R^2)</th>
<th>Adjusted (R^2)</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.173(^a)</td>
<td>.030</td>
<td>-.005</td>
<td>.59732</td>
</tr>
</tbody>
</table>

\(a.\) Predictors: (Constant), Transformational

Source: Survey data 2016

### Table 2

**ANOVA for Transformational Leadership**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>.310</td>
<td>1</td>
<td>.310</td>
<td>.869</td>
<td>.359(^b)</td>
</tr>
<tr>
<td>Residual</td>
<td>9.990</td>
<td>28</td>
<td>.357</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.300</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(a.\) Dependent Variable: Performance

\(b.\) Predictors: (Constant), Transformational

Source: Survey data 2016.

### Table 3

**Coefficients for Transformational Leadership**

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>2.073</td>
<td>.267</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transformational</td>
<td>.124</td>
<td>.133</td>
<td>.932</td>
</tr>
</tbody>
</table>

\(a.\) Dependent Variable: Performance
From table 1 to table 3 above, the regression equation was not significant at \( F (1, 28) = 0.869, p > 0.05 \) with an \( R^2 \) of 0.030. This means that transformational leadership style has no effect on employee performance in the Public Sector of Ghana. The significance level of the regression 0.173 is above 0.05 which is the significance benchmark. The null hypothesis is therefore accepted and the alternative hypothesis rejected. It further means that for every one good transformational behavior of the leader, employee performance will improve by only 12%.

2. \( H_1 \): Transactional leadership style has effect on employee performance at Ghana Atomic Energy Commission.

**Table 4**

**Model Summary for Transactional Leadership**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.094(^a)</td>
<td>.009</td>
<td>-.027</td>
<td>.60384</td>
</tr>
</tbody>
</table>

\(^a\) Predictors: (Constant), Transactional

Source: Survey data 2016

**Table 5**

**ANOVA for Transactional Leadership**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>1</td>
<td>.091</td>
<td>.248</td>
<td>.622(^b)</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>28</td>
<td>.365</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>29</td>
<td>10.300</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Dependent Variable: Performance
\(^b\) Predictors: (Constant), Transactional

Source: Survey data 2016
A simple linear regression calculated to determine the effect of transactional leadership style on employee performance indicated in Table 4 to table 6 below that, the regression equation was not significant with \((F (1, 28) = 0.248, p > 0.05)\) and an \(R^2\) of 0.009. This means that the transactional leadership style has no effect on the employee performance in the Public Sector of Ghana. The regression of 0.94 has a significance level above the benchmark of 0.05. Based on this, the null hypothesis is accepted and the alternative hypothesis rejected. In this case, one transactional leadership trait that will be exhibited will result in only 16.5% improvement in employee performance.
3. \( H_1 \): Laissez faire leadership style has effect on employee performance at Ghana Atomic Energy Commission

**Table 7**

*Model Summary for Laissez Faire Leadership*

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.236a</td>
<td>.056</td>
<td>.022</td>
<td>.58941</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Laissez Faire

Source: Survey data 2016

**Table 8**

*ANOVA for Laissez Faire Leadership*

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>.573</td>
<td>1</td>
<td>.573</td>
<td>1.649</td>
<td>.210b</td>
</tr>
<tr>
<td>Residual</td>
<td>9.727</td>
<td>28</td>
<td>.347</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10.300</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Performance
b. Predictors: (Constant), Laissez Faire

Source: Survey data 2016

**Table 9**

*Coefficients for Laissez Faire Leadership*

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>(Constant)</td>
<td>2.545</td>
<td>.219</td>
</tr>
<tr>
<td>Laissez Faire</td>
<td>-.136</td>
<td>.106</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Performance

Source: Survey data 2016.

Table 7 to table 9 showed the regression equation calculated was not significant at \((F (1, 28) = 0.248, p>0.05)\) and an \(R^2\) of 0.009. This means that there is no significant effect of laissez faire leadership style on employee
performance in the Public Sector of Ghana. Therefore the null hypothesis was therefore accepted and the alternative hypothesis rejected.

**Qualitative analysis;**

The leaders and their subordinates were interviewed. The interview was recorded, transcribed and themes were developed from the responses obtained. The questionnaire was self-developed by the researcher. The leadership style questions focused on the key thematic areas of transformational leadership (idealized influence, individualized consideration, inspirational motivation and intellectual stimulation), transactional leadership (Contingent reward and management by exception) and laissez faire leadership styles. The employee performance questions also were based on the in-role performance and organizational citizenship behavior. Five (5) leaders were interviewed to assess the performance of their subordinates and five (5) subordinates of the same leaders were also interviewed to assess the leadership style of their superiors. The themes are developed are shown in tables 10 and 11 below.

Table 10

Employee performance
### Table 11

**Leadership Style**

<table>
<thead>
<tr>
<th>Style</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformational</td>
<td>He believe in hard work, He believes God rewards, He has attitude of punctuality and time consciousness, He insists on meeting deadlines, He wants the best way of doing things, Am nice but strict at work time, He insists on good jobs to be done, He encourages us to work extra hard, We have one on one chats, He advises to be versatile and be innovative in job performance. He Focus on goals, He do not compromise on quality, He motivates and encourages us never to give up. He attends our social programs and activities, Personal financial support, We have informal discussions through his open door policy, He makes subordinates happy.</td>
</tr>
</tbody>
</table>
He gives rewards and awards, Timeliness is his hallmark, He always gives best worker awards and promotions, He cannot be taken for granted, He gives cautions all the time, Contract terminations, Clear rules and self-correcting.

We always seek approval, His directives are taken serious, He does constant follow ups, He reprimands and quick corrections.

From the responses of the leaders interviewed, they confessed that the performance level of their subordinates is average. Moreover, the subordinates also indicated that their leaders exhibit more of the attributes of a transformational leader. However, it became clear that the leaders exhibit all of the attributes of transformational, transactional and laissez faire leadership styles.

The meaning is that, the leadership style of the leaders does not lead to the best performances from the employees. This therefore confirms the findings from the quantitative analysis that the leadership style has no effect on the performance of the employees in the Public Sector of Ghana.

**Discussion**

Indicating from the findings, quantitatively the independent variable (leadership) represented as transformational, transactional and laissez faire leadership styles have no effect on the performance of employees in the public sector of Ghana. This was further confirmed by results from the qualitative analysis. From the interview, the leaders indicated that the performance of their employees or subordinates is average or good. Summarily the finding shows that the leadership style has no effect on the performance of the employees in the Public Sector. However, the findings of this study do not support assertions of (Asare, 2012; Duncan, 2014; Vigodat-Gadot, 2006; Shafie, Bagersalimi and Barghi, 2013) in similar studies where they found out that leadership styles affect employee and organization performance.
It is believed that, every organization expects the best performance from its employees. Therefore this average performance could then be said to be unsatisfactory and more could be demanded from the employees. Moreover, from the analysis, the employees also indicated that their leaders exhibit the transformational and transactional leadership styles more often and the laissez faire less often. Quantitatively, each of the leadership styles has no effect on the performance of the employees. In addition, qualitatively, it became clear that the leaders don’t exhibit each of these leadership styles exclusively but rather all the attributes of these leadership styles are exhibited comprehensively. Bass and Yammarino (1990) stated that both transformational and transactional leadership styles complement each other. The transformational and transactional leadership styles are regarded as the best, and the current trend of leadership styles that brings the best output from employees. This means that with the leaders exhibiting these leadership styles, the performance of the employees should be high and above average.

If the leaders are able to effectively exhibit all the attributes of the transformational, transactional and laissez faire leadership style, they will be able to persuade and convince their employees to put in much effort to produce higher outputs. This means the leader must convincingly be able to stimulate the intellectual capability of the employees, consider their needs individually, influence them individually, and motivate them inspirationally as well as reward and punish them where appropriate. Because the leaders are exhibiting all the attributes of transformational, transactional and laissez faire leadership styles, the performance of the employees is supposed to be higher but that is not the case from the findings of this study. This means that, the employees do not depend on the leader’s style of leading in the performance of their duties. There could be other militating factors which contribute to the average performance of the employees. Some of these factors could be availability of resources, the culture of the people, the organizations culture and other external factors.

Conclusions and Recommendations

The study concludes that the leaders are exhibiting the right leadership styles even though it is not impacting the performance of the employees. The transformational and transactional leadership styles are complementary
leadership styles that when exhibited correctly should lead to the highest performance levels of employees. The employees do not necessarily rely so much on their leaders in performing their duties. The employees acknowledged the leaders style of leading but that does not influence translate and into perform higher. Implying that, there are other factors which needed to be considered in order to achieve the highest performances of the employees.

Due to these, the following suggestions were made;

1. The leaders should be trained on the right mix and application of the attributes transformational and transactional leadership styles. This will aid them to know when to apply a particular attribute that could stimulate the best outcome from their employees.

2. Secondly, the leaders should find out for other factors that hinder the performance of their employees. They could be applying the right leadership styles but without the necessary needed resources or inputs, the employees cannot do much. Other external factors like the environment and culture could possibly be considered. Since this study was conducted in the Public Sector, the work culture of the public sector might play a role in the low performance.

With this study as basis for future research, the following suggestions could be taken into consideration.

1. Intervening variables like culture and resource availability could be introduced into the topic for future studies to be conducted.

2. Also, this study was done using a scientific research based organization in the Public Sector as a case study. It is suggested that future studies should consider using different organizations and institutions in the Public Sector.

3. In addition, this study adopted the mixed method approach in collecting and analyzing data. This led to only a small sample size selected for the quantitative analysis. Future studies should focus on solely quantitative method so that the sample size could increase.
REFERENCES


Dhammika, K. A. S., Ahmad, F. B., & Sam, T. L. (2013) Transactional, Transformational, Union and Organizational Commitment: An Examination of the Effect Flaws. *International Journal of Business and Social Science* 4(6)103


Determination of Tolerance and Sensitivity of Some Selected Plants to Air Pollution along Major Roads in Obio-Akpor (Port Harcourt) Nigeria Using Air Pollution Tolerance Indices

*Udeagbala, T. N.; Agbagwa, I. O.; Tanee, F. B. G.

Department of Plant Science and Biotechnology, University of Port-Harcourt, Nigeria.
E-mail: nkdearie@yahoo.com 08032927923
*Correspondence author

Abstract

Air pollution is among the most challenging problem in today’s world. In this study, Air Pollution Tolerance Index (APTI) was calculated for four different plants (Panicum maximum, Eleusine indica, Xanthosoma mafafa and Amaranthus spinosus) found growing along four busy roads (Aba road, East/West road, Ikwerre road and NTA road) in Obio/Akpor local government area and control (Ikwerre Ngwo) in Etche local government area in Rivers State, Nigeria. The computed APTI results obtained from four biochemical parameters (relative water content, ascorbic acid, leaf extract pH and chlorophyll) showed that the APTI of the test plants recorded remarkable changes as the values obtained in the experimental sites were higher than the control site. The APTI values in the experimental sites (4 roads) were in the range of P. maximum (7.4 – 8.04); E. indica (7.3 – 8.2); X. mafafa (7.2 – 7.9); and A. spinosus (7.2 – 8.0) as against the control (< 6.2) showing that all the test plants studied were sensitive to pollution. Thus, these plants can be used as a better indicator of air pollution in an environment.

Key words: Air Pollution, Relative water content, leaf chlorophyll, Ascorbic acid content, pH

Introduction

One of the most challenging problems that deteriorate the world today is air pollution. It can be defined as the fluctuation in the values of atmospheric constituent that could have existed without anthropogenic activities (Tripathi and Gautam, 2007). There has been severe increase in the concentration of particulate and gaseous pollutants due to continuous increase in population growth, vehicular traffic, industries and road transportation over the years (Joshi et al., 2009) which poses serious threat to the health of inhabitants due to the adverse effects on the air quality arising from both mobile and stationary combustion sources. These pollutants are classified as either primary (pollutants that pollute the atmosphere directly once introduced into the environment) or secondary (pollutants that are formed as a result of the reactions or interactions of primary pollutants in the atmosphere) pollutants (Agbaire and Esiefarienrhe, 2009). Particulate (aerosols, dust, smoke, fumes etc) and gaseous (carbon monoxides, sulphurdioxide, hydrocarbons, etc) pollutants have negative impacts on humans, plants, animals and the ecosystem at large. Air pollution has been proven to be a contributing factor to increase in mortality rate (Gupta et al., 2004). Epidemiological studies has shown that about 4.6 million people die yearly...
due to exposure to particulate and gaseous pollutants which results to diseases such as cardiopulmonary mortality, cardiovascular diseases and respiratory infections among the habitation (WHO, 2002; Gupta et al., 2004).

In Africa, the risks of exposure to air pollution is high in developing cities, research conducted in Republic of Benin, Ethiopia, Kenya and Mozambique revealed high level of DNA damage in residents in urban areas and higher prevalence of asthma in school children that are exposed to air pollution in urban areas as compared to school children in rural areas (Autrup, 2006). Plants provide some ecosystem functions like temperature amelioration, drainage and water storage filtration, air filtering etc (Bolund and Hunhammer, 1999).

Plants serve as integral basis for our ecosystems and could be affected by air pollution. They have been identified as the most potential organisms that are mostly affected by ambient air pollution because they are stationary and are continuously exposed to pollutants from the atmosphere. Hence; injuries caused by air pollution to plants is proportional to the intensity of pollution. Plants are important tools used to evaluate the impact of air pollution. Sensitive plant species act as biological indicators of air pollution (Lakshmi et al., 2009). Plants response to air pollution can be understood by determining the air pollution tolerance index (APTI) which is species dependent plant attribute that expresses the ability of plant to encounter stress that arise due to pollution. APTI is obtained by using four biochemical parameters which are; relative water content of leaf, ascorbic acid, pH of the leaf and chlorophyll of the leaf (Singh and Verma, 2007). Dileswar et al. (2015) studied the APTI of Tectona grandis, Saraca asoca, Terminalia catappa, Syzygium cumini, and Cassia fistula, and they observed that Cassia fistula (14.34%) had the highest results followed by Syzygium cumini(10.87%), Saraca asoca(10.77%), Tectona grandis(8.72%) and Terminalia catappa (7.41%).

Thus; this study was designed to determine the air pollution tolerance level of the test plants as well as the sensitivity of the test plants with respect to air pollution. The result obtained will assist in environmental biomonitoring of air polluted areas.

Materials and Methods

Description of the Study Area

The study was carried out along four roadsides (i.e Aba road, East/West road, Ikwerre road and NTA road) in parts of Obio/Akpor local government and the control (in IkwerreNgwo) in Etche local government areas in Rivers State in the Southern region of Nigeria. Two seasons are experienced in this area; the dry and rainy seasons which ranges from the month of November – March and April-October respectively.

Aba road and East-West road are among major roads in Obio/Akpor local government area linking parts of the eastern, western and northern states to Rivers State which results to a lot of anthropogenic activities in the area. These areas experience a lot of vehicular
traffic and exhaust fumes emanating from smaller and heavy duty vehicles while Ikwerre and NTA roads are roads where commercial activities take place. These roads link to some residential areas and local roads in the city. The control site (IkwerreNgwo) is a rural area. Residents here are mostly peasant farmers.

Table 1: GPS of Sample Locations

<table>
<thead>
<tr>
<th>Locations</th>
<th>Northings</th>
<th>Eastings</th>
<th>Elevations (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obio/Akpor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aba Road</td>
<td>04° 53' 12.3&quot;</td>
<td>007° 08' 36.4&quot;</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>04° 52’ 45.8”</td>
<td>007° 07’ 37.1”</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>04° 52’ 05”</td>
<td>007° 06’ 21.0”</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>04° 51’ 30.2”</td>
<td>007° 4’ 28.7”</td>
<td>25</td>
</tr>
<tr>
<td>East/West Road</td>
<td>04° 51’ 14.7”</td>
<td>007° 04’0 6.6”</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>04° 51’ 53.1”</td>
<td>007° 02’ 46.9”</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>04° 52’ 13.4”</td>
<td>006° 54’ 47.4”</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>04° 53’ 41.0”</td>
<td>006° 54’ 47.4”</td>
<td>12</td>
</tr>
<tr>
<td>Ikwerre Road</td>
<td>04° 55’ 08.2”</td>
<td>006° 59’ 50.0”</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>04° 54’ 51.2”</td>
<td>006° 59’ 52.3”</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>04° 53’ 40.8”</td>
<td>007° 00’ 06.8”</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>04° 53’ 15.3”</td>
<td>007° 00’ 08.0”</td>
<td>22</td>
</tr>
<tr>
<td>NTA Road</td>
<td>04° 53’ 49.0”</td>
<td>006° 54’ 25.5”</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>04° 52’ 44.3”</td>
<td>006° 54’ 39.7”</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>04° 52’ 06.1”</td>
<td>006° 57’ 28.5”</td>
<td>8</td>
</tr>
</tbody>
</table>
Sampling Procedures

Sampling was done in the months of August (wet season) and December (dry season), 2014. Four sample points along each of these roads located within a minimum of one kilometer between sample points. Four plant species (*Panicum maximum* (Jacq.), *Eleusine indica* (L.), *Xanthosoma maafafa* (Schott.) and *Amaranthus spinosus* (L.) ) found flourishing in both the experimental and the control sites were selected for the experimental study. The leaves of the test plants used for this investigation were collected before noon between the hours of 6.30am and 11am. Replicates of fresh leaves were harvested at a distance of 1 metre away from the roadside in the experimental and control sites. They were put in well labeled sterile cellophane bags and were hurriedly transported to an analytical laboratory for analysis. It was ensured that the selected plant species were under the same ecological condition with regard to soil, light and rainfall.

Analysis of Leaf for Biochemical parameters

Relative water content, total chlorophyll content, pH and ascorbic acid content of leaf extract were analyzed. The values obtained were used to compute the APTI values.

The Relative Water Content (RWC) was determined by weighing the fresh leaf samples of the test plants on a digital balance (Setra model number: BL-410S) to obtain the fresh weight (FW). The fresh leaves were then immersed in water for twenty four hours, blotted dry with the aid of whatman filter paper and reweighed to obtain the turgid weight (TW). They were finally oven dried (Gallenkamp plus II oven) for 48 hours at a temperature of 70°C and reweighed again to determine their dry weight (DW). Then RWC was computed using the formula described by Singh (1977) and Taneet *et al.*, (2014) as stated below:

\[
RWC = \frac{\text{Fresh Weight } - \text{Dry Weight (DW)}}{\text{Turgid Weight (TW) } - \text{Dry Weight (DW)}}
\]
Total Chlorophyll Content (TLC) was obtained according to the method of Stewarteet al. (1974) in which 0.1 gram of each of the leaf samples was soaked in 10 ml of 50% acetone; and then allowed to stand for two days to extract the available chlorophyll using a spectrophotometer.

The pH of the leaf was obtained by homogenizing 2 gram of fresh leaves in 20 ml of deionized water and leaf pH determined using a pH meter (HI8314). The Ascorbic Acid Content (AAC) was obtained using the indophenols acetic acid method (AOAC, 1984).

Air Pollution Tolerance Index (APTI) was calculated using the standard method as described by Singh and Rao (1983). Thus:

\[
\text{APTI} = \frac{\text{AAC (TLC + pH) + RWC}}{10}
\]

**Statistical Analysis**

Data was statistically analyzed using Standard Error Mean (SEM) using Microsoft excel package version 2007. Least significant difference (LSD) \( p < 0.05 \) was used to separate means.

**Results**

The average values of the biochemical parameters and percentage increase/decrease in total chlorophyll, leaf pH, ascorbic acid, relative water content for the four plant species at both the experimental and control sites are represented in Tables 2-5 below. The APTI for the test plants at both the experimental and control sites are shown in table 6.

The relative water content of the test plants was higher in the experimental sites than the control site for both seasons. That is; plants in experimental sites retain more water than the ones in control site (Table 2a and b). The highest was recorded in \( X. mafa \) in all the roads in the wet season.

**Table 2a:** Relative Water Content (wet season)

<table>
<thead>
<tr>
<th>Location</th>
<th>Species</th>
<th>Control</th>
<th>Experimental Site</th>
<th>% Increase/Decrease</th>
</tr>
</thead>
</table>
### Table 2b. Relative Water Content (dry season)

<table>
<thead>
<tr>
<th>Location</th>
<th>Species</th>
<th>Control</th>
<th>Experimental Site</th>
<th>% Increase/Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aba Road</td>
<td><em>P. maximum</em></td>
<td>63.0±0.9</td>
<td>74.9±0.1</td>
<td>+15.9</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>62.6±1.3</td>
<td>77.1±1.5</td>
<td>+18.8</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>63.7±1.1</td>
<td>74.8±1.8</td>
<td>+14.8</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>60.6±1.9</td>
<td>75.2±1.5</td>
<td>+19.4</td>
</tr>
<tr>
<td>East/West Road</td>
<td><em>P. maximum</em></td>
<td>63.0±0.9</td>
<td>71.8±2.2</td>
<td>+12.3</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>62.6±1.3</td>
<td>70.4±2</td>
<td>+11.1</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>63.7±1.1</td>
<td>70.3±1.5</td>
<td>+9.4</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>60.6±1.9</td>
<td>69.6±1.7</td>
<td>+12.9</td>
</tr>
</tbody>
</table>

Where; + = % increase, - = % decrease
The pH of the leaf extract was found to be lower in the experimental site than the control site (Table 3a and b). The highest pH was recorded in *Xanthosomamafafa* on Aba road while the least was recorded in *Amaranthuspinosus* on East/West road for both seasons.

**Table 3a:** pH of the Leaf Extracts (Wet Season)

<table>
<thead>
<tr>
<th>Location</th>
<th>Species</th>
<th>Control</th>
<th>Experimental Site</th>
<th>% increase/decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aba Road</td>
<td><em>P. maximum</em></td>
<td>4.12±0.1</td>
<td>2.31±0.1</td>
<td>-52.1</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>3.52±0.2</td>
<td>2.36±0.04</td>
<td>-43.4</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>4.22±0.2</td>
<td>2.4±0.1</td>
<td>-50.1</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>3.49±0.2</td>
<td>2.12±0.07</td>
<td>-27.4</td>
</tr>
<tr>
<td>East/West Road</td>
<td><em>P. maximum</em></td>
<td>4.12±0.1</td>
<td>1.3±0.1</td>
<td>-47.9</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>3.52±0.2</td>
<td>2.02±0.1</td>
<td>-49.5</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>4.22±0.2</td>
<td>1.08±0.03</td>
<td>-38.6</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>3.49±0.2</td>
<td>0.98±0.04</td>
<td>-43.9</td>
</tr>
<tr>
<td>Ikwerre Road</td>
<td><em>P. maximum</em></td>
<td>4.12±0.1</td>
<td>2.11±0.1</td>
<td>-56.6</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>3.52±0.2</td>
<td>2.11±0.1</td>
<td>-39</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>4.22±0.2</td>
<td>1.80±0.03</td>
<td>-53.8</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>3.49±0.2</td>
<td>1.5±0.1</td>
<td>-50.1</td>
</tr>
<tr>
<td>NTA Road</td>
<td><em>P. maximum</em></td>
<td>4.12±0.1</td>
<td>2.23±0.1</td>
<td>-43.3</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>3.52±0.2</td>
<td>1.84±0.1</td>
<td>-49.9</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>4.22±0.2</td>
<td>0.65±0.3</td>
<td>-35.6</td>
</tr>
</tbody>
</table>

Where; + = % increase, - = % decrease

Where; + = % increase, - = % decrease.
Table 3b: pH of the Leaf Extracts (Dry Season)

<table>
<thead>
<tr>
<th>Location</th>
<th>Species</th>
<th>Control</th>
<th>Experimental Site</th>
<th>% increase/decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aba Road</td>
<td><em>P. maximum</em></td>
<td>6.5±0.2</td>
<td>5.3±0.2</td>
<td>-22.6</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>6.3±0.2</td>
<td>5.4±0.2</td>
<td>-16.7</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>6.3±0.1</td>
<td>5.6±0.2</td>
<td>-12.5</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>6.5±0.1</td>
<td>5.4±0.1</td>
<td>-20.4</td>
</tr>
<tr>
<td>East/West Road</td>
<td><em>P. maximum</em></td>
<td>6.5±0.2</td>
<td>5.37±0.2</td>
<td>-21</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>6.3±0.2</td>
<td>5.13±0.2</td>
<td>-22.8</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>6.3±0.1</td>
<td>5.13±0.1</td>
<td>-22.8</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>6.5±0.1</td>
<td>5.05±0.2</td>
<td>-28.7</td>
</tr>
<tr>
<td>Ikwerre Road</td>
<td><em>P. maximum</em></td>
<td>6.5±0.2</td>
<td>5.2±0.2</td>
<td>-25</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>6.3±0.2</td>
<td>5.5±0.2</td>
<td>-14.6</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>6.3±0.1</td>
<td>5.1±0.2</td>
<td>-23.5</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>6.5±0.1</td>
<td>5.4±0.2</td>
<td>-20.4</td>
</tr>
<tr>
<td>NTA Road</td>
<td><em>P. maximum</em></td>
<td>6.5±0.2</td>
<td>5.4±0.1</td>
<td>-20.4</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>6.3±0.2</td>
<td>5.4±0.1</td>
<td>-16.7</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>6.3±0.1</td>
<td>5.6±0.1</td>
<td>-12.5</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>6.5±0.1</td>
<td>5.6±0.1</td>
<td>-16.1</td>
</tr>
</tbody>
</table>

Where; + = % increase, - = % decrease

During rainy season, the ascorbic acid content of the test plants in the experimental sites were lower in all plants except for *P. maximum* in NTA road (Table 4a). While in dry season, it varied among locations with *E. indica* in NTA road having the highest value and *P. maximum* in Aba road with the least value (Table 4b).

Table 4a: Ascorbic Acid Content (AAC) at Wet Season
<table>
<thead>
<tr>
<th>Location</th>
<th>Species</th>
<th>Control</th>
<th>Experimental Site</th>
<th>% Increase/Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aba Road</td>
<td><em>P. maximum</em></td>
<td>0.52±0.01</td>
<td>0.38±0.01</td>
<td>-36.8</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>0.54±0.01</td>
<td>0.45±0.02</td>
<td>-20</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>0.52±0.01</td>
<td>0.4±0.02</td>
<td>-30</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>0.56±0.01</td>
<td>0.46±0.02</td>
<td>-21.7</td>
</tr>
<tr>
<td>East/West Road</td>
<td><em>P. maximum</em></td>
<td>0.52±0.01</td>
<td>0.43±0.01</td>
<td>-20.9</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>0.54±0.01</td>
<td>0.52±0.01</td>
<td>-3.9</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>0.52±0.01</td>
<td>0.32±0.003</td>
<td>-62.5</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>0.56±0.01</td>
<td>0.53±0.01</td>
<td>-5.7</td>
</tr>
<tr>
<td>Ikwerre Road</td>
<td><em>P. maximum</em></td>
<td>0.52±0.01</td>
<td>0.42±0.01</td>
<td>-23.8</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>0.54±0.01</td>
<td>0.47±0.01</td>
<td>-14.9</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>0.52±0.01</td>
<td>0.43±0.003</td>
<td>-20.9</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>0.56±0.01</td>
<td>0.50±0.01</td>
<td>-12</td>
</tr>
<tr>
<td>NTA Road</td>
<td><em>P. maximum</em></td>
<td>0.52±0.01</td>
<td>0.55±0.02</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>0.54±0.01</td>
<td>0.5±0.01</td>
<td>-8</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>0.52±0.01</td>
<td>0.33±0.01</td>
<td>-57.6</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>0.56±0.01</td>
<td>0.44±0.004</td>
<td>-27.3</td>
</tr>
</tbody>
</table>

Where:  + = % increase, - = % decrease

**Table 4b:** Ascorbic Acid Content (AAC) for Dry Season
Results from this study showed that the test plants in the experimental sites had lower total chlorophyll content than in the control site (Table 5a and b).

Table 5a. Total leaf chlorophyll (wet season)

<table>
<thead>
<tr>
<th>Location</th>
<th>Species</th>
<th>Control</th>
<th>Experimental Site</th>
<th>% Increase/Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aba Road</td>
<td><em>P. maximum</em></td>
<td>4.12±0.1</td>
<td>2.31±0.1</td>
<td>-78.4</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>3.52±0.2</td>
<td>2.36±0.04</td>
<td>-49.2</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>4.22±0.2</td>
<td>2.4±0.1</td>
<td>-75.8</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>3.49±0.2</td>
<td>2.12±0.07</td>
<td>-64.6</td>
</tr>
<tr>
<td>East/West Road</td>
<td><em>P. maximum</em></td>
<td>4.12±0.1</td>
<td>1.3±0.1</td>
<td>-216.9</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>3.52±0.2</td>
<td>2.02±0.1</td>
<td>-74.3</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>4.22±0.2</td>
<td>1.08±0.03</td>
<td>-290.7</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>3.49±0.2</td>
<td>0.98±0.04</td>
<td>-256.1</td>
</tr>
<tr>
<td>Ikwerre Road</td>
<td><em>P. maximum</em></td>
<td>4.12±0.1</td>
<td>2.11±0.1</td>
<td>-95.3</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>3.52±0.2</td>
<td>2.11±0.1</td>
<td>-66.8</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>4.22±0.2</td>
<td>1.80±0.03</td>
<td>-134.4</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>3.49±0.2</td>
<td>1.5±0.1</td>
<td>-132.7</td>
</tr>
<tr>
<td>NTA Road</td>
<td><em>P. maximum</em></td>
<td>4.12±0.1</td>
<td>2.23±0.1</td>
<td>-84.8</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>3.52±0.2</td>
<td>1.84±0.1</td>
<td>-91.3</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>4.22±0.2</td>
<td>0.65±0.3</td>
<td>-549.2</td>
</tr>
</tbody>
</table>
The test plants in this study had APTI values of less than 16 for both seasons. It was observed that the APTI for both seasons were higher in the experimental sites than the control site. The maximum APTI values for rainy season was recorded in *Panicum maximum* on NTA road while the least was recorded in *X. mafafa* and *A. spinosus* on East/West road while the highest values for dry season was recorded in *Elusine indica* on NTA road and the least was recorded in *Amarathus spinosus* in Ikwerre road (Tables 6a & b).

**Table 6a**: Air pollution Tolerance indices (APTI) of the Test Plants (Wet Season)
<table>
<thead>
<tr>
<th>Location</th>
<th>Species</th>
<th>Control</th>
<th>Experimental Site</th>
<th>% Increase/Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aba Road</td>
<td><em>P. maximum</em></td>
<td>5.6±0.3</td>
<td>7.74±0.1</td>
<td>+27.6</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>5.8±0.4</td>
<td>8.02±0.2</td>
<td>+27.7</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>5.6±0.3</td>
<td>7.75±0.2</td>
<td>+27.7</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>5.7±0.5</td>
<td>7.82±0.2</td>
<td>+27.1</td>
</tr>
<tr>
<td>East/West Road</td>
<td><em>P. maximum</em></td>
<td>5.6±0.3</td>
<td>7.4±0.2</td>
<td>+24.3</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>5.8±0.4</td>
<td>7.4±0.2</td>
<td>+21.6</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>5.6±0.3</td>
<td>7.2±0.2</td>
<td>+22.2</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>5.7±0.5</td>
<td>7.2±0.2</td>
<td>+20.8</td>
</tr>
<tr>
<td>Ikwerre Road</td>
<td><em>P. maximum</em></td>
<td>5.6±0.3</td>
<td>7.4±0.3</td>
<td>+24.3</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>5.8±0.4</td>
<td>7.3±0.2</td>
<td>+20.6</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>5.6±0.3</td>
<td>7.5±0.3</td>
<td>+25.3</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>5.7±0.5</td>
<td>7.5±0.4</td>
<td>+24</td>
</tr>
<tr>
<td>NTA Road</td>
<td><em>P. maximum</em></td>
<td>5.6±0.3</td>
<td>8.04±0.1</td>
<td>+30.4</td>
</tr>
<tr>
<td></td>
<td><em>E. indica</em></td>
<td>5.8±0.4</td>
<td>7.6±0.3</td>
<td>+23.7</td>
</tr>
<tr>
<td></td>
<td><em>X. mafafa</em></td>
<td>5.6±0.3</td>
<td>7.8±0.2</td>
<td>+28.2</td>
</tr>
<tr>
<td></td>
<td><em>A. spinosus</em></td>
<td>5.7±0.5</td>
<td>8.0±0.3</td>
<td>+28.8</td>
</tr>
</tbody>
</table>

Where; + = % increase, - = % decrease

Table 6b: Air pollution Tolerance indices (APTI) of the Test Plants (Dry Season)
**Discussion**

When there is reduction in the rate of leaf transpiration, as a result of air pollution, plants lose its engine that pulls water from the roots to supply photosynthesis. The plants will either cool the leaf or bring minerals from roots to leaf where biosynthesis occur (Seyyednjad et al., 2011). Plants at the experimental sites were found to have more relative water content than the control. Similar result has been reported by Bhattacharya et al. (2013) where they observed higher relative water content in the monsoon season while Das and Prasad (2010) observed high leaf RWC during rainy season, low in winter and least in summer season. This retained water acts as an adaptive feature that helps in the maintenance of plants physiological balance against pollution stress condition (Verma, 2003). This shows that the ability to retain and accumulate water is an adaptive feature of plant to tolerate pollution stress.

pH plays very vital role in the modification of the toxicity of air pollution such as SO₂. Singh and Verma (2007) reported that plants with lower pH are more susceptible while those with pH of about 7 are more tolerant to pollution. High pH could increase the efficiency of the conversion from hexose sugar to ascorbic acid (Escobedo et al., 2008). The decrease in pH in the leaves of plant at the experimental sites could be explained that the exposure of plant to air pollutant causes an appreciable acidification of the cytoplasm to occur (Veljovic-Jovanic et al., 1993) leading to low photosynthesis.

Ascorbic acid activates some defense and physiological mechanisms (Arora et al., 2002) and serves as a tool acceptable to biomonitor pollutants. Its reducing power is proportional to its concentrations (Raza and Murthy, 1988). It also plays very significant role in light reaction during photosynthesis (Singh and Verma, 2007) but when subjected to stress, it has the ability to replace water from light reaction II (Singh and Verma, 2007). Ascorbic acid is a strong reducer that has significant function in photosynthetic fixation of carbon with its reducing power proportional to its concentration. So it reductions in the experimental site is an indicator of air pollution.

![Table]

<table>
<thead>
<tr>
<th>Road</th>
<th>Species</th>
<th>RWC 1</th>
<th>RWC 2</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ikwerre</td>
<td>P. maximum</td>
<td>6.2±0.1</td>
<td>7.7±0.1</td>
<td>+19.9</td>
</tr>
<tr>
<td></td>
<td>E. indica</td>
<td>6.0±0.03</td>
<td>7.5±0.2</td>
<td>+20.2</td>
</tr>
<tr>
<td></td>
<td>X. mafafa</td>
<td>6.1±0.02</td>
<td>7.9±0.2</td>
<td>+22.2</td>
</tr>
<tr>
<td></td>
<td>A. spinosus</td>
<td>6.2±0.2</td>
<td>7.4±0.2</td>
<td>+16.3</td>
</tr>
<tr>
<td>NTA</td>
<td>P. maximum</td>
<td>6.2±0.1</td>
<td>7.8±0.1</td>
<td>+20.8</td>
</tr>
<tr>
<td></td>
<td>E. indica</td>
<td>6.0±0.03</td>
<td>8.2±0.2</td>
<td>+26.2</td>
</tr>
<tr>
<td></td>
<td>X. mafafa</td>
<td>6.1±0.02</td>
<td>7.7±0.1</td>
<td>+20.3</td>
</tr>
<tr>
<td></td>
<td>A. spinosus</td>
<td>6.2±0.2</td>
<td>7.7±0.1</td>
<td>+19.8</td>
</tr>
</tbody>
</table>

Where; + = % increase, - = % decrease
Some air pollutants have been reported to reduce chlorophyll content (Tiwari et al., 2006; Joshi and Swami, 2007 and 2009; Joshi et al., 2009) while others increase it (Tripathi and Gautam, 2007; Agbaire and Esiefarienrhe, 2009). The reductions in the pH and ascorbic acid also have a direct effect on chlorophyll synthesis as observed in the result. Similar results had been reported by Joshi and Swami (2007) who observed that one of the most common impacts of air pollution is the gradual disappearance of chlorophyll. Decrease in values of pH of leaf extract and total chlorophyll content of leaf as observed also agrees with the findings of Jyothi and Jaya (2010) who proposed that high concentration of automobile pollution results in reduction in chlorophyll content of leaf in higher plants near roadsides. This shows that there is a correlation between leaf pH, ascorbic acid content and chlorophyll synthesis. Though, this varies from plant species to species, leaf age, pollution level as well as abiotic and biotic conditions (Katiyar and Dubey, 2001). Reduction in the chlorophyll content of plants results in poor productivity in plants. Thus; plants that maintain their chlorophyll in a polluted environment are referred to as tolerant (Singh and Verma, 2007).

APTI plays important role in determining the susceptibility and resistivity of plant species against levels of pollution. The results showed that various plants respond differently to air pollution. Differences in the values obtained from the four biochemical parameters (pH, ascorbic acid, chlorophyll and relative water content) resulted in variation in APTI values. In this study, the result of the APTI values of all the test plants fell within the range of sensitive for plant in the experimental site (Table 7). The increase in the APTI of the test plants may be due to increase in the RWC of the test plants that aid in plant physiological balance against pollution. Agbaire and Esiefarienrhe (2009); Tanee and Albert (2013); Taneet al. (2014) and Dileswaret al. (2015) have also reported some plants with varying level of sensitivity and tolerance to pollution using APTI.

Table 7: Grouping of plants based on APTI

<table>
<thead>
<tr>
<th>APTI Value</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 – 100</td>
<td>Tolerant</td>
</tr>
<tr>
<td>29 – 17</td>
<td>Intermediate</td>
</tr>
<tr>
<td>16 – 1</td>
<td>Sensitive</td>
</tr>
<tr>
<td>&lt;1</td>
<td>Very Sensitive</td>
</tr>
</tbody>
</table>

Source; Lakshmi et al., (2009)

Conclusion

All the test plants showed increased values at the experimental site for relative water content and ascorbic acid except for E. indica and X. mafa in Aba road and E. indicain NTA road. Also, the test plants in the control site had higher values of pH and total chlorophyll
but the values of APTI for the test plants were higher in the experimental sites than the control site. Hence, plants found growing along busy roads are exposed to pollutants to their own system which alter the biochemical nature of the leaf. All the plants in this study fell within the range of sensitive category to air pollution. Therefore, these plants can be explored as biomonitors in air pollution prone environment.

References


Determinant of Executive Remuneration in the Indonesian Banking Sector

Arif Harmano*, Lukytawati Anggraeni**, Imam Teguh Saptono***

*) Post Graduate, School of Business, Bogor Agricultural University, Indonesia 16151  
**) School of Business, Bogor Agricultural University, Indonesia 16151  
***) School of Business, Bogor Agricultural University, Indonesia 16151

ABSTRACT

The remuneration or the amount of compensation for the board of directors of the banking sector will affect the significance of the relevant banking management and decision-making systems. A sound banking sector management system will be directly proportional to the performance of the banking sector. The research is conducted to analyze the influence of bank performance towards the remuneration of the board of directors in The Indonesia’s Stock Exchange Financial Reports using descriptive analysis and to analyze the factors affecting the remuneration of the banking board in Indonesia using static panel modeling analysis. The performance of national banking in 2015 grows moderately with the growth of assets, credit, and Third Party Fund (DPK) of 9.53 persen, 10.85persen and 7.56 percent per year respectively, so that the profitability of the Indonesian banking industry continues to increase positively, which is an increase of 30percent – 50 percent per year. The amount of remuneration of the board of directors of public banks in Indonesia is influenced by the number of boards of directors (DIR), number of branch offices (CAB), profit banks (LABA), Loan to Deposit Ratio (LDR), and Operational Income Operating Cost (BOPO) Adequacy Ratio (CAR) and Net Interest Margin (NIM) have no significant effect.

Keywords : Remuneration, Bank performance, Static panel

I. INTRODUCTION

The current condition of the banking industry shows increased competition. This is indicated by the increasing number of branch offices operating in Indonesia. Recorded until 2015, the number of branch offices that have been opened there are 34,656 branches (Statistic of Indonesia’s banking, 2013-2015). The amount increased by 60% from the year 2013 as much as 21,657 branch offices. The data shows that business competition in the banking industry in Indonesia is increasing. Obviously the business competition aims to improve bank profits.

Net Profit (Net Income) is key measurement of a company’s success in whole. Profit could affect the Company’s capability to get loans and equity funding, the company’s position of liquidity and the company’s ability to make changes. The amount of profit (earnings) obtained on a regular basis and the tendency or trend of increased profit is a crucial factor and need more attention by the analysts in assessing the profitability of a company.

Table 1 shows the profit of 10 Public Banks which owns the biggest assets of Indonesia’s Banking Industry and also represents the 85,1 percent from total population of Public Banks and 67,81 percent of Total Assets in Indonesia’s Banking Industry.

Table 1  Profit of 10 Public Banks with the biggest assets 2011-2015

<table>
<thead>
<tr>
<th>Name of the Bank</th>
<th>Profit (in Billions of Rupiah)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2011</td>
</tr>
<tr>
<td>BCA</td>
<td>10,818</td>
</tr>
<tr>
<td>Bank Mandiri</td>
<td>12,695</td>
</tr>
<tr>
<td>BRI</td>
<td>15,088</td>
</tr>
<tr>
<td>BNI</td>
<td>5,808</td>
</tr>
<tr>
<td>CIMB Niaga</td>
<td>3,176</td>
</tr>
<tr>
<td>Bank Danamon</td>
<td>3,402</td>
</tr>
<tr>
<td>Bank Permata</td>
<td>1,038</td>
</tr>
<tr>
<td>BTN</td>
<td>1,119</td>
</tr>
<tr>
<td>Maybank Indonesia</td>
<td>671</td>
</tr>
<tr>
<td>Bank Panin</td>
<td>2,053</td>
</tr>
</tbody>
</table>

Source : The Indonesia’s Stock Exchange Financial Reports 2011-2015

Remuneration is a rewards given by the company for their meritorious workforce in helping the company to achieve their goals. For the Banking sector board of directors, Remuneration influence significantly on the management system and the Banking Decision Making. A good banking system management will be directly proportional to the Performance of that Banking sector.
Table 2 shows the Board Director Remuneration from 10 Public Bank with biggest assets 2011-2015. Table 1 and 2 shows the correlation of Profit and Remuneration. For example the Board Directors of Maybank Indonesia Remuneration in year 2012 declined from 2011, while profit of 2012 grows positively for the year before. Bank BTN is experiencing the same in 2014-2015. Its different from what happened to Bank CIMB Niaga, since the profit of Bank CIMB Niaga on 2013-2015 is decreased but the remuneration is still high.

<table>
<thead>
<tr>
<th>Name of the Bank</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCA</td>
<td>16,494</td>
<td>19,434</td>
<td>21,177</td>
<td>27,291</td>
<td>29,793</td>
</tr>
<tr>
<td>Bank Mandiri</td>
<td>12,308</td>
<td>14,774</td>
<td>17,460</td>
<td>19,259</td>
<td>22,408</td>
</tr>
<tr>
<td>BRI</td>
<td>9,637</td>
<td>11,463</td>
<td>13,298</td>
<td>21,358</td>
<td>23,640</td>
</tr>
<tr>
<td>BNI</td>
<td>8,184</td>
<td>11,026</td>
<td>20,062</td>
<td>15,682</td>
<td>15,258</td>
</tr>
<tr>
<td>CIMB Niaga</td>
<td>9,934</td>
<td>10,430</td>
<td>11,639</td>
<td>11,786</td>
<td>13,545</td>
</tr>
<tr>
<td>Bank Danamon</td>
<td>6,372</td>
<td>7,314</td>
<td>11,218</td>
<td>10,839</td>
<td>11,595</td>
</tr>
<tr>
<td>Bank Permata</td>
<td>6,867</td>
<td>7,417</td>
<td>9,704</td>
<td>8,402</td>
<td>7,174</td>
</tr>
<tr>
<td>BTN</td>
<td>7,265</td>
<td>7,913</td>
<td>9,190</td>
<td>5,757</td>
<td>5,118</td>
</tr>
<tr>
<td>Maybank Indonesia</td>
<td>5,093</td>
<td>4,570</td>
<td>6,219</td>
<td>4,630</td>
<td>4,890</td>
</tr>
<tr>
<td>Bank Panin</td>
<td>2,862</td>
<td>3,305</td>
<td>3,949</td>
<td>4,700</td>
<td>4,575</td>
</tr>
</tbody>
</table>

Source: The Indonesia’s Stock Exchange Financial Reports 2011-2015

Table 1 and Table 2 shows that there is a correlation between the Bank Performance and the Board Directors Remuneration. Previous Researchs also support this opinion, that there’s a significant correlation between Board Directors Remuneration and the Financial Performances. Scott (1997) found that the designing Board Directors Remuneration is based on the managerial performance measure, that is Net Income and Stock Price.

The expertise of Executive Managerial functions is closely related with the Financial performance of an organization. Therefore, it needed a good understanding between the level of executive remuneration with the measure of financial success. Agency Theory (Jensen and Meckling, 1976) explains that the connection between Bank Management with the achieving of company’s targets is unseparable. Previously, researches which clarify the correlation between remuneration and company’s performance have been done in several country including Indonesia. So it can be used as a guide and reference for next researchs. As the research done by Ayadi and Boujelbène (2013) on the influence of Board Directors to the Board Directors Remuneration on Banking Industry. The variable used on the research are the number of Board Director, ROA and ROE. The result of the research shows that the number of Board Directors and ROE influenced positively and significant, while the variable ROA has no significant influence to the Board Directors Remuneration at Europe Banking. Other research for reference is the research done by Kurawa and Saidu (2014) on the correlation between the Board Directors Remuneration and the Banking Performance illustrated by profit. The result of the research shows the positive and significant correlation between the banking profit and the Board Directors remuneration.

Up to now the research on the correlation of performance and Board Director Remuneration which has been done in Indonesia focused on commercial companies and other sector but Banking, like the research done by Vidyatmoko et al (2009) about the factors influencing the Executive Remuneration and its correlation with the performance of the state-owned plantation company. Therefore, to expand the research on executive remuneration in Indonesia, this research will focus on the Banking sector. Moreover, past researches only see from the profit or Banking’s benefit and also the accounting measurement for Bank performance, like ROA, CAR, LDR and so on. However on this research,will also focus on other factors which influencing the remuneration of Banking Board Director, that is the number of Board director at a Bank and the number of branch office that a Bank has which can shows the expansion efforts of a Bank. The Object of this research are the Public Bank of Indonesia.

The purpose of this research is (1) to analyze the remuneration growth and the performance of Indonesia’s public banks. (2) to analyze factors influencing the remuneration of Indonesia’s public banks board of directors.
II. RESEARCH METHODS

The type of data used on this research are secondary data. Data used are time-series data and cross section. Time-series data involves yearly data for as long as five years, from 2011 to 2015. While the Cross-section data involves 32 Public Banks which registered at Indonesia’s Stock Exchange (BEI).

This research used qualitative analysis method and modelling analysis. The modelling method used is the Static Panel data analysis with Microsoft Excel 2010 and Eviews 6. The research model used is adopted from the research of Ayadi et al (2013) with additions of 3 more research. As for the differences of this research and the research which was done by Ayadi et al (2013) is (1) Addition variable of numbers branch offices of a bank which applied from the Aduda research (2011). (2) the variable of Bank Profit which applied from the Kurawa et al research (2014). (3) Addition variable of CAR, NIM, LDR, and BOPO which applied from the Chowdhury et al research (2012). To analyze the variable or factors influencing the Remunerations of Board Directors, the model is develops as follows:

$$\ln (REN_t) = B0 - B1 \ln (DIR_t) + B2 \ln (CAB_t) + B3 \ln (LABA_t) + B4 (CAR_t) + B5 (NIM_t) + B6 (LDR_t) + B7 (BOPO_t)$$

Data Processing Techniques and Data Analysis

The data processing at this research used the static panel data regression. There is 3 approach in choosing the estimated model of panel data regression which is pooled least square (PLS), fixed effect or least square dependent variable (LSDV), and random effect (Gujarati 2007). Choosing of estimated methods was done to determine the best approach model, that is to use the Chow, Uji Hausman, and Uji LM testing. Also the evaluation model method used on this research is using the hypothesis testing (Test-F, Test-t, Determination coefficient), Assumption testing (Normality testing, Heteroscedasticity testing, multicollinearity testing, and autocorrelation test), and Economical testing.

III. RESEARCH RESULT

Descriptive statistics of Research Variables

Table 3 shows the descriptive statistic of all variable that serve as a general overview of internal and external factor condition that influence the amount of Indonesia’s public bank Board director’s remuneration. In five year time from 2011 to 2015, the average of board directors remuneration at Indonesia’s Public Bank is 21.99 percent with minimum of 19.73 percent and maximum of 26.23 percent. The average number of board director per board director remuneration is 1.90 percent, the average number of branch offices per board directors remuneration is 5.51 percent, the average of bank profit per board directors remuneration is 28.32 percent, the average of CAR per publin bank board directors remuneration is 18.60 percent, the average of NIM per public bank remuneration board directors is 8.49 percent, the average of LDR per public bank board directors remuneration is 84.19 percent, and the average of BOPO per public bank board directors remuneration is 84.69 percent.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>REN</td>
<td>21.99159</td>
<td>1.905915</td>
<td>5.514717</td>
<td>28.32536</td>
<td>18.60050</td>
<td>6.384750</td>
<td>84.19263</td>
<td>84.69619</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIR</td>
<td>21.85862</td>
<td>1.945910</td>
<td>5.766550</td>
<td>28.10835</td>
<td>16.36500</td>
<td>5.310000</td>
<td>84.96000</td>
<td>84.94500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAB</td>
<td>26.23062</td>
<td>2.564949</td>
<td>9.269741</td>
<td>30.90994</td>
<td>87.49000</td>
<td>68.58000</td>
<td>140.7200</td>
<td>173.8000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LABA</td>
<td>19.73517</td>
<td>1.098612</td>
<td>2.564949</td>
<td>13.81551</td>
<td>8.020000</td>
<td>0.240000</td>
<td>43.46000</td>
<td>33.28000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAR</td>
<td>1.237722</td>
<td>0.396643</td>
<td>1.546258</td>
<td>1.443185</td>
<td>10.45408</td>
<td>8.289801</td>
<td>12.84819</td>
<td>16.44565</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NIM</td>
<td>0.862029</td>
<td>-0.30195</td>
<td>0.248232</td>
<td>-6.04039</td>
<td>4.580529</td>
<td>6.077071</td>
<td>0.172082</td>
<td>1.235614</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDR</td>
<td>4.396155</td>
<td>2.006535</td>
<td>2.446882</td>
<td>65.30424</td>
<td>28.05086</td>
<td>42.50954</td>
<td>5.632630</td>
<td>9.383185</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOPO</td>
<td>32.81084</td>
<td>8.240376</td>
<td>3.682777</td>
<td>47.433138</td>
<td>11391.52</td>
<td>28.10835</td>
<td>18.60050</td>
<td>84.94500</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Correlation of Bank Performance to the Board Directors Remuneration of Public Banking in Indonesia.

In banking industry sector the high and competitive remuneration that was given to the employees especially the board directors are expected to make productivity, profit, and business growth. Table 4 shows that the Indonesia’s banking performance is growing positively, shown by the increasing CAR compared to the year 2014 become 21.39 percent and the total assets is increasing on the year of 2015 as much as 9.53 percent so that the level profitability of indonesia’s banking industry is having a positive increase by average of 30 percent to 50 percent per year.

www.ijsrp.org
Table 4  General condition of the Indonesia’s Banking Sector

<table>
<thead>
<tr>
<th>Rasio</th>
<th>2014</th>
<th>TW I</th>
<th>TW II</th>
<th>TW III</th>
<th>TW IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total assets (Billion rupiah)</td>
<td>5,404,403</td>
<td>5,577,929</td>
<td>5,732,978</td>
<td>5,943,259</td>
<td>5,919,406</td>
</tr>
<tr>
<td>Credit (Billion rupiah)</td>
<td>3,521,831</td>
<td>3,527,817</td>
<td>3,677,335</td>
<td>3,805,326</td>
<td>3,904,158</td>
</tr>
<tr>
<td>DPK (Billion rupiah)</td>
<td>3,940,494</td>
<td>4,028,755</td>
<td>4,156,933</td>
<td>4,297,649</td>
<td>4,238,349</td>
</tr>
<tr>
<td>CAR (Percent)</td>
<td>19.57</td>
<td>20.98</td>
<td>20.28</td>
<td>20.62</td>
<td>21.39</td>
</tr>
<tr>
<td>ROA (percent)</td>
<td>2.85</td>
<td>2.69</td>
<td>2.29</td>
<td>2.31</td>
<td>2.32</td>
</tr>
<tr>
<td>NIM (percent)</td>
<td>4.23</td>
<td>5.3</td>
<td>5.32</td>
<td>5.32</td>
<td>5.39</td>
</tr>
<tr>
<td>BOPO (percent)</td>
<td>76.29</td>
<td>79.49</td>
<td>81.4</td>
<td>81.82</td>
<td>81.49</td>
</tr>
<tr>
<td>LDR (percent)</td>
<td>89.42</td>
<td>87.58</td>
<td>88.46</td>
<td>88.54</td>
<td>92.11</td>
</tr>
</tbody>
</table>

Source: Statistic of Indonesia’s banking, 2015

The consequences of the financial performance of the banking industry have an impact on the appreciation of the board directors in form of increasing remuneration or higher remuneration. Table 5 shows the interval of the board directors remuneration of public bank from the year of 2011 to 2015. The data from the table shows that there is an increase number of banks with the amount of board directors remunerations higher than 10 billion rupiah.

Table 5  the interval of board directors remuneration of Public bank 2011-2015

<table>
<thead>
<tr>
<th>Interval Remuneration</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>x &gt; 10 M (Rp)</td>
<td>6%</td>
<td>16%</td>
<td>19%</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>5 M (Rp) &lt; x &lt; 10 M (Rp)</td>
<td>31%</td>
<td>19%</td>
<td>19%</td>
<td>9%</td>
<td>13%</td>
</tr>
<tr>
<td>x &lt; 5 M (Rp)</td>
<td>63%</td>
<td>65%</td>
<td>62%</td>
<td>66%</td>
<td>62%</td>
</tr>
</tbody>
</table>

Source: The Indonesia’s Stock Exchange Financial Reports 2011-2015

Table 6 shows that in year 2015 there are 5 banks which has the remuneration of board directors above 10 billion rupiah, that is Bank BCA, Bank Mandiri, BRI, BNI, and CIMB Niaga. Meanwhile the remuneration of board director of Bank Danamon, BTPN, Bank Bukopin, Bank Permata, OCBCNISP, BTN and Maybank Indonesia is at the interval of 5 billion to 10 billion rupiah. And the remuneration of board director from the rest of the 20 public banks is at the interval below 5 billion rupiah.

Table 6  The remuneration interval of the Board Directors of public bank 2015

<table>
<thead>
<tr>
<th>x &gt;10 M (Rp)</th>
<th>5 M (Rp) &lt; x &lt;10 M (Rp)</th>
<th>x &lt; 5 M (Rp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCA, Mandiri, BRI, BNI dan CIMB NIAGA</td>
<td>Danamon, BTPN, Bank Bukopin, Bank Permata, OCBC NISP, BTN dan BII (Maybank)</td>
<td>Bank JATIM, Bank Mega, PANIN Bank, QNB Indonesia, BNP, ArthaGraha, WSI, Bank Windu, Bank Mestika Dharma, Jrust Indonesia, Bank Ganesa, Bank MNC, Bank Pundi, Bank Victoria, Bank Sinarmas, Bank BumiArta, BJB, BRI Agro, Bank Ina Perdana dan Bank Nationalnobu</td>
</tr>
</tbody>
</table>

Source: The Indonesia’s Stock Exchange Financial Reports 2011-2015

Selecting the best model

Estimating best model selection is done with the Chow Testing and Hausman testing to choose random-effect model, fixed-effect model, or pooled least square. The result on the Chow testing is the p-value 0.000 is less than 0.05, then decline H_0 and the chosen model is Fixed-effect model. Hence, the best model selection based on Chow Testing and Hausman Testing is fixed-effect model.

Table 7 the estimation result of the best model selection shows that the variable number of bank board directors, bank profit, LDR, and BOPO significantly affected the remuneration of board directors of public banks.
### Table 7: The estimation result of factor model of the determinant factor of board directors remuneration

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ln DIR</td>
<td>-0.430612***</td>
<td>0.049086</td>
<td>-8.772572</td>
<td>0.0000</td>
</tr>
<tr>
<td>Ln CAB</td>
<td>0.151763**</td>
<td>0.082669</td>
<td>1.835795</td>
<td>0.0688</td>
</tr>
<tr>
<td>Ln LABA</td>
<td>0.069426***</td>
<td>0.021580</td>
<td>3.217213</td>
<td>0.0017</td>
</tr>
<tr>
<td>CAR</td>
<td>0.000227***</td>
<td>0.002398</td>
<td>0.094545</td>
<td>0.9248</td>
</tr>
<tr>
<td>NIM</td>
<td>0.000322**</td>
<td>0.002116</td>
<td>0.152028</td>
<td>0.8794</td>
</tr>
<tr>
<td>LDR</td>
<td>0.016246***</td>
<td>0.003005</td>
<td>5.406828</td>
<td>0.0000</td>
</tr>
<tr>
<td>BOPO</td>
<td>0.006693***</td>
<td>0.002290</td>
<td>2.922668</td>
<td>0.0041</td>
</tr>
<tr>
<td>C</td>
<td>18.06779</td>
<td>0.930100</td>
<td>19.42565</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R-squared | 0.982213
Adjusted R-squared | 0.976628
F-statistic | 175.8393
Prob(F-statistic) | 0.000000

Remarks:

*** Significant at 1 percent real level

** Significant at 10 percent real level

Based on the estimation result of factor model shown on table 8, then the research model is:

\[
\ln(R_{\text{EN}_t}) = 18.068 - 0.431 \ln(DIR_{t}) + 0.151 \ln(CAB_{t}) + 0.069 \ln(LABA_{t}) + 0.0002 \times CAR_{t} + 0.0003 \times NIM_{t} + 0.016 \times LDR_{t} + 0.0057 \times BOPO_{t} + \alpha + \beta_{t} \times \epsilon_{it}
\]

keterangan:

- \( R_{\text{EN}_t} \) = The remuneration of board directors at bank i at year t (Rupiah)
- \( DIR_{t} \) = The numbers of board directors of bank i at year t (people)
- \( CAB_{t} \) = The number of branch offices of bank i at year t (pieces)
- \( LABA_{t} \) = Net profit of bank i at year t (rupiah)
- \( CAR_{t} \) = Capital Adequacy Ratio bank i at year t (percent)
- \( NIM_{t} \) = Net Interest Margin bank i at year t (percent)
- \( LDR_{t} \) = Loan to deposit ratio of bank i at year t (percent)
- \( BOPO_{it} \) = The Operating costs of Operational revenue bank i at year t (percent)
- \( \alpha \) = Intercept
- \( \beta_{t} \) = koefisien regresi
- \( \epsilon_{it} \) = Error

### Deciding factor of remuneration of board director at public bank in Indonesia

#### Number of bank board director (DIR)

The variable number of director of a bank is affecting significantly on real level as much as 1 percent of the board directors remunerations of a bank (REN) as much as -0.431. These shows that with increasing the number of directors by one percent, the remuneration will decrease by 0.43 percent. The estimation result is in accordance with the initial hypothesis and in accordance with the research of Ayadi et al. (2013).

The more or less number of board directors is unable and has no effect on the management actions in generating profits. This is because the number of board directors is unable to guarantee the effectivity in performing the monitoring functions to the management performances as explained in the research of Widyati (2013). This shows that the performance of the Bank Board Directors in generating profits is not influenced by the number of board directors so that the addition of board directors will only decreasing the percentage of the divisions of board directors remuneration.

#### Bank Profit (Profit)

Bank profits affecting significantly on real level at one percent to the remuneration (REN) with the coefficient value estimated at 0.069. This shows that in every increased profits by one percent the will be an increase of remuneration by 0.069 percent. This estimation results is in accordance with the initial hypothesis and in accordance with the research done by Kurawa et al. (2014). This results is also shows that the higher of the profit gained surely will effect on boards remunerations.

In accordance with the letters from the Financial Services Authority Number 40/SEOJK.03/2016 on the implementation of governance on the provision of remuneration for public banks on clause 19 arranged that the provision of remuneration is adjusted with the financial condition of a bank, in case of loss, the variable amount of remuneration given to board directors can be suspended or given with the relatively smaller amount. The increased profits generated by a banks will increase the variable remuneration received by board directors.

#### Loan to Deposit Ratio (LDR)
Loan to Deposit Ratio influence significantly on the real level by one percent to the remuneration (REN) with coefficient value estimated by 0.016. This shows that in every increase of LDS by one percent will increase the remuneration by 0.016 percent. The estimation result is in accordance with the initial hypothesis and with the research done by Chowdhury et al. (2014).

LDR is the ratio used to measure the ability of a bank to do expansion or to distribute credits to community, that is if the value of LDR is high it means that the Bank is able to distribute credits to community. Hardiyanti (2012) states that the profit is positively and significantly influenced by LDR. In results the increase of LDR gives the bank a chance to generated profits from the credit distribution. The increase of profit will make the amount of remunerations that received by the board directors higher.

The Operating costs of Operational revenue bank

The operational cost of operating income (BOPO) influence significantly on the real level by one percent to the remuneration (REN) with coefficient value by 0.0067. This shows that in every increase of BOPO by one percent will increase the remuneration by 0.0067 percent. The estimation result is in accordance with the initial hypothesis and also the research done by Chowdhury et al (2014).

Based on the letter from Bank Indonesia no.6/23/DPNP dated 31 May 2004 states that one indicator of a bank categorized healthy is banks with BOPO value by 76-93%. The condition of banking industry in Indonesia by 2015 state that the average of BOPO value is 82%. This condition shows that the indonesia banking industry is healthy. This healthy condition states that BOPO value at banking industry is efficient or bank is said in good condition on managing its operational costs in generating profits so that the increase of BOPO value will affect also on the increase of bank profits. The long-term effect is that the bigger of profit will maximize the remuneration received by the Bank Board Directors.

IV. CONCLUSION

Based on the research that has been done, we can conclude that using descriptive analysis to shows the general picture of the internal and external factors which influences the amount of remuneration for board directors of public banks in Indonesia. In five year time from 2011 to 2015, the average of board directors remuneration of public banks in Indonesia is 21.99 percent with minimum value at 19.73 percent and maximum value at 26.23 percent.

Several factors influencing the remuneration of board director of public banks is the number of board directors, the number of branch offices of a bank, net profit of a banks, Capital Adequacy Ratio (CAR), Net Interest Margin (NIM), Loan to Deposit Ratio (LDR), Operational costs of operating income (BOPO).

The result of the research with static panel model of analysis shows that the amount of remuneration of the board directors in public bank of indonesiа is influenced significantly by the number of board directors (DIR), bank profit (Profit), Loan to Deposit Ratio (LDR), and operational costs of operating income (BOPO).

BIBLIOGRAPHY


AUTHORS

First Author – Arif Harmano, Post Graduate, School of Business, Bogor Agricultural University, Indonesia. Email: arif.mano1@gmail.com

Second Author – Dr Lukytawati Anggraeni, SP, M.Si., School of Business, Bogor Agricultural University, Indonesia. Email: lukytawati.anggraeni@gmail.com

Third Author – Dr. Imam Teguh Saptono, MM., School of Business, Bogor Agricultural University, Indonesia. Email: itsaptono@yahoo.co.id

Correspondences Author – Arif Harmano, arif.mano1@gmail.com, +6281213506427.
Impact of Proprioceptive Exercises Post ACL – Reconstructive Surgery

Dr. S. S. Subramanian

M.P.T (Orthopaedics), M.S (Education), M. Phil (Education), Ph.D (Physiotherapy), The Principal, Sree Balaji College Of physiotherapy, Chennai – 100., Affiliated To (Bharath) University, BIHER, Chennai – 73.

Abstract - An increasing prevalence of injury to the knee joint leading to ACL reconstruction surgery (ACL–R) a common procedure getting done. Irrespective of the ages, rehabilitation post ACL-R needs more focus for early functional return of the subjects. Aims and objective of this original research report was to analyse proprioceptive exercises among ACL-R, impact of exercises on obesity, and their combined effects on womac score in 1 year follow up. Materials and Methods: 5 subjects with mean age of 34 years of both sex who had ACL-R with mean BMI of 42 kg/m² were treated with proprioceptive exercises and weight reduction exercises in a one year follow-up from 2015-2016, with weekly twice frequency at Chennai. Results: pre and post womac score p<.01 and BMI p<.05 were analysed statistically and recorded. Conclusion: Than regular exercises among post ACL-R, subject, focus on obesity, angular correction exercises, core strengthening, graft specific exercises along with continued follow-up are key focus of this monograph presentation.

Index Terms - ACL – R – Anterior Cruciate Ligament Reconstruction, BMI, Womac Score

I. INTRODUCTION

Anterior Cruciate Ligament (ACL) is a anterior stabilizer of knee, restricting anterior tibial translation and rotational forces at the tibio femoral joint.

Injury: ACL deficiency results in pain increased instability and altered function (Heringston et al. 2006). ACL injury is the most common injuries of knee joint and accounts for 50% of total injuries occur in knee joint (Allan et al. 2013).

Prevalence: In New Zealand 80% of all knee LG injured (ACL –R) Anterior Cruciate Ligament Reconstruction (Gianotti 2009) more than 2,50,000 ACL injuries occur yearly in US (Chapman et al. 2001) and more than 50% of them under goes ACL - R (AAOS 2007)

Economy with ACL – R

- With an average cost of an ACL – R surgery is $10, 32 US dollars in 2011 (Lubowitz & Appleby 2011). Total costs including diagnosis, surgical reconstruction and post operative rehabilitation of ACL injuries accounts to 13 billions in united states annually (Brophy et al. 2009)

- ACL – R life time cost for a patient was $38, 121 and $7.6 million annually in US who were projected to develop radiographic osteoarthritis life time, would need total knee replacement (TKR) (Scott et al. 2000)

- Wright et al. 2012 have in a systematic review post ACL –R reported with increasing health care cost, increased psychological distress and re injury

Keywords: ACL – R: Anterior Cruciate Ligament Reconstructive Surgery, ACL, Womac Score, TKR, CKC – Closed Kinematic Exercise Proprioception, BPTB, EMG, QOL

Role and Need for Surgery in ACL Injury :

- ACL –R may aid patients in regaining proper joint kinematics, minimising poor joint kinematics are abnormal stresses that could occur with ACL – D (Losina et al. 2009)

- ACL – R surgery is aimed at restoring joint stability, minimizing further damage to the menisci and articular cartilage (Gold Blatt et al. 2005) and (Lynch et al. 2013)

- Have identified criterions such as absence of giving way, absence of joint effusion symmetry of quadriceps strength, patient reported outcomes, return to sports, as successful outcome of the post ACL –R surgery.

- A Cochrane review by smith et al. 2014 analysed ACL injured subjects with ACLR and conservatively managed with exercises, recorded no difference with regard to knee function, health status and return to pre injury level.

Aims & Objective of this monograph was to analyse Proprioceptive exercises on obesity and womac among post ACL- R subjects

II. MATERIALS & METHODOLOGY

5 subjects with mean age of 3 who underwent ACL-R following RTA were included in this research in a one year follow up study. Their mean BMI was 42 Kg/m² all the subjects were regularly treated with weekly twice frequency at Chennai where this study was conducted during the period of Feb 2016 to march 2017 with good adherence for exercises, all the subjects have continued their daily routine activities.

All the subjects were treated by the author from the first Post operative day of surgery, but PTB grafts were used on 3 subjects and hamstring Grafts on 2 subjects.

Key emphasis on closed kinematic, proprioceptive exercises using air inflated, physioball, other weight bearing
means such as wobble board were used. Also core strengthening and resisted means of exercises to contra-lateral limb were used A set of 5 specific proprioceptive exercises in various positions such as supine, sitting and standing were used, progression was done with increasing repetition and duration with isometric holds. Also 5 core strengthening exercises using physioball were, where progression was done with more repetitions.

1. No undue pain were recorded with session but the subjects reported knee laxity with exertional activities such s long standing, prolonged sitting with travelling on both knee.
2. Also few articular changes such as crepitus and pain on movements with mild joint effusion was recorded
3. An interesting feature is with an quadriceps easting of mean 2 cm but hypertrophy of gastrocnemius with 3 cm were recorded
4. Getting rid of brace usage post operatively depends on confidence pain, level of activities and strength of quadriceps post ACL-R was noted among participants

III. RESULTS
Table of results of all the subjects post ACL-R with womac score and BMI using paired t test:

<table>
<thead>
<tr>
<th></th>
<th>MEAN</th>
<th>SD</th>
<th>SE</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMAC SCORE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRE</td>
<td>8.95</td>
<td>3.99</td>
<td></td>
<td>8.52</td>
<td>.05</td>
</tr>
<tr>
<td>POST</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI PRE</td>
<td>2.19</td>
<td>.97</td>
<td></td>
<td>3.50</td>
<td>.05</td>
</tr>
<tr>
<td>POST</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: X - Statistically Significant, XX - Highly Significant

IV. DISCUSSION
Rehabilitation of ACL:

- Strengthening of quadriceps and gastrocnemius are of greater important instead of hamstrings post ACL – R rehabilitation (Kvist and Gillquist 2001)
- Closed Kinematic Chain (CKC) exercises were widely used in the knee rehabilitation as they stimulate functional activities and similar daily activities (Heijne etal 2004) and increase tibiofemoral joint compression and emphasize co contraction between hamstring and quadriceps muscle, thus stabilizing the joint and minimize strain on the healing ACL (Escamila etal 1998)
- Also CKC exercises helps to correct neuro muscular imbalances for optimal biomechanics and reduction of knee injuries (Ford etal 2003)

Role of Proprioceptive Exercises in Post ACL – R:

- Proprioceptive deficits have been found beyond 1 year post ACL – R (Decker etal 2002) and proprioceptive exercises have been shown to enhance strength gains in the quadriceps and hamstring muscles post ACL – R (Zalter Storm 2000)
- Proprioceptive input and neuromuscular control are to be attended post ACL injury (Woijys & Huston 1994) and proprioceptive exercises produces compensatory muscle activation patterns in the neuro muscular system that assist with joint stability (Cooper etal 2005)
- High intensity electrical stimulation to improve quadriceps strength and gait parameters were reported by many studies (Fitzgerald etal 2003)
- Evidence appears with contractile activity improved if this can be done during weight bearing, in an upright position, once the patient can tolerance placing the limb in a dependant position with at minimum partial weight bearing (Baratta etal 1988)
- With CKC position, decreased stress placed on the graft tissue as compressive forecast the tibiofemoral joint and co contraction of muscles surrounding the knee help control excessive motion at all joints in the closed chain (Oh Kohi etal 1991)
- If the patient has difficulty in performing supine knee extension, they can perform in prone position with hip extensor aiding achievement of full extension (Weber etal 2004)
- Hamstring activity is needed as they are synergistic to ACL, strengthening of the hamstring muscles may provide a primary dynamic restraint to anterior tibial translation (Gross etal 1993)
- Closed kineamic chain squats on a stable surface between 4-6 weeks post ACL – R, where knee flexed at 250- 300 and maintain that position as it will produce a co contraction of the hamstrings and quadriceps (Wilk etal 1996)
- Fitzgard etal 2000 have examined proprioceptive training in ACL deficient patients and recorded decreased frequency of giving way episodes following their ACL injury.
- Between 6 weeks to 3 months, where auto graft reaching nits weakest point structurally (Bulte etal 1989) as controlled loading will enhance ligament and tendon healing, while excessive stress loading to an ACL graft may cause graft elongation leading to excessive un wanted anterior posterior laxity (Beynnon eta 1994)
- Post ACL –R between 3 months period core trunk training and stability to maintain. Center of mass, balance and postural control, hence exercises for the trunk and hips are more desired (Myer etal 2008). Which can consists of sit-ups, bridging exercises, single leg bridges, straight leg dead lifts and planks (Hewett etal 2005) core exercises were part of this subjects therapy regime as supported by the above studies

www.ijsrp.org
Surgical Techniques and Exercises:

- Patellofemoral complications are common especially following with patella tendon grafts (Sachs et al 1989) Tyler et al 2007 among 49 patients following Bone Patella Tendon – Bone (BPTB) – R with immediate weight bearing, have recorded decreased anterior knee and increased vastus medialis activity with EMG (Electrotherapy) but no difference in range of movement and articular cartilage among weight bearing group
- In BPTB- R as the extensor mechanism has undergone significant insult in the harvesting process, so early motor control with an active quadriceps contraction pulls tension through the patellar tendon, minimising the potential for entrapping scar tissue. Also it additionally squeezes scar tissue of the anterior knee helping to decrease swelling (Shelbourne 1990)
- Hamstring Auto Graft when used, maximal isometric exercises in 4-6 weeks period can be useful. The ACL mechano receptor reflex arc to the hamstrings may cause a loss of proprioception, as a latency of the hamstrings is almost twice that of the normal contra lateral uninjured knee (Lutz et al 1990) as at this time enough soft tissue healing of the hamstrings should allow tolerance to perform gentle hamstring, gastrocnemius and soleus flexibility exercises.

Procedures and Exercises:

- ACLR with a hamstring tendon graft has demonstrated better self reported function and decreased anterior knee pain when compared with a patellar tendon graft (Wipfler etal 2011)
- Frobell etal 2013 have demonstrated with patella tendon graft, have significant increase in patella femoral arthritis, not tibio femoral, when compared to hamstring graft.

Complications Post ACL – R

- Brittney etal 2014 have recorded that 44% of subjects who underwent developed osteoarthritis knee
- Øiestad etal 2009 n a 10 years follow up among ACL tear subjects reported the risk of developing arthritis was 13%
- As displayed in results table with reduction in BMI which statistically proven P<.05, hence complications post ACL – R, were less among this study subjects
- Barnius of osteoarthritis in a 14 year follow up post ACL – R prevalence of osteoarthritis in a 14 year follow up post ACL – R and increased knee laxity leading to meniscal chondral lesions (Loger Stedt etal 2010)
- Palmieri etal 2008 have in a systematic review post ACL –R recorded 20% subjects with quadriceps strength deficit with 2 year follow up and Øiestad etal 2009 link this to lower neural drive.

Quality of Life:

- As QOL and psychological health of the injured individual are often much lower than that of an uninjured individual (Schweer etal 2006) also major knee injuries like ACL can directly affect the ability to participate in sports, daily activities and employment requirements (Lee etal 2008). An improved womac score of this subject treated with Proprioceptive as main tool have improved functional mean as shown in table of results

Critical Analysis of the Topic:

1. Knee exercises alone sufficient post ACL – Right? Total leg strengthening exercises of the operated knee as well trunk, contra laterral leg are important for better rehabilitation outcome from day one of Post ACL – R, are highly recommended
2. Does regular follow up favours functional outcome? As reported 25% of patients post ACL – Right suffer a second tear in 10 years. Altered neuromuscular control of hip and knee during a dynamic landing task and postural stability deficits after ACL – R are predictors for second injury decreased muscular strength, joint position sense, postural stability are reported in 6 months – 2 years following post ACL – Right, hence regular therapy favours better functional outcomes is evident.
3. Other than Proprioceptive (Closed kinematic chain exercises) what specific exercises can be beneficial post ACL – R Evidence suggests Cryotherapy post arthroscopic surgery decreases pain and disinhibition effect on the quadriceps muscle. Electrical stimulation to quadriceps core strengthening exercises (Hewet etal 2005) in a 6 week plyometric have recorded an increase in strength and function post ACL – R
4. Any muscles to focus specifically post ACL – R? While quadriceps muscle strengthening is key post ACL – R, Hamstring, Gastrocnemius also to be strengthened. Also Vastus medialis’s of the operated knee to be given more attention
5. Major factors influencing post ACL – R rehabilitation? Obesity, strength of quadriceps, type of grafts used, proper rehabilitation injury to associated structures of knee such as meniscus, medical LG, age of the subject, cost involved, type of exercises adopted all of which influences on the prognosis post ACL – R
6. Is Proprioceptive exercises alone enough? Through Proprioceptive exercises are key area to be focussed in post ACL – R, other exercises to mobilise knee joint, strengthening of various muscles in different angles in line with the protocol, core strengthening and resisted means of exercises to contra lateral leg have to be added along with Proprioceptive exercises for good functional Proprioceptive clinical result
7. Range of motion of knee how much to expect and what are the factors influencing? Pre operative loss of knee extension (In comparison to Contra lateral Knee) were likely to have limited knee extension after surgery but the good of knee flexion is 90° at week one and by 4th week 120° post ACL – R (Maske etal 2012) but combined with meniscectomy or medical LG repair influences post ACL – R range of motion of knee.
8. Is there chances of (Other) contra lateral knee getting affected post ACL – R? With neuromuscular imbalances post ACL – R, contra level knee and ipsilateral lumbar spine, hip ankle, will undergo altered
biomechanical changes as inferred by Ford et al. 2003. Also with an abnormal alignment with varus or valgus deformity along with obesity can cause further degenerative changes of the contralateral uninjured knee hip and lumbar spine.

9. Quadriceps deficit mainly Vastus Medialis weakness persists?
Many studies evidenced quadriceps deficit mainly Vastus medialis’ in post ACL – R subjects even 2 years post surgery mainly in post BPTB graft is used.

10. Changes in articular cartilage occurs?
Effects of early weight bearing post ACL – R, on articular cartilage is known, but altered biomechanics with decreased muscle strength, lack of range of motion, decreased joint position sense, abnormal leg alignment, neuromuscular deficit post ACL – R can lead to articular cartilage degenerative changes is evident.

Critical Appraisal of this Presentation:
1. Further studies where larger sample with long-term follow-up post ACL – R are recommended along with analysing quality of life parameters.
2. Limitations of this study includes smaller sample size, isolated Proprioceptive exercises were not experimented in this study as such parent study was available and should not be detrimental to the subject hence such effort was not made, however more focus on Proprioceptive means were given among the selection of exercises.
3. No qualitative parameters such as NMRI, were used in this study to validate the results.
4. Also reduction in BMI should be sustainable to correlate functional improvement of womac.
5. Sample of population represents one metro city of India and multi centre trial with the same topic are recommended further.

V. EXECUTIVE SUMMARY
Post injury to knee joint resulting in ACL lesion are getting common also its management with ACL-R. This original monograph mainly focus on impact of proprioceptive exercises among post ACL-R subjects, proprioception exercises not only prevent damage to grafts but facilitates joint stability with co-contraction, which is similar to many daily activities with 5 subjects treated with proprioceptive exercises as major component along with core strengthening and strengthening of lateral limb post ACL-R in a one year follow up this research report strives to analyse the role of proprioceptive exercises in the rehabilitation of post ACL-R patients. Also obesity and womac score were evaluated with due statistical means. Critical analysis on the effect of core exercises, contra-lateral limb exercises, graft specific exercises were analysed, with strong conclusion on emphasis of patient specific, graft specific exercises and long term follow-up required among post ACL-R for sustained benefits and prevention of complications associated with it were presented in this monograph.

VI. CONCLUSION
As evidenced with various complications associated with post ACL-R, core should be taken while choosing exercises for example keeping an eye on obesity holds a key for better recovery. Also continued follow up for knee laxity, quadriceps strength and regular check on contra-lateral knee and lumbar spine are highly recommended with altered biomechanics. The role of physiotherapist gets highlighted with increased prevalence of ACL injury and subsequent ACL-R, hence pattern of prognosis should be patient centric and functional based one are the major outcome of this original monograph presentation.

REFERENCES
ISSN 2250-3153


390


AUTHORS

First Author – Dr. S.S. Subramanian, M.P.T (Orthopaedics), M.S (Education), M. Phil (Education), Ph.D (Physiotherapy), The Principal, Sree Balaji College Of Physiotherapy, Chennai – 100., Affiliated To (Bharath) University, BIHER, Chennai – 73., subramanian.sbcp@bharathuniv.ac.in, subramanian.podhigai1968@gmail.com, Phone: 99400 47137.

www.ijsrp.org
Flexural Strength of Concrete beam using Hospital Waste Ash as replacement

Sabo Bala, Hassan Abba Musa
Civil Engineering Department, Abubakar Tafawa Balewa University Bauchi, Nigeria

Abstract - This paper is the presentation of flexural strength of concrete beam using hospital waste ash as replacement of cement. The study covered the test of aggregates grading, specific gravity of materials, workability and water absorption as well as the flexural strength test of the composite concrete to determine the suitability of Hospital waste as replacement using constant mix design proportion of 1: 1.64: 2.47: 0.50 in accordance to standard DOE method, with different mixes added based on 0%, 10%, 20%, 30%, and 40% replacement. A total of 75 beams of sizes 450mm × 150mm × 150mm were tested for flexure after the curing period of 3, 7, 28, 60, and 90 days by complete immersion. It shown that the workability of the composite mix decreased with replacement higher than 10%, but density and water absorption increases with replacement level and curing age respectively, while 20% replacement appeared to be the optimum. The study also reveals that replacement of Hospital Waste Ash under flexural test reduces the flexural strength value as minimum compared to conventional value of concrete. However, it maintains, or slightly reduces the mechanical and durability properties of cement-based materials with cementitious properties that are suitable to be bind together with cement as replacement.

Index Terms - Flexural Strength test, Hospital Waste Ash, Absorption test, Cementitious Properties

1.0 INTRODUCTION

With the advancement of technology and increased application of concrete and mortar; the strength, workability, durability and other characteristics of the ordinary concrete is continually undergoing modifications to make it more suitable for any situation. The growth in infrastructure sectors led to scarcity of cement thus makes it increasing incrementally with time, Example in Nigeria, the cost of cement hits N2600 per bag. In order to combat the scarcity of cement and the increasing cost of concrete under these circumstances; the use of recycled solid wastes, agricultural wastes, and industrial by-products like fly ash, blast furnace slag, silica fume, rice husk ash, phosphogypsum, Hospital waste ash, volcanic ash, stone dust etc. will sufficed the problems. The use of above mentioned waste products in partial replacement of cement paved a role for; modifying the properties of the concrete, controlling the cost of concrete production, and finally has the advantageous disposal of industrial wastes.

The use of particular waste product will be economically advantageous usually at the places of abundant materials and production. Much of the literature is available on the use of fly ash, blast furnace slag, silica fume, rice husk, etc. However, the literature on the use of hospital waste in construction industry begins to develop. This paper tries to focus on the use of hospital waste in partial replacement of cement in concrete.

According to Becher and Lichtnecker (2002), medical waste presents a high risk to doctors, technicians, sweepers, hospital visitors and patients due to arbitrary management. It has equally received very little attention in Nigeria in contrast to the management of other types of solid waste as hospital waste management was in a deplorable state with less or no provision for the health-care waste disposal. By the nature of its composition, hospital waste is a breeding ground for all sorts of diseases and infections if not properly handled, managed and controlled. In Nigeria, as close to the end of the third millennium, it was observed that there were weak policies on hospital waste management in Nigeria, and that is why it is not uncommon to find various components of hospital waste like used syringes, discarded blood vials, needles, empty description bottles etc. improperly disposed and left untreated (Coker et al., 1998). Hence, this study aims to determine the flexural strength of concrete using hospital waste ash as replacement.

2.0 BACKGROUND OF THE RESEARCH

Elinwa (2002), reported that 10% replacement of cement with saw dust ash (SDA) showed good performance giving the desired workability and strength [3]. Siva and Kumar (2010), reported that an industrial waste like phosphogypsum impairs the strength development of calcined products and hence it can be used in construction industry for preparation of concrete replacing some quantity of cement, which is a valuable ingredient of concrete, to achieve economy. With 10% replacement of cement with phosphogypsum the flexural strength not only
decreased significantly with higher replacement of cement with phosphogypsum but with increase in water-binder ratio also. The width and number of cracks increased with the increase in replacement of phosphogypsum above 10% [4].

Vegas and Urette (2006), incorporation up to 20% calcined paper sludge into cement paste modifies initial setting time by accelerating the process just to 60 minutes. Workability is reduced when using calcined paper sludge. The partial replacement of cement by calcined paper sludge enhances flexural strengths slightly after 7 days of curing.

According to the results of flexural strength test, all the replacement degrees of RHA researched, achieve similar results. Then, it may be realized that there is no interference of adding RHA in the flexural strength. All the samples studied have similar results in elasticity module. A decreasing in the module is realized when the levels of RHA are increasing [5].

Khater (2011), Flexural strength of all the studied mixes increases with hydration age and decreases with burned dust giving-more than 20 kg/cm² enough for safe handling, after one day of hydration except for mix that has full replacement by dust. After one day of water curing, all mixes give flexural strength exceeds that required for the concrete bricks used in the non-load bearing walls (25 kg/cm²), according to the Egyptian Standard specifications 1292 (1992), except the specimens of the mix of 100 wt. % burned cement dust replacement that reaches the last mentioned value after 3 days. Beyond 3 days mixes having up to 60 wt. % BD give a flexural strength higher than that required for the concrete bricks used in the load bearing walls (70 kg/cm²). According to the same Egyptian standard specifications, the specimens of all mixes at all water curing periods have a moderate bulk density (1.40 to 2.00 g/cm³). The results of this study show that the mix of waste concrete, grog, hydrated lime and burned cement dust can be used instead of the cement constituent in mortars, and in concrete brick-making. In spite of the decrease of flexural strength values (main property of building materials) with the replacement of hydrated lime by burned dust, yet these values reach the flexural strength required for the brick used for the load bearing walls (70 kg/cm²) after 1, 3 or 28 days of hydration in addition to the benefit of saving a raw material (hydrated lime) that used in many industries using an environmental pollutant waste dust instead. Generally, it could be said that direct replacement (mixing) of burned cement dust with demolished wastes is more effective than the recycling of dust with cement raw materials, which forms unfavoured clinker phase during the firing in cement kilns that attributed to the effect of high dust alkalinity on the nature of clinker phases [6].

Eduardo (2010), reported that sugar cane bagasse ash (SCBA) maintains, or even improves, the mechanical and durability properties of cement-based materials such as mortars and concretes and has cementitious properties indicating that it can be used together with cement [7].

Joo Hwa (2003), reported that mixes containing the ash have a slightly higher workability than the control (0% ash) mix. In the mix containing 10% ash, strengths comparable with or higher than that of the control mix were obtained, whereas the 20% and 30% ash mixes had strengths about 40%–50% lower [8].

Kula (2002), reported that flexural strength of all specimens containing 1 wt. % of tincal ore waste was higher than that of the control at the 28th day of curing. At 90 days, the contribution to strength by Bottom ash (BA) + Tincal ore waste (TW) and Fly ash (FA) was higher than in the concrete-prepared equivalent TW beyond 3 wt. % of Portland cement (PC) replacement. With the replacement of 3–5 wt. % of PC by TW, the flexural strength of the concrete decreased compared to control concrete. However, the values obtained are within the limit of Turkish Standards (TS). Adding BA or FA with TW improved the performance relative to TW replacement only. Increasing replacement of TW gives rise to a higher setting time. As a result, TW, BA, and FA samples may be used as cementitious materials [9].

Canpolat (2004), reported that replacement materials have some effects on the mechanical properties of the cement. The inclusion of zeolite up to the level of 15% resulted in an increase in flexural strength at early ages, but resulted in a decrease in flexural strength when used in combination with fly ash. Also, setting time was decreased when zeolite was substituted. The results obtained were compared with Turkish Standards (TS), and it was found that they are above the minimum requirements [10].

3.0 MATERIALS AND EXPERIMENTATION

3.1 Materials

3.1.1 Hospital waste: The sample of the hospital waste ash was obtained from a small scale incinerator at Abubakar Tafawa Balewa University Teaching Hospital Bauchi. It was then grinded and sieved through 150 μm sieve and finally incorporated into the concrete as cement replacement. Below table shows the chemical composition of the Hospital waste ash.

<table>
<thead>
<tr>
<th>Chemical Constituent</th>
<th>Percentage by weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO₂</td>
<td>20.60</td>
</tr>
<tr>
<td>P₂O₅</td>
<td>0.95</td>
</tr>
<tr>
<td>S0₃</td>
<td>1.50</td>
</tr>
<tr>
<td>Cl</td>
<td>2.38</td>
</tr>
<tr>
<td>K₂O</td>
<td>9.78</td>
</tr>
<tr>
<td>TiO₂</td>
<td>1.20</td>
</tr>
<tr>
<td>CaO</td>
<td>47.43</td>
</tr>
<tr>
<td>V₂O₅</td>
<td>0.04</td>
</tr>
<tr>
<td>CrO₃</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Table 3.1: Chemical Composition of Hospital waste ash

www.ijsrp.org
3.1.2 Cement: Ashaka brand of ordinary Portland cement was used throughout the course of this project, and conform to BS 1881.

- Physical properties
Cement is a fine grey powder. It is mixed with water and materials such as sand, gravel and crushed stones to make concrete. The cement and water forms paste that binds the other materials together.

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Gravity</td>
<td>3.15</td>
</tr>
<tr>
<td>Lose Bulk Density (Kg/m^3)</td>
<td>3150</td>
</tr>
<tr>
<td>Loss on Ignition (%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Specific Surface (m^2/g)</td>
<td>2.30</td>
</tr>
<tr>
<td>Soundness (mm)</td>
<td>9.25</td>
</tr>
</tbody>
</table>

- Chemical Properties
Portland cement is composed of four major oxides: Lime, silica, alumina and iron. It also contains small amount of magnesia, alkalis and sulfuric anhydride as shown in Table 3.1.2 below:

<table>
<thead>
<tr>
<th>Oxide</th>
<th>Common Name</th>
<th>Percentage by Weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CaO</td>
<td>Lime</td>
<td>60 - 67</td>
</tr>
<tr>
<td>SiO_2</td>
<td>Silica</td>
<td>17 - 25</td>
</tr>
<tr>
<td>Al_2O_3</td>
<td>Alumina</td>
<td>3 - 8.0</td>
</tr>
<tr>
<td>Fe_2O_3</td>
<td>Iron</td>
<td>0.5 - 6</td>
</tr>
<tr>
<td>MgO</td>
<td>Magnesia</td>
<td>0.1 - 4.0</td>
</tr>
<tr>
<td>Na_2O and K_2O</td>
<td>Alkalis</td>
<td>0.2 - 1.3</td>
</tr>
<tr>
<td>SO_3</td>
<td>Sulfuric anhydride</td>
<td>1 - 3.0</td>
</tr>
</tbody>
</table>

3.1.3 Fine aggregate: The sand used in this experimental work was river sand and conformed to the requirement of BS 882.

3.1.4 Coarse aggregate: Coarse aggregate for this research was obtained from quarry in Bauchi state and it conformed to the requirement of BS 882.

3.1.5 Water: Ordinary drinking water from tap was used in this research work.

3.2 Experimentation
In this research work, the various tests carried out include:

3.2.1 Concrete mix design:
In this work a mix proportion of 1:1.64: 2.47:0.50 was used throughout, the detailed mix design has been presented in appendix Table 3.2 below shows the percentage of the constituent materials;

<table>
<thead>
<tr>
<th>Mix No. (%)</th>
<th>Cement (Kg)</th>
<th>Fine aggregate (Kg)</th>
<th>Coarse aggregate (Kg)</th>
<th>Hospital waste ash (Kg)</th>
<th>Water content (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-0</td>
<td>51.03</td>
<td>84.08</td>
<td>126.12</td>
<td>25.52</td>
<td></td>
</tr>
<tr>
<td>M-10</td>
<td>45.93</td>
<td>84.08</td>
<td>126.12</td>
<td>5.10</td>
<td>25.52</td>
</tr>
<tr>
<td>M-20</td>
<td>40.82</td>
<td>84.08</td>
<td>126.12</td>
<td>10.21</td>
<td>25.52</td>
</tr>
<tr>
<td>M-30</td>
<td>35.72</td>
<td>84.08</td>
<td>126.12</td>
<td>15.31</td>
<td>25.52</td>
</tr>
<tr>
<td>M-40</td>
<td>30.62</td>
<td>84.08</td>
<td>126.12</td>
<td>20.41</td>
<td>25.52</td>
</tr>
</tbody>
</table>

3.2.2 Casting of Beams:
The fresh concrete was placed in 450 mm×150 mm ×150 mm mould and compacted. A total of 75 beams were casted. The casted beams were then completely immersed in water at room temperature after 24 hours.

3.3 Characterization of Materials
3.3.1 Sieve analysis:
The grading was carried out in accordance with BS 812 part 1 (1975). The sand was air dried for 24 hours and 1000 g of the sand were weighed and passed through the following set of sieves 10mm, 5.0mm, 2.36mm, 1.18mm, 600μm, 300μm, 150μm, 100μm, 50μm.
3.4 Test carried out on Fresh Concrete

3.4.1 Soundness Test:

The cement paste was prepared by gauging cement with 0.78 times water required to give a paste of standard consistency. The gauging time was 4 minutes. The inner surface of the mould was oiled. The mould was then placed on a glass plate and filled with cement paste, taking care to keep the edges of the mould gently together. The mould was covered with another piece of glass plate and a small weight was placed on this covering glass plate and immediately submerged the whole assembly in water at a temperature of 27°C and kept it for 24 hours. The assembly was then removed from water after 24 hrs. The distance between the indicator points was measured and recorded as (D1). The mould was submerged again in water to boiling in 25 to 30 minutes and was kept boiling for three hours. The mould was removed from the water, allowed to cool and the distance between the indicator points was measured and recorded as (D2). Two samples were tested and average of the results was reported and shown in Table 4.4 and detailed in appendix ii.

3.4.2 Consistency Test:

The test was conducted in accordance with BS 196 part 3, (1996) which is similar to IS: 4031, Part 4 (1988) 400g of cement was weighed and mixed with a weighed quantity of water. The time of gauging was about 5 minutes. The Vicat mould was filled with the cement paste and was leveled with a trowel. The plunger was lowered gently to till it touched the cement surface and was released, allowing it to sink into the paste. The reading on the gauge was noted. The above procedure was repeated taking fresh samples of cement and different quantities of water until the reading on the gauge is 5 to 7mm.

3.4.3 Initial and Final Setting Time

- Initial Setting Time:

The test was conducted according to Indian standard IS: 4031, Part 5 (1988).Cement paste of 400g was prepared by gauging the cement with 0.85 times the water required to give a paste of standard consistency. Stop-watch was started the moment water was added to the cement. Vicat mould was filled completely with the cement paste gauged as above; the mould resting on a non-porous plate and the surface was smooth off, making it level with the top of the mould. The cement block thus prepared in the mould is the test block. The test block was then placed under the rod bearing the needle. The needle was lowered gently in order to make contact with the surface of the cement paste and was then release quickly, allowing it to penetrate the test block. This procedure was repeated until the needle fails to pierce the test block to a point 5.0 ± 0.5mm measured from the bottom of the mould. The time period elapsing between the time, water was added to the cement and the time, the needle fails to pierced the test block by 5.0 ± 0.5mm measured from the bottom of the mould, was recorded as the initial setting time.

- Final Setting Time:

The initial setting time needle was replace by the one with an annular attachment. The cement was considered as finally set when, the needle was released gently to the surface of the test block, and the needle makes an impression therein, while the attachment fails to do so. The period elapsing between the time, water is added to the cement and the time, the needle makes an impression on the surface of the test block, while the attachment fails to do so, was recorded as the final setting time. The result was reported and shown in Table 4.3 and detailed in appendix ii.

3.4.4 Workability (slump test)

The slump test was conducted in accordance with BS 1881: part 102 (1983), a truncated cone of 300mm height with 200mm and 100mm bottom and top diameter respectively was used for this test. The cone was cleaned with damp cloth, left to dry and lightly lubricated. It was then placed on a metal plate and held in place. It was filled in three layers each being compacted by at least 15 short strokes of a tamper to ensure uniform filling of the mould. The outer surface was wiped and cleaned. After 15 seconds, the cone was raised vertically at a constant rate; the reduction in height of the specimen was measured and recorded as the slump. Test results were presented in Table 4.2.

3.5.0 Test Conducted on Hardened Concrete

3.5.1 Water absorption test:

The test was conducted in accordance with BS 1881 part 122 (1983). The concrete beams were removed from the curing tank; they were then weighed under saturated surface dry condition and after air dried for 24 hours. Finally the percentage difference in weight between the air dried and weight (SSD) is the water absorbed.

\[
\text{Water absorption} = \frac{\text{weight of water (kg)}}{\text{weight of sample} \times 100}\%
\]

The summary of result of this test was presented in chapter four and detailed in Appendix 111.

3.5.2 Pozzolanic activity index test:

The test was carried out in accordance with EN 196 part 5 (1996). The pozzolanic activity index is a number based on the flexural strength of sample beams such that:

\[
\text{Pozzolanic activity index with Portland cement} = \frac{A}{B} \times 100
\]

Where, A is the average compressive strength of test mix beams containing pozzolana (N / mm²), and B is the average compressive strength of pozzolana free test beam mix (N/ mm²).
3.5.3 Flexural Strength Testing:
At the required ages (3, 7, 28, 60 and 90 days), three beams were removed from the curing tank and tested for flexure in accordance with the method prescribed in BS 1881 Part 188, 1983. The results were reported individually. The specimen was placed and ensured that it is symmetrical on the supporting blocks as specified. The loading block adjusted to fit the test specimen using the knob at the side of the machine and then tightened. The pointer was adjusted to zero and the operation started by moving the handle to and fro until the beam failed. The maximum ultimate load at failure was recorded.

![Beam Diagram](image)

Figure 1: Beam Diagram

The modulus of rupture (MOR) was computed on the basis of ordinary elastic theory, using the following formula: if the fracture occurs within the third middle of the beam (i.e. when “a” is greater than 133mm, which is 1/3 of the beam size).

Flexural strength:

\[
F_b \text{ (N/mm}^2\text{)} = \frac{PL}{bd^2} \quad \text{............................................... (i)}
\]

But if “a” is less than 133mm (i.e. fracture occurs outside the load point). The equation used is:

Flexural strength:

\[
F_b \text{ (N/mm}^2\text{)} = \frac{3pa}{bd^2} \quad \text{............................................... (ii)}
\]

Where:
P is the failure load (N)
a = Distance of line of rapture from the nearest support (mm)
L = Beam span (mm)
b = Width of the beam (mm)
d = Depth of the beam (mm)

Both equation (i) and (ii) above was used base on the distance of line of rapture from the nearest support.

4 RESULTS AND DISCUSSION

4.1 SIEVE ANALYSIS:
The result of sieve analysis performed on the aggregate presented in table 4.1 shows that it is well graded as shown in figure 4.1 and was found to be in Zone 2 according to BS 882 part 2 (1973) grading limits of fine aggregate.

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Mass retained</th>
<th>Mass passing</th>
<th>Cumulative mass retained</th>
<th>% Retained</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.00</td>
<td>1000</td>
<td>0</td>
<td>0.0</td>
<td>100.00</td>
</tr>
<tr>
<td>5</td>
<td>19.02</td>
<td>980.98</td>
<td>19.02</td>
<td>1.90</td>
<td>98.10</td>
</tr>
<tr>
<td>2.36</td>
<td>143.78</td>
<td>837.2</td>
<td>162.8</td>
<td>14.38</td>
<td>83.72</td>
</tr>
<tr>
<td>1.18</td>
<td>196.64</td>
<td>640.5</td>
<td>359.44</td>
<td>19.66</td>
<td>64.06</td>
</tr>
<tr>
<td>0.6</td>
<td>200.06</td>
<td>440.5</td>
<td>559.5</td>
<td>20.91</td>
<td>44.05</td>
</tr>
<tr>
<td>0.3</td>
<td>232.05</td>
<td>208.45</td>
<td>791.55</td>
<td>23.21</td>
<td>20.84</td>
</tr>
<tr>
<td>0.15</td>
<td>175.96</td>
<td>32.49</td>
<td>967.51</td>
<td>17.59</td>
<td>3.25</td>
</tr>
<tr>
<td>0.075</td>
<td>19.45</td>
<td>13.09</td>
<td>986.96</td>
<td>1.95</td>
<td>1.30</td>
</tr>
<tr>
<td>pan</td>
<td>5.30</td>
<td>7.74</td>
<td>992.26</td>
<td>0.53</td>
<td>0.77</td>
</tr>
<tr>
<td>Total</td>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.1.0: Sieve Analysis Result of Coarse Aggregate

www.ijsrp.org
Figure 2.0: Grading curve for Coarse Aggregate

Table 4.1.1: Result of sieve Analysis of Fine Aggregate.

<table>
<thead>
<tr>
<th>Sieve size (mm)</th>
<th>Percentage Passing (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3</td>
<td>100</td>
</tr>
<tr>
<td>5.0</td>
<td>99</td>
</tr>
<tr>
<td>4.76</td>
<td>98</td>
</tr>
<tr>
<td>3.35</td>
<td>88</td>
</tr>
<tr>
<td>2.4</td>
<td>60</td>
</tr>
<tr>
<td>1.2</td>
<td>30.5</td>
</tr>
<tr>
<td>0.6</td>
<td>14</td>
</tr>
<tr>
<td>0.3</td>
<td>6.1</td>
</tr>
<tr>
<td>0.15</td>
<td>0.9</td>
</tr>
<tr>
<td>Pan</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Figure 3.0: Grading curve for Fine Aggregate

4.2 Workability (Slump test):
Incorporation of Hospital waste ash has greater effect on the workability of the concrete. Table 4.2 showed the results, the slump was greater for 10% replacement, suddenly these values reduced as the replacement level increases. As shown in figure 4.2 below and presented in Figure 4.0

Table 4.2: Workability (slump)

<table>
<thead>
<tr>
<th>Mix NO</th>
<th>Slump (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-0</td>
<td>21</td>
</tr>
<tr>
<td>M-10</td>
<td>25</td>
</tr>
<tr>
<td>M-20</td>
<td>20</td>
</tr>
<tr>
<td>M-30</td>
<td>19</td>
</tr>
<tr>
<td>M-40</td>
<td>15</td>
</tr>
</tbody>
</table>
4.3 Setting Time: Mixes containing the ash has higher setting time as compared to the control mix as shown in Table 4.3 below.

<table>
<thead>
<tr>
<th>Mix No</th>
<th>Initial Setting Time (minutes)</th>
<th>Final Setting Time (minutes)</th>
<th>Normal Consistency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-0</td>
<td>45</td>
<td>496</td>
<td>29</td>
</tr>
<tr>
<td>M-10</td>
<td>185</td>
<td>876</td>
<td>34</td>
</tr>
<tr>
<td>M-20</td>
<td>300</td>
<td>985</td>
<td>36</td>
</tr>
<tr>
<td>M-30</td>
<td>490</td>
<td>1075</td>
<td>39</td>
</tr>
<tr>
<td>M-40</td>
<td>670</td>
<td>1100</td>
<td>41</td>
</tr>
</tbody>
</table>

4.5 Water absorption: Table 4.5 has shown the summary of results obtained, water absorption increased with increased in curing age for both the control and other replacement levels. Figure 5.0 presented these results.

<table>
<thead>
<tr>
<th>Mix No</th>
<th>Average Water Absorption (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-0</td>
<td>1.98</td>
</tr>
<tr>
<td>M-10</td>
<td>1.98</td>
</tr>
<tr>
<td>M-20</td>
<td>1.99</td>
</tr>
<tr>
<td>M-30</td>
<td>3.00</td>
</tr>
<tr>
<td>M-40</td>
<td>2.69</td>
</tr>
</tbody>
</table>

Table 4.5: Summary of Water absorption

AVERAGE WATER ABSORPTION (%)
4.6 Density of Concrete: The concrete mix was designed for a density of 2360 kg/m³ but the test result shows higher average values for the modified concrete as in Table 4.6, the control has an average density of 2553 Kg/m³ which is above target, while 10%, 20%, 30% and 40% replacement give an average of 2609 Kg/m³, 2649Kg/m³, 2643 Kg/m³, 2585 Kg/m³ respectively, but the percentage difference is minimal, Figure 4.4 below shows a bar chart of the result averages.

<table>
<thead>
<tr>
<th>MIX NO</th>
<th>Age (days)</th>
<th>M-0</th>
<th>M-10</th>
<th>M-20</th>
<th>M-30</th>
<th>M-40</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>2548</td>
<td>2548</td>
<td>2535</td>
<td>2601</td>
<td>2522</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>2550</td>
<td>2550</td>
<td>2627</td>
<td>2647</td>
<td>2591</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>2629</td>
<td>2629</td>
<td>2742</td>
<td>2719</td>
<td>2589</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>2519</td>
<td>2785</td>
<td>2785</td>
<td>2741</td>
<td>2737</td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>2522</td>
<td>2537</td>
<td>2558</td>
<td>2509</td>
<td>2489</td>
</tr>
</tbody>
</table>

4.7 Flexural Strength Test:
The results of the test were shown in Table 4.7, which showed that the addition of Hospital waste ash led to a decrease in flexural strength (modulus of rupture), a bar chart Figure 7.0 compared the percentage decreased in modulus of rupture against age. For the control mix the flexural strength increased with curing age, while for 10% and 20% replacement maximum value of flexural strength was obtained at 7 days, then it suddenly declines with curing age, it declines at 28 days and increase at both 60 and 90 days. For 30% and 40% replacement, maximum value of flexural strength was obtained at 28 days; it then declined with curing age.

<table>
<thead>
<tr>
<th>Mix No</th>
<th>3 (days)</th>
<th>7 (days)</th>
<th>28 (days)</th>
<th>60 (days)</th>
<th>90 (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-0</td>
<td>3.32</td>
<td>3.39</td>
<td>3.83</td>
<td>4.92</td>
<td>4.80</td>
</tr>
<tr>
<td>M-10</td>
<td>3.21</td>
<td>3.95</td>
<td>3.70</td>
<td>3.40</td>
<td>3.12</td>
</tr>
<tr>
<td>M-20</td>
<td>2.12</td>
<td>4.12</td>
<td>3.50</td>
<td>4.02</td>
<td>4.01</td>
</tr>
<tr>
<td>M-30</td>
<td>2.22</td>
<td>3.16</td>
<td>3.64</td>
<td>3.51</td>
<td>3.25</td>
</tr>
<tr>
<td>M-40</td>
<td>1.17</td>
<td>1.97</td>
<td>3.50</td>
<td>3.14</td>
<td>3.10</td>
</tr>
</tbody>
</table>

4.6 Pozzolanic Activity Index Test (PAI):

The Pozzolanic activity index (PAI) of Hospital Waste Ash with OPC refers to ratio of the compressive strength at 28 days of the test of 10% of pozzolana specimen to that of control specimen expressed in percentage.

\[
PAI = \frac{\text{Compressive strength of 10% at 28 Days of test specimen}}{\text{Compressive strength of control specimen at 28 days}} \times 100\%
\]
### Table 4.8 Pozzalanic Activity Index Test

<table>
<thead>
<tr>
<th>Mix No</th>
<th>Mean Strength (N/mm²)</th>
<th>Mean PAI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-0</td>
<td>25.02</td>
<td>85.97</td>
</tr>
<tr>
<td>M-10</td>
<td>21.51</td>
<td>85.97</td>
</tr>
</tbody>
</table>

### 4.0 CONCLUSION

Based on the results obtained from various tests undertaken, it shown that; Hospital Waste Ash used for the research has about 85.97% of PAI which makes it suitable to be used as a pozzolana since this value exceeds the 70% specified by ASTM. Also, the slight decrease in the modulus of rapture due to increase in replacement clearly indicated that Hospital Waste Ash is a durable construction material and it can be utilized in concrete production.

### APPENDIX

**ACKNOWLEDGMENT**

The Authors wish to acknowledge Prof. A. U Elinwa for his guidance, and all the Civil Engineering Staffs for their inputs and suggestions toward the completion of this research.

### REFERENCES


Analysis of Customer Churn prediction in Logistic Industry using Machine Learning

Pradeep B‡, Sushmitha Vishwanath Rao* and Swati M Puranik†
Department of Computer Science
NMAMIT, Nitte,
Karkala taluk, Udupi district,
Karnataka, India – 574 110
Email: ‡pradeep.b2505@gmail.com, *itsmesushmitharao@gmail.com, †swatimp15@gmail.com, ‡akshykumars@gmail.com

Abstract: Customer churn prediction in logistics industry is one of the most prominent research topics in recent years. It consists of detecting customers who are likely to cancel a subscription to a service. Recently, logistics market has changed from a rapidly growing market into a state of saturation and fierce competition. The focus of the logistic companies has therefore shifted from building a large customer base into keeping customers in house. For that reason, it is valuable to know which customers are likely to switch to a competitor in the near future. The data extracted from the industry can help analyse the reasons of customer churn and use that information to retain the customers. We have proposed to build a model for churn prediction for a company using data mining and machine learning techniques namely logistic regression and decision trees. A comparison is made based on efficiency of these algorithms on the available dataset.

Keywords: Customer churn, logistic regression, linear regression, predictive analysis, data mining, machine learning.

I. INTRODUCTION

In simple words, customer attrition occurs whenever a customer stops doing the business with a service provider or a company. Churners have always been a big issue for any service providing company. Churn increases cost of the company as well as decreases their rate of profit. Considering machine learning perspective, the churn prediction is supervised and can be defined as: Given a predefined forecast horizon, the goal is to predict the future churners over that horizon, given the data associated with each subscriber in the network. Churn prediction aims to identify subscribers who are about to transfer their business to a competitor. Since the cost associated with customer acquisition is much greater than the cost of customer retention, churn prediction has emerged as a crucial Business Intelligence (BI) application for modern service providing companies. The flow of the raw materials or other goods to end customers is called as logistics. The essential success factor for any logistic industry lies in delivering items to the correct place and at appropriate time with a reasonable cost. Customer dissatisfaction at any of the stages of this process leads to a huge loss in the business and that is where the exact concern lies. A long-term relationship with the customers is a very crucial factor in the logistics industry because of the innumerable aspects of service encounters which can easily be imitated by the competitors. One of the gauging successes in the logistics industry is customer churn. Therefore, there is a huge need for a defensive marketing strategy which prevents the customers from switching the service providers. Customer churn causes revenue loss and other negative effects on corporate operations. Therefore, our idea mainly focuses on customer churn prediction model for identifying the key factors which are crucial and which cause the churn. The set of techniques that we use to do the same, include Logistic regression (LGR), decision tree analysis and artificial neural network.

II. LITERATURE SURVEY

K B Oseman [8] in technical paper, explains about the predictive modelling for churners which are based on data mining methods. The paper discusses about the usage of decision tree analysis model in detail.

The paper mainly discussed about the customer churning from a business perspective. However, at the end of the paper they also discussed case studies along with process flows and modelling techniques.

Teemu Mutanen [9] in the technical paper, described a case study on customer attrition. The paper described in detail the methods used for the prediction, data used and the result that was achieved. The author described two methods for churn analysis. The first one is logistic regression. Logistic regression is used to predict a discrete outcome based on continuous and/or categorical variables. In this method only one dependent variable can exist. This method applies maximum likelihood estimation after transforming the dependent variable into a logistic variable. The second method analyses the estimation results of the logistic regression. It is known as the lift curve. This curve is related to ROC curve of signal detection theory and precision-recall curve. The lift is a measure of predictive model calculated as the ratio between the results obtained with and without the predictive model.
In [10] Shyam V. Nath describes a case study in which an Oracle based database of fifty thousand customers of wireless telecommunication industry was analysed to predict churners. The study used JDeveloper tools and the analysis was done using Naïve Bayes algorithm with supervised learning.

Marco Richeldi and Alessandro Perucci [11] wrote a paper on case study of churn analysis. This paper discusses the use of Mining Mart, a churn analysis tool. It mainly discusses the pre-processing of data to analyse with Mining Mart.

III. PROBLEM AND ITS IMPACT

Churn rate is the number of customers or subscribers who cut ties with your service or company during a given period. These customers have “churned.”

(A) Understanding the problem:

- The flow of the raw materials or other goods to end customers is called as logistics. The essential success factor for any logistic industry lies in delivering items to the correct place and at appropriate time with a reasonable cost.
- Customer dissatisfaction at any of the stages of this process leads to a huge loss in the business and that is where the exact concern lies.
- A long-term relationship with the customers is a very crucial factor in the logistics industry because of the innumerable aspects of service encounters which can easily be imitated by the competitors.
- One of the gauging successes in the logistics industry is customer churn. Therefore, there is a huge need for a defensive marketing strategy which prevents the customers from switching the service providers.
- Customer churn causes revenue loss and other negative effects on corporate operations.

(B) Churn impact:

- The aftermath of churn is Long-Reaching
  - The company loses the chance to upsell them with other products or services in its portfolio as the brand is now likely tarnished in the minds of the spurned customer.
- A small improvement in churn will have a big impact on value over time
  - As gaining new customers is difficult and if your company continues to lose existing customers it will effect on company’s revenue and turnover.
- Churn helps competitors
  - Negative customer reviews are a gift to the competitor companies as these act as powerful ammunition for the competitors to position against your product.
- Higher customer churn may indicate bigger problems.
  - High churn indicates that something is failing in your customer relationships. It reflects poorly on your company and your product.

(C) Objective:

To develop an AI prototype to analyse and predict customer churn and the probability to win an opportunity at an early stage of the customer engagement using a variety of structured or unstructured data sources. The solution should show quantifiable measurable metrics displaying thorough analytics on customers to help shape the future strategies and decision making.

IV. METHODOLOGY

(A) Methods of churn analysis:

There are many ways to do churn analysis. However, these methods can be primarily categorized in two sections. They are:

- Supervised methods
- Unsupervised methods

1) Supervised methods: In supervised methods [7], the method basically learns to classify the data based on what type of data it learns from given training data. The training data, for example is a pair consisting of an input object and a desired output value. In our case the input object would be the rows of our data and the output value would be the probability depicting whether the customer has churned or not. However, our dataset does not have any attribute that will be saying who will churn. Therefore, we cannot use supervised approach with our dataset.

2) Unsupervised methods: On the other hand, unsupervised methods refer to the problem by trying to find hidden structure in unlabelled data. We can use unsupervised methods to cluster our data set. This way the churners could become part of a separate cluster. Again, we can use methods which self-learn the data.

(B) Our approach:

We begin by conducting a series of data pre-processing tasks which include merging the customer, shipping and delivery tables, removing records with missing values, deleting duplicate records and also aggregating the records for each business customer. The groups of active and lost customers are defined. The lost customers are further classified into groups to determine the reason for not engaging in transactions. We mainly designed three models. The first one was the linear regression model which gave us the predicted probability of 76% of all the features that were considered. This Linear Regression model considered all the KPI values and the milestones. Without stopping at that point, we moved on to design another model considering the status and that too yielded us the predicted probability of around 93%. We combined the predicted probabilities and constructed a last model using Linear Regression and ended up with the results of final predicted probability of around 94%. The case company (that is, the company under
consideration) gives a total of N variables divided into general categories to build the model. The KPI weights were multiplied with the values and because valuable customers contribute more to the profitability of the firm than do less valuable customers we apply random sampling technique for over M times to generate multiple datasets and for each of the generated datasets, a tenfold cross-validation is applied to evaluate sample quality.

V. CONCLUSION
To conclude, purpose of customer value analysis is to identify valuable customers that potentially contribute to the profitability of the company. A customer churn prediction model can be used as an early warning tool for businesses and extracting the critical factors related to the customer churn that provides additional useful knowledge which supports decision making.

VI. FUTURE WORK
The method can be used for campaign management, by modelling the best groups to be approached with a specific marketing campaign and by pinpointing individuals who are the most influential over their peers. Our method can also be used in other domains where the links between people can be measured or inferred, such as social networking sites on the Internet, in order to predict customer behaviour.

VII. REFERENCES
Assessment of knowledge and risk factors of hypertension among school teachers in a selected district in North Central Province of Sri Lanka

L.A.D.N.L.Wijayathunge*, U.P.K.Hettiaratchi**

*Department of Allied Health Sciences, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka
**Department of Biochemistry, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka

Abstract

Background: Hypertension is a major public health problem in developing countries including Sri Lanka. Prevalence of hypertension in Sri Lanka in 2014 was 21.2%. Studies indicate that work related risk factors are causative agents in the development of hypertension and school teachers are more vulnerable to develop hypertension due to the above mentioned risks.

Method: This study was a population based descriptive cross-sectional study aimed to find out the prevalence, knowledge and life style factors of hypertension among school teachers in a selected district in Sri Lanka. Cluster sampling technique was used to recruit 397 teachers and self administered questionnaire was used for data collection.

Results: There were 397 school teachers of whom 79.6% were females. A total number of 87(21.9%) among surveyed school teachers were found to be hypertensive (during the study period). Most of the subjects (59.9%) had poor knowledge with regard to hypertension. Only 1.3% respondents possessed good knowledge on basic information about hypertension. Most of the teachers had following factors and life style behaviors that might contribute to development of hypertension in the future, i.e., 57.8% had family history of hypertension, 51.6% were found to be obese, 22.2% were overweight, 50.9% never do regular physical activities (exercises for at least 30 minutes/day), 45.7% male teachers consume alcohol, usage of non-steroidal anti-inflammatory drugs was recorded in 19.1%, 47.4% use salt more than the recommended amount/day (5g/full tea spoon).

Conclusion: Due to the poor level of knowledge about the disease condition and high levels of risk factors among the study population, there is an urgent need for health education sessions and screening programmes for teachers in Sri Lanka, to prevent hypertension becoming a burden in the country.

Index Terms- Hypertension, Knowledge, Risk factors, School teachers, Sri Lanka

I INTRODUCTION

Hypertension is one of the most important preventable causes of premature death worldwide (NICE, 2011). During the past decades, hypertension has been identified as a major cause of the cardio vascular disease morbidity and mortality. It is a rapidly growing public health problem and becoming a major burden globally. The global prevalence of hypertension is estimated to be 1.56 billion in 2025(WHO, 2011). Hypertension kills nearly 8 million people every year, worldwide (WHO, 2014). Approximately one-third of the adult population in the South East Asia region has hypertension (WHO, 2014). According to the latest statistics of WHO; the prevalence of hypertension in Sri Lanka (2014) was 21.2% (WHO, 2014). Therefore, it is vital to conduct population based studies on modifiable causes for premature death such as hypertension in different populations in the society to improve the quality of life of the present as well as future generations. But there were scanty numbers of studies which conducted among school teachers throughout the world. Thus, there was a need to conduct a study among teachers to address this important aspect.

According to previous studies it was highlighted that the school teachers are vulnerable to develop hypertension due to their work related risk factors such as unhealthy dietary habits, overweight, obesity and less active life style (Ali &Asadi, 2009; Kamel, 1992; Vijaya Kumar, 2013). In spite of them being an educated group in the society, their lack of knowledge about the prevention of hypertension and lack of motivation to reduce the incidence might be responsible for these reported data.

Thus, it is very pertinent to study the knowledge about hypertension and the awareness about the risk factors that might contribute to the development of hypertension among school teachers as their physical and mental status will affect the quality of education of the students they are handling. Teachers with good knowledge about risk factors will be able to influence the life styles of their students in a positive manner as well as pass these health messages to the society as they are the role models of the students.

Therefore, the aim of this study was to estimate the proportion of school teachers with diagnosed hypertension, assess knowledge about hypertension and risk factors that might contribute to hypertension among school teachers in a selected district in North Central Province of Sri Lanka. The findings of this research will help the stake holders of education sector as well as health sector to improve the health of teachers by organizing educational programs, screening programs and various other multidisciplinary tasks.

www.ijsrp.org
II RESEARCH ELABORATION

This was a descriptive cross-sectional study & study population were school teachers who were employed in a selected district in North Central Province of Sri Lanka. Cluster sampling technique was used to recruit 397 school teachers (Females - 316, Males - 81) from 10 selected schools in the selected area. Pre tested, self-administered, questionnaires were distributed to the participants to collect data on three categories; Part 1: Socio-demographic data - age, gender, religion, ethnicity, marital states, and education etc., Part 2: Knowledge on Hypertension - disease condition, signs and symptoms, risk factors. One mark was given per one correct answer for the questions in part 2 (total marks 20) Afterwards, their level of knowledge was assessed in 3 different categories as poor, fair and good; poor (0-12), fair (13-17), good (18-20) (Tshering, 2010), Part 3: Life style factors – food habits, alcohol intake, smoking, physical activity, stress, family history.

Ethical approval was obtained from the Ethical Review Committee of the Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka. Permission was obtained from the educational directors of relevant educational zones and also from the principals of selected schools. A convenient time and venue for teachers was used to give the questionnaire to them (interval time at staff rest room) and a labeled box was kept in the staff rest room to drop the questionnaire. Written informed consent was taken after explaining the study by using information sheet and consent form. Data were analyzed using descriptive statistics with SPSS version 16.0. Results are presented by percentages.

III RESULTS

Socio demographic characteristics of the participants

The age of the participants varied from 20-65 years. The maximum respondents (39.8%) were within the age group of 41-50 years and minimum (2.8%) were within the age group of 61-65 years. Females constituted 79.6% out of total number of participants. The majority was married (88.7%) and the maximum number of respondents (25.3%) has served as teachers for 21-25 years. Nearly half of the respondents (46.3%) have a university degree as the highest education qualification. Most of the participants, (65.4%) lived within 1-5 km away from their working school and majority of the teachers, (74.2%) used their personal vehicles to reach school daily while 21% teachers traveled by bus and only 4.8% traveled by foot.

The respondents were asked about their current health status and majority (61%) reported as healthy and only 1% reported of having very poor health status. In addition, 49.4% of participants have had their blood pressure checked within one year while 15.4% had never checked their blood pressure during their life time.

The proportion of the teachers with diagnosed hypertension among surveyed school teachers (during the study period) was 21.9% and it was almost the same as the prevalence of hypertension of general population in Sri Lanka (21.2%). In addition, it is comparable to the results of few other studies conducted with school teachers in other countries. One study revealed that 23.3% of teachers in Alexandria, Egypt were diagnosed with hypertension (Kamel, 1992) and 21.3% among secondary school female teachers in Basrah, Iraq were hypertensive (Ali & Asadi, 2009). The prevalence of hypertension is 21.8% for teachers in Addis Ababa, Ethiopia (Fikadu & Lemma, 2016).

Majority of the hypertensive subjects (93.1%) were under treatment for hypertension while 4.9% had given up medication due to their personal preference without any medical advice. Although they are educated individuals, they have neglected their personal health by not paying attention on their medication regime for hypertension. Nearly half of the teachers who have hypertension (47.1%) have been diagnosed recently within 1-5 years range. However, 57.5% of the respondents reported that they were diagnosed as having hypertension from government hospitals and reason for the diagnosis for majority (70.1%) was having headache and dizziness.

When considering the characteristics of participants who have been diagnosed with hypertension, 88.5% respondents were more than 40 years of age. Most of those respondents were females (80.5%) and majority of them (98.9%) were married. Maximum number of them (24.4%) had their monthly family income level within range of USD 207 – USD 333. Among the respondents with hypertension, 66.7% of teachers had been working as a teacher for more than 20 years. More than half (56.3%) of the teachers with hypertension were teaching in grade 6 -11 section. Most of them (94.6%) traveled by their personal vehicles or by bus from their residences to the schools.

Knowledge level about hypertension of the participants

Only 1.3% respondents possessed good knowledge on basic information about hypertension (i.e., questions included; what it is, normal blood pressure value, and high blood pressure value etc.), symptoms of hypertension and preventive and curative aspects of hypertension. As shown in table I, the majority (59.9%) possessed poor knowledge on hypertension indicating the urgent need to conduct proper educational measures to enlighten these aspects of the study population as well as the general public.

When considering the level of knowledge, among the participants who are already diagnosed with hypertension, majority (60.9%) had poor knowledge and 37.9% had fair knowledge on hypertension (Table 1) which is a concern that needs to be effectively addressed. Majority possessed poor knowledge on hypertension possibly because the awareness on hypertension is very minimal. It might lead to poor control of hypertension as well as higher chance of development among these subjects. This may ultimately affect their ability to lead a normal life as well as deliver a proper education in school. When analyzing the data it
emphasis that the level of knowledge is similar among the total participants and participants already diagnosed with hypertension. This raises an alarm as to the consequences the later group will face with time to come due to their lack of knowledge about the disease.

Table I: Level of knowledge regarding hypertension among total participants and participants with diagnosed hypertension

<table>
<thead>
<tr>
<th>Knowledge level (Percentage)</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total participants</td>
<td>59.9%</td>
<td>38.8%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Participants with diagnosed hypertension</td>
<td>60.9%</td>
<td>37.9%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Sources of information on hypertension

When inquired about the available sources of information on hypertension, 37% of participants mentioned that they gained information about high blood pressure and its complications from media (newspapers, television, and radio) while 33.8% from health care workers such as doctors and nurses. Few of them (12.2% and 11.9%) had obtained information from their relatives and friends, respectively. Only 5.1% of them have had their information on hypertension from their different levels of education.

This further indicates that the mass media can expand their role in educating the general public regarding hypertension as well as other non-communicable diseases related to health matters and enlighten the public on the prevention aspects on these health issues to reduce these becoming a major threat and affecting the development of the country.

Prevalence of risk factors of hypertension among participants

1. Family history of hypertension of the participants

The respondents were asked about the status of their immediate family history (parents /grandparents / siblings) with regard to hypertension. Among the 397 subjects, 57.8% respondents reported that there is family history with regard to hypertension and 37.1% mentioned that there is no family history of hypertension while 5.1% interestingly was not aware about having or not having a family history. As shown in table II, majority of the respondents, (62.1%) who were diagnosed with hypertension reported that their family had a history of hypertension and 32.2% said that their families don’t have history of hypertension that the rest of the teachers were unaware about the family history. The ignorance about the health issues present in the family is a crisis that needs to be addressed as this will prevent the present and future generations taking preventive measures or diagnosing the diseases that run in the family early enough to manage well.

Table II: Family history of hypertension

<table>
<thead>
<tr>
<th>Family history (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Total participants</td>
</tr>
<tr>
<td>Participants with diagnosed hypertension</td>
</tr>
</tbody>
</table>

2. Life style of the participants

When considering the Body Mass Index (BMI) of the participants, about 2.7% were under weight. More than half of the teachers, (51.6%) were obese and 22.2% participants were overweight while rest of the participants had normal BMI in this study.

When considering salt intake of the study subjects, 51.9% reported that they don’t use salt more than the recommended amount per day for one person (5g/full tea spoon). But 47.4% of participants use salt more than the recommended amount. Half of the respondents, (49.4%) with hypertension have reported that they use salt more than recommended amount per day.

According to the table III, respondents were categorized in to 3 broad categories which reflect their alcoholic status such as, current alcohol drinker, non-drinker and past habitual drinker. Majority of the males, (51.9%) reported that they are non-drinkers, whereas 45.7% males revealed that they are current alcohol drinkers. However, 2.5% male teachers were found to be past habitual drinkers. Only 8.6% participants used alcohol once a week while majority (30.9%) out of 37 teachers had only on special occasions and festivals. Further, 14.4% teachers took traditional medicines which contained alcohol (Table III).

As shown in table III, 48.9% responded that they engage in regular physical activities (exercises for at least 30 minutes/day) while majority of the respondents, (50.9%) never engaged in regular physical activities. Only 2.3% respondents engaged in vigorous physical exercises [Eg-running, swimming, cycling, , carrying heavy loads, competitive sports and games (Football, Volleyball)] and 24.2% respondents engaged in moderate physical exercise [Eg-walking briskly, slow dancing, housework and domestic chores (vacuuming,
Table III: Life style factors of study subjects

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt/day (whether consuming more than recommended amount per day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>188</td>
<td>47.4</td>
</tr>
<tr>
<td>No</td>
<td>206</td>
<td>51.9</td>
</tr>
<tr>
<td>Alcohol-males</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>37</td>
<td>45.7</td>
</tr>
<tr>
<td>No</td>
<td>42</td>
<td>51.9</td>
</tr>
<tr>
<td>Alcohol type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local variety</td>
<td>23</td>
<td>28.4</td>
</tr>
<tr>
<td>Beer</td>
<td>10</td>
<td>12.3</td>
</tr>
<tr>
<td>Wine</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Whisky</td>
<td>5</td>
<td>6.2</td>
</tr>
<tr>
<td>Alcohol/week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once a week</td>
<td>7</td>
<td>8.6</td>
</tr>
<tr>
<td>1-3days/week</td>
<td>4</td>
<td>4.9</td>
</tr>
<tr>
<td>4-6days/week</td>
<td>3</td>
<td>3.7</td>
</tr>
<tr>
<td>Others- occasionally</td>
<td>25</td>
<td>30.9</td>
</tr>
<tr>
<td>Traditional medicine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>34</td>
<td>0.3</td>
</tr>
<tr>
<td>No</td>
<td>358</td>
<td>90.2</td>
</tr>
<tr>
<td>Smoking-males</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8</td>
<td>9.9</td>
</tr>
<tr>
<td>No</td>
<td>72</td>
<td>88.9</td>
</tr>
<tr>
<td>Physical activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>194</td>
<td>48.9</td>
</tr>
<tr>
<td>No</td>
<td>202</td>
<td>50.9</td>
</tr>
<tr>
<td>a. Vigorous activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9</td>
<td>2.3</td>
</tr>
<tr>
<td>No</td>
<td>188</td>
<td>47.4</td>
</tr>
<tr>
<td>b. Moderate activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>96</td>
<td>24.2</td>
</tr>
<tr>
<td>No</td>
<td>101</td>
<td>25.4</td>
</tr>
<tr>
<td>c. Light activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>126</td>
<td>31.7</td>
</tr>
<tr>
<td>No</td>
<td>71</td>
<td>17.9</td>
</tr>
<tr>
<td>NSAID(Non Steroidal Anti Inflammatory Drugs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>76</td>
<td>19.1</td>
</tr>
<tr>
<td>No</td>
<td>318</td>
<td>80.1</td>
</tr>
<tr>
<td>OCP(Oral Contraceptive Pills)-females</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>14</td>
<td>3.5</td>
</tr>
<tr>
<td>No</td>
<td>295</td>
<td>94.6</td>
</tr>
<tr>
<td>Meditation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>98</td>
<td>24.7</td>
</tr>
</tbody>
</table>
| No                                       | 295       | 74.3       

Sweeping the floor, gardening, yoga, active involvement in games and sports with children /walking with domestic animals. Majority of the respondents, (31.7%) engage in light physical activities [Eg-walking slowly (shopping, walking around the school), sitting at the computer, making the bed, eating, preparing food, and washing dishes]. In addition to lack of engaging in physical activities, the majority of the teachers of this study usually travel by their personal vehicle or by bus (94.6%) and no longer have regular physical activities such as walking and cycling, and it is reasonable to consider this also as a risk factor for hypertension. Hence, public health initiatives should encourage healthier lifestyles with emphasis on preventing obesity and increasing physical activity.

IV CONCLUSION

This study identified that the proportion of teachers with diagnosed hypertension among surveyed school teachers in a selected district in North Central Province of Sri Lanka was 21.9%.

According to the findings of this study, there is a deficiency in their knowledge on hypertension and prevention strategies. In addition, most of them had risk factors that might contribute to the development of hypertension such as less active life style, extra salt intake, immediate family history of hypertension, increasing Body Mass Index, consumption of alcohol, Non-Steroidal Anti Inflammatory Drugs intake etc.

Therefore, there is a vast need for implementing effective health promotional interventions for school teachers to assist in halting the escalating problem by the health care providers and authorities of education sectors. These programs should concentrate to educate, motivate school teachers to modify their lifestyles. Due to lack of time to speak to public & patients on diseases by health care workers, it’s very important that there are other methods to enhance knowledge on diseases by regular media advertisements & programs as well.

ACKNOWLEDGMENT

Authors would like to acknowledge all school teachers who participated in this study.

REFERENCES


AUTHORS

First Author - L.A.D.N.L. Wijayathunge, B.Sc. Nursing(Special), Department of Allied Health Sciences, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka nlwijethunga@gmail.com

Second Author – U.P.K. Hettiaratchi, B.Sc (Hons), PhD Department of Biochemistry, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka usha@sjp.ac.lk

Correspondence Author – U.P.K. Hettiaratchi

Address: Senior Lecturer, Dept. of Biochemistry, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka usha@sjp.ac.lk

E-Mail: usha@sjp.ac.lk

Telephone: Mobile: +94777851157
A Case Study of the Kithulgala Adventure Base Camp, whitewater rafting: Standards and Risk Management

Aluthge I.M.* , Liyanage D.L.S.M.**

*Department Sport Science & Physical Education, University of Kelaniya, Sri Lanka  
**Department of Sport Science & Physical Education, University of Kelaniya, Sri Lanka

ABSTRACT- Risk is and in inherent part of adventure recreation and is often a main reason for participation in activities such as whitewater rafting. The particular study titled “The Kithulgala Adventure Base Camp, whitewater rafting: Standards and Risk Management” was carried out with special reference in Kithulgala Adventure Base Camp. This study was thoroughly undertaken by researcher by focusing on the problem that was identified from the preliminary observation and through experience. The main purpose of study was to explore current standards of whitewater rafting and to explore risk management practices of whitewater rafting. The researcher carried out an exerptive literature review to provide conceptual background for the study. Simple random sampling method was used and selected 20 participants for the sample for this study and also organizational manager included. Data collection occurred using a single case design, which included interviews, observation and visual analysis. Three types of method, what are the qualitative analysis technique was used to data analysis proceed. The result provides that, organization which currently involve in Adventure Base Programs are practicing their own formulated standards. When it comes to conclusions with the consideration of findings it can be said, in Sri Lanka Whitewater Rafting Standards is in a very low level. There are no answerable persons connect in to this. The persons who are working about this field also haven’t more concentration about this. Looking at the standards in the world, it is clear that we must bring Sri Lanka even to a closer level. According my point of view as the researcher to expand rafting more in Sri Lanka, we must develop Whitewater Rafting Standards.

INDEX TERMS:- Whitewater Rafting, Adventure, Standards, Risk Management

I. INTRODUCTION

At the moment, it has been started to create a trend for adventure based programs. During past period, it could be seen rapid progress in adventure based programs. So, it’s necessary to consider about the sides which would be developed in this field. As a step of that consideration, here it has been studied about international standards of adventure based programs and way of practicing those standards.

Risk is an inherent part of adventure recreation and is often a main reason for participation in activities such as white-water rafting. However, as an awareness of the need to mitigate risk in the adventure recreation industry has arisen in recent years, owners, managers and participations are faced with the challenge of balancing the inherent risk in adventure recreation activities.

At the same time, it would seem contradictory that adventure recreation participants seek to engage in programs in which elements of risk serve as motivation for participation, while concurrently feeling a need for their safety to be ensured. It is even possible to offer a safe, yet risky experience for participants whose image of adventure is often falsely created and fueled by the popular media? Is this what sell adventure?

Adventure recreation companies’ pamphlets and brochures advertise excitement, thrills, adventure, fun and exhilaration through participation in activities involving elements of risk. This research seeks to uncover how white-water adventure recreation in Kithulgala Adventure Based Camp make decision in adopting risk mitigating standards and regulations and their perceptions of how proposed standards and regulations impact their service provision.

There would be a limited need for standards and regulations if injuries were not occurring in adventure recreation. Studies of accident and injuries in the New Zealand adventure industry highlight the current and past realities of pursuing adventure recreation and suggest that an increased awareness of the realities of risk in offering adventure recreation activities is needed (Bentley & Page, 2001; Bentley, Page, & Laird, 2000).

In a North American context, a study of The National Outdoor Leadership School’s (NOLS) incident profiles calculates rates, causes and severity of injuries occurring during the operation of their trips which highlights the occurrence of risk on these types of experiences (Leeman & Schimpelpfenig, 2003). Specific to the white-water adventure recreation industry, studies have identified common injuries associated with white water kayaking (Fiore, 2003; Fiore & Houston, 2001) and rafting (Fiore; Whisman, 2003; Whisman & Hollenhorse, 1998) as well as the severity of these injuries and the impact that these activities have on the human body (Burrell & Burrell, 1982; Wallace, 1992).

In order to mitigate and prevent injuries and fatalities occurring in white water adventure recreation a variety of standards, regulations, qualification and policies can be implemented.

Several studies have looked at the deficiencies of government-initiated regulation schemes (Chisholm & Shaw, 2004; siderelis & moore, 2006; Woollenven, Allison & Higgins, 2007). However, these studies found that these regulation schemes were usually developed by officials with limited knowledge of the actual needs and practices of the activity for whom the regulations were intended.

Previous attempts by the Canadian Government to regulate white water rafting have failed to address the increase in injuries and fatalities and little research is available with regards to the effectiveness of government-initiated regulations in the white-water adventure recreation industry.

However, research into a government initiated licensing scheme in the United Kingdom offers some insight into the implications government
regulations have for the recreation providers and the industry, particularly if the regulations are developed in response to a widely publicized incident (Woolfeven et al., 2007). In New Zealand, the whitewater industry is highly developed and has a variety of government initiated accreditation processes and qualification standards for white water adventure recreation (Chisholm & Shaw, 2004).

Although qualification standards for adventure guides have been discussed in-depth through the literature (Ewert, 1985, 1987; Gass, 1999; Priest & Gass, 1997; Webb, 1999), whiter water adventure recreation providers currently employ unofficial industry qualifications standards to show guide/leader competencies in the Kithulgala Adventure Based Camp. Very hard to find International Standards for guide competency exist

New regulations have been proposed to regulate commercial white water rafting across Canada. These regulations will govern all aspects of commercial white-water rafting, from equipment requirements to record keeping procedures. The impacts and influences of these regulations and how they are similar to and differ from the current standards, qualifications and policies practiced by white water rafting in the Kithulgala Adventure Based Camp is the main focus of this research.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

Based on this, the key objective of this research is, to examine the variance between Sri Lanka standards and world standards in white water rafting. The Specific Objectives are, to identify world standards practices for adventure based camp in Sri Lanka and to identify the standards in white water rafting in Sri Lanka.

This study used the qualitative case study research design to guide the study and the collection of data. Data collection took the form of unstructured interviews of unstructured interviews of owner and manager of the Kithulgala Adventure Based Camp, selected 20 participants and document analysis of program policies related to qualifications and regulations. In this regard, external secondary data were simultaneously utilized. To collect the external secondary data, the sources such as textbooks, Journals, Publications and World Wide Web were referred.

III. DATA PRESENTATION AND ANALYSIS

There are many international standards which are considered as necessary for Adventure Base Camp and Whitewater rafting activities. Basically, British Canoe Union, an internationally recognized institute has put forward these accepted standards.

Accordingly, the researcher has used the standards mentioned in “Camping Standards Manual – Revised Edition 2014” issued by “The United Church of Canada” and “River Rafting Adventure Activity Standards” published by “Outdoor Recreation Center – Victoria Inc.” in this case study. Thus, these standards used by the researcher are considered as the internationally recognized standards. (Appendix A)

The researcher intends to make a comparative analysis of the difference between international standards and the standards and the used in Kithulgala Adventure Base Camp through this study. A final summary will be given as to how the local conditions in Adventure Base Camp could be improved to full in line with the international standards through this. For the successful presentation of this study, the research has used “interview” method which is chiefly used for collecting data. Having visited Kithulgala Adventure Base Camp and having discussed with the manager and the participant, the researcher managed to collect all the necessary data. Apart from this method even the observation method was adapted in this venture. The study will be continued analyzing the data collected through interviews and observations with the international standards comparatively.

The findings for this study are derived from two primary data sources. First, camp director who, Kithulgala Adventure Base Camp was interviewed. Then, first day three male local participant and three male foreign participant were interviewed. And two female local participant and two female foreign participant were interviewed. And also, the second day three male local participant and three male foreign participant were interviewed. And two female local participant and two female foreign participant were interviewed. Each interview ranged in duration from one hour in length. Interview questions were guided by the interview guide/ interview protocol. Participants were asked initial questions pertaining to their personal experience and roles. These questions were followed by the pertinent research questions and their associated sub-questions as represented in the interview guide. Interview questions did change during the course of each interview as participants began to divulge specific information that required direct and specific question rewording. However, no questioning went outside of the general area of the research guide. Observation is the second data source for this research. That was limited to researcher’s eye and the photos.

First the researcher interviewed a camp director. As the researcher I questioned him about what is water rafting? Discussing it, I understood that he has a great knowledge about international standards. He replied about the levels which should the rivers have.

Camp Director

The Director of the camp has the power and responsibility to carry out the programmers. When the Director is away, another special person should be appointed as the Acting Director. This requirement is fulfilled even in Kithulgala Adventure Base camp. On a particular day when the researcher was observing the camp, a special person had been appointed to cover the duties of the Director as he was away.

Site Area

Another two very important factors that are considered according to the international standard are having the best site area for Adventure Activities and having a personal safety assumed environment. It is quite obvious that the location of Kithulgala Adventure Camp meets those environmental requirements. It can be concluded that no problem regarding safety has never arisen.

Kelani River

The Kelani River is used for whitewater rafting Kithulgala Adventure Base Camp. For confidence jump activity, Kataran Oya, a branch of Kelani River is used. According to the camp director in Sri Lanka, level 3 which is the most apposite level from the levels of rivers in the world is used. It is not a very dangerous level or not a very simple level. This river is considered as that participants can get a good rafting experience. These levels of the rivers are introduced in Rivers Levels. Mr. Peter Blug who introduced 3 places as,

- Butter Crunch
- Killer Fall
- Whitewater

Camp director said to me, who is the researcher that there is a main reason that tourists come up to Sri Lanka for rafting. In 1956 a film named “A Bridge in the River Quay” was photographed in Kithulgala. Numerous tourists who come to Sri Lanka to see that place participate rafting.
Involvement in risky activities is a characteristic of Adventure Camp. Therefore, all the staff members should have a better understanding about the risk assessment of the position and level of screening etc. The staff should also possess specific qualifications and skills in managing such risk promptly. The researcher found through interviews that the staff possessed such skills and experience of respective situations.

Staff discipline also stands very high among standards rules and regulations. During duty hours, taking drugs and illegal medicine is banned according to standard law. “Basic minimum standards for water base activities” stresses that no drug what so ever must be taken six hours prior to any water related activities, the acting camp manager admitted that there is a possibility of the staff members using drugs without the knowledge of the director board in spite of the prohibition. This show that the staff members take drugs.

During observation, the researcher was able to witness every guide who does whitewater rafting smoking before getting on the boat. This is a very common sight in Kithulgala Adventure Base Camp. It is expected that the camp displays a set of written rules and regulations regarding unlawful sexual relationships. However, this was not seen in the premises of this camp. The acting camp manager emphasized that there had not be such incident reported so far.

To the questions about the training period of a new guide, the camp director said that they have been trained for six months.

“The starting period of a new guide was being qualified for one year, but in present as the great demand, after six months a guide is being given permission for rafting tours. In a short period, he is given an opportunity to paddle, when a chief guide is behind. After that he is given an opportunity to ride a boat alone.”

Through the information that the camp director said, it is understood that with the great stipulate and the popularity the standards in the present is not similar as the standards in past.

**Record Keeping**

It is essential that a guide must record about the tours he has gone. It is considered as a main standard. It is essential that those records are certified by a camp director. There is such a sample of record of British Canoe Union through appendix. To the questions which were asked by the researcher it is understood that many international standards has been cancelled, and Kithulgala whitewater rafting industry has become an industry which is obtainable after capital. Through that, the Sri Lankans as well as tourists have to do activities been given danger to their lives.

There is a standard empowering the camp to collect personal data of the staff in the camp. The interviews done by the researcher showed that the camp had not received any such reports on the personal data. The acting camp manager stated that the members of the staff were the residents of the closer by areas. The staff members are known to each other by name only and their personal files of five main staffers are kept in the camp. Only the main staffers are kept in the camp further inquiry revealed that the personal files of the other 33 members are not available.

“Camping Standards Manual” records that there is a very important standard stressing the significance of maintaining the reports including the personal data and confidential data of the staff members. It was revealed that the files were in the custody of the director in Kithulgala Adventure Camp too.

International standards mention camper files, personal files and so on should be maintained at least once in every seven years. However, the researcher who visited Kithulgala Adventure Base Camp and inquired on 24/09/2015 found such a practice as mentioned above was not be seen. Through records such as health and safety are essential for a camp, such records could not be seen here. On inquiry, the acting manager happened to say that one person’s forehead was wounded a week before and one got a mild injury were common. Yet what should happen is that all the information reporting injuries with the dates should be recorded and seriousness of such situations should be well handled. Such practices cannot be seen here.

It was revealed that insurance policies and previous reports regarding this satisfactory in this camp.

**Equipment**

The equipment used in all the games must be of a good standard. But it is not certain whether some of the equipment reaches the standard level. Even the strings and ropes in the boats to be used in an emergency are broken. The paddles, life jackets etc. are mostly the ones which have been mended.

Checking the equipment before each trip could be seen. Yet inflating the boats is not done according to an accepted standard. It was observed that the boats were inflated by the guides as they wished before each trip. When the researcher questioned a guide about this he said, that he inflated the boat as he felt by his hand.

According to standards, new equipment must be brought and the old equipment must be replaced with the new equipment once in these years, that does not happen in this camp. Experts on equipment are not employed to check the quality of the equipment used or brought. The acting camp manager declared that a new boat after unpacking could be used for four years and another one year and a half after service.

In spite of the fact that good boats for rafting are manufactured in the countries like Chaina, America, Japan and Korea it was related through observations and interviews that the boats used there were Korean products known as “ZEBEC”.

**Safety**

One of the most important things in adventure programs is keep a vigilant eye on those who suffer from sicknesses. Especially those who suffer from heart ailments should not be involved in these activities. Even through the acting manager ensured that the people were questioned about their health condition, the application given to those who come for whitewater rafting activity is printed in English. Everyone irrespective of their knowledge of English has to put their signature on this form. The application states that even the life of those who do rafting activity could be lost yet the camp will not be answerable for any such haggard while the person himself will be held responsible. What is surprising is that even the content of the application from is not explained to the participants. What happens here is getting them to sign and sending them for the activity in a hurry.

- A licensed medical physician
- A registered nurse or licensed practical nurse in good professional standing with the provincial licensing body
- An emergency medical technician
- A standards first-aid certificate with CPR

According to the international standards, at least one of the above-mentioned qualifications should be made available in the camp. Through there is a valid medical practitioner is employed in Kithulgala Adventure Camp, he is just an Ayurvedic doctor. The interviews revealed that he was employed to promote Ayurvedic medical treatments and massage system among the foreign participants. And also, the camp has not employed a properly qualified nurse or an emergency medical technician. Only a person with CPR qualification is available here.

The medical staff in the camp should give treatment under curtains limitation according to their qualifications. This standard is properly followed in Kithulgala Adventure camp. The reason for this is taking the injured person to Kithulgala Base Hospital at all time.
First-Aid

To the questions about the method about captivating the persons who is in poor health and injured in the camp. The camp director has said that, “Really our institute has a weakness. We must have a bed in the camp to take the persons who is in poor health and injured to the main road, but we haven’t a such facility. But in such situations that patient is been taken on a sheet which has made from strong polythene.”

It is a situation that the protection is in minimum. When they are taking, the polythene may be broken down. But it can be exposed that such facility is not in Kithulgala Camp even in the present day. Through interview and observation, I have experimented as the researcher that there is 8 km from Kithulgala Adventure Camp to Kithulgala Base Hospital. By experimenting the distance between the two places and the facilities which the camp has, there is much weaknesses in it.

This camp does not have First-Aid Kits in activity areas although this is compulsory in every area where this type of programmers is done. Yet this camp has a first-aid kit which cannot be used in the activity areas. It must be emphasized that for this type of risky activities, keeping first-aid kits in vital areas is a must.

Emergency

Kithulgala Adventure Camp seems to have broken the accepted standard which states that local emergency telephones numbers must be displayed near all the telephones. Even the simplest opportunities necessary for risk management have been neglected.

Local participants

However, through discussions for two days it is understood that the Sri Lankan participants are the persons who haven’t knowledge about the risk. Mostly, they aim only to get a cheerfulness from a leisure pursuit. Lankan participants are the persons who haven’t knowledge about the risk. Mostly, they aim only to get a cheerfulness from a leisure pursuit.

Through discussions for two days it is understood that the Sri Lankan participants are the persons who haven’t knowledge about the risk. Mostly, they aim only to get a cheerfulness from a leisure pursuit.

To the questions about the list which has to be signed by them before going rafting, they have said that they haven’t considered it so much. At that moment also, there were many persons who have come up to take part for rafting, and all of them have signed for that document. They have signed to that, not considering much about that.

To the questions about the list which has to be signed by them before going rafting, they have said that they haven’t considered it so much. At that moment also, there were many persons who have come up to take part for rafting, and all of them have signed for that document. They have signed to that, not considering much about that.

The persons, who had gained the first rafting experience before that, presented the second idea. The persons, who had gained the first rafting experience before that, presented the second idea.

To the questions “did they have knowledge about rafting is an activity which has danger?” all 10 of them said, that before they know that it is a game with danger, but they have experienced the danger more than the danger they had known.

It is understood that the guide who went rafting with them, is a person who had an excellent acquaintance and a good skill and experience. The participants said that they haven’t feel like the guide who went rafting with them had drunk liquor.

To the questions, by the researcher that “did they observe about wearing helmets and life jackets?” They have said that the guide had observed about all and he explained the importance of it.

Before the tour, a video scene about the rafting level of the river must be shown to the participants, but the persons that the researcher has interviewed said that it had not been done.

Foreign participants

During the two days, the researcher has interviewed 10 Sri Lankans and 10 Foreigners. For that 6 gents and 4 ladies have been selected. Among 6 gents, 3 of them have experienced rafting in a foreign country before this. Those 3 have said, in Sri Lanka they have experienced a comparable experience to that. Their another which is to wristwatch the place of “Bridge in the River Quay.”

Researchers have questioned not only the Sri Lankans, but also from the tourists. They have said that it is a normal situation to sign in written about the responsibility of the activities similar to rafting. It is understood that they have a good knowledge about the danger of it.

Except those three persons, all the others have gained their first rafting experience in Sri Lanka, and they have said it very joyfully. They have said that it was a tour with much danger and many experiences. The tourists who have experienced rafting before that, said they had signed a more detailed document, than the document they have signed in Sri Lanka. The tourists who have knowledgeable first, said that such signing is essential for a danger activity like rafting.

They all have assumed that they did rafting activities having a good understanding about the jeopardy of it. They have said that it is understood after the tour also. That the guide was a person who went rafting with them had excellent experience. They have said that they did not feel like the guide had drunk alcohol, but they had seen the guide had smoke cigarettes. Always they have to do activities in water, to control the coolness of the body, that it is typical situation, smoking cigarettes approximating that.

The guide has observed about the life jackets and helmets, and it is observed about wearing them in the approved manner. But before the tour, they had not shown the video about the temperament of the river. “If they had seen such a video before the tour, the occurrence of that tour can be known sooner than that. So, my idea is it is suitable of not doing that”.

“After they had seen such a video, they go for rafting, known the experience of that. It is good quality for our acquaintance. That is my suggestion”.

The persons who had gained their first experience, assumed the first idea. The persons, who had gained the first rafting experience before that, presented the second idea. Finally, there is a visual analysis between Sri Lankan equipment and the world standards equipment. When considering all the above factors, it can be decided that Kithulgala Adventure Camp does not meet many of the requirements according to international standards. It should be emphasized that there must be such accepted standards when considering the big publicity given through media and the tendency of the youth. Even if no such precarious incidents have been reported so far, it must be stressed that today’s younger generation can be vulnerable to future hazards. If timely measures are taken to guarantee the international standards. Adventure activities can be made more popular in Sri Lanka and the country will be able to earn a lot of foreign exchange through this in time to come.

IV. FINDINGS

- There is a good demand for whitewater rafting in Sri Lanka at in attendance.
- During the week days, there are 100 – 150 participants and during weekends 200 – 250 participants can be seen.
- Many tourists who come to Sri Lanka, go to Kithulgala and have gained experience about whitewater rafting.
- There are accepted international standards for rafting in the world.
- Sri Lankans who play a part for rafting have not a good knowledge about standards.
- Although tourists have knowledge about it, they gain satisfaction by giving first place to the experiences to the jeopardy and the risk.
- Although the camp director is a person who has a good knowledge about international standards, he is not attentive about it because of the enormous stipulate.
- According to the survey data, rafting standards of Sri Lanka has not reached even international standards.
- According to the survey data, risk management about rafting has been done in a great limited level.
V. CONCLUSION

When it comes to conclusions with the consideration of findings it can be said, in Sri Lanka Whitewater Rafting Standards is in a very low level. There are no answerable persons connect in to this. The persons who are working about this field also haven’t more concentration about this. Looking at the standards in the world, it is clear that we must bring Sri Lanka even to a closer level. According my point of view as the researcher to expand rafting more in Sri Lanka, we must develop Whitewater Rafting Standards.

IV. RECOMMENDATION / SUGGESTIONS FOR FURTHER RESEARCHES

- A great concentration should be given to Adventurer Base Activities by Sri Lanka Government.
- By observing international standards of it and it must be ongoing the activity doing in Sri Lanka.
- According to the data in this research the standards which connects rafting is in a very low stage, comparing to the international standards. But responsible persons have not been deciding on yet. So responsible should be admitted for it.
- There must be a fixed activity about how can we manage the ganger of the whitewater rafting game.
- Sri Lankan government should stimulate more researches about these factors and keep updates.
- Whitewater rafting activity which is very trendy among the persons in present is somewhat jeopardy. So, we have to recompense much attention for that. By paying much attention, we can convey it popular in the world also. Then we can earn foreign exchange too.

APPENDIX A: International Standards

Basic Minimum Standards for Water Based Activities

River Running

01. Any company operating river running trips or commercial white-water rafting trips must be registered with Indian Association of Professional Rafting Outfitters/Adventure Tour Operators Association of India and Ministry of Tourism. 02. All trips on white water for tourists will be conducted with at least one qualified guide on each craft. A senior guide or trip leader must be present and supervise the activity at all times.

03. The Guide accompanying the trips should:
- a) be at least 18 years of age;
- b) have a high level of guide skills and knowledge;
- c) have a thorough knowledge of trip planning, white water rescue techniques, emergency procedures and advanced first aid;
- d) have guided a raft as a qualified guide on at least twenty white water runs within the past two years in rapids of the same class or higher than the run they intend to lead on;
- e) should have excellent communication skills in Hindi and English.

07. Kit: All trips must carry a well-equipped first Aid kit (it must have triangular bandages, sterile pads, gauze roller bandages, pressure bandages, first aid adhesive tape, splints, scissors as bare minimum), a repair kit (it must contain approx. half meter of repair material, a sufficient amount of flue and accelerator, sand paper or roughing tool and waterproof repair tape/duck tape). Oar rafts must carry at least one spare oar. All rafts must have a safety line going all around the raft, a bow- line and preferably a stern line as well. All rafts must have a throw bag and a bailing bucket (in case of non-self-bailing bucket boats). A flip line is recommended for all big drops.

08. Personal River Equipment: All rafters/ kayakers must have a life jacket on all times while on water. This includes the guides also. The life jackets must have adequate buoyancy (minimum of 6.14 kgs, and preferably 9 – 10 kgs.), must be the proper type (U.S. coast Guard Type III or V) with a provision of ensuring a snug fit by straps etc. and the life jacket must be worn correctly. Inflatable life jackets and the “keyhole” type jackets should not be allowed. Guides must ensure that the life jackets are on in a secure manner before the trip starts and above all major drops. Helmets are mandatory on all rapids and it is recommended that helmets be kept on throughout the trip. The helmet should be properly strapped. Rafts must be of good condition with no leakage or compartment damage. A baffle / compartment inflation check must be carried out at regular intervals to ensure that each compartment is air tight with no leaks. A minimum of 14 – 16 feet boats are recommended for commercial rafting. Self-bailing rafts are recommended.

09. Age Limit: Fourteen years on all stretches except float trips (grade II and below), where it may be relaxed to ten years.

10. Non-Swimmers: Non-swimmers should not be allowed on any serious rapid (grade III+/IV) or hard section.

11. Safety Briefing: Guides/ trip leader must ensure that a thorough safety briefing covering all pertinent details for that particular trip is given before each trip. The trip leader must ensure that clients are in suitable attire (bulky clothes, series, neck ties, long skirts and three-piece suits should not be permitted). People suffering from any serious ailments, weak heart conditions, epilepsy and expecting mothers should not be allowed. Non- swimmers should be allowed to body surf only with rope back up. Shoes/appropriate sandals/ booties are a must for rafting. Appropriate clothing must be worn during winter/ on glacial melt rivers with cold air temperatures. For such rivers, dry suits/ wet suits are recommended. If not, light woolens/synthetic clothes are a must. Trips must be timed carefully to finish at least an hour before sunset.

12. Alcohol and Drugs: Consuming alcohol in any form or quantity or illicit drugs at least six hours prior to the river trip must not be allowed.

13. Senior Guide: A senior guide must have spent at least three consecutive seasons on any of the above three rivers with a minimum of sixty days on the river per season. He must have all requisite first aid and cardiopulmonary resuscitation (CPR) qualifications and must have a clean safety record. A senior guide must have river-running experience on at least three different rivers.

14. Safety Kayaker: A safety and rescue kayaker must be thoroughly trained and experienced in all safety norms, river rescue and first aid cardiopulmonary resuscitation (CPR) certification. A minimum of thirty days on the river is mandatory before kayaking with commercial trips.
REFERENCE

1) AAS. Outdoor Recreation Center Inc. River Rafting Adventure Activity Standard Guidelines for Dependent Groups. (Version 3.1-2010)
10) Boulder, C.O. Outdoor Industry Association, Outdoor Recreation Participation Study for the United States. 3rd esition :

First Author – Aluthge I.M, BA Department Sport Science & Physical Education, University of Kelaniya, Sri Lanka. Email: ishanialuthge@yahoo.com

Second Author – Liyanage D.L.S.M, BA Department Sport Science & Physical Education, University of Kelaniya, Sri Lanka. Email: shashika430@gmail.com

Correspondence Author – Liyanage D.L.S.M, BA Department Sport Science & Physical Education, University of Kelaniya, Sri Lanka. Email: shashika430@gmail.com
Factors affecting fairness of Taxation on Category “B” Taxpayers in Tercha City, Dawuro zone, SNNP of Ethiopia

Afworke Asfaw Amele*, Wondaferahu Mulugeta Demissie**, Endeg Tekalegn Wolde***

* Graduate of Master of Science in Economics /Economic Policy Analysis/ Economics Department, College of Business and Economics, Jimma University, Ethiopia
** Associate Professor of Economics, Economics Department, College of Business and Economics, Jimma University, Ethiopia
*** Lecturer, Economics Department, College of Business and Economics, Jimma University, Ethiopia.

Abstract- The aim of the study was to examine factors affect fairness of taxation on category “B” tax payer’s in case of Dawuro zone, Tercha City, SNNP of Ethiopia. 238 numbers of sample respondents were selected from 526 number of total category “B” taxpayers in study area. The finding shows that, majority of the tax payers negatively perceived towards fairness of their tax system due to high tax rates, unfair distributions of tax burdens among tax payers compared with ability to pay, unequal treatments of individuals by authority, tax payers have little knowledge about tax system and complicated tax law and bulky procedures makes tax payers does not easily understand their tax system in the study area. In addition, the logistic regression analysis shows that except general fairness all 8 tax fairness aspects such as; exchange with gov't, horizontal fairness, vertical fairness, time-related equity and fairness, self-interest, tax knowledge and tax complexity has significant effects on tax fairness perceptions at 0.05% of confidence intervals.

Index Terms- Tax fairness, Tax fairness aspects, Tax knowledge, Voluntary compliance, Equity of tax system

I. INTRODUCTION

Many literates agreed that a fair tax means where the greater burden of the tax is imposed by individuals who are more financial wealth or well-off and capable of paying the tax. If a tax system in a nation is unfairly designed it affect the tax holder, therefore, it is important to understand how taxpayers will respond to adjustments in fiscal policies. The perceptions of taxpayers’ on the burdens and benefits associated with tax decisions allow for more effective functioning of the tax system and can help to mitigate tax avoidance and evasion. Therefore, understanding behavioral or cultural issues is essential to ensure more content of citizens (Richardson, 2006). Early work of Adam in 1776 states that; All countries, even the very poorest and most aid dependent, need to collect taxes for several aims, such as to finance progressive activities, to encounter their day-to-day expenses related to care of a free and fair civilization, to control the economy through fiscal measures, and to a certain extent, to change the economic behavior of people. The authority of national governments to collect monies from taxpayers must recognize a balance between the nations’ authority to tax and taxpayers’ rights. Thus, the real challenge for nations is to ensure that taxpayers are treated with fairness, justice, and equity, while national governments assert their jurisdiction as taxing authorities.

Richardson, M., and Sawyer, A.J. (2001) noted that no single tax structure can possibly meet the requirements of every country. The best system for any country should be determined taking into account its economic structure, its capacity to administer taxes, its public service needs, and many other factors. Nonetheless, one way to get an idea of what matters in tax policy is to look at what taxes exist around the world. In this regard, Head, J. G. (1992), stated that most developed countries are characterized by a broad base for direct and indirect taxes with tax liability covering the vast majority of citizens and firms. Developing countries, in contrast, are confronted with social, political and administrative difficulties in establishing a sound public finance system. As a consequence, developing and emerging countries are particularly exposed to unfair taxation system includes tax evasion and avoidance activities of individual taxpayers and corporations. This can be considered one of the primary reasons for large differences in the ability to mobilize own resources between developed and developing countries. Earlier study by Gerbing (1988) were conducted a survey in US and identified five tax fairness dimensions. Such as, general fairness/distribution; exchange with government; attitude towards taxes of the wealthy; progressive versus flat tax rate; and self-interest. In other studies of Christensen et al., (1994) also found the same five tax fairness dimensions similar to Gerbing (1988). Moreover, many research findings suggest that in order to achieve the objective of an equitable distribution of income; the business profit tax system must be fair. The current study attempted to add literature by empirically testing through collaborating overall potential determinants of tax fairness from theoretical views for Ethiopia, particularly in Tercha city, Dawuro zone of the SNNP (South Nation, Nationalities and People) region.

www.ijsrp.org
II. LITERATURE REVIEW

Adam Smith, (1776) argued that a fair tax system asks citizens to contribute to the cost of government services based on their ability to pay. This is a hot idea, as old as the biblical notion that a few pennies from a poor woman’s purse cost her more than many pieces of gold from a rich man’s hoard. Further, for him tax fairness has four maxims. Such as, simplicity, transparency, neutrality, economic efficiency, and other desirable attributes for a good tax system. With regarding to this, AICP, (2007) reiterates that equity system considered the following seven tax fairness dimensions. Exchange Equity and Fairness means that, over the long run, taxpayers receive appropriate value for the taxes they pay. Procedural fairness refers, Taxpayers have a voice in the tax system, are given due process and are treated with respect by tax administrators. Horizontal Fairness which supported by distributive justice theory (DJT) define as tax payers under the same income or wealth brackets should pay the same amount of taxes. Vertical Equity and Fairness which refers to progressive tax rate means when income increase tax rate also increase. i.e., taxes are based on ability to pay. Time-Related Equity and Fairness refers that tax are not disproportionately one-sided when income or prosperity levels vary over time. Inter-Group Equity and Fairness refers that no group of taxpayers is preferred or chosen to the disadvantage or damage of another without decent cause. And Compliance Equity and Fairness refers that all taxpayers pay what they are indebted on a timely basis.

Since 1960s, equity theory began through the work of Adams Smith, states that people make judgment of the ratio of their strength put with that of their profits gained and eventually with the same ratios of others. If an inequality reflects in the ratios, make some in to worries, wrongdoing and irritation among more benefited and less benefited relatively. In equity theory two particular points addressed. Such as: the perception to be equitable and the act of people following their perception of equity. With regarding to this, the recent works of Kempis & Wilkinson (1998) originated that taxpayers adjust their perceived inequalities through tax evasion. This implies that the implementation of the tax systems should be based on either progressive tax structure or flat tax rate structure. However; most of the individual taxes are progressive tax structures, i.e., that is vertical in terms of providing equity does not meet the expected equity. Therefore, to confirm the entire tax system is fair or not seeing the attitudes of tax payers to ward taxation is very crucial. Tax fairness is concerned with three dimensions from perception of taxpayers (social psychology) - distributive justice (viewed as the exchange of resources i.e., benefit and cost); procedural justice (viewed as the process of resource distribution), and retributive justice (viewed as the appropriateness of sanctions when norm-breaking occurs) and those influencing taxpayers compliance behavior because it is related to tax burdens. Under distributive justice theory and tax fairness principles, the social system will be perceived as fair if the compensation received is equivalent to any loss incurred in the social system. Such as; neutrality of procedures used, trustworthiness of the tax authorities, and the polite, dignified, and respectful treatment of taxpayers as individual or groups. Taxpayers expect that tax authorities will provide sufficient information about the tax law and regulations so that they can complete their tax return as accurately as possible. Therefore, it is argued that increased information about tax law and regulations can increase fairness perception and compliance (Vito & Howell, 2000).

Porcine (1984) convey with that tax fairness is a multidimensional concept and their analysis shows answering the reasons why it produces inconsistent results. Gerbing (1988) included in her study eight factors of tax fairness dimensions through Confirmatory Factor Analysis (CFA) using survey data in UK. The results from factor analysis showed the students had better perceptions of tax fairness after being exposed to tax knowledge. However, only five factors such as exchange with government; attitude towards taxes of the wealthy; progressive versus flat tax rate; and self-interest could be measured as fairness dimensions. Also he identified that perceptions of taxpayers is one of the factor that affect fairness of taxation in US. In US there are some clear privileges only meant for the wealthy. There are only general deductions and provisions meant for all who really qualify for it. However, the wealthy taxpayers may have high claims on medical, even for child insurance policies and so on due to their life style and status. Another deduction that can be related to be special is donations made to approved institutions and deducted at the gross income stage itself. Hite, & Roberts (1991) distinguished that judging from the ideology of equity; fairness is an individualistic concept whereby the individual is the key determinant asking or arguing for equity. Tax shelters have direct relationship with fairness attitudes. Found people with higher income believe progressive tax rate are more fair (vertical equity) or in other words favor a lower tax rate. Various literature on taxation state that demographic variables such as age, gender, education level, family size of taxpayers have impact on tax compliance. According to C. Adams (1993), demographic variables indirectly affect tax compliance on three aspects; attitudes, perceptions, and noncompliance opportunity.

III. METHODOLOGY OF THE STUDY

Both primary and secondary data are used to achieve the broad objectives of the study. Primary data were collected from sample selected on category “B” tax payers and Dawuro zone revenue authority through self-administered questionnaires and in depth interview from respondents of a target group. And secondary data were obtained from review of related literature, document and annual tax report in Dawuro zone revenue authority, taxation books, and internet. Thus, finally tax fairness tested in this study has 10 tax fairness aspects in the existing tax system with 40 items. The study also covers questions on the dependent variable which is the Taxpayers fairness perceptions which has 10 items, also with dummy responses. The scale value for 1 is fair tax system which is the opposite compared to the value assigned to 1 which is 0 for unfair tax system. This is because the items used by Richardson (2006) to measure tax compliance behavior are on noncompliance attitudes such as underreporting and tax cheating (measuring honest or dishonest).

The large sample size that is much more likely to be representative of the population and more accurate and precise sample were used. The target population is 526 category “B” tax payers and 20 revenue authority officers in Dawuro zone, Tercha city. To conduct survey to total population in the study was

www.ijsrp.org
impossible. Because of limited time and resources. Considering these constraints researcher was used the appropriate sample size by using Simplified formula for proportions. For non-respondents 5% were added. And also sample size were used respondents of tax officials from tax authority determined by similar formula. Therefore, the total sample size was utilized in the current study is 227 + 23 = 250. On the data analysis, simple statistical tools such as table, graphs, frequency, percentages, mean and St.dev. and econometric model was used to. The logistic distribution function for analyzing perceptions of tax fairness can be defined as: The average score over the nine (9) items was taken as an index for tax fairness issues. Based on this score, taxpayers were categorized into two levels of tax fairness perceptions: unfair and fair. Given the scaled ranking information of the dependent variable with binary out comes, binary logistic regression was applied. The binary logistics have the following form following Richardson (2006).

\[
Z_i = \ln \left( \frac{p_i}{1-p_i} \right) = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots + \beta_k x_{ik} + \varepsilon_i
\]

Or

\[
\text{Logit}(Y_i) = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots + \beta_k x_{ik}
\]

The "Y" is the logit, also called the log odds. The "\beta_i" terms are the logistic regression coefficients, also called parameter estimates. Exp(\beta) = the odds ratio for an independent variable= the natural log base e rose to the power of \beta. The odds ratio is the factor by which the independent increases or (if negative) decreases the log odds of the dependent. Exp(Y) = the odds ratio for the dependent variable, being the odds that the dependent equals the level of interest rather than the reference level.

IV. RESULT AND DISCUSSION

4.1. Characteristics of the Respondents

The survey was conducted between April and May 2016. Participation in the study was voluntary. The participants were assured that their answers would be kept confidential. 238 out of 250 questionnaires papers are distributed to the taxpayers were returned. In other words return rate is 95.2%. The general information about the respondents’ gender, age, educational qualification, years of experiences and work position are presented for better understanding of their background. Table 1 below at the note, shows the analysis of demographic variables using descriptive statistics of the 238 survey respondents in the sample. Table 4.1 shows personal and demographic characteristics of sample respondents of the study consist of both male and female individuals. From total survey male were found more than female respondents, i.e. out of total respondents 74.4% are male. Whereas the remaining 25.6% are female. The largest group of the respondents were between the ages of 40-49 years (30.7%). Age group below 30 years is (26.1%), 30-59 years is (25.2%) and 60 years and above is (14.3%). In terms of education level 1.7% of the respondents are illiterate (i.e. not attained in formal schools), 17.2% of the respondents had completed between (1-8) grades or primary school education, 42.9% had completed high school education, 19.7% of the respondents has certificate, 12.2% of respondents are Diploma holders and 6.3% the respondents are 1st degree holders. This survey result reflects that majority of tax payers have secondary school complete. Hence they able to understand simplified tax law and regulation. Also four family size groups were prominent among the respondents; i.e. out of 238 numbers of respondents; 32 numbers of the respondents (13.4%) has less than 3 family sizes, 89 numbers of the respondents (37.4%) has between 4-7 family sizes, 92 numbers of the respondents (38.7%) has between 8-11 family sizes and 25 numbers of the respondents (10.5%) has more than 12 numbers of family sizes. In terms of Forms of business ownership, out of 238 forms of business ownership types; 167 forms of business ownership types (70.2%) are Sole proprietors, 70 numbers of Forms of business ownership types (29.4%) are Partnership and only one forms business ownership type (0.4%) is belong to share company. Again, respondents were categorized based on their business sectors or types. i.e. As per the outcomes of the survey, about 26.5 percent of the respondents were engaged in service sectors, 68.9% of the respondents were engaged in merchandise/trading activities and 4.6% were to be engaged in service and manufacturing sectors.

4.2. Descriptive statistics on overall Tax fairness aspects

Table 4.2 below at the note shows descriptive statistics output on tax fairness items; 70.6% of the responded said that the existing tax system is not fair. The responded reasoned authority doesn’t work according to pay principles. But the remaining 29.4% of the responded said that there is a fair tax system in the régime. Table 4.2 result indicate that majority (70.6%) of the category “B” tax payers were dissatisfied with income tax system. These negative attitudes of the taxpayers negative effects on fairness of taxation.

4.3. In-depth interview results

In this study researchers also gathered qualitative data with 17 business profit taxpayers those are purposively selected. The main reasons of interviews was to examine how tax payers’ perceive fairness their income tax system and to what extent the effects tax knowledge and tax complexity on fairness perceptions. Respondents selected from different business sectors. This in turn enables the study to assess divergent views and arguments from different angles. In-depth interview data results in Table 4.3 below at the note indicate that out of 20 focus groups 15% of the responded was reason out that initial late payment penalty on the unpaid tax, imposed on non-compliant taxpayers under the current tax system, is unfair. The same 15% of the responded was said that there are still inadequate and unequal provisions of public services such as roads, pure water, schools, health center and etc. to low income families due to reasons of corruption, tax avoidance and tax evasions by authority and taxpayers. 10% of the responded said that having little tax knowledge and bulky tax laws in tax system increases the probability of tax payers pays their income taxes with high penalty and extra tax costs. Also the same 10% of the responded said that Individuals who deliberately evade paying their taxes should be penalized with the same amount of penalty regardless of the amount of tax evaded is observable and this indicates
unfair taxation. 15% of the respondents agreed that the administration of the income tax system by the Ethiopian Revenue and Custom Authority or Inland Revenue Authority is inconsistent across years and taxpayers. This indicates there is low transparency and trust among authority and tax payers. 20% of the respondents said that taxes not based on the ability to pay principles. In other words there is unequal share of tax burdens among high, middle and low income groups compared to their income amount or ability to pay. 10% of the respondents agreed that similarly situated taxpayers are not taxed similarly. In other words individuals having the same income level doesn’t pay the same amount of income tax. This indicates there is unfair distributions of tax burdens among tax payers those have the same level of income amounts. These results suggest tax structure needs some improvements in the study area.

4.4. The Logistic Regression Result

The logit result indicates that 8 variables (i.e. tax fairness dimensions) have p-value less than .05 and significant at 5% confidence interval. But General fairness not significant at 5% CI in this study. In respect of the Wald’s-test, analysis revealed results with regard to the taxpayers’ perceptions towards the fairness of business profit tax system. The result shows that almost all of the respondents have different perception towards the business profit tax system. The Wald statistic is a chi-square ‘type’ of statistic and is used to test the significance of the variable in the model and tests the null hypothesis that the estimate equals 0. More specifically, the Wald’s-test analysis shows that the respondents have lower fairness perceptions, and tax knowledge. Whereas, in terms of complexity of the tax system, similarly the Wald’s test viewed that the system is more complex. At the same time, path coefficients, in the logit model, represents the predictive link among constructs. Therefore, the path coefficients for tax fairness dimension tested variables except general fairness and other variables like horizontal fair, exchange with gov’t, tax knowledge and tax complexity were highly significant at the 0.05 level. Finally, the R² value suggests to what extent the independent constructs help to explain the dependent constructs. Thus, the bigger the R², the more predictive power the model possesses. Therefore, the R² result shows that 73.5 percent of all independent variables included in the model explains the dependent variable. The Variables in the Equation table contains the coefficients for the (fitted) lie and other relative information about the coefficients. The equation of the line found from the output is

\[
\text{Logit}(Y) = -10.343 + 0.33GFns + 2.57Exgov + 2.2HFns - 2.162VFns + 1.66TREqFns - 1.95Slfinrst - 1.6Admnfs + 1.9TxlKnlge - 2.4Txcmpltxy
\]

Table 4.9.1 below at the note revealed the effect of tax fairness dimensions on perceptions of tax fairness on category “B” taxpayers in Dawuro zone with corresponding sig-values to determine whether or not the tax fairness aspects affects the tax fairness perceptions. Concerning to the result of the model, of the nine variables included in the model except general equity and fairness aspect all variables such as, exchange with government, horizontal equity and fairness, vertical fairness, time related equity and fairness and self-interest or personal fairness, tax knowledge and tax complexity originate to be significant at 5% level. Wald is basically \( \chi^2 \) which is Chi-Square distributed with \( DF=1 \). However, SPSS gives the significance levels of each coefficient. The result indicates that all of the coefficients are significantly different from zero. (P-values are 0.000), further shows the adjusted R for the fit of the logit model of the study area. As can be seen in table 4.9.1, the null hypothesis that except general fairness all the regressing coefficients are jointly zero is rejected at 0.05% level of significance.

V. CONCLUSIONS AND RECOMMENDATIONS

The objective of this study was to find out factors affect fairness of taxation on category “B” tax payers in Dawuro zone, SNNP of Ethiopia. The overall survey result was presented based on three tax fairness aspects; social aspects, political aspects and economic aspects of tax payers. The logistic regression analysis showed out of nine variables (tax fairness aspects) in the model; 8 tax fairness aspects namely; exchange with government, horizontal equity and fairness, vertical fairness, time related equity and fairness, and self-interest or personal fairness, tax knowledge and tax complexity are significant effects on tax fairness in the current tax system but General fairness is insignificant at 5% level of CI. Regarding to general fairness insignificant result, tax payers perceived both general fairness and exchange equity on the same line. A similar proposition provided in the descriptive analysis and interviews results on various tax fairness aspects and fairness perceptions. The survey result indicated majority of respondents agreed that exchange with government, horizontal fairness and time related fairness as relatively fairer in current tax system. But General fairness, vertical fairness, administrative fairness, self-interest or personal fairness, tax knowledge and tax complexity are negatively perceived by majority of tax payers and reflect negative effect on tax fairness. Overall, this study limited to explore all potential tax fairness aspects due to multidimensional concepts. A comprehensive study need to be considered to further validate the operational aspects of the new dimensions. Implementing strong tax authority (i.e. working with high tax professional, using improved tax equipment’s, well work environment, clear program and visions in tax system) changes some negative perceptions towards fairness of tax system in the study area are advisable. Providing adequate tax training to the public or tax payers must be considered crucial. Therefore authority, must be apply more efforts on training and tax information because of taxpayers’ need more information about their tax obligations and their role in promoting the growth of the economy of the country and the well-being of its citizens. Applying Individual’s actual income based taxes changes some negative perceptions towards fairness of tax system in the study area.

REFERENCES


www.ijsrp.org
Table 4.1: Demographic information of sample respondents

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>177</td>
<td>74.4</td>
</tr>
<tr>
<td>Female</td>
<td>51</td>
<td>25.6</td>
</tr>
<tr>
<td>total</td>
<td>238</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>less than 30 yrs.</td>
<td>9</td>
<td>3.8</td>
</tr>
<tr>
<td>30-39</td>
<td>62</td>
<td>26.1</td>
</tr>
<tr>
<td>40-49</td>
<td>73</td>
<td>30.7</td>
</tr>
<tr>
<td>50-59</td>
<td>60</td>
<td>25.2</td>
</tr>
<tr>
<td>above 60</td>
<td>34</td>
<td>14.3</td>
</tr>
<tr>
<td>Total</td>
<td>238</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Table 4.1:** Demographic information of sample respondents


<table>
<thead>
<tr>
<th>Education Level</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td>1-8 grade</td>
<td>41</td>
<td>17.2</td>
</tr>
<tr>
<td>8-10/12 grade</td>
<td>102</td>
<td>42.9</td>
</tr>
<tr>
<td>Certificate</td>
<td>47</td>
<td>19.7</td>
</tr>
<tr>
<td>Diploma</td>
<td>29</td>
<td>12.2</td>
</tr>
<tr>
<td>Degree and above</td>
<td>15</td>
<td>6.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family Size</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than three</td>
<td>32</td>
<td>13.4</td>
</tr>
<tr>
<td>4-7</td>
<td>89</td>
<td>37.4</td>
</tr>
<tr>
<td>8-11</td>
<td>92</td>
<td>38.7</td>
</tr>
<tr>
<td>Above 12</td>
<td>25</td>
<td>10.5</td>
</tr>
<tr>
<td>Total</td>
<td>238</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Forms of Business Ownership</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sole proprietors</td>
<td>167</td>
<td>70.2</td>
</tr>
<tr>
<td>Partnership</td>
<td>70</td>
<td>29.4</td>
</tr>
<tr>
<td>Private limited company (plc.)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Share companies</td>
<td>1</td>
<td>.4</td>
</tr>
<tr>
<td>Total</td>
<td>238</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Business Sector</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>63</td>
<td>26.5</td>
</tr>
<tr>
<td>Merchandise and other different types of trade</td>
<td>164</td>
<td>68.9</td>
</tr>
<tr>
<td>Manufacture</td>
<td>11</td>
<td>4.6</td>
</tr>
<tr>
<td>Total</td>
<td>238</td>
<td>100.0</td>
</tr>
</tbody>
</table>
position of the respondent in the sector

<table>
<thead>
<tr>
<th>Position</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>owner</td>
<td>211</td>
<td>88.7</td>
<td>88.7</td>
<td></td>
</tr>
<tr>
<td>employees</td>
<td>14</td>
<td>5.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>manager</td>
<td>13</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>238</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Working duration

<table>
<thead>
<tr>
<th>Duration</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 1 years</td>
<td>11</td>
<td>4.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3 years</td>
<td>65</td>
<td>27.3</td>
<td>37.4</td>
<td>100.0</td>
</tr>
<tr>
<td>3-5 years</td>
<td>89</td>
<td>37.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>more than 5 years</td>
<td>73</td>
<td>30.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>238</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: category “B” Business profit taxpayers” survey/ SPSS output and own computations

4.2. Descriptive statistics on overall Tax fairness aspects

Table 4.4.2 tax fairness perceptions and ability to pay taxes

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>unfair or disagree Valid</td>
<td>168</td>
<td>70.6</td>
<td>70.6</td>
<td>70.6</td>
</tr>
<tr>
<td>fair or agree</td>
<td>70</td>
<td>29.4</td>
<td>29.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>238</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Sources: SPSS output
4.3. In-depth interview results

<table>
<thead>
<tr>
<th>Responses</th>
<th>frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Similarly situated taxpayers are not taxed similarly</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Taxes are not based on the ability to pay principles</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>All taxpayers pay what they owe on a timely basis.</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>The administration of the income tax system by the Ethiopian Revenue and</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Custom Authority or Inland Revenue Authority is inconsistent across years and taxpayers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The main reasons for low revenue performance and gov’t. Unable to achieve social goals, such as the provision of benefits for low income families are reflects of corruption, tax avoidance and tax evasions.</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Because of having little knowledge about income tax systems and complicated law and rules tax payers were exposed to penalty and extra tax costs.</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>The government spends too much tax revenue on unnecessary welfare assistance</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>The initial late payment penalty on the unpaid tax, imposed on non-compliant taxpayers under the current tax system, is unfair</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Individuals who deliberately evade paying their taxes should be penalized with the same amount of penalty regardless of the amount of tax evaded is observable this is unfair</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>100</td>
</tr>
</tbody>
</table>

Sources: author’s survey design.
### 4.9.1: Summary of the regression model/ logit

<table>
<thead>
<tr>
<th>Variables</th>
<th>S.E.</th>
<th>R2 Adjusted</th>
<th>Coefficient B</th>
<th>Wald’s test</th>
<th>Exp(B)</th>
<th>CI.</th>
<th>p-value sig.(2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects on tax fairness</td>
<td>1.394</td>
<td>.735</td>
<td>-10.343</td>
<td>55.011</td>
<td></td>
<td></td>
<td>.000</td>
</tr>
<tr>
<td>GFns</td>
<td>.405</td>
<td>-.323</td>
<td>.635</td>
<td>-1.381</td>
<td>.05</td>
<td>.425</td>
<td></td>
</tr>
<tr>
<td>Exgov</td>
<td>.519</td>
<td>2.57</td>
<td>24.653</td>
<td>13.169</td>
<td>.05</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>HFns</td>
<td>.482</td>
<td>2.2</td>
<td>21.123</td>
<td>9.159</td>
<td>.05</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>VFns</td>
<td>.480</td>
<td>-1.992</td>
<td>17.236</td>
<td>-7.329</td>
<td>.05</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>TREqFns</td>
<td>.524</td>
<td>2.783</td>
<td>28.212</td>
<td>16.174</td>
<td>.05</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Slfinrst</td>
<td>.426</td>
<td>-1.685</td>
<td>15.610</td>
<td>-5.391</td>
<td>.05</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Admfns</td>
<td>.465</td>
<td>-1.613</td>
<td>12.048</td>
<td>-5.018</td>
<td>.05</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>TxKnlge</td>
<td>.455</td>
<td>-1.933</td>
<td>18.053</td>
<td>-6.909</td>
<td>.05</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Txcmplxty</td>
<td>.506</td>
<td>-2.413</td>
<td>22.749</td>
<td>-11.167</td>
<td>.05</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

Note: Level of significance;* p<0.05 at 5%.

Source: SPSS data result
PREVALENCE & MANAGEMENT of HEADACHE & its ASSOCIATED FACTORS among FEMALE UNDERGRADUATE PHARMACY & NON-PHARMACY STUDENT POPULATION of LAHORE COLLEGE for WOMEN UNIVERSITY, LAHORE

Minahil Tahir¹, Rafia Mubashir², Dr. Fatima Amin³

Institute of Pharmacy, Lahore College for Women University

Abstract- Objectives: the aim of study was to observe clinical characteristics of headache, assessment of possible contributing factors, pharmacotherapy and trend of self-medication among students.

Methodology: This observational study presents the prevalence, impact of headache in undergraduate students, demographic details, headache patterns and its clinical characteristics, associated factors, family history, its relation with studies and its management strategies among female pharmacy and non-pharmacy students of Lahore College for Women University.

Results: The study found that 35% of respondents experienced monthly headache, 54% of total respondents on weekly basis while 11% on daily basis. Of all subjects, 55% experienced difficulty concentrating, 43% experienced irritability while 26% experienced nausea and vomiting along with headache. Stress and sleep disturbances were two major headache triggering factors. The overall self-medication rate among subjects was 74% for pharmacy students and 56% for non-pharmacy students.

Conclusion: Headache has high prevalence among pharmacy students. Analgesics were commonly used by students to self-medicate themselves. Students found difficulty in performing daily activities and missed classes or work due to headache. Headache negatively impact student’s quality of life.

Index Terms- Headache, Prevalence, Pharmacotherapy, Pharmacy Students, Non-Pharmacy Students

I. INTRODUCTION

Headache, or its medical term "cephalgia", is one of the common medical ailments that is not only considered a nuisance but also has a negative impact on the quality of life, making the person too ill to perform his routine daily activities properly. Although headache is a prevalent disorder, especially among adolescents and young adults, but it is also counted as the most common presenting complaints of students, predictably due to various physical and psychological stress factors which students are more prone to facing as opposed to general population and other groups of specific population.

Overall, 47% of the adult population presents an active headache disorder, tension-type headache and migraine being the most frequent disorders, with a prevalence of 38% and 10%, respectively. The global burden of headache is very large but paradoxically, a burden of headache widely ignored which will still increasingly affects quality of life and routine activities. The World Health Organization (WHO) reports that almost half of all adults worldwide will experience a headache in any given year.

According to the Global Burden of Disease Survey 2010, headache disorders are among the top 10 causes of disability worldwide. Headache is a highly prevalent condition among students at University than other population. Economic burden of
headache is substantial especially due to its peak prevalence in the most productive years of life and results from work-related disability than the direct medical cost for treating it.

Recurrent headache is a risk factor for future chronic headache and other pain syndromes. The risk of developing headache is greater in individuals with a family history, smoking, high body mass index, sleeping problems, substance abuse, oversleeping, premenstrual period, stressful life events, hot/cold weather, menstruation, hangover and others. [2]

Headache terminology is unfortunately inconsistent, owing to the fact that headache is a *chronic disorder with episodic manifestations*. Headache disorders, are considered as major global health problems due to their high prevalence, chronicness and their substantial disability burden upon the sufferers. Headache disorders especially in student populations are usually under-diagnosed and under-treated conditions and thus the headache attacks lead to lose of days of study and worse academic performance. [3]

Reasons for headache are: hormonal shifts including hormonal changes during a woman's menstrual cycle, premenstrual syndrome, peripartum procedures, intracranial disorders, systemic disorders such as hypertension, blood clots, psychological; factors such as fatigue, anxiety, depression, stress, prolonged tension, changes in sleep or lack of sleep, hangovers, medications to treat other disorders, overuse of pain medications, panic attacks, strokes, dehydration, influenza, hypertension, strong odours, allergies, excessive intake of caffeine, changes in chemical activity in brain, over activity of pain sensitive structures in brain, blood clots, brain freeze, concussion, caffeine withdrawal, smoked meats, skipping a meal, mechanical factors such as neck strain and cigarette smoking.[4,10-12]

The International Headache Society (IHS) categorize headaches as primary, when they are not caused by another condition, or secondary, when there is a further underlying cause. Primary headaches are stand-alone illnesses caused directly by the over activity of, or problems with, structures in the head that are pain-sensitive. Secondary headaches are symptoms that happen when another condition stimulates the pain-sensitive nerves of the head.

Headache types include; Tension headaches which are the most common form of primary headache. Such headaches normally begin slowly and gradually in the middle of the day. Migraines cause a pulsating, throbbing pain usually only on one side of the head. Rebound headaches or medication-overuse headaches stem from an excessive use of medication to treat headache symptoms. They are the most common cause of secondary headaches. Cluster headaches usually last between 15 minutes and 3 hours, and they occur suddenly once per day up to eight times per day for a period of weeks to months. Hormone headache, women can get headaches from changing hormone levels during their periods, pregnancy, and menopause. The hormone changes from birth control pills also trigger headaches in some women.

Headache treatment depends upon the frequency, severity, and symptoms of headache. Acute treatment refers to medicines you can take when you have a headache to relieve the pain immediately. It includes pain relievers containing codeine or meperidine, NSAIDs, ergot derivatives (e.g., ergotamine), serotonin agonists called "triptans" (e.g., sumatriptan, zolmitriptan), dopamine antagonists (e.g., metoclopramide, prochlorperazine).Preventive treatment refers to medicines you can take on a regular (usually daily) basis to prevent headaches in the future. It includes serotonin blockers such as pizotifen, tricyclic antidepressants such as amitriptyline and nortriptyline, avoiding headache triggers. [5, 13]

Headache is often treated with analgesics and is the most common reason for analgesic use in the general population. In the current scenario of the increased prevalence of headache, most of the victims have been found to practice self-medication
leading to irrational treatment and even possibly induction of refractory type of headache as well as analgesic over use headache. Very high percentage (88.2 %) of students was reported to take over the counter drugs without the consultation of physicians in most countries. The use of analgesics is common among adolescents with headache, especially among girls. Internationally, self-medication has been reported as being on the rise. The drugs most commonly taken for relief of either migraine or tension-type headaches included aspirin alone or in combination with codeine and acetaminophen alone or in combination with codeine. [6]

A high level of self-medication with small percentage of patients visiting consultants also present among headache patients, particularly younger generation. Severe and frequent episodes of headache have a greater impact on academic performance and quality of life, thus bringing about limitation to daily activities and work, as well as significantly influencing students' personal and professional behaviour and ultimately academic records. [1]

The pharmacist can play several roles in the management of headache. The pharmacist can screen patients for headache, provide information, diagnose the headache subtype, manage the conditions by giving the patients OTC, pharmacy or other medicines or refer them to general physician for management of headache. Pharmacist can also play an important role in provision of some clinical complementary therapies and treating patients as part of professional headache team. [7] The Pharmacist can engage the patient in a discussion that includes the patient's description of the headache history including pain type, location, intensity, quality, frequency and duration. Pharmacist can also explain the risk of medication induced headache and prevention principles to the patient. Pharmacist can help the patient in understanding about the level of severity of their headache especially migraine attacks. [8] Pharmacist can counsel the patients regarding precipitating factors, risk of medication overuse headache to the people who are using acute treatments for their headache disorders, reasons of headache and prevention strategies. The pharmacist must be duly qualified to undertake the management of headache and provide support and reassurance to the patients. [9].Pharmacist are likely to have an enhanced role in the headache management in the future after the switch of drugs from prescription only to pharmacy medicines [7]

II. MATERIALS AND METHODS

Questionnaire-based observational cross-sectional study was conducted from May to June, 2017 to observe prevalence, characteristics, triggering factors and pharmacotherapy of headache among undergraduate pharmacy and non-pharmacy students. A convenient sampling of 100 undergraduate students was done in which 50 were pharmacy students and 50 were non-pharmacy students. Undergraduate students with primary headache taking self medications or prescribed medication for relieve of headache were included in this study while all other students with headache other than primary headache and related neurological disorders were excluded from the study.

A data collection form was concisely designed covering the following aspects: demographic characteristics including student’s name, age, marital status, subjects, name of institution etc. Family history of headache, life style health behaviors, stepwise evaluation to determine prevalence of lifetime headache, clinical characteristics of headache, i.e. frequency, average severity, duration with and without medications, , nature, location of headache etc , headache triggers, associated symptoms, related factors, management strategies, list of medications for treatment of headache, reasons of self medication, impact of headache on quality of life Data was collected during face to face interview on a data collection form. Data was tabulated; results were calculated and presented in the form of graphs.

III. RESULTS

The data was collected from 100 undergraduate students(i.e. 50 Pharmacy and 50 Non-Pharmacy Students) out of which all reported headache. 28 respondents had recurrent headaches for a mean of 1-5 years in both cases i.e pharmacy and non-pharmacy students. 47 students reported having headaches for about less than a year while 25 respondents had headaches for >5
years. (Fig 1). Frequency of headache attacks among both population ranges from once a month or less (38% & 32%) to more than once a month but less than a week (32% & 38%) (Fig 2). Most respondents experienced temporary headache with rates of 72% and 70% respectively. (Table 1).

Students had more commonly tension (28% vs. 44%) or pulsating type of pain (28% vs. 20%). Other frequent attributes of headache were pressure, throbbing and sharp pain. (Table 2). Stress/tension, too little sleep, skipped meals, change in weather were the potential triggering factors of student’s headache. 30% pharmacy respondent’s headache triggering factor was stress due to academic burden (Table 5).

Headache was significantly associated with symptoms of irritability and attention problem. Of all subjects, pharmacy students experienced more difficulty in concentrating (37%) and irritability (28%) (Fig 3). Of the Pharmacy respondents, 37 practiced self medication. The remaining 13 respondents preferred consulting a doctor. Among non-pharmacy students, 22 preferred to consult doctors (Table 4).

Of all subjects, 70% pharmacy and 56% non pharmacy students used medications to stop headache (Table 3). Among non-pharmacy students, 49% were using paracetamol, 11% were using disprins to treat their headache, while 15% respondents of Pharmacy were using disprin and 34% used Panadol to get relieve from their headache. Other medications used by students were ibuprofen, ansaid, nims while some students were using migraine specific agents commonly (Table 7).

The most common reason told by the respondents to practice self medication for treatment of headache was that they thought there is no need to consult doctor for minor headache with percentage of 34% for pharmacy students and 37% for non-pharmacy students. Other reasons stated include familiarity with headache medication with higher rates among pharmacy students i.e. 32% (Table 6). About 46% Pharmacy and 58% non-pharmacy students chose rest as management option for headache. Other Management options were taking headache medicine and continue as normal; continue as normal with headache (Fig 4).
Figure 2: Frequency of Headache Attacks

Figure 3: Headache Associated Symptoms
Figure 4: Management options used for headache among students

<table>
<thead>
<tr>
<th>Category</th>
<th>Persistent % (n)</th>
<th>Temporary % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacy Students</td>
<td>28% (14)</td>
<td>72% (36)</td>
</tr>
<tr>
<td>Non-pharmacy Students</td>
<td>30% (15)</td>
<td>70% (35)</td>
</tr>
</tbody>
</table>

Table 1: Nature of Headache

<table>
<thead>
<tr>
<th>Headache Pain Type</th>
<th>Pharmacy Students % (n)</th>
<th>Non-pharmacy Students % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulsing or throbbing</td>
<td>28% (19)</td>
<td>20% (13)</td>
</tr>
<tr>
<td>Pressure</td>
<td>18% (13)</td>
<td>16% (10)</td>
</tr>
<tr>
<td>Tension</td>
<td>28% (19)</td>
<td>44% (28)</td>
</tr>
<tr>
<td>Sharp</td>
<td>12% (8)</td>
<td>9% (6)</td>
</tr>
<tr>
<td>Stabbing</td>
<td>6% (4)</td>
<td>5% (3)</td>
</tr>
<tr>
<td>Dull</td>
<td>4% (3)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Burning</td>
<td>1% (1)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Other</td>
<td>3% (2)</td>
<td>6% (4)</td>
</tr>
</tbody>
</table>

Table 2: Quality of Pain
### Table 3: Use of medication to stop headache

<table>
<thead>
<tr>
<th>Category</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
<td>% (n)</td>
</tr>
<tr>
<td>Pharmacy Students</td>
<td>70% (35)</td>
<td>30% (15)</td>
</tr>
<tr>
<td>Non-pharmacy Students</td>
<td>56% (28)</td>
<td>44% (22)</td>
</tr>
</tbody>
</table>

### Table 4: Consultation with family doctor

<table>
<thead>
<tr>
<th>Category</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
<td>% (n)</td>
</tr>
<tr>
<td>Pharmacy Students</td>
<td>26% (13)</td>
<td>74% (37)</td>
</tr>
<tr>
<td>Non-pharmacy Students</td>
<td>44% (22)</td>
<td>56% (28)</td>
</tr>
</tbody>
</table>

### Table 5: Headache Triggers

<table>
<thead>
<tr>
<th>Triggers</th>
<th>Pharmacy Students</th>
<th>Non–pharmacy Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
<td>% (n)</td>
</tr>
<tr>
<td>Stress</td>
<td>30%(35)</td>
<td>26%(28)</td>
</tr>
<tr>
<td>Menstrual cycle</td>
<td>3%(3)</td>
<td>7%(7)</td>
</tr>
<tr>
<td>Change in sleep</td>
<td>23%(27)</td>
<td>12%(13)</td>
</tr>
<tr>
<td>Skipped meals</td>
<td>16%(19)</td>
<td>11%(12)</td>
</tr>
<tr>
<td>Cheese, chocolate,MSG etc</td>
<td>1%(1)</td>
<td>2%(2)</td>
</tr>
<tr>
<td>Exercise and physical exertion</td>
<td>2%(2)</td>
<td>2%(2)</td>
</tr>
<tr>
<td>Mental exertion</td>
<td>7%(8)</td>
<td>10%(11)</td>
</tr>
<tr>
<td>Change in weather</td>
<td>6%(7)</td>
<td>9%(9)</td>
</tr>
<tr>
<td>Environment over stimulation</td>
<td>7%(8)</td>
<td>13%(14)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>3%(3)</td>
<td>3%(3)</td>
</tr>
<tr>
<td>Others</td>
<td>2%(2)</td>
<td>5%(5)</td>
</tr>
</tbody>
</table>

### Table 6: Reasons for self medication for headache

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Pharmacy Students</th>
<th>Non-pharmacy Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
<td>% (n)</td>
</tr>
<tr>
<td>Headache is mild</td>
<td>9%(5)</td>
<td>18%(12)</td>
</tr>
<tr>
<td>Familiar with headache &amp; its remedy</td>
<td>32%(19)</td>
<td>18%(12)</td>
</tr>
<tr>
<td>Cost of physician’s service</td>
<td>0%(0)</td>
<td>1.5%(1)</td>
</tr>
<tr>
<td>Lack of trustful physician</td>
<td>0%(0)</td>
<td>4%(3)</td>
</tr>
<tr>
<td>No need to consult doctor for minor headache</td>
<td>34%(20)</td>
<td>37%(25)</td>
</tr>
<tr>
<td>Peer’s experience</td>
<td>5%(3)</td>
<td>7%(5)</td>
</tr>
<tr>
<td>Previous expertise</td>
<td>3%(2)</td>
<td>1.5%(1)</td>
</tr>
<tr>
<td>Time saving</td>
<td>14%(8)</td>
<td>10%(7)</td>
</tr>
<tr>
<td>No self -medication</td>
<td>3%(2)</td>
<td>3%(2)</td>
</tr>
</tbody>
</table>

[www.ijsrp.org](http://www.ijsrp.org)
Table 7: Pharmacotherapy for headache used by students

<table>
<thead>
<tr>
<th>Medication name</th>
<th>Pharmacy Students</th>
<th>Non-pharmacy Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
<td>% (n)</td>
</tr>
<tr>
<td>Panadol</td>
<td>34% (21)</td>
<td>49% (30)</td>
</tr>
<tr>
<td>Panadol extra</td>
<td>4.9% (3)</td>
<td>3.3% (2)</td>
</tr>
<tr>
<td>Disprin</td>
<td>15% (9)</td>
<td>11% (7)</td>
</tr>
<tr>
<td>Ponston</td>
<td>7% (4)</td>
<td>6.6% (4)</td>
</tr>
<tr>
<td>Nims</td>
<td>0% (0)</td>
<td>3.3% (2)</td>
</tr>
<tr>
<td>Ansaad</td>
<td>3.3% (2)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Blockium</td>
<td>0% (0)</td>
<td>1.6% (1)</td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>1.6% (1)</td>
<td>1.6% (1)</td>
</tr>
<tr>
<td>Naproxen</td>
<td>1.6% (1)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Artifen</td>
<td>1.6% (1)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Triptan</td>
<td>4% (2)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Tramadol</td>
<td>0% (0)</td>
<td>3.3% (2)</td>
</tr>
<tr>
<td>Epival CR</td>
<td>1.6% (1)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Synflex</td>
<td>1.6% (1)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>NO MEDICATION</td>
<td>25% (15)</td>
<td>20% (12)</td>
</tr>
</tbody>
</table>

IV. DISCUSSION

Headache is the most prevalent and frequent neurological symptom, affecting almost everyone at least once in their lives. 50% of the general population have headaches during any given year and more than 90% report a lifetime history of headache [14,16,21]. Its increasing prevalence and high morbidity had made headache an important general health problem worldwide. It is the main cause of incapacity, stress, diminished job performance and producing deleterious effects on quality of life [2,17].

Literature review and collected data suggest that headaches are highly prevalent in the general population and among university students. Population-based studies on headache in the general population are numerous [19-20]. However, there is little data on its prevalence and characteristics in special population particularly in pharmacy and non pharmacy students in university where conflict and instability in student faculty relationship, academic and curriculum stress, personal life issues, financial obligations constitute a major stressor and hence headache [15,17,36].

A total of 100 questionnaires were distributed to the respondents to record demographic details, headache patterns and its clinical characteristics, associated factors, family history, its relation with studies and its management strategies among female pharmacy and non pharmacy students of Lahore College for Women University.

Lifetime prevalence of headache in total respondents was 50% in this study. 27% of total respondents had experienced more than one headache episode in a year whereas 28% of both respondents had recurrent headache episodes for a mean of 1-5 years. Numerous past studies have also demonstrated high lifetime prevalence of headache ranging from 39% to 96% [22,24-27]. According to Stovner et al., the overall prevalence of headache in general is 47% similar to this study [28]. Primary headaches affect individuals of all ages especially students being a major cause of impairment and poor quality of life. In undergraduate student population, the disability caused by headache had a negative influence on academic productivity [29-32]. Another similar analysis in Brazilian College students showed that about 58% suffered headache in a year [76]. Juni et al., also found that the prevalence of headache in paramedical students was 83.4% in females higher than this study [77].

This study found that 35% of both respondents experienced monthly headache, 54% of total respondents on weekly basis while 11% on daily basis. These findings are in accordance with preceding study [24]. Vilela Braga et al. and Curry. K et al,
study in undergraduate students suggested that approximately 50% of students reported headache monthly and 17% students indicated headache episodes one or more times per week similar to this study [32-33].

Of all undergraduate pharmacy and non-pharmacy students interviewed, 70% had at least one headache episode in the last 3 months, a high prevalence that is in accordance with other studies [16,28,34-35]. Undergraduate students in Spain said that they had suffered from headache during the last year [36]. This study also demonstrated that 30% of respondents had increased frequency of headache episodes similar to other studies carried out in medical students of Andhara Pradesh et al [37].

The self-referred pain intensity in this study was high in pharmacy students than non pharmacy one i.e. 5% (Score 9) as compared to non-pharmacy students i.e. 3%. This may be due to increased stress of study in pharmacy students. The pain intensity of headache was of medium level (score 5) for majority of both respondents. These results are consistent with other studies carried in medical students in Oman and India [22,38]. None of the total respondents had worst possible pain.

This study also confirmed that in 64% of pharmacy students headache last few minutes after self medication while in 50% of non pharmacy respondents headache last for hours even after taking medication. 63% of total respondents stated that headache last for hours without medication indicating that headache is relieved with self-medication. These findings was in accordance with Nandha et al, Sweileh et.al and Abdo et al, [39-41].

In this study, 71% of the total respondents experienced temporary headache similar to previous study i.e. 82.3% [1]. This study also asserted pain quality of headache. Regarding pain quality, the most frequently chosen descriptors by total respondents were; Pulsing or throbbing (32%), pressure (23%), tension (47%), sharp (14%), dull (3%), burning (1%) and others (6%). These results are similar to previous studies [22,24,42-43]. However, these results are lower than some studies [33,44].

The major triggering factors reported by both respondents were stress (56%), change in sleep (35%), skipped meals (27%), mental exertion (17%), environment over stimulation (20%) and change in weather (15%). These findings are consistent with other studies [40][36][65][66]. Preceding studies have stated stress, fatigue, sleep, not eating on time deprivation as the most frequent trigger factors of headache [40,47-52]. Earlier studies have reported menstruation as important trigger factor [51-52] but menstrual cycle was not found to be significant trigger in this study constituting only 10% of total triggering factors similar to previous study .Each individual has different trigger factors, in each headache attack and one may have different trigger factors and some have multiple triggering factors. It is assumed that these factors originate from a single centre in brain like the hypothalamus. Minimising stress, getting enough sleep, increasing awareness and improving the quality of care are proved to be helpful for patients with cephalgia. The proper monitoring and understanding of triggering factors is the important step to reduce frequency and severity of headache [56].

Of all subjects, 66% experienced difficulty concentrating, 52% experienced irritability while 31% experienced nausea and vomiting along with headache. However, 7% of total respondents had none of headache associated symptoms. Others also experienced nose blockage, tearing, cramps and hungers. These findings were in accordance with preceding study [3] but different from as reported by Sweilah et al and Nagesh et al [24][46].

In this study, 13% of both respondents visit emergency due to chronic headache. These findings are different from other studies [63-64]. 26% respondents among pharmacy students and 44% among non pharmacy students visited consultants for medical advice. It was comparable to 23.3% students of Oman [22] but much higher than 2% and 5% prevalence of medical assistance for headache [23,57]. This low tendency of seeking medical care from physicians was similar with reports of Blau, Heinisch and Sanvito et. Al [58-59,61].

The overall self-medication rate among our subjects was 74% for pharmacy students and 56% for non pharmacy students. This result was consistent with other studies [22,26,60]. The relatively high rate of self medication reported by pharmacy students is related to student’s level of education, knowledge of pharmacology and ease of access to pain killers/analgesics.

In this particular study, the most common reasons for self medication for headache among total respondents were no need to consult doctor for minor headache (71%), familiar with headache and its remedy (50%), headache is mild (27%), time saving (24%), peer’s experience (12%), previous expertise (4.5%) and lack of trustful physician (4%). However, 6% of total
respondents didn’t practice self-medication. Similar results were seen in preceding studies [2,25,60,69-70]. Such self-medication may lead to frequent and high dose intake of analgesics and this may result in medication overuse headache and other untoward effects.

This study also reported that 25% of pharmacy students and 20% of non pharmacy students didn’t use medicines to manage headache episodes. These findings are consistent with research by Eman et al i.e. 20.2% [64]. However these findings are much less than other studies [66,37]. The medicines used for the management of headache among total respondents in our study were panadol (73%), disprin (26%), ponston (13.2%), ansaid (3.3%), naproxen (1.6%) and ibuprofen (1.6%). Likewise, in other studies, analgesics remained most preferable Choice among both respondents [2,22-23]. Only 2% participants used specific drugs for headache. These results were comparable with previous studies [67-68]. These results of rare usage of specific medicines and rare consultation visits showed non-serious and careless attitude of pharmacy and non pharmacy students towards health.

10% of pharmacy and 14% of non pharmacy students continued attending lectures even though experiencing headache. This is in accordance with other studies [71-73]. 36% of total respondents continued to study as normal with the use of medicines. These findings are consistent with the results of other studies [2,74]. However, this result is much less than that of Italian population i.e. 84% of population had reported the use of symptomatic drug for headache [66]. This difference can be attributed to our sample only including students whereas the later study was conducted on the general population. 52% of students used non drug measures such as rest. Such non drug treatment options were also reported from other studies [60]. The finding of this study showed much higher results as compared to preceding studies [37,72].

It is also observed from present study that 64% of pharmacy students and 42% of non pharmacy students felt difficulty in performing their activities due to headaches. However, 26% of total respondents said that they have never missed work or college due to headaches. This may be a result from effective self-medication that relieved the symptoms, mild intensity of symptoms or strong motivation among students to attend classes or most likely a combination of all factors. Our study was comparable with studies conducted by Nandha et. al, Ferri et. al, Silva. J et. al, Vilela Braga et. al and Juni et. al [25,33,39,76-77].

V. CONCLUSION

Headache is becoming the most disabling and challenging health problem in the student segment of population. This study indicates that symptoms of anxiety and depression and behavioral problems are associated with recurrent headache and stress/tension, sleep disturbance were the top perceived triggering factors of headache among the university students. Majority of students didn’t seek medical care but largely consuming analgesics to treat their headache. A large majority of pharmacy students indulged in self-medication. High prevalence without adequate medical care seeking behavior and the associated significant analgesic consumption necessitate the designing of all rounded strategies to improve the quality of life of individuals with such neurologic disorders.

REFERENCES


www.ijsrp.org


[58] Heinsick LM (1996) The use and abuse of medication for the immediate relief of headache. UFSC, Santa Catarina, Brazil


[64] Benjamin.WF, Brian. MG. Diagnosis and management of the primary migraine disorders in the emergency department setting; *Emerg Med Clin North Am*. 2009 February; 27910: 71- viii


**AUTHORS**

**First Author** – Minahil Tahir, 5th Prof, Pharm-D, Lahore College for Women University minahil.tahir25@gmail.com

**Second Author** – Rafia Mubashir, 5th Prof, Pharm-D, Lahore College for Women University rafiamubashir94@gmail.com

**Third Author** – Dr. Fatima Amin, Lahore College for Women University.

www.ijsrp.org
SEASONAL VARIATION OF PREY DENSITY OF LARGE PREDATORS IN SATKOSIA TIGER RESERVE, ANGUL, ODISHA, INDIA

B. K. Behera¹, R. K. Mishra² H.K.Sahu³, A.K.Nayak⁴

¹Department of Zoology, North Orissa University, Baripada - 757003
²Department of Wildlife and Biodiversity Conservation, North Orissa University, Baripada – 757003
³Satkosia Tiger Reserve, Angul, - 759143

Abstract

Prey densities were estimated in Satkosia Tiger Reserve, Odisha, India from January 2015 to December 2015 by using line transect distance methods. Season wise availability of prey density was collected. The pre-monsoon and Post-monsoon seasons prey density data was analyzed separately. In total, five prey species were recorded on the transect lines studied both in the core and buffer area of the reserve having an area of 964 km². Population density of Barking deer (Muntiacus muntjac) population densities in the study area were the highest, followed by chital (Axis axis), wild pig (Sus scrofa) and sambar (Rusa unicolor). Results of the study indicate that in Satkosia Tiger Reserve the density of the overall ungulates and each species was fewer as compared to other landscapes. Continuous monitoring of prey population in the Tiger Reserve which may indicate subsequent rising of their populations in reserve subsequently. However, only one year data is presented here to know the preliminary prey status of this tiger reserve. Further analysis is under consideration in due course of prey population study. Therefore, the proper management plan is required for better conservation of the prey and their predator in Satkosia Tiger Reserve.

Keywords: Prey; Density; Transect; Satkosia Tiger Reserve; Odisha

Introduction

Prey species either directly or indirectly influence the population dynamics of their predators. Therefore, to conserve and manage endangered or threatened species, it is essential to understand prey densities in their natural habitat [1]. Prey selection by large carnivore is a complex phenomenon [2, 3, 4]. In forested habitat the actual estimation of prey density, is a difficult task. There are several hypothesis that have been proposed to explain prey selection by predators [5]. These hypotheses pertain to ultimate causal factors such as energetic cost-benefit involved [6, 7] as well as to proximate mechanisms of selection such as search images or prey vulnerability [8, 9, 10]. The estimation of population size and status assessment of prey density in forested habitat is important for wildlife managements. Although ungulate (prey) census may be relatively easy in open grassland or meadow areas, it is much harder in forest habitats [11]. However, in recent past, continued depletion of prey population and fragmentation of natural habitats, apart from poaching is a serious issue acknowledged by conservationists as well as managers. These two major factors led to the present dilemma of tigers in the wild and will determine its survival in future [12, 13].

In this connection we evaluated the ungulates density in Satkosia Tiger Reserve in core as well as buffer area through distance sampling method. Seasonal comparisons among available ungulate density, which is urgently required for survival of the large predators and their co-predators in terms of their available food resources.
There is a paucity of information regarding the estimate of population density of wild ungulates. The attempt was made to estimate the prey density in core as well as buffer areas of Satkosia Tiger Reserve in pre-monsoon and post-monsoon seasons. Such information would be useful for other state wildlife agencies and wildlife managers that are charged with managing prey populations.

Materials and Methods

Study Area

Satkosia Tiger Reserve comprises of two adjoining sanctuaries of central Odisha, namely Satkosia Gorge Sanctuary and Baisipalli Sanctuary. The geographical co-ordinates of 20° 25' 12" N 84° 40' 20" E to 20° 45' 36" N 85° 05' 24" E within which the core is located are. It is one of the best deciduous ecosystems which represents a diverse floral and faunal extravaganza. It is a magnificent gorge ecosystem having many rare and endangered species and also the meeting point of two bio-geographic regions of India; the Deccan Peninsula and the Eastern Ghats, contribute to its immense biodiversity. The Satkosia Tiger Reserve was notified by Govt of Odisha in 2007, and which spreads over 4 districts; Angul, Cuttack, Nayagarh and Boudh. The reserve has an area of 964 sq km with 524 sq km as core area. The northern part of the reserve along the Mahanadi river bed is under the jurisdiction of Satkosia Wildlife Division, Angul while the southern part is under Mahanadi Wildlife Division, at Nayagarh. Climate of the Tiger Reserve is variable. The bulk of precipitation occurs during the rainy season through south-west monsoon. Usually monsoon breaks in the third week of June and continues up to middle or end of September. Pre-monsoon showers are also experienced in first or second week of June, but not very common. Post monsoon showers are also experienced in month of October and November. Thunder storm usually occurs during April and May. The average number of rainy days in a year is 100 out of which, 70 are confined to the period between June to September. The annual average rainfall varies from 1250 mm to 1700 mm. It has a significant elephant population in deciduous forests. The Tiger reserve is also important for the natural habitat of two endangered species of fresh water crocodilians viz. Gharial and Mugger, and a sizeable population of Gaur, Sambar, Chowsingha, Barking deer including Tiger and Leopard. Large population of Giant squirrel is sighted on the canopy cover of the forest. Besides these species, this tiger reserve is home to many rare and endangered birds, butter flies, fishes and aquatic fauna.
Methods

Line transect method by distance sampling [18, 19] was used to estimate densities of prey species in the study area. This method has been widely applied to estimate densities of prey species in tropical forests [20, 5, 21, 22, 23, 24, 25, 26]. We considered forest beat as sampling unit and laid transects on each beat. Eighty One line transects of 2km each (Figure 1) were walked three times (total effort = 243 km) during pre-monsoon and post-monsoon during 2015. Transects walks were carried out after two hours of sunrise.

Potential prey species of large carnivores were recorded from both sides of transect line during transect walk to collect the data on types of prey species, cluster size, animal bearing (with compass) and angular sighting distance (using laser range finder). The density of prey species was calculated using software DISTANCE Version 6.0 [28]. Student t-test [29] showed significant difference (p<0.05) on visibilities of sighting distance of prey species between two seasons (pre-monsoon and post-monsoon) but not within same season of the year. Hence we pooled pre-monsoon and post-monsoon line transects data separately. The density estimated of major prey species such as common langur, Rhesus macaque, spotted deer, sambar, wild pig, and barking deer. Although gaur, elephant, hare and pea fowl were sighted on the line transects in both pre-monsoon and post-monsoon their densities were not estimated because of low sample size. No livestock were sighted on transects. Line transect data were analyzed using the software DISTANCE for each ungulate species. We fitted several plausible detection probability models generated under hazard-rate, half-normal and uniform detection functions to the observed distance data, to select the most appropriate models [30]. We generated estimates of detection probability, animal cluster densities, cluster size and animal densities [31].The software fits a series of functions to the distance data and the model best fitting the data was selected by the Akaike Information Criterion [30]. There are a number of important assumptions regarding the use of Distance sampling and key one is that all animals on the line are detected.
Results

The estimated density of each of the tiger reserve during pre-monsoon and post-monsoon period is presented in Table 1. Barking deer was found as the most abundant prey species during the pre-monsoon (9.86 ±0.09SE/km²) in pre-monsoon and post-monsoon (10.873 ± 0.64 SE/km²) followed by chital Langur, wild pig, sambar in both the seasons (Table – 1).

Half normal-Cosine was best fitted model with lowest AIC value for overall prey density during pre-monsoon and post-monsoon seasons.

The overall prey population density for the entire Tiger Reserve was 22.265 ± 2.11 / km² during pre-monsoon and 19.811 ± 1.546 / km² during pre-monsoon.

Table – 1: Seasonal Prey Densities of Satkosia Tiger Reserve, 2016

<table>
<thead>
<tr>
<th>Season</th>
<th>Density (Number/ Sq.km.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-monsoon</td>
<td>19.811 ± 1.546</td>
</tr>
<tr>
<td>Post-monsoon</td>
<td>22.265 ± 2.11</td>
</tr>
</tbody>
</table>

The prey of tiger & their co-predators density at all the forest ranges except Pampasar & Tikarapada of Satkosia Wildlife Division during pre-monsoon period more as compared to post-monsoon period. However, in Mahanadi WL Division, the prey density of tigers and their co-predators was reverse i.e. more in post-monsoon period and less in pre-monsoon period (Table –3).

Range wise comparative prey density of tiger in Satkosia Tiger Reserve during pre-monsoon period was maximum at Raigoda and minimum at Tikarapda while the maximum value during post-monsoon period was noticed at Raigoda and Jilinda respectively (Table – 2).

Table – 2: Prey species Densities of Satkosia Tiger Reserve in different season
<table>
<thead>
<tr>
<th>Name of Prey species</th>
<th>Observation</th>
<th>Density (Number/ Sq.km.)</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre – monsoon</td>
<td>Post - monsoon</td>
<td>Pre - monsoon</td>
</tr>
<tr>
<td>Langur</td>
<td>97</td>
<td>81</td>
<td>5.482 ± 0.580</td>
</tr>
<tr>
<td>Wild boar</td>
<td>80</td>
<td>97</td>
<td>5.812 ± 1.400</td>
</tr>
<tr>
<td>Barking deer</td>
<td>160</td>
<td>123</td>
<td>9.860 ± 0.918</td>
</tr>
<tr>
<td>Sambar</td>
<td>46</td>
<td>74</td>
<td>5.460 ± 0.765</td>
</tr>
<tr>
<td>Spotted deer</td>
<td>66</td>
<td>47</td>
<td>6.661 ± 0.885</td>
</tr>
<tr>
<td>Over all</td>
<td>541</td>
<td>422</td>
<td>19.811 ±1.546</td>
</tr>
</tbody>
</table>

* Concern species data not sufficient

D - Individual Density, SE - Standard Error, DS - Group Density, AIC - Akaike Information Criteria

---

Over all Ungulate vs. Distance and fitted detection function (Half normal – Cosine, n = 537) during Pre – monsoon
Over all Ungulate vs. Distance and fitted detection function (Half normal – Cosine, n = 541) during Pre – monsoon

Available Prey densities in Satkosia Tiger Reserve during pre – monsoon and post – monsoon season 2015

Table – 3: Range wise prey density of Satakosia tiger reserve
<table>
<thead>
<tr>
<th>Name of Division</th>
<th>Name of Ranges</th>
<th>Density (Number/Sq.km.)</th>
<th>Pre- monsoon</th>
<th>Post- monsoon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satakosia WL</td>
<td>Pampasar</td>
<td>22.415 ± 3.186</td>
<td>24.142 ± 4.139</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Purunakote</td>
<td>29.014 ± 3.412</td>
<td>22.417 ± 3.085</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jilinda</td>
<td>33.472 ± 7.318</td>
<td>15.645 ± 3.329</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tikarapada</td>
<td>19.787 ± 4.967</td>
<td>23.627 ± 6.427</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Raigoda</td>
<td>39.655 ± 7.931</td>
<td>32.410 ± 8.120</td>
<td></td>
</tr>
<tr>
<td>Mean of Satakosia WL</td>
<td></td>
<td><strong>28.868 ± 5.362</strong></td>
<td><strong>23.648 ± 5.02</strong></td>
<td></td>
</tr>
<tr>
<td>Mahanadi WL</td>
<td>Chhamundia</td>
<td>22.914 ± 2.127</td>
<td>28.956 ± 8.336</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kusanga</td>
<td>15.570 ± 4.070</td>
<td>30.707 ± 6.669</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Banigochha W</td>
<td>Insufficient data</td>
<td>25.243 ± 4.332</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Banigochha E</td>
<td>Insufficient data</td>
<td>Insufficient data</td>
<td></td>
</tr>
<tr>
<td>Mean of Mahanadi WL</td>
<td></td>
<td><strong>9.621 ± 1.549</strong></td>
<td><strong>21.226 ± 4.834</strong></td>
<td></td>
</tr>
<tr>
<td>Over all Mean</td>
<td></td>
<td><strong>19.244 ± 3.455</strong></td>
<td><strong>22.437 ± 4.927</strong></td>
<td></td>
</tr>
</tbody>
</table>
Discussion

The estimated density of barking deer in the study area was the highest followed by chital, langur, sambar and wild pig. Chital density was low in Satkosia Tiger Reserve as the species is restricted to some areas like Raigoda, Purunakote and Pampasar.

In a landscape of ever increasing fragmentation of tiger habitat, the potential for sustaining small but productive tiger populations depends primarily on maintaining high prey densities [12]. However, in Satkosia, the density of each ungulate species seems to be very low as compared to other landscapes. From another point of view the low abundance of prey species may be attributed to the unavailability of large grass meadows and suitable habitat for them. Other speculations may be attributed as the tiger reserve received from five villages present around the core areas Satkosia Tiger Reserve. Anthropogenic pressure, poaching as well as NTFP collection within the core area of the Tiger Reserve are the major factors for less number of sightings on transect lines that lead to low density of ungulates or prey species observed in Satkosia Tiger Reserve. The Satkosia area harbours three perennial rivers (Mahanadi River, Suahagi and Nandini River) which flow throughout the year and is dominated by dense canopy cover, semi evergreen, tropical moist deciduous and with open large grassy meadows. This elevated condition of habitat heterogeneity perhaps favoured by the observed density of browsers and grazers [33]. The moist deciduous area offered favourable feeding grounds for wild pig during summer.

The ungulates or prey species play very important role in maintaining the population of predator. Thus it is essential to collect the data on the status and distribution of ungulate species and their fluctuations during adequate time intervals. Population size is an indicator by which the success of a management program is ultimately judged. Ecologists have emphasized the important role that wild prey species play in ecosystems through their influences on the composition, productivity, nutrient cycle and succession [34] and ultimately on the population of the predator. This preliminary line transect survey gave an idea about the ungulate density available in core as well as buffer area of Satkosia Tiger Reserve. However proper management plan is required for better conservation of the ungulates whose presence is predestined for survival of tiger *Panthera tigris* and leopard *Panthera pardus* which is a high profile endangered species.

As part of our ten months rigorous field efforts (from January 2015 to December 2015) in Satkosia Tiger Reserve, Odisha, outcomes that the density of the overall prey species and each prey species seems to be very less occurrence and major in number as to other landscapes. Less abundance of prey species in this reserve may also be attributed to the unavailability of large grassy meadows and their suitable habitation. However, another reason that cannot be ignored is the large anthropogenic pressure and human interference the reserve received due to presence of human habituating around the buffer area of tiger reserve. It needs urgent attention of the line departments and local inhabitants to conserve the Satkosia Tiger Reserve before it is lost its potentiality.

Acknowledgements

The authors are thankful to the Principal Chief Conservator of Forests, Odisha. We also thankful heartily to Dr. A.K.Nayak, RCCF – cum Field Director, Stakosia Tiger Reserve, Angul. We also thankful to S.Md.T. Rahman, DFO, Satkosia WL Division, Smt. Anshupragyan Das, DFO, Mahanadi WL Division and Sri
Subhendu Prasad Behera, ACF, Satkosia WL Division. We acknowledge the help of all Field staff for collecting necessary data and Sri Sanjeev Tripathy, GIS Analyst. We are also indebted to the National Tiger Conservation Authority, Government of India for funding support.

**Funding Body:** National Tiger Conservation Authority, Government of India

**References**


Bottle Gourd Plant Tendril-Role of Electric Charge in Rapid Contact Coiling

S.P.Dhir

* Department, Institute Name
** Department, Institute Name, if any

Abstract- Bottle gourd plant has evolved a special senso-motor organ in the form of tendril. The tendril provides sensory detection of foreign material and mobility to the plant. There are motor cells clustered at strategic locations on the tendril which are at the heart of rapid contact coiling of the tendril. In tendril the motor cell has additional sensory mechanism. Thus these motor cells may be called as SENSO-MOTOR CELLS. The role of electrostatic charge in the functioning of these SENSO-MOTOR cells and other factors involved in rapid contact coiling are discussed.

Index Terms- Bottle gourd, Tendril, Electric Charge, Coiling.

I. INTRODUCTION

In an earlier study it was found that besides touch rapid contact coiling could also be initiated by immersing the tendril in liquid containing electrolytes. It pointed to the role of electric charge in the initiation of rapid contact coiling.[1]

The physical properties of the tendril were studied and role of electric charge in rapid contact coiling of bottle gourd tendril was explored.

II. MATERIALS, METHODS AND RESULTS

1. A charged comb was brought near the tendril. The tendril was attracted by the comb. (Fig. 1)

2. Fibro- foam granules were sprinkled on the tendril. The granules stuck to the tendril. (Fig. 2) Again pointing to the static charge on the tendril.

3. Tendril was suspended in a static electric field. It moved with the movement of the field.

4. A powerful magnet was brought near the tendril. No effect was seen.

The results indicated that tendril behaves like a dielectric and carries an electric charge and no magnetic properties.

III. DISCUSSION

Plants are known to have MOTOR CELLS (Buliform cells) which act like a hinge at joints to enable the movements of plant parts, such as the closing and opening of leaflets in response to light intensity[2]. Motor cells alter their turgidity, and hence the cell shape. The movement is amplified by lever action. The movements resulting from the changes in motor-cell turgor are relatively gradual, taking minutes or hours.

Tendrils have motor cells situated at strategic locations (inner-side of tendril close to the tip) responsible for rapid movement of tendril giving rise to its coiling on coming in contact with an object. When the surface of these cells comes in contact with an object there is loss of electric charge as shown in the diagram No. 1.
Diagram No.1. Schematic diagram of the cell wall of tendril with integral protein acting as a micro-electric switch.

The metabolic machinery inside the cell generates an electric charge. The double layer of phospholipids in the cell wall acts as an insulator so that –ve charge is retained inside the cell and a +ve charge is spread on the outer surface of the cell wall. The integral protein acts as a conductor from inside to outside and acts like a touch screen switch. A number of motor cells are affected when even few cells are touched (Plate Effect seen in electrostatic charge).

IV. MECHANISM OF LOSS OF TURGIDITY BY MOTOR CELL

The opposite cell wall of the Motor Cell which is in contact with extracellular fluid is made of plasma membrane. Plasma membrane has ion channels which control influx and efflux of various ions and liquids. These ion channels are well documented in animal cells and have been visualized by crystallography.[3,4]

Crystallographic structural studies of a potassium channel have shown that, when a potential difference is introduced over the membrane, the associated electric field induces a conformational change in the potassium channel. The conformational change distorts the shape of the channel proteins sufficiently such that the cavity, or channel, opens to allow influx or efflux to occur across the membrane.

An economical and simpler mechanism of these voltage gated channels (better called CHARGE GATED CHANNELS) is described below:

- It is proposed that in bottle gourd plant these ion channels are operated by static electric charge (CHARGE GATED ION CHANNELS). The charge on the ribbon like helix provides the force for closing and opening of the ion channel gate.
- The ribbon like helix keep the ion channel closed when charge is present (Diagram No. 2). Loss of electric charge leads to opening of the ion channel. The opening of these channels lead to movement of ions along with water from inside the cell to interstitial fluid. Loss of fluid from inside of the cell leads to its shrinkage and movement.

Diagram No. 2. Schematic Diagram of Charge Operated Ion Channel

Like Charges repel each other. Under normal circumstances electric charge on the helices keeps the ion channel closed. Loss of charge leads to opening of channel and loss of ions and fluid.

The motor cell in bottle gourd tendril is more than simply motor cell. It has sensory receptors on external surface of the cell (responsible for sensory input) and ion channels on the interstitial side of the cell responsible for motor activity of the cell. Thus it is a SENSO-MOTOR CELL.

Rapid Contact Coiling of Bottle gourd tendril is a three step operation.

- When distal part of tendril comes in contact with an object it makes a weak attachment because of a static charge. The tendril has a positive charge and it sticks to an object carrying a negative charge. Though the attachment is very weak but it serves the purpose. (It is to be noted that tendril will not be attracted to other tendril as it will also be carrying a positive charge. Like charges repel each other. Though feeble but it is an attempt to distinguish self from non-self). Besides the attachment to object is helped by other physical factors. The hook like configuration of the tendril tip and blowing of wind aids in attachment.
- The contact of the tendril to the object leads to the shortening of the charge of the motor cells. This in turn leads to opening up of charge gated ion channels with loss of ions and fluid to interstitial space and collapse of the motor cell. Because of plate effect several motor cells are affected resulting in coiling of tendril. This is a reversible process. In the meantime excessive multiplication and growth of cell on the opposite side gives rise to more permanent coiling.

Acknowledgments are due to Mr. Ravi Kumar for experimental assistance and Ms. Anju Sharma for drawing of ion channels.

REFERENCES

AUTHORS

First Author – Dr. S. P. Dhir H.No.27 Sector 7, Panchkula-134109, Haryana, India, E-mail: <dhirsanittar@yahoo.com>
Parikrama: A spiritual walk to celebrate the Agricultural Harvest in Hindu Religious Cities

Ar. Madhavendra Pratap Singh*, Dr. Vandana Sehgal**

* Architecture, Amity University Lucknow Campus
** Architecture, Abdul Kalam Technical University

Abstract - The Hindu mythology describes that the relevance of Parikrama of a sacred place, which is directly related to a mandatory ritual for prayer towards the almighty. In past few years, the increase in a number of pilgrims has been sensed by several of the researchers. Amongst several of the reasons, this paper seeks to find a relation between rise in the number of pilgrims and the effect of monsoon on the parikrama marg. It deals to find the actual causes which are affecting the rise in the population of pilgrims on parikrama marg. Paper is focusing on the cause which are affecting the sacred yatra as many of the parikrama marg are away from the river basins, where kunds, ponds, and lakes are the only source of water available to pilgrims and locals. The research tries to establish the fact that:

1. A good monsoon not only helps in vegetation that provides enough income to people as their income is generated through agricultural products which gives them a financial feasibility to perform the yatra.

2. The ponds and kunds act as a resting place for the pilgrims before proceeding their journey ahead. The ponds, and the kunds, which helps in the self-purification of the pilgrims to perform their rituals, are either encroached or demystified result a loss of interest among the pilgrims and locals.

The study areas used as a case study are the parikrama path of Varanasi and Ajodhya, both of the cities are situated on the bank of the river comprising a sacred parikrama path which passes through various vans, Upwans, grooves and kunds areas.

Keywords: Parikrama marg, kunds, tourist growth rate, pilgrims, Temple complex.

I. INTRODUCTION

The Parikrama refers to circumambulation of sacred places in Hindu, Jain or Buddhist context. Parikrama means "the path surrounding something" in Sanskrit, and is also known as "to the right", representing circumambulation. Both words are mostly used in the context of religious deities in temples, sacred rivers, sacred hills and a close cluster of temples, and "doing a Parikrama", as a symbol of prayer, is an integral part of Hindu worship.

Typically, Parikrama is done after the completion of traditional worship (Puja) and after paying homage to the deity. In Rig Vedic verses Rig: 2.42.3 and 2.43.1 – "Pra", the Parikrama is done with facing the deity to the right side, in order to pay homage and devotion to the deity. Lakhs of pilgrims do the Parikrama of the sacred cities like Varanasi, Mathura, and Ajodhya, in order to show their devotion towards their beloved deity. During the Parikrama period, the pilgrims have to follow a path, which encircles the whole of the city premises, as to show the homage to the sacred city. The Parikrama Marg stretches from vans, jungles, urban areas, and open landscapes.

(There is another theory behind the sacred parikrama which was brought into light after doing some research on parikrama marg, according to some people parikrama marg was developed by the ancient governing system to protect the boundary of the Indian subcontinent from intrusions by neighbouring countries and states, and to provide the employment and basic amenities to the most remote areas of the country for the sustenance of a healthy life.)

Some of the well-known Parikrama in India are the ones around Narmada parikrama, Govardhan hill parikrama, Vrindavan parikrama, Vraja Mandal Parikrama, Ajodhya, Chitrakoot, Varanasi Panch Kosi and Char Dham Parikrama.
II. TYPOLOGY OF PARIKRAMA

1. Narmada parikrama
India is a land where even rivers are given a status of a mother, as it brings life and prosperity to the region, Narmada parikrama is the best example in which pilgrims and sadhus circumambulate the river to pay homage and show devotion towards river Narmada. It starts from Arabian Sea at Bharuch in Gujarat along the bank of river to the source in Maikal mountains (Amarkantak hills) in Madhya Pradesh and back to Bharuch from the opposite bank of river which makes a circumambulation of about 2600 km (1,600) miles to walk which is considered to be the highest religious efficacy. During the parikrama devotees has to pass various religious places dating back to Mahabharata epic story.

2. Govardhan hill parikrama
It is a narrow sandstone hill known as Giriraj near Mathura Vrindavan in Uttar Pradesh, which is about 8 km (5) miles in length. Its significance with Lord Krishna gave it an important religious place where devotees used to encircle the hill and a festival is celebrated after Dipawali known as Ankut or Annakuta in which devotees use to offer food to the deity which is distributed as Prasad to thousands of devotees. The parikrama encircles to about 21 km (13) miles around the hill and believed to be the sacred ritual performed by believers as spiritual purification.

3. Vrindavan parikrama
It is a religious town in Uttar Pradesh having a spiritual walk around the town with no definite start and stop point. The devotee has to has to encircle the town perimeter covering a distance about 10 km (6.2) miles. Parikrama is generally be done on Ekadasi (eleventh lunar day of waxing and waning of the moon), during the parikrama pilgrims visits to various temples and Ghats to show their devotion and love.

4. Vraj Mandal Parikrama
It is also known as 84 Kosi parikramas which are been performed during the month of October and November. It took devotees 1-2 month depending on the route and the speed to visit twelve forests known as vans twenty-four groves known as Upwans. The twelve forests are - Madhuvan, Talavan, Kumudvan, Bahulavan, kamavan, khadiravan, Vrindavan, Bhadravan, Bhandiravan, Belvan, Lahavan, and Mahavan. The twenty-four groves are- Gokul, Govardhan, Barsana, Nandagram, Sanket, Paramadra, Aring,. Sessai, Mat, Uchagram, Kelvan, Sri Kund, Gandharvavan, Parsoli, Bilchhu, Baccchavan, Adibadri, Kavahla, Ajnokh, Pisaya, Kokilavan, Dadhigram, Kotvan and Raval. Pilgrims have to visit all these places to complete their yatra.

5. Ajodhya
Ajodhya being a temple city in Uttar Pradesh is a center of Hinduism. Pilgrims believe it as a sacred city which motivates people for a sacred walk, parikrama is happening since thousands of years. Various levels of devotion tend to develop various levels of parikrama as 5 Kosi, 14 Kosi, and 84 Kosi. 5 Kosi being the most popular among the pilgrims which encircle the entire city having a parikrama about 15 km performed over a period of two days. Devotees first has to take a holy dip in Saryu river to start a holy walk, in the parikrama marg there are several kunds which act a padav sthalas and the temple completely attached to it, where pilgrims have to take visit after taking bath in the kunds and to offer food and other offerings to deity, which was later distributed to all Pilgrims as Prasad.

6. Chitrakoot
It is one of the oldest religious places in the history of Hindu religion dated back to the epic of Ramayana; its current location is on the border of Uttar Pradesh and Madhya Pradesh. It falls in the northern region of Vindhya Range of the mountain on the bank of Mandakani River. The parikrama of kamadgiri parvat which is about 5 Km. Is believed to be spiritual and comprises of various temple and forests areas.

7. Varanasi Panch Kosi
It is one of the oldest living cities known to Hindu religion and has a significant importance in the Hindu religion. To show their devotion people performs a spiritual walk around the city known as Panch Kosi parikrama which comprises of five places naming, Kardmeshwar, Shivpur, Rameswar, Bhimchandi, and kapildhara. The parikrama starts from Manikarnika Ghats and ends at the same place covering a stretch of about 64 km approx. The devotees have to visit all the places and take bath in the kunds area before entering into the temple. Once all the five places have been visited yatra ends at the Manikarnika Ghat giving pilgrims a spiritual comfort in their life.

8. Char Dham Parikrama
India s most popular pilgrimage circuit comprises of Puri in Orissa, Rameshwaram in Tamilnadu, Dwarika in Gujarat, and Badrinath in Uttrakhand. These important pilgrimages were grouped together in a religious circuit where pilgrims take a spiritual walk encircling the whole country which shows their devotion towards their motherland.
III. TRAFFIC DATA ANALYSIS (TOURISTS & PILGRIMS)

Tourist and pilgrims Traffic data observation:

It has been observed that most of the parikrama performs during the months of September to April, during this period Indian subcontinent faces a good monsoon and a pleasant weather to perform parikrama around various places of the country. A need of water and shelter can easily be provided by Mother Nature after a good monsoon season. It has been observed by the tourism department that after a good monsoon there is a rise in the numbers of the pilgrims because of the availability of natural resources in abundance. According to the tourism data, there is a constant growth of about 6% after a good monsoon but the graph decreases as the annual rainfall decreases.

In order to investigate the matter further, I have conducted a survey on two of the parikrama marg, Ajodhya, and Varanasi, and taking data from the tourism department it is been concluded that there is a rise in pilgrims which is about 6% on average, when there is a good monsoon season the growth rate has increased to 16% in 2009-10 but during the periods of bad monsoon the rise in no. of pilgrims has dropped too dramatically to .8 % in 2013-14 where the max and min. average temp remains almost stationary during this period.

<table>
<thead>
<tr>
<th>Year</th>
<th>Zone</th>
<th>Domestic</th>
<th>Growth</th>
<th>Foreign</th>
<th>Growth</th>
<th>Total</th>
<th>Growth Rate in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>Varanasi</td>
<td>3898557</td>
<td>0.00</td>
<td>188853</td>
<td>0.00</td>
<td>4087410</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Sarnath</td>
<td>704142</td>
<td>0.00</td>
<td>299305</td>
<td>0.00</td>
<td>1003477</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4602729</td>
<td>0.00</td>
<td>488158</td>
<td>0.00</td>
<td>5090887</td>
<td>0.00</td>
</tr>
<tr>
<td>2010</td>
<td>Varanasi</td>
<td>4139785</td>
<td>6.19</td>
<td>219088</td>
<td>16.00</td>
<td>4358873</td>
<td>6.64</td>
</tr>
<tr>
<td></td>
<td>Sarnath</td>
<td>758814</td>
<td>7.76</td>
<td>314510</td>
<td>5.08</td>
<td>1073324</td>
<td>6.96</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4898599</td>
<td>6.42</td>
<td>533598</td>
<td>9.30</td>
<td>5432197</td>
<td>6.70</td>
</tr>
<tr>
<td></td>
<td>Sarnath</td>
<td>800093</td>
<td>5.44</td>
<td>343122</td>
<td>9.09</td>
<td>1143215</td>
<td>6.51</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5267065</td>
<td>7.52</td>
<td>588782</td>
<td>10.34</td>
<td>5855847</td>
<td>7.80</td>
</tr>
<tr>
<td>2012</td>
<td>Varanasi</td>
<td>4783012</td>
<td>7.07</td>
<td>278573</td>
<td>13.40</td>
<td>5061585</td>
<td>7.40</td>
</tr>
<tr>
<td></td>
<td>Sarnath</td>
<td>833500</td>
<td>4.17</td>
<td>355294</td>
<td>3.54</td>
<td>1188794</td>
<td>3.98</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5616512</td>
<td>6.63</td>
<td>633867</td>
<td>7.65</td>
<td>6250379</td>
<td>6.73</td>
</tr>
<tr>
<td>2013</td>
<td>Varanasi</td>
<td>4966161</td>
<td>3.83</td>
<td>285252</td>
<td>2.40</td>
<td>5251413</td>
<td>1.77</td>
</tr>
<tr>
<td></td>
<td>Sarnath</td>
<td>838566</td>
<td>0.61</td>
<td>362113</td>
<td>1.92</td>
<td>1200679</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5804727</td>
<td>3.35</td>
<td>647365</td>
<td>2.13</td>
<td>6452092</td>
<td>3.22</td>
</tr>
<tr>
<td>2014</td>
<td>Varanasi</td>
<td>5202236</td>
<td>4.75</td>
<td>287761</td>
<td>0.87</td>
<td>5489997</td>
<td>4.54</td>
</tr>
<tr>
<td></td>
<td>Sarnath</td>
<td>899457</td>
<td>7.26</td>
<td>374268</td>
<td>3.36</td>
<td>1273725</td>
<td>6.08</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6097693</td>
<td>5.04</td>
<td>662029</td>
<td>2.27</td>
<td>6763722</td>
<td>4.82</td>
</tr>
<tr>
<td>2015</td>
<td>Varanasi</td>
<td>5413927</td>
<td>4.07</td>
<td>302370</td>
<td>5.08</td>
<td>5716297</td>
<td>4.12</td>
</tr>
</tbody>
</table>
Note: (Recorded Figures for the year 2009 to 2015), Source: U.P TOURISM
On further analysis, it has been observed that most of the people who perform parikrama belongs to the lower income group and majority of them are related to the occupation of agriculture or products related to agriculture.

Source: (survey conducted by the researcher)

In many ancient civilization around the world, it has been seen that people used to offer food and ornaments to their beloved deity, as to please him and getting blessed in return with good monsoon rains in their region. A concept of Bali (sacrifice) can also be seen around the world, but a sudden change in the education system and awareness in the society leads to discouraging of this ancient system. In India most of these places where parikrama is done where people tend to promote the ancient system an offering of food items which was later distributed as Prasad, which people took with them as the present from the god’s hand.

On further analysis of the survey, it has been found that most of the people are between at the age of 50 - 75 years and having the primary occupation as agriculture. A good monsoon not only provides them enough food for a healthy living but also helps them to generate enough income to perform a yatra so sacred to them. With a poor monsoon, people don’t have enough money to cater their basic needs.

Source: (survey conducted by the researcher)

A good monsoon also provides enough water to the nearby lakes, ponds, kunds which cater the need of the pilgrims and the people living on the parikrama marg. From ancient times these water bodies act a drinkable source of water for the people associated with it. But because of the urbanization, these water bodies lost its character and the quality of water is deteriorated enough even not to be consumed by animals. These kunds and water bodies are equally sacred and important as the temple area on the parikrama because they share the common history and making them as an entire temple complex. The discarding of the kunds and water bodies would have only discouraged pilgrims to take a holy bath and to offer water to the deity, from that same kund.
Kunds acts as a natural resource of water, away from river and streams. It provides a basic needs for the sustenance of life in a particular region. It can be also said that because of the water bodies the settlement in that particular region persists. Talking about the kunds and water bodies which often lie on the parikrama marg has played a significant role in the parikrama as well as for the people living nearby it. This has been observed that parikrama marg persist from thousands of years because of the kunds and water bodies are associated with the parikrama region, providing pilgrims with a place to stay. Without the kunds and ponds parikrama in that region can never be persisted.

With the increase in the no of pilgrims and people living near the water bodies, there is a constant pressure on kunds to provide adequate water supply to the locals and the pilgrims, they also act as a natural recharging medium of the underground aquifer. Due to extensive use of the water from the kunds the quality and quantity of water has been reduced tremendously. To make the condition worse, people living on the verge of the kunds and ponds use its water for daily needs.

Most of the kunds on parikrama marg are away from the persisted civilization, having no means and measures of wastewater drainage. All the wastewaters were directed towards the kunds because of the natural depression on the site conditions, taking all the impurities with it making water unfit for consumption even for animals. As a result, most of the family living around kunds have their own bore well systems for daily needs, with a result, each family is having two set of bore well, one for outdoor needs and one for indoor needs. The extensive use of water results in the depletion of water table in that particular region making it difficult for ponds and kunds to recharge the underground aquifer. The levels of water in the kunds has been decreased tremendously exposing the impurities settled at the bottom. Conditions like these reduces the interest of the pilgrims to perform their rituals in the kunds and also been abandoned/ encroached by the locals.

The natural landscape and the character of that place have been lost because being rejected by the peoples and pilgrims leading a place reserved for antisocial elements.

IV. CONCLUSION

The paper seeks to conclude that monsoon not only helps pilgrims to provoke for the parikrama while increasing their annual income to support for the expense of the yatra, but also provide the natural resources like food, water and shelter spaces which helps in completing the parikrama. Kunds which are the only source of water in the remote areas also provide a breathing space to the pilgrims. During the rapid urbanization all the kunds and water bodies are either encroached or neglected by urban commuters, resulting in a loss of character of that particular region. People who are living on the parikrama marg or close to the temple area have flourished because of the pilgrim’s influx which was related to their lively hood. They have also promoted migration of their relatives from various places to settle in that particular region making a permanent settlement around those water bodies and temple complex. By conserving the kunds and water bodies associated with the temple complex the parikrama marg can be conserved.

REFERENCES

Conference Paper:


[20] Himadari phulkan, on Impact of Infrastructure on Spiritual Tourism in Uttarakhand with Special Emphasis on Haridwar and Rishikesh.
[21] Lefteris Sdoukopoulos, Methods for assessing the pedestrian level of service: International experience and adjustment to the Greek walking environment - The case of Thessaloniki,

[22] Centre for Research and Technology Hellas / Hellenic Institute of Transport (CERTH/HIT)

[23] Holly Krambeck, the global walkability index: talk the walk and walk the talk, master’s degree candidate (February 2006)

Books:


Report:

[31] South Asia Institute, Metabolism of the Ephemeral City, 2013

Websites:

[36] http://www.urbanstreet.info/2ndsymposiumproceedings/volumes%
[37] http://www.urbanstreet.info/2nd_sym_proceedings/volumes%
[39] http://lj.uwpress.org/content/33/1/59.short

AUTHORS

First Author – Madhavendra Pratap Singh, M. Arch, (Pursuing Ph.D. from Abdul Kalam Technical University), Asst. Professor, Amity School of Architecture and Planning, Lucknow Campus, Email: ar.madhavendrasingh@gmail.com

Second Author – Dr. Vandana Sehgal, Ph.D., Principal, Faculty of Architecture (Abdul Kalam Technical University), Email: Sehgal_vandana@hotmail.com
An Examination Factors Influencing Underpricing of IPOs in Financial and Manufacturing Industries on The Indonesia Stock Exchange over The Period of 2011-2016

Muhamad Rexy Aji Mahatidana*, Irni Yunita**

* Undergraduate of International ICT Business, Telkom University
** Faculty of Economics and Business, Telkom University

Abstract- This study aims to determine the factors influencing the level of underpricing of Financial and Manufacturing companies listed in Indonesia Stock Exchange within 2011-2016. Variables examined include underwriter reputation, auditor reputation, firm age, financial leverage, ROA, and ownership concentration. This research was carried out through the analysis of multiple linear regression with a 5% significance level. Data collection tool that used is observation and literature study with purposive sampling method. This research used 40 selected samples from 140 firms available in population. The research concluded that first underwriter reputation and auditor reputation succeed to show a negative significant effect on the level of underpricing. Second, firm age, financial leverage, ROA and ownership concentration failed to show a significant influence on the level of underpricing.

Index Terms- underpricing, Initial Public Offering (IPO), financial industry, manufacturing industry.

I. INTRODUCTION

The competition to get investors among the companies in the first day of going public or named by Initial Public Offerings (IPOs) is getting tighter and more competitive. In this highly competitive condition, a phenomenon called underpricing commonly happens. Several empirical studies show that investors typically achieve a relatively large abnormal return in a short-term once they invest in initial public offering shares. This is, however, referred to IPO underpricing, and it means the difference between the first day trading price and closing market price even under the efficient market (Tian, 2012). Evidence across capital markets has shown, average of the IPOs is underpriced. The level of underpricing varies across capital markets and countries, but the emerging capital markets tend to be more underpriced than their counterparts of well-developed markets (Gumanti, Nurhayati, & Maulidia, 2015).

II. LITERATURE REVIEW

Many researches have conducted the examination and analysis of factors influencing underpricing of IPOs. However, there is still a gap among the results showed by the researches. Some researches conducted by Gumanti, Nurhayati and Maulida (2015); Carter and Manaster (1990) revealed that initial returns are documented to be negatively related to the reputation of the underwriter. While the studies of Walker (2008); Loughran and Ritter (2004); Beatty and Welch (1996) show that initial returns are positively related to the reputation of the underwriter.

In Indonesia, underpricing has been shown in multiple times in significant numbers Indriani and Marlia (2014) pointed out that within five years (2009-2013) underpricing numbers were 50% of total IPOs every year. In 2012 the all of the IPOs are underpriced. This situation indicated that IPO companies did not generate maximum funding. Compare to neighbourhood countries such as Malaysia, Philippines, Singapore, Thailand, and Hongkong the average initial returns of Indonesia were 25.7% (Suherman, 2013 in Indriani and Marlia, 2014). Furthermore, the numbers of underpricing from 2014-2016 increased. As the data obtained by the author, the following years continued from Indriani and Marlia (2014). The numbers of underpricing almost hit 100% for three years consecutively (2014-2016).

There are nine industries listed in the Indonesia Stock Exchange: Service, Property, Mining, Plantation, Trade, Manufacturing, Financial, Tourism, and Transportation. Among those industries, Financial and Manufacturing industries have the largest share percentages of IPOs in 2007-2016. Financial Industry possesses 18% of the total IPOs, and Manufacturing Industry possesses 16%.

There is a significant increment from the data obtained in the past five years. It is interesting to analyse the underpricing of IPO firms since the variables used in previous researches show inconsistent results. Furthermore, the existences of two top industries of financial and manufacturing that have shares above the average among all the industries listed are attracting the author to do a research on that area. The variables used in this research are underwriter reputation, auditor reputation, firm age, financial leverage, ROA, and ownership concentration. Moreover, previous researches use similar variables with very close similarities. Therefore, in this research the author attempts to examine the variables that commonly used as well as variable that is rarely examined in the case of underpricing of financial and manufacturing industries in Indonesia Stock Exchange within 2011-2016.

Therefore, the following hypothesis proposed:

H1: Underwriter reputation has a negative significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange.

The influence of auditor reputation has been examined by several researchers. The findings of Purwanto and
Mahyani (2016); Junaeni and Agustian (2013); Yoga (2010); Beatty and Ritter (1986) stated that there is a significant negative relationship between auditor reputation with the degree of underpricing. The more reputable the auditor will likely reduce the degree of underpricing.

Accordingly, this hypothesis proposed:

\[ H2: \text{Auditor reputation has a negative significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange.} \]

Firm age as a factor influencing the degree of underpricing has been examined by several researches. Clark (2002) examined the influence of the age-at-IPO of the company to the aftermarket stock performance. He categorized sample firms into high-technology firms and non-technology firms. From the test, the data shows a significant correlation between the age-at-IPO and IPO aftermarket performance. Specifically, high-technology firms obtain a negative relationship between the firm age and excess return, which is contrary to the nontechnology firms. However, Ritter (1991) and Merkley (1994) in Tian (2012) regardless the industry category, the age of the firm will influence the degree of underpricing negatively.

Further, Puspita (2010) shows that firm age has no significant relationship with the degree of underpricing.

Hence, the hypothesis below proposed:

\[ H3: \text{Firm age has a negative significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange.} \]

Several researchers have tested the relationship between financial leverage with the degree of underpricing. Test results on financial leverage by Purwanto and Mahayani (2016) shows that financial leverage has no significant effect on the level of underpricing. Financial leverage showed no significant effect on the level of underpricing as investors viewed the high leverage ratio due to the performance of management. While Yoga (2010); Puspita (2011) show that there is a negative and significant relationship between financial leverage with underpricing.

Thus, the hypothesis below proposed:

\[ H4: \text{Financial leverage has a positive significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange.} \]

Researches about an examination of ROA as an influencing factor of underpricing have been conducted. Yoga (2010); Puspita (2011) states that ROA has a significant effect on underpricing. However, Purwanto and Mulyani (2016) and stated that ROA has no significant effect on underpricing.

Therefore, the following hypothesis proposed:

\[ H5: \text{ROA has a negative significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange.} \]

The effect of ownership structure is rarely examined by researchers in this area. A few of researches have conducted the examination about the ownership structure as an influencing factor to the degree of underpricing. The studies of Darmadi and Gunawan (2012); Venkatesh and Neupane (2005) show that ownership concentration is insignificant in explaining the first-day returns.

Hence, the following hypothesis formulated:

\[ H6: \text{Ownership concentration has a positive significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange.} \]

The variables used in this research can be seen in Table 1.

### III. METHODOLOGY

The research method used is quantitative data. The data required to examine factors influencing the underpricing is taken from www.idx.co.id, the non-financial data will be gathered from the firm’s prospectus data, and financial data taken from the firm’s financial statements and Indonesia Stock Exchange. The purposes of this study are causal as this research will examine whether or not the financial and non-financial variables cause the underpricing of IPOs in Indonesia Stock Exchange. The factors influencing the degree of underpricing will be examined in accordance with the time of the data gathered within five years from January 1st, 2011 to January 1st, 2016. In this research, the author will examine the influences of underwriter reputation, auditor reputation, firm age, financial leverage, return on asset (ROA), and ownership concentration in on the degree of underpricing.

The unit of this research is underpriced IPO firms listed in Indonesia Stock Exchange within January 1st, 2011 to January 1st, 2016. The time horizon in this study is specified as cross-sectional studies due to the author will examine the data in only one period within 2011-2016. The population in this research is all IPO firms listed in the Indonesia Stock Exchange within the period of January 1st, 2011 to January 1st, 2016. From 48 Financial and Manufacturing firms that did IPOs in the period, 7 firms are overpriced and 1 does not have sufficient information; therefore, those companies are not included to the objects of this research. As a result, 40 firms remain and are included to the research sample.

The sampling method used in this research is purposive sampling. The criteria in this research are stated as follows:

2. The IPOs of the companies are underpriced.
3. The companies have available financial reports within 1 or 2 years prior to the IPOs date.
4. The stock price, and listing date are available in the Indonesia Stock Exchange.
5. The establishment date is available.
6. The underwriter and auditor names are available.
7. The ownership structure is available.

Hence based on the criteria stated above, the final sample size is 40 companies that meet the author’s research object criteria.

### Research Variable

The variables used in this research can be seen in Table 1.

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>Indicator</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Underpricing</td>
<td>Degree of</td>
<td>Ratio</td>
</tr>
</tbody>
</table>
Underpricing reputation and auditor reputation are using dummy variable in which 0 and 1 are applied in a certain condition. The underwriter reputation will be scored 1 if the company used top 10 underwriter based on Bloomberg ranking. While the auditor reputation will be scored 1 if the company used top 4 auditors based on ICMD and PusatPembinaanProfesiKeuangan. Otherwise, 0 is applied respectively to underwriter and auditor reputation if they do not meet the condition.

The hypothesis testing used in this research is multiple linear regression. Prior to the hypothesis testing, the data is tested using classical assumptions test to know the fit of using multiple linear regression.

IV. RESULTS AND DISCUSSION

Descriptive statistic

<table>
<thead>
<tr>
<th>Source: Secondary Data Processed (2017)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Underpricing</th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underwriter Reputation</td>
<td>40</td>
<td>0.00</td>
<td>1.00</td>
<td>0.5613</td>
<td>0.19</td>
</tr>
<tr>
<td>Auditor Reputation</td>
<td>40</td>
<td>0.00</td>
<td>1.00</td>
<td>0.23</td>
<td>0.07</td>
</tr>
<tr>
<td>Firm Age</td>
<td>40</td>
<td>2.00</td>
<td>11.00</td>
<td>2.51</td>
<td>2.51</td>
</tr>
<tr>
<td>Financial Leverage</td>
<td>40</td>
<td>0.01</td>
<td>8.88</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>ROA</td>
<td>40</td>
<td>0.00</td>
<td>0.47</td>
<td>0.07</td>
<td>0.5613</td>
</tr>
<tr>
<td>Ownership Concentration</td>
<td>40</td>
<td>0.00</td>
<td>0.00</td>
<td>0.90</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Underpricing (Y)  
Within 2011 to 2016, the level of underpricing of Financial and Manufacturing companies listed in the Indonesia Stock Exchange has an average of 0.27 or 27%. This shows that these companies estimate the IPO price too low. Therefore, it reaches 27% lower compared to the price sold on the secondary market. The highest level of underpricing is 70%. The Issuers with the highest level of underpricing are Bank Agris, Bank Dinar Indonesia, and Bank Yudha Bhakti. The lowest level of underpricing is 1% that is experienced by Kino Indonesia.

Underwriter Reputation (X1)  
Underwriter reputation has a mean of 0.3 or 30%. It means that only 30% of total Financial and Manufacturing IPO firms that used top ten underwriters. The underwriter reputation is a dummy variable which consists of 1 or 0. A company with a value of 1 means that the company chose ten top underwriters based on the underwriter rank by Bloomberg. There are 12 companies that chose to use the ten top underwriters, and the rest did not choose to use ten top underwriters.

Auditor Reputation (X2)  
Auditor reputation has a mean of 0.2 or 20%. From the total underpriced IPOs from Financial and Manufacturing industries within 2011-2016, only 20% used the service of top 4 auditors. The auditor reputation is a dummy variable that consists of 1 or 0. A company with a value of 1 means that the company chose top 4 auditors based on the ICMD and PusatPembinaanProfesiKeuangan. There are 8 companies that used top 4 auditors, and the rest did not.

Firm Age (X3)  
Firm age of financial and manufacturing IPO companies on average is 27 years. The youngest company which conducted IPO is 2 years by WaskitaBeton Precast, and the oldest company is 111 years by Aneka Gas Industri.

Financial Leverage (X4)  
Financial leverage that is measured using Debt to Equity Ratio (DER) has a mean of 3.02. It means that prior to the Initial Public Offering (IPO), the sample companies have total debt up to 3.02 times compared to its own capital owned by the company. Such conditions illustrate that the company's funding policy tend to use debt from third parties rather than using owner's equity. It is possible that the high DER is due to the company is expanding its business; therefore, before doing stock offer to the public, the company borrows to the third parties. The lowest DER is obtained by 0.01 which is owned by Minna PadiInvestamaSekuritas. While the highest DER of 8.88 is owned by Bank Yudha Bhakti.

Return on Asset (ROA) (X5)  
Return on Asset (ROA) ratio shows the company's ability in making a profit on the last financial statement prior to the IPO year. This ROA information by issuers is expected to be an investment decision by investors. Based on the data from 40 samples of Financial and Manufacturing firms, obtained ROA mean of 0.06. This shows that the average issuer get a net profit of 0.06 compared to the total assets on the final report before the IPO. The lowest ROA ratio is 0.00 by Bank Mitraniaga and BankArtos Indonesia. While the highest ROA is 0.47 by Magna Finane and ChitoseInternasional.

Ownership Concentration (X6)  
Ownership concentration has a mean of 0.56 or 56%. It means that on average, the largest shareholder of Financial and Manufacturing IPO companies hold 56% of the total common shares. The lowest ownership concentration is 0.23 by Bank Nationalnobeu, and the highest is 0.90 by Bank Mestika Dharma.

www.ijsrp.org
Classical Assumption Test

1) Normality Test

The test results show that there are no variables showing the VIF value which is greater than 10. This means that the independent variable model predictor used in this study did not show any symptoms of multicollinearity in the regression model.

3) Autocorrelation Test

The autocorrelation test was performed using Durbin Watson test. If the DW value is between du and 4 - du then autocorrelation does not exist in regression model. This research obtained DW value of 2.156. The DW value is greater than du = 1.652 and the DW value is less than (4 - 1.652) which means there is no autocorrelation in the regression model.

4) Heteroscedasticity Test

From the Figure 2, the points in the Scatterplot spread randomly as well as scattered either above or below the number 0 on the Y axis. This can be concluded that there is no heteroscedasticity in the regression model. Therefore, regression model is feasible to use.

Hypothesis Testing

1) Simultaneous Hypothesis Testing (F Test)

The test results show that there are no variables showing the VIF value which is greater than 10. This means that the independent variable model predictor used in this study did not show any symptoms of multicollinearity in the regression model.
According to the above ANOVA test in the Table 4.5, the significance value is 0.009. That significance value is less than 0.05. Thus it can be concluded that simultaneously underpricing of IPOs within Financial and Manufacturing industries in Indonesia Stock Exchange 2011-2016 can be influenced by underwriting reputation, auditor reputation, firm age, financial leverage, ROA, and ownership concentration.

2) Partial Hypothesis Testing (t-Test)

<table>
<thead>
<tr>
<th>Model</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>2.541</td>
<td>.016</td>
</tr>
<tr>
<td>Underwriter_Reputation</td>
<td>-2.118</td>
<td>.042</td>
</tr>
<tr>
<td>Auditor_Reputation</td>
<td>-2.823</td>
<td>.008</td>
</tr>
<tr>
<td>Firm_Age</td>
<td>-.080</td>
<td>.937</td>
</tr>
<tr>
<td>Financial_Leverage</td>
<td>1.556</td>
<td>.129</td>
</tr>
<tr>
<td>ROA</td>
<td>.445</td>
<td>.659</td>
</tr>
<tr>
<td>Ownership_Concentration</td>
<td>-.282</td>
<td>.779</td>
</tr>
</tbody>
</table>

Source: Secondary Data Processed Using SPSS 24 (2017)

Analysis and Discussion

The Influence of Underwriter Reputation on The Underpricing Level

According to the result of t-test, the underwriter reputation has a significant influence and a negative direction on the level of underpricing. The influence can be seen from t arithmetic of -2.118 and t table of -2.035. Therefore, t arithmetic < t table is -2.118 < -2.035, and the significance value of underwriter reputation that is less than the significance level 0.042 < 0.05. Therefore, according to the decision criteria H0 is rejected, and it means that the underwriter reputation influences underpricing level significantly in a negative direction in Financial and Manufacturing IPO companies in Indonesia Stock Exchange (IDX) within the period 2011 to 2016. With a negative coefficient of -0.451 and significantly tested, this finding concludes that an increase of one (1) in the underwriter reputation will lead a decrease in the underpricing level by 0.451.

This finding supports the research results by Puspita (2013); Junaeni and Agustian (2013); Indriani an Maulia (2014); Purwanto et al. (2013); Gumanti, Nurhayati, and Maulidia (2015); and Purwanto and Mahyani (2016) conducted on IPO firms in Indonesia Stock Exchange (IDX) operating underwriter reputation as one of the variables. However, this finding does not support a study by Tian (2012) that stated “Underwriter reputation is not significant to the pricing of IPO”.

Therefore, the H1 proposed in this research where underwriter reputation has a negative significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange is accepted.

This research is in line with the agency theory where Underwriters have better information about demand of issuer's shares, compared to the issuers itself. Similarly, according to investors, underwriters are considered to have more complete information about the condition of the issuer so that underwriters who have a high reputation will set the initial share price in accordance with the condition of the company.

The Influence of Auditor Reputation on The Underpricing Level

According to the result of t-test, the auditor reputation has a significant influence and a negative direction on the level of underpricing. The influence can be seen from t arithmetic of -2.823 and t table of -2.035. Therefore, t arithmetic < t table is -2.823 < -2.038, and the significance value of auditor reputation that is less than the significance level 0.008 < 0.05. Therefore, according to the decision criteria H0 is rejected, and it means that the auditor reputation influences underpricing level significantly in a negative direction in Financial and Manufacturing IPO companies in Indonesia Stock Exchange (IDX) within the period 2011 to 2016. With a negative coefficient of -0.451 and significantly tested, this finding concludes that an increase of one (1) in the auditor reputation will lead a decrease in the underpricing level by 0.451.

The findings of this research supports the studies by Purwanto and Mahyani (2016); Junaeni and Agustian (2013); Yoga (2010); Beatty and Ritter (1986) that stated that there is a significant negative relationship between auditor reputation with the degree of underpricing. However, this research does not support studies by Puspita (2011), and Purwanto et al. (2016), where there’s no significant influence between auditor reputation on the degree of underpricing.

Therefore, the H2 proposed in this research where auditor reputation has a negative significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange is accepted.

This finding has proven the well-known statement that the more reputable the auditor will likely reduce the degree of underpricing. Furthermore, this finding is highly related with Agency theory applied in underwriter reputation since Carter and Manaster (1990) stated that the desire of a firm to protect their reputation leads higher-quality underwriters to market low-risk IPOs is applied accordingly to auditors. Therefore, the agency theory is applicable to this finding where big auditors have better information and tools in auditing the financial condition of the issuers, compared to the issuers itself. Similarly, according to investors, auditors are considered to have more complete information about the condition of financial condition so that auditors who have a high reputation will give information in accordance with the condition of the company.

The Influence of Firm Age on The Underpricing Level
According to the result of t-test, the firm age has no significant influence and has a negative direction on the level of underpricing. The influence can be seen from has t arithmetic of -0.8 and t table of -2.035. Therefore, -t table < t arithmetic < t table is -2.038 < -0.8 < 2.038, and the significance value of firm age that is more than the significance level 0.937 > 0.05. Therefore, according to the decision criteria H0 is accepted, and it means that the firm age does not significantly influence underpricing level in Financial and Manufacturing IPO companies in Indonesia Stock Exchange (IDX) within the period 2011 to 2016. With a negative coefficient of -0.011 and significantly tested, this finding concludes that an increase of one (1) in the firm age will lead a decrease in the underpricing level by 0.011.

This finding supports Puspita (2010) hat shows that firm age has no significant relationship with the degree of underpricing. Meanwhile, this finding is contradictory with researches conducted by Ritter (1991) and Merkley (1994) in Tian (2012) regardless the industry category, the age of the firm will influence the degree of underpricing negatively.

Therefore, the H3 proposed in this research where firm age has a negative significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange is rejected.

This finding shows that no matter how long the company has been around, underpricing level is not significantly influenced. This finding does not support Handayani (2008) that stated “Age of the issuer company shows how long the company is able to survive and become evidence companies are able to compete and can take advantage of existing business opportunities in the economy. Further, that it will reduce the presence of asymmetric information and minimizing market uncertainty that will eventually lower the underpricing rate of the stock”. This research result shows that the length of ability of a company to survive does not necessarily influence the level of underpricing.

The Influence of Financial Leverage on The Underpricing Level

According to the result of t-test, the financial leverage has no significant influence and has a positive direction on the level of underpricing. The influence can be seen from has t arithmetic of 1.556 and t table of -2.035. Therefore, -t table < t arithmetic < t table is -2.038 < 1.556 < 2.038 and the significance value of financial leverage that is more than the significance level 0.129 > 0.05. Therefore, according to the decision criteria H0 is accepted, and it means that the financial leverage does not significantly influence underpricing level in Financial and Manufacturing IPO companies in Indonesia Stock Exchange (IDX) within the period 2011 to 2016. With a positive coefficient of 0.265 and significantly tested, this finding concludes that an increase of one (1) in the financial leverage will lead an increase in the underpricing level by 0.265.

This finding supports the test results on financial leverage by Purwanto and Mahayani (2016) that shows that financial leverage has no significant effect on the level of underpricing. While. This research finding is contradictory with the studies by Yoga (2010); Puspita (2011) that show that there is a negative and significant relationship between financial leverage with underpricing.

Therefore, the H4 proposed in this research where financial leverage has a positive significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange is rejected.

The financial Leverage variable shows no significance to the level underpricing. The reason why financial leverage does not significantly influence underpricing is because the ratio indicating the debt is more reflective to the relatively high company’s risk that resulting in uncertainty in share price and impact on stock return which will be accepted by investors, consequently investors tend to avoid those stocks that have a high Debt to Equity ratio (Handayani, 2008).

The Influence of ROA on the underpricing level.

According to the result of t-test, the ROA has no significant influence and has a positive direction on the level of underpricing. The influence can be seen from has t arithmetic of 0.445 and t table of -2.035. Therefore, -t table < t arithmetic < t table is -2.038 < 0.445 < 2.038 and the significance value of ROA that is more than the significance level 0.659 > 0.05. Therefore, according to the decision criteria H0 is accepted, and it means that the ROA does not significantly influence underpricing level in Financial and Manufacturing IPO companies in Indonesia Stock Exchange (IDX) within the period 2011 to 2016. With a positive coefficient of 0.077 and significantly tested, this finding concludes that an increase of one (1) in the ROA will lead an increase in the underpricing level by 0.077.

This research finding does not support Yoga (2010); Puspita (2011) states that ROA has a significant effect on underpricing. However, this research finding supports Purwanto and Mulyani (2016) and stated that ROA has no significant effect on underpricing.

Therefore, the H5 proposed in this research where ROA has a negative significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange is rejected.

The reason why ROA has no significant influence on underpricing level because investors do not only pay attention to ROA in the prospectus, but possibly investors also pay attention to ROA for several years prior to the IPO. Thus the investor knows whether the report the financials are in mark-up or not (Handayani, 2008).

The Influence of Ownership Concentration on The Underpricing Level

According to the result of t-test, the ownership concentration has no significant influence and has a negative direction on the level of underpricing. The influence can be seen from has t arithmetic of -0.282 and t table of -2.035. Therefore, -t table < t arithmetic < t table is -2.038 < -0.282 < 2.038, and the significance value of ownership concentration that is more than the significance level 0.779 > 0.05. Therefore, according to the decision criteria H0 is accepted, and it means that the ownership concentration does not significantly influence underpricing level in Financial and Manufacturing IPO companies in Indonesia Stock Exchange (IDX) within the period 2011 to 2016. With a negative coefficient of -0.040 and significantly tested, this finding concludes that an increase of one (1) in the ownership concentration will lead a decrease in the underpricing level by 0.040.

This finding supports the studies of Darmadi and Gunawan (2012); Venkatesh and Neupane (2005) show that ownership concentration is insignificant in explaining the first-day
returns. However, it is contradictory with the finding of Yuliyan (2016) that there is a positive significant influence between ownership concentration with the underpricing level.

Therefore, the H6 proposed in this research where ownership concentration has a positive significant influence on the underpricing of Financial and Manufacturing industries IPOs in Indonesia stock exchange, is rejected.

This research result does not prove the agency theory in Yuliyan (2016) that in determining the initial share price, the controlling shareholder tends to choose to set the IPO price at a relatively cheaper price (underprice) in order to maintain its control over the company. Inexpensive IPO prices make controlling shareholders have the opportunity to buy shares of IPOs with large par, so that active control of the company is not taken over by potential new shareholders. This finding indicates that the ownership concentration of current controlling shareholders does not influence the level of underpricing.

The Influence of Underwriter Reputation, Auditor Reputation, Firm Age, Financial Leverage, ROA, and Ownership Concentration Simultaneously on The Underpricing Level.

Table 7 Coefficient of Determination

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.621a</td>
<td>.386</td>
<td>.274</td>
<td>.20144</td>
</tr>
</tbody>
</table>

V. CONCLUSION

This research examines the factors influencing underpricing of IPOs in financial and manufacturing industries listed in Indonesia Stock Exchange within 2011-2016. The study documents that underwriter reputation and auditor reputation respectively has negative and significant influence on underpricing. Firm age, ownership concentration respectively has negative but insignificant influence on underpricing. While financial leverage, and ROA respectively has positive and insignificant influence on underpricing.

REFERENCES


AUTHORS

First Author – Muhamad Rexy AjiMahatidana, Undergraduate, International ICT Business, Telkom University, Indonesia.
Email: rexydana@gmail.com/rexydana@student.telkomuniversity.ac.id

Second Author – IrniYunita, ST, MM, Department of ICT Business Management, Faculty of Economics and Business, Telkom University, Indonesia
Email: irniyunita@telkomuniversity.ac.id

Correspondence Author - Muhamad Rexy AjiMahatidana, Undergraduate, International ICT Business, Telkom University, Indonesia.
Email: rexydana@gmail.com/rexydana@student.telkomuniversity.ac.id

Telp : (+62)81-325-444-410
The Analysis of Influence of Job Stressor upon Performance and Turnover Intention of Broker–Dealer of Equity Securities Companies in Surabaya

Bambang Hadi Santoso*), Siti Sulasmii Irawan **), Dwi Ratmawati ***) and Sasi Agustin ****)

*) STIESIA–Surabaya, Surabaya, Indonesia
dwijdjosumarno@gmail.com

***) The Faculty of Economics and Business, Airlangga University, Surabaya, Indonesia

****) STIESIA–Surabaya, Surabaya, Indonesia

ABSTRACT

The long-term goal of this research is to make the Indonesian capital market equals/parallel to other capital markets in the Asia Pacific region. The research is conducted in securities companies which are Members of Indonesia Stock Exchange located in Surabaya City, East Java Province. The number of domestic investors in the capital market in Indonesia is still very limited, reaching only about 400 thousand people, or less than 0.1% of the number of Indonesia's middle class who already have securities accounts as an active sign of becoming a financier in the stock exchange (Afifiuddin, 2011). This situation is a problem that needs to get serious attention from the government to enliven the Indonesian capital market, so the dream of making the Indonesian capital market parallel to the capital markets in the Asia Pacific region can be realized. The number of domestic investors needs to be increased so that ownership of equity securities (shares) is not only dominated by foreign investors.

The condition of Indonesian capital market as mentioned above is inseparable from the role and performance of Broker–Dealer of Equity Securities (BDES), so this is a problem that needs to be studied and studied. The problems in this research are to test and analyze the influence of role ambiguity on the performance of BDES in Surabaya, to test and analyze the influence of role conflict on the performance of BDES in Surabaya, to test and analyze the influence of role overload on the performance of BDES in Surabaya, to test and analyze The influence of role ambiguity on BDES turnover intention in Surabaya, test and analyze the influence of role conflict on turnover intention BDES in Surabaya, test and analyze the influence of role overload on BDES turnover intention in Surabaya, and test and analyze the effect of performance on turnover intention BDES in Surabaya.

The research variables consist of independent variables consisting of role ambiguity, role conflict, and role overload variables, as well as dependent variables consisting of performance variables of turnover intention. Sampling is done by purposive sampling method, while statistical data analysis is done by using Structural Equation Modeling Method (SEM Method).

The result of this research is the result of hypothesis testing as follows: 1). There is no significant influence between role ambiguity and BDES performance in Surabaya, 2). There is no significant influence between role conflict and BDES performance in Surabaya, 3). There is a significant influence between role overload and BDES performance in Surabaya, 4). There is no significant influence between role ambiguity and BDES turnover intention in Surabaya, 5). There is no significant influence between role conflict and BDES turnover intention in Surabaya, 6). There is a significant influence between role overload and BDES turnover intention in Surabaya, and 7). There is a significant effect between performance and BDES turnover intention in Surabaya.

Keywords : Role ambiguity, role conflict, role overload, performance and turnover intention.

I. INTRODUCTION

Research Background

The number of local investors in investing effective equity securities (stocks) in Indonesia capital market is still limited in number, which is indicated by the number of ownership of shares by local investors in Indonesia are still far behind when compared with Malaysia, Singapore and Japan. PT Kustodian Sentral Efek Indonesia (PT KSEI) notes that the number of local investors in Indonesia only reaches 0.2% of the total population of Indonesia (up to 300,000 people, whereas the population of Indonesia has more than 200 million people). Of the 300,000 local investors, 200,000 of them are new local investors, meaning that the local Indonesian investors are only reached 100,000 people.
Local investors in the Malaysian capital market accounted for 15% of Malaysia's population, and in Singapore accounted for 30% of Singapore's population.

Up to the end of 2012, based on data from PT KSEI, the value of foreign share ownership is reached 67.10% (Rp 772,572 billion) of the total (total) value of shares of Rp. 1,151,354 billion. Until the end of 2013, based on data from the same source, the amount of foreign share ownership still dominates (reaching 62.80% or Rp 1,184,282 billion) of the total value of shares outstanding in Indonesia capital market. Thus, the local investors only control 32.90% each at the end of 2012 and 37.20% of shares by the end of 2013. Meanwhile, the data up to June 2014 shows that foreign share ownership is still high (as much as 63, 42% or Rp 1,313,015 billion) of the total value of shares of Rp. 2,070,473 billion.

In organizations, the conditions of "role stress" associated with a particular aspect of an individual's role have gained considerable attention (Johnston et al., 2000 in Babakus et al., 2006). According to Michael et al., 2004 in Babakus et al., 2006, there are two major components of stress, i.e. role ambiguity and role conflict which have a significant impact on work attitudes and behavior. Research on stress, particularly work stress which comes from individual roles in the organization, shows that role ambiguity and role conflict are related to negative work, including low job satisfaction and organizational commitment, decreasing job performance, high job tension, and high job change intentions (Jackson et al., 1995 in Viator, 2000). The stress condition of individual roles in the organization is also in accordance with Sullivan et al., 2000 study in Iswanto (2002): that stress is measured by role conflict, role ambiguity, and role overload has a negative relationship to performance. The Rajab et al (2013) study also concludes that role conflict, role ambiguity, and role overload have a negative relationship to performance, and even to organizational commitment.

The stress situation within an organization can be experienced by every employee, including in the capital market, such as Broker–Dealer Representatives (BDR)– which is a stockbroker, is commonly known as an Equity Broker–Dealer (BDES). They come from securities companies, as well as members of the Indonesia Stock Exchange. They always make direct interaction with the investor community, functioning as a liaison role, in which this role is the norm for those people to experience conflict or obscurity while they carry out their work (Johnson et al., 2000 in Marck, 2007).

Facing such conditions, it is a challenge for managers of the capital market industry in charge of managing public funds and marketing various investment instruments which have been produced by the industry. It can be argued that capital market industry managers, especially those who interact directly with the capitalist community, are at the forefront of securities companies, which play a major role, especially for the growth of these securities firms, and ultimately for the financial industry "capital market" in general. Therefore any securities firm is required to increase quality and professionalism of its BDES, considering the role of BDES is very important, because of its influence on the acquisition value of stock transactions and the number of investors (local and foreign), as well as a market maker. When the value of stock transactions that can be achieved is getting great, it means that more and more people are investors who make transactions, as well as when the market capitalization and the composite stock price index is getting great. Outcomes/performances that include the value of stock transactions, the number of investors (local and foreign), the securities market capitalization, and the securities index are not only beneficial to the BDES individuals, but also for securities companies where the BDES works, In Indonesia as a whole.

Being the BDES, which requires the BDES to always interact with the capitalist community, is not easy. The BDES from securities companies often face problems, in the form of a lack of clarity of information about the limitation of duties and responsibilities to the investors and to securities companies. Such conditions create uncertainty for the BDES of a securities company in performing its role.

Every problem, work demands and pressure from the organization can disrupt the concentration of the work in terms of the implementation of its work and its adjustment to the work environment, which in itself causes stress: the form of stress in the employee. This condition is in accordance Robbins (2008), that the causes of stress in the work environment include: task demands, role demands, interpersonal demands, organizational structure and leadership in the organization, where every employee who is involved in the organization a bit more will experience pressure in work activities related to the existence of such sources of pressure. Davis and Newstrom in Margiati (1999) express the same opinion that job stress is caused by too many tasks, lack of intelligence, limited time to complete a job, lack of adequate responsibility, role ambiguity, different values with the company, Frustration, change of work type and role conflict. This is in line with the Kreitner (1992) and Minner (1998) models in Iswanto (2002), which suggest that job characteristics cause work stress that has variations and dimensions including role overload, role conflict, role ambiguity and responsible for people.Behrman et al., 1984 in Singh (1998) states that job stress originating from individual roles in the organization typically consists of role conflict, role ambiguity, and role overload. The stress resulted in disadvantage of the employee (without exception BDES), which ultimately had a disadvantageous impact on securities firms, and ultimately can affect the whole capital market industry. High stress can interfere with job performance, so it can affect the concentration of employees in decision making and job control, behavior that becomes less controllable, and ultimately will result in a decrease in productivity and employee performance.

www.ijsrp.org
Profession as the BDES is a stressful job/pressure. A result of a research states that some securities companies are reporting out of the BDES in the same year (Samsuri, 2011). The BDES who cannot handle their task/strain end up leaving their organization/profession. Job stress experienced by employees also does not close the possibility of increased employee turnover intentions (Scotter, 2000). McEvoy (1987) in Scotter (2000) states that performance and turnover intention have negative correlation (indicating that employees with good performance, not quit his job, vice versa). Turnover intention will be "considered functional" if employees with poor performance out of their jobs or leave their jobs. Departing from all these conditions, it is necessary to examine the effects of job stress/role stress (role ambiguity, role conflict and role overload) variables that the BDES is likely to experience on their performance and turnover intention.

Research Problems
Based on the background of the research, the research problems can be submitted as follows: 1). Does role ambiguity affect the performance of BDES in Surabaya? 2). Does role conflict affect the performance of BDES in Surabaya? 3). Does role overload affect the performance of BDES in Surabaya? 4). Does role ambiguity affect turnover intention of BDES in Surabaya? 5). Does the role conflict affect the turnover intention of BDES in Surabaya? 6). Does role overload affect turnover intention of BDES in Surabaya? and 7). Does the performance affect the turnover intention of BDES in Surabaya?

Research Objectives

II. LITERATURE REVIEW

Previous Researches
Previous research was conducted by Rageb et al., 2013, with research variables: organizational commitment, job satisfaction, job performance, role conflict, role ambiguity, role overload, and turnover intention. The results of his research are: 1). Role conflict, role ambiguity, and role overload are negatively correlated to performance, 2). Role conflict, role ambiguity, and role overload are positively correlated to turnover intention, 3). Performance is negatively correlated with turnover intention, and 4). Organizational commitment, job satisfaction, and job performance mediate role stressors (role conflict, role ambiguity, and role overload) and intentions to leave. Rageb et al's research was conducted on the employees of Arab Academy for Science & Technology & Maritime Trasnport, College of Management & Technology, Alexandria, Egypt. Previous research has also been done by Tang and Chang (2010), with research variables role ambiguity, role conflict and employee creativity in manufacturing companies, with the following research results: 1). Role ambiguity positively correlates to employee creativity, and 2). Role conflict negatively correlates to employee creativity. In 2009, Tee conducted research on insurance agents, with research variables: role ambiguity, role conflict, role overload and performance of insurance agents, with the results of research as follows: 1). Role ambiguity positively correlated to insurance performance agent, 2). Role conflict is negatively correlated with the performance of insurance agents, and 3). Role overload is negatively correlated with insurance agent performance.

Job Stress and Cause of Job Stress
Stress according to Robbins and Judge (2008): a dynamic condition in which an individual is exposed to the opportunities, demands, or resources associated with what the individual desires and whose results are deemed uncertain and important. The three categories that are the source of stressor potentials according to Robbins and Judge are factors: environment, organization, and personal. Factors in the organization / work are basically grouped into five categories: (1) intrinsic factors in work: physical demands and task demands, (2) individual roles in the organization: role conflict and role ambiguity, (3) career development: job certainty and lameness of status, (4) relationships in work, or labor relations, and (5) organizational structure and climate.
Stress role is the stress associated with certain aspects of the role of individuals within the organization. Two main components of stress: role ambiguity and role conflict. The role disfunction is a stress generator, namely: role conflict and role ambiguity (Hurrel in Munandar, 2001). Rizzi et al. In Babakus (2006) defines role ambiguity as a situation in
which an individual has no clear direction about the expectations of his/her role in the work/organization, and role conflict is defined as the incompatibility of expectations communicated to perceived perceived performance. Consumer demand and supervisors are conflicting, then the sales force is likely to experience role conflict. Puspa et al., 1999 in Iswanto (2002) states: role conflict is a psychological phenomenon experienced by members of the organization that can cause insecurity in the work, and potentially can reduce the motivation of work. The emergence of role conflict is when there is more than one request from a different source, which can lead to an uncertainty in the employee (Towner, 2010). According to Towner, the rise of role conflict is due to the fact that two different orders are received simultaneously, in which the execution of a single command will result in the neglect of another order, which will cause confusion for the employee who receives the order, especially if the order contradicts between the One with the other.

George et al., 2002 says: the role is a set of behaviors/tasks a person is expected for his position in the organization. Three sources of stress on the role of individuals in the organization: role conflict, role ambiguity, and overload-underload. Role conflict occurs when behaviors and tasks are expected to conflict with each other, role ambiguity is a powerful source of stress for new employees in an organization/workgroup, and overload occurs in a condition where employees have too many tasks to perform, as well as the underload occurs in a condition in which the employee does not have sufficient tugs to do. Such conditions are a source of stress for employees.

The Correlation of Work Stress towards Performance
According to Siagian (2010), stress greatly affects performance. Rajeb et al. (2013) reveals the results of his research: role stressors, role conflict, role ambiguity, role overload, and novelty roles have a negative relationship to performance. Tohardi (2002) states if there is no stress at all, it cannot be said well, because there is no challenge at the same time no adventure. But if there is too much stress, it is also not good, because it can reduce work performance. Based on the theory, we can see a relationship between stress and performance in the form of an inverted U curve, where this curve shows the relationship between performances (measured with low work performance to high work performance) with stress level (measured from low stress level Up to high stress levels). A reverse U-shaped curve hypothesis has long been accepted as an explanation of the relationship between work stress and performance. Iswanto (2002) reveals: some of the latter studies do not support the hypothesis of an inverted U curve. Miner (1988) in Iswanto (2002) found that performance tended to decrease with increasing stress. This is supported by Sullivan et al., 2000 in Iswanto (2002) which states that the study of stress (measured by role ambiguity, role conflict, role overload) and the study of performance, found that work stress has a negative relationship with performance.

The Correlation of Work Stress towards Turnover Intention
Job stress is associated with reduced performance, and is associated with high turnover intention. According to Rajeb et al., 2013: role stressors, role conflict, role ambiguity, role overload, and role novelty have a positive relationship to turnover intention. According to Jackson (1995) in Viator (2000), stress is related to decreasing performance, also associated with high desire ("new desires") to leave the company (turnover intention). This opinion is also supported by Behrman et al., 1984 in Singh (1998) for testing the effect of stress on the work of salespeople, where the results of the test indicate the influence of job stress that comes from the role of individuals in the organization to performance, satisfaction, tension, and organizational commitment. Job stress negatively affects performance, satisfaction, and organizational commitment, and positively affects the intention of moving companies.

The Correlation of Performance with Turnover Intention
Mc Evoy (1987) in Scotter (2000) states that performance and turnover intention have a negative relationship. This is in accordance with the results of Rajeb et al., 2013 which concluded that performance has a negative relationship to turnover intention. Negative relationships show that employees with good performance have a tendency not to quit their jobs, and vice versa, and keep in mind that turnover intention is considered functional, if employees with poor performance become out of work.

Research Variables
The variables in this research consist of exogenous variables which consist of role ambiguity, role conflict, and role overload variables, and endogenous variables which consist of performance and turnover intention variables. The following conceptual framework is to explain which variables are located as exogenous variables and which variables are located as endogenous variables. The prepositions are based on theoretical studies (theories and concepts) and empirical studies, the hypotheses and how the causal relationships between the research variables (see the research conceptual framework) are found.
Research Hypotheses

Hypotheses in this research are as follows: 1). Role ambiguity significantly influence the performance of BDES in Surabaya, 2). Role conflict has a significant effect on the performance of BDES in Surabaya, 3). Role overload has a significant effect on performance of BDES in Surabaya, 4). Role ambiguity significantly influences BDES turnover intention in Surabaya, 5). Role conflict significantly influences BDES turnover intention in Surabaya, 6). Role overload has significant effect on BDES turnover intention in Surabaya, and 7). Performance significantly influences BDES turnover intention in Surabaya.

III. RESEARCH METHODS

Research Approaches, Analysis Units, and Research Location

This research uses quantitative research design. The unit of analysis is BDES from Securities Company located in Surabaya, with research population of 734 BDES spread over 44 securities companies residing in Surabaya, while research sample is done by purposive.

Data Types, Data Collection and Data Analysis

Quantitative data is used in this research because it will be analyzed by statistical analysis. Maholtra (2005) states that in the study, "used" for two reasons: 1). Figures allow statistical analysis to be carried out on the generated data, 2). Figures facilitate communication of measurement rules and results. Data source used is primary data and secondary data. The primary data of this research are data obtained directly from BDES and BDES superiors from 44 securities companies located in Surabaya, through questionnaires, interviews, and observations (direct observation). Questionnaires are structured for the purpose of obtaining data on the variables studied from the respondents. Obtaining data through interviews and observations is done with the aim to further refine the analysis. While secondary data in this research is data obtained from conducting literature study related to the problems studied. After the data collection is done through the spread of questionnaires, observation/observation, as well as interviews, and after determined indicators that the size of each variable, and after determination of measurement techniques to be used, then determined data analysis techniques tailored to the data which are available. The stages in conducting data analysis include quantitative analysis and qualitative analysis. After all data is collected, then data analysis is done by editing, tabulation, and doing data processing that is adjusted with research approach, and in this section data is
processed by using the formula/rules that exist, in accordance with research approach/research design used. Statistical data analysis for this research is done by using the Structural Equation Model (SEM).

IV. DEFINITION OF OPERATIONAL VARIABLES

Role Ambiguity Variable
Role ambiguity or role blurring is a condition in which BDES feels unclear or confused with the definition of work received from Securities Companies where BDES works. The role ambiguity variable is given X1 notation, with the following indicators:
1. Unclear definition of BDES assignment description (notation X1.1).
2. Uncertainty which is the limit of responsibility of BDES to clients, i.e. investors (notation X1.2).
3. The disguise which is the limit of authority of BDES to the investors (notation X1.3).
4. Lack of information from Securities Companies to BDES at any time of policy change (notation X1.4).

Measurement of the value of the role ambiguity variable is based on the sum of scores from the respondent's answer to the BDES, or which is the BDES statement compiled on the basis of the Likert Scale of seven points, where the number 1 shows strongly disagree, the number 2 indicates disagreed, the number 3 shows somewhat disagree, the number 4 indicates quite agree, the number 5 shows somewhat agree, the number 6 indicates agree, and the number 7 indicates strongly agree. Measurement of role ambiguity variable sourced from Rajeb et al. (2013) and Lailah (2006) are modified.

Role Conflict Variable
Role conflict (with notation X2) is a condition in which BDES is required to be able to differentiate and choose between demands and expectations, with the following indicators:
1. Differences of Securities Company's demand on BDES (notation X2.1).
2. Differences of investor demand on BDES (notation X2.2).
3. Differences in expectation of BDES with manager or supervisor (notation X2.3).
4. Violation of Regulation/Policy of Securities Company by BDES in execution of duty (notation X2.4).

Measurement of the value of the role conflict variable is done similar with the measurement of role ambiguity variable. Measurement of role conflict variable sourced from research Rajeb et al. (2013) and Lailah (2006) are modified.

Role Overload Variable
Role overload is an overload of BDES as a result of Securities Company demands that exceed the BDES's resources. There are two types of overload, namely quantitative overload and qualitative overload. The quantitative overload of work is that BDES gets loaded with a lot of work, so there is not enough time to do the work that is charged to it, while the qualitative overload is if the BDES feels it does not have the necessary skills to complete the job (in this case it does not have the ability to meet target of equity securities transactions and the number of investors obtained) up to the specified time, or if the BDES feels less able to perform the tasks which have been assigned to them. Variable role overload given X3 notation, with indicators as follows:
1. Implementing prospects for potential clients/prospective investors outside the hours of work (notation X3.1).
2. Paying attention to potential clients/potential investors after the client/investor has a Securities Account (Opening Account) in Securities Company (notation X3.2).
3. Work through the target system within a certain time limit (notation X3.3).
4. Increase the target volume of equity transactions at any time (notation X3.4).
5. Able to sell all capital market products (X3.5 notation).
6. Selling new capital market products without prior public education/training about new products referred to in detail (note X3.6).

The measurement of the value of the role overload variable is similar with that of role ambiguity measurement. Measurement of role overload variables sourced from research of Rajeb et al. (2013) and Lailah (2006) are modified.

Performance Variable
The performance variable here is the performance of BDES. Performance BDES is a completed BDES activity, or the BDES has successfully completed the activity, task or job assigned or charged to it. Performance (variables with Y1 notation) can be measured from the quantity, quality, and efforts mobilized for the completion of its work, with indicators used include:
1. Ability to establish effective relationships with clients/investors, so that loyalty client/investor remains always awake (notation Y1.1).
2. Able to provide clear and correct information about capital market products to clients/investors, so as to reduce complaints from clients/investors (Y1.2 notation).
3. Ability to resolve problems with respect to complaints/complaints from clients/investors (notation Y1.3).
4. Ability to increase the number of new clients/investors (Y1.4 notation).
5. Capable of achieving the target volume of equity transactions that have been set (notation Y1.5).
6. Ability to understand the needs and desires of clients/investors (Y1.6 notation).
7. Ability to help speed up the settlement of equity securities transactions (Y1.7 notation).

The measurement of BDES performance variables is measured on the basis of the sum of the scores of the respondents' answers/statements (in this case the BDES superiors assessing the performance of BDES) arranged on a seven-point Likert Scale, where the number 1 indicates very unfavorable, the number 2 indicates unfavorable, the number 3 shows a bit unkind, the number 4 shows good enough, the number 5 shows rather good, the number 6 shows good, and the number 7 shows very well. Measurement of performance variables derived from Natakoesoemah (2010) and Lailah (2006) studies which have been modified.

**Turnover Intention Variable**

Turnover intention variable (the desire to leave the company) is a desire of the BDES to leave the company. Job stress is experienced by employees also does not close the possibility of increased desire to move (turnover intention) on employees, or employees leave the company (Flaherty, 2011). Similarly Rajeb et al. (2013) revealed that role conflict, role ambiguity, and role overload have a positive correlation to turnover intention. The desire to leave the company refers to its relationship to the organization, and is "not realized" in the course of action that leaves the organization. This is in accordance with the statement from Natakoesoemah (2010), namely that it is not easy to get a new company at the moment as a placeholder to work from the previous company (Securities Company) to make the BDES stick to Securities Companies, even though they originally wanted to leave these companies. The turnover intention variable is given Y2 notation, with indicators used as follows:
1. BDES is thinking to leave the company (thinking to quit), with Y2.1 notation.
2. BDES intends to seek other work (intention to search), with Y2.2 notation.
3. BDES intends to leave the company (intention to quit), with Y2.3 notation.

The measurement of turnover intention variable is similar with the measurement of role ambiguity variable. The measurement of turnover intention variable sourced from research Rageb et al. (2013) and Lailah (2006) which has been modified.

**V. DISCUSSION**

**The Influence of Role Ambiguity towards Performance**

Hypothesis 1: There is an influence among role ambiguity on the BDES performance in Surabaya. It can be concluded from the results of the hypothesis test "there is no significant influence between the variable role ambiguity and performance variable of the BDES in Surabaya". Statistically it is shown by the standardized coefficient of 0.150 and probability of 0.393> of the 0.05 level of significance. The test results of Hypothesis 1 are contradictory to the study of stress and performance that has been done by Sullivan et al. (1992), who concluded that role ambiguity has a negative relationship with performance, as well as contrary to Viator (2000) research results which concluded that role ambiguity has a negative correlation with work performance. Rajeb et al. (2013) also states through the results of his research that role ambiguity has a negative correlation to performance. Other research results conducted by Tee (2009) also contradict the results of Hypothesis 1 testing of this study, namely that role ambiguity negatively correlated with work performance.

Situations in the field based on observations made, for the BDES there has been a clear description of tasks/job descriptions, in addition to the availability of SOP (Standard Operating Procedures) which is also clear on Securities Companies in general. The code of ethics as BDES is contained in a Membership Regulation that has been regulated by the Indonesia Stock Exchange, as one of the SRO (Self Regulatory Organization), that is the institution or institution entitled to prepare and create its own required rules, among others Membership Regulations addressed to the company–Securities Company, one of which is to manage its BDES contained in the Securities Companies. The FSA (Financial Services Authority) also regulates the various rules and regulations required for the BDES, including regulating the code of ethics of BDES. Membership Regulations, Code of Conduct and other regulations for the
BDES issued by the Stock Exchange and the FSA also set limits on the responsibilities and limitations of the authority of BDES on investors. From the observations made on Securities Companies it is also known that information on policy changes is generally made known to BDES by such Securities Companies, especially Securities Companies that have become public companies, to which they are required to fully Disclosure to all parties, as it is regulated by the FSA, whether disclosure of information within the internal environment of Securities Company and disclosure of information to the investor community (external Securities Company). The existence of the description of duties and responsibilities, clear limits of authority and the SOP on Securities Companies, and with the regulations which have been issued by the Securities Exchanges and the FSA’s that must be obeyed by Securities Companies (i.e. the BDESs), it can be said that there is no role ambiguity in BDES. This is also supported by the average answer of BDES respondents to the statement contained in the indicators that make up the role ambiguity variable, which perceives the average role ambiguity between 5.28 (lowest) to 5.33 (highest), or an average of 5.30 (which according to Category Scale is perceived to be "rather high", with intervals between 4.48 and 5.34). With the average indicators that make up the "rather high" role ambiguity variables, it can be said that these indicators are what makes the BDES role ambiguity increasing in Surabaya. The highest score of 5.33 is in the statement "I feel the disguise that is the limit of my authority as BDES to my client", so "the disguise is the limit of the authority of BDES to the BDES client" is the first thing that makes the BDES role ambiguity increasing. The second highest score of 5.30 is in the statement "I feel the vagueness of the job description definition as BDES", so the "unclear definition of job description as BDES" is the second thing that makes the increasing role of ambiguity BDES.

Although BDES respondents on average perceive indicators that form role ambiguity with "rather high" perceptions, it means that BDES does not perceive these indicators with "high" or "very high" perceptions, which does not result in significant influence between roles ambiguity to the performance of BDES.

The Influence of Role Conflict towards the Performance

Hypothesis 2: There is an influence between the role conflict variable on the BDES performance variable in Surabaya. From the result of hypothesis testing can be concluded "there is no influence between role conflict variable to performance variable of BDES in Surabaya", shown by standardized coefficient 0.267 and probability equal to 0.147> from significance level 0.05. Test result Hypothesis 2 does not match with the research which has been done by Sullivan et al. (1992) which states that role conflict has a negative relationship with performance, as well as not in accordance with research that has been done by Rajeb et al. (2013), which states that role conflict is negatively correlated with performance. Similarly, research conducted by Tee (2009) concludes that in addition to role ambiguity, role conflict is negatively correlated with performance, thus the results of Hypothesis 2 testing of this study do not match well with the research results of Tee.

Based on field observations, there is generally no difference in Securities Company's demand for BDES, no difference of client's demand for BDES, no difference of expectation of BDES with manager or supervisor, and no violation of regulation/policy regulated by Securities Company, Stock Exchange, and FSA by the BDES in the execution of their duties. There is generally good agreement and commitment and negotiation between BDES and Securities Companies, good agreement and commitment between BDES and their clients, and good agreement and commitment between BDES and their manager or supervisor. So BDES generally comply with the regulations/policies issued by Securities Companies, Stock Exchanges or FSAs. The BDES does not wish to be sanctioned for violations of regulations/policies which have been issued by Securities Companies, Stock Exchanges or FSAs, so that BDES generally comply with the rules or policies in the performance of their duties. Sanctions received to BDES are very likely to cause BDES to be blacklisted and may be excluded from the Securities Company, and this also brings impacts to the Securities Company concerned, in the form of Securities Company image in the eyes of many parties investors, and publicly listed companies, which in turn will have an impact on Indonesia's capital market image.

The existence of the regulations and/or policies which have been issued by Securities Companies, Stock Exchanges and FSAs that must be complied with by BDES in particular as well as by Securities Companies in general, and the existence of sanctions which are punishment for BDES as well as for Securities Company, and in addition because good agreement and negotiation between BDES with investor/prospective investor, between BDES with manager/supervisor of BDES, and between BDES and Securities Company, there is no role conflict in BDES with other parties.
The absence of role conflict in BDES in Surabaya that has an influence on BDES performance is supported by the average answer of BDES respondents in the statement contained in the indicators forming the role conflict variable, which perceives the average role conflict between 5.02 (the lowest) to 5.35 (highest), or on average by 5.13 (which according to Category Scale is perceived to be "rather high", at intervals of 4.48 to 5.34). With the average indicators that make up the "somewhat high" role conflict variables, it can be said that these indicators are the ones that make the BDES role conflict increasing in Surabaya. The highest score of 5.35 is in the statement "I often feel in conflict with the company policy which is related to the implementation of tasks in the context of achieving the target", so "often contrary to company policies related to the implementation of tasks in the context of achieving the target" is the first thing that makes the increase of role conflict BDES. The second highest score of 5.14 is in the statement "My work as the BDES is currently against my wishes or expectations," so "work against my wishes or expectations" is the second thing that makes the BDESroleconflictisth. Although BDES respondents on average perceive the indicators that form role conflicts with "rather high" perceptions, it means that BDES does not perceive these indicators with "high" or "very high" perceptions, which does not result in significant influence between roles conflict to performance of BDES.

The Influence Role Overload towards Performance

Hypothesis 3: There is an influence between role overload on the performance of BDES in Surabaya. From result of hypothesis test which have been done can be concluded that role overload variable significantly influence to performance variable of BDES in Surabaya, shown by standardized coefficient equal to 0.920 and probability equal 0.000 <significance level 0.05. The result of Hypothesis 3 testing is in line with the research that has been done by Fried et al. (1998) and Jones et al. (2007) stating that role overload reduces the ability of employees to control their jobs, which in turn can reduce the efficiency andeffectiveness of their work, or in other words it can be said that role overload can reduce or decrease performance. Briefly it can be said that role overload brings influence to work performance (performance). Hypothesis 3 test results are also in line with research conducted by Miner (1988) in Iswanto (2002) supported by Sullivan et al. (1992) in Iswanto (2002), that in addition to the influence of role ambiguity and role conflict on performance, there is also an influence between role overload and performance, all of which have negative relationship with performance. Hypothesis 3 test results of this study are also in line with research by Behrman et al. (1984) in Singh (1998) conducted on the work of the salespeople, and Behrman et al. Supports Miner's (1988) and Sullivan et al. (1992). Hypothesis 3 test results of this research are also in line with the research of Rajeb et al. (2013) which states that role overload has a negative correlation to performance, and so does the role conflict and role ambiguity have a negative correlation to performance.

If it is observed on the data of the numbers of the available BDES in Securities Companies in Surabaya, the amount of BDES is limited. The Securities Company in Surabaya, amounting to 44 companies, has 734 BDES, so on average every Securities Company has only 17 BDES. The number of BDESs in all Securities Companies in Surabaya, which are 734 BDESs with local investors in Surabaya, amounts to approximately 32,000 investors investing in the capital market (so having Securities Accounts), each average BDES serves = 32,000 local investors : 734 = 43.5 local investors (44 local investors) in Surabaya. Whereas if the number of 734 BDESs serves 57,788 local investors in East Java, then this means every average BDES serves = 57,788 local investors: 734 = 78.7 local investors (79 local investors) in East Java. It is apparent here that every BDES in Surabaya must serve the local capital of Surabaya and serve the local capital of East Java in a number not counted yet, serving foreign investors, while foreign investors in Indonesia dominate the number of investors in Indonesia. On the ground, a BDES not only serves clients to carry out securities trading, but also conducts financial analysis of open companies and market analysis to deliver to clients so that clients can make investment decisions Securities, decisions to purchase securities, and the decision to sell securities, and in addition, BDES also performs administrative/operational tasks, seeks new clients, maintains or maintains old clients, and even generally as a marketer. As a marketer, BDES must be able to introduce the investment products offered by the Securities Company in which they work, as well as introduce the Securities Company. As a market driver, the BDES are asked to look for new clients in an effort to increase the volume of securities trading transactions, as one way to increase the volume of securities trading transactions is to increase the number of clients, and in the meantime the BDES also needs to maintain their former clients, with a view to retaining their old clients in order to remain customers in the Securities Company where the BDESs work, and can still make transactions through the Securities Company they work for. Observing the activities/work performed by BDES as mentioned above, it can be seen that the workload of BDES is quite a lot and time consuming. The dominant thing that takes time for BDES is based on the answers of BDES respondents on the distributed questionnaires is "to carry out prospects to prospective clients outside of working hours in order for prospective clients to open a Securities Account" and to "maintain a sustainable relationship with clients who already have Securities Account". By looking at and observing the various activities, as previously mentioned to be done by BDES, then again it can be concluded that the workload of the BDES is so great that it can affect their performance. When the load of a large BDESnjob will
decrease BDES performance, while in the case of a reduced BDES workload, it will be able to boost BDES performance.

The occurrence of BDES role overload in Surabaya which has an influence on BDES performance, is supported by the average answer of BDES respondents on the statement contained in the indicators forming the role overload variable, which perceives the average role overload between 4.95 (lowest) Up to 5.47 (highest), or an average of 5.27 (which according to Category Scale is perceived to be "rather high", at intervals of 4.48 to 5.34). With the average indicator that makes up the "somewhat high" role overload variables, it can be said that these indicators are what make the BDES role overload rise in Surabaya. The highest score of 5.47 is in two statements: "I am conducting prospects for prospective clients outside of working hours" and "My relationship with clients continues even if the client already has a Securities Account" are the two main things that raise the role of BDES role overload. The third highest value (amounting to 5.39) is in the statement "I am trying to reach the target which has been set for a limited time, that is, the target of equity trading transaction", so that "the achievement of the target that has been set in a limited time in the form of the achievement of the amount trading volume of equity securities transactions" is the third thing that makes the increase of BDES role overload.

**The Influence of Role Ambiguity towards Turnover Intention**

Hypothesis 4: There is an influence between role ambiguity and BDES turnover intention in Surabaya. From the result of hypothesis testing which have been done can be concluded that role ambiguity variable has no significant effect to BDES turnover intention variable in Surabaya, as indicated by standardized coefficient is – 0.0060 and probability 0.807> from level of significance 0.05. The results of hypothesis 4 testing are not in line with the results of Viator (2000) research, where Viator concludes from his research that role ambiguity has a positive correlation to turnover intention, and so Flaherty (2011) concludes that work stress is experienced by employees, the only one measured by role ambiguity, does not close the possibility of increased turnover intention employees, as well as Rajeb et al. (2013) reveals that role ambiguity has a positive correlation to turnover intention. Just as explained before, because BDES do not experience the vagueness of the role (no role blurring), it makes no impact on the performance of BDES in Surabaya, also makes no impact on BDES turnover intention in Surabaya. The absence of BDES role ambiguity is also reinforced by the responses of BDES respondents to indicators that measure the role ambiguity variables that have also been discussed previously.

**The Influence of Role Conflict towards Turnover Intention**

Hypothesis 5: There is an influence between role conflict variable and BDES turnover intention variable in Surabaya. From the result of Hypothesis 5 test, it can be concluded that the variable role conflict does not significantly influence the BDES turnover intention variable in Surabaya, which is shown by the standardized coefficient of 0.351 and the probability of 0.205> from the 0.05 significance level. The results of Hypothesis 5 are different from Viator (2000) and Rajeb et al. (2013). Viator concludes that role conflict has a relationship with turnover intention, or Viator concludes conclusively that role conflict is positively correlated with turnover intention, and while Rajeb et al. it can be concluded that the role conflict has a positive correlation to turnover intention. Just as explained before, because the BDES does not experience role conflict, there is no influence between the variable of role conflict with the variable of turnover intention. The absence of role conflict in self BDES in Surabaya is strengthened by respondents' answers to the BDES indicators that measure the role conflict variables that have also been discussed previously.

**The Influence of Role Overload towards Turnover Intention**

Hypothesis 6: There is an influence between role overload variable with BDES turnover intention variable in Surabaya. From the test result to Hypothesis 6 it can be concluded that role overload variable significantly influence to BDES turnover intention variable that exist in Surabaya, shown by standardized coefficient 0.977 and probability equal to 0.012 <from level of significance 0.05. Test results Hypothesis 6 of this study supports research that has been done by Rajeb et al. (2013) stating that role overload is positively correlated with turnover intention. Because the BDES has experienced role overload, there is a significant influence between role overload and turnover intention. This means that when BDES's role overload occurs in Surabaya, it will be followed by increased turnover intention, and vice versa when the role overload is not experienced by BDES in Surabaya, there will be a decrease in turnover intention. This is also supported by respondents' responses to BDES statements on indicators that measure role overload variables, as described previously.
The Influence of the Performance towards Turnover Intention

Hypothesis 7: There is influence between performances with BDES turnover intention in Surabaya. From the result of Hypothesis 7 test, it can be concluded that the performance variables significantly negatively affect the BDES turnover intention variable in Surabaya, as indicated by the standardized coefficient of 0.733 and the probability 0.047 < 0.05 significance level. There is a significant negative influence between performance variables on BDES turnover intention variables, this means that if BDES has a good performance, it has a tendency to not quit its job in Securities Company, and vice versa if BDES has poor performance, tend to quit its job in Securities Company. Mc Evoy (1987) in Scotter (2000: 82) states that performance and turnover intention have negative relationships, meaning that employees with good performance have a tendency to not quit their jobs, and poorly performing employees, or employees who cannot meet or be under the qualifications (performance standards) that the company has set, has a tendency to quit its job. Thus the results of Hypothesis 7 test are in line with those already delivered by Mc Evoy.

Meanwhile Rajeb et al. (2013) through the results of his research revealed that the performance has a negative correlation to turnover intention, meaning that with good performance of employees, the employee is not willing to get out of his job, or not willing to leave his job, while employees with poor performance, is willing to get out of his job or desire to leave his job. Thus, the results of testing Hypothesis 7 of this study are also in line with the results of research that has been done by Rajeb et al. (2013).

On the basis of observations on the ground it appears that at the time of BDES's performance, BDES still joined the Securities Company, and there is no BDES intention to leave the company. When the BDES is not performing, there is a BDES intention to leave the Securities Company, where the culmination is that BDES actually leaves the company. Basuki (2014) states that several Securities Companies have reported BDES out in the same year, among others, that one of the private securities companies headquartered in Jakarta, with its branch offices in Yogyakarta, Surakarta, Surabaya, and several other cities, has been out by 30 BDESs. In Bandung, still according to Basuki, out of a number of BDESs resulted in a private Securities Company being forced to close, and similar things have happened to other Securities Companies, including companies with State-owned Enterprises status.

It can be seen from the responses of BDES superiors who evaluated the performance of BDES, that the average answer of BDES superiors on the statements contained in the indicators measuring the performance variables perceives the average performance between 4.19 (the smallest value) to 5.23 (value highest), where the average performance for all indicators has been calculated at 4.73 (according to Category Scale perceived "rather high", i.e. at intervals of 4.48 to 5.34). The highest score (5.23) is found in the respondent's answer which states "the ability of BDES helps speed up the transaction settlement process", while the smallest value (4.19) is found in the respondent's answer stating "the ability to solve the problems related to the complaint/complaint investors". The second smallest value (value 4.44) is found in the respondent's answer which states "the ability to give clear and correct information about the capital market product to the investor, so as to reduce the complaint/complaint of investors", while the third smallest value (value 4.61) on the respondent's answer stating "the ability of BDES in establishing an effective relationship with investors, so that loyalty investors always awake". In Securities Company, the ability to solve problems related to complaints/complaints of investors, the ability to provide clear and true information about capital market products to investors, so as to reduce complaints/complaints of investors, and the ability of BDES in establishing effective relationships with investors, so that the loyalty of investors is always awake is a crucial thing that describes the performance of BDES, because it will be able to increase the amount of value of trading volume of securities transactions, increase the value of market capitalization of securities, in addition to adding new investors, due to the old investors who have been (which is currently a BDES client), will provide recommendations for new investors to invest through the respective BDES (i.e., BDESis capable of handling or resolving issues pertaining to complaints from investors, and BDES capable of providing clear and true information about investment instruments in the capital market to investors, so as to reduce investor complaints). On the basis of the analysis of respondents' answers relating to the performance of BDES, it can be seen that the performance of BDES related to the things mentioned above is still very necessary, so as to further improve the performance of BDES which can then affect the size of BDES turnover intention, and ultimately can increase capital market performance.

In addition, the submission of analysis of respondents' answers on the indicators of BDES measuring turnover intention variables. The average respondent's answer to a statement measuring a turnover intention variable is 4.47, which according to Category Scale is perceived as "sufficient" (at intervals 3.61–4.47). Although perceived as sufficient, the respondent's answer to one of the indicators that measures the turnover intention variable is perceived to be "rather high", i.e.4.67 (the rather high–Scale Category interval is 4.48–5.34). The answer of BDES respondents on one of the indicators that measure the turnover intention variable is on the statement "I as BDES thinking to leave the company (thinking to quit)". So it turns out BDES respondents in general declared thinking to leave the Securities Company. On the basis of the analysis of respondents' answers on BDES indicators that measure the performance of BDES and BDES turnover intention, it can be concluded that the above analysis supports the results of Hypothesis 7 test which states that the performance of BDES in Surabaya influences BDES turnover intention in Surabaya, which is also supported by Research Rajeb et al. and Mc Evoy.
VI. CONCLUSIONS, FINDINGS AND SUGGESTIONS

Conclusions
The conclusions of this research are: 1). There is no influence between role ambiguity on BDES performance in Surabaya, 2). There is no influence between role conflict on BDES performance in Surabaya, 3). There is influence between role overload on performance of BDES in Surabaya, 4). There is no influence between the role ambiguity of BDES turnover intention in Surabaya, 5). There is no influence between role conflict on BDES turnover intention in Surabaya, 6). There is influence between role overload on BDES turnover intention in Surabaya, and 7). There is influence between performance of BDES to BDES turnover intention in Surabaya.

Findings
Some findings of this research are: 1). The number of domestic investors in the capital market in Indonesia is still very limited, reaching only about 400 thousand people (less than 0.1% of the number of Indonesian middle class who already have a Securities Account as an active sign of being investors in the Indonesian capital market 2). Foreign investors dominate equity ownership (stock), so that decisions that are strategic to companies that are incorporated as Limited Liability Companies are dominated by foreign parties. Until the end of 2013, foreign share ownership reached 62.80% while up to June 2014, foreign ownership is still high, reaching as much as 63.42%, and 3). There was a sharp decline in trading volume of equity securities, which in 2010 decreased 9.32%, in 2011 decreased 9.57%; and in 2012 decreased by 12.45%, where this decline showed a decrease in BDES performance in terms of achievement of trading volume of equity securities.

Suggestions
Suggestions that can be given from this research are as follows: 1). BDES supported by the Financial Services Authority (FSA), Indonesia Stock Exchange and Capital Market Supporting Institution and Capital Market Professional Institution need to work together to increase the number of domestic investors, 2). Promote market makers to increase the volume of equity trading transactions, 3). BDES is advised not to perform administrative tasks, so that BDES does not experience role overload, so that intention turnover can be lowered.

REFERENCES


Towner, Lesley. 2010. Managing Employee Stress. The University of Manchester Institute of Science & Technology (UMIST), Manchester.

Comparative Analysis of Trading-Volume Activity and Abnormal Return Before and After Stock Split

Sasi Agustin*), BambangHadiSantoso **), AlfianDodyFirmansyah***)

*) STIESIA–Surabaya, Surabaya, Indonesia
**) STIESIA–Surabaya, Surabaya, Indonesia
***) STIESIA–Surabaya, Surabaya, Indonesia

Abstract: This study aims to determine whether there are differences in trading-volume activity and abnormal return before and after stock split event. The population in this study is 40 companies with a sample consisting of 23 companies listed on the Indonesia Stock Exchange period 2010-2014. The data used in this study include the date of stock split announcement that is used as event date, daily closing stock price of the company that performs stock split in observation period, Daily Joint Stock Price Index (IHSG) daily, number of stocks traded daily and number of stocks outstanding or listed. The results showed that there was no significant difference in trading activity volume and abnormal return before and after the event. This indicates that investors in Indonesia have not anticipated rapidly the information it receives in the capital market and may even be an investor assumes that stock split events are not good news. In addition, investors and issuers need to pay attention to external factors such as economic factors, political instability, and market conditions because it will indirectly affect the activities of the capital market.

Keywords: Stock Split, Trading Volume Activity, Abnormal Return

I. INTRODUCTION

Capital market is one of alternative means that can be utilized by the owners of capital or investor to make investment. Investors can choose which companies they will invest in their money or capital to gain maximum profit. In the capital market investors can find a variety of information, both publicly available information and private information. One of the available information is the announcement of stock split or stock split. This information can have meaning or value if it causes investors to conduct transactions in the capital market, which will be reflected in changes in stock prices, trading volume, and other indicators or market characteristics.

Stock split is breaking one unit of stock into n stock units. The price per share after the stock split is 1 / n from the previous price (Jogiyanto, 2000). Stock split is an activity done by a public company to raise the number of shares in circulation, where the activity is usually done when the stock price is overvalued, thus reducing the investor to buy it.

There are basically two types of stock splits that can be done, namely split up and split down / reverse split. The split up is a decrease in the nominal price per share which results in an increase in the number of stocks outstanding such as stock split by a factor of 2 : 1, 3: 1, and 4: 1. While the breakdown is the increase in the nominal price per share, and reduce the number of shares outstanding. For example break down with 1: 2, 1: 3, and 1: 4 splitting factor.

According to Baker and Gallangher (quoted from Marwata, 2001) one of the goals of stock split is to return the price per share at the optimal trading level thus increasing liquidity. The foregoing argument holds that stock splits are merely stock distributions that have purely cosmetic changes in the sense that they are an attempt to be more attractive to investors even if they do not increase the wealth of investors. Stock split action will create a mirage effect for investors, i.e.: investors feel more prosperous because of holding shares in large quantities.

Although theoretically the stock split has no economic value but many events in the stock market indicate that stock split is an important event in capital market practice. Stock splits that make stock prices
cheaper are expected to be able to keep stock trading levels within the optimal range and make the stocks more liquid. A cheap stock price will increase the volume of stock trading.

The above phenomenon encourages authors to research “COMPARATIVE ANALYSIS OF TRADING-VOLUME ACTIVITY AND ABNORMAL RETURN BEFORE AND AFTER STOCK SPLIT.”

Aims of Study

This study has the following objectives: (1) To analyze whether there are significant trading-volume activity differences before and after stock split announcement. (2) To analyze whether there are significant abnormal differences of stock return before and after stock split announcement.

II. THEORETICAL BACKGROUND AND HYPOTHESIS

Stock Split

According to the investment and financial dictionary, the stock split event is done in order to break the number of shares outstanding and the stock price of a company without any addition in the equity value of the shareholder. Stock split also interpreted as an act of breaking the nominal price of the stock into smaller fractions and the number of shares becomes large. If before stock split the stock price per unit in the market Rp. 1,000, then after the stock split the unit stock price in the market become Rp. 500,- (Darmadji and Fakhrudin, 2006:183). While these stock split events are essentially uneconomical, firms need to take action when stock prices on the market are overvalued, reducing investor interest in buying them. This is similar to McNichols and Dravid in Marwata (2001) stating that stock split is a management effort to reorganize stock prices over a certain price range. By directing the price to a certain range, it is expected that more market participants will be involved in trading.

Stock Split Theories

Theoretically the motivation behind the company's stock split is described in several theories, among others, Trading Range Theory and Signaling Theory.

1. Trading Range Theory

Trading range theory provides an explanation that stock split increases stock liquidity. According to this theory, management assesses the stock price is too high (overprice) so less attractive to trade. Management seeks to restructure stock prices at a lower price range than before. It is expected that more and more market participants will be involved in trading. With the stock split, stock prices will fall so that many investors will be able to transact.

Thus the management motive of stock splits is driven by the behavior of market practitioners who are consistent with the assumption that by doing stock split can keep stock prices not too expensive. This is done by breaking the nominal price of the stock, because there is an optimal price limit for the stock. The purpose of the stock split is to increase the purchasing power of investors so that there will still be many capital market participants who want to buy shares. This condition will ultimately increase stocks liquidity.

2. Signaling Theory

Signaling theory suggests that stock split events contain an informative signal to investors about the prospect of substantial future returns. The information received may be responded differently by the investor. Here a company that has a reliable fundamental condition can be distinguished from a company that has a fundamentally less reliable condition by sending a signal to the capital market. Signals from companies that have a reliable fundamental condition will certainly be responded by investors, so the signal becomes qualified, while signals sent by companies that are less reliable fundamentals will not be able to match the signal sent by a company whose fundamental condition is reliable (Hendrawijaya, 2009). Stock split events are part of the signaling theory that companies try to do to provide information to the public. Positive signals attempted by managers interpret the company's managers to convey good prospects that can be considered capable of improving the welfare of investors.
Management has more information about the prospect of the company than the investor. Stock split is a management effort to attract investors. Stock splits cost money and only good prospecting companies can do it. Conversely, if a company that does not have a good prospect of trying to give an invalid signal through a stock split will not be able to bear the cost. So instead of a stock split it will increase the price of its securities but will lower it if the market is sophisticated enough to know it (Jogiyanto, 2000:419).

Types of Stock Split

Basically, there are two types of stock splits: split up and split down / reverse split. A split-up is a nominal decrease of price per share that results in an increase in the number of shares outstanding. For example stock split with 1:2 split factor, 1:3, 1:10 and so on. While split down (reverse split down) is the increase of nominal price per share and reduce the number of shares in circulation. For example stock splits down with 2:1, 3:1, 10:1 split factor and so on.

Stock Trading Volume

Stock trading volume is the ratio between the numbers of stocks traded at a certain time against the number of outstanding stock at a given time (Husnan et al., 2005). Stock trading volume is one of the indicators used to see the market reaction to events or information relating to a stock. The change in trading volume is measured by trading volume trading activity as measured by Trading Volume Activity (TVA). TVA is a comparison between the numbers of stocks traded at a certain time with the number of stocks of a company outstanding in a certain period. The magnitude of TVA's average change between before and after stock splitting, is a measure of the consequences caused by stock split on stock trading volume.

The development of stock trading volume reflects the strength between supply and demand which is a manifestation of investor behavior. Rising trading volume is an increase in trading activity of investors in the stock. The increasing volume of supply and demand of a stock, the greater the effect on the fluctuation of stock prices on the stock, and the increasing volume of stock trading shows the increasingly interests onstocks that will bring the effect on rising prices or stock returns. In connection with the stock split, the stock price will become cheaper so that the stock price volatility becomes larger and will attract investors to own the shares or increase the number of shares traded.

Abnormal Return

Abnormal return or excess return is the excess of the actual return to normal return, where the normal return is the expected return (return expected by the investor), thus the abnormal return is the difference between actual return and expected return (Jogiyanto, 2000). A positive abnormal return indicates a higher profit rate between actual return and expected return. In relation to stock split events, in case of a positive abnormal return after stock split, there is an above normal profit on the investor and vice versa if there is a negative abnormal return indicating that the gain is below normal. The abnormal return formula is as follows:

\[
AR_{it} = R_{it} - E(R_{it})
\]

Where: 
- \(R_{it}\) : return of stockion day t
- \(P_{it}\) : stock price of ion day t
- \(P_{it-1}\) : stock price of i on day t-1

While expected returns to be estimated (Brown & Warner, 1985) quoted from Jogiyanto (2000) are expected return estimates using several estimation models, among others:
1. Mean adjusted model

The mean adjusted model assumes that the expected returns are constant in value equal to the average realized return over the previous estimation period. This model can be formulated as follows:

\[
E(R_{it}) = \frac{\sum R_{it}}{t}
\]

Where: 
- \(E(R_{it})\) = expected return of stock ion period t
- \(R_{it}\) = actual return of stock ion period t
- \(t\) = estimation period
Estimation period is the period before the event period. The event period is also called the observation period or event window,

2. Market model.
The calculation of expected returns with this model can be done in two stages. First, the calculation of the expected return to-i in the estimation period. Second, forming the expectation model by using Ordinary Least Square technique with equation as follows:

$$E(R_{it}) = \alpha_i + \beta_iR_{mt} + \epsilon_{it}$$

Where:
- $E(R_{it})$ = the expected return of the i-th securities in the estimation period t
- $\alpha_i$ = intercept, independent of $R_{mt}$
- $\beta_i$ = slope, systematic risks, dependent of $R_{mt}$
- $R_{mt}$ = market return, calculated by the formula:
  $$R_{mt} = \frac{JC_{It} - JC_{It-1}}{IHSG_{It-1}}$$
- $JC_{I}$ = the Jakarta Composite Index (IndeksHargaSahamGabungan)
- $\epsilon_{it}$ = residual error of security in the estimation period t

3. Market adjusted model.
This model assumes that the best estimator to estimate the return of a security is the market index return at that time. Using this model it is not necessary to use an estimation period to form an estimation model, since the estimated security return is equal to the market return.

$$AR_{it} = Rit - R_{mt}$$

Where:
- $AR_{it}$ = abnormal return of stock in period t
- $Rit$ = actual return of stock in period t
- $R_{mt}$ = market return, calculated by the formula:
  $$R_{mt} = \frac{JC_{It} - JC_{It-1}}{JC_{It-1}}$$

Event Study
According Jogiyanto (2000) event study is a study of market reaction to an event whose information is published as an announcement. If the announcement contains information, then the market is expected to react at the time the announcement is received by the market. From that sense, event study can be used to see the reaction of capital market (by approaching stock price movement) to a particular event.

In the event study, there is the term event window / event date and estimated period. The event period is also referred to as the event window of varying length, the length of the window being used in the range of 3 days - 121 days for daily data and 3 months -121 months for monthly data. While the length of the general estimation period used is ranged from 100 days - 300 days for daily data and ranging from 24 to 60 months for monthly data.

Previous Studies
1. Hendrawijaya (2009) with the title of: Comparative Analysis of Stock Price, Stock Trading Volume, and Abnormal Return Stocks Before and After Stock Splits (Studies On Companies Go Public Who Conducted Stock Split Between 2005-2008 at BEI). The result shows that there is no difference of average stock price, stock trading volume and significant abnormal return in period before and after announcement of stock split.
2. Mila (2010) under the title: Analysis of Stock Split Effect on Stock Trading Volume and Abnormal Return on Stock Companies Listed on BEI Year 2007-2009. The result of the research shows that there is no difference of stock trading volume and abnormal return of stock in period before and after stock split.
3. Wang (2000) entitled: The Effect of Stock Split on Liquidity and Stock Return on the Jakarta Stock Exchange. From the results of this study can be seen there is a difference in stock trading volume and there is no significant difference in the abnormal return of stock.

Hypothesis
Based on the analysis of the theories that have been described previously, as well as previous research on the implementation of theories on the event of stock split, the hypothesis in this study can be arranged as follows:

H1: There are significant trading-volume activity differences before and after the stock split announcement.

H2: There are significant abnormal return differences before and after stock split announcement.

III. METHOD

Type of Research
This type of research is a comparative causal study. Comparative causal research is a type of research with problem characteristics of causality between two or more variables. Comparative causal research is a type of ex post facto research, i.e. the type of research on data collected after the occurrence of facts or events. The event in question is a stock split event, which will be further investigated whether the event will lead to differences in trading volumes activity volume and abnormal return.

Population

Sampling Technique
Sample selection is done by using purposive sampling method that is choosing sample with certain criterion, so that in accordance with research designed. The criteria used are as follows: 1) The company is listing on IDX during 2010-2014. 2) Announcing stock split policy for 2010-2014 period. 3) Date the Company does not engage in other corporate actions, such as rights issue, dividend distribution and bonus stock distribution. 4) Date of stock split announcement. 5) The data is completely available.

The existence of these criteria is intended to avoid confusing effects on the research. Based on these criteria, there are 23 companies that do stock split. The list of companies that perform stock split in 2010 and 2014 are as follows: (1) Ciputra Development Tbk, (2) Tunas Redean Tbk, (3) Intiland Development Tbk, (4) Charoen Pokphan Indonesia Tbk, (5) Bank Rakyat Indonesia, (6) London Sumatera Plantation Tbk, (7) Bank Tabungan Pensiunan Nasional, (8) Intraco Penta Tbk, (9) Malindo Foodmil Tbk, (10) Surya Semesta Internusa Tbk, (11) Petrosea Tbk, (12) Astra Internasional Tbk, (13) Indomobil Sukses Internasional Tbk, (14) Modern International Tbk, (15) Central Omega Resources Tbk, (16) Kresna Graha Sekurindo Tbk, (17) Kalbe Farma Tbk, (18) Ace Hardwar Indonesia Tbk, (19) Arwana Citra Mulia Tbk.
MuliaTbk, (20) Sarana Menara Nusantara Tbk, (21) Telekomunikasi Indonesia Tbk, (22) Sepatu Bata Tbk, (23) Jaya Konstruksi.

**Data Collection Technique**

The type of data in this study is documentary data, in the form of archives containing what and when events or transactions occur. The data is in the form of stock price and trading volume of stocks of companies that conduct stock split period 2010-2014.

In accordance with the type of data required, the data source used in this study is secondary data derived from the historical data of the Indonesia Stock Exchange, through quoting data and information from the competent party. These data include: (1) Stock trading volume 5 days before and after stock split, (2) Stock price of the company performing stock splits 5 days before and after stock split, (3) total outstanding stocks of the company 5 days before and after stock splits, (5) companies listed on IDX which conduct stock split policy for 2010 to 2014 period.

Data collection method in this research is documentation that is by observing and recording data in publication of Indonesia Stock Exchange about each company. The data collected is stock data and recorded based on the event window before and after the stock split.

**Variables**

Types of variables include independent variables and dependent variables. The independent variable is the variable that influences or becomes the cause of the dependent variable. While the dependent variable is an influenced variable or variable that is the result of independent variables. Dependent variable in this research is stock price and stock trading volume. While the stock split, in this study, is an independent variable, which is a stock split announcement and will be studied its influence on the dependent variable. The following describes the definition of operation the variables used in this study:

1. **Trading Volume Activity**  
   *Trading volume activity* is the ratio between the number of stocks traded and the number of stocks outstanding.

2. **Abnormal Return**  
   *Abnormal return* is the difference between the actual return with the expected return of each stock.

**Data Analysis Technique**

In each study, techniques are needed in analyzing the data. The data collected is analyzed systematically, leads to the things studied, then the results of data analysis is applied in solving the problem. Techniques for analyzing data used by the author in this case is as follows:

1. **Hypothesis 1 Testing**  
   Testing hypothesis 1 is testing difference of stock trading volume in period before and after stock split. Since there is one dependent variable with two categories and one independent variable, the statistical test used is different test of t test with the corresponding sample (paired sample).

   Testing of hypothesis 1 is done by following stages: 1) Calculate the mean value of Trading Volume Activity (TVA) of all samples in eventwindow. 2) Calculate the descriptive components of TVA before and after events. 3) Do paired sample t-test (at significance level $\alpha = 0.05$). 4) Determine $H_0$ and $H_a$. 5) Decision making can be done by: Accept $H_0$ if sig. > of significance level $\alpha$ (0.05), and reject $H_0$ or accept $H_1$ or $H_a$ if sig. < from the level of significance $\alpha$ (0.05).

2. **Hypothesis 2 Testing**  
   Hypothesis 2 testing evaluates the difference of abnormal return (AR) before and after stock split. Here there is one dependent variable with two categories, i.e. AR in the period before and AR after stock split and one independent variable, i.e. stock split event. The statistical test used is different test of t test with related sample (paired sample).

   Testing of hypothesis 2 is done by following stages: 1) Calculate the daily stock return to look for $R_i$. 2) Calculating daily market returns. Daily market return used in this study is JCI. 3) Calculate the abnormal return of each stock. 4) Calculate Cumulative Abnormal Return (CAR) of each stock. 5) Calculate the average abnormal return of all stocks. 6) Calculate AAR statistical description before and after event.
Doing paired sample t-test (at significance level $\alpha 0.05$). 8) Determine $H_0$ and $H_a$. 9) Decision making can be done by: Accept $H_0$ if sig. $>\alpha$ (0.05), and reject $H_0$ or accept $H_1$ or $H_a$ if sig. $<\alpha$ from the level of significance $\alpha$ (0.05).

IV. RESULTS AND DISCUSSION

Descriptive

Descriptive statistics are performed to provide an overview or description of the variables studied. In descriptive statistics can be known the minimum, maximum, average, and standard deviation of each variable.

Based on the calculation in the attachment, it can be seen that trading volume variables measured by TVA (trading volume activity) both before stock split event and after stock split event and abnormal return variable before stock split event and after stock split can be seen in table 5 below.

| Source: Secondary data |

<table>
<thead>
<tr>
<th>Table 1 Descriptive</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>TVA-pre</td>
</tr>
<tr>
<td>TVA-post</td>
</tr>
<tr>
<td>AAR-pre</td>
</tr>
<tr>
<td>AAR-post</td>
</tr>
</tbody>
</table>

Table 1 shows that:

1. In the TVA variable, the minimum value in the period before the event is 0, and the maximum is 0.02, the mean is 0.0029 with the standard deviation of 0.00434. While in the period after the event, it can be seen the minimum value of TVA is 0, and the maximum is 0.01, the mean of 0.0021 with the standard deviation of 0.00233. Average TVA variables smaller than the standard deviation show deviations from the average value.

2. In the AAR variable, the minimum value of AAR in the period before the event is -0.01, and the maximum is 0.03, the mean of 0.0037 with the standard deviation of 0.01039. While in the period after the event, it can be seen the minimum value of AAR is -0.03, and maximum is equal to 0.03, mean equal to -0.0015 with standard deviation of 0.01446. Analysis of the AAR variable also indicates the presence of deviations from the mean, since the value of the standard deviation is greater than the mean.

Data Analysis

Prior to hypothesis testing, it is necessary to analyze the data obtained from the raw data obtained from the data collection. Analysis is done by comparing the value of each variable in the period before and after the event, which is the period is five days before the event and five days after the event. The results of the data analysis are as follows:

<table>
<thead>
<tr>
<th>Table 2 Mean of TVA and AAR in Observation Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>TVA</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>-5</td>
</tr>
<tr>
<td>-4</td>
</tr>
</tbody>
</table>
Table 2 shows data from 23 sample firms over 11 trading days divided into five days prior to stock split announcement and five days after stock split announcement for each variable.

Test of Data Normality

Before performing statistical tests, the first step should be done is to screen the data to be processed. Because this research uses different test analysis tools for the related sample (paired sample t-test) for hypothesis testing, the assumption used is normal distributed data. To detect the normality of data from each variable, the data normality test (Kolmogorov-Smirnov test) was used.

The first step is to determine the hypothesis, which is as follows:

\[ H_0 : \text{The data is normally distributed} \]
\[ H_1 \text{ or } H_a : \text{The data is not normally distributed} \]

If the result of data processing yields a probability significantly below 5% (0.05) \( H_0 \) is rejected or data from that variable is not normally distributed.

1. Data normality testing of *Trading Volume Activity* Variable

Here are the results of testing the normality of data on the variable Trading Volume Activity:

### Table 3

<table>
<thead>
<tr>
<th>Data Normality Test of Trading Volume Activity Variable</th>
<th>Before and After Stock Split Announcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-Sample Kolmogorov-Smirnov Test</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>5</td>
</tr>
<tr>
<td>Normal Parameters(^a,b)</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>Std.</td>
</tr>
<tr>
<td></td>
<td>Deviation</td>
</tr>
<tr>
<td></td>
<td>Absolute</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
</tr>
<tr>
<td>Kolmogorov-Smirnov Z</td>
<td>.464</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.982</td>
</tr>
</tbody>
</table>

\( a, b \) Test distribution is Normal.
b. Calculated from data.

Table 3 shows that the significance level is 0.836 which means greater than probability value of 0.05. The result means that H0 is accepted or can be interpreted that the data has been normally distributed.

2. Data Normality Testing of Abnormal Return Variable
Here are the results of testing the normality of data on the variable Abnormal Return

<table>
<thead>
<tr>
<th>Table 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data Normality Test of Abnormal Return Variable</strong></td>
</tr>
<tr>
<td><strong>Before and After Stock Split Announcement</strong></td>
</tr>
<tr>
<td><strong>One-Sample Kolmogorov-Smirnov Test</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>AAR-pre</th>
<th>AAR-post</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Normal Parameters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>.0037</td>
<td>-.0015</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>.00406</td>
<td>.01183</td>
</tr>
<tr>
<td>Most Extreme Differences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>.303</td>
<td>.331</td>
</tr>
<tr>
<td>Positive</td>
<td>.223</td>
<td>.331</td>
</tr>
<tr>
<td>Negative</td>
<td>-.303</td>
<td>-.198</td>
</tr>
<tr>
<td>Kolmogorov-Smirnov Z</td>
<td>.677</td>
<td>.741</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.750</td>
<td>.642</td>
</tr>
</tbody>
</table>

a. Test distribution is Normal.

b. Calculated from data.


Table 4 shows that the significance level is 0.642 which means greater than probability value of 0.05. This result means H0 is rejected or can be interpreted data has been distributed normally.

Hypothesis Testing
Before the test, the hypothesis is determined as follows:

\[
H_0 : \mu_1 = \mu_2 \\
H_1 : \mu_1 \neq \mu_2
\]

H0 is accepted if the significance is greater than the level of significance \( \alpha \) (0.05), whereas H0 is rejected if its significance is less than the significance level \( \alpha \) (0.05).

1. First Hypothesis
The first hypothesis states that there is a significant difference in stock trading volume in the period before and after the stock split. The volume of stock trading itself is calculated using Trading Volume Activity (TVA) obtained from the number of stocks traded at time \( t \) divided by the number of stocks outstanding at time \( t \). Having known the average TVA of all samples in the period before and after the stock split announcement, then paired samples t test and the results can be seen in table 5 below:

<table>
<thead>
<tr>
<th>Table 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test of Difference of Trading Volume Activity</strong></td>
</tr>
<tr>
<td><strong>Before and After Stock Split</strong></td>
</tr>
<tr>
<td><strong>Paired Samples Test</strong></td>
</tr>
</tbody>
</table>
The above table shows the result of test of difference on the mean of Trading Volume Activity variable before and after split event. The value of t is 2.097 and the significance value is 0.104 which means greater than the 0.05 significance level. Thus it can be concluded that H0 is accepted or can be said there is no significant difference in the period before and after stock split event, so the first hypothesis is rejected.

2. Second Hypothesis
The second hypothesis states that there is a significant abnormal difference of stock returns in the period before and after the stock split. After knowing the average abnormal return (AAR) in period before and after announcement of stock split, paired sample test is done and the result can be seen in table 6 below:

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>T</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TVA-pre – TVA-post</td>
<td>.00078</td>
<td>.00083</td>
<td>.00037</td>
</tr>
</tbody>
</table>


The above table shows the result of test of difference on the mean of Trading Volume Activity variable before and after split event. The value of t is 2.097 and the significance value is 0.104 which means greater than the 0.05 significance level. Thus it can be concluded that H0 is accepted or can be said there is no significant difference in the period before and after stock split event, so the first hypothesis is rejected.

2. Second Hypothesis
The second hypothesis states that there is a significant abnormal difference of stock returns in the period before and after the stock split. After knowing the average abnormal return (AAR) in period before and after announcement of stock split, paired sample test is done and the result can be seen in table 6 below:

Table 6
Test of Difference of Abnormal Return
Before and After Stock Split
Paired Samples Test

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>T</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAR-pre – AAR-post</td>
<td>.00520</td>
<td>.01217</td>
<td>.00544</td>
</tr>
</tbody>
</table>


The above table shows the result of test of difference on the mean of Trading Volume Activity variable before and after split event. The value of t is 2.097 and the significance value is 0.104 which means greater than the 0.05 significance level. Thus it can be concluded that H0 is accepted or can be said there is no significant difference in the period before and after stock split event, so the first hypothesis is rejected.

Discussion
Hypothesis 1
The result of hypothesis testing one proves that there is no statistically significant difference between Trading Volume Activity period before and after the event of stock split, so the hypothesis that there is significant difference of Trading Volume Activity in period before and after stock split is not proven. Based on the average, TVA before the announcement of stock split is 0.0028 and TVA after the announcement of stock split is 0.0020.

According to the existing theory (trading range theory), which states that after the stock split, the stock will be more liquid so it is expected that more investors are able to transact or increase the volume of stock trading (measured by TVA) is not proven. The result of the research proves that there is no significant difference of stock trading volume in the period before and after stock split announcement. The absence of a
significant capital market reaction after the stock split announcement indicates that investors in Indonesia still do not anticipate rapidly the information it receives in the capital market, or it may be that investors consider that the stock split event is not a good news, so there is no difference in stock trading volume significant in the period before and after stock split.

The results of this study support research conducted by Hendrawijaya (2009) and Mila (2010) which states that there is no significant difference in stock trading volume before and after stock split, but this research is contrary to research conducted by Wang, et al (2000) that found a significant difference between the stock trading volume of the period before and after the stock split.

Hypothesis 2

Testing of hypothesis two did not find statistically significant difference between abnormal return before and after event, so that hypothesis that there is significant difference of abnormal return in period before and after stock split is rejected. Based on the average abnormal return before stock breakout announcement is 0.00367182 and abnormal return after the announcement of stock split is -0.001525549. The result proves that there is no significant difference of abnormal return in period before and after stock split.

Theoretically, it is viewed from signaling theory, which states that signaling theory relates to the existence of information asymmetry between managers and investors, where managers can use stock splits to give a positive signal to the market about their expectations in the future. Brennan and Hughes in Hendrawijaya (2010) assume that investors will only invest in stocks that are completely known with certainty (know about). The stock split activity conducted by the firm will be interpreted by the investor as a signal that the manager has a favorable information which is indicated by a significant abnormal return around the stock split announcement. Through this study, different results are obtained, that is, the average abnormal return does not differ significantly in the period before and after the announcement of stock split. This means that investors do not anticipate any new information published to the market, or investors consider that the split event stock is not good news. So as not to change the preferences of investors to investment decisions.

The results of this study support previous research conducted by Wang, et al (2000), Hendrawijaya (2009) and Mila (2010) stating that there is no significant abnormal return before and after stock splits.

V. CONCLUSION

Conclusion

This study aims to determine whether there are significant differences in trading volume activity (TVA) and abnormal return period before and after stock splitting. Based on the results of tests that have been done, it can be concluded as follows:

1. The first hypothesis test using paired sample t-test shows that there is no significant difference between trading volume activity before and after stock split. This result contradicts the existing theory. Trading range theory which states that stock split event will cause the increasing of trading volume due to the decline of stock price is not proven. This indicates that stock split events do not result in significant changes in trading volume after the announcement of stock split.

2. The second hypothesis test showed no significant difference between abnormal return before and after stock split. This result is different from the signaling theory which states that managers have good information about the company condition, which is indicated by a positive abnormal return around the stock split announcement. The results, in opposite to signaling theory, prove that stock splitting events do not result in a significant abnormal return after the stock split announcement.

Future Research Suggestion

1. For further researchers:

   1) Researchers who want to do similar research can be done using a larger sample. 2) Further research is expected to use a longer observation period so it is hoped that the research results will be more accurate. 3) Research variables can be added to illustrate the effect of stock split more accurately. 4) Using method other than market adjusted model to calculate abnormal return.
2. For Issuers:
The results of this study provide input to the issuer that the stock split activity does not guarantee that the volume of stock trading and abnormal return will increase in accordance with its purpose. Therefore, issuers need to consider the external factors that exist, such as political instability and the Indonesian economy that impact on market sentiment and negative issues that may affect market reaction.

3. For investors:
In making investment decisions, investors should pay attention to the policies issued by companies such as stock split announcements because with the stock split information investors can use it as a reference to take the right investment decisions in order to gain profits. In addition, investors should consider external factors such as economic and political factors, market conditions, as this will indirectly affect the activities of the capital market.

REFERENCES
Effect of Reference Electrode Placement on Measuring CVEMP – Preliminary Study

Prashanth Antony1, Deepika Jayachandran1b, Anitha Selvaraj2, Sri Ranjani3, Aishwariya4

Department of Audiology, MERF- Institute of Speech and Hearing, Chennai, India.

Abstract- This study compared two electrode placements (Sternum versus Mastoid) for measuring cVEMP elicited by air conducted 500 Hz tone bursts in normal hearing individuals. Fifty normal hearing individual with the age range of (18 to 25 years) participated in the study of cVEMP. The results showed that there is no significant difference for both latency and amplitude were found for both the sternum and mastoid reference electrode placement. This study demonstrated that mastoid reference electrode resulted in large amplitude and slightly late latencies when compared to the sternum electrode placement. Our data substantiate the possible clinical benefits of this position, but further systematic patient verification is required.

Index Terms- c VEMP, Mastoid placement, Reference placements, Sternum Placement.

I. INTRODUCTION

Vestibular evoked myogenic potentials abbreviated as (VEMP) were initially described by (Colebatch, Halmagyi, 1992). VEMP can be recorded in two ways: tonically contracted cervical musculature as colli (or) cervical VEMPs (cVEMPs) and from extraocular muscles termed as ocular VEMPs (oVEMPs). Both are the shorter latency responses and they can be elicited using air conduction, bone conduction and also galvanic stimuli. The cervical VEMP with air conduction is a manifestation of the vestibulo colli reflex, initiated by excitation of the saccule and inferior branch of vestibular nerve (Rosengren et al., 2010). Vestibular-dependent myogenic responses to intense sound were first described by (Bickford, Jacobson, & Cody, 1964).

VEMP assesses vestibular function through the vestibulocollic reflex (VCR). The VCR includes the receptor (the saccule), the afferent pathway (the inferior vestibular nerve), and the efferent pathway (the lateral vestibulospinal tract, the medial vestibulospinal tract, and the end muscle). CVEMP testing is most successful when the patient lies supine with head elevated and turned away from the stimulated ear (Isaacson, Murphy, & Cohen, 2006).

The myogenic potential may be recorded from various locations. The primary recording site that is used clinically is the sternocleidomastoid (SCM) along the cervical spine. In spite of its benefits, the procedure still has limitations in regards to eliciting a VEMP response from the SCM of patients with poor muscle tone, poor range of motion in the neck and the pediatric and geriatric populations.

The reliable procedure to record myogenic potentials from the SCM evoked by the tone burst stimulus and the biphasic positive and negative (P1-N1) occurs in the normal subjects were observed. The cVEMP tracing consists of a positive peak at approximately 13 ms and a negative peak at approximately 23 ms and represents the saccule’s response to sound when using an air-conducted stimulus (Colebatch et al., 1994; Murofushi & Curthoys, 1995; Todd, Cody, & Banks, 2000; Welgampola & Colebatch, 2001).

This study aimed on investigating effect of different reference electrode placement and their variation in latency and amplitude using Cervical VEMP.

II. METHOD

Subjects

Cervical VEMPs were performed on normal hearing individuals from the Madras ENT Research Foundation Institute of Speech and Hearing (MERF-ISH). Fifty patients, whose age ranged from 18 to 25 years with no history of hearing loss, vestibular or neurological disorders were recruited. All the participants had a normal otoscopic examination and a normal pure tone audiometric threshold.

Preparation

The electrode sites were prepped using a gauze cloth with NuPrep to obtain acceptable electrode impedances. Impedances were maintained below 5 kΩ. After skin preparation, the active surface electrode was placed over the middle of the SCM, and the reference electrode was placed over the sternum/Mastoid and the ground electrode was placed at the forehead.

Positioning

The testing was done using The Intelligent Hearing System (IHS) Testing position to activate the SCM muscle included sitting with head turned, Target EMG level to maintain tonicity of the muscle throughout the test with minimum patient discomfort is variable and depends on the test position.

Table 1: Stimulus and Recording Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transducer</td>
<td>Insert ear phones</td>
</tr>
<tr>
<td>Type</td>
<td>Tone burst 500 Hz</td>
</tr>
<tr>
<td>Duration</td>
<td>2-0-2 cycle tone burst</td>
</tr>
<tr>
<td>Intensity</td>
<td>100 dB nHL</td>
</tr>
<tr>
<td>Polarity</td>
<td>Rarefaction</td>
</tr>
<tr>
<td>Rate</td>
<td>4.1/sec</td>
</tr>
</tbody>
</table>

ACQUISITION

Analysis time
Pre stimulus 10 to 20 ms
Post stimulus 50 to 100 ms
Electrode type Disc Electrode

**ELECTRODE LOCATION**

<table>
<thead>
<tr>
<th>Type</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noninverting</td>
<td>Midpoint of sternocleido mastoid muscle</td>
</tr>
<tr>
<td>Inverting</td>
<td>Sternum/ mastoid</td>
</tr>
<tr>
<td>Ground</td>
<td>Forehead</td>
</tr>
</tbody>
</table>

Filter settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High pass</td>
<td>10 to 30 Hz</td>
</tr>
<tr>
<td>Low pass</td>
<td>250 to 1500 Hz</td>
</tr>
<tr>
<td>Notch</td>
<td>None</td>
</tr>
<tr>
<td>Amplification</td>
<td>5,000</td>
</tr>
<tr>
<td>Sweeps</td>
<td>200</td>
</tr>
</tbody>
</table>

Air-conducted alternating 500 Hz tone bursts (duration 5 msec) were presented unilaterally via an ER3A inserted earphone although the participants was sitting and turning his head to the contralateral side. A constant tonic activation of the SCM muscle was maintained at 30–75 µV with visual feedback. The EMG signals were amplified (5000X), filtered (bandpass 10–1500 Hz with a Blackman gating function), and recorded. The stimulus intensity was started at 100 dBnHL. A minimum of two VEMP recordings from 200 stimuli were averaged and calculated within -10 to 50 sec time window at 100 dBnHL.

### III. RESULTS & DISCUSSION

The collected data were subjected to statistical analysis using Statistical Package for Social Science (SPSS) version 16.0 software. Descriptive statistics includes Mean, Standard Deviation and Range for sternum and mastoid placement of cVEMP parameters and inferential statistics includes paired sample 't' test were done to extract significant difference between two placement. The cVEMP response was present in all fifty participants (100 ears) on both right and left side, resulting in a response of 100%. Descriptive mean showed P1 and N1 peak latencies were slight longer for mastoid placement compare to the sternum placement and also P1 and N1 amplitude were higher amplitude for mastoid reference position. Table 2 shows significant difference (p >0.05) were obtained for latencies and amplitude of sternum and mastoid as reference position for cVEMP.

#### Table 2 Mean Values, Range and Standard Deviation of cVEMP Curve Parameters for Sternum Placement (100 ears)

<table>
<thead>
<tr>
<th>VEMP Parameters</th>
<th>Mean</th>
<th>Range</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 Latency (msec)</td>
<td>16.74</td>
<td>13.10 - 21.90</td>
<td>1.96</td>
</tr>
<tr>
<td>N1 Latency (msec)</td>
<td>23.81</td>
<td>17.40 - 28.70</td>
<td>2.46</td>
</tr>
<tr>
<td>P1 Amplitude(µV)</td>
<td>80.50</td>
<td>24.97 - 166.09</td>
<td>34.13</td>
</tr>
<tr>
<td>N1 Amplitude(µV)</td>
<td>73.88</td>
<td>20.51 - 167.11</td>
<td>36.07</td>
</tr>
</tbody>
</table>

#### Table 3 Mean Values, Range and Standard Deviation of cVEMP Parameters for mastoid Placement (100 ears)

<table>
<thead>
<tr>
<th>VEMP Parameters</th>
<th>Mean</th>
<th>Range</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 Latency (msec)</td>
<td>17.30</td>
<td>13.40 - 24.50</td>
<td>2.34</td>
</tr>
<tr>
<td>N1 Latency (msec)</td>
<td>24.68</td>
<td>18.80 – 30.20</td>
<td>2.35</td>
</tr>
<tr>
<td>P1 Amplitude(µV)</td>
<td>91.09</td>
<td>20.20 - 196.60</td>
<td>35.73</td>
</tr>
<tr>
<td>N1 Amplitude(µV)</td>
<td>81.57</td>
<td>18.42 - 175.19</td>
<td>34.75</td>
</tr>
</tbody>
</table>

To infer from the present study findings of the data that the mean difference is presence could be due to the individual variability hence, the conventional electrode placement is mid point of the SCM muscle for recording Cvemp. In this present study the reference electrode was interchanged hence it is exhibited in the mean difference however the responses were elicited from the same muscle tendon. As it is depicted in the table 2 and 3 as well in the figure 1.

#### Figure 1 Mean of Latency and Amplitude in Sternum and Mastoid Placement

[Graph showing mean latency and amplitude for sternum and mastoid placements]
The above figure 2a and b are clearly depicting the latency and amplitude information of two different electrode placements i.e (Sternum and Mastoid) for both right and left ear.

**Table 4 comparison Between Sternum and Mastoid Placement of cVEMP Parameters.**

<table>
<thead>
<tr>
<th>Comparison of electrode positions</th>
<th>Paired ‘t’ test (p value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sternum vs Mastoid P1 Latency</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Sternum vs Mastoid N1 Latency</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Sternum vs Mastoid P1 Amplitude</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

The table 4 is clearly depicting the results of paired t test were there is no significant difference could be noticed for both the latency and amplitude parameters. Hence the present findings are in disagreement with the literature support reported by ‘Colebatch’ that CVEMP was recorded with the reference electrode placed on the sternoclavicular joint and C7 reference position and there was a clear morphological changes with differing the recording sites for the two reference electrodes. However the early latency and larger amplitude were observed for sternum placement but increased latency and reduced amplitude were noticed when the reference electrodes were placed in sternoclavicular and C7 positions. This reference placement may be contaminated by other evoked myogenic

FIGURE 2 a and 2 b: Normative CVEMP waveform for both the Mastoid and Sternum placement for the right and left ear.
activity. Hence in this present study, reveals there could have been lesser contamination of the myogenic activity as well as no significant post auricular muscle artifact were noticed. when the reference electrode were placed in mastoid.

IV. CONCLUSION

The findings in this study suggest that normal c VEMP can be recorded in either one of the reference placement, this study further directs to implement on a larger sample as Although the current study found only trends supporting testing may be warranted to determine the different reference electrode placement can be used for the recording, however By studying specific populations the future research may be able to better understand the c VEMP and Furthermore, future research should assess test-retest reliabilitySuch standardization of equipment parameters, testing protocols and clinical uses is crucial for cVEMP testing to be fully implemented into a clinical setting.

REFERENCES


AUTHORS

First Author – Prashanth Antony, Undergraduate students, MERF-Institute of Speech and Hearing.

Second Author - Deepika Jayachandran, Assistant Professor, MERF-Institute of Speech and Hearing.

Third Author - Anitha Selvaraj, Postgraduate student, MERF-Institute of Speech and Hearing.

Forth Author – Sri Ranjani, Undergraduate students, MERF-Institute of Speech and Hearing.

Fifth Author – Aishwariya, Undergraduate students, MERF-Institute of Speech and Hearing.

CORRESPONDENCE AUTHOR

Deepika Jayachandran1b, Assistant Professor, MERF-Institute of Speech and Hearing, Chennai, India.

E mail Id: deepika.jayachandran@gmail.com

Contact Number: 9986974065
Energy Conservation Opportunities & GHG Reductions in Textile Cluster

Mehjabin Z. Shaikh

Gujarat Industrial & Technical Consultancy Organization Ltd.,

Abstract- In this study Energy Audits have been done for a cluster of Textile Industries and its outcomes are discussed. The adopted approach & methodology for this study is based on the guidelines of BEE and also scientific approach related to technological, environmental and pollution related aspects. It has been found that energy audit is an important management tool provided Auditor & industry actively & positively participate in Audit exercise. It will not only improve energy performance of industry but also leads to cost as well as GHG reductions. In the study efficiencies of Boiler were evaluated and set of recommendations were suggested to improve the existing Boiler Efficiency. The implementations of suggestions would result in improvement of efficiency in the range of 10 to 17% with monetary benefits in the range of 15 to 42 Lakh per Annum with payback period of less than one year.

Index Terms- Boiler Efficiency, Energy Conservation, GHG Emissions, Heat Losses

I. INTRODUCTION

Ahmedabad is a well known Textile hub since ancient time. In one of the textile cluster of Ahmedabad, on request of the association, Energy Audit was carried out to find out the energy conservation opportunities and energy savings potentials. All the industries in the cluster are of small and medium scale textile industries. These industries are engaged in dyeing, processing, printing of textiles. These textile industries process about 10 million meters of fabric every year.

The process adopted by the units can be divided in to three major classes:

a. Fabric Pretreatment
b. Dyeing and Printing
c. Finishing

The Textile industries require a large amount of energy both in the form of electrical and thermal energy for processing. The cost of energy (electrical and thermal) varies between 15 to 20% of total manufacturing cost. Industries rely on boiler technologies for thermal energy. However, most of the units being in unorganized sector, are operating with limited resources in terms of technical manpower and technology. Hence, there exist potential of savings of about 20-30% fuel in application and increase the Boilers efficiencies.

This paper presents details of the study conducted on existing Boilers for efficiency analysis, possible energy savings opportunities and monetary benefits arising from the same, retrofitation/up gradation in available technology/design and estimated GHG reduction.

To evaluate boiler efficiency, indirect method as “input-output method” was used, where the energy gain of the working fluid (water and steam) is compared with the energy content of the boiler fuel. Monitoring at site was carried out to measure flue gas temperature, percent Oxygen, CO & CO₂ levels to evaluate efficiency of boilers.

II. STUDY DETAILS

Boiler is used for steam generation in Textile units. Processes requiring steam in a textile process house are jigger Dyeing, Jet Dyeing, Scouring, Mercerizing, Bleaching, Reduction and Clearance, Washing and shrinkage/Sanforizing. Typically, a boiler produce steam in the range of 6 kg/cm² to 10 kg/cm².

The said study was carried out in 5 of the selected units from cluster. Three of the units were using Coal (Lignite) as a fuel and two of the units were using wood chips as fuel. The Boiler capacity was ranging from 1 to 4 t/hr. All the boilers were packaged boilers. The details pertaining to boilers, fuel and their APCM for the study units are presented at Table No.1

<table>
<thead>
<tr>
<th>Name of Industry</th>
<th>Boiler Capacity (t/h)</th>
<th>Type</th>
<th>Type of Fuel</th>
<th>Air Pollution Control Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit-1</td>
<td>1500</td>
<td>3-Pass, Wet Back</td>
<td>Brown-coal(Lignite)</td>
<td>Multi cyclone followed by Water Scrubber</td>
</tr>
</tbody>
</table>

Table No.1: DETAILS OF BOILERS

www.ijsrp.org
III. FLUE GAS STACK MONITORING AND ANALYSIS

The flue gas stack Temperature, Percent Oxygen, Percent Carbon Dioxide and Percent Carbon Monoxide levels are primary indicators of combustion efficiency of boilers. The monitoring of the above parameters was carried out in the study units.

Stationary source sampling was conducted to evaluate gas stream emissions to the atmosphere from stacks/ducts. A pollutant’s concentration is measured by extracting a known volume from the gas stream and determining the average stack gas flow rate over the sampling period.

The flue gas parameter are measured by following IS method and reported in Table No. 2.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Monitoring &amp; Analysis Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>IS 5182 (Part-10) : 1999 Reaf. : (2009)</td>
</tr>
</tbody>
</table>

The results of monitoring are presented at Table No.2. The standard relation between Percent Oxygen, Percent Excess Air Supplied and Equivalent % CO₂ is presented at Table No. 3.

% O₂, % CO₂ and Excess Air Relation in Flue Gases

<table>
<thead>
<tr>
<th>Percentage of O₂</th>
<th>Percentage of Excess Air Supplied</th>
<th>Equivalent of CO₂</th>
<th>Percentage of CO₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>17.1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>16.3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>17</td>
<td>15.4</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>14.6</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>31</td>
<td>13.7</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>40</td>
<td>12.8</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>50</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>62</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>75</td>
<td>10.3</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>91</td>
<td>9.4</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>110</td>
<td>8.6</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>133</td>
<td>7.7</td>
<td></td>
</tr>
</tbody>
</table>

IV. STEAM BOILER EFFICIENCY

Operating the boiler with at an optimum air to fuel ratio minimizes heat loss and improves combustion efficiency. Combustion efficiency is a measure of how effectively the heat content of a fuel is transferred into usable heat.

The Indirect method as “input-output method” is used, where the energy gain of the working fluid (water and steam) is compared with the energy content of the boiler fuel. The indirect method is also called the heat loss method. The efficiency can be calculated by subtracting the heat loss fractions from 100 as follows:

\[
\text{Efficiency of boiler (n)} = 100 - (i + ii + iii + iv + v + vi + vii+vi) 
\]

Whereby the principle losses that occur in a boiler are loss of heat due to:

- H1: Dry flue gas
- H2: Evaporation of water formed due to H2 in fuel
- H3: Evaporation of moisture in fuel
- H4: Moisture present in combustion air
- H5: Radiation and other unaccounted losses
- H6: Due to partial conversion of ‘C’ to ‘CO’
- H7: Unburnt fuel in fly ash
- H8: Unburnt fuel in bottom ash

Boiler efficiency of all the five units understudy were evaluated and reported at Table No. 2. The table reveals that Boiler efficiency in the study units ranges from 57% to 65%. The major efficiency losses are due to H1-Heat loss due to Dry Flue gas, H6- Partial conversion of ‘C’ to ‘CO, H8- Heat loss due un burnt in bottom ash. The Heat losses due H2, H3 and H4 are related to poor fuel quality and ambient atmospheric conditions and could not be averted.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Particulars</th>
<th>Unit-I</th>
<th>Unit-II</th>
<th>Unit-III</th>
<th>Unit-IV</th>
<th>Unit-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type of Boiler</td>
<td>3-Pass, Wet Back, Horizontal Fire Tube, Package Boiler</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Type of Fuel</td>
<td>Coal (Lignite)</td>
<td>Wood Chips</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fuel Feeding System</td>
<td>Manually</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Calorific Value of Fuel (kCal/kg)</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4200</td>
<td>4200</td>
</tr>
<tr>
<td>5</td>
<td>Boiler Capacity (kg/hr)</td>
<td>1500</td>
<td>3000</td>
<td>4000</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>6</td>
<td>Fuel Consumption (kg/hr)</td>
<td>361</td>
<td>746</td>
<td>964</td>
<td>220</td>
<td>259</td>
</tr>
<tr>
<td>7</td>
<td>Fuel Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ultimate Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carbon Content(%)</td>
<td>45.88</td>
<td>45.88</td>
<td>45.88</td>
<td>48.55</td>
<td>48.55</td>
</tr>
<tr>
<td></td>
<td>Sulphur Content(%)</td>
<td>2.50</td>
<td>2.50</td>
<td>2.50</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>Hydrogen Content(%)</td>
<td>3.78</td>
<td>3.78</td>
<td>3.78</td>
<td>6.99</td>
<td>6.99</td>
</tr>
<tr>
<td></td>
<td>Oxygen Content(%)</td>
<td>9.89</td>
<td>9.89</td>
<td>9.89</td>
<td>41.93</td>
<td>41.93</td>
</tr>
<tr>
<td></td>
<td>Nitrogen Content (%)</td>
<td>0.50</td>
<td>0.50</td>
<td>0.50</td>
<td>0.80</td>
<td>0.80</td>
</tr>
<tr>
<td>8</td>
<td>Proximate Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moisture(%)</td>
<td>30.00</td>
<td>30.00</td>
<td>30.00</td>
<td>12.00</td>
<td>12.00</td>
</tr>
<tr>
<td></td>
<td>Ash (%)</td>
<td>20.05</td>
<td>20.05</td>
<td>20.05</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>9</td>
<td>Percentage of Oxygen in Flue Gas</td>
<td>9.00</td>
<td>10.00</td>
<td>10.00</td>
<td>9.00</td>
<td>11.00</td>
</tr>
<tr>
<td>10</td>
<td>Percentage of CO₂ in flue Gas</td>
<td>10.00</td>
<td>9.00</td>
<td>9.00</td>
<td>8.00</td>
<td>6.00</td>
</tr>
<tr>
<td>11</td>
<td>Percentage of CO in flue Gas</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>12</td>
<td>Percent of Excess Air</td>
<td>75.00</td>
<td>90.91</td>
<td>90.91</td>
<td>75.00</td>
<td>110.00</td>
</tr>
<tr>
<td>13</td>
<td>Actual Mass of Air Supplied</td>
<td>11.05</td>
<td>12.06</td>
<td>12.06</td>
<td>10.93</td>
<td>13.11</td>
</tr>
<tr>
<td>14</td>
<td>HEAT LOSSES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

www.ijsrp.org
V. ENERGY CONSERVATION OPPORTUNITIES & MEASURES TO IMPROVE BOILER EFFICIENCY

On the basis of energy audit conducted and the analysis of the heat losses and their causes, opportunities for improvement were identified to increase the efficiency of exiting boilers. The various measures identified are as follows:

1) CONTROL OF EXCESS AIR & FLUE GAS TEMPERATURE:

The levels of excess air and flue gas temperatures compared with standard range

In the study units none of the units were having excess air control system. The levels of excess air and flue gas temperatures are shown in Table No. 2 and graphically presented at Figure No. 1.

The excess air levels ranges from 75% to 110 % with oxygen level of 9 to 11%. As per the BEE Report, for under feed stroker boiler, excess air required for Coal fired boiler is in a range of 20-50 %, and for Wood fired 20-30%.

Controlling excess air to an optimum level always results in reduction in flue gas losses. For every 1% reduction in excess air there is approximately 0.6% rise in efficiency. The units were suggested to control the excess air levels. The various available methods are as follows:

- Portable Oxygen analysers and draft gauges can be used to make periodic readings to guide the operator to manually adjust the flow of air for optimum operation. Excess air reduction up to 20% is feasible.

- The most common method is the continuous oxygen analyzer with a local read out mounted draft gauge, by which the operator can adjust air flow. A further reduction of 10-15% can be achieved over the previous system.
- The same continuous oxygen analyzer can have a remote controlled pneumatic damper positioned, by which the read outs are available in control room. This enables an operator to remotely control a number of firing systems simultaneously.

- The most sophisticated system is the automatic stack damper control, whose cost is really justified only for large systems. Automatic O₂ systems continuously monitor the flue gases and adjust the burner air supply. They are called “O₂ Trim Systems”

2) CONTROL OF FLUE GAS TEMPERATURE:
The flue gas exit temperature ranges from 200 to 220°C in study units. The levels flue gas temperatures are shown in Table No. 2 and graphically presented at Figure No. 2.

None of the units were having heat recovery system. As per the BEE report, the excess temperature of flue gas must also be controlled and it should be between 140-160°C. (as per BEE Report). Approximately 1 % percent efficiency is gained per 40°F decrease in flue gas temperature.

The stack temperature should be as low as possible. However, it should not be so low that water in the exhaust condenses on the stack walls. This is important in fuels containing significant Sulphur as low temperature can lead to condensation of gaseous Sulphuric Acid on the surfaces of the metal when the gas temperature is lower than the acid dew point temperature(130-140°C).

Stack temperatures greater than 180-200°C indicates potential for recovery of waste heat. Energy efficiency can be increased by using waste heat gas recovery system to capture and use some of the heat in the flue gas. The most commonly used waste heat recovery methods are preheating combustion air- Air Preheater and water heating-Economisers.

3) Partial Conversion of 'C' to 'CO':
In all the study units the levels of 'CO' in the flue gas were found to the order of 1% i.e 10,000 ppm against the standard level of 200-400 ppm, (as per CEM Report, CPCB). When there is incomplete combustion, Carbon Monoxide (CO) is formed. “CO” is a product of incomplete combustion and less energy is released when it is formed, reducing combustion efficiency.

\[
C + O₂ \rightarrow CO₂ + 8084 \text{ Kcal/kg}
\]

\[
2C + O₂ \rightarrow 2CO + 2430 \text{ Kcal/kg}
\]

Incomplete combustion can arise due to poor air to fuel ratio or poor distribution of fuel. Non uniform fuel size could be one of the reasons for incomplete combustion.

In all the study units size of the fuel feed were varying from powder to lumps of 4-5 inch and Fuel feeding was manually. The large lumps may not burn out completely, while small pieces and fines may block the air passage, thus causing poor air distribution. The fuel should be of uniform in the size approx. 1 to 2 inch size/dia. Large pieces should be broken out. By applying automatic fuel feeding system the efficiency of boiler can be improved up to 4-5 %.

Based on the above discussions, we have suggested following energy efficiency measures to the study units:

a. To Control Excess Air – O₂ Trim System
b. To Control Flue Gas Temperature- Air Preheater
c. To improve Combustion- Auto Fuel Feeding System
By incorporating above measures, there will be increase of 10 to 17% efficiency of boilers in study units based on the existing efficiency levels. The details of the same is presented in Table No. 4.

**TABLE NO. 4**

**BOILER EFFICIENCY AFTER IMPLEMENTING PROPOSED ENERGY EFFICIENCY MEASURES**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Particulars</th>
<th>Unit-I</th>
<th>Unit-II</th>
<th>Unit-III</th>
<th>Unit-IV</th>
<th>Unit-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type of Boiler</td>
<td>3-Pass, Wet Back, Horizontal Fire Tube, Package Boiler</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Type of Fuel</td>
<td>Coal (Lignite)</td>
<td>Wood Chips</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fuel Feeding System</td>
<td>Manually</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Calorific Value of Fuel (kCal/kg)</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4200</td>
<td>4200</td>
</tr>
<tr>
<td>5</td>
<td>Boiler Capacity (kg/hr)</td>
<td>1500</td>
<td>3000</td>
<td>4000</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>6</td>
<td>Fuel Consumption (kg/hr)</td>
<td>298</td>
<td>595</td>
<td>794</td>
<td>190</td>
<td>190</td>
</tr>
<tr>
<td>7</td>
<td>Percentage of Oxygen in Flue Gas</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Percentage of CO₂ in flue Gas</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>9</td>
<td>Percentage of CO in flue Gas</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>10</td>
<td>Percent of Excess Air</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>31.25</td>
<td>31.25</td>
</tr>
<tr>
<td>11</td>
<td>Actual Mass of Air Supplied (kg/kg of fuel)</td>
<td>8.84</td>
<td>8.84</td>
<td>8.84</td>
<td>8.2</td>
<td>8.2</td>
</tr>
<tr>
<td>12</td>
<td>Flue Gas Temperature</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>13</td>
<td>Ambient Temperature</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>14</td>
<td>HEAT LOSSES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H1 Heat loss due to Dry flue gas loss</td>
<td>7.38</td>
<td>7.38</td>
<td>7.38</td>
<td>9.41</td>
<td>9.41</td>
</tr>
<tr>
<td></td>
<td>H2 Heat loss due to evaporation of water formed due to H₂ in fuel</td>
<td>5.43</td>
<td>5.43</td>
<td>5.43</td>
<td>9.89</td>
<td>9.89</td>
</tr>
<tr>
<td></td>
<td>H3 Heat loss due to moisture present in the fuel</td>
<td>4.79</td>
<td>4.79</td>
<td>4.79</td>
<td>1.89</td>
<td>1.89</td>
</tr>
<tr>
<td></td>
<td>H4 Heat loss due to moisture present in the air</td>
<td>0.21</td>
<td>0.21</td>
<td>0.21</td>
<td>0.27</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>H5 Heat loss due to radiation and other unaccounted losses</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>H6 Heat loss due to partial conversion of C to CO</td>
<td>1.08</td>
<td>1.08</td>
<td>1.08</td>
<td>1.01</td>
<td>1.01</td>
</tr>
<tr>
<td></td>
<td>H7 Heat loss due unburnt in flyash</td>
<td>0.21</td>
<td>0.21</td>
<td>0.21</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>H8 Heat loss due unburnt in bottom ash</td>
<td>3.61</td>
<td>3.61</td>
<td>3.61</td>
<td>0.69</td>
<td>0.69</td>
</tr>
<tr>
<td><strong>BOILER EFFICIENCY</strong></td>
<td></td>
<td><strong>75.29</strong></td>
<td><strong>75.29</strong></td>
<td><strong>75.29</strong></td>
<td><strong>74.81</strong></td>
<td><strong>74.81</strong></td>
</tr>
</tbody>
</table>

VI. ECONOMIC BENEFITS FROM PROPOSED ENERGY EFFICIENCY MEASURES

The economic benefits associated with proposed measures range from Rs. 15 lakhs to 42 lakhs per year with payback period of less than one year. Details of savings calculation is given at Table No. 5.
Table No. 5
Economic Benefits from Proposed Energy Efficiency Measures

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Particulars</th>
<th>Unit-I</th>
<th>Unit-II</th>
<th>Unit-III</th>
<th>Unit-IV</th>
<th>Unit-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>At Existing Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing Boiler Efficiency (%)</td>
<td>62.18</td>
<td>60.09</td>
<td>62.01</td>
<td>64.74</td>
<td>57.59</td>
</tr>
<tr>
<td></td>
<td>Fuel Firing (kg/hr)</td>
<td>361</td>
<td>746</td>
<td>964</td>
<td>220</td>
<td>259</td>
</tr>
<tr>
<td>B</td>
<td>After Implementing Energy Efficiency Measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing Boiler Efficiency (%)</td>
<td>75.29</td>
<td>75.29</td>
<td>75.29</td>
<td>74.81</td>
<td>74.81</td>
</tr>
<tr>
<td></td>
<td>Fuel Firing (kg/hr)</td>
<td>298</td>
<td>595</td>
<td>794</td>
<td>190</td>
<td>190</td>
</tr>
<tr>
<td>C</td>
<td>Fuel savings per hr. kg/hr.</td>
<td>62.81</td>
<td>151.33</td>
<td>170.06</td>
<td>29.61</td>
<td>68.49</td>
</tr>
<tr>
<td>D</td>
<td>Yearly Fuel saving(t/Year)</td>
<td>452</td>
<td>1090</td>
<td>1224</td>
<td>213</td>
<td>493</td>
</tr>
<tr>
<td>E</td>
<td>% Reduction in Fuel Consumption</td>
<td>15.73</td>
<td>17.41</td>
<td>20.28</td>
<td>17.64</td>
<td>13.46</td>
</tr>
<tr>
<td></td>
<td>Cost of Fuel (Rs./kg)</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Total Monetary Savings per Year (Rs. In lakh/Year)</td>
<td>15.83</td>
<td>38.13</td>
<td>42.86</td>
<td>10.66</td>
<td>24.66</td>
</tr>
<tr>
<td></td>
<td>Investment Required (Rs. In lakh)</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
</tr>
<tr>
<td></td>
<td>Payback Period(Months)</td>
<td>9.0</td>
<td>4.0</td>
<td>3.0</td>
<td>10.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

VII. REDUCTION IN GHG EMISSIONS

The major GHG emission reduction source is CO₂. The improved combustion efficiencies will reduce fuel consumption and reduces CO₂ emissions ranging from 380-2061 tonnes per Annum depending up on the boiler efficiency and type of fuel. The details are presented in Table No. 6

Table No. 6
Reduction in GHG as CO₂

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Unit -I</th>
<th>Unit-II</th>
<th>Unit-III</th>
<th>Unit-IV</th>
<th>Unit-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly Fuel saving(t/Year)</td>
<td>452</td>
<td>1090</td>
<td>1224</td>
<td>213</td>
<td>493</td>
</tr>
<tr>
<td>% Carbon</td>
<td>45.9</td>
<td>45.9</td>
<td>45.9</td>
<td>48.6</td>
<td>48.6</td>
</tr>
<tr>
<td>Reduction in Emissions(t/year) CO₂</td>
<td>761</td>
<td>1834</td>
<td>2061</td>
<td>380</td>
<td>879</td>
</tr>
</tbody>
</table>

VIII. CONCLUSION

The boiler efficiency analysis in the study units reveals that, Boiler efficiency can be increased from 10 to 17 % based on the existing efficiency levels by controlling the excess air levels, flue gas exit temperatures and by reducing incomplete combustion of ‘C’ to ‘CO’. These can be achieved by providing auto fuel feeding system in place of manual fuel feeding system, air pre-heater and excess air control systems. There will be reduction in CO₂ emissions to the tune of 380 to 2061 t/Annum depending up on the boiler efficiency and type of fuel.

In terms of monitory gain, the above measures will lead to fuel savings in the range of 15 to 42 Lakh per Annum for the boiler capacity of 1 to 4 t/hr respectively. The investment needed will be in the range of 8-10 Lakh (based on Boiler Capacity) with payback period of less than one year.

ACKNOWLEDGEMENTS

The author is grateful to Shri Nilesh Gajjar (Sr. Consultant-GITCO Ltd.) for continuous support and encouragement. She is also thankful to Shri Bhavesh Shah (Lab Incharge –GITCO Ltd.) for his assistance in Stack Monitoring and Analysis.

REFERENCES

AUTHORS

First Author – Mehjabin Z. Shaikh, (Environmental Engineer)
Gujarat Industrial & Technical Consultancy Organization Ltd.,
Mob. No. 9638196608, E:mail : mehzu2001@yahoo.co.in
THE INFLUENCE OF ORGANIZATIONAL CULTURE WITH EMPLOYEE ENGAGEMENT ON PERFORMANCE
(A Lesson from PT. Wika Bitumen Jakarta-Buton)

M.R. Hazriansyah*, M Syamsul Maarif**, Sadikin Kuswanto**

*) Post Graduate, School of Business, Bogor Agricultural University, Indonesia 16151
**) School of Business, Bogor Agricultural University, Indonesia 16151

ABSTRACT

In the business competition PT. WIKA Bitumen makes each employee a human capital. The human capital concept applies the quality of employees shall be improved through the competence training, knowledge, attributes, and abilities, which is manifested in the ability to work properly so as to generate economic value in development. The objective of this research is to find the influence of organizational culture and employee engagement, and to see the interrelationship of influence between these variables and strategies to improve the employee performance. This study uses primary data obtained from interviews by using questionnaires to employees of PT. Wika Bitumen. The number of respondents is 143 respondents. Employee engangement has a significant positive effect on the performance of PT. Wika Bitumen then The results of organizational culture and employee engangement showes quite well influence. And organizational culture also has a good influence on the performance of employees PT. Wika Bitumen, It becomes an information for the company to find the best solution to create a good organizational culture for employees to be engaged against the company and employee performance will increase.

Keywords: organizational culture, employee engagement, structural equation modeling, performance.

I. INTRODUCTION

In the face of intense competition in the current era of globalization, the company shall maintain the assets it owns to be able to face the competition. One of the assets that did not escape the attention is human resources in a company PT Wijaya Karya Bitumen (WIKA Bitumen) is part of a specialist company expansion in the asphalt industry on the island of Buton known as bitumen buton (asbuton). In business competition WIKA Bitumen makes every employee considered as human capital. The concept of human capital is to apply the quality of employees can be improved through the provision of competence, knowledge, attributes, and abilities, which is manifested in the ability to work properly resulting in economic value in development. Therefore in the management of one of their assets, so as it takes special treatment to maintain. This happens due to a changing work culture since the acquisition of PT Sarana Karya became WIKA Bitumen when the employees who originally came from PT Sarana Karya to Employee of WIKA Bitumen Wijaya Karya Anual Report, (2015).

Employees of PT. WIKA BITUMEN which is an old employee began to feel a significant change after the change of ownership structure. The turmoil began to emerge due to cultural change from before. Cultural changes in this organization that plays a role in employee engagement that will impact on the employee’s own performance. Various new cultures are commonly applied seems not to be accepted directly by employees. The old policies change

www.ijisrp.org
according to the standard operating procedure (SOP) which has been applied by PT. Wijaya Karya Tbk (PERSERO). The employees are often contradictory generally derived of such asphalt plant workers. Many of the factory employees went on strike and even acted anarchically against the management team. Obviously this has a significant influence on the continuity of production activities, must be the main task of WIKA Bitumen in managing one of their assets, so as special treatment is required to maintain its loyalty and good performance to the company. Schein (1990), states that organizational culture as a basic foundation by an organization or company to be able to adapt to external and internal challenges. In addition, organizational culture is also related to the financial performance and success of the organization, where the organizational culture is a value system, beliefs, ingrained norms in an organization. Organizational culture shall also encourage or otherwise in organizational effectiveness (Ivancevich, et al., 2006).

The objective of this study are (1) Analyzing the Influence of Organizational Culture on employee engagement at PT. WIKA Bitumen post acquisition. (2) Analyzing the Influence of Organizational Culture on Employee Performance in PT. WIKA Bitumen post acquisition. (3) To know the influence of employee engagement on employee performance of PT. WIKA Bitumen.

II. RESEARCH METHODS

This study is limited to analyzing the influence of organizational culture and employee engagement on the performance of employees of PT. Wika Bitumen, with a population of 195, which was sampled 143. The research design using cross-sectional study. Sampling technique in the distributing of questionnaires and in-depth interviews through simple purposive sampling method. The study was conducted in Jakarta and Buton, with respondents who are still actively working in the company.

The research was conducted by qualitative and quantitative method using Structural Equation Modeling (SEM) method, Data source is primary data obtained from the result of questionnaire processing.

Processing Technique and Data Analysis

Data analysis is part of the data testing process which results are used as sufficient evidence to draw research conclusions (Indriantoro and Supomo, 2002). The data obtained, processed qualitatively and quantitatively in the form of tables, drawings and matrix, data processing performed in several processes, namely:
1. Distribution of Questionnaires to samples or the specified sample by using purposive sampling technique.
2. Processing and analyzing the results data from the distribution of questionnaires use SEM by using Lisrel software.
3. Formulation of sales promotion strategy from SEM analysis result.
III. RESEARCH RESULT

Responden Characteristics

Gender

Observations performed through the questionnaires obtained the results that the majority of male were percentages (95.8%) and female (4.2%), the number is shown by the following table:

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>137</td>
<td>95.8</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>4.2</td>
</tr>
<tr>
<td>Total</td>
<td>143</td>
<td>100</td>
</tr>
</tbody>
</table>

From the Table 1 it is mentioned that male are more than female, according to Sunar (2012) stated that gender affects employee productivity. So as the gender becomes an important measure for the organization. It makes the organization should place an employees on the basis of gender in order to corresponding the employee's gender skills so as to achieve the expected output.

Age

After the Gender, then the identity of the respondent is explained through age, following figure 6 for comparison of age characteristics after the distribution of questionnaires:

Figure 6 Percentage of respondents by age

Length of work

Characteristics of respondents then seen from how long the employee worked in the organization or institution, the following table 9 shows the comparison of respondent identity through long employment of employees:

<table>
<thead>
<tr>
<th>Long Work</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10 year</td>
<td>49</td>
<td>34.27%</td>
</tr>
<tr>
<td>10 - 20 year</td>
<td>40</td>
<td>27.97%</td>
</tr>
<tr>
<td>&gt;20 year</td>
<td>54</td>
<td>37.76%</td>
</tr>
<tr>
<td>Total</td>
<td>143</td>
<td>100</td>
</tr>
</tbody>
</table>
The Table 2 shows that majority employees work more than 10 years (34.27%), due to the longer a person works in a company shall give more commitment to the organization and ready to perform more challenging tasks and occupy a higher position (Robbins 2006).

**Level of education**

Characteristics of respondents seen from the level of education, where the level of education in general becomes the basis of organization or management to be an important factor recruiting prospective employees in this case is the employee of PT. Wika Bitumen. The following table 10 shows the composition of employees based on education level after the distribution of questionnaires.

<table>
<thead>
<tr>
<th>Education</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SMP</td>
<td>6</td>
<td>4.20%</td>
</tr>
<tr>
<td>SMA</td>
<td>97</td>
<td>67.83%</td>
</tr>
<tr>
<td>D3</td>
<td>19</td>
<td>13.29%</td>
</tr>
<tr>
<td>S1</td>
<td>15</td>
<td>10.49%</td>
</tr>
<tr>
<td>S2</td>
<td>6</td>
<td>4.20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>143</td>
<td>100</td>
</tr>
</tbody>
</table>

From Table 3 shows that the majority of employees of PT. Wika Bitumen at the Head Office as well as at the factory have senior high school education (SMA) equal to (67.83%), Bachelor degree (10.49%) but an employee with Magister or S2 degree who has a percentage of (4.20%). The most influential thing to improve the competitiveness of enterprises is the level of education (Hariandja 2002).

**Test of Conformity of SEM Model**

This suitability test is performed by comparing the sample covariance matrix and the SEC model estimation covariance matrix. According to Wijanto (2008) in terms of methodology, SEM plays a variety roles, including as a system of simultaneous equations, linear causal analysis, path analysis, analysis of covariance structure, and structural equation model. Can be seen Table 4 to display the results of the conformity criteria SEM model based on Goodness Of Fit table.

From the results of table 4 can be seen the results of the overall fit test SEM model. The results of these tests are Chi-Square value of 64.67 in the category of good fit, a significant requirement on chi-square test if the smaller and P-Values ≥ 0.05 then the better. The value of GFI (goodness of fit index) is 0.85 in the marginal fit category. The RMSEA value of 0.025 in the good fit category, RMSEA illustrates the chi-square trend of rejecting the models with a large sample sizes. According to Ramadiani (2010), if the model does not match the data then it is necessary to find the cause of the model, and sought to modify the model in order to obtain better data match.
Table 4 Results of SEM Model Conformity Criteria

<table>
<thead>
<tr>
<th>Goodness-of-Fit</th>
<th>Cut-off-Value</th>
<th>Result</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMR (Root Mean Square Residual)</td>
<td>( \leq 0.05 ) atau ( \leq 0.1 )</td>
<td>0.076</td>
<td>Good Fit</td>
</tr>
<tr>
<td>RMSEA (Root Mean square Error of</td>
<td>( \leq 0.08 )</td>
<td>0.075</td>
<td>Good Fit</td>
</tr>
<tr>
<td>Approximation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GFI (Goodness of Fit)</td>
<td>( \geq 0.90 )</td>
<td>0.98</td>
<td>Good Fit</td>
</tr>
<tr>
<td>Adjusted Goodness of Fit Index (AGFI)</td>
<td>( \geq 0.90 )</td>
<td>0.96</td>
<td>Good Fit</td>
</tr>
<tr>
<td>CFI (Comparative Fit Index)</td>
<td>( \geq 0.90 )</td>
<td>1.00</td>
<td>Good Fit</td>
</tr>
<tr>
<td>Normed Fit Index (NFI)</td>
<td>( \geq 0.90 )</td>
<td>1.00</td>
<td>Good Fit</td>
</tr>
<tr>
<td>Relative Fit Index (RFI)</td>
<td>( \geq 0.90 )</td>
<td>1.00</td>
<td>Good Fit</td>
</tr>
</tbody>
</table>

Based on Table 4 Goodness Of Fit (GOF) shows that most indicators indicate that the SEM model is fit or is good.

The Influence of Organizational Culture and Employee Engagement To Employee Performance

This study uses SEM due to the statistical techniques assessed by the researcher shall answer the question of this dimensional research objective (Ferdinand, 2002). This research uses SEM analysis tool to know the influence of construct, in this case marketing mix and purchasing decision. With the aid of such analysis tool it is know the value of influence between constructs. Sub indicators of the marketing mix and purchasing decisions. Here \( t \) arithmetic is shown in Figure 1.

![Figure 1. \( t \) arithmetic](image-url)
Figure 2. Standardized Loading Factor

Figure 2 shows that the value of $t$ arithmetic is known value of each construct. The picture is explained that the organizational culture has a $t$ value of 17.58 which means significant and positive to Employee Engagement, for organizational culture affect Employee Performance got value of 2.18 means significant and positive, then Employee Engagement affecting employee performance got the value of 2.31 which means a significant positive effect on the performance. Indicators Organization culture symbolized $X_{1.1}$, $X_{1.2}$, and $X_{1.3}$, $X_{1.4}$ symbol $X_{1.1}$ is Impovement, $X_{1.2}$ is Adaptibility, $X_{1.3}$ is Mission and $X_{1.4}$ is Consistency. For the indicators of the Employee Engagement construct symbolized by $Y_{2.1}$, $Y_{2.2}$, and $Y_{2.3}$, that is the meaning of $Y_{2.1}$ is Vigor, $Y_{2.2}$ is Dedication, and $X_{2.3}$ is Absorbtion. The employee performance indicators symbolized by the symbol $Y_{2.1}$, $Y_{2.2}$, $Y_{2.3}$, $Y_{2.4}$, $Y_{2.5}$ as if $Y_{2.1}$ to symbolize the indicator Quantity of work, $Y_{2.2}$ for indicators of work quality, $Y_{2.3}$ for indicator Timeliness, $Y_{2.4}$ for Attendance indicator, $Y_{2.5}$ for the Working Capability indicator. The Linkages between dimension $X_{1.2}$ and Organizational Culture is the most powerful of its significance between $X_{1.1}$ and $X_{1.3}$ and $X_{1.4}$ in a score of 23.61.

Chi Square obtained for 64.67 which means the smaller the value of chi square then the better the model, then the Root Mean Square Error of Approximation (RMSEA) value is 0.075 which means with the terms of value 0.08 or less than 0.08 means the model is accepted. Here Figure 8 to find out how big the contribution of each dimension against construct that has been made in the model. The numbers in red indicate that the relationship is not significant, whereas the relationship between the missing line variables signifies that the observed variables are invalid against latent variables.

After being processed into Lisrel software obtained the contribution value of each construct to dimension factor, such as dimension $X_{1.2}$ has the greatest contribution to the organizational culture that is equal to 1.0. Then for the construct of the largest dimension of contribution employee engagement found in the statement $Y_{1.2}$ that is equal to 0.86. For Construct performance as $Y_{2}$ variable the biggest dimension contribution is at $Y_{2.5}$ that is equal to 0.97. The following Table 24 for description of Hypothesis analysis.
Table 5 Description of Marketing Mix Influence Analysis of Purchase Decision

| Relationship between variables | Path coefficient | |t-hit| | Conclusion |
|-------------------------------|-----------------|-----------------|-----------------|-------------|
| Organizational Culture to Employee Engagement | 0.86 | 17.58 | significant |
| Organizational Culture to Employee Performance | 0.28 | 2.18 | significant |
| Employee Engagement to Employee Performance | 0.43 | 2.31 | significant |

Note: if |t arithmetic| > 1.96 then significant and if |t arithmetic| < 1.96 then not significant

Employee Engagement Relationship Against Employee Performance

Based on the results when viewed from the influence of Organizational Culture on employee performance is significant that is getting a |t-hit| result of 2.31. This shows that Robbins, who stated that organizational culture will be able to improve employee performance, P. Stephen (2002). Especially if the factors that constitute an organizational culture are accepted as values to be embraced, believed and implemented with all the heart, so as will give confine to organizational culture that will impact on improving employee performance. Therefore, organizational culture either directly and indirectly will affect the performance of employees and organizations. However, at least the implementation of all organizational activities will be affected by the performance of the employees themselves.

Organization Cultural Relationship to Employee Engagement

Based on the results when viewed from the influence of Organizational Culture on Employee Engagement is very significant that is getting a |t-hit| result of 17.58. Organizational culture is one of the main pillars that shape behavior, ethics and handles all employees, but performance shall still be improved if employee engagement is high, employees are still working well (Rai Rashmi, 2015). Employee involvement is a key factor in every employee and should be well managed by the organization, because of this involvement shall improve employee performance although when a leaders shall not create a conducive atmosphere, where employee performance improvements are being noticed and the organizational culture that is formed does not support maximum performance, with this Employees need to have a sense of employee engagement in work and job, due to awareness and high sense of responsibility of the employees to encourage good performance and not affected by the outside environment.

Employee Engagement Relationship Against Employee Performance

Based on the results when viewed from the Influence Employee Engagement on employee performance is significant that is getting a |t-hit| result of 2.18. Employee engagement as a form of employee positive statement of work, exceeding that expected by the organization will improve their performance. According to Harter, Schmidt and Keyes (2002) are in line with the results of this study is to argue that the existence of emotional feelings and positive appraisal of employees and their relation to the cultural environment of work will strengthen performance.
IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusion
After the research, based on the results of the research got the following conclusions:

1. Organizational Culture and Employee Engagement have a significant positive effect, got the result from this research which get result which processed by SEM that is at big enough score that is with value 17.58 from T statistic test which means have a significant positive effect.
2. Organizational culture have a significant positive effect on the performance of PT. Wika Bitumen, it is shown through the results of data processed by SEM with score value of 2.18 of T statistic test, which means a significant positive effect.
3. Employee Engagement has a significant positive effect on the performance of PT. Wika Bitumen, that is 2.31 through statistical T test which means a significant positive effect on performance

Suggestion
Based on the conclusions obtained, then the advice that shall be provided the researcher is the company shall examine seriously to find a formula that shall be implemented properly in order to create high employee engagement to improve employee performance. And the company shall build a solid organizational culture, According to Flamholtz (2011), the influence of organizational culture depends on the cultural strength of the organization. Cultural strength of the organization at PT. Wika Bitumen shall refer to how much funding in employees performs the dominant value and the basic assumptions of the company, in a intense culture, all employees in different units carry out the dominant value. Intense organizational culture will last longer and contarily even it will only be held by some people in this organization. This is stated in the concept of employee engagement from PT. Wika Bitumen, in this company there is a two-way relationship between employees and companies. Employee satisfaction is not the same as the employee's attachment to the company (Fernandez, 2007).

BIBLIOGRAPHY


AUTHORS
First Author M.R. Hazriansyah SE, Post Graduate, School of Business, Bogor Agricultural University, Indonesia. Email: hazriansyah@hotmail.com
Second Author – Prof Dr Ir M Syamsul Maarif, MEc, School of Business, Bogor Agricultural University, Indonesia. Email: syamsul Maarif@sb.ipb.ac.id
Third Author – Dr Ir Sadikin Kuswanto, SH, MM, School of Business, Bogor Agricultural University, Indonesia. Email: sadikin_kuswanto@gmail.com

Correspondences Author – M.R. Hazriansyah, hazriansyah@hotmail.com, +6287881798081.
Identification, Drymass and Spore Count of Entomopathogenic *Metarhizium* Fungi from Infected Insects

Nyo Zin Hlaing*, Weine Nway Nway Oo**

* Department of Biotechnology, Mandalay Technological University, Mandalay Region, Republic of the Union of Myanmar  
nyozin@gmail.com

** Department of Biotechnology, Technological University (Kyaukse), Kyaukse, Republic of the Union of Myanmar  
weinenno@gmail.com

Abstract- In the present study, the isolate fungus from infected insects of mini-farm was studied of cultural, microscopic morphology, antifungal susceptibility test and the growth condition concerned with biomass and spore counting. The isolate fungus was close to *Metarhizium* species that confirmed based on cultural and microscopic morphology. The biomass of fungi was studied that the highest dry weight was 0.0667 at 5 days. And the logarithmic number of spore per milliliter was increased till 9.6 at 5 days. The two growth curves have short time stationary phases and they were gradually increased before around 5 days. Ketoconazole was the highest antifungal effect on the isolate strain of *Metarhizium* sp.

Index Terms- Keywords: cultural, morphology, infected insect, growth curve, *Metarhizium* species, biomass.

I. INTRODUCTION

The kingdom Fungi contains a diverse range of taxa with an estimated 1.5 million species and about 700 species from 90 genera have been described as insect pathogens and plant pathogens (Roberts and Humber 1981). Fungal species that infect mites and insects are known as entomopathogens. Entomopathogenic fungi are common natural enemies and epizotics of agricultural and forest pests (Roberts and St. Leger 2004). Entomogenous fungi are being used worldwide for the control of many pests of agricultural importance. Entomopathogenic fungi comprise a heterogenous group of cover 100 genera with approximately 750 species, many of which offer greater potential in pest management. They belong to zygomycotina, ascomycotina, basidiomycotina and deuteromycotina. Compatibility of entomopathogenic fungi with pesticides used in commercial crop protection systems is critical, if these fungi are to be utilized for insect control. Biological control with pathogenic fungi might provide long-lasting insect control without damage to the environment and human. Since many fungicides have broad spectra of activity, the suppression of entomopathogenic fungi by fungicides is of particular concern (WakumaBayissaHundessa, 2016). Entomopathogenic fungi infect host insects by means of asexually produced conidia, which germinate and penetrate the host exoskeleton under favourable environmental conditions. The insect cuticle is made of chitin and other protein components that provide protection and structure to the insect (Richard et al. 2010). Among the most studied insect pathogenic fungi species are *Hypomycetes Beauveria bassiana*, *Metarhizium anisopliae* and *Verticillium lecanii* that are biocontrol agents. Biocontrol is the use of living organisms to kill target organisms or to create a disease epidemic that spreads and kill target organisms. Entomopathogenic fungi are among the first organisms to be used as biocontrol agents against pests (Roberts and St. Leger 2004). The *Metarhizium* genus comprises mostly entomopathogenic fungi. *M. anisopliae*, is a generalist and is known to infect insects from more than seven orders, while *M. acridum* is a specialist (Kimberly Moon San Aw and SeowMun Hue, 2017). The classification of *Metarhizium* could be subdivided on morphological characteristics that discriminated between *M. anisopliae* and *M. floridicidae* and *M. albulum* etc. It can be divided the *M. anisopliae* into short-spore isolates (ranging up to 8μ m in length), which she called variety anisopliae, and long-spore isolates (10 μm up to 14 μm). It is referred to as the “Green muscardine fungi” because of the green color of its spores and has been used to control a variety of insect pests such as termites, mosquitoes and other arthropods. *M. anisopliae* is soil borne fungus and infects over 200 hosts indicating a need to evaluate compatibility with non-targets, with pesticides and natural enemies. *M. anisopliae* and *Beauveria bassiana* are both compatible with many commonly used pesticides and are not toxic to human beings (Burges, 1981). Isoiates of *Metarhizium* spp. have widely differing host range and will become important aspect control intensifies. It can be infected rare on Cleopetera or Hemiptera. *M. anisopliae* was the first fungus worldwide to be mass produced and utilized for insect-pest control. Strains of *Metarhizium* differ in their host range, necessitation selection of the most virulent strain against a target insect (Zimmerman 1993). There is variation in germination triggers between different strains, which may be related to host species (St. Leger et al. 1994a). Penetration of the cuticle is thought to occur by a combination of enzymatic degradation and physical pressure. Evidence for enzymatic degradation includes the disappearance of the wax layer beneath appressuria of *M. anisopliae* wireworm cuticle. *M. anisopliae* holds great potential as a biopesticide for managing aphids’ species on okra and crucifer plants. Oil formulated *M. anisopliae* was effective in suppressing aphid populations, resulting in

[Link to full text]
high mortality of adults of *B. brassicae, L. pseudobrassicae* and *A. gossypii*. It should reduce dependence on broad spectrum synthetic insecticides, promote biodiversity conservation and environmental quality effect on non-target organisms and is compatible with other natural biological approaches necessary for IPM.

In this research work, these *metarhiziumspp* was isolated from infected insects from minifarm at Department of Biotechnology, Mandalay Technological University, Myanmar and grow on Potato-Dextrose Agar media. The growth rate of isolate were determined by measuring the dried mycelia and fungal spore counting. Moreover, it could be studied for drug sensivity test that can be affected on human or not. The aim of this research is to identify and select candidate isolates of entomopathogenic fungus *Metarhiziumspp* as a part of searching for alternatives to environmentally determined chemical insecticides and to assess the interaction between selected fungal isolate and coccinellid aphid predators.

2. MATERIALS AND METHODS

2.1. Collection of Sample
Samples collected from infected insect that got from minifarm at Department of Biotechnology, Mandalay Technological University, Patheingyi Division and Mandalay, Myanmar.

2.2. Growth Conditions
The isolated strain of inoculate was inoculated in PDA media. The plates were then incubated at 28˚C for 7 days. Slide preparations of mature spore 7-12d cultures were mounted for detailed examination of condial morphology and size.

2.3. Generation of Growth Curves for *Metarhiziumspp*
2.3.1. Cultivation of *Metarhiziumspp*
The fungal colonies were inoculated in PDA media. The broth culture had been cultivated in water bath shaker at 168±2 rpm and 28˚C. Culture broth 10ml of isolate at time intervals were pumped up with sterilized pipette. The inoculum was periodically tested at every 24 hours for various growth parameters as provided below.

2.3.2. Determination of Mycelia Dry Weight
The amount of mycelia dry weight in 10ml of freely suspended cultures at time intervals was determined by filtering mycelia through tare filter paper (Whatman No.1), the mycelia pellet was repeatedly washed with distilled water and dried at constant weight at 100˚C for 2 hours. The dried mycelia on each filtered paper was weighed and recorded to determine the growth rate of *Metarhizium sp*.

\[
dry\ weight = (weight\ of\ filter\ paper + mycelium) - (weight\ of\ filter\ paper)
\]

2.4. Spore Counting Method for *Metarhiziumspp*
2.4.1. Media Preparation
PDA media for *Metarhiziumspp* were accurately weighed, dissolved in distilled water, heated with magnetic stirrer and sterilized at 130˚C for 15 minutes. After sterilization, these media were placed into Laminar Flow Cabinet to warm and then mixed with rose Bengal.

2.4.2. Serial Dilution for Fungal Spore Count
The fungal spore population at time interval of incubation had been counted by serial dilution method. Dilution was started by mixing one milliliter of sample solution with nine milliliter of sterile normal saline (0.9% NaCL solution) in a sterile test tube to make a 10⁻¹ dilution. Serial nine fold dilution was thoroughly made until 10⁻⁸ and 10⁻⁹ dilution of suspension was obtained. After making the serial dilution, 1ml of diluted samples was dropped onto a plate and mixed with 15ml of above rose Bengal media. Drying was accomplished at room temperature. After drying, the plates were incubated at 28˚C and fungal colonies were counted after 5 days.

2.4.3. Spore Counting Technique
In the case of viable cell counts, the number of colonies formed was counted from a suitable partition. The result was expressed as colony forming cells per samples (CFU/ml). The number of viable cell population at time interval was recorded and 1x10⁷ no. of spore forming units per ml.

3.5. Antifungal Susceptibility Test
Antifungal susceptibility testing of the isolates was performed by three antifungal drugs Ketoconazole, Clotrimazole and Grisoefulvin. The tested two doses of every drugs are 50 and 100μg.

Antifungal susceptibility testing was performed by disk diffusion method using Mueller-Hinton Agar + 2% Glucose and 0.5μg/ml Methylene Blue Dye (GMB) Medium as per CLSI guidelines (C.L.S.I. document M44-A2, 2009.). The antifungal susceptibility of the isolates was interpreted with the diameter of clear zone.

3. RESULTS AND DISCUSSIONS
3.1. Cultural and Morphological Characteristics of Metarhiziumsp

In cultural morphology, the isolate was incubated on PDA media. At first, the surface on mycelia is white, turning green, yellow-green, brown (often with green tones) to yellow when sporulation has taken place. The reverse was white or pale dried yellow. The colonies of isolate presented a white edge of variable thickness and sporulated, at least in the center. The texture showed circular colonies and thicker, cottony or milky mycelium. The mycelium texture was thin and stuck to the surface of the growth. The size of conidia of isolate was about 5-5.3μm length and 1.7-1.9μm width through dissecting microscope. It was difficult to visualize the arrangement and the structure of conidia for detailed microscopic view. The cultural, microscopic morphologies of spore and mycelium are shown in Fig 1, 2 and 3.

3.2. Generation of Growth Curve for Metarhiziumsp

The isolate strain was cultivated in nutrient broth and filtered and dried. The dried mycelia at everyday were listed in Table 1 and the growth curve of the isolate was shown in Figure 4. In these result, the heaviest amount of dry weight of isolate was 66.7mg at 5 days. The growth curve of isolate was constructed with dry weight of isolate. It was normally increased but it had not almost included the stationary phase. It was observed that the dry weight was continuously decreased after 5 days and then finally reached the dead phase.

![Fig 1: The colonies of Isolate of Metarhiziumsp on PDA](image1)

![Fig 2: Microscopic Morphology of Metarhiziumsp (A and B - Spore of Isolate and C- Mycelium of Isolate)](image2)

![Fig 3: Growth curve of Isolate Metarhiziumsp](image3)

<table>
<thead>
<tr>
<th>Incubation Time (days)</th>
<th>Dry Weight (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>70</td>
</tr>
<tr>
<td>8</td>
<td>80</td>
</tr>
</tbody>
</table>

Table 1: Dry Weight of Isolate Metarhiziumsp Strain in Nutrient Broth
### 3.3. Determination of Fungal Spore Count

The growth curve of the isolate of *Metarhizium* sp was constructed with logarithmic number of viable spores versus incubation periods on Rose Bengal media and presented in Table 2 and Figure 5. The effect of Rose Bengal can prevent bacteria and restrict size of colonies. In this growth curve, the greatest logarithmic number of spore per millimeter was 9.6 at 5 days but it was not obviously different with 4 and 6 days. The spore count of growth curve was gradually increased and decreased. But the stationary phase was short time in also spore count growth curve.

#### Fig 4: Growth Pattern of Spore of Isolate *Metarhizium* sp

![Growth Pattern of Spore of Isolate *Metarhizium* sp](image)

#### Table 2: The Viable Spore Count of The Isolate *Metarhizium* sp

<table>
<thead>
<tr>
<th>Incubation Time (Days)</th>
<th>Number of Spore Forming Units per ml</th>
<th>Log No. of Spore per ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$4 \times 10^5$</td>
<td>5.6</td>
</tr>
<tr>
<td>2</td>
<td>$5 \times 10^6$</td>
<td>6.7</td>
</tr>
<tr>
<td>3</td>
<td>$6 \times 10^7$</td>
<td>7.78</td>
</tr>
<tr>
<td>4</td>
<td>$3 \times 10^8$</td>
<td>8.48</td>
</tr>
<tr>
<td>5</td>
<td>$4 \times 10^8$</td>
<td>9.6</td>
</tr>
<tr>
<td>6</td>
<td>$3 \times 10^9$</td>
<td>9.4</td>
</tr>
<tr>
<td>7</td>
<td>$5 \times 10^6$</td>
<td>6.7</td>
</tr>
<tr>
<td>8</td>
<td>$2 \times 10^5$</td>
<td>5.3</td>
</tr>
</tbody>
</table>

### 3.4. Studying of Antifungal Susceptibility Test

www.ijsrp.org
Metarhiziumsp was attacked by three antifungal drugs: Ketoconazole, clotrimazole and griseofluvin. Among them, Ketoconazole was the most affected (2.9 and 3.5 mm) to isolate. The table showed that the 100μg had the high diameter of clear zone. It was observed that Ketoconazole was a little different with clotrimazole but Griseofluvin was the least strength of antifungal effect to isolate of Metarhiziumsp.

Table 3: Clear Zone Diameter (mm) of Drug Susceptibility Test

<table>
<thead>
<tr>
<th>Types of Antifungal</th>
<th>Clear zone of Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Ketoconazole</td>
<td>2.9</td>
</tr>
<tr>
<td>Clotrimazole</td>
<td>2.5</td>
</tr>
<tr>
<td>Griseofulvin</td>
<td>1.9</td>
</tr>
</tbody>
</table>

*1 = 50 μg and 2 = 100 μg.

4. CONCLUSION

Agriculture is the main industry in Myanmar and biopesticides are necessary in agriculture. In this research, isolates of the entomopathogenic fungi Metarhiziumsp was based on cultural, microscopic morphologies and studied of their biomass and number of spore. Native isolate strain was appropriate for our country. Metarhiziumsp has minimal effect on non-target organisms and is therefore compatible with other natural biological approaches necessary for IPM. Hence, promote conservation of arthropod biodiversity. The future work will be studied to assess the interaction between selected fungal isolate and the sucking insect, Aphids.

5. ACKNOWLEDGEMENT

Special thanks to the Department of Biotechnology, Mandalay Technological University and Biotechnology Research Department, Kyaukse for giving the opportunity to perform this study and for providing the laboratory facilities.

REFERENCES


www.ijsrp.org


Wakuma Bayiaas Hundess (BSc, MSc), *Fungal Entomopathogens (Metarhizium anisopliae and Beauveria Bassiana) for Aphid Management: Variability in Pathogenicity, Species Attributes and Interactions with Other Natural Enemies*; May 2016.

Kyi Pyar Win, Weine Weine Oo, Mya Mya OO: *The Pathogenic of Beauveria bassiana on Spodoptera littura in Cotton field*: 2013, unpublished.


**AUTHORS**

First Author- Nyo Zin Hlaing, Department of Biotechnology, Mandalay Technological University, Mandalay Region, Republic of the Union of Myanmar, nyozin@gmail.com

Second Author- Weine Nway Nway Oo, Department of Biotechnology, Technological University (Kyaukse), Kyaukse, Republic of the Union of Myanmar, weinenno@gmail.com.
Abstract: Present study examined Psychological Health, Conflict Resolution and Marital Adjustment among Married Women. Mental Health Inventory (MHI) by (Veit and ware 1983), Conflict Resolution Questionnaire (CRQ) Retrieved from (University of Arizon 2015) and Marital Adjustment Questionaire (MAQ) by (Pramod Kumar and Kanchana Rohtagi 1985) were used for data collection. The sample of the present study was 100 married women. Purposive sampling technique was used to draw the sample. Descriptive statistics and correlation used to analysis the data. Results indicate that Psychological health have negative relationship with Conflict resolution and marital adjustment.

Key words: Psychological Health, Conflict Resolution, Marital Adjustment, Married women.

I. INTRODUCTION

The most essential relationships between men and women are marriage. It contains emotional and authorized commitment that is important in any adult life. Moreover, choosing a spouse and entering into a marital life is considered both personal success. There is no doubt that the choice of marital mate is one of the most important decisions one makes in his lifetime. People get married for many aims, like love, pleasure, friendship, and the wish to have children, physical charm, or wish to emission from an unhappy situation. The achievement of the marriage is depending relatively on finding the correct person and partially on being the correct person (Ruch, 1970).

Psychological Health

Psychological health is not only an absence of psychological complaint, it is also the ability to survive with problems in life, psychological health is important as physical health to everybody. A good psychological health is critical for primary a good life efficiently if they are distress from tense and pressures and is struggling with psychological health problems such as depression or unstable feeling due to academic, social or psychological burden; with poor psychological health one misplaces overall effectiveness. Psychological health is stability between all phases of life - social, physical and spiritual phase of a person. It instructs on how we cope our surrounds and make choices in our lives unstustainably it is an essential part of our overall health (Negi, Y., 2010).

“Psychological health is those behavior, perception and feeling that conclude a person overall level of personal value, achievement, pleasure and superiority of working as a person. It depends on the improvement and maintenance of aims that are neither to high not low to permit faithful successful preservation of belief in one’s self as commendable, real human being (Kornhauser, 1965). Depression is a state of low mood and distaste to action that can distress a person's considerations, behavior, feelings and sense of well-being (Salmans & Sandra 1995).

Marital Adjustment

Marriage is a commitment with love and duty for peace, pleasure and progress of strong family relationships. Marriage as "socially appropriate sexual combination initiated with a public declaration and started with some ideas of stability; it is expected with more a less obvious marriage agreement, which enchantments out the mutual rights and duties between the partners and future children (Dalack, G.W., 1990).

Marital adjustment is in which there is an overall sensation in husband and wife of pleasure and fulfillment with their marriage and with each other (Sinha & Mukherjee, 1990).

Locke & Wallace (1959) define “place of husband and wife to each other at a given time” is marital adjustment.

According to Spanier and Cole (1976) - “Marital adjustment is a procedure, the result of which is resolute by a degree of (1) upsetting marital differences (2) interpersonal strain and individual anxiety (3) marital fulfillment (4) dyadic interconnection (5) agreement on substances of importance of marital working. According to Schneider (1960) “Marital adjustment is the capability to meet day to day demands, variations and duties of marriage with whatever degree of expressive composure and competence is essential at the time. It involves getting along with and enjoying the company of the marital partner, contributing in the concentration and actions of the family accepting extra duties as they arise and changing one’s style of life to match with changing in the family life.

Marital adjustment is ‘the ceremonial in which there is an overall feeling in husband and wife of pleasure and gratification with their marriage and with each other (Thomas, 1977).

Conflict Resolution

Conflict is usually defined as a difference with affection to interests or ideas. It is a procedure in which one party observes that its interests are being conflicting or adversely exaggerated by another party (Wall and Callister, 1995).

Deutch (1973) defined conflict as incompatible accomplishments. According to Owens and colleagues (2005), is an action necessary to dismiss an conversation of mutual disagreement. According to Tillet (1991), conflict establishes when the requirements and standards of the two or more persons are mismatched.
To summaries, conflict resolution can be noticed as a problem solving procedure which is considered to offer parties an chance to resolve their dissimilarities collaboratively. This process frequently involves third parties who work techniques and procedures that are aimed at simplifying messages between parties involved in conflict.

Relationship among Psychological Health, Conflict Resolution and Marital Adjustment

The aim of present study was to investigate Psychological Health, Conflict Resolution and Marital Adjustment among Married Women. Empirical and theoretical facts have been used to draw attention to the association among these psychological constructs. These psychological construct give insight into the nature of relationship as well. The most recent studies have been stated that recognized the relationship between Psychological Health, Conflict Resolution and Marital Adjustment among Married Women and its development of pattern. The studies showed relations related to these variables. Marital joy is very strongly related to Psychological health. Kurdek(1998) investigated that high levels of depressive symptoms at marriage are connected to low primary marital superiority and that increases in depression are supplemented by decreases in marital superiority. Dehle and Weiss(1998) examined that lower initial marital quality expected larger successive depression and also primarily higher depression scores expected greater deteriorations in marital quality three months later. Anxiety disorder has been found to be associated with poorer marital quality (McLeod, 1994). According to Manju (2016) examined the Marital Adjustment and Depression. Total 200 women in Haryana state were assessed. Findings showed Depression had negative relationship with marital adjustment. Marital duration affects the marital adjustment. Younger women are more adjusted in comparison than the older.

Kiran Sahul, Dheerja Singhll (2014) examined the level of Mental Health and Marital Adjustment among working and non-working Married Women. And find out difference between working and non-working married women about psychological health and marital adjustment. 200 women (100 working and 100 non-working) were selected. To measure mental health Pramod Kumar’s Mental health Inventory and O.P. Mishra and S.K. Srivastava’s Marital adjustment Inventory were used. Result indicated that both working and non-working women have higher level of Mental health and Marital adjustment.

Klaus A. Schneewind, Anna-Katharina Gerhard (2002) examined the Relationship Personality, Conflict Resolution, and Marital Satisfaction in the First 5 Years of Marriage. Total 83 new couples contributed at 6 points over 5 years at 1-year intervals. The results show strong effects across time. Conflict resolution styles appear to form during the 1st year of marriage and are habituated thereafter to a large magnitude. The relationship corresponds closely with conflict resolution styles, which in turn effect marital satisfaction. The effects for involvement, specifically for protective involvement in early marriage, are presented.

II. METHOD

Cross-sectional research design was used in the present research. Independent variable was Psychological Health and dependent variables of the present study were Conflict Resolution and Marital Adjustment.

Objectives

- To investigate the relationship among Psychological Health, Conflict Resolution and Marital Adjustment among Married Women.

Hypothesis

- There would be negative relationship between Psychological Health, Conflict Resolution and Marital Adjustment among Married Women.

Sample

In the current research purposive sampling technique was used because the elements to be included in sample were on the basis of married women. Sample consisted of the present study was n=100 married women from Gujrat, Lahore, Pakistan.

Measures

Mental Health Inventory

The MHI by Veit and ware (1983) is contains on 18-items which describe 4 subscales (Anxiety, Depression, Behavioral Control, and Positive Affect) and 1 total score. The subscale and total scores range from 0-100, with higher scores indicating better mental health that are rate on a 6-point scale that ranges from 1-6.

Conflict Resolution Questionnaire (CRQ) Retrieved

The Conflict Resolution Questionnaire retrieved by University of Arizon (2015) is contains on 25-item help to people identify their preferred styles of conflict resolution. CRQ has Subscales such as Competing, Avoiding, Accommodating, Collaborating and Compromising that are 6-point likert scale that ranges from 1-6.

Marital Adjustment Questionnaire

The Marital Adjustment Questionnaire (MAQ) by Pramod Kumar and Kanchana Rohtatgi (1985). It consists of 25-items with forced-choice (Yes-No) type items. In this, there are only 3 items where scoring is reverse. The possible range is 0 to 25. The higher the score, the higher is the marital adjustment.

Rational of the Study

Present research was investigating the relationship among the Psychological Health, Conflict Resolution and Marital Adjustment among Married Women. The Prevalence of Depression is 1 million be in this world are died yearly caused by suicide and 3000 suicides deaths every single day. The

www.ijsrp.org
frequency of the Depression Patients in Pakistan is 44.4% according to estimate of Psychiatrist and Pakistan Association for Mental Health President prof S Hroon Ahmed. The Researcher investigated how Psychological Health effect the Conflict Resolution and Marital Adjustment of Married women. Researcher analyzed the significant effects of Psychological Health on Conflict Resolution and how Marital Adjustment play role among Married women.

**Conceptual framework**

Human have Psychological Health problem then have problem in Conflict Resolution and Marital Adjustment among Married Women. Concept of this study is given in following figure 1.

![Conceptual framework diagram](image)

**III. RESULTS**

The current study was considered to study relationship among Psychological Health, Conflict Resolution and Marital Adjustment among Married Women. The sample consisted of 100 Married women Statistical package for social sciences (SPSS) 20 was used to evaluate facts and figures. Demographics information of the sample is given in the following table 1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological Health</td>
<td>-</td>
<td>.62**</td>
<td>.53**</td>
<td>.68**</td>
<td>.39**</td>
<td>-.24*</td>
<td>-.16</td>
<td>35.24</td>
<td>3.81</td>
</tr>
<tr>
<td>Anxiety</td>
<td>-</td>
<td>.20*</td>
<td>.37**</td>
<td>.04</td>
<td>-.32**</td>
<td>-.26**</td>
<td>10.15</td>
<td>1.71</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>-</td>
<td>.14</td>
<td>.25**</td>
<td>-.09</td>
<td>-.07</td>
<td>.07</td>
<td>9.07</td>
<td>1.52</td>
<td></td>
</tr>
<tr>
<td>Behavior Control</td>
<td>-</td>
<td>-.22**</td>
<td>-.16</td>
<td>-.08</td>
<td>.691</td>
<td>.34</td>
<td>7.34</td>
<td>1.23</td>
<td></td>
</tr>
<tr>
<td>Positive Affect</td>
<td>-</td>
<td>-.28**</td>
<td>-.47**</td>
<td>.74</td>
<td>113.59</td>
<td>7.24</td>
<td>3.26</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 above shows negative relationship among Psychological Health, Conflict Resolution, Marital Adjustment and subscales of Psychological Health among Married women (N=100).
IV. DISCUSSION

The study was conducted on a sample of 100 married women. The analysis of psychometric properties of the instruments used in the study indicated that these scales entail high level of reliability. Correlation analysis indicated that there is a significant negative relationship among Psychological Health, Conflict Resolution and Marital Adjustment among Married women. It indicates that if a woman has psychological problems (Depression, Anxiety, Stress Behavior control problems) that effect on her Conflict Resolution and create problem in her marital adjustment. And if She has not Psychological problem (Positive Affects) then she has not conflict resolution and marital adjustment problem because these three variables are positively correlated.

Acknowledgements

First and foremost I would like give thanks Allah of all creations who gives me enough courage to complete this task. I would like to show my gratitude to my family who supported me in each and every aspect of my career and also provided me the emotional support. Next, I am especially obliged to my father M. Arif Baig and my brother M. Asim Baig who not only guides me but helped me a lot in data collection as well as financial support. Finally, I am also very much grateful to the families. They all are very much cooperative and helpful.

References


Applying Grey Model and DEA for the Productivity Evaluation of Vietnamese Hydropower Industry

Chia Nan Wang*, XuanTho Nguyen*

*Department of Industrial Engineering and Management, National Kaohsiung University of Applied Sciences, Taiwan

Abstract- Maintaining sustainable development is an important issue for the hydropower industry of Vietnam. This research proposes a hybrid approach based on grey model (GM) and Malmquist productivity index (MPI), to predict future business and measure operational performance of Vietnamese hydropower companies over several time periods. From that, government and decision making units (DMUs) can improve business performance and build a sustainable development strategy. The study conducted on 19 hydropower companies, which have published their complete information on Vietstock site. The result showed twelve companies increased in productivity while the other seven didn't. Technical change was more impact than efficient change in period 2013 – 2016. In general, both of them impact on Vietnam’s hydropower industry productivity. The results also reflect the fact that the performance change did not depend on company size. The study will be a useful reference for other industries as well.

Index Terms– DEA, GM, Hydropower industry, MPI, Performance

I. INTRODUCTION

Vietnamese electricity industry is made up of a diverse combination of power generation, including hydropower, fossil fuels thermal power (coal, gas, and oil), and other power. The total installed capacity is 38,553MW, in which the hydropower occupies 38% with a capacity of 14,636MW [1]. Along with the demand of energy for development, the government had approved to build hydropower dams on ten major largest river basins, with a total of 473 projects (2017). The largest installed hydropower dams are Son La, HoaBinh and Ialy with capacity of 2400MW, 1920MW and 720MW respectively [1]. The statistic of Vietnam’s potential hydropower capacity by major river basin is shown as in Table 1 [2].

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of river</th>
<th>Total potential capacity (MW)</th>
<th>Number of current hydropower factories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ma river</td>
<td>890</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>Da river</td>
<td>6960</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>Other small rivers</td>
<td>1000-3000</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>Gia Vu – Thu Bon river</td>
<td>1360</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>Lo – Gam – Chay river</td>
<td>1120</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>La Nga – Dong Nai</td>
<td>2870</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>Ca river</td>
<td>520</td>
<td>9</td>
</tr>
<tr>
<td>8</td>
<td>Sesan – Srepok river</td>
<td>2680</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Huong river</td>
<td>480</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Ba river</td>
<td>670</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Synthetic by research [2]

There is 60% of them is located in the northern, 27% located in the central highland, and 13% located in the southern of country, by geography [3]. The long shape geography and the difference regional weather causes challenge in hydropower operation and electricity transmission. As a report of Vietcombank Securities (VCBS, 2016 [4], the demand of electricity in Vietnam increases 10.7% per year, but the domestic recent supply volume dose not enough in the period 2016 – 2018. In 2016, the total power production of Vietnam was 184 billion KWh, but imported 3.1% from China and Lao. The average standard hour electricity sale price ranges from 1,388 to 2320VND (6.1-10.2 U.S. cent) per kilowatt hour (KWh). The giant state owned EVN reported $32 million loss in 2016 [1].

An advantage of hydropower in Vietnam is that it plays the role of providing both energy and water supply services (e.g., irrigation and flood control), thus bringing economic and social benefits. Otherwise, hydropower contributes to reduce dependence on fossil fuels, cut of greenhouse gas (GHG). Hydropower plant typically operates at an electrical efficiency of 85% to 95%. This compares to about 55% for combined-cycle gas turbines and 30% for wind power [5].
Although, hydropower was “the most available, mature, reliable and flexible, renewable, and cost-effective electricity generation technology”. It causes huge loss of land and displace large populations, loss of environmental and social costs that far outweigh any benefit provide to society [5]. So that, the sustainable of hydropower and renewable development issues have been questioned Vietnamese government and managers, requires an effective method to improve productivity performance. By the views of decision-makers and stakeholders in hydropower industry, a good productivity is an important key for them to setup their operational strategy and adjust their business. The performance indexes are not just counted for a single period; they should be combined with several periods for catching development trends [6]. Therefore, this research proposes an integrated method, which use of grey model with Malmquist productivity index (MPI), to provide a long-term analysis of the Vietnamese hydropower industry. All data was carefully collected from annual financial reports and classified into inputs and outputs. The aim is to predict future business and evaluate productivity of 19 Vietnamese hydropower companies during four consecutive terms (2013-2016). This research chose total asset (TA), cost of goods sold (CoGS), financial expense (F.Exp), administration expenses (Ad.exp) as input, because they are key of financial indicators contributing to the performance of companies in the hydropower industry. The revenues (Rev) and earnings after tax (EAT) were selected as output, because they are important indices for measuring the performance of this industry.

By this study, we can implement performance evaluation of Vietnamese hydropower industry not only from 2013 to 2016, but also predict future evaluation in the period 2017-2018. The proposed approach enables Vietnamese government to guide policy directions toward sustainable development of the hydropower industry. For investors or stakeholders, the proposed approach provides a method to assess performance information about a company, as well [7].

II. LITERATURE REVIEW

Researchers typically use a time-series forecast to solve various issues. The approaches have different mathematical backgrounds, include fuzzy, neural networks, trend extrapolation, and grey forecasting. Grey system theory, as an interdisciplinary scientific area, was first introduced by Ju-Long Deng (1982) [8]. From then on, the system has been a popular way to solve uncertainty issues, such as unknown parameters and poor or missing information. Grey system theory is superior to conventional statistical models because it only requires a limited amount of data for predicting [9]. GM (1,1) is known as a popular model in grey forecasting. Ren demonstrated that GM (1,N) gave a better forecast ability result than artificial neural network under scanty data conditions, in forecasting the yield of bio-hydrogen [10].

Data envelopment analysis (DEA) is a non-parametric linear programming approach. It measures the relative efficiency of a group of decision making units (DMUs) which receive multiple inputs to produce multiple outputs [11]. DEA has been applied to various field, as operations research, management, economics, etc. The most basic models of DEA are CCR, BCC, additive and slack based measure (SBM). Although DEA only required limited data to evaluate performance, the selection of input and output variables is very important for decision-making. The prerequisite condition for using DEA is that the selected variables should have an isotonic relationship, which can be tested by correlation analysis [12]. If the correlations are not zero, meaning existing linear relationship and can be used by the DEA model. Otherwise, we need to re-choose these variables.

DEA and grey theory have been applied by various research communities across a wide range of industries. Hui et al. (2009) used the GM (1,1) to forecast the growth of Japanese Larch in the Liaoning province [13]. Shi (2009) proposed an effective and reliable Grey-Fuzzy evaluation to evaluate teaching quality [14]. Lin, Liou, and Huang (2011) applied the grey forecasting model to estimate future CO2 emissions in Taiwan from 2010 until 2012. The results showed that the average residual error of the GM (1,1) was below 10% [15]. Wu et al. (2006) applied DEA Malmquist productivity index to evaluate the influence of intellectual capital on competitive advantages. The study dealt with 39 Taiwanese IC design companies as sample, and used ROA method to measure the intellectual capital stocks of them [16]. Chen and Chen [17] used DEA and MPI to explore Taiwanese chip manufacturing company operating performance. Nguyen and De Borger (2008)[18] applied DEA Malmquist model to evaluate 15 Vietnamese commercial banks and found that the productivity of these banks was on a downturn. Liang et al. (2008) applied DEA to investigate production efficiency the biotech industry before and after integration. The study had analyzed the possible integrative targets of a particular Taiwanese biotech company [19]. Chen, Hsieh, and Chen (2010) applied DEA to evaluate performance efficiency of 20 stores of the E-Life Mall in Kaohsiung City, Taiwan [20]. Mathur and Paul (2014) used the DEA approach, CCR and BCC models to appraise the performance of 20 Indian Non-Life Insurance Companies [21]. Fuentes, Fuster, and Lillo-Bañuls (2016) used a three-stage DEA model to measure technical efficiency of learning and teaching [22]. Piran et al. (2016) used DEA to evaluate effects of product modularization on the efficiency of the product engineering and the production process of a bus manufacturer. The results showed that product modularization provides significant improvements in efficiency [23].

Although grey theory and DEA have been applying in a board filed, this is the first time the models is used to predict future business, measure operational performance and productivity change in the hydropower industry of Vietnam. The combine model will help the hydropower companies and government adjust business performance and build a sustainable development strategy.

III. RESEARCH DEVELOPMENT, DATA COLLECTION AND METHODOLOGY

3.1 Research development

This research proposes an integrated model to evaluate long-term performance efficiency. Figure 1 provides detailed stages. The stage of introduction states current status of Vietnamese hydropower industry and define motivations and objectives. Data collection and
input – output variable selection are next works in this paper. Stage three implements empirical works, by the use of hybrid GM (1, 1) and MPI models to predict future business and evaluate performance efficiency. In order to ensure that the forecast errors are reliable, mean absolute percent error (MAPE) is applied to measure the prediction accuracy in this step. Once the error rate is too high, the study has to reselect the input and output factors. The Pearson Correlation Coefficient Test is used to check correlation values between inputs and outputs, whether or not they are positive. If there is a negative coefficient, it will be removed, and stage of data collection will be repeated to establish a new factor. This is done until it can meet our requirements. GM (1, 1) and MPI models are employed to calculate with realistic data in this stage. The purpose is to predict and assess the productivity efficiencies of DMUs for our analysis works. The conclusions and suggestions will be stated in stage of conclusion.

3.2 Data collection

Based on the research procedure proposed in Section 3, Table 2 shows 19 Vietnamese hydropower companies selected for the study. These companies are the top companies in the hydropower industry of Vietnam. They are qualified with transparent financial data, which was collected from the stock market observation posting system of Vietstock.vn [24]. Vietstock is a premier site providing business and financial market information in Vietnam. Due to printed space limitations, only the data of the year 2016 are listed in Table 3.

<table>
<thead>
<tr>
<th>No.</th>
<th>DMU</th>
<th>Companies name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DMU1</td>
<td>Vietnam Electricity Corporation (EVN)</td>
</tr>
<tr>
<td>2</td>
<td>DMU2</td>
<td>Vinh Son - Song Hinh Hydropower Joint Stock Company</td>
</tr>
<tr>
<td>3</td>
<td>DMU3</td>
<td>Central Hydropower Joint Stock Company</td>
</tr>
<tr>
<td>4</td>
<td>DMU4</td>
<td>Thac Mo Hydro Power Joint Stock Company</td>
</tr>
<tr>
<td>5</td>
<td>DMU5</td>
<td>Can Don Hydro Power Joint Stock Company</td>
</tr>
<tr>
<td>6</td>
<td>DMU6</td>
<td>Hydro Power Joint Stock Company – Power No.3</td>
</tr>
<tr>
<td>No.</td>
<td>DMUs</td>
<td>Companies name</td>
</tr>
<tr>
<td>-----</td>
<td>------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>7</td>
<td>DMU7</td>
<td>Se San 4A Hydro Power JSC</td>
</tr>
<tr>
<td>8</td>
<td>DMU8</td>
<td>Southern Hydropower JSC</td>
</tr>
<tr>
<td>9</td>
<td>DMU9</td>
<td>Thac Ba Hydropower Joint Stock Company</td>
</tr>
<tr>
<td>10</td>
<td>DMU10</td>
<td>Nam Mu Hydropower Joint Stock Company</td>
</tr>
<tr>
<td>11</td>
<td>DMU11</td>
<td>Daklak Power Hydroelectric JSC</td>
</tr>
<tr>
<td>12</td>
<td>DMU12</td>
<td>Gia Lai Hydropower JSC</td>
</tr>
<tr>
<td>13</td>
<td>DMU13</td>
<td>Huong Son Hydro Power Joint Stocks Company</td>
</tr>
<tr>
<td>14</td>
<td>DMU14</td>
<td>DakDoa Hydropower Joint Stock Company</td>
</tr>
<tr>
<td>15</td>
<td>DMU15</td>
<td>IdicoScroKPhuMieng Hydro Power Joint Stock Company</td>
</tr>
<tr>
<td>16</td>
<td>DMU16</td>
<td>DinhBinh Hydro Power Joint Stock Company</td>
</tr>
<tr>
<td>17</td>
<td>DMU17</td>
<td>A Vuong Hydropower JSC</td>
</tr>
<tr>
<td>18</td>
<td>DMU18</td>
<td>Naloi Hydropower Joint Stock Company</td>
</tr>
<tr>
<td>19</td>
<td>DMU19</td>
<td>Tay Nguyen Electricity Investment JSC</td>
</tr>
</tbody>
</table>

Table 3: The historical data of the input and output variables of 19 DMUs in 2016

<table>
<thead>
<tr>
<th>DMUs</th>
<th>Inputs (Billions of VND)</th>
<th>Outputs (Billions of VND)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(I)TA</td>
<td>(I)CoGS</td>
</tr>
<tr>
<td>DMU1</td>
<td>692,216</td>
<td>233,671</td>
</tr>
<tr>
<td>DMU2</td>
<td>6,110</td>
<td>181</td>
</tr>
<tr>
<td>DMU3</td>
<td>3,084</td>
<td>253</td>
</tr>
<tr>
<td>DMU4</td>
<td>1,299</td>
<td>256</td>
</tr>
<tr>
<td>DMU5</td>
<td>1,411</td>
<td>154</td>
</tr>
<tr>
<td>DMU6</td>
<td>136</td>
<td>25</td>
</tr>
<tr>
<td>DMU7</td>
<td>1,280</td>
<td>85</td>
</tr>
<tr>
<td>DMU8</td>
<td>2,646</td>
<td>274</td>
</tr>
<tr>
<td>DMU9</td>
<td>880</td>
<td>99</td>
</tr>
<tr>
<td>DMU10</td>
<td>486</td>
<td>91</td>
</tr>
<tr>
<td>DMU11</td>
<td>108</td>
<td>11</td>
</tr>
<tr>
<td>DMU12</td>
<td>363</td>
<td>41</td>
</tr>
<tr>
<td>DMU13</td>
<td>660</td>
<td>61</td>
</tr>
<tr>
<td>DMU14</td>
<td>219</td>
<td>20</td>
</tr>
<tr>
<td>DMU15</td>
<td>901</td>
<td>97</td>
</tr>
<tr>
<td>DMU16</td>
<td>112</td>
<td>23</td>
</tr>
<tr>
<td>DMU17</td>
<td>2,056</td>
<td>333</td>
</tr>
<tr>
<td>DMU18</td>
<td>127</td>
<td>29</td>
</tr>
<tr>
<td>DMU19</td>
<td>260</td>
<td>12.8</td>
</tr>
</tbody>
</table>

Source: Synthetic by researcher [24]

3.3 Grey forecasting model

The GM(1,1), which is pronounced as “Grey Model First Order One Variable,” can only be used in positive data sequences [25]. This model is a time series forecasting model. The differential equations of the GM(1,1) model have time-varying coefficients.

Let \( X(0) = (x(0)(1), x(0)(2), \ldots, x(0)(n)) \) be sequences of raw data. Denote its accumulation generated sequences by \( X(1) = (x(1)(1), x(1)(2), \ldots, x(1)(n)) \). Then \( X^{(0)}(k)+ax^{(1)}(k)=b (1) \) is referred to as the original form of the GM(1,1) model, where the symbol \( GM(1,1) \) stands for first order grey model in variables. Consider \( X^{(0)}(k)+az^{(1)}(k)=b (2) \) as the basic form of this model. Denote \( Z^{(i)} = (z^{(i)}(2), z^{(i)}(3), \ldots, z^{(i)}(n)) \), we have \( z^{(i)}(k) = (1/2)(x^{(i)}(k)+x^{(i)}(k-1)) \), with \( k=2,3,\ldots,n \).
Theorem 1: Let \( X(0), X(1), \) and \( Z(1) \) be the same as the above except that \( X(0) \) is nonnegative. If \( a = (a, b)^T \) is a sequence of parameters.

\[
\begin{align*}
Y = & \begin{bmatrix}
X(0)(2) \\
X(0)(3) \\
\vdots \\
X(0)(n)
\end{bmatrix} \\
B = & \begin{bmatrix}
-Z(2) \\
-Z(3) \\
\vdots \\
-Z(n)
\end{bmatrix}
\end{align*}
\]

Then satisfies \( \hat{a} = (B^T B)^{-1} B^T Y \), so from theorem 1 notations, if \( [a, b]^T = (B^T B)^{-1} B^T Y \), then \( dx(1)/dt + ax(1) = b \).

Theorem 2: Let \( B, Y, \hat{a} \) be the same as in Theorem 1. If \( \hat{a} = [a, b]^T = (B^T B)^{-1} B^T Y \), then

\[
\begin{align*}
(1) & \quad \text{The solution of } dx(1)/dt + ax(1) = b \text{ is given by } x(1)(k+1) = \frac{(1-ea)}{a} x(1)(k) \\
(2) & \quad \text{The time response sequence of } dx(1)/dt + ax(1) = b \text{ is given as follow: } s(1)(k+1) = s(1)(1) - s(1)(k) \\
(3) & \quad \text{The restored values of } x(0)(k) \text{ are given with marked as equation: } x(0)(k) = (1-ea)x(1)(1) - \frac{b}{a}.
\end{align*}
\]

3.4 Evaluation of volatility forecasts

The forecasting method is implemented to predict future results via present incomplete information; thus, it always carries errors and risks. Hence, a mean absolute percent error (MAPE) is employed to measure the accuracies in statistics. The smaller value of MAPE demonstrates that the forecasting value is more reasonable. Stevenson and Sum (2010) stated MAPE in their book as the following equation [26]:

\[
\text{MAPE} = \frac{1}{n} \sum_{t=1}^{n} \left| \frac{\text{Actual}_t - \text{Forecast}_t}{\text{Actual}_t} \right| \times 100; \text{ where } n \text{ is number of periods.}
\]

The grade of MAPE declare the forecasting reliability as in Table 4:

<table>
<thead>
<tr>
<th>Accuracy level</th>
<th>&lt;10</th>
<th>10-20</th>
<th>20-50</th>
<th>&gt;50</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Excellent</td>
<td>Good</td>
<td>Qualified</td>
<td>Unqualified</td>
</tr>
</tbody>
</table>

Source: [27]

3.5 Malmquist productivity index (MPI)

Malmquist productivity index (MPI) was used to calculate productivity changes of many decision making unit entities. MPI provides performance analysis over a period time based on DEA model. The MPI denotes two components of productivity change including efficient change (catch-up) and technical change (frontier-shift or innovation). MPI >1 means that productivity increases; while MPI= 1 means productivity do not change; and MPI < 1 demonstrates that productivity decreases (from period t to another t+1). The efficient change and technical change can be formulated as follow equation (Coelli et al, 2005) [28]:

\[
\text{Catch-up} = \frac{\delta_t^{t+1}(x_0, y_0)}{\delta_t(x_0, y_0)} \quad \text{and} \\
\text{Frontier-shift} = \left[ \frac{\delta_t^{t}(x_0, y_0)^{t}}{\delta_t^{t+1}(x_0, y_0)^{t+1}} \right]^{1/2}
\]

Where \( (x_0, y_0)^t \) and \( (x_0, y_0)^{t+1} \) denote the DMU data in periods t and (t+1); \( \delta_t(x_0, y_0)^t \) and \( \delta_t^{t+1}(x_0, y_0)^{t+1} \) represent the efficiencies in period t frontier; \( \delta_t^{t+1}(x_0, y_0)^{t+1} \) and \( \delta_t^{t+1}(x_0, y_0)^{t+1} \) represent the efficiencies in period (t+1).

The MPI can be further interpreted as a geometric average of efficient change and technical change in period (t) and period (t+1).

\[
\text{IV. EMPIRICAL RESULTS}
\]

4.1 Results of prediction for all DMUs

This research predicts the future business of hydropower companies by the use of GM (1,1) model. The results will be shown in following Table 5 and Table 6.
### Table 5: The derived prediction values of 19 DMUs in 2017

<table>
<thead>
<tr>
<th>DMUs</th>
<th>Inputs (Billions of VND)</th>
<th>Outputs (Billions of VND)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(I)TA</td>
<td>(I)CoGS</td>
</tr>
<tr>
<td>DMU1</td>
<td>883,923.66</td>
<td>283,307.26</td>
</tr>
<tr>
<td>DMU2</td>
<td>7,864.13</td>
<td>192.48</td>
</tr>
<tr>
<td>DMU3</td>
<td>2,990.47</td>
<td>268.44</td>
</tr>
<tr>
<td>DMU4</td>
<td>1,251.91</td>
<td>233.70</td>
</tr>
<tr>
<td>DMU5</td>
<td>1,483.15</td>
<td>148.47</td>
</tr>
<tr>
<td>DMU6</td>
<td>134.00</td>
<td>28.00</td>
</tr>
<tr>
<td>DMU7</td>
<td>1,256.98</td>
<td>85.35</td>
</tr>
<tr>
<td>DMU8</td>
<td>2,402.76</td>
<td>307.66</td>
</tr>
<tr>
<td>DMU9</td>
<td>812.97</td>
<td>80.49</td>
</tr>
<tr>
<td>DMU10</td>
<td>446.39</td>
<td>103.83</td>
</tr>
<tr>
<td>DMU11</td>
<td>107.01</td>
<td>10.09</td>
</tr>
<tr>
<td>DMU12</td>
<td>342.79</td>
<td>41.88</td>
</tr>
<tr>
<td>DMU13</td>
<td>631.41</td>
<td>66.01</td>
</tr>
<tr>
<td>DMU14</td>
<td>204.92</td>
<td>22.95</td>
</tr>
<tr>
<td>DMU15</td>
<td>834.84</td>
<td>98.02</td>
</tr>
<tr>
<td>DMU16</td>
<td>110.45</td>
<td>24.53</td>
</tr>
<tr>
<td>DMU17</td>
<td>1,465.83</td>
<td>390.81</td>
</tr>
<tr>
<td>DMU18</td>
<td>133.68</td>
<td>35.54</td>
</tr>
<tr>
<td>DMU19</td>
<td>260.34</td>
<td>25.88</td>
</tr>
</tbody>
</table>

Source: Calculated by researcher.

### Table 6: The derived prediction values of 19 DMUs in 2018

<table>
<thead>
<tr>
<th>DMUs</th>
<th>Inputs (Billions of VND)</th>
<th>Outputs (Billions of VND)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(I)TA</td>
<td>(I)CoGS</td>
</tr>
<tr>
<td>DMU1</td>
<td>1,094,072.92</td>
<td>340,258.94</td>
</tr>
<tr>
<td>DMU2</td>
<td>10,059.11</td>
<td>206.24</td>
</tr>
<tr>
<td>DMU3</td>
<td>2,882.57</td>
<td>283.89</td>
</tr>
<tr>
<td>DMU4</td>
<td>1,140.78</td>
<td>215.59</td>
</tr>
<tr>
<td>DMU5</td>
<td>1,546.37</td>
<td>144.25</td>
</tr>
<tr>
<td>DMU6</td>
<td>133.01</td>
<td>28.00</td>
</tr>
<tr>
<td>DMU7</td>
<td>1,238.61</td>
<td>84.86</td>
</tr>
<tr>
<td>DMU8</td>
<td>2,183.03</td>
<td>341.38</td>
</tr>
<tr>
<td>DMU9</td>
<td>768.64</td>
<td>69.39</td>
</tr>
<tr>
<td>DMU10</td>
<td>406.45</td>
<td>115.00</td>
</tr>
<tr>
<td>DMU11</td>
<td>106.04</td>
<td>9.98</td>
</tr>
<tr>
<td>DMU12</td>
<td>316.67</td>
<td>40.56</td>
</tr>
<tr>
<td>DMU13</td>
<td>602.96</td>
<td>70.69</td>
</tr>
<tr>
<td>DMU14</td>
<td>191.80</td>
<td>24.60</td>
</tr>
<tr>
<td>DMU15</td>
<td>773.42</td>
<td>99.04</td>
</tr>
<tr>
<td>DMU16</td>
<td>108.10</td>
<td>26.33</td>
</tr>
<tr>
<td>DMU17</td>
<td>1,133.71</td>
<td>447.47</td>
</tr>
<tr>
<td>DMU18</td>
<td>142.62</td>
<td>39.66</td>
</tr>
</tbody>
</table>
In this study, the MAPE was used to test the accuracy of prediction to ensure appropriate predictive methods. The results are shown in Table 7.

<table>
<thead>
<tr>
<th>DMUs</th>
<th>Average MAPE</th>
<th>DMUs</th>
<th>Average MAPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMU1</td>
<td>26.054%</td>
<td>DMU11</td>
<td>13.154%</td>
</tr>
<tr>
<td>DMU2</td>
<td>7.340%</td>
<td>DMU12</td>
<td>1.629%</td>
</tr>
<tr>
<td>DMU3</td>
<td>3.289%</td>
<td>DMU13</td>
<td>4.068%</td>
</tr>
<tr>
<td>DMU4</td>
<td>9.551%</td>
<td>DMU14</td>
<td>4.007%</td>
</tr>
<tr>
<td>DMU5</td>
<td>1.699%</td>
<td>DMU15</td>
<td>1.135%</td>
</tr>
<tr>
<td>DMU6</td>
<td>10.629%</td>
<td>DMU16</td>
<td>3.317%</td>
</tr>
<tr>
<td>DMU7</td>
<td>11.998%</td>
<td>DMU17</td>
<td>8.709%</td>
</tr>
<tr>
<td>DMU8</td>
<td>3.240%</td>
<td>DMU18</td>
<td>8.825%</td>
</tr>
<tr>
<td>DMU9</td>
<td>2.719%</td>
<td>DMU19</td>
<td>27.079%</td>
</tr>
<tr>
<td>DMU10</td>
<td>5.054%</td>
<td>Average all MAPE</td>
<td>8.079%</td>
</tr>
</tbody>
</table>

Source: Calculated by researcher.

This research applied a quantitative model forecasting approach, through re-simulating the past actual data. So that, if the error is within the allowable limits, then the model is reliable and usable. Table 10 indicated that the values of MAPE are excellent and good (less than 10%), (based on rules of Table 4). The average of all MAPE is 8.079%, this means the predicted results have a high level of accuracy. It forcefully affirms that GM(1,1) model is suitably to approach in this research.

4.2 Pearson correlation

In this research, we use the Malmquist productivity index model to analyze productivity of DMUs, where the condition for using DEA is the correlation coefficient, which could not be negative or equal to 0. Thus, the authors used the Pearson correlation coefficient to determine the data used in this study, which is in accordance with the DEA standards. Correlation coefficients are always in the range of (-1) to (1); if a value is as close to (1), it is a perfect linear relation [29]. The results are shown in Tables 8.

The results of the Pearson correlation coefficient showed that the variables used in this study have a strong linear relationship. This means that is consistent with the conditions of DEA and can be used for analysis.

4.3 Analysis of efficiency change

The changes of efficiency are called “catch-up” effects. The annual efficient change index for each experiment is shown in Table 8.

The changes of efficiency are called “catch-up” effects. The annual efficient change index for each experiment is shown in Table 9.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DMU1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>DMU11</td>
<td>1.0000032</td>
<td>0.9999987</td>
<td>1</td>
</tr>
<tr>
<td>DMU2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>DMU12</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>DMU3</td>
<td>0.9483737</td>
<td>1.0544366</td>
<td>1</td>
<td>DMU13</td>
<td>1.0371984</td>
<td>1.1084924</td>
<td>1.0555641</td>
</tr>
<tr>
<td>DMU4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>DMU14</td>
<td>1.3507149</td>
<td>0.8030357</td>
<td>0.9894512</td>
</tr>
<tr>
<td>DMU5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>DMU15</td>
<td>1.1989457</td>
<td>0.8639746</td>
<td>0.8810726</td>
</tr>
<tr>
<td>DMU6</td>
<td>1</td>
<td>1</td>
<td>0.9838042</td>
<td>DMU16</td>
<td>1.0000014</td>
<td>1.0000033</td>
<td>1</td>
</tr>
</tbody>
</table>
Seven DMUs showed efficient improvement in period 2013 – 2014. They are DMU10, DMU11, DMU13, DMU14, DMU15, DMU16, and DMU18 with efficient change scores larger than one. This means that these DMUs improved performance efficiency between 2013 and 2014. Nine DMUs has no change in their efficiency and the other three DMUs lost to improve their efficiency in this period. DMU14 and DMU10 obtained the largest improvement; they scored of 1.35071 and 1.22260, respectively. While on the other hand, DMU8 had a largest declines of 0.93678, following by DMU3 and DMU9.

From 2014 to 2015, only four DMUs improved efficiency, including DMU3, DMU9, DMU13 and DMU16. Six DMUs were decreased and nine DMUs do not change in efficiency. DMU13 obtained the highest improvement of efficiency (increasing 10.8%), while DMU14 had a worst declines of 20%, followed by DMU15 (14%) and DMU17 (12%).

In the period 2015 – 2016, only four DMUs improved efficiency, including DMU8, DMU10, DMU13, and DMU17. DMU17 has a largest efficient improvement of 13%, while DMU15 had a highest decline of 12% in efficiency.

For whole period 2013 – 2016, the average efficient change ranged from 0.980 to 1.035. An average efficiency improved of 3% from 2013 to 2014, slightly decline in period (2014 – 2015) with a number of 2%, and re-increase 1% in periods (2015 – 2016). DMU14, DMU15 and DMU17 have largest decline in efficiency across 2014 to 2015.

### 4.4 Analysis of technical change

Technical change, also called “innovation” or “frontier-shift” effect is the second component of the Malmquist productivity change index. This component shows the effect of the shift in frontier of the individual experiment productivity change for an exposition of technical change’s effect on productivity change using production functions. Table 10 and Figure 3 reports annual index of technical progress or regress.

#### Table 10: Annual technical changes from 2012 to 2015

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DMU1</td>
<td>1</td>
<td>0.3892133</td>
<td>0.9955872</td>
<td>DMU11</td>
<td>0.9744398</td>
<td>0.9769933</td>
<td>1.0043696</td>
</tr>
<tr>
<td>DMU2</td>
<td>6.225231</td>
<td>0.1195965</td>
<td>1.1383126</td>
<td>DMU12</td>
<td>0.8975201</td>
<td>1.0584761</td>
<td>1.4561878</td>
</tr>
<tr>
<td>DMU3</td>
<td>1.5620620</td>
<td>1.1742677</td>
<td>0.2320586</td>
<td>DMU13</td>
<td>0.9073718</td>
<td>0.9314945</td>
<td>0.9689560</td>
</tr>
<tr>
<td>DMU4</td>
<td>1.8315457</td>
<td>0.9266133</td>
<td>0.7152448</td>
<td>DMU14</td>
<td>0.9703644</td>
<td>0.9434307</td>
<td>1.0095128</td>
</tr>
<tr>
<td>DMU5</td>
<td>1.4259536</td>
<td>0.9265972</td>
<td>0.7258004</td>
<td>DMU15</td>
<td>0.9703412</td>
<td>0.9582678</td>
<td>1.0047975</td>
</tr>
<tr>
<td>DMU6</td>
<td>0.8788788</td>
<td>1.0503358</td>
<td>1.0086759</td>
<td>DMU16</td>
<td>0.9474521</td>
<td>1.1048392</td>
<td>1.3939657</td>
</tr>
<tr>
<td>DMU7</td>
<td>1.2401531</td>
<td>0.6445131</td>
<td>1.1353878</td>
<td>DMU17</td>
<td>1.2756553</td>
<td>0.9873285</td>
<td>0.8633467</td>
</tr>
<tr>
<td>DMU8</td>
<td>1.7690334</td>
<td>0.9640251</td>
<td>0.8900178</td>
<td>DMU18</td>
<td>1.7936488</td>
<td>2.6242811</td>
<td>2.6451094</td>
</tr>
<tr>
<td>DMU9</td>
<td>0.9624337</td>
<td>0.9618837</td>
<td>0.9304664</td>
<td>DMU19</td>
<td>2.4329067</td>
<td>0.4479694</td>
<td>0.9415516</td>
</tr>
<tr>
<td>DMU10</td>
<td>0.8888026</td>
<td>0.9571915</td>
<td>0.9589611</td>
<td>Average</td>
<td>1.5253207</td>
<td>0.955122</td>
<td>1.0535953</td>
</tr>
</tbody>
</table>

#### Figure 2: Annual efficiency changes from 2013 to 2016

For whole period 2013 – 2016, the average efficient change ranged from 0.980 to 1.035. An average efficiency improved of 3% from 2013 to 2014, slightly decline in period (2014 – 2015) with a number of 2%, and re-increase 1% in periods (2015 – 2016). DMU14, DMU15 and DMU17 have largest decline in efficiency across 2014 to 2015.
In the period 2013 – 2014, there are total nine DMUs with scores of technical change smaller than one, which expressed that technical regressed or innovation deteriorated in this period. It is also meaning that there were too much expenses but were reduced in output (revenues and earnings). DMU16 has the worst technical regress of 13%, while on the other case DMU2 and DMU19 had the highest progress of 522% and 143%, respectively.

From 2014 to 2015, fourteen DMUs were regressed in technical change, other five DMUs showed technical progress (DMU3, DMU6, DMU12, DMU16 and DMU18). In this period, we found that the highest technical progress is 162% (DMU18), while the worst deteriorated is 89% (DMU2). The same bad trend was shown in period 2015 – 2016, when having eleven DMUs showed technical regressing. In which DMU3 had the worst technical regressing of 77%.

For whole period 2013 – 2016, the average technical change ranged from 0.955% to 1.525%. The results showed that technical change progresses in period 2013 – 2014, while it is deteriorated in period 2014 – 2015 and slightly increase in period 2015 – 2016.

### 4.5 Analysis of productivity change

As presented in Eq. (8), a greater than one Malmquist productivity value will denote an improvement in the performance of business management. Table 1 and Figure 4 displays the calculation of annual productivity changes of Vietnam’s hydropower companies over the period 2013 – 2016.

![Frontier-shift](image)

**Figure 3: Annual technical changes from 2013 to 2016**

In the period 2013 – 2014, there are total nine DMUs with scores of technical change smaller than one, which expressed that technical regressed or innovation deteriorated in this period. It is also meaning that there were too much expenses but were reduced in output (revenues and earnings). DMU16 has the worst technical regress of 13%, while on the other case DMU2 and DMU19 had the highest progress of 522% and 143%, respectively.

From 2014 to 2015, fourteen DMUs were regressed in technical change, other five DMUs showed technical progress (DMU3, DMU6, DMU12, DMU16 and DMU18). In this period, we found that the highest technical progress is 162% (DMU18), while the worst deteriorated is 89% (DMU2). The same bad trend was shown in period 2015 – 2016, when having eleven DMUs showed technical regressing. In which DMU3 had the worst technical regressing of 77%.

For whole period 2013 – 2016, the average technical change ranged from 0.955% to 1.525%. The results showed that technical change progresses in period 2013 – 2014, while it is deteriorated in period 2014 – 2015 and slightly increase in period 2015 – 2016.

### 4.5 Analysis of productivity change

As presented in Eq. (8), a greater than one Malmquist productivity value will denote an improvement in the performance of business management. Table 1 and Figure 4 displays the calculation of annual productivity changes of Vietnam’s hydropower companies over the period 2013 – 2016.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DMU1</td>
<td>0.3892133</td>
<td>0.9955872</td>
<td>DMU11</td>
<td>0.9744429</td>
<td>0.9769921</td>
<td>1.0043696</td>
<td></td>
</tr>
<tr>
<td>DMU2</td>
<td>0.1195965</td>
<td>1.1383126</td>
<td>DMU12</td>
<td>0.8975201</td>
<td>1.0584761</td>
<td>1.4561878</td>
<td></td>
</tr>
<tr>
<td>DMU3</td>
<td>1.4814186</td>
<td>0.2320586</td>
<td>DMU13</td>
<td>0.9411245</td>
<td>1.0325546</td>
<td>1.0227951</td>
<td></td>
</tr>
<tr>
<td>DMU4</td>
<td>1.8315457</td>
<td>0.7152448</td>
<td>DMU14</td>
<td>1.3106857</td>
<td>0.7576085</td>
<td>0.9988636</td>
<td></td>
</tr>
<tr>
<td>DMU5</td>
<td>1.425936</td>
<td>0.7258004</td>
<td>DMU15</td>
<td>1.1633864</td>
<td>0.8279191</td>
<td>0.9885995</td>
<td></td>
</tr>
<tr>
<td>DMU6</td>
<td>0.8788788</td>
<td>1.0503358</td>
<td>DMU16</td>
<td>0.9747535</td>
<td>1.1048429</td>
<td>1.3939657</td>
<td></td>
</tr>
<tr>
<td>DMU7</td>
<td>1.2401531</td>
<td>1.1353878</td>
<td>DMU17</td>
<td>1.2756553</td>
<td>0.8732164</td>
<td>0.9761691</td>
<td></td>
</tr>
<tr>
<td>DMU8</td>
<td>1.6572103</td>
<td>1.0026139</td>
<td>DMU18</td>
<td>1.7936606</td>
<td>2.6242811</td>
<td>2.6451094</td>
<td></td>
</tr>
<tr>
<td>DMU9</td>
<td>0.9486948</td>
<td>0.9304664</td>
<td>DMU19</td>
<td>2.4329067</td>
<td>0.4479694</td>
<td>0.9415516</td>
<td></td>
</tr>
<tr>
<td>DMU10</td>
<td>1.0866507</td>
<td>1.0471775</td>
<td>Average</td>
<td>1.5547301</td>
<td>0.9365377</td>
<td>1.0652263</td>
<td></td>
</tr>
</tbody>
</table>
In period 2013 – 2014, the result showed that, total twelve companies has MPI values larger than one; it means that productivity growing in this period. The other six companies have MPI less than 1, which means loss of productivity; one company does not change. DMU2 and DMU19 had the highest productivity growth over this period while on the other hand DMU6 had the largest loss, followed by DMU12.

From 2014 to 2015, thirteen DMUs had productivity increase except DMU3, DMU6, DMU12, DMU13, DMU16 and DMU18. The results showed that DMU2 had the largest productivity loss, followed by DMU1, DMU19 and DMU7. In the period of 2015 to 2016, nine companies had productivity growth and the other ten companies had productivity loss. DMU3 had the largest productivity growth, followed by DMU4 and DMU5.

In general, the whole period 2013 – 2016 showed average productivity gains. The period 2013 – 2014 recorded a highest growth (55%); but slightly decrease 7% in period 2014 – 2015.

As mentioned in Section 3.2, the MPI is a multiplicative composite of efficiency and technical change. The major cause of productivity improvements can be ascertained by comparing values of efficiency change and technical change indexes. Put differently, the productivity losses described can be the result of either efficiency declining, or technique regressing, or both. Table 12 presents the MPI’s results of the 19 hydropower companies from 2013 to 2016. The average percentage productivity change ranged from 79% (DMU1) to 249% (DMU2). DMU2 had the highest productivity growth from 2013 – 2016, followed by DMU18, DMU19 and DMU8.

---

<table>
<thead>
<tr>
<th>DMUs</th>
<th>2013~2016 Annual average efficient change</th>
<th>2013~2016 Annual average technical change</th>
<th>2013~2016 Annual average productivity change (MPI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMU1</td>
<td>1</td>
<td>0.7949335</td>
<td>0.7949335</td>
</tr>
<tr>
<td>DMU2</td>
<td>1</td>
<td>2.4943800</td>
<td>2.4943800</td>
</tr>
<tr>
<td>DMU3</td>
<td>1.0009368</td>
<td>0.9894628</td>
<td>0.9838893</td>
</tr>
<tr>
<td>DMU4</td>
<td>1</td>
<td>1.1578013</td>
<td>1.1578013</td>
</tr>
<tr>
<td>DMU5</td>
<td>1</td>
<td>1.0261171</td>
<td>1.0261171</td>
</tr>
<tr>
<td>DMU6</td>
<td>0.9946014</td>
<td>0.9792968</td>
<td>0.9738514</td>
</tr>
<tr>
<td>DMU7</td>
<td>1</td>
<td>1.0066847</td>
<td>1.0066847</td>
</tr>
<tr>
<td>DMU8</td>
<td>1.0003684</td>
<td>1.2076921</td>
<td>1.1879645</td>
</tr>
<tr>
<td>DMU9</td>
<td>1.0000689</td>
<td>0.9515946</td>
<td>0.9516583</td>
</tr>
<tr>
<td>DMU10</td>
<td>1.0903149</td>
<td>0.9349851</td>
<td>1.0163415</td>
</tr>
<tr>
<td>DMU11</td>
<td>1.0000006</td>
<td>0.9852676</td>
<td>0.9852682</td>
</tr>
<tr>
<td>DMU12</td>
<td>1</td>
<td>1.1373947</td>
<td>1.1373947</td>
</tr>
<tr>
<td>DMU13</td>
<td>1.067085</td>
<td>0.9359407</td>
<td>0.9988248</td>
</tr>
<tr>
<td>DMU14</td>
<td>1.0477339</td>
<td>0.9744360</td>
<td>1.0223860</td>
</tr>
<tr>
<td>DMU15</td>
<td>0.9813310</td>
<td>0.9778022</td>
<td>0.9588683</td>
</tr>
<tr>
<td>DMU16</td>
<td>1.0000016</td>
<td>1.1578524</td>
<td>1.1578541</td>
</tr>
<tr>
<td>DMU17</td>
<td>1.0050345</td>
<td>1.0421102</td>
<td>1.0416803</td>
</tr>
<tr>
<td>DMU18</td>
<td>1.0000022</td>
<td>2.3543464</td>
<td>2.3543504</td>
</tr>
<tr>
<td>DMU19</td>
<td>1</td>
<td>1.2741425</td>
<td>1.2741425</td>
</tr>
</tbody>
</table>
From 2013 to 2016, there are twelve companies with average MPI values larger than one, it means productivity growing in this period. The other seven companies have average MPI’s value less than one, which indicates decreasing in productivity. In other words, twelve companies improved their performance efficiency, whereas the other seven companies failed to improve their efficiency during the four-year period. Productivity loss for DMU6 and DMU15 was driven by both catch-up and frontier-shift effect. The results also indicate that these two companies have still great space for improvement business and need to cut of input resources waste and maximize output production to enhance efficient operation. Conversely, productivity loss for DMU1, DMU3, DMU9, DMU11, and DMU13 was mainly driven by technological regress, so that these firms need upgrade technology and maximize production to enhance efficient performance.

In general observations, the average efficient change and technical change of all companies were 100% and 117%, respectively. Therefore, the productivity change was due to improvement innovation in technology rather than in efficiency. The productivity of Vietnam’s hydropower companies over the past four years is quite good. Technical change was more impact than efficient change, in terms of contribution to MPI improvement. However, both “catch-up” and “innovations” (“frontier-shift”) effects predominately attributed to Vietnam’s hydropower industry productivity growth.

V. CONCLUSION

Since DEA has been applying in a board filed, this is the first time GM(1,1) and MPI models were used to forecast future business and evaluate productivity change in Vietnam’s hydropower industry. This research conducts an empirical experiment on 19 Vietnam’s hydropower companies in the period 2013—2016. Based on the completed public data, the study employed GM (1,1) model to predict future business performance. The accurate forecasting value had been tested by average MAPE and received a reliable percentage of 8.079%.

The MPI’s results showed that twelve companies increased productivities and the other seven companies were decreased productivity. Productivity loss for DMU6 and DMU15 was driven by both catch-up and frontier-shift effect. Conversely, productivity loss for DMU1, DMU3, DMU9, DMU11, and DMU13 was mainly driven by technological regress. The average efficient change and technical change of all companies were 100% and 117%, respectively. Therefore, technical change was more impact than efficient change, in terms of contribution to MPI improvement. However, both “catch-up” and “innovations” (“frontier-shift”) effects impact on Vietnam’s hydropower industry productivity growth. The results also reflect the fact that the MPI’s changes did not depend on company size. DMU2 is the most efficient company with a highest MPI of 249%, and will be a good reference model for other companies. In contrasted, these inefficient companies should more invest technology and improve performance to reach efficient level.

In a conclusion, to sustain the development of Vietnamese hydropower industry, the government should help these companies. Which could be divided into two groups including (group 1: DMU1, DMU3, DMU9, DMU11, and DMU13 - need to improve output production) and (group 2: DMU6 and DMU15 - need to improve both efficient and production).

The result provide a meaningful reference to help hydropower companies to improve their operating efficiency, make an effective production plan, speed up business management change, strengthen core competitiveness, and achieve balance development. The research argues that control of performance efficiency and productivity are necessary jobs for keeping competitive ability and determining the failures or successes of companies in this industry. The application provides useful information for practitioners and academics in this field.

REFERENCES


**AUTHORS**

**First Author** – Chia Nan Wang, Professor, Department of Industrial Engineering and Management, National Kaohsiung University of Applied Sciences, Taiwan, cn.wang@cc.kuas.edu.tw

**Second Author** – XuanTho Nguyen, Ph.D candidate, Department of Industrial Engineering and Management, National Kaohsiung University of Applied Sciences, Taiwan, nguyenhanam188@gmail.com

**Correspondence Author** – XuanTho Nguyen, nguyenhanam188@gmail.com,
Entrepreneurial intentions among undergraduate students in university of Jaffna

Mr. Logendran Mayuran

Department of Human Resource Management, University Of Jaffna
Email: logenmayuran@gmail.com

Abstract: This research aimed at studying the entrepreneur intention among undergraduates in university of Jaffna. The study was built on psychological model based on Ajzen’s theory of planned behavior to identify the factors influencing the entrepreneurial intention of these students. The study analyzed the factors contributing towards entrepreneurial intention among University of Jaffna students. Attitudinal, educational and behavioral factors have been taken as characteristic of entrepreneurs. Data were collected through questionnaires obtained from 534 students of four different faculties in University of Jaffna. The study utilized correlation and regression statistics to analyze the data. The findings showed a significant positive relationship between attitudinal factor (r=0.535), behavioral factor (r=0.624) and educational support (r=0.524) towards entrepreneurial intention. From the linear regression analysis, it can be concluded that entrepreneurial characteristics contributed 46.5% towards entrepreneurial intention among undergraduates at University of Jaffna. The result of the study has valuable implications for policy makers in Higher Education Division, university administrators, educators and Government.

Key words: Entrepreneurial intention, attitudinal factors, educational support, behavioral factors

Introduction
Today entrepreneurship has become one of the critical factors that would support development of economy. Growth of entrepreneurial activities leads to creation of various opportunities such as job creation, self-employment & etc. The main reason for increased unemployment is less entrepreneurial intention among the people. If government takes great attention in developing entrepreneurial intention, unemployment will automatically decline. So entrepreneurship plays a major role in Sri Lanka’s economic development. But entrepreneurs in Sri Lanka are facing greater challenges in the modern business under tough competition, rapidly changing new technologies & globalization of products and services.

Education system of Sri Lanka produces large number of highly educated individual with academic skills only. But they not provide skills that are needed to become an entrepreneur. Unfortunately today, the university system in Sri Lanka is not producing even five percentages in entrepreneurship. Recently, University of Uwa Wellasa has introduced a course in entrepreneurship that is called as entrepreneurship and management studies. Nowadays some universities and technical colleges provide educational and assistance program to students. Such as, entrepreneur program for practicing business. Sri Lankan government is also changing their educational system and should facilitate to entrepreneur for getting success in future.

Number of variables has the influence on the entrepreneurial intention. For this research purpose, we have selected three variables that are attitudinal factors, educational support and behavioral factors as our independence variable. According to today’s needs, we have selected undergraduate students in university of Jaffna as our sample and analyzed entrepreneurial intention among those students.
Review of literature

Several conceptual models of entrepreneurial intentions have been developed to identify the factors that have impact on entrepreneurial intention of starting a new business (Shapero, 1982; Bird, 1988; Davidsson, 1997 and Autio 1997). Intention to start a business drives from a propensity to act upon opportunities and from perceptions of desirability and feasibility. University students are trained to enter the business according to their area of study. Christion (2000) studied on Batak students’ intention to be entrepreneurs and found that 65% to the respondent had intention to be entrepreneurs.

According to our conceptual model, we have included attitudinal factor, educational support and behavioral factors and analyzed impact of three factors on entrepreneurial intention.

Ajezen (1991) found out relationship between personal attitude factors with intention to be an entrepreneur. Here personality traits, curiosity and locus of internal control have been taken under the attitudinal factors. Personality is usually broken in to five components that are called as big five personality which are openness to experience, conscientiousness, extroversion, agreeableness and neuroticism. These components are generally stable overtime and appear to be attributable to person’s genetics rather than effects of one’s environment. Nishantha (2009) analyzed effect of personality traits have impact on motivation of student to select entrepreneur career and revealed that need for achievement and risk taking propensity are highly contributed for developing positive attitude towards entrepreneurship.

Individuals believe that they can control events affect them that is called as locus of control. There are two types of local of control that are internal locus of control and external locus of control. External locus of control means individuals believes that his/her behavior is guided by fate or luck or other external circumstance. Internal locus of control means Individual believe that his/her behavior guided by his or her personal decision and effort.

Curiosity has also seen identified as a major motivator of behavior in domains such as educational occupational and recreational area (Reio & Wi Swell 2000)

Kushadan & Roberts (2004) found that highly curious individuals are more motivated to explore new environment to obtain diverse cognitive perceptual or sensational information to satisfy their curiosity.

Gelord and Salesh (2011) investigated the impact of educational support and structural support on entrepreneurial intention. They found out the key role of education for the development of entrepreneurial intention. Reynolds (1995) and Miller (1990) revealed that groups with lower education show less of interest in an entrepreneurial career. But there are some problems to predict the results regarding positive relationship between educational support and entrepreneurial intention because people with higher education may have better chances of success and to attain their personal goals not only as business owner manager, but also as employee. Peterman & Kennedy (2003) suggested that exposure to enterprise education affects intention. Current research suggests that the use of a variety of learning experience helps students to expose to real world situations (Edelman & Mansiova 2008). We can expect that students self-efficiency can gradually increase, which is possible as students gain experience by developing skills.

Entrepreneurial behavior is defined as a set activities and practices by which individuals at multiple levels autonomously generate and use innovation and resource combinations to identify and pursue opportunities. We have included creativity and risk taking into behavioral factors. Creativity is the ability to produce something new through imaginative skills and creativity by individual is a starting point for innovation that is often used interchangeably with creativity.

Daniel Yarhamidi et al (2000) found that high scores on creativity test yielded a strong positive effect on entrepreneurial intention. There is along tradition of describing entrepreneurship and innovative business behavior as an act of creativity (Amable 1996 & Ward 2004).
Davidssons (2002) said entrepreneurs must come up with new goods and services that can be brought to a market. Risk taking refers to the tendency to engage in behaviors that have the potential to be harmful or dangerous yet at the same time. Provide the opportunity for some kind of outcomes that can be perceived as positive. Some researchers have identified the relationship between risk taking behavior and entrepreneurial intention but some researchers found out no relationship between these two variable. Brockhavs (1980) identified that risk to tolerance or ambiguity does not affect entrepreneurs differently. However Chosh & block (1993) identified that risk and ambiguity have impact on entrepreneurial behavior or intention. Therefore previous studies have shown variables that might affect entrepreneurial intention. This study has covered behavioral factors, attitudinal factors & educational support and how those factors have the influence on intention of university students to become entrepreneur.

Hypothesis

H1: There is a significant relationship between attitudinal factors with intention to become an entrepreneur.
H2: There is a significant relationship between behavioral factors with intention to become an entrepreneur.
H3: There is a significant relationship between educational supports with intention to become an entrepreneur.
H4: attitudinal, educational and behavioral factors have the impact on entrepreneurial intention.

Objective

1. To examine the relationship between attitudinal factors (personality traits, locus of control, curiosity), behavioral factor (risk taking and creativity) and educational support with intention to be an entrepreneur.
2. To examine the contribution of attitudinal, behavioral and educational support factor towards intention to be an entrepreneur.
3. To understand the perception or opinion of entrepreneurship among the students

Research conceptual framework

The conceptual framework for this study is built based on the theory of planned behavior by Ajzen (1991). Entrepreneurial intention is a dependent variable and attitudinal factors, Educational support and behavioral variable in this model.
Methodology

Population and Sampling

This study was carried out through a survey method, using questionnaires as the main instrument. We used Stratified sampling method to collect the data and this sample consists of respondents among students from four faculties in university of Jaffna (faculty of management & commerce, science, arts and Agriculture).

Research Instruments

The final questionnaire consists of two parts. Part I includes questions to collect demographic information and educational background of respondents. Part II aims at measuring attitudinal factors, educational support, behavioral factors and Entrepreneur intention. All the variables were measured using five point likert scale with level 1= strongly agree and 5= strongly disagree. Data have been analyzed using correlation and regression.

The questionnaire was adopted from various previous sources and used to collect the data. The personality traits were adapted from the structure of phenotypic personality traits (Goldberg, 1993). 5 items were constructed to look into the internal locus of control and 4 items were to look into levels of curiosity of an individual. These items were adapted from Traits and state curiosity in genesis of intimacy (Kashdan et al 2004). The 4 items on risk taking were adapted from A Domain-specific Risk-attitude scale (Weber, Blais, & Betz, 2002). 4 items were taken to measure creativity and innovation which was taken from Entrepreneurial Leadership and New Ventures (Chen, 2007). The items for educational support were constructed by researches taking into consideration of the present educational support given by university of Jaffna.

Reliability: The internal consistencies of scale were assessed through computing Cronbach’s alpha. The components of factor affecting entrepreneurial intention show the reliability value is 0.889. Implication from these values indicates that all of the items used for each component in the questionnaire have a high and consistent reliability values.

Results & Discussion

In this study, the relationships between attitudinal factors, behavioral factors, educational factors and entrepreneurial intention were examined. Correlation and regression analysis were used to analyze the data.

Table 1

<table>
<thead>
<tr>
<th>Correlations</th>
<th>intention</th>
<th>education</th>
<th>Attitudinal factors</th>
<th>Behavioral factors</th>
<th>Total (characteristic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>intention</td>
<td>Pearson Correlation</td>
<td>.524**</td>
<td>.535**</td>
<td>.624**</td>
<td>.682**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>532</td>
<td>532</td>
<td>532</td>
<td>532</td>
<td>532</td>
</tr>
<tr>
<td>education</td>
<td>Pearson Correlation</td>
<td>.457**</td>
<td>.519**</td>
<td>.858**</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>534</td>
<td>534</td>
<td>534</td>
<td>534</td>
<td>534</td>
</tr>
<tr>
<td>Attitudinal factors</td>
<td>Pearson Correlation</td>
<td>.521**</td>
<td>.753**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>534</td>
<td>534</td>
<td>534</td>
<td>534</td>
<td>534</td>
</tr>
</tbody>
</table>
The results showed that the correlation coefficients between attitudinal factors and entrepreneurial intention is r = 0.535, (p<0.01). A significant moderate positive correlation (p<0.01) was found between attitudinal factors and entrepreneurial intention.

The results showed that the correlation coefficients between educational factors and entrepreneurial intention is r = 0.524, (p<0.01). A significant moderate positive correlation (p<0.01) was found between educational factors and entrepreneurial intention.

The results showed that the correlation coefficients between behavioral factors and entrepreneurial intention is r = 0.624, (p<0.01). A significant strong positive correlation (p<0.01) was found between behavioral factors and entrepreneurial intention.

The relationship between entrepreneurs' characteristics and entrepreneurial intention is positively correlated at significance level of .01.

<table>
<thead>
<tr>
<th>Behavioral Factors</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.624**</td>
<td>.000</td>
<td>532</td>
</tr>
<tr>
<td></td>
<td>.519**</td>
<td>.000</td>
<td>534</td>
</tr>
<tr>
<td></td>
<td>.521**</td>
<td>.000</td>
<td>534</td>
</tr>
<tr>
<td>Total (characteristic)</td>
<td>Pearson Correlation</td>
<td>Sig. (2-tailed)</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>.682**</td>
<td>.000</td>
<td>532</td>
</tr>
<tr>
<td></td>
<td>.858**</td>
<td>.000</td>
<td>534</td>
</tr>
<tr>
<td></td>
<td>.753**</td>
<td>.000</td>
<td>534</td>
</tr>
<tr>
<td></td>
<td>.822**</td>
<td>.000</td>
<td>534</td>
</tr>
</tbody>
</table>

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

Table 2

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

a. Predictors: (Constant), entrepreneurs' characteristic

Regarding to the above model summary, R square value is 0.465. R square states to what extent characteristics of entrepreneur (attitudinal, educational and behavioral factors) determine entrepreneurial intention. R square value is also low. It indicates that only about 46.5% is explained by the variation in the score of entrepreneurs’ characteristic. The remaining is unexplained.

Table 3

<table>
<thead>
<tr>
<th>ANOVA^b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant)attitudinal factors, educational factors and behavioral factors

b. Dependent Variable: intention

The above table is used to find out the overall fitness of characteristics of entrepreneur (attitudinal, educational and behavioral factors) and entrepreneurs’ intention. F value indicates whether this model has overall significant or not. Based on the above result F value is...
461.073 and its significant is at 0.000 at 0.01 significant levels. So characteristics of entrepreneur (attitudinal, educational and behavioral factors) are the significant for entrepreneurs’ intention.

According to the above table, the relationship between the two variables, that are characteristic of entrepreneurs as an independent variable and entrepreneurial intention as a dependent variable, is positive and their coefficient is 0.940. The value of t-statistic of the above output is $t = 21.473$ with a significance of 0.000. Since the significance is less than 0.01, it can be said that at 1% significance level, Positive linear relationship exists between characteristics of entrepreneur (attitudinal, educational and behavioral factors) and entrepreneurs’ intention.

Regression equation for characteristic of entrepreneurs and entrepreneurial intention is:

\[
\text{Entrepreneurial intention} = -0.61 + 0.940 \times \text{characteristic of entrepreneur}
\]

From the linear regression, analysis can be concluded that entrepreneurial characteristics contributed 46.5% towards entrepreneurial intention among University of Jaffna.

### Results of hypotheses testing

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Description</th>
<th>Tools</th>
<th>Hypotheses supported/rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>There is a significant relationship between attitudinal factors with intention to become an entrepreneur.</td>
<td>Correlation</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>There is a significant relationship between behavioral factors with intention to become an entrepreneur.</td>
<td>Correlation</td>
<td>Supported</td>
</tr>
<tr>
<td>H3</td>
<td>There is a significant relationship between educational supports with intention to become an entrepreneur.</td>
<td>Correlation</td>
<td>Supported</td>
</tr>
<tr>
<td>H4</td>
<td>Atitudinal, educational and behavioral factors have the impact on entrepreneurial intention.</td>
<td>regression Analysis</td>
<td>Supported</td>
</tr>
</tbody>
</table>
**Conclusion**

The purpose of this study was to find out the relationship between the entrepreneurs’ characteristics and entrepreneurs’ intention of undergraduate students in university of Jaffna. According to our research findings, attitudinal factors, educational factors and behavioral factors have significance influence on entrepreneurial intention. But among those three factors, behavioral factors have more influence on entrepreneurial intention. Educational factors have low influence on entrepreneurial intention compare with other factors. University and government have to take action to revise curriculum that exists in present and universities need to design new paths to guide the students and to develop their skills and knowledge according to our present situation. Since entrepreneurship is important as a very relevant instrument to promote economic growth for the nation's economies, more need to be done to promote new enterprises and business venture to infuse dynamism in the economic activity.

This research only covered the four faculties in university of Jaffna. But this is a small position. Future researchers can include all faculties in university of Jaffna or may select other universities in Sri Lanka. If future researcher extend this sampling, that will give powerful result about entrepreneurs’ intention.

This research aimed at studying the entrepreneur intention among undergraduates in university of Jaffna. We have identified only three major factors for entrepreneur intention. But so many factors have the influence on entrepreneur intention. Such as, subjective norms, perceived feasibility, perceived competitiveness and so on. So, when future researchers consider other characteristics that will give valid insights. Our results will provide some implications for universities, governments, entrepreneurship trainers as well as families on how to cultivate entrepreneurial intention among universities.

**References:**

A Psychological Analysis of Employees’ Stress related to Job Satisfaction in Employees Trust Fund Board.

Wasana Hansamali Wijenayaka
B. A Philosophy and Psychology,
University of Sri Jayewardenepura,Gangodawila, Nugegoda, Sri Lanka
Wasanahansamali123@gmail.com

Abstract-In today’s competitive global environment, employee work satisfaction is an essential element of a company’s success. Employee satisfaction can be significantly hindered by high levels of stress experienced in the work environment. In addition, poor indoor air quality contributes to deterioration of employee health and well-being, which further reduces productivity. This study examined employees’ level of work stress, job satisfaction and organizational commitment.

The object of this study was to explore psychological effects of stress that may reduce employee motivation and enhance work satisfaction while exploring individual, organizational and social stressors which affect to the employees’ health. The study discusses limitations as to the wider applicability of the approach described herein and proposes recommendations for future works in this research.

However in this research there are mainly included about work place stress, job satisfaction, and other all factors that contribute to overcome work place stress and developing job satisfaction. Herein you can get a vast knowledge regarding work place stress and job satisfaction.

Index Terms- Associate level employees, employer, work stress & job satisfaction.

I. INTRODUCTION

Today we live in a very complex society. In day to day life we have to confront many issues, problems, and crisis and so on. There are increasing numbers of mental crisis among every people. We cannot overcome all the difficulties without support of the society. Somebody must guide them in the right path. Time to time somebody must counsel them. In that case I have paid my attention towards the employees. Because, every employee engage in lots of work all over their lifespan, also I can choose vast area in one category & every person suffer with at least one kind of stress. Most people spend more time at work than they do at any other activity. Not surprisingly, then, work can be a prime source of stress and there is a great deal of evidence to show that on-the-job stress affects the physical and mental health of many employees. However this stress affects to all human beings in the society. Therefore the aim of my research is to help others learn how to cope with stress, primarily in the workplace but also in personal life. The need to manage stress work is vital, if you are to achieve your goals and objectives, whether they are work related or more personal. As an employee or employer you will find the stress management skills taught in this research valuable for betterment of your health and psychological well-being. I hope this research will be very useful & helpful to all the employees, employers and also your personal life.

Therefore I have chosen as a sample of government organization called, Employees Trust Fund Board and its employees to clarify my research topic. Especially I hope to study the problems related to the employees during working time, harms of their company and also mental problems affected to their personal life. This research helps to solve psychological problems and managing stress with job satisfaction and give better solutions to them in a psychological viewpoint.

2. LITERATURE REVIEW

According to the book of “The Stress of Life” by Hans Selye, had emphasized about stress as follows, Today all people are suffering with various mental illnesses, such as stress, anxiety, depression...etc. People who are engaging any kind of work are feeling anxious because of excessive workload. There is no anymore peaceful and simple working environment. Especially government employees stuck with lots of duties in this competitive society. Employees, who are giving their service to the people, have to be more kind, peaceful, friendly, and passive. But with the excessive workload they miss these qualities and they suffer with stress. That is obstacle to the development of mental, psychological & physical wellbeing of the employer, employee and also it mainly affects to the
organization. With these stresses employees have not good connection with customers and others, because of the displeasure, loss of mutual understand and communication problems. Due to these problems employers and employees are failing with efficiency, devotion and success. All of these things related to the stress are consist in the book of “The Stress of Life”, 1956 written by Hans Selye.

According to the article of “job satisfaction meaning in the Cambridge English Dictionary” have emphasized about job stress as follow, Job satisfaction means “an individual’s reaction to the job experience” (Berry, 1997). There are various components that are considered to be vital to job satisfaction. These variables are important because they all influence the way a person feels about their job. These components include the following: pay, promotion, benefits, supervisor, co-workers, work conditions, communication, safety, productivity, and the work itself. Each of these factors figures into an individual’s job satisfaction differently.

According to the book of “A guide for Managers and Employees” by Samuel L. Malone, Work Related Stress (WRS) is stress caused or made worse by work. It simply refers to when a person perceives the work environment in such a way that his or her reaction involves feelings of an inability to cope. It may be caused by perceived/real pressures/deadlines/threats/anxieties within the working environment.

3. METHODOLOGY

In this study I expect to exercise content analysis method. Therefore I use qualitative data and quantitative data in appropriate. The researcher examined the phenomenon through the questionnaires that will be given out to respondents for the statistical representation of the findings in the study, interviews with the respondents and a few experts in this field will also be conducted. The questioner based on the following three variables due to the broadness of the topic. The researcher selected independent variable as the Individual factors, Personal & family factors, Social factors and Occupational factors.

Hypothesis - There are some mental stresses affects to the job satisfaction of the employees.

Sample size - Under the topic of “A Psychological analysis of employees stress related to job satisfaction in Employees Trust Fund Board I have focus on the employees’ stress and their job satisfaction. For that I expect to choose a sample as Employees Trust Fund Board that is located in the Narehenpita. The questionnaire was administered to a random selection of 100 employees both men and women.

Data collection- The researcher uses the random sample method to which included close ended questions.

Data analysis- Data analysis was done by using the Excel and researcher has used graphs and tables in order to show the data. Primary data collection – primary data is gathered through the structured questionnaire. Secondary data collection- the data to be gathered in using or precious research findings, literature survey of text books, internet, reports and related articles from journals and magazines.

1.1 Individual factors questions data summery

<table>
<thead>
<tr>
<th>Question Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>None</td>
<td>8</td>
<td>16</td>
<td>None</td>
<td>None</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Agree</td>
<td>47</td>
<td>56</td>
<td>72</td>
<td>13</td>
<td>13</td>
<td>9</td>
<td>31</td>
</tr>
<tr>
<td>Neutral</td>
<td>39</td>
<td>32</td>
<td>12</td>
<td>39</td>
<td>37</td>
<td>23</td>
<td>39</td>
</tr>
<tr>
<td>Disagree</td>
<td>14</td>
<td>4</td>
<td>None</td>
<td>43</td>
<td>42</td>
<td>57</td>
<td>23</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>5</td>
<td>8</td>
<td>7</td>
<td>None</td>
</tr>
</tbody>
</table>
1.2 Personal & family factors questions data summery

<table>
<thead>
<tr>
<th>Question Number</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>None</td>
<td>21</td>
<td>9</td>
<td>13</td>
<td>21</td>
</tr>
<tr>
<td>Agree</td>
<td>4</td>
<td>57</td>
<td>23</td>
<td>42</td>
<td>43</td>
</tr>
<tr>
<td>Neutral</td>
<td>23</td>
<td>15</td>
<td>13</td>
<td>31</td>
<td>29</td>
</tr>
<tr>
<td>Disagree</td>
<td>51</td>
<td>7</td>
<td>16</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>22</td>
<td>None</td>
<td>39</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
1.3 Social factors questions data summary

<table>
<thead>
<tr>
<th>Question Number</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>None</td>
<td>None</td>
<td>4</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>7</td>
</tr>
<tr>
<td>Agree</td>
<td>13</td>
<td>3</td>
<td>29</td>
<td>7</td>
<td>12</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Neutral</td>
<td>59</td>
<td>21</td>
<td>34</td>
<td>29</td>
<td>44</td>
<td>23</td>
<td>48</td>
</tr>
<tr>
<td>Disagree</td>
<td>28</td>
<td>57</td>
<td>21</td>
<td>45</td>
<td>41</td>
<td>64</td>
<td>14</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>None</td>
<td>19</td>
<td>12</td>
<td>19</td>
<td>3</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>
1.4 Occupational factors questions data summery

<table>
<thead>
<tr>
<th>Question Number</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>None</td>
<td>None</td>
<td>5</td>
<td>38</td>
<td>37</td>
</tr>
<tr>
<td>Agree</td>
<td>4</td>
<td>None</td>
<td>46</td>
<td>47</td>
<td>33</td>
</tr>
<tr>
<td>Neutral</td>
<td>62</td>
<td>66</td>
<td>37</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>Disagree</td>
<td>28</td>
<td>25</td>
<td>12</td>
<td>None</td>
<td>6</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>6</td>
<td>9</td>
<td>None</td>
<td>None</td>
<td>3</td>
</tr>
</tbody>
</table>
4. FINDINGS

The researcher wanted to identify are there some mental stresses affects to the job satisfaction of the employees. In order to measure this hypothesis the questions are asked based on the work related stresses. According to my survey I have found that there are various kinds of effects which bother employees’ work satisfaction. They are such as, busy work schedule, lack of some facilities, work turn over, some kinds of grievances, etc. They are affects both male and female employees in the company. And also I have found out that there are some symptoms can be seen in this company. They are such as, Absenteeism, escaping from work responsibilities, arriving late, leaving early, etc., Memory loss, Over-reacting, arguing, getting irritated, anxiety, etc. Deteriorating health, Improper eating habits (over-eating or under-eating), excessive smoking and drinking, sleeplessness, etc.

But also I could find that there are lots of arrangements to manage employees’ stress in this company. Such as, ShramasuwaRekawarana Hospitalization services, Permanent Disability Insurance Cover, Financial Grant for GCE (A/L) 2016 passed students (English/Sinhala/Tamil), Financial Grant for Year Five Scholarship 2016 passed students (English/Sinhala/Tamil), Day care facilities for employees’ children, Annual get-to-gathers, and Annual trips with their family members, Salary increments, Fair bonus, Other incentives and facilities, Medical allowances, Hospital coverage, Scholarships for employees’ children, Training programs for beginners, Have a fair and just distribution of incentives and salary structure, Promote job rotation and job enrichment, Create a just and safe working environment. However I have found that there is no any counseling process in this company. According to my opinion it is really important to have a counselor or counseling committee.

5. RECOMMENDATIONS

According this research main goal is to recognize stress factors which affect to employees in ETFB and their job satisfaction and through those surveys helps to increase their capacity of job satisfaction and motivation. Especially there is a clear guidance in this research that can be applicable in any organization. In this research I hope to emphasize about new recommendations on behalf of the wellbeing of this organization.

Ultimately, the primary goal in this research is to enhance workers’ job satisfaction by reducing stress and enhancing the employee’s well-being. However in this research my hypothesis become proved and there can be seen some employees who are facing with stresses, but not huge amount of employees. It is simply few employees who are suffering with stress. Most of the employees are in
the middle ranges. Those are merely normal condition which can be in day to day life. However through this research I expected to indicate some recommendations.

According to my survey I have recognized that there is no professional counselor to this company. Employee counseling is a very good strategy to overcome employee stress. Through counseling, employees can become aware of their strengths and how to develop those strengths; their weaknesses and how to eliminate them; and they can develop strategies for changing their behavior. Typically it is very important to have a counselor or counseling committee to help employees’ psychological problems, because of in modern developing society there are huge problems in everywhere that affects to humans’ wellbeing. Therefore it is important to have a counselor to help workers in the company.

According to my survey I have recognized there are some valuable facilities to employees’ wellbeing. Such as, Shramasuwa Rekawarana Hospitalization services, Permanent Disability Insurance Cover, Financial Grant for GCE (A/L) 2016 passed students (English/Sinhala/Tamil), Financial Grant for Year Five Scholarship 2016 passed students (English/Sinhala/Tamil), Day care facilities for employees’ children, Annual get-to-gathers, and Annual trips with their family members, Salary increments, Fair bonus, Other incentives and facilities, Medical allowances, Hospital coverage, Scholarships for employees’ children, Training programs for beginners, Have a fair and just distribution of incentives and salary structure. Those are very important to the employees’ job satisfaction. And also it is very vital if the organization will increase those facilities more on behalf of the employees’ job satisfaction.

According to my opinion I have some strategies and considerations regarding this employees’ wellbeing. Such as,

- Encouraging more of organizational communication with the employees so that there is no role ambiguity/conflict. Effective communication can also change employee views. Employers can use better signs and symbols which are not misinterpreted by the employees.
- Encourage employees’ participation in decision-making. This will reduce role stress.
- Grant the employees greater independence, meaningful and timely feedback, and greater responsibility.
- The organizational goals should be realistic, stimulating and particular. The employees must be given feedback on how well they are heading towards these goals.
- Encourage decentralization.
- Have a fair and just distribution of incentives and salary structure.
- Promote job rotation and job enrichment.
- Create a just and safe working environment.
- Have effective hiring and orientation procedure.
- Appreciate the employees on accomplishing and over-exceeding their targets.

As an organization these strategies will be vital to the employees’ wellbeing and development of the organization.

According to my research there are also some recommendations and considerations as an individually to develop employees’ wellbeing and satisfaction. Such as,

- The employees should make a “to-do” list daily, prioritize the acts in the list and plan the acts accordingly. Take regular breaks during work to relax you. By effective time management, the employees can achieve their targets timely and can meet work pressures and, thus, avoid stress.
- Do hard work. Strive to achieve your goals but do not do it to the harm of family, health, or peer.
- Indulge in physical exercises. It helps in effective blood circulation, keeps you fit, diverts mind from work pressures.
- Encourage a healthy lifestyle. Take a regular sleep, have plenty of water, have healthy eating habits. Promote relaxation techniques such as yoga, listening music and meditation.
- The employees should have optimistic approach about their work. They should avoid connections with negative approach employees.
- The employees should have emotional intelligence at workplace. They should have self-awareness, self-confidence and self-control at workplace.
- The employees should build social support. They should have close connections with trustworthy peer who can listen to their problems and boost their confidence level. This social network will help the employees to overcome stress.
- Employee counseling is a very good strategy to overcome employee stress. Through counseling, employees can become aware of their strengths and how to develop those strengths; their weaknesses and how to eliminate them; and they can develop strategies for changing their behavior. Employees are also given career counseling which helps in reducing their ambiguities with regard to career.
- Find a fun way to release stress, such as, cracking jokes, playing tennis, golf, etc.
➢ Do not remain pre-occupied with yourself. Turn your focus outwards. Help others. This will release some stress.

According to these things, organization can develop their targets. Employees’ can eliminate their stress problems and increase job satisfaction. These are really helpful to overcome any kind of problem. Finally we can evaluate these stress problems clearly and make employees ready to face those problems in work place. According to my hypothesis there are some stresses factors which affect to employees’ satisfaction can be recognized clearly. Those are simply depicted as day today stressors.

However according to this research above mentioned recommendations are really useful for any organization. It’s not merely for wellbeing of the employees; it is also useful for the development of organization’s wellbeing. Ultimately, the primary goal in this research is to enhance workers’ job satisfaction by reducing stress and enhancing the employee’s well-being.

According to my research hypothesis there are some stressed employees in this organization and they are merely limited amount of employees. And also through this research I have indicated most suitable recommendations to this organization and it will be vital to develop career progress of the employees too. Therefore finally by using these facts any employee can improve their wellbeing.

According to my point of view by using above mentioned recommendations employees can overcome their psychological problems in work place and improve job satisfaction. And also organizations also can develop. Therefore I think that this research will be a great influence to the employees and employers to their wellbeing.

6. CONCLUSION

The researcher’s aim is to find out the factors of the employer, employee work related stress for the improvement of job satisfaction in associate level employees. The study had been done by the researcher through a structured questionnaire.

A hypothesis which proved through the data analysis part which implies that there are some mental stresses affects to the job satisfaction of the employees. In the findings this has been clearly mentioned by the author and the recommendations given in order to enhance the employer employeejob satisfaction. With these recommendations it is clear that job satisfaction in associate level employees can be improved from the selected factors.

7. APPENDIX

Questionnaire

This questionnaire includes 25 questions and 5 options to select you to. These are very easy and simple for understanding. These five options are;

a) Strongly agree.

b) Agree.

c) Neutral.

d) Disagree.

e) Strongly disagree.

1. Not enough hours in the day to do all the things that I must do

2. My self-confidence / self-esteem is lower than I would like it to be

3. My body feels tense all over.

4. I have trouble falling asleep.
5. I feel fatigued or tired even when I wake after an adequate sleep
6. My appetites have changed, have either a desire to binge or have a loss of appetite / may skip meals
7. I experience mood swings, difficulty making decisions, concentration and memory is impaired
8. My sex drive is lower, can experience changes to menstrual cycle.
9. Increase in muscular aches and pains especially in the neck, head, lower back, shoulders
10. I find I have a greater dependency on alcohol, caffeine, nicotine or drugs
11. I find that I don’t have time for many interests / hobbies outside of work
12. I have some problems in my family
13. Trouble with boss.
14. Trouble with clients/customers
15. Trouble with work colleagues.
16. Job interfering with home/family life
17. I arrive at work late.
18. My emotions change unpredictably and without any apparent reason.
19. When I have an important personal problem I can't solve myself, I do not seek professional help.
20. “Employees in the organization have necessary authority to perform their duties effectively”.
21. “Organization organizes counseling programs for the employees regularly”.
22. “Employees get Appreciation and rewards if the desired work / targets are accomplished”.
23. “Welfare facilities provided to the employees by the organization are satisfactory”
24. Which of the following factors which motivates you most?
   a. Salary Increase
   b. Promotion
   c. Leave
   d. Motivational talks
   e. Recognition
25. Rate your Overall Satisfaction with your Job?

REFERENCE


12. Lyle H. Miller, PhD, and Alma Dell Smith, PhD, “Stress in the Workplace - American Psychological Association”, Available from: www.apa.org › Psychology Help Center


**Author**

**First Author** – Wasana Hansamali Wijenayaka, B. A special in Philosophy and Psychology, University of Sri Jayewardenepura
Abstract- Fire disasters have caused injuries, numerous deaths and extensive damages to homes and businesses. Despite various systems in place for household preparedness and survival, the effects of fire destruction still affect the economic and social fabric of the whole community. Preparedness and effective response reduces vulnerability from inevitable events of fire destruction. The purpose of this study was to investigate farmer's fire hazard preparedness and response in Mumias Sugar belt zone in Western Kenya. The proximity of sugarcane plantations in Mumias Sugar belt makes communities living in the zone vulnerable to fire destruction because of the dry sugarcane leaves that easily catch fire. The study adopted a cross-cultural study design. 384 farmers were selected through multistage random sampling and interviewed using questionnaires. Data obtained was analyzed using descriptive statistics and ANOVA with the aid of SPSS computer software program Version 18. Study findings revealed that 92.7% (357 respondents) had low levels of knowledge and misconceptions regarding fire disaster preparedness, whereas 66% (253 respondents) had a positive attitude towards fire preparedness programs. The study concluded that gaps in knowledge, misconceptions about fire hazard preparedness and mitigation as well as negative attitudes make the communities ill prepared to deal with fire disasters. The study recommends intensive education to members of the community to fill the gaps in knowledge and to correct the misconceptions noted. The education should be tailored to help improve on attitudes towards fire disaster mitigation and fire safety.

Index Terms- Fire Disasters, preparedness, Response, Community, Knowledge, Attitudes

I. INTRODUCTION

Worldwide, fire disasters cause injuries, numerous deaths and extensive damages to homes and businesses (World Fire Statistics Bulletin, 2012). Such fires may be caused by natural forces/processes known as natural disasters or by human actions such as negligence or errors commonly referred to as ‘anthropogenic disasters’. According to USAID (2012), fire destruction, as with most other natural disasters, is usually aggravated by anthropogenic activities; thus the fire hazards which are part of nature often turn into disasters due to human actions or inactions. Despite advances in knowledge and technology, vulnerability to and risks to fire disasters have been rising in both the developed and developing countries. Risks and vulnerability to fire disasters have resulted from changes of people’s lives socially, economically, culturally, politically and environmental contexts partly due to development as well as lack of development processes. However, according to Hemond & Robert (2012), sometimes man faces risks from such disasters because of lack of awareness of hazard in his environment.

Aspects leading to fire destruction are present almost everywhere ranging from wildfires caused by lighting or dropping of cigarettes outside on surfaces that are flammable, industrial accidents to earthquakes which have been known to cause damage of gas leaks leading to explosions and fires (Wisner et al, 2012). Fire destruction can also come from acts of arson and terrorism such as the September (2011) terrorist attack in the United States of America in which terrorists crashed planes into the world Trade Centre causing jet fuel explosion which set the twin towers on fire. Recent examples of fire as natural disaster (out-of-control wildfires) which caused death and destruction have been witnessed in Australia in 2009, in Russia in 2010, and virtually every year through different southern and western states of the United States and Mediterranean Europe. However, among the developed countries, USA has had a bigger share of fire disaster destruction.

The United States of America (USA) and Canada have recorded the highest absolute number of fire-related deaths in the world and fire death rates, generally 2 to 4 times those in Europe (Euro Fire Protection, 2012). The United States also has also recorded one of the highest per capita fire rate losses (Coppola, 2015). The cause of accidental death in the United States of America by fire is exceeded only by automobile collisions, falls and drowning (Coppola, 2015). Wildfire affecting urban and semi-urban areas is a phenomenon which deserves much greater attention than it has been given because of the dense population of people in these areas (ADPC, 2007).

In Africa, fires disasters have occurred virtually in all the Sub Saharan countries and several key sectors of the economy have been affected negatively. Kenya faces a rising degree of vulnerability to fire disaster risks ranging from loss of property worth billions of dollars to loss of lives. The frequency and magnitude of fires in Kenya has increased over the last few years making communities also more vulnerable (UNISDR, 2013). Several cases of fire incidences have previously occurred in Kenya with most of them being fatal. The more recent tragic cases include the 2009 fire in Nakumatt stores downtown.
Majority of fires in Kenya are started by people (Republic of Kenya, 2009). Of these fires, 40% were classified as due to arson, 20% are caused by negligence and carelessness, and 40% due to unknown causes (Republic of Kenya, 2009). Most cases of fire outbreak disaster in the communities are never reported. Communities in Kenya are predisposed to fire disaster destruction by a combination of factors such as poverty, settlement in areas prone to perennial fire outbreaks, areas with poor infrastructure and services such as the informal urban settlements, or even poorly constructed buildings.

This study sought to investigate community preparedness and response to fire disaster in the Mumias Sugar Belt Zone. The Mumias sugar belt zone is an area concentrated with sugarcane plantations and human settlement. Majority of the people in the Mumias Sugar belt zone are cane farmers. Both the farmers and nearby premises were included in the study. Fire outbreaks are among the greatest risks faced in this zone; such outbreaks may occur as a result of lightning strikes, accidents or arson. The numerous sugarcane plantations make communities living in this zone vulnerable to fire destruction because of the dry sugarcane leaves that easily catch fire. On several occasions, large hectares of cane plantations have been razed down and reduced to ashes in the Mumias Sugar-belt zone (G.o.K, 2011). The economic losses suffered by the residents, farmers and sugar millers are enormous. The sugar milling companies are forced to harvest premature burnt cane which has a smaller than normal yield, and in the process, disrupt harvesting operations and disrupting livelihoods. As a result, farmers and sugar factories incur huge economic losses. These fire disasters predispose community members to risks of poverty, injuries and even deaths.

Responses to these fire disasters have been disheartening. People appear to lack basic standards of professionalism; furthermore, the fire brigade units operate independently, without a coherent strategy or any central command (Kiveu, 2015). This situation is worsened by the fact that there are no standardized training programs in the country and that the National Disaster Operations Centre (NDOC) doesn’t have its own resources (G.o.K, 2012). This leaves communities vulnerable to fire disaster destruction. With so many accidental and non-accidental fires occurring in the zone, and the risks of large fire plantations which easily catch fire, safety from fire disasters is a concern.

It is still not clear how prepared people in the sugar belt zones are in dealing with the problem of fire hazards. Despite various systems in place for household preparedness and survival, the effects of fire destruction still affect the economic and social fabric of the whole community. Community preparedness and response to fire disasters is invaluable since the burden of care and support for affected people lies more on the community than any other agency. Community preparedness reduces vulnerability to losses that may result from inevitable events of fire destruction. Community participation and capacity are therefore critical in preparedness (Nelson, 2014). Moreover, Disaster Risk Reduction (DRR) also recognizes social and adaptive capacities of communities as critical components to successful preparedness against disasters. Knowledge of fire safety precautions, knowledge of what should be done in case of fire outbreaks are invaluable for planning the development of this area and for taking steps to protect individuals and their property from fire disaster destruction. The rationale here is that community preparedness, mitigation and management of fire hazards would minimize losses incurred from fire disasters and also save human lives.

II. MATERIALS AND METHODS

The study adopted a Cross-cultural research design that used both quantitative and qualitative data collection methods. Structured questionnaires and interview schedules were developed and validated in consultation with professionals from the Center for Disaster Management and Humanitarian Assistance of Masinde Muliro University. These instruments were pretested and necessary corrections made before embarking on actual data collection. The sample size was determined using the Fischer et al formula n=Z²pq/d² (Creswell, 2013) and a sample size of 384 obtained was used. 384 House Hold heads were randomly selected from the study area; in addition, 11 key informants were purposively selected for the study. The study proposal received approval of the National Commission of Science and Technology (NACOSTI).

The study site (Shibinga) was randomly selected by multistage random sampling from the three divisions of Mumias Sub County. Lists of all the Cane farmers contracted to Mumias Sugar Company within shibinga zone were obtained from the respective farmer zonal cane supervisors of the Mumias sugar company. The researcher then mapped and assigned numbers to the farmers list creating a complete list of all the farmers in Shibinga. This was done with the assistance of the various Zonal cane farmer supervisors and four research assistants. Ballot sheets were then assigned numbers corresponding to each farmer, from the first to the last in shibinga. Using the numbered ballot sheets, cane farmers were randomly selected and the selected farmer was interviewed. In situations where the farmer could not be reached (such as those who were in employment far away from their homes), the spouse of the farmer was considered as his representative and was subsequently interviewed. And in situations where the farmer or their representatives were available but not present at the time of the visit by the research team, appointments were booked and two follow up visits made to meet the respondent. Fortunately, upon the two revisits, these respondents were traced and interviewed. Using this procedure, 301 male and 83 female respondents were interviewed. In addition, 11 Key informants and 11 observation checklists were also used to collect data. A summary of data collection methods adopted in the study are presented in Table 1 below.

www.ijsrp.org
Table 1: Data collection Methods adopted for a study on fire disaster preparedness and response in the Mumias Sugar Belt Zone, Kenya

<table>
<thead>
<tr>
<th>Study population Unit</th>
<th>Sampling Method</th>
<th>Sample Size</th>
<th>Data collection Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers</td>
<td>Multistage Random sampling</td>
<td>384</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>Key Informants</td>
<td>Purposive</td>
<td>11</td>
<td>Interview Guide</td>
</tr>
<tr>
<td>Buildings</td>
<td>Purposive</td>
<td>11</td>
<td>Observation checklist</td>
</tr>
</tbody>
</table>

Data for this study was collected during the month of August, 2012.

SPSS for windows version 18.0 - Computer software program was used for coding, entering, and cleaning of quantitative data obtained from questionnaire respondents. Coding was done using the data editor in SPSS to allocate each variable a numerical value, for example, 1 for male and 2 for female. The data was then sequentially entered for each respondent. Cleaning of the data involved cross checking each answer for any inconsistency and running through the SPSS data viewer for any gaps and inconsistencies. Frequency distributions and descriptive statistics of scores were then obtained and their meanings derived. Chi-square tests of independence and Analysis of Variance (ANOVA) were used to check for any significant differences between variables of interest. Spearman’s rho correlation coefficients between the different variables with attitude were also determined. This particular statistic was used because it does not assume a linear relationship between variables and is indicated for ordinal data.

To determine the level of Knowledge on fire preparedness, respondents were asked a series of specific questions on fire preparedness. These questions tested on the cause of fire disasters, Fire safety precautions, knowledge different types of extinguishers, knowledge of how to use different types of extinguishers, knowledge of practices used to prevent fire out breaks, knowledge of where and how to report fire outbreaks. Responses to these question items were scored. A correct response was assigned a score value of 2, while an incorrect response was scored as 0. The result was a scale for knowledge on fire hazard preparedness with scores ranging from 0 (the lowest level of knowledge) to 40 (the highest level of knowledge). For the purpose of easy comparison, these scores were also expressed as percentages. Level of Knowledge on fire preparedness was determined using a scale.

Using the knowledge scale, the cumulative score for responses for each respondent was then computed. It was established that respondents attained scores ranging from 10 (25 %) to 24 (60 %) with a mean score of 12 (30 %) and a standard deviation of ± 3. From these scores, the level of knowledge was then categorised as follows; Respondents with high level of knowledge – these were respondents who had attained a score of at least 20 i.e. ≥ 50% on the scale for knowledge. Respondents with low level of knowledge - these were respondents who had attained a score less than 20 i.e. < 50% on the scale for knowledge.

To determine the attitudes of the respondents, two sets of analysis were carried out to illicit association between attitude and key variables. First, attitude towards fire hazard preparedness and programs on fire safety was determined from respondents feelings on a 5 point Likert scale of responses i.e. ‘strongly disagree’, ‘disagree’ undecided’, ‘agree’ and ‘strongly agree’. Analysis was by determining score values for responses in agreement with the positive attitude to the question asked. Responses were scored as follows; strongly agrees or Agrees was assigned a score of 2 points; while responses in disagreement with the positive attitude were scored as follows; strongly disagree/ disagree/undecided was assigned a score value of 1 point. The result was an attitude scale with scores ranging from 10 points (very poor attitude) to 20 points (most favorable attitude). A score of 15 (60 %) was used as the cutoff point to determine the type of attitude each respondent had.

Using this scale, the cumulative score for responses for each respondent was then computed. It was established that respondents attained attitude scores in the range from 12 to 18 with the mean score at 16 points (a score of 60%). Respondents were then grouped into two categories as follows; Respondents with positive attitudes – These were respondents who had attained a score of at least 15 points on the attitude scale i.e. agreed with at least 60% of the statements of positive attitude towards fire safety and fire hazard preparedness; Respondents with negative attitude - These were respondents who attained a score less than 15 points on the attitude scale i.e. disagreed with at least 60% of the statements of positive attitude towards fire safety and fire hazard preparedness.

The last section of analysis involved scores using a checklist for preparedness of premises and buildings in the study area.

III. STUDY FINDINGS

Socio-demographic characteristics

Results showed that 301 (78%) of the respondents were male while 83 (22%) of the respondents were female. There was significant variation in the gender distribution (Pearson Chi $\chi^2$, 0.01=9.00; P<0.01); thus, the larger proportion of the respondents was males and therefore controlled most of the households or farms. The age of the 384 farmers was as follows; 73 (18.90%) were aged 18-25 years; 53 (13.80%) were 26-32 years; were 33-40 (46.80%) and 41 years and above were 68 (17.70%). A chi square test of independence conducted on age distribution of the respondents showed a significant (p>0.05) distribution of age (Pearson Chi $\chi^2$, 4, 0.05 =36.69). A fairly large proportion (80.4%) of the respondents can be described as small scale farmers because they have 1-6 acres under cane. A chi square test of independence conducted on the distribution of acreage of land owned under cane plantation showed that there was nonsignificant variation (P<0.005) in the distribution of land acreage(Pearson Chi $\chi^2$, 24, 0.05=8.57). Ownership of acreage of land under sugar cane plantations was determined by the gender of the respondents, with 12 of the male respondents owning 12 acres and above acreage of land under canes as compared to only 1 of the females in the same.
Knowledge on fire disaster preparedness

Results showed that a majority (92.9%) of the respondents had a low Level of knowledge on Fire hazard preparedness (Table 2).

Table 2: Levels of Knowledge regarding fire disaster preparedness and response in the Mumias Sugar Belt Zone, Kenya

<table>
<thead>
<tr>
<th>Levels of knowledge</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents with high levels of knowledge</td>
<td>357</td>
<td>92.9%</td>
</tr>
<tr>
<td>Respondents with low levels of knowledge</td>
<td>27</td>
<td>8.1%</td>
</tr>
<tr>
<td>TOTALS (N)</td>
<td>384</td>
<td>100%</td>
</tr>
</tbody>
</table>

These findings agree with study findings by Kiveu (2015) which reported poor fire preparedness knowledge levels among residents of Kisumu. Further analysis of responses on knowledge questions revealed differences and gaps in knowledge on issues related to fire hazard preparedness. Differences are noted when we compare knowledge for the variables gender, level of education and age of respondents.

Generally, both the male and female respondents displayed poor knowledge regarding Fire preparedness. These findings agree with study findings by Woodrow (2012) which reported poor no similar perceptions about fire safety among the different gender. The only observable differences on knowledge across gender are on issues of knowledge of using fire extinguishers. Table 3 below summarizes the differences noted on knowledge across the variable gender.

Table 3: Differences in Knowledge on fire disaster preparedness across gender in Mumias Sugar belt Zone in Western Kenya

<table>
<thead>
<tr>
<th>Variable.</th>
<th>Frequency of correct responses</th>
<th>Level of significance on difference. (p-value at 0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males (n=301)</td>
<td>Females (n=83)</td>
<td></td>
</tr>
<tr>
<td>Knowledge on using Fire Extinguishers</td>
<td>90 (30%)</td>
<td>10 (12%)</td>
</tr>
<tr>
<td>Action to take in case of a fire outbreak</td>
<td>60 (20%)</td>
<td>12 (13%)</td>
</tr>
<tr>
<td>Knowledge on basic fire safety precautions</td>
<td>54 (18%)</td>
<td>6 (2%)</td>
</tr>
</tbody>
</table>

Table 3 revealed that male respondents were more knowledgeable than their female counterparts in the issues of fire safety, causes of fire outbreak and knowledge of using fire extinguishers. These differences are significant; however, the percentages scoring correct answers were very low.

When the average scores of knowledge were cross tabulated with level of education, it appeared that the respondents with university level of education had better knowledge levels than the rest with the highest (60%) answering correctly the knowledge questions. The respondents with secondary school level of education come second with 43% answering positively. The primary level graduates came third in the knowledge aspects (37%) while the respondents with no formal education were last with an average score of 7 %. This finding reveals that level of education is an important factor in fire preparedness. This perhaps is because some lessons are taught in school about fire safety.

The pattern observed from the results was that knowledge on fire preparedness increased with age as the oldest respondents (over 45 years old) also had the highest average of positive answers to the questions of knowledge (57%). The youngest respondents had the lowest average level of knowledge (43%). This finding agrees with study findings by Thomas (2012) which reported that older persons in rural South Africa were more knowledgeable on fire safety issues.

The study also sought to establish perceptions by cane farmers on the risk of fire disaster outbreak. Table 4 below presents a summary of the findings.

Table 4: Cane farmer Perceptions of the risk of fire outbreak in sugar cane farms in the Mumias Sugarbelt zone

<table>
<thead>
<tr>
<th>Perception</th>
<th>High Risk%</th>
<th>Moderate Risk%</th>
<th>Low Risk%</th>
<th>No risk%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>276 (71.9%)</td>
<td>15 (3.9%)</td>
<td>7 (1.8%)</td>
<td>3 (0.8%)</td>
<td>301</td>
</tr>
<tr>
<td>Females</td>
<td>57 (14.8%)</td>
<td>20 (5.2%)</td>
<td>5 (1.3%)</td>
<td>1 (0.3%)</td>
<td>83</td>
</tr>
</tbody>
</table>

Source: Field Data, (2012)
Table 4 revealed that majority of the respondents (86.7%) were well aware of the potential risk of a fire outbreak in their home environment. This finding agrees with study findings by Kiveu (2015) which reported that more people in Kisumu were well aware of the potential risks of fire outbreaks in their communities. 9.1% of the respondents perceived the risk of fire outbreak as moderate, while only 16 (4.2%) respondents either perceived it as low risk or no risk at all. However, it is also emerged from the data that male respondents perceived the risk of fire outbreak as more likely than their female counterparts.

**Attitudes towards fire disaster preparedness and programs on fire safety**

Results showed that two-thirds 253 (66%) of the respondents held positive attitude towards fire safety and fire hazard preparedness (Figure 1).

![Figure 1: Attitudes towards fire safety and response in Mumias Sugar belt Zone.](source_field_data_2012)

Further analysis revealed varied opinions on certain issues key to fire safety and fire hazard preparedness. Both male and female respondents held similar feelings regarding fire safety and fire hazard preparedness. There were only a few differences in as regards feelings on fire safety and fire hazard preparedness. Table 5 below summarizes the main observable differences in feelings noted.

| Table 5: Differences in Attitude on fire safety and fire disaster preparedness across Gender |
|----------------------------------|----------------------------------|----------------------------------|
| Variable.                        | Frequency of positive attitude responses | Level of significance on difference (p-value at 0.05) |
| Attitude statement that:-        | Males. (n=301)                      | Females. (n=83)                   |
| Everyone should create time to learn about fire safety | 202 (67%) | 72 (87%) | .005 |
| Fire safety should be introduced in school as part of the curriculum | 213 (71%) | 72 (87%) | .013 |

Source field Data, (2012)
Table 5 reveals that male and female respondents differ in opinion about the three attitude variables regarding fire safety and fire hazard preparedness. Female respondents appeared more willing to create time to learn about fire safety and would be more willing to attend fire drills. These differences across sex are however, not strongly significant. Similar study findings were reported by Mahendra (2011) which reported that women in agricultural rural zone were more willing to create time for lessons on disaster preparedness.

There wasn’t much difference between people with a higher education and those with a lower education over some of their attitude and Perceptions about fire safety and fire hazard preparedness. Higher education here implied having at least secondary school education. The differences noted were summarized in table 6 below.

**Table 6: Differences in attitude on fire safety and fire disaster preparedness across levels of education**

<table>
<thead>
<tr>
<th>Variable.</th>
<th>Frequency of positive attitude responses</th>
<th>Level of significance on difference ( (p\text{-value at 0.05}) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>I’m willing to pay for lessons on fire safety.</td>
<td>200 (72 %)</td>
<td>104 (96 %)</td>
</tr>
<tr>
<td>I’m willing to spend money on fire safety equipment.</td>
<td>200 (72 %)</td>
<td>99 (92 %)</td>
</tr>
<tr>
<td>I would create time to attend fire safety lessons</td>
<td>136 (50 %)</td>
<td>83 (77 %)</td>
</tr>
</tbody>
</table>

It is notable from Table 6 above that more people with a higher education are willing to pay for lessons on fire safety. This same pattern applies to spending money on fire safety equipment and creating time to attend fire safety lessons. These differences in feelings across education are quite significant.
The second part on analysis of attitude aspects involved using Spearman’s rho correlation coefficients for the different aspects of attitude with the independent variables; age, sex, level of education and employment status were determined. The highest correlation (0.191) was found in the category of employment status and creating time to learn about fire safety. People in formal employment are less likely to create time to learn about fire safety. This study finding agrees with study findings by Hemond & Benoit (2012) which reported that formal sector employees were less likely to create time to attend to fire preparedness lessons and drills. Among the demographic factors, Gender emerged as the least important with small correlation coefficients between gender and the attitude measures (P<0.05).

IV. DISCUSSION AND CONCLUSION

Generally, the level of knowledge about fire disaster preparedness recorded for members of the study community was low. This low level of knowledge can be attributed to lack of awareness campaigns in this community. There is need for community members to be exposed to fire safety campaigns through the media, seminars or trainings. Gaps in knowledge and certain misconceptions about fire hazard preparedness were evident. Men were significantly more knowledgeable than women on certain issues on fire safety (p-Knowledge on using Fire Extinguishers001. Action to take in case of a fire outbreak) probably because men are regular attendants of social gatherings such as public Gatherings (Baraza’s) where this information is often delivered; and also because men get more information for listening more to the Radio. Higher levels of education (secondary and tertiary) are linked to better knowledge on fire disaster preparedness this is probably because people with higher education levels can easily comprehend some ‘difficult’ aspects about fire safety. Gaps in knowledge and misconceptions noted could be an indicator that certain aspects about fire safety are still difficult for some community members to comprehend; but could also be a reflection of lack of related information fire disaster mitigation.

Gaps in knowledge and misconceptions such as those revealed in this study have clear negative implications and reduce the potential to mitigate fire disasters in a sizeable population of the community. For instance, community members who do not know the difference where to give information in case of a fire disaster outbreak leave the community in a vulnerable position from fire destruction. Similarly, failure by some community members to understand on basic fire safety precautions makes them vulnerable.

The study population held varied attitudes towards fire disaster preparedness and programs to prevent fire outbreaks.

Source field Data, (2012)

Figure 2: Differences in attitude on fire safety and fire disaster preparedness across different levels of Education
Based on the study findings, attitudes towards programs on fire safety can generally be described as poor. Key issues necessary for fire preparedness and safety scored poorly.

Higher levels of education (secondary and tertiary) are linked to positive attitudes about and programs fire disaster preparedness and programs to prevent fire outbreaks is probably because people with higher education levels can easily comprehend some difficult aspects about fire disaster mitigation. Thus they can therefore give correct or expected views.

Attitude towards fire disaster and Programs to prevent fire outbreak has important implications because attitude has a major influence over behavior whether

This study has shown that the people living in sugar belt zone and non-industrial premises in Mumias Sugar Belt zone are ill prepared to respond to a fire hazard. Mumias Sugar Belt zone, being a fast growing region in terms of population size is fairly representative of the situation in other towns in the country. There is a general lack of awareness on fire hazards in the working environments. This leads to a poor attitude and practice among farmers. Fire safety knowledge, attitude and practice among the people are not optional, as this may be the difference between life and death in many fire incidents. Ignorance and apathy of the administrators, compounded by lack of funds constrain the enforcement of the existing legislation. Inadequate staffing and poor or no training of fire service providers make a bad situation worse.

REFERENCES


AUTHORS

First Author – Mukhwana Laura Nasimiyu, Masinde Muliro University of Science and Technology, Kenya

Second Author – Wakhungu, J.W, Center for Disaster Management and Humanitarian Assistance, Department of Disaster Management and Sustainable Development, Masinde Muliro Universityof Science and Technology, Kenya

Third Author – Omuterema ,S., Center for Disaster Management and Humanitarian Assistance, Department of Disaster Management and Sustainable Development, Masinde Muliro Universityof Science and Technology, Kenya
Theory of Securitization to Counter Ebola: The Nigerian Approach

Tasew Tafese
tasew21@gmail.com
Institute for Peace and Security Studies (IPSS), Addis Ababa University, Ethiopia

Abstract

The 2014 outbreak of Ebola Virus Disease is one of the zoonotic diseases\(^1\) that become health security threat for international community. It affected Guinea, Liberia, Sierra Leone, Nigeria, Senegal and Mali in West Africa and also USA and Spain outside of Africa. However, in Africa, Nigeria and Senegal securitized it successfully, but others not potentially contained it in time. This paper will be evaluated theory of securitization based on the Nigerian approach and highlighting the lessons that others affected countries could learn from the Nigerian approach and how to protect in the future. In light of this understanding, the paper will be discussed the military and nonmilitary issues of security studies, the Nigerian situation and history of Ebola as background; Ebola as health security threat, the Nigerian approach, the Copenhagen Schools theory of securitization, the Nigerian securitization framework and major lessons.

Key Words: Ebola, security, theory of securitization, Nigerian approach, zoonotic disease.

1. Introduction

"Security studies represent the core of International Relations, predominantly dealing with issues of war and peace" (Šulović, 2010:1). Following WWII, security studies have became a synonym for strategic studies with distinct focus on the military sector. However, gradually different new security challenges emerged like growing complexity of international relations, rise of economic and environmental challenges, new international relations' actors, and nonmilitary security issues. Thus, security studies were begun at the end of Cold War. Accordingly, in the late 1980s, it has rapidly developed from war and peace threats into international security (Seniwati, 2014). In such understanding, Buzan, Waever, and de Wilde (1998) argued that security can be broadened to include other threats beyond the traditional military and political domain. In the traditional domain, security studies didn't paid attention for nonmilitary threats. However, according to Walt (1991:213), "issues such as pollution, disease, child abuse, or economic depressions could all be viewed as threats to security." Hence, security threats do go beyond military threats and include poverty, economic inequality, disease, human rights abuses, and natural disasters.

The United Nations has acknowledged the widening of the concept of security by identifying new security threats, such as poverty, infectious disease and environmental degradation, and war and violence within states (UN Department of Public Information, 2004:11). Recently, international communities have also started to pay attention for health issues as a security threat. For instance, according to Centers for Disease Control and Prevention (CDC) and EU (2011), Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS), Anthrax, Sever Acute Respiratory Syndrome (SARS), and Highly Pathogenic Avian Influenza (HPAI) seemed to confirm the need to approach health from security perspectives. In 2014, Ebola Virus Disease governs the attention

---

\(^1\) Zoonotic diseases are contagious disease that spread between animals and humans.
of international communities as a major health security threat. In this regard, the spoke of Margaret Chan, the director general of WHO, "a threat to national security well beyond the outbreak zones", and the US president Barack Obama, "a growing threat to regional and global security (2014)"; reflect how much health issue become security threat. Consequently, the spoke of UN Secretary-General Ban Ki-moon on 18 September 2014, "the gravity and scale of the situation now requires a level of international action unprecedented for an emergency", attested the concern of international communities, regarding health as security issue to be free from threats, as Buzan's (1991:18) definition, "security is pursuit of freedom from threats." Therefore, this paper is evaluated theory of securitization based on the Nigerian approach to counter Ebola and highlighting the lessons that other affected countries could learn from the Nigerian approach.

2. Background of the Study

2.1 General Feature of Nigeria

West Africa has had good experience for the largest Ebola outbreak in History. Nigeria is one of the West African countries that exposed for zoonotic disease. "It has Federal state structure consists 37 regional states including 774 government authorities" (Okello, Welburn and Smith, 2014:4). In the Federal Government, Ministry of Health and Ministry of Agriculture worked in collaboration to prevent zoonotic disease. Both are represented down to the local government authority level.

Nigeria’s Federal Structure has shaped the delivery systems for both human and animal health with federal, regional and local government. According to Olaniyan and Lawanson (2010), the three levels of government are involved to various degrees in the delivery, management and financing of health. The setup for human health, although not recognized by law, is the responsibility of the federal government as tertiary health care, whilst the state and local government authorities coordinate health services at secondary and primary levels (Ibid). In the animal health sector, including trans-boundary animal diseases are controlled and coordinated at the state level under federal law. For instance, in 2006 the Nigerian Federal Government received $50 million credit from World Bank to protect HPAI in commercial poultry farm in Kaduna State (Okello, et al., 2014). Although, according to World Bank² (2014) figures from 2009-2013, the Nigerian government health expenditure is better than other West African countries. Thus, all these indicated the Nigerian potential to prevent zoonotic diseases; which are contagious disease spread between animals and humans.

2.2 Brief History of Ebola Virus Disease (EVD) Outbreaks

Ebola is a zoonotic disease that transmitted by virus from animals to human; and human to human via body contacts. Scientifically, Ebola belongs to Filoviridae virus family. According to WHO (2014)³, Filoviridae virus family has three classifications. They are Caevavirus, Marburgvirus, and Ebolavirus. Ebolavirus was first emerged in 1976 in the Democratic Republic of Congo; in the community near to "Ebola River"⁴, and in Sudan (Johnson, et al., 1977; WHO, 1978⁵). The outbreaks involved what eventually proved to be two different species such as Zaire and Sudan; and sources were detected in fruit bats in Africa. In 1977 it appeared in DRC, and also 1979 in Sudan.

⁴ Ebola River is found in DRC, that the first place of Ebola virus disease emerged and took its name from the specific place.
Ebola reappeared in 1989 in Reston, Virginia, primate facility outside of Washington DC. It was appeared in monkeys imported for research. However, its trait was different from the previous species (Jahrling, et al., 1990; Peters, et al., 1991). In 1994 Ebola virus again appeared in Gabon and Cote d'Ivoire. The Gabon case was related with Zaire Ebolavirus, whilst in Cote d'Ivoire, at Tai Forest national park, had new feature. Ebola virus also reappeared in 2007 in Uganda, Bundibugyo (WHO, 2014), however, it has different trait from others.

Generally, since 1976 to 2014 EVD appeared in West Africa (DRC, Gabon, Congo, Guinea, Liberia, Sierra Leone, Nigeria, Senegal and Mali); East Africa (Uganda and Sudan); South Africa, Johannesburg; North America, USA; and Europe, Spain. According to WHO's (2014) data\(^6\), until 2012 the first largest outbreak of EVD was in the DRC during 1995 and 2007. The second largest outbreak was in Uganda during 2000 and 2007. The third largest outbreak also in Congo by 2003. However, different sporadic outbreaks were recorded until 2012 (Amman, et al., 2012; Albarino, et al., 2012). Therefore, from 1976 to 2012, according to WHO (2014), scientifically five Ebola virus species were identified. They are Zaire, Sudan, Bundibugyo, Reston and Tai Forest. The first three are repeatedly appeared in Africa.

### 3. Ebola Virus Disease as Health Security Threats

Health and security are historically not associated from a policy, legal and practical point of view but formed part of different policy realms. This perception changed gradually and international community's start to pay attention for health as a security issue. This is because zoonotic diseases have political instance and affect world security. For example, recent epidemics emerging zoonoses such as Anthrax in the USA in 2001, SARS in 2003 and HPAI since the late 1990s seemed to confirm the need to approach health from security perspectives and have resulted in mass political action, international advocacy and funding in a 'One Health' frameworks (CDC and EU, 2011).

On the other hand, the UN Secretary-General provided a panel discussion in 2004 by the High-level Panel on "Threats, Challenges, and Change". The Panel’s report states that "…any event or process that leads to large-scale death or lessening of life chances...as basic unit of international system is a threat to international security."\(^7\) The other event that divert the attention of international community from military to nonmilitary issues was the political dynamism towards zoonotic disease control under 'One Health' in 2005 (BBC, 2005). According to Scoones and Foster (2007), the political intention towards zoonotic disease was increased since 2005 under 'One Health' movement. As such, zoonotic disease has been politicized and became health security threats since 2005 after David Nabarro’s terrible warning that essentially reframed the HPAI policy debate. Therefore, the 2008 multi-partner "One World, One Health: A Strategic Framework"\(^8\) is a striking example of the 'significant policy shift'.

Although, the outbreak of Ebola since 1976 become another health security threat for international community. Its fatality rate increased and WHO worried on its sporadic outbreak. Previously, international community's did not paid attention for it, however, the 2014 outbreaks become worst and govern their attention followed by HIV/AIDS. Consequently, the Security Council provided an emergency meeting on 18 September 2014 and adopted a "Resolution S/RES/2177/2014"\(^9\), which declared the unprecedented extent of Ebola hemorrhagic fever outbreak in Africa as a threat to international security. Therefore, resolution S/RES/2177/2014 represents the symbolic culmination of an increasing process of securitization. Besides, "the statements"\(^10\) made by member states upon the adoption of resolution reveal a high degree of endorsement of the Council’s determination that Ebola outbreak constitutes a threat.

---


\(^7\) Report of the High-level Panel on Threats, Challenges and Change’ UN Doc A/59/565 (2 December 2004).


www.ijsrp.org
Generally, sporadic epidemic disease like EVD, currently control the international media and international communities as a serious global health security threat. For this reason, international communities have been started to pay attention for health as global security issues equivalent with nuclear weapons, terrorism, and civil war. This is because EVD can affect the socioeconomic and political life of everyone regardless of border, wealth, status, color, age, gender, and etc.

4. The Nigerian Approach to Counter Ebola

According to CDC (2014)\textsuperscript{11}, Nigeria's success story was due to her strong Emergency Operations Center (EOC) and Polio eradication experience. The Nigerian EOC was established after the first case of EVD confirmed in Guinea. This indicates that Nigeria was ready to contain any trans-border diseases. Therefore, to counter Ebola the Nigerian government design its own approach. The major strong way of their approach can be simplified into the following steps after they confirmed the first case in Lagos.

1. The Nigerian Government recognized Ebola as existential threat in the highly populous city of Lagos. Immediately after the first case confirmed, the Nigerian government took three rapid actions with public speech: a) organize the Federal Government, the Lagos State and Local Government; b) the president declared public health emergency; and c) mobilize the human, financial and material resources.

2. The Nigerian government gave credit for Ministry of Health and other relevant institution's leaders that come together to develop one common plan. Such as Minister of Health, Governor of Lagos and Project director of Nigeria Center for Disease Control (NCDC) are coming to work together.

3. The Nigerian government strengthened the Emergency Operation Center (EOC). Then, EOC became an operational organ of the NCDC. EOC developed its structure based on six different teams: epidemiology/surveillance team, case management team, point of entry team, communication and social mobilization coordination team, logistics team, and management/coordination team. The EOC coordinator provided the functions of each team based on one common plan and operates using close approach within a designated facility. The government also invite international actors to work together like the WHO, UNICEF, Doctors without Borders, US/CDC, MSF, and Red Cross. All internal and external security actors agreed on one plan and implement it in a way that emphasize on efficiency and accountability based on a clear understanding to deliver on specific tasks.

Therefore, the Nigerian government apply intensive and close approach to contain the spread of Ebola under Ebola Emergency Operation Center (EOC). Such intensive and close approach of Nigeria reflects the concept of securitization theory. So, there is a situation whereby government and international actors agreed on the strategies and develop one plan to implement together. In this circumstances, through their intensive and close approach, the Nigerian government and the audiences agreed on the identified existential threat; and actively move to contain the spread of Ebola with three important promises:

1. Fast and thorough tracing of all potential contacts;
2. Ongoing monitoring of all of these contacts;

5. Theory of Securitization: the Nigerian Approach Perspectives

\url{www.ijsrp.org}
Securitization was first articulated in a working paper of Waever in 1989 and further developed in *Securitization and Desecuritization* (1995). Consequently, theory of securitization was developed by the Copenhagen school, originally consisting of Buzan, Waever and de Wilde (1998). This school contributed to security studies by broadening security issues beyond the traditional military and political sectors; and include non-state actors as agents of security with human beings as the referent object besides the state. In this understanding, security exists on a spectrum, from non-politicized to securitized issues.

![Securitization Spectrum](image)

- **Non-politicized**: The state doesn't cope with the issue; The issue is not included in the public debate.
- **Politized**: The issue is managed within the standard political system; It is part of public policy, requiring government decision and resource allocation or more rarely, some form of communal governance (Buzan et al., 1998:23).
- **Securitized**: The issue is framed as a security question through an act of securitization; A securitization actor articulates an already politicized issue as an existential threat to a referent object.


The Copenhagen School broadly understands non-military security threats, like health, appears in public space as security agenda. As such, securitization refers to the process through which an issue is labeled a security issue by an elite actor, a process which moves the issue out of normal political sphere. According to Waever (1995:55), "labeling something a 'security' issues affects policy and as such 'security' is a 'speech act'." According to securitization spectrum, Ebola is an existential threat in Nigeria and framed as a security question through an act of securitization. Thus, by speaking 'security', the securitizing actor moves the issue out of regular policies into the security sphere, thereby legitimizing the use of extraordinary measures to deal with the threat for a successful securitization.

Accordingly, "successful securitization consists three elements such as existential threats; emergency action; and effects on inter-unit relations by breaking rules" (Buzan et al., 1998:26). Therefore, to securitizing the issue, in the 'speech act', audience take the major share, however, the Copenhagen School's conceptualization of the audience in securitization process is vague. To solve this, Balzacq (2005) reformulates the assumptions of securitization in such a way as to give the audience a central role. In line to this reason, in order to mobilize the audience towards the identified threat, the securitizing actors should target the audiences interest, feeling and experiences during the 'speech act' in their language. In this regard, Özcan (2013:62) states that:

securitization is a 'speech act' refers to the process, in which an issue is presented as an existential threat, requiring emergency measures and justifying actions beyond the normal bounds of political procedure. Accordingly, securitization normally only occurs if the 'securitizing actor' indicates an 'existential threat' and perceives a way out through 'extraordinary measures', substantially highlighting 'the speech act' towards 'the audience'.

[www.ijsrp.org](http://www.ijsrp.org)
According to Özcan (2013), this represents the clearest example of the securitization process as shown below.

**Figure 3. Process of Securitization**


According to Buzan, et al., (1998:21), "security is about survival" and from this understanding a matter is presented as "posing an existential threat to a designated referent object", comprised of government, territory and society. As such, contained Ebola is a survival question for Nigerian and they move towards such existential security threat. In this case, they are formulated the three key facilitating conditions for successful securitization such as the speech act emphasizing priority, urgency and survival; the securitizing actor being in a 'position of authority' to maximize audience acceptance; and the future of the alleged 'threats'. Based on this understanding, the Nigerian president made public speech about the confirmed case of Ebola and declared public health emergency. This speech act and declaration provoked the Nigerian audiences to realize the future effect of Ebola in the populous city, Lagos. This led them to successful process of securitization and contained Ebola through "a war-room" approach.

6. The Nigerian Securitization Framework

According to Buzan, et al., (1998:27), "a successful process of securitization results in an issue being framed in such a way that 'emergency measures' are deemed acceptable and necessary to deal with the threat in question." In Nigeria, the government aware about Ebola and identified it as an existential threat being to be framed.

**Figure 4. Nigerian Government’s Securitization Approach Framework**

(This model is developed by the author to clarify the Nigerian approach to contain Ebola through the concept of the Copenhagen School’s theory of Securitization.)
According to the three steps of securitization theory, Ebola is an existential threat for Nigeria. Therefore, the Nigerian government identified this existential threat and took rapid action to galvanize the people for the sake of successful securitization. Thus, the Nigerian "a war-room" approach was a timely response to contain Ebola. Although, as it was confirmed by their doctor, that Sawyer affected by Ebola, the Nigerian government concerned to the issue and give rapid response for health sectors. For instance, Ministry of Health and Lagos State were started to work together; the president declared public health emergency; mobilize human, finance and material resources; high officials follow up and organized health command post with ongoing monitoring of the campaign in each center of isolation camp; health workers intensively treat the infected people in collaboration with local communities and international actors; and break the normal rule of bureaucracy. In such strong national campaign, they have understanding and common goal among the government actors, audiences and international actors; and finally WHO declared Nigeria free from Ebola. All these resulted that under the process of securitization through "a war-room" approach, the Nigerian government built trust among health workers and local communities.

**Nigerian intensive and close approach**

![Diagram showing the steps of the Nigerian approach](image)

Therefore, the Copenhagen School places considerable importance on the securitizing agent's "speech act," and deems it the starting point in the process of securitization in Nigeria. Accordingly, successful securitization is a matter of establishing an intersubjective understanding between the agent and audience about the existential nature of threat; as what done in Nigeria.

### 7. Lessons from Nigerian Approach

"Actors in a position of power are more likely to be successful in securitizing by virtue of the added legitimacy of their position, though this does not guarantee that the audience will accept the securitizing move" (Buzan, et al., 1998:31). However, according to Waever (1995), when the elites declare an issue as security threat, it can be a security issue. Therefore, it is important to note the role of audience in securitization, as an issue only because securitized once the audience accepted a securitizing move as valid. Thus, to avoid the rejection of audience, the security actors should be sure how much the audience accept the issue as an existential security threat.

As such, the Nigerian government pay attention for Ebola as an identified existential threat and galvanized all resources to securitized in its own legitimate position. For successful securitization, the Nigerian government take the lion share to contain Ebola. Such national campaign of the government inspired the people to care of Ebola and aware how they protect themselves. The Nigerian approach is well organized and structured. Actually, Nigeria has better economic development and resources to finance for the campaign, well trained and skillful health workers that can prevent the trans-border zoonotic disease and epidemic disease like Polio than other West African countries. However, other affected countries also can control Ebola with the support of international communities with formal and structured base of prevention like Nigeria.

Therefore, the most affected countries in west Africa and other potentially exposed countries can learn from Nigerian "a war-room" approach to counter Ebola. Nigeria assured that EVD can defeat and indeed manage any sporadic disease outbreak with adequate preparedness, effective coordination, rapid action and cohesive teamwork. For such kind of sporadic disease, dalliance by
itself affect many things and positive mind, sincerity, rationality, and breaking normal bureaucratic rules without political and social differences are very important. Nigerians also provide community awareness about the disease, symptoms, treatment, contact tracing, isolation and burial ceremony. They provide well structured roadmap which suitable for international supporters. All these organized systems are important to end Ebola virus and other affected countries can learn from Nigerian successful approach.

Conclusion

Ebola hemorrhagic fever is one of the zoonotic disease emerged in West Africa since 1976. The 2014 outbreaks are worst and affected Guinea, Liberia, Sierra Leone, Nigeria, Senegal, and Mali in West Africa; USA and Spain outside of Africa. Among those affected countries, Nigeria, Senegal, USA and Spain were successfully contained its spread, whilst the rest are not yet. The Nigerian government successfully contained Ebola through intensive and close approach with the concept of the Copenhagen School's theory of securitization. Under their securitization approach, the Nigerian government followed the three successful securitization process like identifying an existential threat, emergency action and inter-unit relations by breaking rules. Thus, theory of securitization is begin to serve as a tool for the new ways of counter Ebola and divert the dominant feature of security studies from "military, political, economic and environmental" (Buzan, 1983:75-83) to the new angle of health security. In this case, the Copenhagen School's securitization theory become an alternative approach to see nonmilitary security threats as the Nigerian government deliver intensive and close approach.

Thus, the Nigerian government through intensive and close approach under the concept of the Copenhagen School's theory of securitization, successfully contained the problem; and finally WHO declared Nigeria free from Ebola. Moreover, the Nigerian approach is very clear, well organized and open for external actors. So, epidemic preparedness and response will consistently be comprehensive and institutionalized. Therefore, West African most affected countries can learn from Nigerian approach and apply theory of securitization for the existential health threat, Ebola.

References


Sentiment Analysis Algorithm
RUTUL B. PANDYA, NATIONAL INSTITUTE OF TECHNOLOGY, SURAT, INDIA
u13ec132@eced.svnit.ac.in

Abstract
Sentimental Analysis Algorithm refers to the usage of statistics, natural language processing, and text to identify and extract the text sentiment into categories that can be termed as positive, negative, or neutral. Sentimental analysis is, therefore, the computational treatment of emotions, subjectivity of text and opinion. The present paper provides a comprehensive review of the proposed enhancement of algorithms and some sentimental analysis applications. Some of the areas investigated and presented in the article include emotion detection, transfer learning, and resource building. Sentimental analysis provides an opportunity to arrive at a decision that is binary; you are either for or against the decision. An example of such a binary question can be used on Twitter or political polls, e.g., “Do you support the use of nuclear warheads?” with the option of either answering Yes or No.

Keywords
Social sentiments, Sentiment analysis, Opinion mining, Sentiment classification, Natural language processing

Introduction
Sentimental analysis (SA) forms part of opinion mining where consumers are identified to give the attitudes, emotions, and opinions towards a firm’s brand, product, and service offered. Opinion mining (OM) and sentimental analysis (SA) are used interchangeably since they define a mutual meaning. OM and SA are different as OM can extract and analyze opinions people make on an entity while SA makes sentimental identification in a text and finally examines it. SA, therefore, targets to get opinions, identify expressed sentiments and then classify them by their polarity. The process is shown in the image below (Zhe, 567).

Sentimental Analysis is, therefore, a process of classification. It is divided into three primary levels: the document, sentence, and aspect levels.

Sentimental Analysis (document level) module analyzes a text piece and determines whether it has a positive or negative sentiment.

The document-level sentimental analysis supports the following languages: the UK and US English, German, Spanish, French and Italian. The module is configured in such a way that it never runs automatically during the workflow of data processing. The module, additionally, is wrapped up by the transform API that has a get sentiment output with one of the following values: POSITIVE, NEGATIVE. An empty or null input returns a NULL.

Sentence-level SA classifies the sentiment expressed in each of the sentences. It establishes whether the judgment is objective or subjective in nature. Sentence level SA applies a determination of whether a sentence is positive, negative or neutral when analyzing a subjective statement. Modalities are often employed in making this
determination. Given that, sentences are just short documents; no fundamental differences exist between sentence and document level classification.

The aim of the Aspect-level SA, concerning the individual aspect of entities, is to classify the sentiment. It involves the identification of objects and their aspect. This allows providing different opinions for the same aspect.

**Use Cases of Sentimental Analysis**

Sentimental analysis is applied to reviews of consumer insights. Marketing teams and customer service targets the feelings and opinions of their product’s consumers. In product reviews satisfaction or dissatisfaction of a consumer can be expressed through sentimental analysis. Analysis of the impact of a new product, a campaign ad in the market can also be implemented through sentimental analysis (Pozzi, Fersini, Messina, 58).

Sentimental analysis allows customer service agent to categorize their emails depending on the urgency purely based on the email’s sentiment so as to identify frustrated consumers.

The system is also applied in business intelligence to establish the reasons (subjective) why clients are responding or not responding to a product.

Other fields that applies sentimental analysis include; analysis of ideological bias in political science, gauging reactions, and trend opinions (Pozzi, Fersini, Messina, 122).

**Sentiment Analysis Challenges**

Sentiment analysis can be easily misled by factors like rhetorical devices for example irony, sarcasm and at times implied meanings. The fact that people can also express opinions in the very sophisticated way makes it hard using sentiment analysis.

**Algorithmia** is a tool that gives some very powerful sentiment analysis algorithm for developers. Installing such apps is very simple in our devices given there are no settings needed for configuration or servers to set up.

Social Sentiment Analysis is the algorithm employed in updating the status for social media accounts. This algorithm when fed with a string, gives either ‘positive,’ ‘negative” or “neutral” returns. The algorithm can also provide a compound result; a general sentiment of the whole string (Satapathy, Suresh, Prasas, Rani, Siba, Raju, 456).

```json
{
    "sentenceList": [
        "I like Italian cheese pizza,",
        "I love white coffee and round donuts,",
        "I don't want to be diagnosed with diabetes type A."
    ],
    "positive": 0.445,
    "negative": 0,
    "sentence": "I like Italian cheese pizza",
    "neutral": 0.535,
    "compound": 0.3512
},
{
    "positive": 0.542,
    "negative": 0,
    "sentence": "I love white coffee and round donuts",
    "neutral": 0.498,
    "compound": 0.6399
}
```
{  
"positive": 0,
"negative": 0.264,
"sentence": "I don't want to be diagnosed with diabetes type A",
"neutral": 0.776,
"compound": -0.0592
}

For a more general text like articles, books or transcripts, an algorithm can also feature a sentimental analysis algorithm that is flexible and can be multi-used. After taking a string input, the algorithm returns a 0 to 4 rating. With 0 representing very negative, one serving negative, 2-neutral, 3-positive and 4-very positive.

Additionally, “Algorithmia offers a Sentiment by Term” performing a document analysis and establishing a specific set of term’s sentiment. Such an algorithm takes in a string, consisting of the terms. It conducts the splitting of the document and average computation of each term’s sentiment done. An auto-tagging algorithm is used alongside to make the algorithm tough. Examples of auto-tagging algorithms include “Auto-Tag URL LDA and “Named Entity Recognition” algorithms. (Satapathy, Suresh, Prasas, Rani, Siba, Raju, 49).

The following pre-processing is required for sentimental analysis: noise removal, classification, named entity recognition, subjectivity classification, feature selection, and finally sentiment extraction.

The table below shows some of the steps used in Sentiment Classification Techniques used to come up with a sentiment analysis algorithm.

Conclusion
Conclusively, sentiment analysis algorithm involves the use of computer language in data mining processes. It requires processing of natural language text analysis and statistics to be able to extract and identify the sentiment of that particular text as positive, negative, or neutral. In other cases, it is viewed at as the computational treatment of attitudes, opinions, and subjectivity of the text.

Works Cited

The Influence of Job Satisfaction, Leadership, and Leader-Member Exchange on the Employee’s Intention to Quit in PT. Pamapersada Nusantara Banjarmasin

Meiske Kristin Lumanauw*
* Student of Doctoral Program Accounting Science Airlangga University, Surabaya, Indonesia
meiskekl@gmail.com

SitiSulasmi**
** Department of Management, Airlangga University, Surabaya, Indonesia
sulasmi_m@feb.unair.ac.id

Abstract
Era of globalization is influential especially in the business world. The problem that companies encounter nowadays in the human resources management is the level of employee’s intention. Job dissatisfaction has been frequently identified as one of the important reasons that cause individuals to leave their jobs behind. The phenomenon of employee’s intention to quit, especially among the staff- and the manager-level employees, has also been encountered by PT. Pamapersana Nusantara Banjarmasin every year. Based on the results of analysis and discussion regarding the job influence has significant influence with negative direction toward the intention to quit among the employees. The leadership has significant influence with negative direction toward the intention to quit among the employees. The leader-member exchange variable had significant influence with negative direction toward the intention to quit among the employees.

Keywords : employee intention, job satisfaction, leader-member exchange

I. INTRODUCTION

Era of globalization is influential especially in the business world. In the era of globalization, there are many heavy competition among companies in order to attain the targeted market; in addition, business domains inevitably are encouraged to achieve their organizational objectives effectively and efficiently. Effectiveness and efficiency in a company is very necessary in order that the company has both competitive edge and superiority in comparison to their competitors; by doing so, companies may survive in the world of competition.

The problem that companies encounter nowadays in the human resources management is the level of employee’s intention to quit. The intention to quit is triggered by several factors namely job satisfaction, leadership style that causes discomfort in the job performance, inharmonious leadership-member exchange, and difficult performance standard (Hassan, 2014; Su, 2014; Oluwafemi, 2014).
Job dissatisfaction has been frequently identified as one of the important reasons that cause individuals to leave their jobs behind. Job dissatisfaction has direct influence toward the manifestation of intention to quit (Iqbal et al., 2014; Mbah and Ikemefuna, 2014). Mahdi et al. (2012) explained that job satisfaction has negative relationship to employee’s intention to quit. The high level of intention to quit will be a serious problem for many companies; in fact, it may even frustrate the companies as they found that the recruitment process that has successfully gathered well-qualified staff members becomes useless because these staff members decide to work for other companies (Rageb et al., 2013). The high level of intention to quit in a company will draw various potential costs namely the training cost that has been invested to the employees, the level of performance that should be sacrificed, and the re-recruitment and training cost.

Ali et al. (2014) and Salleh et al. (2012) stated that all aspects of job satisfaction that includes promotion, job, and supervision, except colleagues, is proven to have negative influence toward the employee’s intention to quit. The negative influence that has been proven by such studies strives to explain that the higher the job satisfaction is the lower the intention to quit. The individuals who are satisfied with their job performance will try to stay in the company while the individuals who are less satisfied with their job performance will decide to leave the company. This statement is also supported by the findings from a study by Mbah and Ikemefuna (2012), which show that the job satisfaction of an employee has negative influence to the employee’s intention to quit.

Another factor related to the employee’s intention to quit is leadership. Yadav & Misra (2015) identified one of the factors that may have influenced the employee’s intention to quit, namely leadership. When employees feel comfortable with their leader, they tend to stay in the company; on the contrary, when their leader becomes the source of their discomfort then the employee’s intention to quit will improve (Ali et al., 2014). Leadership is a process of influencing members in determining the organizational objectives, of motivating members to achieve objectives, and of influencing group and culture (Robbins, 2014:186). Iqbal et al. (2014) argued that good leadership might motivate employees and might decrease their intention to quit.

In addition to job satisfaction and leadership, another factor that has also been related to the intention to quit is leader-member relationship. The leader-member relationship does not only pay attention to the leader’s behaviors but also emphasizes the quality of the relationship between the leader and the members. Due to the limited time in having interaction with the subordinate, a leader establishes a special relationship with a small group of his or her subordinate.

The phenomenon of employee’s intention to quit, especially among the staff- and the manager-level employees, has also been encountered by PT. Pamapersana Nusantara Banjarmasin every year. PT. Pamapersada Nusantara (later on will be regarded as PAMA) Banjarmasin is a subsidiary company under PT. United Tractors Tbk, the distributor of Komatsu-branded heavy equipment in Indonesia. Nowadays,
PAMA has actively been managing a number of coal mine, gold mine, quarry, and alike; the same company has also been actively working on the projects of dam construction, road construction, excavation, and transportation. In addition, PAMA has also had subsidiary companies namely PT Kalimantan Prima Persada (KPP), and PT Prima Multi Mineral (PMM). The phenomenon that occurs in PAMA Banjarmasin is the high level of employee’s intention to quit especially among the staff- and the manager-level employees. This high level of intention to quit is serious, recalling the fact that to be promoted to the staff-level and the manager-level employees this company has been investing massive costs for training, education and alike in order to expand the level of their skill and knowledge. The followings are the percentage (%) of the staff-level and the manager-level employees who have resigned from PAMA from 2008-2015.

Table 1.
MEAN OF RESIGNING STAFF-LEVEL AND MANAGER-LEVEL EMPLOYEES IN PT. PAMA PERSADA NUSANTARA BANJARMASIN FROM 2008-2015

<table>
<thead>
<tr>
<th>No</th>
<th>Year</th>
<th>Number of Staff and Manager Level Employees</th>
<th>Resigned Employees (People)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2008</td>
<td>64</td>
<td>6</td>
<td>9.32%</td>
</tr>
<tr>
<td>2</td>
<td>2009</td>
<td>71</td>
<td>16</td>
<td>22.41%</td>
</tr>
<tr>
<td>3</td>
<td>2010</td>
<td>81</td>
<td>17</td>
<td>21.00%</td>
</tr>
<tr>
<td>4</td>
<td>2011</td>
<td>73</td>
<td>11</td>
<td>15.03%</td>
</tr>
<tr>
<td>5</td>
<td>2012</td>
<td>87</td>
<td>18</td>
<td>20.77%</td>
</tr>
<tr>
<td>6</td>
<td>2013</td>
<td>100</td>
<td>24</td>
<td>24.00%</td>
</tr>
<tr>
<td>7</td>
<td>2014</td>
<td>104</td>
<td>31</td>
<td>29.69%</td>
</tr>
<tr>
<td>8</td>
<td>2015</td>
<td>111</td>
<td>26</td>
<td>23.45%</td>
</tr>
</tbody>
</table>

Source: Data Recapitulation from PT Pamapersana Nusantara (PAMA) Banjarmasin Report, 2016.

Based on the results that have been displayed in the above table, it is apparent that the number of employees who have resigned among the staff and the manager level in PT. Pamapersada Nusantara (PAMA) Banjarmasin is high, from 9.32% in 2008 to 22.41% in 2009. In 2010, the percentage of the resigning employees in the staff and the manager level has decreased into 21.00% and in 2011 this percentage has declined into 15.03%. However, in 2012 the number of resigning employees has increased into 20.77% and in 2013 this figure has increased into 24.00%. On 2014, the percentage of resigning employees has increased into 29.69% but it has declined into 23.45% in 2015. Although the percentage has not been 50.00%, the high percentage of resigning employees in PAMA Banjarmasin is interesting to study. With the great brand and the good image, PAMA Banjarmasin should have been able to develop fair and harmonious in-group and out-group leader-member exchange and also to motivate the employees so that the
company might satisfy their employees; this satisfaction, thus, will lead to decreasing the employees’ intention to quit from the company.

The intention to quit in a company is usually a final choice for an employee if the employee has found that the working conditions do not meet his or her expectation anymore. Every year, approximately around 19 employees in the staff and the manager level of PAMA Banjarmasin resign from the company without any clear reasons; there are also several employees who resign from the company in the middle of their training program. This figure is quite enormous, recalling the fact that the employees who have resigned are the staffs and the managers who have been highly skilled in their domain; not to mention, the applicants that the company have accepted are not able to compensate or to replace the employees who have resigned. The high intention to quit will bear negative consequence to the organization because it creates instable labor conditions, decreasing employee productivity, ill-conducive job atmosphere, and increasing human resources cost.

Based on the problems that have been detailed, through the study the researcher would like to test and analyze:
1. The influence of job satisfaction toward the employee’s intention to quit in PT. Pamapersada Nusantara Banjarmasin
2. The influence of leadership toward the employee’s intention to quit in PT. Pamapersada Nusantara Banjarmasin
3. The influence of leader-member exchange toward the employee’s intention to quit in PT. Pamapersada Nusantara Banjarmasin

II. LITERATURE REVIEW

Job Satisfaction

Job satisfaction is a pleasant or unpleasant emotional state by which employees view their job. Job satisfaction reflects an individual’s feelings toward his or her job. Job satisfaction is apparent in an employee’s positive attitude toward the job and all matters that the employee deals with around his working environment. Department of Human Resources or Management should always monitor the job satisfaction because it influences the level of absence, the turnover, the job enthusiasm, the complaints, and the other vital problems related to personnel (Handoko, 2010:193).

According to Werther (1996:501), job satisfaction is the favorableness or unfavorableness with which employees view their work. The statement implies that job satisfaction related to how employees view their job as something profitable or not. Similar to motivation, job satisfaction is also influenced by the environment; on the other hand, the job itself might trigger satisfaction through its design. A job that is related to the element of behaviors such as autonomy, job identity, significant job, and feedback will
provide contribution to the employee satisfaction. In short, each element that is related to the job environment may increase or decrease the job satisfaction.

Robbins (2014:99) stated that job satisfaction can be defined as a positive feeling toward an individual’s job which has been the results of his or her characteristics. Handoko (2010:36) stated that job satisfaction is a reflection of a worker upon his work. Job satisfaction is a feeling that has been related to the job and that involves the aspects such as wage, or accepted payroll, career development opportunities, relationship with other employees, job place, job type, organizational structure of a company, and monitoring quality. On the other hand, the feelings that have been related to the workers are namely age, health conditions, capacities, and education.

**Leadership**

Leadership refers to the manner in which a leader persuades his subordinate though the form of behavioral or personality pattern. Leadership is basically defined as a manifestation of a leader’s behavior with regards to his capacities of leading the group. This manifestation usually shapes certain pattern or form. Such definition of leadership is in accordance to the opinion by Davis and Newstrom (2015), who proposed that a leader’s pattern of action in overall is similar to the one that has been perceived or been referred by the subordinate. Leadership represents philosophy, skills, and attitudes of the leader in politics.

Leadership is a pattern of behaviors that has been designed to integrate organizational objectives and individual objectives in order to achieve certain goals (Heidjrachman and Husnan, 2013), on the other hand according to Tjiptono (2012) leadership is a manner that a leader exerts in establishing interaction with his subordinate. Another opinion also stated that leadership is a pattern of behaviors (words and actions) of a leader that has been perceived by other people (Hersey, 2014).

**Leader-Member Exchange**

Leader-member exchange within an organization implies that information flows from the higher authority to the lower authority (Pace and Faules, 2000:281). Top-bottom relationship displays the messages that flow from the superordinate or the leaders to the subordinate. Most of the top-bottom relationship is utilized to convey messages related to direction, objective, discipline, order, question, and general policy. According to Yukl (2004:119), the underlying paradigm of LMX theory is that leaders develop different leader-member exchange with different subordinate. On the other hand, according to Robbins (2014:321), Leader-Member Exchange (LMX) is an interpersonal exchanging relationship between the subordinate and their superordinate. As having been updated in a study by Graen et al. (2012) and Sandjaja (2012), leader-member exchange is focused on the assessment toward the relationship and the interaction between the supervisor (superordinate) and the subordinate. The level of proximity in the relationship between the superordinate and the subordinate that displays the indication and the leader-member exchange in the company within an organization enables the manifestation of different relationship between the leader and
the employees as the subordinate. Kambu et al., (2012) and Ekin and Terri (2013) stated that leader member exchange has been a level of relationship quality between the supervisor and the employees which may improve the performance of both parties.

**Employee’s Intention to Quit**

Intention to quit is a employee’s desire or tendency to quit from his or her job voluntarily according to his or her own option. The intention to quit is heavily influenced by the job dissatisfaction, the low level of organizational commitment, and the high level of job stress that has been caused by the job stressor (Firth, 2004:219). The intention to quit explains individual desires to quit from and leave the organization where the individual has been working. In this study, this variable is used in wide coverage that includes the overall withdrawal cognitions that the employees perform according to Nugroho (2008:46).

According to Mellor et al (2004:129), intention is a function of three fundamental determinants: first is individual attitude toward behaviors, second is individual perception toward social pressure to perform or not to perform the given behaviors, and third is the aspect of control upon the behaviors that have been lived. Zeffane et al. (1995:88) defined intention as a desire of performing something that comes from an individual. On the contrary, Kitcapi et al. (2005:98) stated that intention is a desire that comes from an individual in performing something. It might be stated that the definition of intention itself is a desire that comes from an individual in performing something.

**Hypotheses**

Based on the background, the problem formulation, the research objective, the literature review, and the conceptual framework, the researcher would like to design the following hypotheses:

1. Job satisfaction has significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin.
2. Leadership has significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin.
3. Leader-member exchange has significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin.

**III. METHOD**

**Design**

This study was an explanatory research, which according to Sekaran (2012:318) has been a research that analyzes inter-variable relationship and that will explain the causal relationship between the independent variable and the dependent variable through a hypothesis testing. This study would also made use of descriptive approach in order to depict and analyze the actual phenomenon.
Population, Sample, and Sample Gathering Technique

a. Population

The population in this study was the employees, especially the staffs and the managers, in PT. Pamapersada Nusantara Banjarmasin who accounted 11 people.

<table>
<thead>
<tr>
<th>Working Area</th>
<th>Number of Staff and Manager Level Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM 73 Office</td>
<td>30</td>
</tr>
<tr>
<td>KM 64 Office</td>
<td>28</td>
</tr>
<tr>
<td>Wara</td>
<td>28</td>
</tr>
<tr>
<td>Megashop 2</td>
<td>25</td>
</tr>
<tr>
<td>Total Staff and Manager</td>
<td>111</td>
</tr>
</tbody>
</table>

Source: Processed data, 2017

b. Sample

The sample who had been selected in this study was the one that had been gathered from the population whose characteristics would be studied, namely the staffs and the managers of PT. Pamapersada Nusantara Banjarmasin

Location and Period

The study was conducted in four mining sites of PT. Pamapersada Nusantara Banjarmasin which had been located in TabalongTanjung Regency, South Borneo, from KM 73 office working area, KM 64 office working area, wara, and megashop 2. Then, the study was conducted for three months from March 2016 until May 2016.

Data Analysis Technique

The data analysis technique that had been implemented was the theory and concept-based structural equation modeling (SEM) in combination with the package of Analysis of Moment Structure (AMOS). The strength of SEM in a managerial research was that it has been able to display a comprehensive model with its capacities in measuring the relationship of influence that has theoretically been present.
IV. ANALYSIS

Structural Equation Model Assumption Test

Normality Test

The SEM analysis could be conducted if the data had been normally distributed. Therefore, data normality test became important. The researcher conducted the data normality test by using the univariate normality method and by viewing the index skew univariate coefficient (tendency) and the index kurtosis univariate (high-plain). The data would meet the data normality requirements if the index skew univariate coefficient and the index kurtosis univariate had been between ± 2.58 (-2.58 ≤ CR ≤ +2.58). If the index had been beyond this requirement, then it might be regarded that the data had been abnormal. The results of normality test would be shown in Table 3.

Table 3

<table>
<thead>
<tr>
<th>RESEARCH DATA NORMALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Y2.1</td>
</tr>
<tr>
<td>Y2.2</td>
</tr>
<tr>
<td>Y2.3</td>
</tr>
<tr>
<td>Y2.4</td>
</tr>
<tr>
<td>X3.1</td>
</tr>
<tr>
<td>X3.2</td>
</tr>
<tr>
<td>X3.3</td>
</tr>
<tr>
<td>X3.4</td>
</tr>
<tr>
<td>X2.1</td>
</tr>
<tr>
<td>X2.2</td>
</tr>
<tr>
<td>X2.3</td>
</tr>
<tr>
<td>X2.4</td>
</tr>
<tr>
<td>X1.1</td>
</tr>
<tr>
<td>X1.2</td>
</tr>
<tr>
<td>X1.3</td>
</tr>
<tr>
<td>X1.4</td>
</tr>
<tr>
<td>X1.5</td>
</tr>
<tr>
<td>Multivariate</td>
</tr>
</tbody>
</table>

Source: Appendix IV with processing
By utilizing the CR criteria that had been equal to 2.58 at the level of significance 5.00%, through the observation toward the numbers in the CR column that had been displayed in the above table the researcher might conclude that there was not any number that had been higher than +/- 2.58 and the range of the number in the skewness column had not been higher than +/-1.96 at the level of significance 5.00%. These findings showed that the data that had been processed had normal distribution.

**Multicolinearity and Singularity Test**

In order to see whether there had been multicolinearity and singularity within the variable combination, the researcher should pay attention to the determinant of covariance matrix (Ferdinand, 2002). The completely small determinant indicated the presence of multicolinearity or singularity; as a result, the data might not be processed for the analysis that had been undergone. The results of this study showed that the value of determinant of sample covariance matrix = 48.432 and it had been higher than zero (Appendix 4). Thereby, the researcher might conclude that the data in this study might be processed in the analysis.

**Outlier Evaluation**

Outliers were the observations that appeared with extreme values both in univariate and multivariate manner; these observations appeared due to the combination of unique characteristics that the variables have and these observations completely different than the other observations (Ferdinand, 2002:52). The evaluation toward the multivariate outliers should be conducted because, although the data under analysis did not show the presence of outliers in the univariate level, the observations might be the outliers when they were combined.

The detection toward the outliers was conducted by using Mahalanobis distance that displayed the distance of the data from certain central point. The data would be considered as outliers if they had p1 and p2 score that had been less than 0.05 (Santoso, 2007). In this study, the researcher found 7 data units (0.02%) which became the outliers (Appendix 4). Because the number of the outliers had been lower than 5.00% and the normality test requirement had been met, these data were still processed. Therefore, the researcher might conclude that within the existing data the disturbing factors were not found; as a result, the data might be processed. Then, within the analysis of this study, if there were not any special reason to exclude any case that contained the outlier than the case should be included in the further analysis (Ferdinand, 2002:108).

**Research Variable Confirmatory Test**

In order to ensure the validity of each indicator that shaped a construct (variable), there should be a confirmatory factor analysis in order to confirm all of the indicators that shaped each variable or construct.
All of the constructs should be assessed at least by two indicators. Several criteria that would be applied in measuring the reliability of a construct were namely Alpha Cronbach coefficient value, composite reliability coefficient value, and extracted variance proportion. A construct would be considered reliable if the Alpha Cronbach coefficient had at least been equal to 0.60 (Sekaran, 2012). The reliability of a construct would be achieved if the composite reliability value had been higher than 0.70 (Ferdinand, 2002).

In addition, the proportion of variance from each indicator in a construct was expected to be at least 0.50 (Hair et al. 1995). The inspection of validity was determined by the size of loading standardize estimate that had been attained. If the loading value had been higher than 0.40, then the presence of an indicator would be considered moderately strong to measure a construct. The results of variable (construct) confirmatory analysis might be seen in Table 5.24 as follows.
Table 4
RESULTS OF RESEARCH VARIABLE CONFIRMATORY ANALYSIS

<table>
<thead>
<tr>
<th>Variable/Indicator</th>
<th>Standardized Coefficient</th>
<th>S.E</th>
<th>C.R</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>X1</strong> Job Satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X1.1 The Job Itself</td>
<td>7.174</td>
<td>.259</td>
<td>27.648</td>
<td>0.000</td>
</tr>
<tr>
<td>X1.2 Salary</td>
<td>6.965</td>
<td>.264</td>
<td>26.347</td>
<td>0.000</td>
</tr>
<tr>
<td>X1.3 Promotion</td>
<td>7.826</td>
<td>.243</td>
<td>32.196</td>
<td>0.000</td>
</tr>
<tr>
<td>X1.4 Monitoring</td>
<td>7.209</td>
<td>.264</td>
<td>27.316</td>
<td>0.000</td>
</tr>
<tr>
<td>X1.5 Colleague</td>
<td>7.287</td>
<td>.257</td>
<td>28.384</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>X2</strong> Leadership</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X2.1 Ideal Influence</td>
<td>7.270</td>
<td>.265</td>
<td>27.385</td>
<td>0.000</td>
</tr>
<tr>
<td>X2.2 Inspirational Motivation</td>
<td>7.322</td>
<td>.255</td>
<td>28.666</td>
<td>0.000</td>
</tr>
<tr>
<td>X2.3 Intellectual Stimulation</td>
<td>7.565</td>
<td>.247</td>
<td>30.656</td>
<td>0.000</td>
</tr>
<tr>
<td>X2.4 Individual Consideration</td>
<td>7.678</td>
<td>.254</td>
<td>30.196</td>
<td></td>
</tr>
<tr>
<td><strong>X3</strong> Leader-Member Exchange</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X3.1 Contribution</td>
<td>7.583</td>
<td>.248</td>
<td>30.543</td>
<td>0.000</td>
</tr>
<tr>
<td>X3.2 Loyalty</td>
<td>7.200</td>
<td>.268</td>
<td>26.916</td>
<td>0.000</td>
</tr>
<tr>
<td>X3.3 Affection</td>
<td>7.478</td>
<td>.254</td>
<td>29.408</td>
<td>0.000</td>
</tr>
<tr>
<td>X3.4 Respect toward Profession</td>
<td>7.078</td>
<td>.264</td>
<td>26.807</td>
<td>0.000</td>
</tr>
<tr>
<td><strong>Y2</strong> Employee’s Intention to Quit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y2.1 Job Quantity</td>
<td>7.574</td>
<td>.248</td>
<td>30.596</td>
<td>0.000</td>
</tr>
<tr>
<td>Y2.2 Job Quality</td>
<td>6.652</td>
<td>.273</td>
<td>24.411</td>
<td>0.000</td>
</tr>
<tr>
<td>Y2.3 Punctuality</td>
<td>8.191</td>
<td>.225</td>
<td>36.348</td>
<td>0.000</td>
</tr>
<tr>
<td>Y2.4 Attendance</td>
<td>7.696</td>
<td>.253</td>
<td>30.473</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: Appendix IV with processing

As having been displayed in Table 4, the confirmatory factor analysis toward all research variables displayed significant results. The significant results were confirmed by the CR value that had been higher than 2.00 or p-value < 0.05 and the overall standardize estimate that had been higher than 0.40. these results also confirmed that each indicator had high level of validity toward the construct.

Goodness of Fit Model Test
After the measurement model had been analyzed through the Confirmatory Factor Analysis and after having viewed that each variable might be utilized in defining a latent construct, a full-model SEM might be analyzed. The results of data processing by means of AMOS program might be viewed in the following figure.

The results of goodness of fit model test in the above figure showed that the chi-square value had been equal to 28.001 and the probability values had been equal to 0.64 which had been higher than the significant limite namely 0.05. In addition, the goodness of fit model test index value that covered GFI (0.905), AGFI (0.959), TLI (0.999), CFI (0.943), RMSEA (0.062), and CMIN/DF (1.266) fell under the range of the expected values (Table 5). All of these results showed that there had not been any differences between the sample covariance matrix and the population covariance matrix that had been estimated; as a result, the full model SEM might be accepted.

Table 5.

RESULTS OF STRUCTURAL EQUATION MODEL TEST
### Goodness of Fit Measure

<table>
<thead>
<tr>
<th>Measure</th>
<th>Cut off Value</th>
<th>Model Results</th>
<th>Model Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi Square ($\lambda^2$)</td>
<td>Expected to be small</td>
<td>28.001</td>
<td>Good</td>
</tr>
<tr>
<td>Significance Probability ($p$)</td>
<td>$\geq 0.05$</td>
<td>0.064</td>
<td>Good</td>
</tr>
<tr>
<td>RMSEA</td>
<td>Between 0.03-0.08</td>
<td>0.062</td>
<td>Good</td>
</tr>
<tr>
<td>GFI</td>
<td>$\geq 0.90 &lt; 1.00$</td>
<td>0.905</td>
<td>Good</td>
</tr>
<tr>
<td>AGFI</td>
<td>$\geq 0.90 &lt; 1.00$</td>
<td>0.959</td>
<td>Good</td>
</tr>
<tr>
<td>CMIN/DF</td>
<td>$\leq 2.00$</td>
<td>1.266</td>
<td>Good</td>
</tr>
<tr>
<td>TLI</td>
<td>$\geq 0.95 &lt; 1.00$</td>
<td>0.999</td>
<td>Good</td>
</tr>
<tr>
<td>CFI</td>
<td>$\geq 0.95 &lt; 1.00$</td>
<td>0.943</td>
<td>Good</td>
</tr>
</tbody>
</table>

Source: Appendix IV with processing

### Structural Model Equation Analysis

#### Hypothesis Testing

The hypothesis testing was conducted by observing the probability ($p$) that had been resulted from the regression weight estimate for the structure equation model (Appendix 4). The regression weight estimates of the structural equation model for the influence of job satisfaction, leadership, and leader-member exchange to the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin were shown in Table 6. If the $p$-value had been lower than 0.05, then the hypothesis would be accepted.

### Table 6

**RESULTS OF STRUCTURAL MODEL HYPOTHESIS TEST**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path Direction</th>
<th>Coefficient of Regression</th>
<th>C.R</th>
<th>P-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>The influence of job satisfaction to the employee’s intention to quit in PT. Pamapersada Nusantara Banjarmasin</td>
<td>-0.112</td>
<td>4.221</td>
<td>0.000</td>
<td>Accepted</td>
</tr>
<tr>
<td>H2</td>
<td>The influence of leadership to the employee’s intention to quit in PT. Pamapersada</td>
<td>-0.319</td>
<td>3.741</td>
<td>0.000</td>
<td>Accepted</td>
</tr>
</tbody>
</table>
The influence of leader-member exchange to the employee’s intention to quit in PT. Pamapersada Nusantara Banjarmasin

Based on the regression weight estimates of the structural equation model in the above table, then the results of hypotheses testing might be concluded as follows:

1. The job satisfaction variable had significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin. This finding had been confirmed with the regression coefficient value which had been negative, namely -0.112, the critical ratio value which had been 4.221 (higher than 2.000), and the probability (p) value which had been 0.000 (lower than the significance rate (α)) namely 0.05. Therefore, the first hypothesis, namely “The job satisfaction has significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin,” might be accepted.

2. The leadership variable had significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin. This finding had been confirmed with the regression coefficient value which had been negative, namely -0.339, the critical ratio value which had been 3.741 (higher than 2.000), and the probability (p) value which had been 0.000 (lower than the significance rate (α)) namely 0.05. Therefore, the second hypothesis, namely “The leadership has significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin,” might be accepted.

3. The leader-member exchange variable had significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin. This finding had been confirmed with the regression coefficient value which had been negative, namely -0.422, the critical ratio value which had been 3.377 (higher than 2.000), and the probability (p) value which had been 0.000 (lower than the significance rate (α)) namely 0.05. Therefore, the first hypothesis, namely “The leader-member exchange has significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin,” might be accepted.
CLOSING

Conclusion

Based on the results of analysis and discussion regarding the influence of job satisfaction, leadership, and leader-member exchange to the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin, the researcher would like to draw the following conclusions:

1. The job influence has significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin. If the employees are satisfied with their job then they will stay in the organization where they have been working. On the other hand, if the employees are not satisfied with their job then they will decide to leave the organization where they have been working. The perceived job satisfaction might influence an individual’s intention to quit. This finding is in line with the results of the study by Mahdi et al. (2012); Mbah and Ikemefuna (2012); Iqbal and Ehsan (2014); Ali et al. (2014); Salleh et al. (2012); Widyantara and Ardana (2015); Irzani and Witjaksono (2014); and Setyanto et al. (2013).

2. The leadership has significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin. If the company leader is the source of comfort for the employees then their intention to quit will decrease. Company leaders should establish good interaction in order that the employees feel comfortable in performing their activities within the company. This finding is in line with the results of a study by Hamstra et al. (2011); Dewi and Subudi (2015); Setyaningsih and Witjaksono (2014); and Sartika (2014).

3. The leader-member exchange has significant influence with negative direction toward the intention to quit among the employees of PT. Pamapersada Nusantara Banjarmasin. The harmonious relationship between the superordinate and the subordinate will be achieved if there is agreement and common vision between them in relation to their position and role as fellow producers. On the other hand, a balanced job relationship can be achieved if the superordinate and the subordinate pay attention to their needs from one to another. This finding is in line with the results of the study by Michael and Columbus (2014) and also Muhaimin et al. (2011).

Suggestions

Based on the conclusions, the researchers would like to provide the following suggestions for the company and the future researchers.

Suggestions for the Company Practice

Based on the above conclusions, the researcher would like to provide the following suggestions to the leaders, the employees, and the company:
1. It is apparent that performance has positive influence toward the intention to quit; therefore, the researcher would like to expect that the company is able to decrease the employee’s intention to quit from the internal and the external aspect. In other words, the employees are provided with freedom in exploring their capacities and in maintaining harmonious situation so that they may maintain their good performance with good harmony in order to stay in the company.

2. Especially in the company, the leaders should be able to create good and harmonious job atmosphere as well as to improve the cooperation between the superordinate and the subordinate.

3. The company might establish a special institution for the employees in order to establish interaction among fellow employees so that there will be a bridge between the top management and the employees. By doing so, the top management will be able to develop a good and strong relationship between the superordinate and the subordinate.

4. The employees should be able to optimize their relationship in order to display the achievement that they may attain; in doing so, the job satisfaction and the leadership can be a motivator along with their commitment to the company.

Suggestions for the Future Studies

Based on the limitations on the results of this study, the researcher would like to provide the following suggestions in order to improve the subsequent scientific development:

1. For the future studies, the researcher would like to expect that the future researchers might perform more in-depth study, which is not limited on the variables that have been studied (the influence of job satisfaction, leadership, and leader-member exchange to the employee’s intention to quit); instead, the future researcher might add other variables that may be related to the performance and the intention to quit such as organizational culture, compensation, commitment, and alike.

2. In the future studies, especially in relation to the leader-member exchange, the researcher would like to expect that the future researchers develop the measurement aspect and expand the supporting theory instead of being limited to the contribution, the loyalty, the affection, and the respect toward the profession.

3. The researcher would also like to expect that the future researchers may use wider coverage of object; the object may not only one company but also two or three companies that can be compared.

4. The researcher would expect as well that the future researchers might develop the existing analytical model and to consider the other analytical tools which might be more accurate and update.
LIST OF REFERENCES


STRATEGY TO GROWTH AN EXCELLENCE COMPETITIVENESS IN BROILER CHICKEN BUSINESS
(A Case Study: Poultry Company in Indonesia)

Soerjo Rahardjo*, M.Parulian Hutagaol**, Anggraini Sukmawati***

*School of Business, Bogor Agricultural University (IPB)
**Department of Economics, Faculty of Economics and Management, Bogor Agricultural University (IPB)
***Department of Management, Faculty of Economics and Management, Bogor Agricultural University (IPB)

Abstract - Indonesian society tend to buy a living chicken or a fresh chicken meat in traditional market. Their awareness to consume a hygiene processed-chicken product is still at a low level. Producer can not establish the selling price because they sell chicken in live bird that makes the price is determined by market mechanism. This research aims to analyze the growing of excellence competitiveness one of the broiler chicken producer in Indonesia. The primary data is taken from an indepth interview through purposive sampling and focused group discussion (FGD). Porter’s five forces model is used to analyze the competitiveness level by the whole of broiler chicken business. This research is using descriptive analysis methods with AHP multi-rater as a supporting tools. Some issues in certain company that are unmeasured is simplified into some parts, then managed into a certain hierarchy based on the concern levels through synthesis variables. The result of this research shows a factor that affecting the excellence competitiveness is the bargaining power from buyers. The aim of this research in increasing the excellence competitiveness is by decreasing the production cost, and also the alternative strategy chosen is improving the farming technology

Keywords: Analytic Hierarchy Process (AHP), Competitive Advantage, Porter’s Five Forces

I. INTRODUCTION

Indonesian society tend to buy a living chicken or a fresh chicken meat in traditional market. Their awareness to consume a hygine processed-chicken product is still at a low level. Producer can not establish the selling price because they sell chicken in live bird that makes the price is determined by market mechanism. Chicken meat consuming level in Indonesia society is still low, only 8 kg per capita per year, this number is far below Malaysia which is 36 kg, Thailand 16 kg, even Philippines 9 kg. Poultry community has already do a nutrient campaign so that the consuming level is growing. The phenomenon above stimulates competitiveness level between chicken broiler producers that become merely high. Based on Central Agency on Statistics, broiler chicken population in Indonesia is having grown during the period of 2012-2016, as it seen on Table 1. At 2012 the number of broiler chicken is only 1.244 million, is increasing become 1.593 million on 2016, or having grow up for 27.98%. The growing of this population is align with the income growth level per capita as well as the population of this society. According to BPS data, the numbers of Indonesia population on 2016 reach 259 million with income per capita up to USD 3.605, and the economy growth level reach 5.02%.

Tabel 1 Broiler chicken population

<table>
<thead>
<tr>
<th>Year</th>
<th>Broiler Chicken population (in million bird)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>1.244</td>
</tr>
<tr>
<td>2013</td>
<td>1.344</td>
</tr>
<tr>
<td>2014</td>
<td>1.443</td>
</tr>
<tr>
<td>2015</td>
<td>1.528</td>
</tr>
<tr>
<td>2016</td>
<td>1.592</td>
</tr>
</tbody>
</table>

Source: Central Agency on Statistics (2017)

According to Porter (1998) a corporation who is classified has excellence competitiveness once they have something that others have not, or can do something better than others, or able to do something that others can not do. A competitiveness level can be reached by a corporation through changing and innovation. Whereas changing and innovation is only can be done by human. A corporation that has power in which others can replicate that is considered a corporation that has distinctive competence, which is a specific competence of a corporation (Rangkuti 2016). According to Mulyadi and Setiawan (2001), in a competitive business environment, corporate competitiveness can be constructed if the corporation has a certain leading compared to others. Business environment condition is always changing; the competition between corporations is getting tight and rapidly changing in this
digital era (Dewobroto 2005). Thus, the industry needs precise systematic procedures for survival (Dyah 2015). The process of determining systematic procedures and precise strategy for a certain industry is surely a holistical thought about any aspects related to this industry. Therefore, the purposes of this research are to 1) Analyse condition factors that influence the corporate competitiveness 2) formulize the excellence competitive strategy.

II. DATA AND METHODOLOGY

This research is conducted in Jakarta. The location is choosen intentionally by considering headquarter that is located in Jakarta. The days this research is conducted is on April until August 2017. This research design is using qualitative method through an exploration of using indepth interview technique as well as purposive sampling and focused group discussion (FGD) with the experts that has purpose to gain complete overview about business competition in poultry. Those experts are from managerial level of the corporatin which are President Director, Head of Production, Head of Marketing, Finance Controller and Branch Manageger.

Data is taken from quistionaire and interview, after that we do an analysis using Porter's Five Forces Model. According to Porter (1998) a company is depend on a five power that will determine their sustainability. Method that is used to formulize strategy is Analytic Hierarchy Process (AHP), with AHP hierarchicycl structure based on the competitiveness level theoretical approach of Porter's Five Forces, which is consisted from four hierarchycal level; focus, factor, goal, and alternative strategy. AHP is one of the fluid models that give chance for individual or group to construct ideas and explain the issues by creating their own assumptions and gain the solution that is expected to (Saaty, 1990). Complex issues that can be simplified and fastened for taking decision (Marimin and Maghfiroh 2010). AHP has a capability to solve problems either multi-objective or multi-criteria based on the preference comparison on each element inside the hierarchy. Thus this model is a comprehensive decision model (Tatcchi 2009). The strategy formulation that is gained based on discussion result from experts can be a trustworthy respondent from filling the AHP quistionaire. Next the strategies are formulated and re-questioned to the experts that concerning abut how important those strategies should be done by giving a value or comparative-coupling scale according to AHP method. After giving the value, data is re-conducted by using Expert Choice 11 software. The priority strategy can be obtained by seeing the highest socre on the AHP analysis. Thus, based on that result it can be obtained an output about what regulation should be done by the corporate management to support the prior strategy so that can be run effectively and efficiently. AHP framework on this research can be seen on this Figure 1.

![AHP Framework](image)

III. DISCUSSION AND RESULT

General Overview of Broiler Chicken Corporate

The research object is corporate that run their business in broiler chicken farming. This farming activity is done with maintaining relationship with the breeder as a partner. Corporate sell their products as a live bird with the main consumen is seller distributor. They buy chicken in a bulk quantity and sell again to collectors. Then collectors sell to individual merchants in traditional markets, then after that reach to the end customers.
Condition Factors That Influence Competitiveness By Using Porter’s Five Forces Model

The analysis result is using Porter's Five Forces model to know factors condition that influence the competitiveness level of broiler chicken as can be seen on Figure 2. Competition environment that is faced by poultry business is generally from the high-demands level from buyer because buyer dominates the distribution chain. Producers are not yet have their own marketing channel. The distribution channel from producer to consumer is merely long. The stakeholders that involve in this selling process are distributor, sub-distributor, agent and individual merchant in traditional markets. Buyer is easily moving to other producer, with reason the buying requirement that is looser. The supplier also has high bargaining power because corporate can not determine the product quality that will be bought. The threat of new player as a broiler chicken breeder in that appears as single business entity or individual. Besides that other threat is the plan of import product (chicken leg quarter). The high price of chicken encourages them to enter the broiler chicken industry. The competition of each industry is including the rise of high capacity and less differentiation. Corporates compete to fight for plasm and get the buyer. The threat of substitution product, like black campaign threat and news that goes viral in socialmedia about farming product like: hormone usage, antibiotics residue, cholesterol content, triggers of any desease (cancer, high blood pressure, cholesterol) including livestock and environment sustainability, so that broiler chicken should be avoid.

![Figure 2 Analysis Competitiveness Improvement in Broiler Chicken by Using Porter’s Five Forces Model](attachment:image)

Alternative Strategy To Improve Competitiveness of Broiler Chicken

After knowing condition factors that influence competitiveness, next we do the analysis to determine the alternative strategy and then do the hierarchical process to determine priority strategies to be implemented to run broiler chicken business. From the interview results, we can obtain three essential answer that become purpose to improve the excellence competitiveness such as:

1. Lower the production cost by using chosen strategy in improving the horticulture technology, human resource competencies, and the implementation of information technology.
2. Improve processed product, strategy that is chosen is processed product diversification and the improvement of human resource competencies.
3. Expand the marketing networks with chosen strategy that is the improvement of human resources competencies and the implementation of information technology.

Priority Strategy Analysis in Improving Excellence Competitiveness

Next analysis that is done in this research is constructing hierarchy by seeing Focus, Factor, Purpose, and alternative strategy that has been analyzed on the next level. AHP to improve the excellence competitiveness can be seen on figure 3. Results from this vertical processing on AHP excellence competitiveness is as in follow:

1. Factor

   The outcome of vertical processing in Factor level for strategy decision making of excellence competitiveness that can be seen in Table 2. The results experts discussion shows that the main factor that is the most influencing towards the excellence competitiveness is from buyer bargaining level (F1) with value by 0.488. Corporate has an enough high dependencies as wholesalers in promoting their products, they know their marketing channel. The wholesalers by any reasons and chances always ask for discount. Because the product that is offered is live bird thus during the harvest season, whether want it or not the chicken should be harvested. Because if it is not sale soon, corporate will bear the risk so that they concerned with the wholesalers. Once the chicken is harvested, but the price is getting decrease, the wholesaler is asking for rebate.

   www.ijsrp.org
Second priority with the same value as 0.243 is competition factor between each corporate in same industry. The third priority with the value 0.146 is threat factor of newcomers. The fourth priority with value 0.083 is threat factor from substitute product. The fifth priority with the value 0.040 is a factor of supplier bargaining level. From AHP result with the minimum requirement less than 0.1, the output of five experts for those factors result consistency value in 0.06, this value is less than 0.1 thus can be concluded as reach the minimum consistency requirement from five experts in assessing the Factor.

2. Goal

The output of vertical processing on goal level to take strategy decision of improving excellence competitiveness can be seen in Table 3. This hierarchy result on goal result value with the third most priority, based on compounding assessment from experts result the most priority on the purpose hierarchy in which by decreasing production cost with value by 0.642. Main component on the cost structure of broiler chicken pricing is feed, around 70%. The decreasing of production cost can be reached by doing feeding efficency. Second priority with value by 0.258 is on the purpose of expanding on marketing network. The third priority with value by 0.100 is on Purpose improving processing product.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Value</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve processing product</td>
<td>0.100</td>
<td>3</td>
</tr>
<tr>
<td>Decreasing the Production Cost</td>
<td>0.642</td>
<td>1</td>
</tr>
<tr>
<td>Expand The Marketing Networks</td>
<td>0.258</td>
<td>2</td>
</tr>
</tbody>
</table>

From those AHP results with minimum consistency requirement less than 0.1, the compounding results from five exprers for the actor generates consistency value by 0.06 , in which this value less than 0.1 so that it can be concluded it has already expected the consistency level from 5 experts on assessing the Goal.

3. Alternative strategy
Results of vertical processing on alternative strategy level for strategy decision making of excellence competitiveness can be seen on Table 4.

<table>
<thead>
<tr>
<th>Alternative Strategy</th>
<th>Value</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing Product Diversification</td>
<td>0.172</td>
<td>3</td>
</tr>
<tr>
<td>Information Technology Implementation</td>
<td>0.062</td>
<td>4</td>
</tr>
<tr>
<td>Human Resources Competence Improvement</td>
<td>0.195</td>
<td>2</td>
</tr>
<tr>
<td>Farming Technology Improvement</td>
<td>0.571</td>
<td>1</td>
</tr>
</tbody>
</table>

Hierarchy result on the strategy generates the value with four priority levels, based on the compounding assessment from five experts it results the main priority on that strategy hierarchy is the improvement of horticulture technology with the value by 0.571. Second priority with the value by 0.195 is the improvement of human resource competencies and the third priority with the value by 0.172 is processing product diversification, and the fourth priority with the value by 0.062 is on information technology implementation. From the AHP results with the minimum requirement of the consistency in which less than 0.1, the compounding results from five experts for the alternative strategy results value by 0.06, in which this value is less than 0.1 so that can be concluded has been already meet the standard from these five experts in assessing the strategy.

The implementation of good farming technology can decrease the production cost. Feed is a main component for production cost. The feed usage indicator is based on feed conversion ratio (FCR), in which how much kilogram feed is needed to produce one kilogram chicken meat. The decreasing of FCR will improve the competitiveness. Besides that farming technology is expected to eliminate any negative impacts caused by global climate changing. The global climate changing will let any disease come. For example the emerging of any diseases that affects the harvest failure or the increasing of production cost. Leading farming need to be supported with the using of information technology so that it will encourage the agility in doing a decision making. The distributors dependancies can be handled by simplify the supply chain, through e-commerce. This strategic plan should be supported with the using information technology. It will encourage automation in any fields. Other strategic decision is by producing processing product. But this decision could be supported with a campaign that involving society to accept the processign chicken that is processed hygienically. The using of information technology is to make all of the internal business process become more efficient. The implementations of information technology are in supporting a decision making, production analysis, production cost calculation, and decision making in selling or not selling the product. Corporate is starting to realize that it is necessary to manage the human resource correctly. Employee with correct competencies inside their daily works will improve corporate performance. In determining competencies corporate need to identify a correct competency model used to activate human resource management. Business strategy that has been formulated needs to be implemented with supporting human resources. According to Dar (2011), Marchington (2003), DeSarbo et al (2007), Gilgieous & Parveen (2001), and Khandekar & Parveen (2001) excellence competitiveness can be created by empowering human resource.

Managerial Implications
Managerial implication that can be done by a corporation management is explained as follow:
1. The improvement of farming technology is in an implementation of chicken coop close house, positive or negative pressure usage, and bio security control
2. A good coop implementation management, therefore it results efficient chickens, because the death level is low and the usage of wool is growing
3. To improve the quality of human resource itself

IV. CONCLUSION AND RECOMENDATIONS

Conclusion
After this research is done, based on the research outcome it can be concluded as in follow:
1. To improve excellence competitiveness through decreasing in cost production
2. Alternative strategy chosen is in horticulture technology improvement and human resource competency improvement

Recommendations
This study can be a useful reference in anticipating business environment changing. To improve excellence competitiveness, corporate need to adopt latest and the most updated farming technology. Besides that corporate is need to upgrade the quality of human resources. Therefore, corporate can reach the excellence competetiveness in which technological and human resource based.

REFERENCES

www.ijsrp.org
AUTHORS

First Author – Soerjo Rahardjo, Post Graduate, School of Business, Bogor Agricultural University, Indonesia. Email: soerjorahardjo@gmail.com

Second Author – Prof. Dr Ir M.Parulian Hutagaol, MS, School of Business, Bogor Agricultural University, Indonesia. Email: parulian_gaol@yahoo.com

Third Author – Dr Ir Anggraini Sukmawati, MM, School of Business, Bogor Agricultural University, Indonesia. Email: anggrainism@apps.ipb.ac.id

Correspondences Author – Soerjo Rahardjo, soerjorahardjo@gmail.com, +628129294622.
ASSESSMENT OF THE CONTRIBUTION
FIREWOOD CONSERVATION STOVE
INSUSTAINABLE USE OF WOOD FUEL ENERGY
IN EMBU NORTH SUB –COUNTY, KENYA.

Janet Wangari Kariuki*, and Dr. Jane Mutinda**

*MSc. Student: Department of Environmental Science and Community Development; Kenyatta University: Nairobi, Kenya.
**Senior Lecturer: Department of Environmental Science and Community Development; Kenyatta University: Nairobi, Kenya.

Abstract- Wood energy is a renewable form of energy if sustainably utilized. In Africa, Kenya included, the dependence on natural regeneration compounded with increased use due to population pressure and wood fuel depletion is a major concern in the region. This led to the introduction of the firewood conservation stove to reduce consumption of firewood which is the main insource of domestic energy in Kenya. Although the intervention is in place, sustainable wood energy has not yet been achieved. Therefore there is need to assess the contribution of the intervention measure in enhancing sustainable wood energy use. The main objective of the study was to assess the contribution of the firewood conservation stove in sustainable use of wood fuel energy in Embu north Sub County, Embu County, Kenya. The specific objectives are: to assess the level of awareness on the stove in Embu North Sub County, Evaluate how the cost of the stove influenced its impact in sustainable use of wood fuel, finally to assess the level of utilization of the stove and the effect of this to sustainable wood fuel use in the study area. Criterion sampling was used for this study, where 105 house hold were sampled half of whom had the stove and the other did not. The study used survey design where questionnaires, interview schedule, focus group discussion and observation was used in data collection. The study was concluded that firewood stove had great potential in bringing wood energy sustainability but was not being utilized due to the faults in design as well as level of awareness. The study recommended that emphasis be put to create awareness of wood fuel conservation stove and community participation designing of the stove to make it user friendly.

Index Terms- firewood conservation stove, sustainable use.

INTRODUCTION
Wood is considered humankind’s very first source of energy. Today, it still is the most important source of renewable energy providing over 90% of the global total energy supply (International Energy Agency [IEA], 2015). Wood energy is as important as any other renewable energy sources. More than two billion people worldwide depend on wood energy for cooking and/or heating, particularly in households in developing countries (Food and Agriculture Organization of the United Nations, 2013). Firewood represents the only domestically available and affordable source of energy. Private households’ cooking and heating with fire wood represents one third of the global renewable energy consumption, making wood the most decentralized energy in the world (IEA, 2014).

Wood energy can be a sustainable energy as it is a renewable energy especially with efforts to improve its supply and enhance a sustainable demand (United Nations, 2015). Many conventions and international agreements have been established focusing on alternative sources of energy but it has become clear that the ladder energy theory of shifting energy sources if people have more income is not the case (Taylor et.al 2010, Kroon et.al2013). Therefore, there is a global shift to view biomass as a sustainable energy source (Campbell et.al, 2003). This has shifted focus from introduction of alternative energy sources to replace firewood to improving firewood technologies to make it more sustainable (Nansaioet.al, 2010). This led to introduction first of firewood energy conservation stove. This is an improved type of stove which is more efficient in wood use than the traditional three stone stove. It uses wood directly from harvesting having been only dried. Firewood saving is mainly due to the fact that the fired clay liner ensures heat is retained in the stove over a long time. The fired ceramic liner provides the thermal insulation to minimize heat loss (GTZ/PSDA, 2007). The stove can be fixed in the kitchen or can be portable by being enclosed in metal casing commonly known as Kunimblijiko. According to a research study done in Tanzania, a household using three stones stove consumes around 2880 kg/year of firewood. According to the study, through the use of improved firewood stove consumption is reduced to 1728 kg/year/household, annual saving is around 1152 kg/household (equivalent to more than 20 trees/year) (TATEDO, 2005). The adoption of firewood saving technologies would go a long way in ensuring sustainable use of the forest resources as the fuel wood demand will decrease. Currently the uptake of the fuel wood improved stove is estimated at 5% (Muchiri, 2008) and yet majority of the rural people in Kenya use firewood as their main source of fuel. Two factors have contributed to the introduction of energy conservation stoves. On one hand is the great effort to reduce excessive use of firewood in the attempt to safeguard forest lands and on the other hand is the effort to bring down the cost of firewood (Wereko-Brobby and Mintah, 2012). As this household fuel becomes more and more scarce, the law of supply and demand dictates that its price must go up. Consequently, there has been a dire need to come up with a strategy that reduces energy waste and hence reduce the amount of firewood that households use. Due to the combined effort of these two factors, the energy conservation stove was introduced (Theuri, 2002). It was hypothesized that it would achieve 30-45% savings on firewood, which means that it would theoretically reduce forest degradation by a similar value (United States Environmental Protection

www.ijsrp.org
Agency [US EPA], 2014). In Kenya, the introduction of energy cooking stoves was aimed at reducing firewood use by as much as 60% because the energy conservation stove would save over 60% of firewood compared to the traditional three stone fireplaces (Joint Energy and Environment Projects [JEEP], 2014). A study conducted using 800 households found that the energy conservation stove is capable of saving between 15% and 20% (Wereko-Brobby and Mintah, 2012). The achievement of such huge savings on firewood use would indeed make great contribution towards the reduction in firewood use. However, while the introduction of the energy conservation stove was based on high levels of optimism, the achievement of the hypothesized savings has not yet been determined or sufficient studies on this have not yet been conducted. This research study tried to seal this gap by determining whether the energy conservation stove has achieved the levels of firewood savings forming the basis of its introduction.

Acceptability is a major factor affecting the effectiveness of any technology in achieving its desired goal. High acceptability rates mean high intention, by intended users, to use the technology. However, this does not imply high adoption rate because acceptability is just but one element of the adoption equation where other factors such as cost take effect. The intention to use energy conservation stove is high. In a study conducted in Accra, Ghana, to assess the acceptability of the energy conservation stove, the acceptability rate was found to be at 90% despite the high cost of the same compared to the traditional cooking stove (Wereko-Brobby and Mintah, 2012). In Kenya, on the contrary, a project aimed at protecting the Kakamega forest managed to introduce 3,795 energy conservation cooking stoves to homesteads surrounding the forest within two years (Anon, 2012). Despite massive campaigns aimed at promoting energy conservation stoves, it is worrying that the level of penetration of improved efficient woodstoves for the rural households is still below 5%, yet there is enormous potential (Muchiri, 2008).

Although the energy conservation stove technology has been found to achieve significant reduction in firewood use, such assessments have not been conclusive on its actual level of success in making firewood sustainable. Therefore, there is a need of this study to answer that question.

Objectives of the study

Main Objective.
To establish the effectiveness of the energy conservation stove technology in achieving sustainable use of fuel wood energy in Embu North Sub County.

Specific Objectives.
1. To establish the level of awareness and community perception of the wood fuel conservation stove in achieving sustainable use of fuel wood energy in Embu North Sub County.
2. To evaluate the Level of utilization and impact in achieving sustainable use of fuel wood energy in Embu North Sub County.

II MATERIALS AND METHOD

Research site
The study was carried out in Embu North Sub County, an administrative unit in the larger Embu County. The County covers 111.7 Sq Kilometers and has a population density of 661 people per square kilometer (KNBS, 2013). The total population of the Sub County is 73841 people with a total of 19,131 households (KNBS, 2013). Embu people inhabit the region and their main economic activity is farming (KNBS, 2013). Figure 1

Figure 1.0: Map of Embu North, the Study Area.

Embú North is a cool and wet area on the south east of the slopes of Mt. Kenya on the windward side at an altitude of 2070 meters above sea level (Kenya Information Guide, 2015). Wood energy is readily available considering that the Irangi forest and the Mount Kenya forest are nearby; however, the move by the government to regulate tree harvest has resulted in dire shortage of the source of energy for families. Mt. Kenya is one of the main water towers in the country. Its destruction from deforestation has caused concern (Kenya Information Guide, 2015). Therefore firewood conservation stove was introduced by the government as well as the NGOs to enhance sustainable wood energy use. Little impact has been felt in reduced demand of firewood. Therefore the need to assess the level of success of the intervention in enhancing sustainable wood energy.

Sampling and Sampling Techniques

Sampling Frame describes how the researcher determined her sample size and sampling techniques used. As ample is that number of people selected from the entire population for the purpose of research by the researcher (Creswell, J. W., 2013). This study adopted the stratified and purposive technique as an alternative to probability technique due to limited time and resources.

The sampling method used the administrative units in the Sub County to classify the households in distinctive strata. There are a total of 7 administrative units in Embu North Sub-County(Marlow, 2003), states that at least 30% of the
total population is representative. Thus, 30% of the accessible population is enough for the sample size. The total number of households in the sub county was 19,131. The target Population were all households that had acquired any type of wood energy conservation stove, these were 513 households. The total number of sampled households was therefore 123. This makes up 36.9% of the target population. Further, key informants were also included in the sample where one respondent was selected from each administrative unit. The total sample size for the study was therefore was 130.

Table 1. Sampling method

<table>
<thead>
<tr>
<th>Administrative unit/Village</th>
<th>Target population (N)</th>
<th>Key informants</th>
<th>total respondents(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruguru</td>
<td>50</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Ngandori west</td>
<td>68</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Kathanagrire</td>
<td>70</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>Mbovuri</td>
<td>46</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Gaturi North</td>
<td>96</td>
<td>1</td>
<td>28</td>
</tr>
<tr>
<td>Kimbugu</td>
<td>107</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td>Ngondori East</td>
<td>76</td>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>513</strong></td>
<td><strong>7</strong></td>
<td><strong>123 (7+123=130)</strong></td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSION

Evaluation of Firewood conservation stove for sustainable energy use.

Firewood conservation stove technology was evaluated based on its effectiveness in reduction of firewood consumption, as a measure of enhancing sustainable wood fuel energy use in the study area. The first part analysed the perception and level of awareness of the house holds about the technology. The second part analysed the stoves utilisation in comparison with other biomass stoves; that is the traditional three stones stove and the charcoal stove. The third part presents findings on the stoves impact on firewood consumption. The final part will analyse the challenges facing the utilisation of the stove.

Level of awareness and community perception of the technology.

Table 2. Level of awareness of the conservation stove

<table>
<thead>
<tr>
<th>%</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aware of the stove</td>
<td>11%</td>
</tr>
<tr>
<td>Aware and have acquired</td>
<td>9%</td>
</tr>
<tr>
<td>Aware and have not acquired</td>
<td>1%</td>
</tr>
<tr>
<td>Not aware</td>
<td>79%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Unavailability of the stoves as well as artisans to make them. The technology was mainly promoted by one NGO and community based organisation in the study area. The organisations mainly dealt with the portable firewood stoves, which were found to be less popular than the fixed stoves.

Table 3: Level of Utilisation of the firewood stove

<table>
<thead>
<tr>
<th>Number of households with conservation stove</th>
<th>%</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>Sometimes</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Rarely</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>Never</td>
<td>40</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td>14</td>
</tr>
</tbody>
</table>

From table three the level of utilisation of the stove among those who had acquired it was at 60%. This showed that acquisition did not directly mean utilisation of the technology. The term conservation stove was mainly interpreted to mean the charcoal conservation. With 80% stating that the wood fuel conservation stove only utilised charcoal. It was clear that the level of awareness and understanding of the technology has reduced its uptake and utilisation.
The charcoal conservation stove was introduced as the main wood fuel energy conservation technology. This stove was commonly known as KCJ-Kenya Ceramic stove, it was developed through a design process spearheaded by the Ministry of Energy. The stove easily found acceptance among urban stove producers who were initially offered free training and marketing support by the ministries of Energy, Agriculture, and Environment and Natural resources. Therefore the introduction of the firewood conservation stove found challenges as it came as a secondary solution to the KCJ stove.

**Impact of firewood stove on wood fuel consumption**

It was found that the conservation stove reduced firewood consumption from about 3 loads per week to about 1.5 loads per week. The study estimated one load to weigh on average 20kg. This brought the consumption of the three stone stove to 3120kg/year. With the conservation stove the consumption halved to 1560kg/year. This accounted for 17.95%. These results were similar to the studies done in Tanzania, a household using three stones stove consumes around 2880 kg/year of firewood. According to the study, through the use of improved firewood stove consumption is reduced to 1728 kg/year/household, annual saving is around 1152 kg/household (equivalent to more than 20 trees/year) (TaTEDO, 2005)

Table 4: Impact of firewood stove on wood fuel consumption.

**Comparison with other biomass stoves**

There are three main stoves utilised in the study area which are the traditional three stones stove, the improved charcoal stove and the firewood conservation stove. This part of the study compared the firewood conservation stove with the two other stoves in terms of their level of acquisition and utilisation in order to understand their influence on the use of the Firewood conservation stove.

**Comparison with three stones traditional stove**

Figure 6: Comparison of use between three stone and fire wood conservation stoves.

It was found that only 10% of households used the fire wood conservation stove, while 90% used the three stone traditional stoves. It was found that the fixed firewood conservation stove was more available in the house holds than the mobile stove. This was said to be because the fixed stove as modelled mainly by women groups and thus done to their specifications mainly address their needs. While the mobile one was fabricated by the organisations introducing them and had challenges in the design that made it hard for the women to use them. This led to some households who had acquired them not to use them. A majority of the respondents (90 %) in the study area reported that they had never used improved firewood stoves. However, about 9% of the respondents reported always using the improved stove compared to less than 1% who used it sometimes.

Figure 5: Rating of wood fuel stove use

The fabrication of the fixed stove was highlighted as being time consuming and required skill set to produce a viable stove. This was unlike the traditional stove that just required having the stones of approximately same size and shape and the distance between them could be adjusted as per the size of the cooking pan in use. With the three stone stove the households were able to use crop residue which was not possible with mobile firewood stove. This made the households to opt for the three stone stove though most knew that its wood consumption was high.

The traditional stove was found to be multipurpose unlike the improved stove as it was being used to light the kitchen as well as for heating the house at night which was not possible with the improved stove due to the ceramic lining.

**Comparison with conservation charcoal stove**

The study showed that charcoal was second in use from firewood. The charcoal conservation stove was prominent
than the firewood improved stove as found in figure 4.2. The charcoal stove acquired by 88.6% of the households with the firewood stove acquired by only 10%. It was found that all the households who had acquired charcoal stove had the traditional three stone stove which was used as the main source of energy and the charcoal stove mainly used to warm the house at night and supplement in cooking. While those that used the mobile conservation stove did not have the charcoal stove.

The acquisition and use of firewood stove is quite low compared to the number of households who were using wood fuel as their main source of fuel for cooking and heating purposes. The findings are much lower than those of Karanja (1999) in a study done in Kathiani, Kenya where the use of firewood conservation stoves was 43.4% compared to 9.8% in Embu North Sub County.

The findings were in agreement with (Owino, 2006) and also (Johnson, 2007) who stated that there was low utilization of the improved wood stove in Kenya. In the study area the reasons for the low uptake and utilization was attributed to the high cost of the stoves and minimal availability of the stoves in the local market.

### Challenges facing firewood cook stove

The success of the firewood conservation stove was found to be minimal though there is great potential due to the high dependence of the community to wood energy in the study area. The key issues highlighted as the main challenges to utilisation were the retention of ashes in the combustion chamber, slow in cooking, as well as accommodating small sized pieces of wood thus requires constant addition and attention. This made multitasking by the women hard. All these hampered the effective utilization of the stove.

The cost of the stove was found to be inhibitory to its acquisition this was more so because the alternative technology which is the traditional three stone stove has no installation cost and thus most of the households were not finding it as a necessary cost.

The stoves’ availability was also a challenge. The stove was promoted mainly by one NGO and therefore is not able to distribute effectively due to the inadequate capacity. The artisans trained on its installation are also few and at the...
same time though trained by the NGO on the installation they are paid by the individual household they install for which brought a challenge since most community members expect free services from the NGOs. Unlike in the Charcoal saving stove the government had not played a role in the introduction of the firewood conservation stove. Since the government involvement gives legitimacy to a technology the firewood stove lacked this support.

The design of the cook stove has several limitations in its utilization; it requires finely split wood fuel which is a challenge to the women. The design restricts use to only cooking, while it is not effective in warming or lighting of the house as the traditional three stone stoves. The respondents highlighted a difficulty in utilization of the stove mainly the mobile one due to the clogging of the ventilation holes by ashes which makes the stove not to light. The charcoal stove is more available and affordable compared to the firewood stove. This makes the households to opt for as an alternate for the three stone stoves.

Conclusion and Recommendation

Conclusion
According to the study the following conclusions were made:
The use of the firewood conservation stove reduced firewood consumption by 17.95% compared to the traditional three stone stove. Regardless of this the level of acquisition and use was found to be below 10%. This was due to the level of awareness of the firewood conservation stove that was found to be at 10%. In comparison the firewood conservation stove was least used compared to the three stone traditional stove and the charcoal stove.
The main challenges found to the utilization of the stove were; availability, cost and poor design.

5.3 Recommendation
1. Awareness creation and focus on the firewood conservation stove so as to make more available as well as affordable by the NGOs involved in the sector as well as the Kenya Forest Service.
2. There is need for aggressive campaign in dissemination of improved firewood stoves technology in order to reduce pressure on forest and other woodlands surrounding Irangi block of Mt. Kenya forest mainly by the KFS.
3. An energy center needs to be established in the Embu North Sub County which can act as the focal point for dissemination of energy efficient technologies.
4. It is important to build capacity of field extension staff in the energy sector ministries e.g. Ministry of environment, Ministry of energy.

There is need for standardization in the design and making of energy efficient stoves so that quality may not be compromised in expense of quantity in order to make more money. Compromise of quality may make households revert back to metallic stoves which lasts longer but are energy inefficient.
The conservation of wood energy should be given a priority through promotion of improved stoves with higher efficiency. The improved stoves to be promoted for adoption should consider users’ needs which include cooking comfort, convenience, health, safety and their affordability as these factors influence adoption of improved cooking devices.

Strengthen wood energy institutional framework Wood energy systems have multi-disciplinary characteristics with many stakeholders strongly integrated between the socio-economic layers of rural areas, all requiring technical agencies from forestry, agriculture and industry sectors. Therefore, wood energy development strategies should be pursued as common task by all the relevant sectors. The coordination and linkages among the sectors concerned has been weak and need to be strengthened, (IJST, 2012).

Enabling wood energy policy and planning Firewood production strategy should be developed with prime objective of making each county self-sufficient. Decentralized area based wood energy planning is the most suitable in Kenya as wood energy situation and problems are site-specific and vary from one region to the other. Therefore, the implementation strategies in the decentralized wood energy plan should be site specific depending on the prevailing problems.

Improvement of wood energy database to improve wood energy data within the country, wood energy databases should be established at regional and national levels. These can be achieved through establishing regular field surveys for wood energy, supply, demand and data analyses to monitor the changes over time. Regular surveys need to be undertaken in future preferably at five year intervals to enable updating the data for future wood energy plans and policy formulations.

References


Authors

First Author

Janet Kariuki is currently a Project coordinator at an one governmental organization - Environmental Conservation Network. An Environmental Impact Assessment consultant. A grandanda of Kenyatta University, Masters of Environmental Science, and Community Development: Nairobi, Kenya. Email: jntkariuki@gmail.com

Second Author

Dr. Jane Mutinda is a senior lecturer in the School of Environmental Science, Department of environmental Science and Community Development at Kenyatta University: Nairobi, Kenya. Email: Mutinda.jane@ku.ac.ke

www.ijsrp.org
ACADEMIC ACHIEVEMENT AMONG YOUTH OF JAMMU.

Neeru Sharma*, Meenakshi Anand** and Harpreet Kour***

Department of Home Science, University of Jammu, Jammu 180006, J &K
Meenakshi26oct@gmail.com, Mobile no- 9419597143

ABSTRACT

The present research was undertaken on Academic Achievement among youth of Jammu District. The sample for the study comprised of 120 youth, out of which 60 respondents (30 male and 30 female) in the age group of 18-22 years were from urban areas and 60 (30 male and 30 female), from the same age group, were from rural areas. They were selected from Government Colleges of Jammu. The tool used for the study was Performa for Background Information, which included the Academic achievement in Classes 10th and 12th. Mean age of the respondents (both male and female) was 19 years. Most of the respondents from both urban and rural areas resided in the nuclear families. Most of the male respondents were studying in 2nd Semester and most of the female respondents were in 4th Semester, of their Graduate Degree Program. Most of urban respondents had obtained 50-60% of marks and fall in the category of ‘Above Average’ Academic Achievement, whereas most of the rural respondents had scored 70-80% of marks and fall in the range of ‘Very Good’ in Academic Achievement, in class 10th. Results reveal significant sex difference in Academic Achievement in class 10th. Most of the urban and rural respondents had obtained 60-70% of marks and fall in the category of ‘Good’ Academic Achievement, in class 12th. Significant sex differences were observed in Academic Achievement in class 12th.

Keywords: Academic Achievement, Youth

INTRODUCTION

Academic Achievement means the acquired knowledge by individual from the school. Academic Achievement or Academic performance is the outcome of education- the extent to which a teacher or institution has achieved their educational goals. Academic Achievement is commonly measured by examinations or continuous assessment but there is no general agreement on how it is best tested or which aspects are more
important. According to Lawrence (2012) Academic Achievement is a measure of knowledge gained in formal education usually indicated by test scores, grade points, average and degrees.

Academic Achievement occupies a very important place in education as well as in learning process. It has become an index of child’s future in this competitive world. It has been one of the most important goals of the educational process. Depending upon the level of achievement, individuals are characterized as high achievers, average and low achievers. It means the achievements of pupils in the academic subjects. Students, colleges and universities have no worth without student. Students are most essential asset for any educational institute. The social and economic development of the country is directly linked with student academic performance. The students performance (academic achievement) plays an important role in producing the best quality graduates who will become great leader and manpower for the country thus responsible for the country’s economic and social development (Ali et.al, 2009). The extent of student’s learning in academics may be determined by the grades that a student earns for a period of learning that has been done. It is believed that a grade is the primary factor that indicates such learning. If a student earns high grades it is concluded that they may also have learned a lot while low grades indicate lesser learning.

FACTORS THAT AFFECT STUDENT’S ACADEMIC ACHIEVEMENT:-

- The support and availability of the parents, their financial situation and standard of living. It has been observed that students in socioeconomically disadvantaged areas get lower marks.

- The geographical location of the educational institution.

- The grouping together, in certain schools, of students with severe learning difficulties, or with problems associated with psychosocial integration in special education classes.

- The various practices pertaining to the student admission requirements. Some educational institutions admit students indiscriminately, whereas other selects them on the basis of previous academic achievement or their results on aptitude tests.

RESEARCH METHODOLOGY
The present study was undertaken to know the Academic Achievement of college going students.

SAMPLE

The sample of 120 Youth from rural and urban area of Jammu district were selected for the study. The sample further comprised of 30 males and 30 females from rural areas and 30 males and 30 females from urban areas. For the purpose of study District Jammu was selected purposively. From the urban and rural areas of Jammu, a list of colleges was prepared and out of them two colleges from urban and two colleges from rural areas was selected randomly. Further from each college 15 girls and 15 boys were selected, by using lottery method. They were listed as per their residence. Those studying in city colleges and belonging to rural areas were not included as the sample, similar criteria was followed for the selection of sample from rural areas.

TOOLS USED FOR THE STUDY

- **Academic Achievement:** Aggregate % of marks obtained by the sample in their 10\textsuperscript{th} and 12\textsuperscript{th} class examination were collected and treated as in indicators of academic achievement. It was analyzed as below, looking at the University Criteria.

<table>
<thead>
<tr>
<th>Academic Achievement category</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Average</td>
<td>40-50</td>
</tr>
<tr>
<td>Above Average</td>
<td>50-60</td>
</tr>
<tr>
<td>Good</td>
<td>60-70</td>
</tr>
<tr>
<td>Very Good</td>
<td>70-80</td>
</tr>
<tr>
<td>Excellent</td>
<td>80-90</td>
</tr>
<tr>
<td>Outstanding</td>
<td>90-100</td>
</tr>
</tbody>
</table>

DATACOLLECTION:-

Before finalizing the tool for data collection, pretesting was done on a sample of 20 (10 male and 10 female) students to ensure the validity of scales. After pretesting, no need for modifications was felt and the
tools were finalized for data collection. After finalizing the tool, the data was collected by visiting the selected Government Colleges in rural (R.S Pura and Bishnah) and urban (Canal road and Ambedkar road) areas of Jammu. It took one month for data collection. It was not easy to get information from the sample. Researcher introduced herself and objectives of her study to build the rapport with respondents. A verbal consent from the respondents, prior to interview, was obtained. They were ensured the confidentiality of their responses.

DATA ANALYSIS:-

Data was subjected to both content and statistical analysis. Frequencies, percentages, chi-square, Mean, Standard deviation, t-test, ANOVA and correlation were calculated to describe and compare the data. The data has been presented in the form of tables, figures and diagrams.

RESULTS AND DISCUSSION

2. BACKGROUND INFORMATION OF THE RESPONDENTS:-

Table No. 1.1:- Age wise distribution of the respondents (Area wise)

<table>
<thead>
<tr>
<th>Age (in Years)</th>
<th>Urban(n=60)</th>
<th>Rural(n=60)</th>
<th>Total(n=60)</th>
<th>Urban(n=60)</th>
<th>Rural(n=60)</th>
<th>Total(n=60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-20</td>
<td>Male(n=30)</td>
<td>N (%)</td>
<td>Male(n=30)</td>
<td>N (%)</td>
<td>Male(n=30)</td>
<td>N (%)</td>
</tr>
<tr>
<td></td>
<td>Female(n=30)</td>
<td>N (%)</td>
<td>Female(n=30)</td>
<td>N (%)</td>
<td>Female(n=30)</td>
<td>N (%)</td>
</tr>
<tr>
<td>18-20</td>
<td>19 (31.66)</td>
<td>25(41.66)</td>
<td>44(36.66)</td>
<td>21(35)</td>
<td>24(40)</td>
<td>45(37.5)</td>
</tr>
<tr>
<td>21-23</td>
<td>11(18.33)</td>
<td>5(8.33)</td>
<td>16(13.33)</td>
<td>9(15)</td>
<td>6(10)</td>
<td>15(12.5)</td>
</tr>
<tr>
<td>Mean S.D</td>
<td>20±1.17</td>
<td>19.90±.88</td>
<td>19.73±1.36</td>
<td>19.26±1.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. No. 1.1:- Agewise Distribution (Area wise)

www.ijsrp.org
Table 1.1 and its figurative presentation(Fig. no. 1.1) indicate that majority of the urban and rural respondents (36.66% and 37.5% respectively) were in the age group of 18-20 years. From Urban areas, majority of the male and female respondents (31.66% and 41.66% respectively) were in the age group of 18-20 years whereas 18.33% male and 8.33 % female respondents were in the age group of 21-23 years. From Rural areas, majority of the male and female respondents (35% and 40% respectively) were in the age group of 18-20 years whereas 15% male and 10% female respondents were in the age group of 21-23 years.

Mean age of urban male was 20.16 ±1.17 i.e 20 years and urban female was 19.90± 0.88 i.e 19 years whereas mean age of rural male was 19.73±1.36 i.e 19 years and rural female was 19.26±1.04 i.e 19 years. They were all in their early adulthood.

Table No. 1.2:- Age wise distribution of the respondents (Sex wise)

<table>
<thead>
<tr>
<th>Age (in Years)</th>
<th>Male(n=60)</th>
<th>Female(n=60)</th>
<th>Total(n=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-20</td>
<td>40 (66.66)</td>
<td>49 (81.66)</td>
<td>89 (74.16)</td>
</tr>
<tr>
<td>21-23</td>
<td>20 (33.33)</td>
<td>11 (18.33)</td>
<td>31 (25.8)</td>
</tr>
<tr>
<td>Mean S.D</td>
<td>19.95±1.28</td>
<td>19.58±1.01</td>
<td>19.76±1.16</td>
</tr>
</tbody>
</table>

Table 1.2 and its figurative presentation(Fig. no. 1.2) indicate that majority of the respondents (74.16%) were in the age group of 18-20 years. Majority of the male respondents (66.66%) and female respondents
(81.66%) were in the age group of 18-20 years. It can be concluded that the mean age of the male respondents was 19.95 ±1.28 i.e 19 years and female respondents was 19.58±1.01 i.e 19 years.

Table No. 1.3:- Type of the family of the respondents (Area wise)

<table>
<thead>
<tr>
<th>Type Of The Family</th>
<th>Urban(n=60) Male(n=30) N(%)</th>
<th>Female(n=30) N(%)</th>
<th>Total(n=60) N(%)</th>
<th>Rural(n=60) Male(n=30) N(%)</th>
<th>Female(n=30) N(%)</th>
<th>Total(n=60) N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear</td>
<td>18(30)</td>
<td>19(31.66)</td>
<td>37(30.8)</td>
<td>25(41.66)</td>
<td>22(36.66)</td>
<td>47(39.16)</td>
</tr>
<tr>
<td>Joint</td>
<td>12(20)</td>
<td>11(18.33)</td>
<td>23(19.16)</td>
<td>5(8.33)</td>
<td>8(13.33)</td>
<td>13(10.8)</td>
</tr>
</tbody>
</table>

$\chi^2$ 0.07 NS 0.88 NS

NS=Non Significant

Table no.1.3and its figurative presentation (Fig. no. 1.3) indicate that majority of the urban and rural respondents (30.8% and 39.16% respectively) reside in the nuclear families. Majority of male and female respondents from both Urban and Rural areas (Urban males 30%, Urban females 31.66%, Rural males 41.66% and Rural females 36.66% respectively) reside in the nuclear families. Results further reveal that more respondents from urban areas (20% male and 13.33% female) reside in joint families as compared to respondents from the rural families. Chi square value reveals insignificant area wise differences in the type of family of the respondents.

Table No. 1.4:- Type of the family of the respondents (Sex wise)
Table no.1.4 and its figurative presentation (Fig. no. 1.4) indicate that majority of the respondents (70%) reside in the nuclear families. Majority of the male and female respondents (71.66% and 68.33% respectively) reside in the nuclear families. Chi square value reveals insignificant sex wise differences in the type of family of the respondents.

2 EDUCATIONAL STATUS OF THE RESPONDENTS

Table No. 2.1: Semester wise distribution of the Undergraduate respondents (Area wise)

<table>
<thead>
<tr>
<th>Semester wise Distribution In UG</th>
<th>Urban(n=60) Male(n=30)</th>
<th>Female(n=30)</th>
<th>Total(n=60)</th>
<th>Rural(n=60) Male</th>
<th>Female</th>
<th>Total(n=60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sem</td>
<td>02(3.33)</td>
<td>02(3.33)</td>
<td>4(3.33)</td>
<td>02(3.33)</td>
<td>00(0)</td>
<td>2(1.6)</td>
</tr>
<tr>
<td>2nd Sem</td>
<td>14(23.33)</td>
<td>07(11.66)</td>
<td>21(17.5)</td>
<td>07(11.66)</td>
<td>08(13.33)</td>
<td>15(12.5)</td>
</tr>
<tr>
<td>3rd Sem</td>
<td>02(3.33)</td>
<td>00(0)</td>
<td>02(1.6)</td>
<td>04(6.66)</td>
<td>03(5)</td>
<td>7(5.8)</td>
</tr>
</tbody>
</table>
The study was carried out on the sample studying in the Undergraduate Program. Table No. 2.1 and its figure presentation (fig no. 2.1) show that most of the urban respondents (17.5%) were studying in 2nd semester and most of the rural respondents (25%) were in 4th semester. From urban areas, most of the male respondents (23.33%) were studying in 2nd semester whereas most of the female respondents (21.66%) were in 6th semester. From rural area, most of the male and female respondents (21.66% and 28.33% respectively) were studying in 4th semester. Chi square value reveals insignificant differences regarding area wise differences in the education of the undergraduate respondents.

**Table No. 2.2:- Semester wise distribution of the Undergraduate respondents (Sex wise)**

<table>
<thead>
<tr>
<th>Semester wise Distribution In UG</th>
<th>Male (n=60) N(%)</th>
<th>Female(n=60) N(%)</th>
<th>Total (n=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sem</td>
<td>04(6.66)</td>
<td>02(3.33)</td>
<td>6(5)</td>
</tr>
</tbody>
</table>
Table No. 2.2 and its figurative presentation (fig. no. 2.2) show that majority of the respondents (35%) were studying in 4th semester. Most of the male respondents (35%) were studying in 2nd semester and most of the female respondents (41.66%) were in 4th semester. Chi square value reveals insignificant sex wise differences in the semester wise distribution of the undergraduate respondents.

### 3 ACADEMIC ACHIEVEMENT

#### Table No. 3.1: Percentage of marks obtained in class 10th (Area wise)

<table>
<thead>
<tr>
<th>%age of marks obtained</th>
<th>Urban(n=60) Male(n=30) N(%)</th>
<th>Female(n=30) N(%)</th>
<th>Total (n=60)</th>
<th>Rural(n=60) Male(n=30) N(%)</th>
<th>Female(n=30) N(%)</th>
<th>Total (n=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-50(Below average)</td>
<td>-</td>
<td>01(1.66)</td>
<td>01(0.83)</td>
<td>1(1.66)</td>
<td>02(3.33)</td>
<td>03(2.5)</td>
</tr>
<tr>
<td>50-60(Above)</td>
<td>13(21.66)</td>
<td>05(8.33)</td>
<td>18(15)</td>
<td>11(18.33)</td>
<td>03(5)</td>
<td>14(11.66)</td>
</tr>
</tbody>
</table>
Results in table no. 3.1 and its figurative presentation (fig. no.3.1) indicate that most of urban respondents (15%) had obtained 50-60% of marks and fall in the category of ‘Above Average’ Academic Achievement, whereas most of the rural respondents (15%) had scored 70-80% of marks and fall in the range of ‘Very Good’ Academic Achievement. Most of the urban male respondents (21.66%) had scored 50-60% of marks and fall in the range of ‘Above Average’ whereas most of female respondents (21.66%) from urban area had scored 60-70% of marks and fall in the range of ‘Good’ Academic Achievement in class 10th. Most of the rural male respondents (18.33%) had obtained 50-60% of marks and fall in the category of ‘Above Average’ whereas 13.33% female respondents from rural areas had obtained 70-80% of marks and fall in the category of ‘Very Good’ and equal number of female respondents (13.33%) had scored 80-90% of marks and fall in the range of ‘Excellent’ in their Academic Achievement in class 10th. Chi square value reveals insignificant area wise differences among percentage of marks obtained in class 10th.

Table No. 3.2: Percentage of marks obtained in class 10th (Sex wise)
<table>
<thead>
<tr>
<th>%age of marks obtained</th>
<th>Male (n=60) N(%)</th>
<th>Female (n=60) N(%)</th>
<th>Total (n=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-50 (Below average)</td>
<td>1(1.66)</td>
<td>03(5)</td>
<td>4(3.33)</td>
</tr>
<tr>
<td>50-60 (Above average)</td>
<td>24(40)</td>
<td>08(13.33)</td>
<td>32(26.66)</td>
</tr>
<tr>
<td>60 – 70 (Good)</td>
<td>9(15)</td>
<td>19(31.66)</td>
<td>28(23.33)</td>
</tr>
<tr>
<td>70 – 80 (Very Good)</td>
<td>19(31.66)</td>
<td>16(26.66)</td>
<td>35(29.16)</td>
</tr>
<tr>
<td>80 – 90 (Excellent)</td>
<td>06(10)</td>
<td>11(18.33)</td>
<td>17(14.16)</td>
</tr>
<tr>
<td>90-100 (Outstanding)</td>
<td>01(1.66)</td>
<td>03(5)</td>
<td>4(3.33)</td>
</tr>
</tbody>
</table>

χ² = 15.29**

**Sig at the p≤0.01

Results in table no. 3.2 and its figurative presentation (fig. no. 3.2) indicate that most of male respondents (40%) had obtained 50-60% of marks and fall in the category of ‘Above Average’ Academic Achievement, whereas most of the female respondents (31.66%) had scored 60-70% of marks and fall in the range of ‘Good’ Academic Achievement. Chi square value reveals significant sex difference among percentage of marks obtained in class 10th.

Table No. 3.3: Percentage of marks obtained in class 12th (Area wise)

<table>
<thead>
<tr>
<th>%age of marks obtained</th>
<th>Urban (n=60) Male (n=30) N(%)</th>
<th>Female (n=30) N(%)</th>
<th>Total (n=60)</th>
<th>Rural (n=60) Male (n=30) N(%)</th>
<th>Female (n=30) N(%)</th>
<th>Total (n=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-50 (Below average)</td>
<td>1(1.66)</td>
<td>5(8.33)</td>
<td>06(5)</td>
<td>01(1.66)</td>
<td>02(3.33)</td>
<td>03(2.5)</td>
</tr>
<tr>
<td>50-60 (Above average)</td>
<td>12(20)</td>
<td>7(11.66)</td>
<td>19(15.83)</td>
<td>12(20)</td>
<td>03(5)</td>
<td>15(12.5)</td>
</tr>
<tr>
<td>60-70 (Good)</td>
<td>12(20)</td>
<td>9(15)</td>
<td>21(17.5)</td>
<td>10(16.66)</td>
<td>10(16.66)</td>
<td>20(16.66)</td>
</tr>
<tr>
<td>70-80 (Very Good)</td>
<td>4(6.66)</td>
<td>7(11.66)</td>
<td>11(9.16)</td>
<td>4(6.66)</td>
<td>08(13.33)</td>
<td>12(10)</td>
</tr>
<tr>
<td>80–90 (Excellent)</td>
<td>1(1.66)</td>
<td>01(1.66)</td>
<td>02(1.66)</td>
<td>1(1.66)</td>
<td>05(8.33)</td>
<td>06(5)</td>
</tr>
</tbody>
</table>

www.ijsrp.org
Table No. 3.3 and its figurative presentation indicate that urban respondents (17.5%) and rural respondents (16.66%) had obtained 60-70% of marks and falls in the category of ‘Good’ Academic Achievement. Most of male respondents (20%) from urban areas had obtained 50-60% of marks and falls in the category of ‘Above Average’ Academic Achievement and equal number of male respondents (20%) had scored 60-70% of marks and falls in the range of ‘Good’ Academic Achievement in class 12th whereas most of female respondents (15%) from urban areas had scored 60-70% of marks and falls in the range of ‘Good’ Academic Achievement. Most of the rural male respondents (20%) had obtained 50-60% of marks and falls in the category of ‘Above Average’ Academic Achievement whereas 16.66% female respondents from rural areas had obtained 60-70% of marks and falls in the category of ‘Good’ Academic Achievement in class 12th. Chi square value reveals that insignificant area wise difference among percentage of marks obtained in class 12th.

Table No. 3.4: Percentage of marks obtained in class 12th (Sex wise)

<table>
<thead>
<tr>
<th>%age of marks obtained</th>
<th>Male (n=60)</th>
<th>Female (n=60)</th>
<th>Total (n=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-50 (Below average)</td>
<td>02(3.33)</td>
<td>07(11.66)</td>
<td>09(7.5)</td>
</tr>
<tr>
<td>50-60 (Above average)</td>
<td>24(40)</td>
<td>10(16.66)</td>
<td>34(28.33)</td>
</tr>
<tr>
<td>60 – 70 (Good)</td>
<td>22(36.66)</td>
<td>19(31.66)</td>
<td>41(34.16)</td>
</tr>
<tr>
<td>70 – 80 (Very Good)</td>
<td>08(13.33)</td>
<td>15(25)</td>
<td>23(19.16)</td>
</tr>
</tbody>
</table>

NS = Non Significant
Table No. 3.4 and its figurative presentation (3.4) indicates that most of the respondents (34.16%) had obtained 60-70% of marks and falls in the range of ‘Good’ Academic Achievement in class 12th. Most of male respondents (40%) had obtained 50-60% of marks and falls in the category of ‘Above Average’ Academic Achievement in class 12th, whereas most of the female respondents (31.66%) had obtained 60-70% of marks and falls in the range of ‘Good’ Academic Achievement in class 12th. Chi square value reveals that significant sex difference among percentage of marks obtained in class 12th.

CONCLUSION

Academic Achievement is very important in our Indian society, where numerical achievement matters more than the skills while seeking higher education and employment. Academic Achievement or Academic Performance is the outcome of education. Academic Achievement occupies a very important place in education as well as in learning process.

The major findings of the Study were:

Majority of the Urban and Rural respondents were in the age group of 18-20 years. Mean age of the male and female respondents was 19 years. Most of the respondents, from both urban and rural areas, reside in the nuclear families. Most of the urban respondents were studying in 2nd Semester and most of the rural respondents were in 4th Semester of their Graduate Degree Program. Most of the male respondents were studying in 2nd Semester and most of the female respondents were in 4th Semester. In Class 10th most of urban
respondents had obtained 50-60% of marks and fall in the category of ‘Above Average’ Academic Achievement, whereas most of the rural respondents had scored 70-80% of marks and fall in the range of ‘Very Good’ Academic Achievement. Most of male respondents had obtained 50-60% of marks and fall in the category of ‘Above Average’ Academic Achievement, whereas most of the female respondents had scored 60-70% of marks and fall in the range of ‘Good’ Academic Achievement. Results reveal significant sex difference in percentage of marks obtained in Class 10\textsuperscript{th}. Most of the urban and rural respondents had obtained 60-70% of marks and fall in the category of ‘Good’ Academic Achievement in class 12\textsuperscript{th}. Most of male respondents had obtained 50-60% of marks and fall in the category of ‘Above Average’ Academic Achievement in class 12\textsuperscript{th}, whereas most of the female respondents had obtained 60-70% of marks and falls in the range of ‘Good’ Academic Achievement in class 12\textsuperscript{th}. Results reveal that significant sex difference among percentage of marks obtained in class 12\textsuperscript{th}.

REFERENCES


WEBSITES:

http://www.education.gouv.qc.ca/en/students/exams/processing-of-results/factors-that-may-affect-students-academic-achievement/

www.wikipedia.com
Study on Domestic Violence in Infertile Women

Dr. Niranjani’S*, Dr. Jayanthi **, Dr. Nishanthini ***

* Post graduate in MS OBG in Meenakshi Medical college, Kanchipuram.
** Professor and unit chief of OBG in Meenakshi medical college
*** Assistant professor of obg in Meenakshi medical college

Abstract - INTRODUCTION : Millions of men and women suffer from infertility worldwide. Infertility is defined as the failure to conceive after 12 months of unprotected regular sexual intercourse. Experiencing infertility causes aggression, anger, labile economic status, reprimand, divorce, public isolation, losing social status, deprivation, disappointment and violence. Furthermore, violence is a global disaster. Usually, women and girls are the prime victims of domestic violence. Infertility may affect the public health in many countries. Domestic violence is the intentional use of physical force, power or threat against oneself, another person or another group or community which leads to injury, death, mental harm, lack of development or deprivation. The cause of infertility and magnitude may vary with geographical location and the socio economic status. Evidences suggest that infertility is becoming a public health problem in India and 60-80 million couples suffer from infertility every year among which 15-20 million in India alone. National family health survey 3 shows that approximately 21 percent of women who has been interviewed have experienced physical, emotional, verbal and sexual violence in last 12 months. It is becoming more and more evident that infertility and gender based violence are the emerging health problems in India. The world health organization estimates that at least one in 5 women have experienced violence in their lives. Gender based violence have long term psychological and physical consequences and effect many aspects of women’s lives.

METHODOLOGY : The study is a community based cross sectional study conducted in the department of Obstetrics and Gynaecology in Meenakshi medical college hospital and research institute. The study group 50 was selected from the women who are coming to the infertility clinic and also who are willing for the study. The study is subjected to the series of who multi-centric interviewer based semi-structured questionnaire while ensuring adequate privacy.

RESULTS: There is a statistical significance association between socio economic class and physical abuse (kicked you or beaten you up) at 95% (p < 0.05).

CONCLUSION: In this study, infertile women are prone for domestic violence, with the prevalence percentage of physical abuse – 19.66%, physical violence – 45.33%, emotional violence – 24.66%, sexual violence – 12.57%, analysis for domestic violence and alcohol consumption by the husband was found to be 20.66%.

I. INTRODUCTION

Millions of men and women suffer from infertility worldwide. Infertility is defined as the failure to conceive after 12 months of unprotected regular sexual intercourse.

II. OBJECTIVE OF THE STUDY

- To study the prevalence of violence in the infertile women and 3 of its components i.e., emotional abuse, physical violence, sexual violence among women in age group 25-49 years in MMCH RI.
- To study the prevalence of gender based violence after the birth based on the sex of the baby.

III. METHODOLOGY

- The study is a community based cross sectional study conducted in the department of Obstetrics and Gynaecology in Meenakshi medical college hospital and research institute.
- The study group 50 was selected from the women who are coming to the infertility clinic and also who are willing for the study.

www.ijsrp.org
IV. INCLUSION CRITERIA

All women presented with infertility aged 25 – 49 years, married and following 1 year after marriage who are unable to conceive naturally.

Women with the following causes for infertility

a. Tubal factor
b. Uterine factor
c. PCOS
d. Endometriosis
e. Diminished ovarian reserve
f. Unexplained factor
g. Male infertility
h. post nataally after a female child

VI. PROCEDURE

- Women who are infertile for more than 2 years, doesn’t want to get pregnant due to personal reasons.

V. EXCLUSION CRITERIA

- Women married for less than 1 year.

VII. OBSERVATIONS

### TABLE 1:
INFERTILITY IN RELATION TO SOCIOECONOMIC CLASS, PARITY & OTHER MEDICAL DISORDERS:

<table>
<thead>
<tr>
<th>Socioeconomic Class</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class II</td>
<td>12</td>
<td>24.0</td>
</tr>
<tr>
<td>Class III</td>
<td>20</td>
<td>40.0</td>
</tr>
<tr>
<td>Class IV</td>
<td>18</td>
<td>36.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parity</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>19</td>
<td>38.0</td>
</tr>
<tr>
<td>Secondary</td>
<td>31</td>
<td>62.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Co Morbidities</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>Hypothyroid</td>
<td>6</td>
<td>12.0</td>
</tr>
<tr>
<td>No Disease</td>
<td>39</td>
<td>78.0</td>
</tr>
<tr>
<td>Hypertensive</td>
<td>3</td>
<td>6.0</td>
</tr>
</tbody>
</table>

### Table 2:

<table>
<thead>
<tr>
<th>Physical abuse</th>
<th>Yes N (%)</th>
<th>No N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household Work Not Satisfactory</td>
<td>37(74)</td>
<td>13(26)</td>
</tr>
<tr>
<td>Disobeys Husband</td>
<td>16(32)</td>
<td>34(68)</td>
</tr>
<tr>
<td>Refuses Sexual Relationship</td>
<td>15(30)</td>
<td>35(70)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emotional violence</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulted and Made Feel Bad about HERSELF</td>
<td>15(30)</td>
<td>35(70)</td>
</tr>
<tr>
<td>Belittled or Humiliated Infront of Everyone</td>
<td>17(34)</td>
<td>33(66)</td>
</tr>
<tr>
<td>Done Things to Scare and Intidimate HER on Purpose</td>
<td>5(10)</td>
<td>45(90)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical violence</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Threatened to hurt HER</td>
<td>4(8)</td>
<td>46(92)</td>
</tr>
<tr>
<td>Slapped thrown Something at HER</td>
<td>13(26)</td>
<td>37(74)</td>
</tr>
<tr>
<td>Pushed HER</td>
<td>12(24)</td>
<td>38(76)</td>
</tr>
<tr>
<td>Hit HER with Fist</td>
<td>4(8)</td>
<td>46(92)</td>
</tr>
<tr>
<td>Choked Or Burnt HER on Purpose</td>
<td>3(6)</td>
<td>47(94)</td>
</tr>
<tr>
<td>Threatened to Use Knife or other Weapon</td>
<td>1(2)</td>
<td>49(98)</td>
</tr>
<tr>
<td>Kicked or Beaten HER Up</td>
<td>7(14)</td>
<td>43(86)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sexual violence</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>She was Physically Forced You to Have Sexual Intercourse When she doesn’t want to</td>
<td>4(8)</td>
<td>46(92)</td>
</tr>
<tr>
<td>She had a fear on Sexual Intercourse that something would happen</td>
<td>5(10)</td>
<td>45(90)</td>
</tr>
<tr>
<td>She was forced to do Something that found degrading or humiliating during sexual intercourse</td>
<td>0(0)</td>
<td>50(100)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pregnancy and post partum violence</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>She has been Physically Assaulted While she was Pregnant</td>
<td>0(0)</td>
<td>50(100)</td>
</tr>
</tbody>
</table>
In our study, infertile women are prone for domestic violence, and their prevalence of physical abuse is 19.66%, prevalence of physical violence is 45.33%, emotional violence is 24.66%, sexual violence is 12.57%. We have also analysed the correlation for domestic violence and alcohol consumption by the husband which came up to 20.66%. We have also analysed the correlation of the socioeconomic class with the physical violence experienced by the women where there is a statistically significant association was found between the socioeconomic class and physical violence (kicked or beaten her up) with a P value <0.05 at 95%.

VIII. RESULTS

TABLE 3: COMPARISON OF SOCIO ECONOMIC CLASS WITH PHYSICAL VIOLENCE:

<table>
<thead>
<tr>
<th>Threatened to Hurt Her</th>
<th>Total</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (%)</td>
<td>No (%)</td>
<td></td>
</tr>
<tr>
<td>SOCIOECONOMIC CLASS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLASS II</td>
<td>0(0)</td>
<td>12(26.1)</td>
</tr>
<tr>
<td>CLASS III</td>
<td>2(50)</td>
<td>18(39.1)</td>
</tr>
<tr>
<td>CLASS IV</td>
<td>2(50)</td>
<td>16(34.8)</td>
</tr>
</tbody>
</table>

- Slapped thrownSomething at HER
- Pushed HER
- Hit HER with Fist
- Choked Or Burnt HER on Purpose
- Threatened to Use Knife or other Weapon
- Kicked or Beaten HER Up

IX. DISCUSSION

Evidences suggest that infertility is becoming a public health problem in India and 60-80 million couples suffer from infertility every year among which 15-20 million in India alone. National family health survey 3 shows that approximately 21 percent of women who has been interviewed have experienced physical, emotional, verbal and sexual violence in last 12 months. The world health organization estimates that at least one
in 5 women have experienced violence in their lives. Gender based violence have long term psychological and physical consequences and effect many aspects of women’s lives. Yildizhan et al. (2009) found the prevalence of domestic violence against infertile women to be 33.6%. Ardabily et al. (2011) found the prevalence of domestic violence to be 61.8%, psychological violence 33.8%, physical violence 14% and sexual violence 8% in infertile women. Pasi et al. have reported that infertile women experienced physical or sexual violence more frequently than fertile women, also reported that 76.3% of infertile women and 65.9% of those who have at least one child have experienced violence. In our study there is 45.3% of prevalence of domestic violence which is nearly correlating with the Yildizhan et al study.

X. CONCLUSION

According to the findings of this study, prevalence of domestic violence was relatively high among infertile women. Therefore, identification and prevention of this public health issue seems crucial. ‘Violence against women’ the recent happenings in the country tops the list of emerging new concerns for the girls and women in our country. Eradication of gender bias lays the foundation for change. Feticide is an act of violence when in the womb itself. Initiating health care to the women and also educating male child a non-violent environment which creates a healthy environment to the female.

REFERENCES

[1] Yildizhan et al. (2009) found the prevalence of domestic violence against infertile women to be 33.6%.
[2] Ardabily et al. (2011) found the prevalence of domestic violence to be 61.8%, psychological violence 33.8%, physical violence 14% and sexual violence 8% in infertile women.
[3] Pasi et al. have reported that infertile women experienced physical or sexual violence more frequently than fertile women, also reported that 76.3% of infertile women and 65.9% of those who have at least one child have experienced violence.

AUTHORS

First Author – Dr. Niranjani.S – Post graduate in MS OBG in Meenakshi medical college, Kanchipuram.
Second Author – Dr. Jayanthi – professor and unit chief of OBG in Meenakshi medical college
Third Author – Dr. Nishanthini – assistant professor of obg in Meenakshi medical college
“Book Catcher”: An Automated Navigation Application to help search and find books in a library

Sri Lanka Institute of Information Technology

Abstract- The purpose of this research is to help users navigate within libraries using an android application. Nowadays people visiting libraries has gone down. The reason is the traditional way of manually searching and finding a book. It takes a long time to search and find a book in a library, time and energy waste if the book is borrowed by someone else, should wait for the one to return, though the book is needed immediately, lack of choice of choosing a good book and lack of ways to share opinions about a book. The application will help users to search and find books so quickly and navigate them to reach the book’s location using indoor navigational techniques such as Wi-Fi localization. It will also allow users to share their opinions among other readers through reviews and chats. The borrowers will be notified if the borrowed book is wanted by someone else too.

Index Terms- Android, Library, Indoor navigation, Wi-Fi localization, customized notifications

I. INTRODUCTION

In Sri Lanka, there are thousands of libraries and millions of readers. With the development of technology, the needs and wants of people have changed in searching and finding a book in a library. In daily life, people are spending much time and in finding things inside of huge buildings like shopping malls, libraries, museums and so on. To overcome these problems, many research teams have developed many smartphone applications using indoor navigation technologies like Wi-Fi technologies, iBeacon Technologies and radio based Technologies to navigate to the particular places.

The people now a days wish to do things in an efficient and productive way. They do not want to waste time and energy in carrying out their day to day activities. In the traditional way of library process, the user visits the library and search for the books they want shelf by shelf and row by row. At last, they borrow books by marking entry on the system by the librarian. It is inefficient searching and borrowing and if the book wanted is already borrowed by someone else, it is just a waste of time in searching them. The biggest issue is to find and locate the books in a library. The user might have to waste time unnecessarily, if the needed book is not available or lent out. The traditional way in libraries makes people unsatisfied and unwanted to visit library.

The readers might prefer visiting libraries to borrow the books they want as it would be more efficient but since GPS doesn’t work well indoors and other forms of indoor navigation have to be looked into in order to allow a user to navigate within a library.

Sometimes, the user might find difficulties in trying to choose a book. The user would not have the option to get to know what others think about each book so that the user might be able to make decision on which book to borrow.

The librarian also faces difficulties in lending out books and provide certain information for the borrowers and members so that their resources are spent efficiently and members would not be annoyed by unnecessary and irrelevant information from the library.

The “Book Catcher” is an android application with an overall objective of improving the library experience by overcoming all of the mentioned problems. The application would allow user to search and find books in a library and based on the search results, the application should navigate the user within the library. The application would also suggest users based on the past borrowing patterns. The user would get notified, if the book borrowed by themselves needed by someone else too. The application would also allow the users to share the opinions about books through reviews and chat with other members of the library.

Figure 1: High Level Architecture Diagram

Figure1 illustrates the high-level architecture diagram of the system where the users can manage the data and borrowing details. As shown in the diagram the database that was chosen to store data was MySQL database and PHP was used to access that database. Wi-Fi access points would be placed around the library to enable indoor navigation. Signals received from these access points would help the system to decide user’s location. There is a backend system for the librarian to maintain the books in future.
The research paper discusses about background and related work in the second chapter. Where the third chapter discuss the methodology that was used to develop a prototype system. Fourth chapter discusses about the implemented prototype system. Fifth chapter discusses about the issues faced during the development of the system. The conclusion that was derived and the limitations faced are discussed in the sixth chapter. Future work is discussed in the seventh chapter.

II. BACKGROUND

With the development of technology, the needs and wants of people have changed in searching and finding a book in a library. In daily life, people are spending much time and in finding things inside of huge buildings like shopping malls, libraries, museums and so on. Many research teams have developed many smartphone applications using indoor navigation technologies like Wi-Fi technologies, iBeacon Technologies and radio based Technologies to navigate to the particular places. Smartphone applications can be used is to help search and find books in the library. Another way in which the smartphones can be used is to help the users navigate around.

There is no specific application which resembles “Book Catcher” directly but there are several applications that allow the users to navigate within library.

“Book Mark” is an android application which helps the user to have illustrated a technique by providing a detailed map to any desired book by simply scanning the barcode on the back of any other book in the library [1]. “iMoon” is another android application with a unique feature which provides Image-based Indoor Navigation is based on sensor-enriched 3D models of indoor environment methodology [2].” Newman Project is another app which helps users to identify the location or direction of the resources within a library with the help of maps using handheld devices [9].

Wi-Fi-based Indoor Navigation with Mobile GIS and Speech Recognition Technique describes two positioning techniques based on WLAN: Triangulation and fingerprinting which associated with speech recognition and spatial data model is presented [3].

Wi-Fi Based Indoor Positioning System Using Smartphones research investigates other built-in sensors and develops methods for improving the accuracy of indoor positioning. it can be deployed with a minimal cost, as no specialized hardware is necessary for setting up the system[4].

A Secure Shopping Experience Based on Block chain and Beacon Technology approach for a future shopping system. Customers’ personal data are protected by a block chain based storage network. The system transacts encrypted data in a tamperproof way and is able to run secure multiparty computations while no one but the data owner has access to the input data[6].

The research on Indoor Navigation System for Handheld Devices, they tested Bluetooth, Wi-Fi, and radio frequency according to their maximum ranges, but from this list they have decided to choose Wi-Fi because, Wi-Fi is, readily available throughout most buildings, minimal costs for implementation and medium range (100 meters) [7].

The research called 3D Model based Indoor Navigation System for Museum. Provide accurate descriptions of locations of indoor objects. This three-layer system with application, web service and database is developed to provide localization, navigation and visualization services. The network extraction method is smart and renewable [8].

Fingerprinting is another technique used for localization and Fingerprinting introduce some basic indoor positioning concepts and then focus on one method that relies on fingerprinting Bluetooth iBeacon signals using machine learning[3],[5].

The research done at 3RigaTechnicalUniversity examined several aspects of location fingerprinting based indoor positioning. This system can be relatively easily implemented for notebook computers, personal digital assistants (PDAs), smartphones, and other Wi-Fi enabled mobile devices and working in 5GHz frequency in the application[10].

Most of the currently available applications are mostly concerned on only providing basic features such as navigate the library, few applications offer few unique features but none of the applications offer features like locating and directing users to help find and search book in the library.

Therefore “Book Catcher” fills the all mentioned gap by creating a Book Catcher application which allows the users to find books with in the library and locate the particular book that the user want by using Wi-Fi technology. Reviews and ratings about the book will help other users to make borrowing decisions.

III. METHODOLOGY

Prototype methodology was selected as the methodology in order to develop “Book Catcher”. Analysis, Designing and Implementation phases were executed concurrently and iteratively until all requirements were gathered and implemented in a manner where system fulfills all the functional and nonfunctional requirements of the system. The initial prototype was built with less number of features, where then it was developed upon and features were added in every prototype. This procedure helped the research group to be more accurate about requirements and was also helpful to figure out the defects and fine tune the functions which were developed.

A. Planning

Planning phase was started at the initiation of the project where the research group understood the system to be developed and how it can be built. Scope, problems and the objectives were discussed among group members in order to identify them accurately. A feasibility analysis was done to make sure that the project was feasible.
B. Requirement Gathering and Analysis

Analysis phase focused on gathering information and analyzing the difficulties faced by the members of library in modern days which paved the way to develop the requirements of the system. Data sources which were used to gather data were categorized as primary and secondary data sources. As primary data source, a questionnaire was created and distributed among public in order to obtain their opinions about borrowing books in a library and how it could be improved. The questionnaire contained only closed ended questions since most people preferred it. The gathered information from primary data source were more helpful to get a better understanding about the member’s needs. Whereas secondary data are gathered from research journals, articles, book etc. The data gathered through research papers are discussed in detail in the previous section.

C. Design

The primary objective of the design phase was to create a design that satisfies the agreed application requirements. Initially overall design was done starting with the high-level architecture diagram (Figure 1). Thereafter the physical design of the system was done which included the actual input and output process of the system. The Wi-Fi signals are transmitted from access points and these will act as inputs to detect the location of the user. Data from the database would also act as input for certain processes and all the other input will be touch inputs. All the outputs will be displayed on the screen. Secondly the interface design was done which defined how the user interacts with the system including inputs and outputs of the system. The user interface was designed to be more understandable and easy to navigate. When designing UI, basic principles were followed such as the layout, aesthetics, content awareness, user experience, consistency and minimum user effort. Finally, the database design was done which defined how the data was to be stored in the database. Number of tables, relationships between each table, primary keys and foreign keys were decided in this process.

D. Implementation

Implementation is the fourth stage of the SDLC where the project team transformed the design into a working system. Android studio was the IDE which was used to build “Shopping Helper” and several libraries were used to add the functionalities required as well as to improve the performance of the system and ease the development of the application. Since, the member details have to be used the database had to be stored externally. MySQL database was chosen for this purpose. To Communicate and integrate with the database, PHP scripts were used and this along with the database was hosted on Amazon Web Services.

For indoor navigation, Wi-Fi access points which are readily available with in the building were used. The Software Development Kit (SDK) which was used to provide indoor navigation was Situm SDK. The Wi-Fi access points will transmit Wi-Fi signals continuously which will be read by the user’s mobile device. Along with the Wi-Fi signals, GPS signals will be transmitted which will help the system to locate more accurately. The signals will be used to estimate the location of the user within the library.

E. Testing

During the testing phase, the following testing were performed in order to test the functionality as well as to identify defects of the system which would result in a system with better quality, performance and accuracy.

- Unit testing is where the smallest testable parts of an application called units, which are individually and independently analyzed for proper operation.
- Integration testing focuses on testing whether the set of modules functions together without errors. Data flow and the data exchange between modules is mainly focused on this testing.
- System testing is where the completed and integrated system is tested to verify that the system meets functional and non-functional requirements.

IV. IV. RESULTS

The “Book Catcher” is an android application focusing on improving the library experience by providing several functionalities such as search books, indoor navigation within the library, customized notification, sharing reviews of books and chat.

“Book Catcher” which allows the user to share book details with their family members in order to make reading more efficient and effective. Figure 1 shows the implementation of this functionality.

Figure 1: Share Book Details

Book Catcher allows the user to search the particular book that the user wants. Figure 2 shows the implementation of this functionality.
Indoor navigation functionality of “Book Catcher” allows the user to locate themselves within the library as well as to locate and navigate to the book’s location. Figure 3 shows the implementation of this functionality. Situm SDK was used to implement the indoor navigation functionality.

“Book Catcher” allows the users to chat with other members. Figure 5 shows the implementation of this functionality.

“Book Catcher” developed a backend system for librarian which is help to add the books and view the books in the library. Figure 6 shows the implementation of login functionality in backend system.

Previous readers should be able to rate the books this will help to future users to get an idea about that particular book. Figure 4 shows the implementation of this functionality.

Figure 7 shows the implementation of Add member functionality in backend system.
V. DISCUSSION

The “Book Catcher” was developed with an overall objective to improve the library experience of members and through the implemented system; members can enjoy a more efficient and effective library experience.

While developing system, the team had to experience some technical issues and following are those issues along with how the team managed to overcome those issues.

The most important issue was the level of accuracy of indoor navigation using Wi-Fi access points. The reason for this issue is that the location of the user is measure based on the signal strength received from the Wi-Fi access points and when a user is at a particular location the signal strength from the Wi-Fi access point’s signal kept on varying. Another cause for the issue was when the smartphone received Wi-Fi signals from too many Wi-Fi access points at the same time the system had trouble figuring out where exactly the user was. This was not an issue when user is walking along a straight path but only when the user was in an open area. In order to overcome this issue, the signal strength of the Wi-Fi access points was reduced and the transmitting interval of the signals was also reduced. This improved the accuracy up to a certain extent but did not eradicate the issue completely.

The assumptions made when developing the system are as follows,

- User has a basic knowledge of using android smartphone applications.
- User is within the mapped area when using indoor navigation
- User’s phone is running on android version 4.4 to 5.1

When considering about the dependencies,

- The mobile should be always connected to internet via mobile data, Wi-Fi, hotspot and etc. to make use of all the functionalities of the system

VI. CONCLUSION

Based on the statistical analysis results it can conclude as location of user, Accuracy of Wi-Fi access points, environmental factors and patterns/order affects the efficiency of navigating, locating and suggesting. Membership does not affect the efficiency that much however if there is an application which helps to find and locate books within a library the efficiency can be improved. There is a strong relationship between accuracy of Wi-Fi access points and efficiency of navigating, locating and suggesting. It is recommended considering the accuracy of Wi-Fi access points when assisting navigation. Overall this system should be able to improve efficiency in sharing and locating books.

Following are the limitations that were figured out about “Book Catcher” by the development team when developing the system.

- One of the main limitations is that if the user is outside the mapped area but still receive the Wi-Fi signals from the access points, the system will assume that the user is within the mapped area. The only solution for this would be to map every area that the user can reach which might be costly.
- Wi-Fi access points based navigation cannot be used on phones with android version below 4.3 as Wi-Fi access point support for android was only introduced with android version 4.3.
- Wi-Fi access points based navigation only has an average accuracy of 4-5 meters and this can sometimes become worse depending on the location of the user and the placement of the access points. The accuracy will be acceptable when the user is in a straight path and not when in an open area.
VII. FUTURE WORK

• To use other indoor navigational techniques such as beacons and geomagnetic readings to improve the accuracy.
• The System could be made compatible with other operating systems such as IOS, Windows, Blackberry and etc.
• Add GPS support so that the app would allow the user to navigate even when outside the Library.
• Have an algorithm which would allow the user to go to the required libraries in a sequence so that they will be spending the least amount of time.
• Add further conditions to sort out the notifications for the users.

ACKNOWLEDGMENT

The research team takes this opportunity to sincerely acknowledge the individuals and groups who have provided guidance and assistance throughout the project.

The project team would like to declare our honest sense of gratitude to our institution – Sri Lanka Institute of Information Technology (SLIIT). We are extremely grateful to whose assistance, knowledge, experience and encouragement helped us in all the times of study and analysis of the project in the pre and post research period.

Finally, we would like to acknowledge with gratitude, the great amount of support and advice given by others whose names were not mentioned.

REFERENCES


AUTHORS

First Author – R.Keerthiga, Sri Lanka Institute of Information Technology, keerthiha95@gmail.com
Second Author – P.Mohanajanani, Sri Lanka Institute of Information Technology and jananijo30@gmail.com.
Third Author – N.Sahirithini, Sri Lanka Institute of Information Technology, sahir1585@gmail.com.
Fifth Author – E.Nideshika, Sri Lanka Institute of Information Technology, nideshika.e@sliit.lk.

Correspondence Author – R.Keerthiga, keerthiha95@gmail.com, 0094778265529.
SaveMORE: An Automated System to Reduce Food Wastage in the Field of Hospitality

Sri Lanka Institute of Information Technology Computing (Pvt) Ltd.

Abstract- Tourism has become one of the main incomes in Sri Lanka where food is the highlight which makes the standards among the field of hospitality. At the same time the wastage of food in these hotels is a hidden bitter truth which cause a huge loss silently. In a time where people die starving, tons of food is being thrown away without hesitation in the same so called high class society. As this is a crisis with less attention around the world, it is now high-time to consider it with some given weight because food is an essential for all the living being. Considering the classy hotels which maintain a procedure, an automated system which would take control from ordering to give suggestions to reduce wastage was proposed as a solution for the above problem. Though there are systems to make the ordering efficient and gives the customer a better experience, none of them has the concern about the wastage which occur every day without limitations. That is where SaveMORE has a major role to play where it measures the weight of the wastage and keep the hoteliers alerted other than the functionalities of an existing system in a better way. This system which has eliminated the manager and being a Business Intelligence (BI) that identifies the reasons for this loss of food, provides relevant suggestions and beneficial solutions as a result, is the only product existing to reduce the food wastage in the field of hospitality.

Index Terms- Android application, field of hospitality, automated system, Data mining, opinion mining

I. INTRODUCTION

The wastage of food which is a hidden crisis around the world has reached a point where it can no more be ignored. Though this loss occurs almost everywhere, the field of hospitality tops the ranks of relativity as food is its main component of serving. Food that is initially produced for human consumption is only measured as food waste, which means non-edible food and parts of products are excluded in consideration. According to the United Nations Environment Programme (UNEP) and the World Resource Institute (WRI), about 1 in 4 calories purposive for consumption is never actually eaten which is about one-third of all food produced worldwide, worth around US$ 1 trillion get lost or wasted in food production and consumption systems. [1] These statistics showcases that in a world full of hunger, rapidly changing food prices and social disturbance, these facts are being environmentally, organizationally and economically excessive. To overcome this massive wastage, the proposed system could be a better approach, may be not in a huge scale but of course to begin with in the field of hospitality.

When the perspective of the organization is considered, the system is mainly focused on reducing the food wastage in the field of hospitality by providing the analyzed daily usage, wastage and suggestions to the management of the organization through building and prompting the analyzed data. The system maintains the expenses of the organization by tracking the wastage including the weight of the leftovers, provide suggestions to control and reduce unwanted expenses in a daily routine. The mechanism that is used to calculate the amount of the daily wastage is identifying the ordering patterns accordingly (seasons, day/night) and getting the statistics of the usage of the ingredients from the supervisor/manager of the kitchen through an interface which identify the quantitative data by using the Data mining algorithms, making the system to perform intelligently.

Considering the customers of the organization/hotel, the ordering process of the customers’ favorite menu is determined through a tablet with the Android application installed, which is provided to him/her for food placements so that it saves time spent to order and to make the ordering efficient. To ensure that the customers get a better service, the orders are distributed among the various chefs by considering their expertise, workload and availability by displaying the orders to the chefs through an interface so that they can select the orders accordingly. As every organization rely on their customers’ feedback/satisfaction which is qualitative data, SaveMORE is also designed to get
the customer feedback through the Android application and decide whether the comment/review is positive or negative by analyzing through opinion mining.

This research paper contains the Background of the product, SaveMORE where it emphasizes the need of such system and then the Methodology will clarify the stages which SaveMORE has followed to reach be a product. The chapter of Results will contribute the final output of the project whereas the Discussion will summarize the limitations it had. Finally the Conclusion part will revise all what is explained before and there will be suggestions to focus on in future work.

II. LITERATURE REVIEW

Since the technology came into play, people have developed and experimented various techniques to improve customer satisfaction, to manage the service in different business communities and for so many more. There are a number of researches that have being done related to the area which the project team is in. Before commencing the research project, the whole project team went through a deep study of literature to seek better ideas to bring life to the proposed system – SaveMORE under the existing automated ordering systems, similar applications (mobile/standalone/web), Data mining and opinion mining and effective waste management and solutions.

A. Automated Ordering Systems

According to the research done by, Dhore et.al [3], the system is been planned to design as such the first function for the customer who can book tables and place orders. Second, the kitchen unit in a restaurant, which enables the staff to view current orders. Third, the manager of that restaurant in order to keep track of all the transactions. The uniqueness within this system is that there is no application in use today that enables customers to book tables of their choice, place prior orders, and also make payments. No application today supports order placing from remote locations and view of customer's current location with the help of GPS service. The following are the features which can be a part of the proposed system: Ordering, Waiting, Billing, Table Reservation, Home Delivery, KOT, and Advertisement.

B. Similar Applications

Sarkar et.al in [7] discuss the integration of touch technology in restaurants using Android. In hospitality industries showcased that various applications based on wireless technologies are already in use enabling partial automation of the food ordering process. This system is a basic dynamic database utility system which fetches all information from a centralized database. The tablet at the customer table contains the Android application with all the restaurant and menu details. The customer table, kitchen display, and the cashier counter connect directly with each other through Wi-Fi.

C. Data mining and Opinion Mining

Data mining which is also called as Knowledge Discovery in Data (KDD) performs an automatic search in large stores of data to discover patterns and trends that go beyond simple analysis. Advanced mathematical algorithms are used to segment the data and evaluate the probability of future events. Data mining can generate answers to the questions that cannot be addressed through simple query and reporting techniques [19]. Opinion mining is a type of natural language processing which is used to track the mood (opinion) of the consumer about a particular product. Sentiment analysis is a synonym to opinion mining as automated opinion mining normally uses machine learning, which is a type of artificial intelligence (AI) to mine text for sentiment [20]. Ahmed and Elarby in [11] have discussed various Data mining algorithms and techniques. Clustering was mentioned as one of the algorithms which is used to find groups of objects such that the objects in one group will be similar to one another and different from the objects in another group. Classification accuracy, data sparsity, and sarcasm are discussed as the primary issues in previous techniques of sentiment analysis because they classify most of the tweets with a very high percentage as neutral [14]. To overcome them, an algorithm for tweeter feeds classification based on a three-way classification (data acquisition, pre-processing and classification and evaluation) was introduced by Khan et.al. [14].

D. Effective Waste Management and Solutions

Food loss occurs in each phase of food chain [16]. This is a survey conducted in Swiss food service to show the potentiality of the food waste to
the economy and the environment and conducted on as survey done in two departments in a specific time period. It's not ethical to justify results of waste. Two sectors of companies (educational department and business department) were used to provide estimates under storage losses, preparation losses, serving losses, and plate waste which was conducted for 5 days. The customer has evaluated with a set of questioners.

Within our research topic, the system itself has included eliminating human interference within the hotel by automating food ordering system. By providing a proper customer service to the current and future customers, making reservations, undertaking customer orders, sending the particular customer order to the kitchen department, collecting payment bills and receiving the evaluation through the customers all will be automated according to this research topic. Also introducing the wireless device to the customers towards more user-friendly, personalized and for a flexible service. That effect of eliminating the human errors, introducing new technology to the customers while getting the maximum use from modernizing technology to the business. Collecting the customer evaluations and providing a finalized report to the management that effects on making managerial decisions regarding the restaurant development, expansion, future planning and customer loyalty, restaurant popularity enhancement are the added advantages.

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Computers - 2</strong></td>
<td></td>
</tr>
<tr>
<td>Processor: CORE i5 2Ghz</td>
<td>Android Studio</td>
</tr>
<tr>
<td>Free Space: 80GB</td>
<td>SQL Management Studio 2014/</td>
</tr>
<tr>
<td>RAM: 4GB</td>
<td>PHP MyAdmin</td>
</tr>
<tr>
<td><strong>Tablets - 1</strong></td>
<td></td>
</tr>
<tr>
<td>Android OS V4.0</td>
<td>NetBeans IDE</td>
</tr>
<tr>
<td>WIFI supported</td>
<td>Microsoft Word 2013</td>
</tr>
<tr>
<td><strong>Electronic scale</strong></td>
<td>Arduino IDE</td>
</tr>
</tbody>
</table>

SaveMORE does not conflict with any legal procedure under any circumstances. Therefore it was legally feasible to carry on. The project team did have well and clear vision towards the scope and was scheduled feasible as it could be completed within the scheduled time frame according to the submissions and all the project functionalities.

**B. Requirement Gathering and Analyzing**

Though the statistical analysis did not give positive results based on the response to the questionnaire which would explain the correlation or regression in between the independent variables and the dependent, the discussions and interview sessions with the industrial personalities expressed that SaveMORE would be a better solution to the existing problem of wasting food which has caused a major impact on the day-to-day life, especially in Sri Lanka considering current affairs. They have mentioned that the fact which SaveMORE will suggest and predict things on the menus, orders and the wastage which would lead to decrease the weight of the bins resulting reduced wastage, makes the difference from the existing systems. While the primary data were gathered through the Questionnaire and the Interview sessions, literature review provided the required secondary data.
C. Designing

As it is shown below in Figure 1, when a customer enters the restaurant/hotel, he/she will be offered a tablet with the interface to select and order what is preferred from the menu. With the placement of the order, order details will be saved in a database and forwarded to the kitchen after checking the availability of the chefs so that it makes the service to the customer more efficient. At the end of the day, the orders which were placed will be analyzed to strain out the daily preferences of the customer-base. At the same time, the supervisor of the kitchen would provide the statistics (quantity-wise) of the day as it acts as an aid to analyze the quantities. Customer reviews/comments would be counted as facts about the quality of food. In addition, the weight of the litter buckets would be measured through the system with the logic, if the weight of the litter bucket decreases, it is a sign of the reduction of food wastage. The management of the relevant restaurant would be notified with the daily usage, wastage and suggestions to reduce wastage and maintain the quality of the restaurant. As the targeted society (star-hotels) is more familiar with the technology based systems, this would be more user-friendly to the customers as well as the management with more reliable statistics and suggestions on how to reduce the wastage of food.

![Figure 1: Architecture Diagram](image1)

Data mining project was carried on based on the following ER diagram which is shown below in Figure 2, to produce a better result.

![Figure 2: ER Diagram](image2)

D. Implementation

The components took place in implementation as follows.

1. Data mining

System generates reports to the management about the most preferred dishes and what quantities needed to be reduced wastage on meal ingredients quantity predictions. Details on the orders placed will be gathered according to the table number and are analyzed using Business intelligent Studio. Ingredient details are taken from the ingredient table which contains the quantities of the ingredients provided. Weight of the Litter bucket is taken from the electronic scale which is built and the statistics then are uploaded to the database. Time series algorithm is used to predict the patterns of food ordering annually so that the managements could prepare for the new time period where the food wastage would then reduce hopefully. Most ordered meal will be queried and suggested to the management to collect more ingredients on such meals so that the service towards the customers would be more efficient.

2. Android Application

Android application is installed in a Tablet and would be given to the customer to place orders. Interfaces are built to provide a convenient way to make orders without waiting for a waiter to be stood near the table. It includes the meal details which clearly mentions the number of person that the meal would be enough so that the customer would be ordering a quantity which would reduce the wasting leftovers by ordering unnecessarily without knowing the portion size exactly. Meal details are fed in to the
application through the Internet. Jason objects carries the data with the use of VOLLY HTTP libraries.

3. Order preparation and work load balancing in kitchen

The time to serve the prepared meal effects the quality of the food as the temperature of a meal plays a major role in the quality of food. Workload is balanced by assigning the new order to the chef who has taken the least number of orders. Once the order is placed through the Tablet, the particular order is displayed on a standalone computer where a java application has been built which would make the service effective and efficient so that the quality of the food could be thoroughly considered. This application is connected over WI-FI to the main hosted MYSQL database to fetch the ordered meals which has been placed through the Android application.

4. Feedback processing

Feedback is taken from the customer to gather the customers’ perspective on the quality of food. So that the Management can review them and make relevant decisions to control the quality or the taste of meals. The system is with a unique feature in the system to analyze the opinions or the reviews that the customers have given using the Android application. Opinion mining is performed inside another java application which decides whether the opinion is positive or negative (Yes/No) using an algorithm running inside.

Steps in Algorithm

- Take the reviews from the database and save it in a text file.
- Search for a meal which is taken from a user to analyze the review (in the saved text file).
- Display the reviews for the search word or the meal in a list.
- Find the adjectives in the content and search for negative adjectives and positive adjectives or find verbs that convey the positive or negative idea.
- Count how many of positive ideas and negative ideas.
- Take an average and display the opinion behind the user entered data to search.

5. Measuring Wastage

Measuring the litter bucket was essential to take a proper numeric measure on the wasted food. For this process, an electronic scale (shown above in Figure 3) was developed using the ARDUINO technology. This electronic device takes the readings which is the weight of the litter bucket and store them in a database through the java application in the kitchen.

E. Testing

Under the testing of the system the research team used unit testing to observe the behavior and the response of separate units developed separately. After each unit’s performance was satisfied and confirmed error-free, integration testing was started. The modules were integrated one by one and in each time it was tested separately. Once the integration was completed with the testing, the team took the system as a whole and tested it to check the performance, usability and whether it meets the requirements which were planned initially.

IV. RESULTS AND DISCUSSION

Modern world is at a stage where they cannot control the massive amounts of litter dumped to the environment which heaps up daily. As it is stated previously, the main purpose of the automated software system was to reduce the wastage in the hospitality sector. Prediction accuracy for food preparation caused the most food to be wasted. Through our system we have developed an efficient way to increase the accuracy by reducing the wastage. This wastage could enhance the extra cost spent on food. The managers or the staff should know about the quality of the meals, how the customer feel about the meal or what kind of a service they need likewise. These kind of details would provide a business value to the
company/business. By allowing the customer to have a rough idea of the meal (as shown in Figure 4) he/she is about to get, would help him/her to order according to his/her need and save the food. Interface which is located in the kitchen (Figure 5) would manage the workload and offer the staff a trouble-free environment.

Figure 4: Interfaces of the Android application

Figure 5: An Interface of Kitchen UI

Following are some of the major challenges faced by the research group.

- Build/adjust algorithms to achieve accurate results.
- Decide between an app installed tablet and a public Android application for the customers to download and install themselves.
- Compatibility of the software tools used. (SQL Server Business Intelligent Studio, Android Studio and Arduino IDE.)
- Building the Data mining model was not easy as the exactly required data sets could not be found. Therefore data had to be pre-processed and adjusted in order to perform the mining.

To avoid the listed problems, the team had to seek for support from other individuals who are working as Software Developers in the industry and to refer tutorials, YouTube videos, books etc. related to algorithm development and to develop the Android and Java applications. The system was initially planned only to reduce the food wastage by providing a summary with suggestions to the management. After the interviews and the Questionnaire were carried out, the research group learned that the meal or dish served in time to preserve the quality (freshness and taste) is important as well (shown below in Figure 6).

Figure 6: Suggestions Interface

After additional research the group decided to give a Tablet to the customer without giving making them to install the application themselves, otherwise an additional limitation would have been created as such every customer of the hotel has to have the app installed. In addition, if the application was to be installed by the customers themselves, the application would have to reconsider its compatibility with the other platforms like iOS and Windows. The system was changed accordingly to support the changes.

The accuracy of the SaveMORE varies according to the amount of data used for data mining. The database contains the data of orders completed in more than three years of time which prediction accuracy.

**Limitations**

- When measuring the weight, all the plate waste was taken as the waste of weight
though they may contain the bones, covers, etc. which cannot be consumed further.

- Practically it is impossible to take ingredients waste weight separately though it is taken separately from the time of meal preparation.
- To some extent the attitude of people will change the amount would be consumed such as some people might not have intentions to waste food but they might not be interested in ordering food according to their need. Such situations could increase the wastage of food which is impossible to prevent by our system.

V. CONCLUSION AND FUTURE WORK

Waste of food which is a hidden crisis around the world will be reduced by the implemented automated system to reduce the food wastage in the field of hospitality- SaveMORE, through delivering efficient suggestions on how to reduce the wastage to the management on a daily-basis. Future research directions for this research paper would include a web application so that the customer may not need to worry to come to the hotel/restaurant to have their favorite meal but to order online. In addition the customers may then be identified separately and will be able to provide customer intimacy which will be a better option from the business perspective as well as the technical perspective. As the main objective, this paper has introduced a solution for the food wastage in the field of hospitality.

ACKNOWLEDGMENT

We would like to take this opportunity to express our profound gratitude and deep regard to Dr. Yayas Jayaweera the Academic Head of SLIIT Computing (Pvt). LTD. and Mrs. Gayana Fernando Senior lecturer and lecturer in-charge of the module for providing us with the opportunity to conduct the Research Project. We thank the other members of the academic staff of SLIIT Computing (Pvt.) LTD. specially Ms. Nideshika Ellepola and Mr. Vibhavi Artigalla for providing help and guidance. We would also like to thank Mrs. Kumudini Wijewardana, Account Section - Hotel Concord Grand for providing us with the data we required to proceed with the data mining and for being helpful in gathering our primary data.

REFERENCES


AUTHORS

**First author**- H.M.T.I.Herath, Group Leader, Sri Lanka Institute of Information Technology Computing (Pvt) Ltd., thashmikah94@gmail.com

**Second author**- D.M.P.G.P.Dissanayake, Sri Lanka Institute of Information Technology Computing (Pvt) Ltd., prabathdsn7@gmail.com

**Third author**- R.M.B.P.Rathnayake, Sri Lanka Institute of Information Technology Computing (Pvt) Ltd., bprathnayakern@gmail.com

**Fourth author**- T.S.Liu, Sri Lanka Institute of Information Technology Computing (Pvt) Ltd., tersh.leon5uk@gmail.com

**Fifth author**- V.N.Vithana, Senior Lecturer at Sri Lanka Institute of Information Technology Computing (Pvt) Ltd.

**Correspondence author**- H.M.T.I.Herath, thashmikah94@gmail.com
Stylistics Analysis on Poem “Trees” Joyce Kilmer

By: Jomel B. Manuel
Department of Arts and Humanities
College of Arts and Sciences
Cagayan State University,
Carig Campus, Tugugao City

Abstract

This paper aims to analyze Joyce Kilmer’s poem entitled “Trees” for the perspective of stylistic analysis. The analysis is made under the aspects of phonological, morphological, graphological, and lexico-syntactic levels. This research is helpful in understanding the basic concepts, literal and hidden meanings of the poem.

Index Terms. graphological level, lexico-syntactic level, morphological level, phonological level, stylistics

1. Introduction

Style is the basic feature of any literary piece of writing. This gives uniqueness to every writer. Through one’s style, s/he can convey more the message to the readers. This shows that what makes one understandable and effective in expressing the message he/she wanted to convey would depend on how he/she dresses up his/her thoughts.

Furthermore, Leech (1969) said that personality of the writer is connected with his particular style. It reveals that how a person effectively and beautifully depicts his ideas and thoughts. It describes the way of person's speaking and writing. It is derived from the Latin word "elocutio" which means "style" and means "lexis" in Greek.

Style is an aspect of language that deals with choices of diction, phrases, sentences and linguistic materials that are consistent and harmonious with the subject matter (Lawal, 1997). Style is involved in both, spoken and written, literary and nonliterary types of language. However, it is particularly associated with written form of the literary texts.

Different scholars have come up with different views or definitions about stylistics. According to Freeman (1971), stylistics is a sub-discipline which started in the second half of the 20th century. Leech and Short (1981), on the other, defined stylistics as the linguistic study of style, is rarely undertaken for its own sake, simply as an exercise in describing what use is made of language. According to Widdowson (1975), stylistics is the study of literary discourse from a linguistic orientation which differs stylistics from the literary criticism and considers linguistics as its linking techniques.

According to Simpson (2004), stylistics is a method of textual interpretation in which primacy of place is assigned to language. He mentioned further that the reason why language is so important to stylistics is because the various forms, patterns, and levels that constitute linguistic structure are an important index of the function of the text. Undoubtedly, to do stylistics is to explore language and to explore language creativity in language use.

In Stylistic Analysis, we make use of linguistic description to investigate how spoken or written language communicates meaning in a variety of contexts (Coxon, 1993). Meanwhile, Simpson (2004) stated three basic principles in stylistic analysis. It should be rigorous, retrievable, and replicable. Rigorous means that it should be based on an explicit framework of analysis. Stylistic analysis is not the end-product of a disorganized sequence of ad hoc and impressionistic comments, but instead underpinned by structured models of language and discourse that explain how we process and understand various patterns of language. Retrievable means that the analysis is organized through explicit terms and criteria, the meanings of which are agreed upon by other students of stylistics. Although precise definitions for some aspects of language have proved difficult to pin down exactly, there is a consensus of agreement about what most terms in stylistics mean. Replicable means that the methods should be
sufficiently transparent as to allow other stylisticians to verify them, either by testing them on the same text or by applying them beyond that text.

II. Levels of Stylistic Analysis

Stylistic analysis could be conducted by means of the levels of analysis. The levels of stylistic analysis are identified as follows:

1. Phonological Level. This deals with the study of sound patterns of a given language, rules of pronunciations, the rhyming scheme and utterance of the words in the sentence. Phonological devices are rhyme elements, alliteration, consonance, and assonance.

2. Graphological Level. This deals with the formalized rules of writing. Leech (1969) claims that graphology exceeds orthography which refers to the whole writing system; punctuation, paragraphing and spacing. In short, it deals with the systematic formation, structure and punctuation in the sentence.

3. Morphological Level. This deals with the construction of the words by adding prefixes and suffixes to the root words. The main aim of this level is to study and analyze the words, internal structure of sentence and their formation. To find out foregrounding and the deviation, clauses, phrases, words, nouns and verbs are to be distinguished.

4. Lexico-Syntax Level. It is the combination of two different words” Lexis” and “syntax”. Lexis means the vocabulary which is used in a language or in any writing for any purpose. On the other, syntax means ‘sentence construction’: how words group together to make phrases and sentences. According to Tallerman(1998). Lexico-syntactic choices are obtained through devices such as piling of usual collocates, unusual collocates, archaic, words, particular parts of speech, and figures of speech.

Thus, close analysis of lexis, syntax, morphological, phonological, and graphological features of a text helps us uncover and appreciate the layers, patterns, and levels that constitute stylistic description.

III. Analysis of the Poem

On Phonological Level

Couplet

I think I shall never see
A poem lovely as a tree

The poem uses a literary device called couplet. A couplet is two lines of poetry. Kilmer uses six different couplets. Most of the couplets are usually connected with rhyming end words.

Rhyme

A tree whose hungry mouth is prest
Against the earth’s sweet flowing breast

Rhyme is likewise of word sounds. Prest and breast have like sounds therefore are rhyming words.
Rhyme scheme

The rhyme scheme of the poem is **aa, bb, cc, dd, ee, aa**. This happens because the final words of the first couplet have same sounds (see, tree), second couplet (prest, breast), third couplet (day, pray), fourth couplet (wear, hair), fifth couplet (lain, rain), while the last couplet has the same sound with the first couplet (me, tree).

Alliteration

*A nest of robins in her hair*. (Line 8)

*And lifts and leafy arms to pray*. (Line 6)

The words her and hair in Line 8 begin with letter h, while the words lifts and leafy in Line 6 begin with letter l. The poet uses alliteration to produce beautiful effect on the reader.

Assonance

*Against the earth’s sweet flowing breast*. (Line 4)

The poet uses poetry device **assonance**. This is the repetition of a vowel sound within a line in poetry. In the poem, the words against, earth’s, breast in Line 4 have similar vowel sound e. This provides tone and musical color.

Consonance

*Against the earth’s sweet flowing breast*. (Line 4)

*A tree that may in summer wear* (Line 7)

The words against, sweet, and breast in Line 4 end with t sound. Further in Line 7, the words summer and wear have the final sound of r.

Repetition

*A poem lovely as a tree
A tree whose hungry mouth is prest
A tree that looks at God all day
A tree that may in summer wear
But only God can make a tree.*

The word tree is repeated five times (5x). This emphasizes how the poet appreciates and praises trees.

Rhythm
I think I that I shall ne I ver see I

\[ \begin{array}{cccc}
  & x / & I & x / & I & x / & I & x / & I \\
\end{array} \]

The line shows a clear pattern of iambic feet; since each line has four feet, this rhythm is called iambic tetrameter. The iambic means the unstressed syllable is followed by the stressed one. Unstressed is represented by [x] and stressed is represented by[/]. Iambic [x/].

**On Graphological Level**

**Period/Full-stop(.)**

_A poem as lovely as a tree. (Line 2)_
_Who intimately lives with rain. (Line 10)_
_But only God can make a tree. (12)_

In the poem, period or full-stop is used thrice as can be seen in Line 2, 10, and 12. Period or full-stop is used to end a complete thought not necessarily the end of a stanza; it is also used to end the whole poem.

**Semi-colon(;)**

_Against the earth's sweet flowing breast; (Line 4)_
_And lifts her leafy arms to pray; (Line 6)_
_A nest of robins in her hair; (Line 8)_
_Upon whose bosom snow has lain; (Line 9)_

It is evident that in the poem, the semi-colon is used 4 times as can be seen in Line 4, 6, 8, and 9. It was used by the poet for a longer pause than a comma but not as long as of the period or full-stop.

**Comma (,)**

_A tree that looks at God all day, (Line 5)_
_Poems are made by fools like me, (Line 11)_

In the poem, the comma is used twice as can be seen in Lines 5 and 11. The poet employs comma for short pause and to separate sentential elements in the poem.

**On Morphological Level**
Affixation (suffix)

A poem as lovely as a tree. (Line 2)
A tree whose hungry mouth is prest (Line 3)
Against the earth's sweet flowing breast; (Line 4)
A tree that looks at God all day, (Line 5)
And lifts her leafy arms to pray; (Line 6)
A nest of robins in her hair; (Line 8)
Who intimately lives with rain. (Line 10)
Poems are made by fools like me, (Line 11)

It is seen that the poet uses only suffixes. As gleaned above, derivational suffixes such as lovely, hungry, flowing, leafy, intimately and inflectional morphemes which include earth's, looks, lifts, arms, robins, lives, poems, fools are used in the poem.

This reveals that the poet uses only morpheme/s added to the end of a word to create another word; that is, deflates or change the tense or number of a word, that is; inflectional.

On Lexical-Syntax Level

Personification

A tree whose hungry mouth is prest (Line 3)
Against the earth's sweet flowing breast; (Line 4)
A tree that looks at God all day. (Line 5)
And lifts her leafy arms to pray. (Line 6)
A tree that may in Summer wear (Line 7)
A nest of robins in her hair; (Line 8)

The poet articulates his thoughts through the use of personification. Personification is a figure of speech in which human attributes are conferred upon things that are not human. In the poem, the words hungry mouth (Line 3), breast (Line 4), looks (Line 5), arms (Line 6), wear (Line 7), hair (Line 8) are used in which human attributes.

In the poem, Kilmer personifies a tree in different ways. This shows that its extensive use of this figure of speech displays that the tree is alive. Clearly, it shows how people should praise God.

Simile

A poem lovely as a tree (Line 2)

Poems are made by fools like me, (Line 11)

The poet uses the literary device simile. Simile is a comparison between two unlike objects using the words like or as. In the poem, Kilmer uses the word as in Line 2, while the word like is also used in Line 11.

In the poem, simile is the great device used to give the reader something to compare an object to which gives the object a greater effect.
IV. CONCLUSION

The poet uses simple words and phrases to make it understandable and to clarify his intentions. By using different literary devices such as simile and personification, the poet makes the poem more effective to convey his message and to show the beauty of God’s creation. Thus, “TREE” is a poem which shows the poet’s religious faith and world’s nature beauty. Stylistics, by this analysis, has shown that there is a distinction between poetic and non-poetic language as a means of defining literature, language manipulated in ways that signal it as different from ordinary language.

APPENDIX

TREES
by Joyce Kilmer

I think that I shall never see
A poem as lovely as a tree.

A tree whose hungry mouth is prest
Against the earth's sweet flowing breast;

A tree that looks at God all day,
And lifts her leafy arms to pray;

A tree that may in Summer wear
A nest of robins in her hair;

Upon whose bosom snow has lain;
Who intimately lives with rain.

Poems are made by fools like me,
But only God can make a tree.

ACKNOWLEDGMENT

This piece of work is seemingly nothing without the inspiration extracted from his literature classes. Further, he would like to acknowledge the language professors in the Department of Arts and Humanities for the brilliant inputs just to finish this analysis.

REFERENCES


AUTHOR

DR. JOMEL B. MANUEL is an Associate Professor II at Cagayan State University and the current Department Chair of Arts and Social Sciences, College of Arts and Sciences-Carig Campus.

Dr. Manuel finished his Bachelor of Secondary Education- English in 2001 and Master of Science in Teaching- English in 2003 from Saint Paul University Philippines, Tuguegarao City. He also obtained his Doctor of Philosophy in Language Education at Cagayan State University in 2012.

He teaches Grammar and Composition 1 and 2, Sociolinguistics, Applied Linguistics, Methods of Language Research, English Discourse, Masterpieces of World Literature, Survey of English-American Literature, and Language research. He is a Graduate School professor handling Language Testing and Second Language Acquisition. He is also invited as a part-time Graduate School professor at University of Cagayan Valley, Tuguegarao City.

He is also one of the accreditors of the Accrediting Agency of Chartered Colleges and Universities in the Philippines (AACCUP).

He already published International Researches which include: Second Language Classroom Interaction: A Transactional, Proposed Module in Grammar and Composition, and Turn-taking Practices in Literature Classes (co-researcher).
Repair Strategies on Spoken Discourse

¹Jervis Canonio (main researcher), ²Rachelle Nonato (main researcher), ³Jomel B. Manuel (co-researcher)

Department of Arts and Humanities
College of Arts and Sciences, Cagayan State University, Carig Campus
Tuguegarao City, Cagayan North, Philippines 3500
³jomelmanuel@yahoo.com

Abstract: This study aimed to analyze the repair strategies used in spoken discourse in both ordinary and institutional conversations. The study used the descriptive - qualitative method. The data were derived from the 10 recorded institutional and 10 recorded ordinary discourses through audio-recording. A four part process analytic technique: Record-View-Transcribe-Analyze (R-V-I-A) method was used. Recorded conversations were transcribed and analyzed using the frequency count and percentage. The results of the study show that most interlocutors preferred self-initiated self-repair in both institutional and ordinary discourses to resolve communication problem during their turn. Further, disfluency in communication was the most committed trouble source. This confirms that the interlocutors are knowledgeable and have good grasp as regards content; however, they have difficulty in articulating their thoughts because of the poor facility of the English language.

Keywords: trouble source, repair strategies, self-initiated-self repair, other initiated-self repair, other-initiated-other repair

Introduction

Language is the human capacity for acquiring and using complex systems of communication either in the form of written or spoken discourse. Language is the most important aspect in the life of all beings. Through language, we are able to exchange knowledge, beliefs, opinions, wishes, threats, commands, thanks, promises, and other declaration of feelings.

Moreover, language is a channel for communication and productive conversation which is very significant to transmitting knowledge and to sustaining good rapport. It is the fundamental of communication and tool for social interaction and is therefore considered as an exclusive human property.

Communication is inevitably part of our daily lives. It is a medium for speakers to discuss ideas in any topic on a certain point and context. We, social beings, communicate to interact in order to establish relationships and maintain it through constant conversation.

Conversation is an interactive and spontaneous communication in social environment to share and access information between and among interlocutors. According to Wardhaugh (2010), conversation deals with a lot of meanings and interpretations depending upon of its context.

Hence, conversation is a progression of exchanges among participants who are considered as learning system by which existing knowledge is conveyed and new knowledge is generated. However, communication problems may occur during conversation that brings barriers to the interlocutors because of some reasons. This phenomenon is inherently unavoidable in any angle of conversation. Such errors are recurrent problem to both institutional and ordinary talk which is definitely prone to difficulties of interlocutors to maintain the flow of connection in a conversation.
Conversation, according to Sacks, Jefferson and Schegloff (1977), is when a speaker is talking, he has either way to self-repair himself or other participant when committing errors. Repairs include self-initiated self-repair, self-initiated other-repair, other-initiated self-repair, other-initiated other-repair.

Repairs are strategies that speakers use in spoken discourse either in an ordinary conversation or institutional talk. It is the way speaker corrects things which someone else has said, and checks what he/she has understood.

Moreover, repairs do not just correct grammar rather as a way to better express oneself in a conversation. Normally, repair is being done when an interlocutor locates and replaces a prior information unit. Then, this shows the speakers’ sensitivity on their own production of discourse covers both institutional and ordinary conversation.

Repair can be initiated by the speaker of the repairable (self-initiated repair) or may it be initiated by its recipient (other-initiated). In addition, a repair can be made by the speaker of the repairable item (other repair). In combination, these possibilities allow for four types of repair: self-initiated self-repair, self-initiated other-repair, other-initiated self-repair, other-initiated other-repair.

In this premise, the researchers would like to analyze the conversations both in institutional and ordinary discourses among students in the university. This paper considered the model of mechanism for repair conversation by Schegloff’s, Sacks’, and Jefferson’s (1977). The theory defined the strategies for resolving miscommunication problems involving speaking, hearing and understanding.

**Statement of the Problem**

Generally, this study aimed to determine the repair strategies on spoken discourse at Cagayan State University, Carig Campus, Tuguegarao City for the school year 2014-2015.

Specifically, it sought to answer the followings:

1. To what extent do the following trouble sources are observed in institutional conversation and ordinary conversation?
   a. Dysfluency in communication
   b. Unpreparedness
   c. Lack of communication Skills
   d. Physical Noise
   e. Vagueness
   d. Poor Comprehension

2. How frequent do the following repairs occur in institutional conversation and ordinary conversation?
   a. Self-initiated self-repair
   b. Other-initiated self-repair
   c. Self-initiated other-repair
   d. Other-initiated other-repair

3. How frequent do the following repair strategies are used in the different trouble sources?
   a. Self-initiated self-repair
b. Other-initiated self-repair
c. Self-initiated other-repair
d. Other-initiated other-repair

**Methodology**

*Research Design*

This study used the descriptive-qualitative method. This study was predominantly qualitative method in terms of the type of analysis. That is to say, to describe how the language is being used in the ordinary and institutional discourses by using the detailed transcription of obtained data from the audio recording. This method concerned with developing explanations of social phenomenon. It studied behavior in natural settings or used people’s accounts as data, focused on description and interpretation and might lead to development of new concepts or theory, or to an evaluation of an organizational process (Hancock, Windridge K., and Ockleford.: 2007).

To objectively analyze the data, the researchers used a four part process analytic technique: Record-View-Transcribe-Analyze (R-V-I-A) method.

*Participants*

This study recorded both discourses inside and outside classrooms at Cagayan State University, Carig Campus for the school year 2014-2015. There were 10 ordinary and 10 institutional discourse analyzed based on the 140 utterances transcribed.

*Research Instrument*

This study made use of audio-tape recording to capture the conversation of the interlocutors. Further, the researcher interviewed and took down notes to validate and supplement the data gathered.

*Procedures*

All data were collected during the first semester of the school year 2014-2015. For the ordinary conversation, the researchers recorded conversation from the different places or areas of the campus which include: in the canteen, under the shade of the tress, and inside the library. For the institutional discourse, audio-recording occurred after permission was granted. These include: classroom discussions, meetings, and other formal gatherings.

*Data Analysis*
In order to investigate the study, the repair strategies used by the interlocutors and the trouble sources committed by the interlocutors were analyzed using the frequency count and percentage.

For the frequency, the researchers adapted Mariana’s formula:
\[
\%
\] = \frac{\text{Frequency of the repairs}}{\text{Total source of Data}} \times 100\%

Results and Discussion

Frequency of Repair Strategies occurred in Institutional Conversation

Table 1 presents the frequency and percentage distribution of repair strategies in institutional conversation. The table shows that the most repair strategy used was the self-initiated self–repair with a frequency of 47 or 68.11%, followed by self-initiated-other repair and other initiated self-repair with a frequency of 16 and 4 or 23.18% and 5.79% respectively. Further, the least repair strategy used was other-initiated repair with a frequency of 2 or 2.59%.

This shows that the speakers tried to correct what they thought to be a mistake. This displays that self-initiated repair is a well-organized, orderly, and rule-governed phenomenon and not a chaotic aspect of spoken discourse (Schegloff et al.; Rieger, 2000).

The result of the study is in contrast with the study conducted by McHoul who found that there is more tendency on other-initiation (mostly by teacher), self-completed repair (by students). McHoul concluded that “other-correction can occur without difficulty, but self-correction is a much more routine and observable phenomenon, and it is frequently by students following initiation by teachers” (1990,p. 353).

Table 1. Frequency of Repair Strategies occurred in Institutional Conversation.

<table>
<thead>
<tr>
<th>Repair Strategies</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self- initiated Self-repair</td>
<td>47</td>
<td>68.11%</td>
</tr>
<tr>
<td>Self- initiated Other repair</td>
<td>16</td>
<td>23.18%</td>
</tr>
<tr>
<td>Other-initiated Self-repair</td>
<td>4</td>
<td>5.79%</td>
</tr>
<tr>
<td>Other-initiated Other repair</td>
<td>2</td>
<td>2.89%</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>100%</td>
</tr>
</tbody>
</table>

Extract 1: (Self-initiated Self-repair)

T: Correct. Ariel (2.0) what kind (3.0) what do you mean about the message of-ah of the last
question?
(3.0)
S: the-e ahh (2.0) the message is (3.0) is=is all about: that as long as (3.0) as: we dream we still ha:ve the-the courage to live(6.0) and to(3.0) and to -to strive hard to keep=attain our goals in life.
T: Okay. Very good.

In the given extract, it shows that the student repaired his own statement. Here, the student used self-initiated self-repair strategy to correct trouble sources present in the turn. This shows that the student prefers to clarify and be clearly understood in his own turn by repairing his statement without the teacher giving any chance to correct him. In the study of Evelyn Hatch entitled “Discourse and Language Education”, Deborah Schiffrin cited that self-initiated self-repair shows speakers’ sensitivity to their own production of discourse by replacing, locating an item from an outgoing utterance, speakers display their productive efforts. Furthermore, according to Heritage and Greatbatch, institutional conversation often withholds participation by the speaker. Thus, repair does not rely from any participant but from the speaker himself due to “speakership rights” (Heritage and Greatbatch, 1991).

**Frequency of Repair strategies occurred in Ordinary Conversation**

Table 2 presents the frequency and percentage distribution of repair strategies occurred in ordinary conversation. The table shows that the most repair strategy used was self-initiated self-repair with a frequency of 57 or 80.28%, followed by other-initiated self-repair and self-initiated-other repair with a frequency of 8 or 11.26% and 7.07 percent respectively. Moreover, the least repair strategy occurred was other-initiated other-repair with a frequency of 1 or 1.40%.

This implies that self-initiated self-repair exhibits a strong tendency to be used more for one function in conversations between friends and for another in conversations between strangers. More so, one possible factor for the high frequency of self-initiated self-repair is the elaborative function-bearing repair between strangers.

**Table 2: Frequency of Repair strategies occurred in Ordinary**

<table>
<thead>
<tr>
<th>Repair Strategies</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-initiated Self-repair</td>
<td>57</td>
<td>80.28%</td>
</tr>
<tr>
<td>Self-initiated - Other repair</td>
<td>5</td>
<td>7.04%</td>
</tr>
<tr>
<td>Other-initiated Self-repair</td>
<td>8</td>
<td>11.26%</td>
</tr>
<tr>
<td>Other-initiated other-repair</td>
<td>1</td>
<td>1.40%</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>100%</td>
</tr>
</tbody>
</table>

Extract 2: (Self-initiated self-repair)

Mary: Where is the regist=registrar-office?
In this extract, the interlocutor did not anticipate the question coming from a friend in which Mary is not used of giving instructions. Thus, it made her answer unclear to Mae. However, Mary tried to make her instructions more comprehensive by using self-initiated self-repair though her utterances are still ill-formed.

In this case, self-initiated self-repair in ordinary conversation is heavily marked by unplanned discourse. Unplanned discourse is often delivered clause by clause or phrase by phrase. Further, self-initiated was used when the speaker encountered problems in retrieving the target language item which seemed to be a mistake.

Analysis on Trouble Sources Committed in Institutional and Ordinary Conversations

Table 3 presents the frequency and percentage distribution of the analysis on trouble sources committed in the institutional conversation. As gleaned from the table, the most committed trouble source was dysfluency having the frequency of 32 or 46.47%; unpreparedness with a frequency of 18 or 26.08%; vagueness and lack of communication skills, 6 with 8.69%; poor communication, 5 with 7.24%; physical noise, 2 with 2.89%.

Further, the table presents ordinary conversation in which interlocutors made use of 6 self-initiated self-repair and 1 in self-initiated other-repair in resolving the lack of communication skills. Also, there were 25 self-initiated self-repair, 1 self-initiated other-repair and 4 other initiated self-repair in treating dysfluency in communication. Moreover, in unpreparedness, there were 23 self-initiated self-repair, 2 self-initiated other-repair, and 2 other initiated self-repair addressed to the problem. Furthermore, there was only 1 other-initiated self-repair used in physical noise and vagueness. Additionally, 3 self-initiated self-repair, 1 other-initiated other-repair and 1 other initiated other-repair used in poor comprehension.

The table shows that self-initiated self-repair is the most recurrent strategy being used by interlocutors in treating trouble sources.

The result clearly demonstrates that dysfluency in communication is the most prominent trouble source in both institutional and ordinary conversation. According to Waterson (2008), second language learners struggle to transmit messages to their interlocutors fluently using the English Language as a medium of communication. It is an inevitable problem in communication to non-native speakers. The idea of an interlocutor is complete; however, problem arises from the speaker who does not have the command of the language in presenting his thoughts.

Markee (2000) also believed that there is a strong preference for self-repair over other repair in first language conversations and there is a strong possibility of it in second language conversation. The preference of self-initiated self-repair within a context is highly favored because English is learned as a foreign language. Thus, being second language learners, dysfluency in communication is a natural phenomenon.

Table 3. Analysis on trouble sources committed in Institutional and Ordinary Conversations

<table>
<thead>
<tr>
<th>Trouble Source</th>
<th>Institutional</th>
<th>Ordinary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysfluency</td>
<td>32 (46.47%)</td>
<td></td>
</tr>
<tr>
<td>Unpreparedness</td>
<td>18 (26.08%)</td>
<td></td>
</tr>
<tr>
<td>Vagueness and lack of communication skills</td>
<td>6 (8.69%)</td>
<td></td>
</tr>
<tr>
<td>Poor communication</td>
<td>5 (7.24%)</td>
<td></td>
</tr>
<tr>
<td>Physical noise</td>
<td>2 (2.89%)</td>
<td></td>
</tr>
<tr>
<td>Other-initiated self-repair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other-initiated other-repair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-initiated self-repair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-initiated other-repair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other-initiated other-repair</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

www.ijsrp.org
<table>
<thead>
<tr>
<th>Trouble Sources</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of Communication Skills</td>
<td>6</td>
<td>8.69%</td>
<td>7</td>
<td>9.85%</td>
</tr>
<tr>
<td>Dysfluency in Communication</td>
<td>32</td>
<td>46.37%</td>
<td>30</td>
<td>42.25%</td>
</tr>
<tr>
<td>Unpreparedness</td>
<td>18</td>
<td>26.08%</td>
<td>27</td>
<td>38.02%</td>
</tr>
<tr>
<td>Physical Noise</td>
<td>2</td>
<td>2.89%</td>
<td>1</td>
<td>1.04%</td>
</tr>
<tr>
<td>Vagueness</td>
<td>6</td>
<td>8.6%</td>
<td>1</td>
<td>1.04%</td>
</tr>
<tr>
<td>Poor Comprehension</td>
<td>5</td>
<td>7.24%</td>
<td>5</td>
<td>7.02%</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>100%</td>
<td>71</td>
<td>100%</td>
</tr>
</tbody>
</table>

Extract 3: (Disfluency in Communication)

T: Correct. Jerv (2) what kind(3) what do you mean about the message of(ah of the last question (3.0)?

S: the-e ahh (2) the message is (3) is= is all about= that as long as (3) as: we dream we still have the-the courage to live(6) and to(3) and to - to strive hard to keep= attain our goals in life.

In this extract, the student has an idea only that, he prolongs and repeats his words. This shows that dysfluency is the problem why he could perfectly express himself. Thus, facility of the second language is necessary.

Table 4. Frequency of repair strategies used in the different trouble sources under Institutional Conversation

Table 4 presents the frequency and percentage distribution of repair strategies in the different trouble sources on institutional conversation. The table shows that disfluency in communication was committed most in both self-initiated self-repair and self-initiated other-repair with a frequency of 23 (48.93%) and 8 (50%) respectively, followed by unpreparedness with a frequency of 15 (31.91%) on self-initiated self-repair while lack of communication with a frequency of 4 (25%) on self-initiated other-repair.

This indicates that self-initiated self-repair was the dominant repair strategy used in repairing dysfluency, which is the dominant trouble source which triggers repairing.

Table 4. Frequency of repair strategies used in the different trouble sources under Institutional Conversation.
Table 5. Frequency of repair strategies used in the different trouble sources under Ordinary Conversation

Table 5 presents the frequency and percentage distribution of repair strategies used in ordinary conversation. The table shows that disfluency in communication was committed most with a frequency of 25(43.85%) on self-initiated self-repair and 4 (50%) on other-initiates self-repair, followed by unpreparedness with a frequency of 23(40.35%) for self-initiated self-repair, 2(40%) for self-initiated other-repair, and 2(25%) other initiated self-repair.

This reveals that self-initiated self-repair is the most recurrent strategy being used by interlocutors in treating trouble sources under ordinary conversation.
### Conclusion

Based on the findings of the study, it is concluded that self-initiated self-repair is the most frequently used repair strategy in addressing dysfluency in communication as a trouble source, the most committed trouble source, in spoken discourse whether institutional or ordinary. This also confirms that the interlocutors are knowledgeable and have good grasp as regards content; however, they have difficulty in articulating their thoughts because of the poor facility of the English language.

With this, language teachers should encourage students to be risk-takers, and use this strategy, which was classified as one of the communication strategies.

### Acknowledgement

The researchers would like to acknowledge the people who in one way or another contributed to the success of this academic endeavor- the whole faculty members of the Department of Arts and Humanities for the brilliant inputs which give meaning to this study.

### About the Researchers

Mr. Jervis Canonio is a graduate of the AB English program of the Department of Arts and Humanities, College of Arts and Sciences at Cagayan State University, Carig Campus.

Ms. Rochelle Nonato is a graduate of the AB English program of the Department of Arts and Humanities, College of Arts and Sciences at Cagayan State University, Carig Campus.

Jomel B. Manuel is an Associate Professor II at Cagayan State University and the current Department Chair of Arts and Social Sciences, College of Arts and Sciences-Carig Campus. Dr. Manuel finished his Bachelor of Secondary Education- English in 2001 and Master of Science in Teaching- English in 2003 from Saint Paul University Philippines, Tuguegarao City. He also obtained his Doctor of Philosophy in Language Education at Cagayan State University in 2012.
References

“The  Behavioural analyst today” 5.3 (2004) American Psychology Association,
INC.Web.8 July.
Hancock B., Windridge K., and Ockleford E. (2007). An Introduction to Qualitative
Research. The NIHR RDS EM/ YH.
Ferdowsi University of Mashhad, Iran.
Liddicoat, Anthony J,(2007). An Introduction to Conversation Analysis. London SE1 7 NX.
University Press Great Clerendon Street, Oxford 0x2 6DP Hong Kong.
Morgan, Aliyah, Marie Leroy-Collobel, and Stephanie Caet. “Self-and other-
Research. Philippines by ESP printers, INC. Cangage Learning Asia Pte.Ltd.
Conversations: The Role of Language, Gender and Proficiency, PhD Dissertation,
University of Alberta.
Sato, Rintaro. (2008). Japan Association for Language Teaching (JALT) journal: Self-
initiated Modified Output of the road to Comprehensibility. Nora
University of Education. Japan.
Schiffrin, Deborah. (2000). Approaches to Discourse. Malden Massachusetts, USA.
Wardhaugh, Ronald(2010). An Introduction to Sociolinguistics. Hong Kong: John Wiley &
Son.
pub.London.
Wray, Alison and Aileen Bloomer. Project Linguistics: A Practical Guide
Researching Language. Oxford University Press: Incorporation BF: Great

<phht://go.galegroup.com/ps/i.do?id=GALE%7CA170115053&v=2.1&phcicm&it=mp=AONE&sw=w>
<phht://go.galegroup.com/ps/i.do?id=GALE%7CA346052753&v=2.1&phcicm&it=mp=AONE&sw=/>
Study of Risk Factors of Mild Cognitive Impairment in Patients with Type 2 Diabetes Mellitus

Modugula S Naga Swetha¹, Srinivasa S.V.², Abhishek Kumar Verma³, Prabhakar K⁴

¹. Post graduate, Department of General medicine, Sri Devaraj Urs Medical College, Kolar, Karnataka
². Associate Professor, Department of General medicine, Sri Devaraj Urs Medical College, Kolar, Karnataka
³. Post graduate, Department of General medicine, Sri Devaraj Urs Medical College, Kolar, Karnataka
⁴. Professor, Department of General medicine, Sri Devaraj Urs Medical College, Kolar, Karnataka

I. INTRODUCTION

Diabetes mellitus is a severe metabolic disease which can affect multiple organs in the body. It is a complex disorder and several factors related to it, either the disease itself or its treatment, long-term complications and comorbidities can affect the brain⁴. Type 2 diabetes has been consistently associated with increased risk of accelerated cognitive decline² and an higher incidence of dementia,³⁴ particularly in older individuals. Patients with Type 2 Diabetes mellitus are almost two times more likely to experience cognitive decline and dementia compared to those with normal glucose tolerance (NGT).⁴ Studies have suggested that T2DM effects cognitive domains like verbal memory (verbal fluency, immediate and delayed verbal recall), attention and processing speed, psychomotor ability, and executive functions.⁵⁶. Diabetes has also been observed to be related with cognitive decrements such as worsening of abstract reasoning⁷, complex motor functioning and working memory⁷.

Such decline maybe in part due to an array of tissue response from chronic hyperglycemia, postprandial glucose fluctuations, advanced glycosylated end-products, and altered insulin action and amyloid-beta (Aβ) peptide accumulation⁸⁹. Chronic hyperglycemia is implicated, perhaps by promoting the development of cerebral microvascular disease. Inflammation and oxidative stress also appear to be involved in the pathogenesis of cognitive decline. These two factors form a vicious cycle that accelerates brain injury and cognitive impairment.⁹

The spectrum of cognitive decline in type 2 diabetes mellitus ranges from asymptomatic state to dementia. Mild cognitive impairment (MCI) is the intermediate clinical state which generally preceeds dementia in which patients have cognitive complaints and objective disturbances on cognitive tests but their daily functioning is largely preserved. Although people with MCI have a higher dementia risk, the conversion rates reported range from 1% to 25% or more per year.¹⁰ In fact, many persons with MCI convert back to a cognitively normal state.¹⁰

This transitional and therefore possibly modifiable characteristic makes the state of MCI a promising approach in the development of prevention strategies of dementia. Though association of diabetes with early cognitive decline is vastly studied, risk factors which accelerate it are not completely studied. Hence by identifying the risk factors for MCI, the patients at risk can be identified early and will be benifitted by aggressive management, thus preventing development of dementia. Thus, we investigated the association between various physical and biochemical parameters in patients with type 2 diabetic patients and mild cognitive impairment (MCI).

Objective of the study: To identify risk factors of mild cognitive impairment in type 2 diabetes patients.

II. METHOD OF STUDY

The study was done in Sri Devraj Urs Medical College, Kolar, Karnataka. Type 2 Diabetes mellitus patients presenting to Department of General Medicine were screened to be included in the study. After applying stringent inclusion and exclusion criteria, 206 type 2 diabetic patients were enrolled in the study.

The inclusion criteria were as follows:

➢ T2DM patients aged 18years and above and volunteer to participate in the study.
➢ T2DM was diagnosed according to diagnostic criteria given by American Diabetes Association.

The exclusion criteria were as follows:

➢ Patients with other neurological conditions such as history of head trauma, brain tumor, epilepsy, stroke, transient ischemic attack, coma, or presence of dementia before T2DM, Parkinson’s disease.
➢ Patients with psychiatric disorders; depression, alcohol dependence, drug dependence, and use of antidepressant or antipsychotic medications, schizophrenia.
➢ Patients with auditory/visual disorders.

All patients gave their written consent prior to participation, and the study was approved by Institutional Ethical Committee.

Assessment of Variables:

Detailed history was taken from the participants and general and systemic examination was done.

• History including level of physical activity, duration of diabetes, history of hypertension and history of smoking was taken.
Physical activity was determined on the basis; if subject was doing at least 30 min of aerobic exercise in a day, he/she was considered as active and if otherwise as sedentary.

- Anthropometric measurements such as –
- Height and weight were measured and body mass index (BMI) was calculated according to Quetelet equation (BMI = weight in kilograms/height in meters squared).
- For waist–hip ratio, waist circumference was measured at the midpoint between the lower margin of ribs and the superior border of the iliac crest. Hip circumference was measured around the widest portion of the buttocks.
- Systolic blood pressure (SBP) and Diastolic blood pressure (DBP) were noted down as a mean of two tests conducted after an interval of 3 min in sitting position after 15 min of rest.
- Laboratory tests were done which includes-
  - HbA1c, total blood cholesterol, HDL cholesterol,
  - Mild cognitive impairment was diagnosed by using the Montreal Cognitive Assessment (MoCA) score. It is a score with total of 30 points. Patients with score of 26 or more were considered as without MCI and less than 26 are considered with MCI.

The scoring by MMSE can be influenced by the effect of age and education level. To avoid any bias, present data were well matched for age and education status.

Figure 1 shows the data collection protocol after following stringent inclusion and exclusion criteria.

### III. STATISTICAL METHODS

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Continuous data was represented as mean and standard deviation. ANOVA (Analysis of Variance) was the test of significance to identify the mean difference between group with no cognitive impairment (NCI) group and with MCI. Pearson’s correlation was done to find the correlation between two quantitative variables. p value <0.05 was considered as statistically significant.

Figure 1: Showing data collection protocol after following stringent inclusion and exclusion criteria
IV. RESULTS

A total of 206 type 2 diabetic patients were enrolled in the study. Participants are aged between 52 - 76 years with mean age of 66 years. 107 (51.9%) were men and 99 (48.1%) were women. The median duration of diabetes was 12 years.

118 (57.3%) patients have MCI (MoCa <26) and 88 (42.7%) do not have MCI (MoCa ≥26).

When various physical and biochemical variables among study population are compared, there were significant differences in the mean duration of diabetes ([8.09 ± 3.02 y vs. 5.80 ± 4.06 y], p = 0.002), rate of patients with hypertension ([59% vs. 41%], P=0.025), rate of patients with sedentary life style ([48% vs. 33%], p = 0.001), rate of patients with smoking history, ([37% vs. 29%], p = 0.003), percentage of patients with BMI more than 27 kg/m², ([69% vs. 57%], p = 0.045), percentage of patients with waist hip ratio more than 0.85 ([68% vs. 59%], p = 0.004), between group with MCI and without MCI.

Duration of diabetes, presence of associated hypertension, smoking history, high BMI and waist hip ratio positively correlated with MCI whereas physical activity correlated negatively with MCI.

There are no significant differences in the duration of hypertension and SBP, DBP values, levels of HbA1C and blood lipid between group with MCI and without MCI. Though all the variables had a higher rate among group with MCI, the difference was not statistically significant.

Duration of diabetes, presence of associated hypertension, smoking history, BMI, waist hip ratio and physical activity were included in the multivariate logistic regression models to find probability of these variable as risk factors for MCI, only duration of diabetes, sedentary life style and smoking history had p less than 0.005. hence, they could be independent risk factors for development of MCI in type 2 diabetes patients.

V. DISCUSSION

In the present study, we studied correlation between various parameters in type 2 diabetic patients and mild cognitive impairment.

Several screening tools are available for detecting cognitive impairment. The Montreal Cognitive Assessment (MoCA) was developed as a 30-point, 10-minute test that evaluates visuospatial and executive function, orientation, language, attention and recall. It is more sensitive (90% vs 18%) than MMSE in detecting mild cognitive impairment with a specificity of 87%. MMSE has a good sensitivity and specificity for the detection of dementia, but for the detection of nondementia cognitive impairment, its sensitivity is only 20%–60%. In order to correct MMSE deficiencies, the MoCA has been introduced into clinical practice.

Our results show that duration of diabetes, lack of physical activity and smoking are independent risk factors for MCI. These findings are in agreement with other studies. 11,12,13 The findings of another study 14 suggest an association between earlier onset, longer duration, and greater severity of diabetes and MCI. One study12 proves that compared to never smokers, middle-aged male smokers experienced faster cognitive decline in global cognition and executive function, which is inagreement with our study. Another study 13 points out that practical interventions aimed at reducing and replacing sedentary behavior with intermittent light intensity physical activity can help slow cognitive decline.

Higher prevalence of cognitive decline is alarming, and results of the present study suggest that every diabetic subject should be examined for cognition so that dementia can be prevented or delayed effectively in diabetic patients.

Limitations of the study is that MoCA score which is influenced by age and educational level is used in prospective observational study. Though age and education status are well matched while comparing results in our study, the results are more dependable when done in a case-control type of study.

VI. CONCLUSION

The longer duration of diabetes, sedentary life style and smoking could be risk factors of MCI in type 2 diabetic patients. The study suggest that lifestyle changes can reduce risk of MCI development in diabetic patients. This finding could have an important impact on the management of cognitive decline in diabetic patients. In absence of curative treatments for dementia with type 2 diabetes mellitus (T2DM), it is worthwhile to target modifiable risk factors so that progression of dementia can be delayed or prevented.

REFERENCES


www.ijsrp.org

**AUTHORS**

**First Author** – Modugula S Naga Swetha, Post graduate student, Department of General medicine, Sri Devaraj Urs Medical College, Kolar, Karnataka, msnswetha@gmail.com

**Second Author** – Srinivasa S.V Associate Professor, Department of General medicine, Sri Devaraj Urs Medical College, Kolar, Karnataka

**Third Author** Abhishek Kumar Verma, Post graduate student, Department of General medicine, Sri Devaraj Urs Medical College, Kolar, Karnataka, abhishek1.verma@gmail.com

**Fourth author** Prabhakar K Professor, Department of General medicine, Sri Devaraj Urs Medical College, Kolar, Karnataka

**Correspondence Author** – Srinivasa S.V Associate Professor, Department of General medicine, Sri Devaraj Urs Medical College, Kolar, Karnataka
Evaluation the Effect of Different Surface Treatment on Shear Bond Strength between Composite Increments  
(An in vitro study) 

Zuha Ayad Jabber 

Master of conservative dentistry, Collage of dentistry / university of kufa

Abstract- Objective: to evaluation the effect of different surface treatment on shear bond strength between composite increments to determine the most effective procedure that increase bond strength between composite increments Methods: four groups used in this study and each group consist of 20 blocks of composite. The block made at the same dimension: (3mm, 3mm, 2 mm) made from 3M Nano Hybrid Z 250XT. 1st group: include Oxygen polymerization inhibited samples. 2nd group: include sample that inhibit the formation of Oxygen polymerization inhibited layer by utilize strip. 3rd group: include the samples that uses3M one bottle self etch bond that contain silane. 4th group: include surface grinding of first composite increment by turbine diamond bur, each of these four groups composite from 20 block of composite. Using VALO Cordless curing light for composite increment curing. Results: the mean of bond strength for first group is 32.14 ± 1.148 Mpa, second group 30.75 ± 1.854 Mpa, third group 13.73 ± 1.301 Mpa and last group 19.67 ± 1.919 Mpa. The one way ANOVA (F-test) utilized to identify the significant differences between the four groups, L.S.D was apply to compare the differences of two groups as multiple comparison. The higher shear bond strength in group contain oxygen inhibiter layer and group use one bottle bond (saline) group, and lowest mean result of group that Inhibit oxygen inhibiter layer formation and surface grinding groups. Conclusions: the shear bond strength between composite increment increase when there is oxygen inhibiter layer on the composite surface and also increase when used one bottle bond agent contain silane while the absence of oxygen inhibiter layer lower the bond strength between the increment when add another composite layer. also the rough surface gave better bond strength result compared to smooth surface.

Index Terms- Evaluation, effect, bond strength, composite increments

I. INTRODUCTION

The progressive using of composite restoration for anterior and posterior teeth has increased severely. At this time the a application of composite restoration are either by the increment technique or bulk fill. The basis for using increment layering technique are:
1- Layering procedure are extensively documented as a major reason in the diminution the stress of polymerization shrinkage.
2- The matching of the color for composite restoration with the natural color of the tooth obligate using a multiple composite shade that was helps in layering placement techniques to get an best color match for the normal tooth.
3- For all types of cavity classes with conservative cavity preparation make tooth colored restoration is ideal option (Roulet et al., 2001).
4- The majority of hybrid composites can just be cured to a depth of 2 mm, and for this reason layering procedure are necessary to fill the cavity.

The layering procedure decrease C-factor of the configuration of the cavity and the failure of bonding to cavity wall following polymerization shrinkage. The highly possibility of porosity formation between the layers and the longer time taken by placing the increment make that as disadvantage. The dental restorative cosmetic work need be rapidly and simply bond to composite material. (Irfan Ahmad, 2013)

In this paper studying the composite-to-composite union by using layer technique of two composite increments to recognize causes influencing the composite-to-composite bond and evaluate the effect inhibiter layer by oxygen and the lack of inhibiter layer. The oxygen reaction with free radical carbon-based to create peroxy radicals, which is less reaction to dual bonds, the effectiveness of beginning of reaction is reduced, leading to significant delay of the polymerization. These unwanted reactions with oxygen take place at the layer facing air where the oxygen concentration is about 10^{-2} to 10^{-3} M. This cause the polymerization reaction delayed at the area directly facing air. (Andrzejewska, 2001)

The second group study the using of the 3M universal bond (one bottle technique), this system represent the seven generation in bond classification which characterize by join acid etch, prime, and bond agent in one bottle, this system first introduce in 2002.

The ‘conventional’ dentine adhesives systems apply acid etch or bonding agent or prime separately which all this must be done before insertion the filling material in to the cavity, this multiple steps increase the possibility for contamination by blood or saliva which have unfavorable outcome on the restoration bonding. (Abdalla A et.al, 1998)( Asmussen E et.al,2001)( Sano H et.al 1998).

To defeat this challenges, many manufacture reach to collect the bond, etch and prime in one bottle to be apply in one step procedure and this will reduce the possibility of failure of bonding procedure. (MF Burrow, MJ Tyas 2003)
Silane agent are coupling agent which composed of bifunctional particle, one of these particle react with different kinds of inorganic material ex: glass and silica. at the same time as the other molecule react to several kinds of organic materials which increase the cause for using silane agent in composite defect or fracture repair (Sattabanasuk V, et.al 2004)

Also the effect of surface roughness on composite repair was study by utilize a diamond type bur to make the superficial facing layer of the composite coarse before place the second increment layer , where the last group in this study the using colloid strip to cover first layer of composite during curing to avoid the construction of the polymerization inhibition layer.

II. MATERIALS AND METHODS

In this paper the comparison done between 4 group each group twenty block of composite which standardized to as the same dimension which is the length is 3mm, the width is 3mm, and block thickness is 2mm, each blocks construct according to group creation procedure condition.

Mold creation:
Starting by preparing block of sticky type wax at which is the length is 3mm, the width is 3mm, and block thickness is 2mm which show in figure one.

Figure (1) sticky type wax block

The dimension of the block of sticky type wax measured by digital vernier (total TMT322001) which shown in figure two to fit the dimension which is the length is 3mm, the width is 3mm, and block thickness is 2mm

Figure (2) digital vernier measure the block dimension
This block of wax positioned on the table and by using a heavy body impression material, c-silicone impression material made first mold surrounding the block of wax which appear in figure three. After the final set of the heavy body material the block of wax was removed and now the mold is complete to use in production initial layer of composite blocks.

![Figure (3) the block of wax surrounded by heavy body impression material](image)

The first mold that construct of heavy body is bordered by layer of heavy body material to create another mold of a heavy body that are larger than first mold and the first constructed mold fit in it and have the same dimension represented by opening in the center to create the second composite layer of a composite block which is appropriate fit to first created layer of composite show in figure four.

![Figure (4) the heavy body molds constructed for block of composite](image)

The composite utilize in this study was 3 M Nano Hybrid Z250XT and the shade that selected was B2 which shown in figure five. Ash number 6 utilized for the applying the first layer of the composite into the costructed mold which appear in figure six.

![Figure (5) 3M composite](image)
The VALO Cordless curing light was used in this study which has many wavelength range from 395 to 480nm for 10 Sec. which used to made total set of first layer of composite block that prepared according to group production procedure.

The groups now are divide according to preparation procedure into:

The First group: which contain Oxygen inhibited polymerization layer samples which is 20 block of composite are constructed by placing the first layer of composite in the heavy body mold, then using ash number 6 to adapted composite surface without put anything on the surface of blocks of the composite before curing for 10 Sec shown in figure seven. Then, the next layer composite apply and cured for 10 Sec in figure eight.
Figure (8) The first and second layer of composite layer

The second group: in this group prevent the formation of Oxygen–polymerization inhibited layer this group compose of specimens 20 blocks of composite which are prepared by put the first layer in the costructed mold, then composite adapted by ash 6 after that the celluloid strip placed on the surface of composite block before doing curing for 10 Sec which appear in figure nine. Then the second composite layer applies and cured for 10 Sec.

Third group: in which include useing all in one adhesive system (self etching 3M single universal bond adhesive which is contained silane) after the first composite layer placed in the mold and cured then 3M ESPE single bond placed to the outer layer of the cured composite and cured for twenty Sec shown in figure (10) Then, the composite second layer applied and cured for 10 Sec.
The four group: in which roughening outer surface of composite specimens done (20 blocks): in this group blocks are prepared by placing the first composite layer in the heavy body mold, then adapted by ash 6 then no strip was used. After curing the outer surface of the cured composite is grinned by using turbine diamond fissure bur which shown in figure (11) to produce rough outer surface of each specimen for 10s at highly speed with water spray cooling shown in figure (11). Then, a second composite layer applied and cure for ten Seconds.

The light used in curing is Light Emitting Diode (LED) Cordless VALO curing device shown in figure 12 with different wavelength rangel from 395 to 480nm which give high intensity power for composite layer polymerization. The composite 3M cure at 400 to 500nm wave length, in which time need 10 sec to produce complecture.

After complet preparing of the blocks, do calculation for the force of union of the two increments of composite, because incremental techniques are identify as a main factor in the decrease of shrinkage stresses.

Then the test of shear bond strength was apply to achieve mechanical trials which calculated by dividing the applied force during measurement to the surface area and expresse in Mega Pascal (Mpa), while using stereo- and scanned by electron microscopy (SEM) which produce the mean result that help to evaluate development in failure patterns.
Figure (13) completely cured four groups of composite block

The test of Shear bond strength:

Each one of the samples include 2 composite increments which is union together was placed and secured by tighten the prasser which close to a base of acrylic that the composite block embedded in it, in the Universal testing machine fixed part, with a ppling load cell of 5N, while the other composite side of block aligned with the upper testing machine movable compartment load axis.

Figure (14) A- specimen in machine. B- testing machine

The tensile force with shear load put on at the crosshead which at speed of 0.5 mm/min using the test machine appear in figure 14, sequentially to create a shearing force that produce the debonding of 2 composite increments by the slow speed of the crosshead was applied. The load produce the debonding was show in Newton and the data recorded by using computer software which presented in figure (15). To produce the bond strength in MPa the load cause the failure in Newton was divide by the block bond area in mm². The results were collect, put into a tables then statistically analyzed.

Figure (15) data that recorded in computer
III. RESULTS

The result of measuring shear bond strength of each sample of the four study groups show in the table (1):

<table>
<thead>
<tr>
<th>Contain layer</th>
<th>oxygen inhibitor</th>
<th>One bottle bond (saline)</th>
<th>Inhibit layer</th>
<th>oxygen inhibitor</th>
<th>Surface grinding</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.24</td>
<td>32.20</td>
<td>13.31</td>
<td>17.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.20</td>
<td>32.24</td>
<td>13.35</td>
<td>17.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.26</td>
<td>32.19</td>
<td>13.29</td>
<td>17.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.16</td>
<td>32.25</td>
<td>13.37</td>
<td>17.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.75</td>
<td>29</td>
<td>13.09</td>
<td>20.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.79</td>
<td>31</td>
<td>13.13</td>
<td>20.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.81</td>
<td>29.7</td>
<td>13.08</td>
<td>20.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.73</td>
<td>30.3</td>
<td>13.14</td>
<td>20.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.31</td>
<td>33.31</td>
<td>15.2</td>
<td>18.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.35</td>
<td>33.35</td>
<td>14.8</td>
<td>18.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.29</td>
<td>33.29</td>
<td>14.95</td>
<td>18.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.37</td>
<td>33.37</td>
<td>15.05</td>
<td>18.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.64</td>
<td>28.86</td>
<td>13.53</td>
<td>22.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.68</td>
<td>28.90</td>
<td>13.57</td>
<td>22.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.62</td>
<td>28.84</td>
<td>13.52</td>
<td>22.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.70</td>
<td>28.92</td>
<td>13.58</td>
<td>22.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>29.42</td>
<td>14.40</td>
<td>19.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>29.46</td>
<td>14.48</td>
<td>20.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29.7</td>
<td>29.40</td>
<td>14.41</td>
<td>19.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.3</td>
<td>29.48</td>
<td>14.47</td>
<td>20.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table (1)

SPSS. ver. 21 software statistical was used to do data analyze. One way ANOVA (F-test) used to notice the significant differences between the studies groups. L.S.D used to do compare of the mean between groups (multiple comparison). P≤0.01 which considered to be significant at 1%.
Table (2)

<table>
<thead>
<tr>
<th>Methods</th>
<th>Mean ±SD</th>
<th>Sig.</th>
<th>L.S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contain oxygen inhibiter layer</td>
<td>32.14±1.148</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One bottle bond (saline)</td>
<td>30.75±1.854</td>
<td>0.000</td>
<td>1.811</td>
</tr>
<tr>
<td>Inhibit oxygen inhibiter layer</td>
<td>13.73±1.301a,b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface grinding</td>
<td>19.67±1.919a,b,c</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a= differ significantly (P<0.01) from group contain oxygen inhibiter layer,
b= differ significantly (P<0.01) from One bottle bond (saline) group,
c= differ significantly (P<0.01) from Inhibit oxygen inhibiter layer group.

- The mean result of Inhibit oxygen inhibiter layer group (strip placement) was highly significant difference from group contain oxygen inhibitor layer and from One bottle bond (saline) group.
- The mean result of surface grinding group has a highly significant difference from mean results of the other groups.
- The mean result of oxygen inhibiter layer has non significant difference from mean results of One bottle bond (saline) group.
- The mean result of surface grinding group has non significant difference from mean results of One bottle bond (saline) group.

IV. DISCUSSION

The result that show highest mean among the study group was the group contain oxygen inhibiter layer (direct) which is 32.14 Mpa, which mean the two composite layers bonding of this group occur when polymerrization of material occur by radical polymerization which is complete in the existence of an oxygen inhibited layer with un-polymerized resin, the unwanted reactions in the presence of oxygen will result in strengthen the bond between the two composite increments.

Li J. found that fresh layer of composite which is enclosed by an oxygen inhibited layer simply able to bond, because the presence of uncured surface layer, so the covalent bond is create with the recently applied layer of composite (Li J, 1997).

The mean result of One bottle bond (saline) group was 30.75 Mpa that represent the second maximum results in the study groups because the existence of silane in 3M one bottle bond and the silane has union promoters effect because it composed of 2 reactive functional groups, that react with organic and inorganic materials.

Hisamatsu et al, in 2002 conclude that no matter what variation in the material, the mixing of a silane primer with bonding agent usually demonstrated the greatest degree of bond strength.

No significant difference detected between group contain oxygen inhibitor layer and One bottle bond (saline) group as both of them has highest bond strength result between 2 composite increments.

The lowest result of shear bond strength the 2 groups are surface grinding sample 19.67 Mpa and Inhibit oxygen inhibitor layer sample (strip group) is 13.73 Mpa , which have significant difference from highest mean result (oxygen inhibitor layer group and One bottle bond group).

Tabatabaei et al, in 2004 found that to do repair of an aged restoration of composite material the best result obtain by surface treatment with diamond bur and silane.

the effect of surface coarsen by burs result in raise the mechanical micro-retention which go with result of surface grinding sample was 19.67 Mpa that are better than the mean result of Inhibit oxygen inhibitor layer group which was 13.73
(Mpa), which may be related to exposure of composite resin filler particles to disc (Yesilyurt C, et.al 2009) while utilize strip result in smooth sample surface which diminish mechanical micro-retention also may be due to absence of the oxygen inhibiter layer.

V. CONCLUSION

The samples that contain oxygen-inhibited layer on their outer surface show highest bond strength to newly add composite increment, which is adverse to the result of composite increment that covered by colloid strip before cure which show least bond strength.

The bond that contain silane coupling agent will raise the bond strength between composite increment, also surface roughness of composite surface raise bond strength between composite increment better than composite smooth surface.

The best suggested technique in application of composite was layering increment technique, during work the dentist may require using the celluloid strip or surface correction of composite by bur so the application of bond that contain silane necessary if we need additional composite increment.

REFERENCES


AUTHORS

First Author – Zuha Ayad Jabber, Master of conservative dentistry, Collage of dentistry / university of kufa
TAX AWARENESS AND PERCEPTION OF TAX PAYERS AND THEIR VOLUNTARY TAX COMPLIANCE DECISION: EVIDENCE FROM INDIVIDUAL TAX PAYERS IN SNNPR, ETHIOPIA

1Niway Ayalew Adimasu
Lecturer, Accounting and finance Department, Arba Minch University, Ethiopia
Email- newayayalew@yahoo.com
Mobile-+251 910 20 66 10

2Wondwossen Jerene Daare
Lecturer, Accounting and finance Department, Arba Minch University, Ethiopia
Email-wosserjerene@yahoo.com
Mobile-+251 920 44 09 67

Abstract-The objective of this study was to examine tax awareness and perception of tax payer’s and their influence on voluntary tax compliance decision. The study used descriptive research design. Category A tax payers were the target population of this study. A sample of 377 individual Category A tax payers were randomly taken from selected cities. The study used primary and secondary data sources. Primary data were collected through questionnaire and secondary data were collected from reports and manuals of Ethiopian Revenue and Customs Authority (ERCA) branches. Descriptive statistics such as tables and percentages have been used for data analysis. The result of this study revealed that tax awareness was the major problem for voluntary tax compliance attitude and most tax payers viewed the current tax rate and penalty rate is high and they also believed that existing tax system is unfair. Besides, this study shows that tax payer’s positive perception towards the tax system and government spending also encourages voluntarily tax compliance.

Key words: Tax awareness, Perception, Voluntary tax compliance, SNNPR, Ethiopia

1. Introduction

According to Kirchler (2007) definition, tax compliance is taxpayers’ willingness to pay their tax liability as per tax laws and regulations. In general, complying with the tax laws and regulations means reporting of the correct tax bases, timely filing of tax returns and payment of the amount payable to concerned tax authority and correct determination of the tax burden (Andreoni, Erard & Feinstein, 1998). In both developed and developing countries achieving high levels of voluntary tax compliance is the area of concern. It is not as such easy to convince all taxpayers to comply with the tax laws. Hence, the amount of tax noncompliance is still a challenge for all governments but it’s more serious in developing countries (Loo &McKerchar, 2010; Kim, 2008; Cobham, 2005). In Ethiopia, the tax revenue to GDP ratio is 13.4% in 2014/15 which is lower than the sub-Saharan Africa average of 18% and developed countries 25-35% (OECD, 2016). This is due to tax non compliant behavior of tax payers and inefficiency of the tax authority. This can be taken as evidence that the tax laws are not enforced properly due poor tax administration or due to non compliance of tax payers. Tax payer’s voluntary tax compliance attitude may depend on various factors such as tax fairness, tax rate, probability of being audited, perception of tax payer’s towards the government and taxation, tax penalty, culture, personal and social norms (Kirchler, 2007). Similar previous empirical studies found mixed results on the relationship between determinant factors and tax compliance behavior. This mixed find indicates that tax compliance determinants operate differently under different conditions and environment.

In self assessment tax system, mutual trust and cooperation among tax payers and the tax authorities is very important. If there is a mutual trust, tax payers have positive attitude towards the tax systems and tax authorities and cooperate accordingly. In the environment which is characterized by mutual trust, audits and fines would show authoritarianism and distrust, and thus, rather than increasing voluntary tax compliance. Accordingly, Kirchler, Hölzl and Wahl (2008) suggested that tax audits and fines are pertinent under the condition of low trust in tax authorities and government. Similarly, if there is no mutual trust between tax payers and tax collecting authorities, tax payers can be forced to comply using tax enforcement mechanisms such as penalties and fines. This measurement might be ineffective or even unproductive in long run. Related to voluntary compliance, tax knowledge, tax payer’s positive attitudes, personal and social norms of cooperation, tax fairness perception of the tax system are important as a basis of a motivational trend to cooperate and mutual trust. The issue of tax payers’ tax knowledge is critical in self assessment system. Tax payer’s tax knowledge and awareness is imperative for the tax authority to get better the tax system and for voluntary compliance.
Previous studies such as Palil (2010) recommended tax knowledge and awareness were the significant factors that were influence taxpayers’ voluntary compliance attitude. Besides tax payer’s positive perception towards the tax system and tax authorities enhance the voluntary compliance behavior of tax payers.

In addition, the tax system should be fair and equitable and everyone should pay its own share fairly to assure sustainable voluntary tax compliance tendency (Eriksen & Fallan, 1996). In other words, the tax payer should believe each tax payer is paying its own share fairly. Besides, the tax authority should require tax payers to collaborate in the function of a tax system rather than to be forced to do their tax duty. In general, tax payers should perceive that the tax system is fair and the government is spending the tax revenue properly to be voluntary tax compliant.

Thus, in the environment of self-assessment system developing tax knowledge and awareness of taxpayers is the critical issues to administer tax system successfully and enhance voluntary tax compliance. However, tax payer’s tax awareness level and perception and the extent of their influence on voluntary tax compliance decision was not well investigated and similar studies in this topic have not been carried out particularly in SNNPR, Ethiopia. Therefore, this study investigates tax payer’s awareness about the taxation, tax payer’s perception towards the tax system and their tax compliance decision and the outcome of this study may used as an input for tax policy makers to design appropriate strategies related to voluntary tax compliance.

2. Objectives of the study
The main objective of this study was to study individual tax payer’s tax awareness, perception and their tax compliance decision in selected cities in SNNPR, Ethiopia.

The specific objectives of this study were;
- To find out the general tax awareness of tax payers about tax.
- To understand tax payer’s perception on tax authorities and the government.
- To study the influence of tax awareness on voluntary tax compliance decision of tax payers.
- To know how tax payer’s perception influences their voluntary tax compliance decision.

3. Review of related literature
Tax is defined as a compulsory contribution by tax payers irrespective of any corresponding return of services or goods by the government (James & Nobes, 2000). Governments levy and raise tax revenue to finance various public expenditures (Palil, 2010). Tax compliance defined as the reporting of all incomes from different sources and payment of all tax liability by satisfying the requirements of tax laws and regulations (Alm, 1991). Conversely, tax non-compliance is taxpayer’s failure to pay a correct amount tax liability (Kasipillai & Jabbar, 2003). Different factors might affect tax compliance attitude such as economical, institutional, social, individual factors. Previous empirical studies in Ethiopia (Lemessa, 2007; Wubshet, 2011; Beza, 2014; Tilahun & Yidersal, 2014; Suresh, 2014; Amina & Saniya, 2015; Redae & Sekhon, 2016) also found the following factors as determinant factor for tax compliance (tax knowledge, perception on government spending; perception on equity and fairness of the tax system; penalties; personal financial constraint; changes on current government policies; and referral group such as friends, relatives).

Tax non-compliance might be intentional or unintentional. Tax payers may fail to comply with tax laws and regulations unintentionally due to lack of tax knowledge and poor tax awareness. Eriksen and Fallan (1996) also argue that a taxpayer should be given better tax knowledge to improve perceptions of fairness. They also recommended that tax education should be included in the education curriculum as a compulsory subject. Under the self-assessment tax system, one of the objectives of the taxing authority is to achieve voluntary tax compliance by the majority of the taxpayers (Kasipillai et al., 2003). But, it is common that a large proportion of taxpayers may be unable to complete their own tax returns due to lack of knowledge and understanding of tax laws and regulations. It was also found that there was a strong positive relationship between tax knowledge and the level of voluntary tax compliance (Kasipillai, Mustafa, Noraza, & Munusamy, 1999).

With regard to the relationship between tax rate and tax compliance, Hai and See (2011) and Clotfelter (1983) found that the high tax rate results in high tax noncompliance. Spicer & Becker (1980) also argue that those taxpayers who are aware that their tax rate is higher than average tax rate paid by other have higher tendency of tax evasion and tax non compliance. By the same token, those tax payers who perceive that paying tax rate can overshadow their high tax rate payment through tax evasion. They also claimed that decreasing tax rates is not the only policy that has the potential to encourage tax compliance and discourage tax evasion. Nevertheless, the tax rate is an important factor in influencing tax compliance attitude even if the exact impact is still controversial and unsolved.

Tax audits, frequency of audit and prior audit experience have been ambiguously discussed in relation to tax compliance. Some studies found out that audits have a positive relationship with tax evasion (Tadesse & Goitom, 2014). These findings recommended that tax audits can play an important role in tax compliance. Frequency of audits and the carefulness of tax audits could encourage taxpayers to become more careful computing and submitting their tax returns. Conversely, taxpayers who have never been audited might be trying understating their income and over stating their deductions (Palil, 2010). A study by Beron, Tauchen and Witte, (1988) and Tilahun and Yidersal (2014) argue that audits did not significantly relate with tax compliance. Hence, it shows that previous studies have found controversial results about the association between tax audit and tax compliance.
With regard to the association of tax payer’s perception towards government spending and tax compliance, if taxpayers perceive that the government is wisely spending the tax revenue for public goods and services, it is expected that voluntary tax compliance will enhance. But, if taxpayers believe that the government is spending tax revenue unwisely on unnecessary things then taxpayers will feel be unfaithful to and attempt to avoid taxes (Palil & Mustapha, 2011). (Fjeldstad & Ranker, 2003) also argue that, tax payers voluntary tax compliance behavior rests on the government’s capability to provide public goods and services. Therefore, the government at all levels should wisely spend taxpayers’ money to provide them (taxpayers) greatest benefits for their contribution as a citizen and to distribute resources.

According to previous studies such as Palil (2010), simplicity of tax system has one of an imperative factor that determines tax compliance behavior of tax payers. Specifically, under SAS, tax payers are required to complete their tax returns by themselves which require at least a logical level of simplicity because taxpayers may have different tax knowledge and backgrounds, with differing educational and income levels. Therefore, to help tax payers to fill their tax returns correctly, the tax authority should provide simple and sufficient tax return forms. In this regard, Slemrod (1989) argue that in self assessment system a simple tax return forms and simpler tax laws and regulations will increase voluntary tax compliance because taxpayers do not have to spend much time in checking the accuracy of the returns and determining their tax burden.

As far as the fairness of tax system concerned, a good tax system should satisfy certain principles which become its characteristics such as equality or fairness and certainty (Bhatia, 1976). As it’s stated by Jackson & Milliron, 1986), tax payer’s perception towards fairness of the tax system also has an influence on the tendency towards tax non compliance. That means when taxpayers perceive that the tax system is unfair they will tend to not paying taxes. This also confirmed by the study of Etzioni (1986) that states that if taxpaying people feels that taxes are unfairly levied on them, it will be most likely to not paying and underreporting taxes. The finding of the study by Bradley (1994) also shows that the probability of tax evasion will increase, when taxpayers consider the tax system is unfair. Due and Friedlaender (1981) also recommended that tax payers will not pay taxes if they feel the current tax system treat them unfairly and allow other tax payers to escape a tax burden. Hence, it is important that a good tax system should become fair and equitable to tax payers regardless of the type of tax payers. According to Palil (2010), tax payers decisions whichever to pay or not to pay tax are also influenced by referral groups such as family members, friends who engaged in the same business activities. For this reason, previous tax compliance studies have evidenced that the influence of friends and family members in making tax compliance decisions may be essential and it should be to be examined in more tax compliance researches. Besides, tax authorities efficient and effectiveness can play significant role in encouraging tax compliance.

4. Research Methodology

Research Design
In order to achieve the objective of the study, descriptive research design was employed. This design helps to describe the data at hand.

Data Sources and Method of Collection
Both primary and secondary sources of data were used. Primary data were collected through close and open ended questionnaires. Close ended questionnaires were prepared in the form of Likeret-Scale in the form of “Agree” and “Disagree” and “Yes” and “No” form. The questionnaire was also translated from English language to Amharic language to make it easy for respondents.

Sample Size and Sampling Method
The target population of this study was Category A individual tax payers in selected cities in SNNPR, Ethiopia. According to Income tax proclamation number 979/2008 Category A tax payer is a business having an annual turnover of Birr 1000,000 (One Million Birr) or more.

The study used purposive and random sampling techniques for collecting data from tax payers. Purposive sampling was employed to select five cities in SNNPR (Hawassa, Wolita Sodo, Dilla, Arba Minch, and Hosahina). These cities were selected by taking in to account the number of total Category A tax payers they have and based on their relative business transaction. Individual tax payers were randomly selected equally in each cities using random sampling technique. The number of tax payers and their addresses were obtained from Ethiopian Revenue and Customs Authority branch offices in each city. In year 2015 there were about 6,530 Category A tax payers in all selected cities. The sample size was determined using (Yemane, 1967) formula. Hence, samples of 377 individual tax payers were selected and equal numbers of tax payers were taken from each selected city.

5. Data Analysis and Presentation
This chapter presents the results of the field survey study that was conducted in Category A tax payers found in SNNPR, Ethiopia. Accordingly, a total of 377 questionnaires were distributed to Category A taxpayers, of which 310 filled completely and returned. This made the return rate around 82 %, indicating good response rate. After the data were collected, checked for errors and completeness, it was analyzed using descriptive research techniques.
5.1. Demographic characteristics of respondents:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>239</td>
<td>77</td>
</tr>
<tr>
<td>Female</td>
<td>71</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Questionnaire, 2016

As indicated from the above table 5.1, 77% of respondents were males and 23% of respondents were females. Therefore, we can conclude that during the study period most of respondents were males and females’ participation in business activity was low during the study period.

Figure 5.1.2: Frequency distribution of age of respondents

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-25</td>
<td>65</td>
<td>21</td>
</tr>
<tr>
<td>26-35</td>
<td>152</td>
<td>49</td>
</tr>
<tr>
<td>&gt;35</td>
<td>93</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Questionnaire, 2016

Table 5.1.2 above also shows that the age of the respondent’s profile. Accordingly, 21% of respondents were aged between 15 and 25, 49% of respondents were aged between 26 and 35; and 30% was aged above 35. Hence, as it is shown in the above figure, the majority of the tax payers fall in the working age group of 26 and 35 that accounts to 49%, almost half of the total respondents.

Table 5.1.3: Frequency distribution of educational level of respondents

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Primary Education</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>Secondary Education</td>
<td>127</td>
<td>41</td>
</tr>
<tr>
<td>Degree/Diploma holders</td>
<td>130</td>
<td>42</td>
</tr>
<tr>
<td>Masters degree holders</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>Above masters degree</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Questionnaire, 2016

When we see the educational background of respondents as presented above in table 5.1.3, 3% of respondents were illiterate, 8% of respondents were completed primary education, 41% of respondents were completed secondary education, 42% of respondents were Degree/Diploma holders, 5% of respondents were Masters Degree holders, and 1% of respondents are above master’s degree. Based on the above data, the educational level of most tax payers is primary education and Degree/Diploma.

5.2. Taxpayers’ general tax awareness about Taxation

Tax knowledge and awareness are an important aspects in a voluntary compliance with the tax system particularly in determining an accurate tax liability and understanding the tax laws (Kasippilai, 2000). Eriksen and Fallan (1996) also argue that knowledge about tax law is assumed to be important for tax compliance and attitudes towards taxation. They suggested that tax knowledge correlates with attitudes towards taxation and tax compliance behavior can be improved by a better understanding of tax laws. Hence, in order to know the general knowledge of the respondents about taxation in the study area, different questions were forwarded to them on different issues. The responses of the respondents are briefly summarized below;

Table 5.2.1: Frequency distribution of reasons why tax payers pay taxes

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>To avoid punishment</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>To get public facilities</td>
<td>161</td>
<td>52</td>
</tr>
<tr>
<td>It’s an obligation</td>
<td>130</td>
<td>42</td>
</tr>
<tr>
<td>I don’t know the reason</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Questionnaire, 2016

Table 5.2.1 above shows responses of respondents why they pay tax. Accordingly, respondents were asked why they pay taxes, 52% of the respondents said that they pay taxes in expectation of public facilities from the government and 42% of tax payers responded that because it is a duty to the government, 5% of tax payers replied that they pay tax to avoid punishment, and 1% of respondents were responded that they don’t know why they pay tax to the government. This indicates there is a positive understanding by most tax payers about the reasons why they pay taxes.
payers as to why people pay taxes and if successive works are done probably better results can be registered. However, the response of others who said they don’t know why they pay tax to the government and those who said to avoid penalties indicates that they may have the intention not to pay if they have the opportunity to do so or their compliance behavior is uncertain.

Table 5.2.2: Tax education and tax training

<table>
<thead>
<tr>
<th>Statements</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have attended formal education and tax training</td>
<td>Yes: 183</td>
<td>No: 127</td>
</tr>
<tr>
<td>about taxation</td>
<td>Total: 310</td>
<td>Yes: 59</td>
</tr>
<tr>
<td></td>
<td>No: 41</td>
<td>Total: 100</td>
</tr>
<tr>
<td>Trainings arranged and given by ERCA was relevant</td>
<td>Yes: 96</td>
<td>No: 214</td>
</tr>
<tr>
<td>and practical to know about tax</td>
<td>Total: 310</td>
<td>Yes: 31</td>
</tr>
<tr>
<td></td>
<td>No: 69</td>
<td>Total: 100</td>
</tr>
<tr>
<td>I will comply with the tax law if I have adequate</td>
<td>Yes: 298</td>
<td>No: 12</td>
</tr>
<tr>
<td>tax knowledge</td>
<td>Total: 310</td>
<td>Yes: 96</td>
</tr>
<tr>
<td></td>
<td>No: 4</td>
<td>Total: 100</td>
</tr>
</tbody>
</table>

Source: Questionnaire, 2016

As indicated in the above table 5.2.2, for the question raised to know whether tax payers have attended formal tax education and training about taxation or not 59% of the respondents’ replied that they have got the chance to attend tax training/education and 41% of respondents were responded that they did not got tax related training/education. The reason why 41% of respondents did not yet have attended tax training/education was due to the limited capacity of the tax authority in giving tax training and the training schedules were not convenient for tax payers to attend.

The respondents were also asked whether trainings arranged and given by ERCA was relevant and practical to know about tax laws. Accordingly, majority of tax payers (69%) responded that the tax training which was given by ERCA was not relevant and practical and 31% of respondents said that the training is relevant and practical.

Respondents were also asked whether tax knowledge is important to comply with tax laws and regulations. Hence, majority of taxpayers (96%) agreed that they will comply with tax laws if they have adequate tax knowledge and 4% of respondents were responded that tax knowledge is not relevant to comply with tax laws. Tax knowledge also increases the tax awareness of tax payers and to have positive attitude towards the tax system.

Table 5.2.1: Tax payer’s response for the reasons why tax payers are not willing to pay tax

<table>
<thead>
<tr>
<th>Possible Answers</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Because of lack of awareness</td>
<td>127</td>
<td>41</td>
</tr>
<tr>
<td>Because of lack of ability to pay</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>Intentional</td>
<td>36</td>
<td>12</td>
</tr>
<tr>
<td>Negligence</td>
<td>48</td>
<td>15</td>
</tr>
<tr>
<td>Poor and tiresome collection system</td>
<td>77</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Questionnaire, 2016

As it’s shown from the above table 5.2.1, tax payers were asked to express their view about the reasons why tax payers are not willing to pay tax voluntarily. Consequently, 41% of tax payers were replied that most tax payers do not pay taxes because of lack of awareness about taxation, 25% of tax payers were responded because of existence of poor and tiresome tax collection system, 15% of tax payers were answered because of negligence of tax payers, 12% of tax payers were replied that because of intentional non compliance of tax payers and 7% of tax payers responded that because of lack of capacity to pay by tax payers. Therefore, from the this finding, we can conclude that the main reason for tax non compliance by most tax payers is lack of awareness about taxation followed by existence of poor and tiresome collection system, negligence, intentional and lack of ability to pay respectively.

5.3. Tax Audit and its contribution for tax voluntary compliance

Respondents were asked whether they are audited by tax authority to know the coverage of tax audit in the study area. As it’s pointed out in table 5.3.1 below, 30% of tax payers had been audited while the majority or 70% of tax payers had never been audited by the tax authority for tax purpose. This result suggested that majority of tax payers have never been audited by the tax authority for tax audit.

Respondents were also asked whether the probability of audit affects the level of tax compliance. Accordingly, 86% of tax payers agreed that the level of compliance increase if probability of auditing increases.8% of respondents were neutral and the remaining 6% of respondents were disagreed with the concept that probability of auditing has positive contribution to tax compliance. This finding suggested that in SAS tax system, tax audits can play a significant role and their fundamental role is to increase tax compliance level. Because if there is tax audit, the probability of detection is high that results in penalty. Rate of Audits and the carefulness of the
audits could encourage taxpayers to be more cautious in completing and submitting their tax returns on time due to fear of detection. Conversely, taxpayers who have never been audited might participate in not reporting or under report their tax liability accordingly. Nevertheless, tax payers were said that though the existence of tax audit is vital for tax compliance and collection due to fear of detection and any tax enforcement consequences, it may also discourage voluntary compliance by tax payers and creates distrust among tax payers and the tax authority. In this regard, Kirchler (2007) argue that, in the situation of mutual distrust, tax payers may be enforced to comply with tax laws. However, if the environment is exemplify by mutual trust between tax authorities and citizens tax enforcements such as tax audits and tax fines would indicate authoritarianism and distrust, and thus, rather than increasing voluntary compliance, its result could be ineffective or even unproductive in the long run. Because, in the climate of mutual trust, tax payers will have positive towards the tax systems and tax authorities and work together spontaneously. For this reason, this finding indicates that tax authority and other responsible bodies should work to enhance voluntary tax compliance by using different awareness creation strategies and the tax authority can conduct tax audit visit for assisting and consulting tax payers rather than penalizing and enforcing tax payers to comply with tax laws.

Table 5.3.1: Tax payers’ response about tax audit and its contribution for tax compliance

<table>
<thead>
<tr>
<th>Item</th>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your organization audited for tax purpose?</td>
<td>Yes</td>
<td>93</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>217</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
<tr>
<td>Probability of being audited has positive contribution for tax collection</td>
<td>Agreed</td>
<td>266</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>Disagreed</td>
<td>44</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
<tr>
<td>Probability of being audited has positive contribution for voluntarily complying with tax laws and regulations</td>
<td>Agreed</td>
<td>58</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Disagreed</td>
<td>252</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Questionnaire, 2016

5.4. Tax payers’ attitude and perception

Tax payer’s perception about the tax rate, the penalty rate, the government spending and tax system fairness and simplicity may differ from one tax payer to the other. Hence, this perception influences tax payers’ tax compliance behavior negatively or positively. Therefore, under this section we will see the perception of tax payers towards tax rate, the penalty rate, the government spending and tax system fairness and simplicity as follows;

Table 5.4.1: Tax payers’ perception and their voluntary tax compliance behavior

<table>
<thead>
<tr>
<th>Item</th>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>The current tax rate is high</td>
<td>Agreed</td>
<td>174</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Disagreed</td>
<td>136</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
<tr>
<td>Tax rate doesn’t matter to comply with the tax law</td>
<td>Agreed</td>
<td>226</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>Disagreed</td>
<td>84</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
<tr>
<td>The current tax laws and regulations are complex</td>
<td>Agreed</td>
<td>158</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Disagreed</td>
<td>152</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
<tr>
<td>If the tax laws and regulations are simple to understand, I will comply with the tax law</td>
<td>Agreed</td>
<td>242</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>Disagreed</td>
<td>68</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
<tr>
<td>The current tax system is fair</td>
<td>Agreed</td>
<td>140</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Disagreed</td>
<td>170</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
<tr>
<td>Fair tax system encourage voluntary compliance</td>
<td>Agreed</td>
<td>260</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td>Disagreed</td>
<td>50</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>310</td>
<td>100</td>
</tr>
</tbody>
</table>
Respondents were asked a question to express their view about the tax rate. Majority of the respondents (56%) agreed that the rate was high, where as 44 % were disagreed that the current tax rate is high. In addition respondents were also asked to express their perception towards the change in tax rate and their compliance attitude, 73 % of respondents agreed that tax rate has no impact on tax compliance behavior of tax payers while 27% tax payers disagreed that the tax rate has no influence on tax compliance behavior of tax payers. If tax payers perceive the tax rate is high, hence their tax compliance level will decrease and vice versa. However, as per this study finding majority of tax payers agreed that the change in tax rate has no influence in their compliance decision.

With regard to tax simplicity, respondents were asked about their view regarding simplicity of tax system. The questionnaire seeks to find from tax payers how easy it was to understand the current tax system, calculate and file tax returns. As it’s shown in table 5.4.1 above, Majority of the respondents (51%) agreed that the existing tax system is complex; where as 49 % of tax payers believe that the current tax system is complex. Besides, 78 % of tax payers agreed that simplifying tax system encourages tax payers to comply with tax laws and regulations voluntarily while 22% of tax payers disagreed that simplifying tax system enhances voluntary tax compliance.

Related to tax payer’s perception on tax fairness, if taxpayers perceive that the tax system is unfair, tax evasion is more likely to occur while if tax payers perceive that the tax system is fair they are more likely to comply with the tax system (Palil, 2010). Consequently, respondents were asked regarding the fairness of the present tax system to know their perception about tax fairness. Moreover, a belief in the authenticity of the tax authority and trust in it, with a sense of procedural fairness also increase compliance with its norms and procedures. Although a belief in the legitimacy of the tax system is ultimately tied to the greater issue of legitimacy of the government which the taxes support, individuals’ direct contacts with the tax authority greatly influence their perception of whether an authority is legitimate and procedurally fair (Stephen, 2011). Hence, according to tax payer’s response result in table 5.4.1 above, 55% of the respondents believed that the existing tax system is not fair, 45% of tax payers agreed that the tax system is fair. This implies that majority of the taxpayers perceived that the tax system is not fair which discourages the level of compliance. As well 84% respondents agreed that fair tax system encourages voluntary tax compliance while 16% of respondents disagreed that tax fairness encourage voluntary tax compliance.

Regarding to penalty rate, respondents were asked about the existing penalty rate. Hence, as it is shown in table 5.4.1 above, 42% of respondents agreed that the existing penalty rate is high, majority (58%) of respondents said that the existing penalty rate is not high. Moreover, tax payers were asked to express their view towards high penalty encourage tax compliance, 58% of taxpayers disagreed that high penalty encourage tax payers tax compliance whereas 42% of respondents agreed that high tax penalty encourage tax compliance. Hence, from this finding we can high penalty adversely affects tax payer’s voluntary compliance. This gives a direction for the tax authority that the severity of penalty imposed on any tax evasion has negative impact on the level of voluntary tax compliance.

With regard to perception on government spending, it is expected that if the government spends taxpayers’ money wisely, for example on basic facilities like education, health and safety and public transportation, it is assumed that voluntary compliance will increase. In contrast, if taxpayers perceive that the government spends too much on something else, taxpayers might feel betrayed and attempt to evade (Stephen, 2011; Palil, 2010). Therefore, to see the perception of tax payers on government spending and its influence on the level of compliance respondents were asked. Therefore, as it is shown in table 5.4.1 above, only 34 % of tax payers were believed that the government is spending tax revenue properly; conversely, 30 % of tax payers do not believe that the government spending tax revenue properly for public goods and services while 36 % of tax payers were not sure about whether the government spending tax revenue properly or not. Further, 83 % of respondents said proper spending of tax revenue for productive activities will encourage their tax compliance level whereas 17% disagreed that proper spending of tax revenue by the government encourages tax compliance.
5.4.1 Efficiency and Effectiveness of tax authority

Table 5.4.2: Evaluation of the tax authority by tax payers

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Excellent</td>
</tr>
<tr>
<td>Creating awareness</td>
<td>22</td>
</tr>
<tr>
<td>Enforcing the tax law</td>
<td>20</td>
</tr>
<tr>
<td>Giving feedback on issues</td>
<td>20</td>
</tr>
<tr>
<td>Customer handling</td>
<td>24</td>
</tr>
<tr>
<td>Detecting tax evasions</td>
<td>23</td>
</tr>
<tr>
<td>Encouraging tax payers</td>
<td>18</td>
</tr>
<tr>
<td>Adopting modern tax system</td>
<td>22</td>
</tr>
<tr>
<td>Transparency</td>
<td>18</td>
</tr>
</tbody>
</table>

Source: Questionnaire, 2016

From the above table it’s observed that, respondents rated the tax authority’s awareness creation performance as Excellent (22%), good (24%), and poor (54%). Respondents also evaluated the authority with respect to law enforcement activity as an excellent (20%), good (54%), and poor (26%). Similarly, respondents rated the performance of the authority related to giving feedbacks on issues as follows; excellent (20%), good (47%), Poor (33). With regard to customer handling performance of the tax authority, respondents rated the authority’s performance as excellent (24%), good (29%), and poor (47%) respectively.

On the other hand, concerning to its tax detection ability, they rated the authority as excellent (18%), good (49%), poor (28%). In terms of tax payers encouragement, the performance of the tax authority was evaluated by tax payers as follows; excellent (18%), good (23%), poor (59%).

With regard to adopting modern tax system the performance of the tax authority rated by tax payers as follows excellent (22%), good (27%), and poor (31%). With regard to tax authorities’ transparency the performance of the tax authority was rated as follows excellent (18%), good (30%), and poor (52%). In addition, as we have seen from the above finding, in all the parameters significant number of respondents rated the authority’s effort as good and below that. Specifically, majority of tax payers give poor performance result for tax authority’s tax awareness, tax authority’s effort in encouraging tax payers and transparency performance.

Hence, this result signals that the tax authority is not that much effective in providing satisfactory service for taxpayers with regard to the above parameters especially in terms of awareness creation, in encouraging tax payers, in transparency and customer handling.

6. Conclusions and Recommendations

Conclusions
Based on the results of the analysis and findings of this study conclude the followings. According to tax payer’s response, the major reason of tax non compliance is lack of awareness by tax payers followed by lack of capacity to pay, intentional non compliant tax payers, negligence, existence of poor and tiresome collection system, and expectation amnesty of tax penalty respectively. Most of tax payers were said that the current tax penalty is high and this also discourages them to voluntarily comply with the tax system though it may force them to comply just because of fear of the penalty. Hence, according to their response high tax penalty discourages voluntary compliance.

Tax payers also said the current tax rate is high and beyond their capacity. However, according to majorities’ response, even if the current tax rate is high, the rate did not influence on their tax compliance attitude. Regarding to the probability of auditing, tax payers were responded that probability of audit can enhance tax compliance but it’s because of fear of detection and penalty. Hence it may discourage voluntary compliance and it may create distrust between tax payers and tax authority. Tax payers were also asked about the simplicity of tax returns and administration and more than half of tax payers replied that, the existing tax system is complex and if the tax system becomes easy it encourages them to voluntarily comply with tax laws.

Tax payers were also asked about their perception on tax fairness and equity. Most of tax payers believed that the current Ethiopian tax system is not fair. Therefore, fair and equitable tax system can encourage them to voluntarily comply with the tax system. They were also asked about their awareness about their perception on government spending and significant number of tax payers believed that the government is spending tax money unwisely and other have no idea whether the government is spending tax money properly or not. And tax payers also said that if the government spends tax money properly for necessary things, this encourages them to voluntarily comply with tax laws.

Recommendations
This study forwarded the following recommendations;

- The role of tax awareness and perception of tax payers towards the tax system is pivotal for voluntary tax compliance decision; hence, the Ethiopian Revenue and Customs authority should continuously work on tax payer’s awareness creation and tax knowledge by giving adequate tax training and education to tax payers. The ERCA shall provide continuous and problem solving
and practical trainings to taxpayers by using Medias such as Television, Radio, and Newspaper etc and by arranging training sessions through integration with universities or it is also recommendable to incorporate tax course in educational curriculums as a common course just to create tax awareness to citizens sustainably.

- In addition, it’s important to create awareness about taxation, how the government spends tax revenue by disclosing the government budget and expenditure and the total amount collected from the tax to citizens transparently.
- Voluntary taxpayers may be discouraged if they believed that the current tax system is unfair and inequitable or if they perceive others escaping tax burden. This can be done by encouraging and caring truthful and loyal taxpayers by adopting fair competition and fair treatment. Hence, Ethiopian Revenue and Customs Authority should maintain tax fairness through treating all tax payers fairly at the time of levying tax, registration, collection and so on. In addition, bringing non taxpayers to tax system has to be considered as a measure of ensuring tax equity and this can also protect honest and loyal tax payers. In general, the tax authority should try to ensure tax fairness and equity so as to encourage voluntary compliance behavior.
- ERCA should also try to make the tax system as simples as possible for calculating and filing tax returns such as by providing simple tax return forms and by revising complex tax laws and regulations, or by adopting economical modern technologies that facilitate tax collations.
- ERCA should also encourage loyal tax payers through different mechanisms such as by giving recognition for them; this will ultimately encourage voluntary tax compliance.

References


OECD (2016). *The African economic outlook*


www.ijsrp.org
African Partisan Politics and Its Implication to Moral Behavior of the Contemporary Youth, a Case Study of Sokoto Central of Nigeria.

I Sulaiman Garba Abubakar


Abstract- The involvement of the youth of Northern Nigeria in politics which dates back to 1958 in the first Republic with the Northern People Congress and Northern Elements Progressive Union as regions dominate parties, has been a mixed bag of blessing. In one breath, the youths have participated the social, economic and Political development of the region, in another breath however, particularly since the return to politics in 1999 youth participation in politics has been largely violent and destructive of lives and properties. This time around they have been turned in to criminals given to drug addiction and violent expression of their political support. In view of this, this paper examines the challenges posed by those immoral behaviors of some youth participating in politics, particularly the thugs towards nation building in Nigeria in the 21st century.

I. INTRODUCTION

Immoral activities were known to some of our youth before and after the third Republic of the political dispensation in Sokoto metropolis in particular. Looking at the word indiscipline and immoral behavior, one can understand that these two words share the same meaning with regard to their effect on the society. Any act that tarnishes the image of the society or generating any controversy among members of the society is simply an immoral attitude, which is prevalent among the present youth. In this regard, any kind of indiscipline as well as political thuggery in the name of youth participation in politics was influenced by some politician in Sokoto State.

In 1956, youth participation in democratic parties was aimed at achieving noble objectives of providing social amenities to the people, and not looking for worldly accumulation, unlike some of the present youth who took center stage in politics for tarnishing the image of opposition members and spreading controversy, killings and other insurgences.

In the second republic, youth in Sokoto played a vital role towards participation in politics, but not all of the youth participated with sincere mind to move the country forward by electing good leader for the enhancement of peace and security in the country, but rather their zeal is to elect one who will concede to their personal objectives. Youth in North, especially from 1999 to 2007 supported political parties for personal reasons, they often express their political accomplishment through self-aggrandizement and arrogant attitudes.

The objectives of this paper are to shade more light on youth participation in partisan politics from 1958 to 2007. This with a view to expose the selfish and immoral attitude of contemporary youth (1958-2007) in politics, and how this has affected the stability and progress of Nigeria’s return to politics.

II. THE CONCEPT OF YOUTHS

The youth’s identity is situational; it is multi-dimensional and consists of several ranges even at international level. For some countries, age range of the youths is from 12 years to the maximum of 40 years. United Nations defines the youth in the age category of 15 years to 24 years while Commonwealth of Nations recognizes the age between 16 and 29 years. The Nigeria State defines the youths to include those in the age bracket of 18 to 30 years. The relevance of each of these depends on the objective situation, on the ground and the direction of social policy in a given social formation.

Conceptualization of youths indicates that in whatever circumstances, youths constitute a fundamental group to any nation and the age bracket shows period of complex changes, energy and vulnerability. Their physical and intellectual processes are continuously in search for the truth and meaning of life. At this critical period, the youths need to be facilitated to have positive thinking and behavior accepted by the society. Such that they interact within the community and imbibe good behaviors, which would enable them to deal effectively with themselves, their needs and their environment.

The term partisan politics:

An adherent or supporter of a person, group, party, or cause, especially a person who shows biased, emotional allegiance, social relations involving intrigue to gain authority or power. In another interpretation, politics means “The activities and affairs involved in managing a state or a government.”

Political parties in the first republic

In the first republic, the country was split into three geopolitical regions, namely Western Region, Eastern Region and Northern Region and its political parties took on the identities and ideologies of each region. The Northern People's Congress (NPC) represented the interests of the predominantly Hausa/Fulani Northern Region, the National Council of Nigeria and the Cameroons (NCNC) (later renamed "National Council of Nigerian Citizens") represented the predominantly Igbo Eastern Region, and the Action Group (AG)
dominated the Yoruba Western Region. The Northern People Congress (NPC) took control of the federal parliament, and formed a coalition government with the National Council of Nigeria and the Cameroons (NCNC). The National Independence Party (NIP) formed by Professor Eyo Ita became the second political party in the old Eastern Region. Ahmadu Bello, the Sardauna of Sokoto, leader of the Northern People's Congress (NPC), was poised to become the Prime Minister, but instead he chose to become the Premier of the Northern Region, and supported is deputy Tafawa Balewa's candidacy for Prime Minister. This raised suspicions amongst the southern politicians, who resented the idea of a federal government controlled by a regional leader through his designated proxy. In the end, Tafawa Balewa of Northern People's Congress (NPC) was named Prime Minister and Head of Government, and Nnamdi Azikiwe of National Council of Nigeria and the Cameroons (NCNC) was named President. The most popularly parties in Northern Nigeria were Northern People's Congress (NPC) of Sardauna and NEPU (Northern Elements Progressive Union) of Mallam Aminu Kano, which was the opposition party in Northern Nigeria.

Northern Elements Progressive Union (NEPU) was the first political party in Northern Nigeria. Founded in Kano on 8th August 1950, it was the offspring of a pre-existing political association called the Northern Elements Progressive Association. It became the main opposition party in Northern Nigeria after the region was granted self-governance in the 1950s. In the First Republic it maintained a steady alliance with the NCNC against the NPC-dominated Federal Government. These two political parties were influential on the youth from among their supporters who served the party’s objectives in order to win the election.

**Party youth supporters in the first republic**

The Northern People Congress (NPC) youth supporters named RSS (Rundunar Samarin Sawaba) while Northern Elements Progressive Union (NEPU) youth supporters group named YGN (Yan gabagadiNepu) these two groups of youth played their role for the success of their parties. Some people regarded their effort as an attack against each other and even behaving badly to any opposition member, especially the RSS youth who were normally known as trouble-making group in the society by Northern Elements Progressive Union (NEPU) party supporters, even though, one of the RSS members attributes that they have mutual understanding between them and YGN members (Yan gabagadiNepu) there was no expression of disturbances between them especially in the urban areas.

Another YGN (Yan gabagadiNepu) youth member of NEPU party, explained that he was initially the supporter of NEPU party, but he had decamped by force from Northern Elements Progressive Union (NEPU) to Northern People Congress (NPC) party because of the intimidation of the government against their parents, thought he remained sympathetic to the Northern Elements Progressive Union (NEPU).

According to him when the military coup succeeded in mid-1960 I and others from RSN youth (Rundunar Samarin sawaba) were happiest than ever before, hoping that we would now be safe from intimidation and harassment of Northern People Congress (NPC) Government headed by Sardauna Ahmadu Bello. He added that in most cases youth supporters from Northern People Congress (NPC) party are not fully involve into political thuggery as well as intimidation to opposition party members e.g. Northern Elements Progressive Union (NEPU) in the urban areas especially in the early reign of Ahmadu Bello Sardauna of Sokoto, until recently when first tenure of the regime is about to come to an end, virgin girls are sending to party campaign by force, their fathers were forcing to have dance front of their daughters and they were shave with breaking bottle.

With regard to the above, the assumption of the general public will definitely be that the participation and habit of Northern People Congress (NPC) and Northern Elements Progressive Union (NEPU) youth members are the same with that of present political youth supporters in terms of political thuggery.

One of the RSS (Rundunar Samarin Salama) youth member, denied political thuggery during Sardauna’s regime. He therefore said: Sardauna And Mallam Aminu Kano, have no grudges between themselves but some times they are politically accusing each other purposely for their objectives of moving the Northern part forward, against the ambition of southern part political leaders, unlike the deed of some bad present political leaders, who sponsor our youth into making political disturbances as well as thuggery and other immoral behaviour in the society for their own personal and political interest.

The shame emanates in departure from political philosophy of the northern political hero, Sir Ahmadu Bello, Sardauna of Sokoto, who laid foundation for their success, then turned back and destroyed the North with political thuggery and religious bigotry. In the second republic, youth in Sokoto played a vital role towards participation in political parties but not all of the youth participated with sincere mind to move the country forward by electing good leader, for the enhancement of peace and security to the countrymen but rather their zeal is to elect one who will attend to their personal objectives.

The major concern now in most urban towns and cities throughout the country is the increasing rate of crimes among the youth. In the early sixties there were relatively little urban crimes in the country, and one felt safe walking the streets day and night. But now, more than thirty years later following a civil war, increasing unemployment, the spectacular growth and downturn of the economy, rapid population growth and explosion and overcrowding of the towns, serious crimes are rampant in the country. hardly a day passes by without reports of numerous inhuman atrocities such as murder, armed robbery and so on. In most cases these social problems should be referred to our contemporary political aspirants, especially in this political era where youth of today are being sponsored by these politicians in order to commit such crimes before and after elections.

**Youth and politics, the rebirth of political transaction in 1999**

Before the emergence of fourth republic in 1999 there were a group among the youth in different areas of Sokoto metropolis and environs like: Ahmadu Bello way, Emir Yahaya Road, Sultan Atiku Road, Iraqi area along Sultan Abubakar Road
etc. who were involved in such acts of immoral behavior, when these youth became involved into black market as a result of fuel scarcity in 1996 which was witness and identified observed by the people of Sokoto as an element of area boyism activities in the metropolis. The youth were attacked by one military officer who was the task force chairman in charge of sale of fuel product and distribution in Sokoto. This attack indirectly “trained” youth to bedeferent and cruel in future, where usually attacking and furnishing them with severe punishment, even if they run to their homes, this has made them to behave cruelly in their society. People of this metropolis have considered that as the first approach to area boyism by these youth in Sokoto. Never the less the first person to have died in this undesired act in Ahmad Bello Road is called Sani Tamba.14

In 1999 two political parties were dominant in Sokoto i.e People Democratic Party (PDP) and All People Party (APP) and latter All Nigerian People’s Party (ANPP), these youth were politically divided into two in support of their party aspirants; the gubernatorial candidate of People Democratic Party (PDP) at that moment was Alh. Muhammad Modi Yabo, while Alh. Attahiru Dalhatu Bafarawa was the candidate of the All National People Party (ANPP). Bafarawa captured the majority from the youth thus winning election, and was sworn in on the 29 May 1999 for a first tenure that lasted till 29 May 2003.15 Meanwhile, the Weekly Trust of 4th August, 2000 reported that these youth commonly called “Are Boys” beganto belong to a ‘gang’ controlling territories to check what they call the activities of “intruders” meaning boys of their areas who come to court girls in areas other than theirs. The notorious areas then were Sokoto cinema, Assada, KofarKade, Bello Way/Kalfu, Emir Yahaya and parts of KofarAtiku. Their activities then were considered as juvenile delinquency, and much attention was not paid to them until they started fighting among themselves with dangerous weapons over girls and other petty rivalries.16

In 1995, their activities took a more dangerous trend when they began abducting young girls and sexually molesting them. Sometimes jewelry was snatched from girls, including married women, in broad daylight while people watch helplessly because they were said to be above the law. With the advent of the notorious “Area Boys” activities in Lagos, the Sokoto gangs also assumed the name and their activities became a serious threat to public peace. Disturbed by their lawlessness, the Nigerian Police Command in Sokoto under police commissioner Abubakar Tsav launched a special operation in 1996. That was thought to be the end of Area Boyism in Sokoto until 1997 during the Abacha local government chairmanship elections when they re-emerged as political supporters of candidates who in turn used them to intimidate their opponents.17

In anticipation of the 2011 elections there have been reports of intercepted guns and ammunitions at our boarders coupled with various incidents of electoral violence in different part of the country. on the 9th August later another political violence broke out in Zamfara State, the state that share border with Sokoto state to the south East where many were killed in a clash between the members of the ruling PDP and those of ANPP. According to J. A Paddle

This can occur when there is intense political rivalries and the inability of security to curtail the situation. Indeed numerous cases of out breaks of conflicts is well pronounced on election days. The major cause is usually due to attempts by political parties to stuff the ballot boxes with pre-thumb printed ballot papers or the inability of the security agents to maintain law and order in the polling station.18……………………………………..

Law enforcement agents report revealed that There is a direct relationship in Nigeria between political violence and corruption which most of the present youth are committing, many public officials use stolen public revenues to pay for political violence in support of their ambitions, as well as using power to even released persecuted youth who definitely causing unrest during election, as one Niger Delta academic who maintains that his 2003 Senate campaign was derailed by the violent efforts of one of the Nigerian political parties to intimidate voters and rig the vote.

Human Rights Watch, revealed that “Most of the politicians are linked to cult groups they finance them, they maintain them, they sustain them. And all of this is from the government funds, e.g. in Gombe State, a leading lawyer and former minister who is one of the law enforcement officers in the federal government, published allegations in the national press that the state government was funding the activities of “yan Kalare” thugs using public money. If such immoral act is sponsored by state Government in using the public funds, which action should be taken against these bad youth? In that state?19

III. CONCLUSION

The cause of the high rate of political thuggery committed by our youth could definitely be attributed to our bad political aspirants whose effort is to lead the country by all means. Their effort before Election Day up to the time when votes are returned for counting, youth should be involved in making conflict during this process.

This political thuggery occurred when there are disputes over election results by the contesting parties and the inability of the judiciary to resolve these disputes, in an exact time fixed for judgment. Almost all elections in this country ranging from 1958 down to 2007 have been characterized by electoral violence.

In 1958 and 1965 during NPC/NEPU’s political Dispensation, the love of country by both parties and their candidates had vitiated has vitiates the effort of bad supporters whose aims was violence and destruction of democracy.

IV. RECOMMENDATIONS

To refine the attitude of the youth for better democracy and sustainable peace and security in the society the following recommendations should be taken into consideration:

I. Youth should respect their elders.
II. They should also abide by law and order.
III. They should avoid drugs in all their dealings with people during interaction.
IV. To know that democracy in Nigeria can not be without youth participation.
V. They should avoid anything tarnishing their image in their society.
VI. They should not rely on their candidates after election as a way of solving their problems.
VII. They should be acquainted with vocational training for self reliance rather than looking at dividend of democracy.

VIII. To also participate in politics for the progress of their people.

Note:
A sixteen year old member of one of the youth groups who insisted his name should not be mentioned told that some politicians on power in Sokoto support them with money and in turn serve as their “boys” if they complied the politicians can be responsible of whatever the boys may committed of insurgences and public harassment and no appropriate action should be taken because their political power.

REFERENCES


[8] Ibid: p.20

[9] Interview with Abdu Majidadi, on 5th Jan, 2016 at his resident Sabon Birniare,Sokoto age 73.

[10] Interview with Abdu Majidadi, on 5th Jan, 2016 at his resident SabonBirniare,Sokotoage 73.


[14] Mango, H. Shame on the Northern Leaders and Northern Students, husanimango@yahoo.com


[17] Oxford Online Dictionaries


AUTHORS

First Author – 1 Sulaiman Garba Abubakar , Department Of Islamic Studies Sscoe, Sokoto At62 Annual Conference On The Historical Societyof’ Nigeria (Hns) Sokoto State University Sokoto. 2017., Email: sgabubakar1@gmail.com, 08182012007
Blind Guider: An IT Solution for Visually Impaired People


Sri Lanka Institute of Information Technology
New Kandy Road Malabe Sri Lanka

Abstract -- "The Blind Guider" application is a real time application for detecting obstacles such as staircases, potholes, pedestrian crossings and moving vehicle detection and getting current location by GPS and giving directions to travel from place to place using the mobile phone camera with voice instructions. This Android application will warn of the obstacles in the road to the user. The system uses Haar-Cascade, BLOB and SURF algorithms for object detection. In order to identify key matching objects and for voice instructions the system uses a machine learning algorithm. Blind people use a white cane to navigate through roads and even indoors. The developed system is much more accurate than the white cane because the system will identify obstacles for the user within a certain distance. This application will provide assistance to the user when required. The mobile camera input is sufficient to commence the processing, the system will assist the user to navigate through obstacles in indoors and outdoors.

Index Terms — Image Processing, OpenCV, Background subtraction, Object detection, GPS, voice recognitions

INTRODUCTION

According to the estimations of World Health Organization, there are 285 million people who were visually impaired worldwide. Regardless of the disability, these people interact with their day today life against all odds. The application "Blind Guider" will help these people to make their life easy. The system is user-friendly, and a low-cost system which can be installed on a smartphone. Though there are multiple types of equipment exist for blind people, the inability to afford these type of equipment has restricted the usage of them. Rather than using a costly system the "Blind Guider" application can be installed directly on any android mobile phone. They can operate android smartphones as a normal person.

Object detection using image processing is a wide area of development [1]. This application uses image processing for object detection and uses mobile phone GPS system to locate the current location of the user. Using GPS technology system is able to guide the blind user. The visually displayed instructions are given via audio / vocal mode. The application is a real time system which detects and identify obstacles and giving warnings to the user. The application provides information about pothole detection, staircases detection, pedestrian crossing, obstacle detection and moving vehicles detection. Additionally, this system has features of typing messages and reading messages to the users.

METHODOLOGY

A collection of several methods are been used in the research to provide an accurate and effective results. The method analyze the frames of the video to detect the movement of the foreground and to extract the object through the color of the object and subtract the background to enhance the foreground. Through the background subtracted image the feature detection been run to identify the foreground. Parallel the audio analysis is also been commenced to recognize the objects that appears in front of the system.
committed to the pothole tracking algorithm that tries to trace this region within the subsequent frames. Once the region of interest leaves the viewport the tracking algorithm is stopped, the detection algorithm is resumed and the number of detected potholes is incremented. The tracking algorithm has to be performed on every frame independently, and in case of multiple potholes, it is executed in parallel.

![Figure 2: Image of a pothole detection](image)

**B. Staircases Detection**

There are various kinds of staircases. Stairs consist of a sequence of steps which can be regarded as a group of consecutive curb edges. To extract these features, [17] we start with an edge detection by applying a “Sobel” type operator to obtain the edge map from RGB image of the scene and then perform a Hough transform to extract the lines in the extracted edge map image. These lines are parallel for both stairs. Therefore, a group of concurrent parallel lines represents the structure of stairs. In order to eliminate the noise from unrelated lines, we add constraints including the number of concurrent lines, line length, etc.

![Figure 3: Image from camera frame](image)

**C. Pedestrian-Crossing Detection**

Pedestrian crossings are dangerous places for a visually impaired person to cross safely [11]. Mostly pedestrian crossing content yellow and white color with a specific shape. Once the pedestrian crossing detected in a video frame, detection algorithm tracks the caption until it remains in the subsequent frames. To detect the pedestrian crossing template matching technique is being used. Once the pedestrian crossing is detected it is alert to the user.

**D. Moving vehicle detection**

Designed solution mainly focuses on getting information of motion detection and object detection. Because of the noisy background identifying moving vehicle detection was a challenge. All the objects in the video frames are being captured through the camera of the mobile phone. “Haar cascade” algorithm [4] was an efficient method, which was used in order to overcome the challenges. The algorithm uses a collection of trained positive and negative samples via XML files.

Absolute different between frames are used in the system to detect the moving objects. To calculate the absolute frame difference multiple numbers of frames are used. Eight consecutive frames from a video signal are considered and each of them is subtracted from the background image. The difference between images is added together to obtain a resultant image. This image represents the maximum movement of the objects in the given eight frames [5]. Then compute a rectangle box and it is drawn and then moving vehicles are being captured. Then the user identified the direction of the vehicle by drawing a virtual line. Then the frames are touched by the virtual line and then the direction is being identified. The user is being guided by the system. The detected vehicles are notified using voice instructions.

**E. Obstacle Detection**

According to the process of template matching, the technique is being used to detect obstacles in indoor and outdoor environments. For this purpose, the system used the first frame of an object as a template. This template is then used to match with the detected object. This method is the most accurate method for this purpose. For Template matching also OpenCV is being used. After detecting the obstacle within a certain distance using a mobile camera and giving voice instructions to the user.

**F. Accurate Determination of Position**

This module is capable of guiding the blind by providing voice commands to navigate the user from one place to other by using Google Map API. Here the important part is that the module can differentiate the user’s current location with the image provided by the street view API and tell the user as to where to navigate accurately [12][13]. The user will have to specify the destination location through voice commands to the device. Once the user confirms to navigate through voice command, the localization module gets activated. The user will be navigated to the destination through voice command from the device. Once the user reaches the destination, this component should alert the user that he has reached the destination. In order to accurately locate the destination, the localization module will help the user. Localization module is responsible for accurately identifying or locating the exact place or building that the user intended to reach. To achieve this the module uses Google street view image and image captured from the device. The figure below explains how the localization works.

www.ijsrp.org
The extraction component will accept images from Google street view API and image captured from the device. Extraction component will filter the received images and outputs the enhances street view image and the camera image to the comparison module. So the street view image represents the destination place. The camera image taken from the device represents the actual location the user is looking at.

The comparison module should compare the difference between the two-image set and provide data to the process results module. Process results module will obtain the average value from the values received from the comparison component and outputs a percentage value. This value indicated how exactly the two images match. Hence, the system can suggest whether the user has reached his or her exact location.

G. Enable Voice Conversation

Record the sample of each word of the vocabulary is the first task. After speech samples are collected, they are converted an analog signal to digital form by sampling to make them understand the speech system.

Sampling means make the speech signals at regular intervals. The collected data is now quantized to eliminate noise in samples. Then collected samples passed through the feature extraction, feature training, and feature testing stages. Feature extraction transforms the incoming sound into an internal representation. It is possible to reconstruct the original signal from it. Then used MFCC [6] for feature extraction. It is used in every state of speech recognition system. MFCC (Mel-frequency cepstral coefficient) is a standard method for feature extraction in speech recognition task.

Decoding [7] is the most important step in speech recognition. It is performed for finding the best match for the incoming vector matches. A decoder performs the actual decision about recognition of a speech utterance by combining and optimizing the information conveyed by the acoustic and language models. Two types of acoustic models [7]. Word model and phoneme model. It is implemented using HMM (Hidden Markov Model) [8]. It is used in every state of speech recognition system. HMM, state have a set of output symbols known as output probabilities and having a finite numbers of state $Q= \{q_1, q_2, ..., q_n\}$. One process is related to the transitions among the states. It is controlled by a set of probabilities called transition probabilities to model the temporal variability of speech. Another process is concerned with the state output observations $O= \{o_1, o_2, ..., o_n\}$ regulated by Gaussian mixture distributions $b(ot)$ where $1 <= j <= N$, to simulate the spectral variability of speech. Use of the Viterbi algorithm to generate the given sequence symbols, without having to search all possible sequences. Markov chain has changes to states according to its transition from state $i$ to state $j$ denoted as:

$$a_{ij} = P[Q_{t+1} = j | Q_t = i] .$$

Language models [7] are used to guide the search correct word sequence by predicting the likelihood of nth word using (n-1) preceding words. Language models can be classified into:

- Uniform model: each word has an equal probability of occurrence.
- Stochastic model: a probability of occurrence of a word depends on the word preceding it.
- Finite state languages: languages use a finite state network to define the allowed word sequences.
- Context free grammar: It can be used to encode which kind of sentences is allowed.

In pronunciation modeling [7], during recognition, the sequence of symbols generated by acoustic model HMM is compared with the set of words present in a dictionary to produce sequence of words that is the system's final output contains information about which words are known to the system and how these words are pronounced. A decoder is then used for recognizing words by combining and optimizing the information of acoustic & language models.

RESULTS AND DISCUSSION

The results are conducted to evaluate the performance of the proposed method. Those results are obtained using the detection and tracking algorithms that have been discussed above. Fig.2 shows the pothole detection. Fig.3 shows the results for moving vehicle detection and fig.4 shows the determination of the position. After recognition of features, outputs are given as audio using headphones.

“Blind Guider” system is more accurate for visually impaired people. Though the system is accurate there are some limitations of the system that is this cannot be used in the dim light and the night time. And the other limitation is by using the system user can be see only one side at one time. As future advancement, the
product hope to develop further using LED. Then this system can be used in the night time even.

**CONCLUSION**

The developed system successfully modeled the object detection using Image processing. This application is developed user friendly and more effectively for blind users. Due to a combination of several methods, the application’s accuracy and efficiency have been increased. There using background subtraction, motion detection, edge detection and also feature extraction in open source computer vision (OpenCV) to develop this application. After the obstacles are detected through the camera of the mobile phone, the image processing results are converted into voice instructions to the user. This application is a low-cost application when comparing to other equipment available in the market. Thus this system increases the confidence of blind people by giving them the proper information of the objects around them and enabling them to move independently in indoor and outdoor environment. There are certain limitations and it is important to develop this application for the future.

**REFERENCE**


**AUTHORS**

First Author – Mallawarachchi Yasas, yasas@slit.lk

Second Author – K.S. Maalik, mkamurdeen@gmail.com

Third Author – Ashfaq M.Z.M, ashfaqzeemath@gmail.com

Fourth Author – De Silva K.P.S.H, himeshila@gmail.com

Fifth Author – Ragulan.S, sragulansathy@gmail.com

Correspondence Author – K.S. Maalik, mkamurdeen@gmail.com, 0754585463
Microbial Quality and Sensory Assessment of Yogurt Marketed in Akure Metropolis, Nigeria

Adebisi Olabisi O.*, Oyetayo Victor O.*, Ajayi Kehinde O.*

*Department of Microbiology, the Federal University of Technology, Akure, Nigeria

Corresponding author: Adebisi Olabisi O. phone number: +2348136503298; e-mail: adeolaminibisio@gmail.com

Abstract- Several companies have emerged in the production of yogurts due to its high consumption and health benefits, but in most of these companies, the environmental conditions involved in the production, storage and distribution of many of yogurts are not strictly monitored hence affecting its microbial and sensory qualities. In view of these, commercially available brands of yogurt drinks in Akure metropolis, Ondo State, Nigeria, were purchased and analyzed for their microbiological, physiochemical and organoleptic properties using standard methods. It was observed that (16.7%), (8.3%) and (25%) of the yogurt samples analysed lack NAFDAC number, batch number, and attractive packaging respectively. All samples had high total viable bacteria counts but the fungal load observed falls within specification. Coliforms were found in 42% of the samples. The isolated microorganisms include; Bacillus sp, Streptococcus thermophillus, Lactobacillus bulgaricus, Listeria sp, Serratia sp, Klebsiella sp, Proteus sp, Escherichia coli, Aspergillus sp, Candida sp, Saccharomyces sp, and Mucor sp. Streptococcus thermophillus and Lactobacillus bulgaricus were the most prevailing bacteria encountered (23.6%). Aspergillus sp, was the most encountered fungi (44.5%), pH and Total Titratable Acidity (TTA) ranged from, 3.6 to 4.6 and 1.35 to 0.72 respectively. The sensory evaluation revealed that there were significant differences (p≤0.05) in the organoleptic properties of some of the yogurts. Conclusively, The study revealed that above fifty percent (50%) of the yogurt samples bought from Akure city were still below stipulated quality standard in terms of their microbial and organoleptic qualities.

Index Terms- microbial quality, organoleptic properties, physicochemical, yogurt samples

I. INTRODUCTION

Milk is often regarded as being nature’s most complete food; it earns this reputation by providing many of the nutrients which are essential for the growth of the human body (Olasupo et al., 2002). According to (Oyeleke, 2009) yogurt was described as a notoriously balanced food containing almost the nutrients present in milk but in a more assimilable form. Yoghurt is a unique fermented milk product produced as a result of controlled bacteria fermentation of milk, its uniqueness is attributable to the symbiotic fermentation (Tamime, 2007) carried out by a group of Heterofermentative lactic acid bacteria specifically Lactobacillus bulgaricus and Streptococcus thermophilus. These bacteria are known as yoghurt cultures and fermentation of lactose by these bacteria produces lactic acid, which acts on milk protein to give yogurt its texture and characteristics.

Yogurts have been found to be contaminated with both spoilage and pathogenic organisms due to unhygienic pre production, production and post production processes. This is because the environmental conditions surrounding the production, storage, distribution and sales of yogurt in many parts of Nigeria is not ideal (Oyeleke, 2009; Alli et al., 2010). As a result of this, it’s microbiological and sensory qualities are not satisfactory as most of its quality parameters falls below standard and are usually not in conformance with quality specification (Mbaeyi-Nwaoha and Egbuche, 2012; Makwin et al., 2014).

Molds and yeasts are the primary contaminants in yoghurt produced commercially in Nigeria (Oyeleke, 2009). When these microorganisms grow in yogurt, they utilize some of the acid and produce a corresponding decrease in the acidity, which may favour the growth of putrefactive bacteria (Agu et al., 2014).

Undesirable bacteria that can cause spoilage of dairy products include Gram-negative psychrotrophs, coliforms and lactic acid bacteria (Willey et al., 2008; Oyeleke, 2009; Yabay and Idris, 2012). So to ensure the proper quality and safety of yoghurt there should be a complete check on the method by which yogurt is produced and sold in local markets and major streets (El-Diasty et al., 2009; Eissa et al., 2010; Mbaeyi-Nwaoha and Egbuche, 2012). According to (Younus et al., 2002), practical approach towards the quality of yoghurt is to evaluate the different samples of yoghurt sold in local markets and beverage stores for their conformity to standards as stated by food regulatory agencies. Thus, it is imperative to evaluate the microbial and sensory quality of yogurts sold in Akure metropolis, due to the high risk associated with consuming substandard or unhygienic yogurt.

II. MATERIAL AND METHODS

Study Area
The study was carried out in Akure city Ondo state from February 2016 to June 2016. Akure city is the capital of Ondo state which is one of the 36 states in Nigeria, it lies about 70°15 north of the equator and 50°15 east of the Meridian (Ajibefun, 2014). Their climatic condition follows the pattern of southwestern Nigeria where the climate is influenced mainly by the rain-bearing south west monsoon wind from the ocean and the dry northwest winds from the sahara desert. High temperature and high humidity also characterize the climate (Ajibefun, 2014). Various part of the city especially the indigenous core areas which is characterized by high density and low income population is experiencing environmental challenges in the area of pollution, poor housing, lack of potable water, waste disposal and sanitation as the city is growing in population (Ajibefun, 2014).

Sample collection

Twelve different brands of commercially prepared yogurts packaged in plastic or paper box containers were purchased in triplicates from street vendors, market places and beverage stores in different locations in Akure, capital of Ondo State, the yogurts were then refrigerated before the commencement of the analysis. Information like NAFDAC registration number, expiry date, batch number and other information on the labels of the yogurt were noted and recorded and the samples were evaluated by a random experiment with 3 repetitions for each sample and the mean values and the standard deviation of the three values were recorded.

Determination of pH

A digital pH meter (Hanna) was calibrated, 50ml of the yogurt sample was dispense into clean beaker and the calibrated pH meter was wiped with a clean tissue paper, switched on, and immersed into the yogurt mixture. The pH value of the yogurt sample was then seen displayed on the digital readout and the value was noted and recorded. This was then repeated for each of the yogurt samples (Olugbuyiro et al., 2011).

Determination of the Total Titratable Acidity (TTA)

To obtain the TTA, a clean burette was clamped to the retort stand and fill to the zero mark with 0.1M sodium hydroxide (NaOH), 20 ml of the yogurt sample was measured and poured into a clean conical flask, 2-3 drops of phenolphthalein was added to the solution and then NaOH was titrated against it until a pink color was observed. The titer value was noted and recorded (Olugbuyiro et al., 2011). The titre value was then use in calculating the TTA. Using the expression;

\[
\text{Lactic acid} = \frac{0.1M \times \text{Titre value} \times 0.09}{\text{volume of sample}} \times 100\%
\]

Microbial Analysis

Isolation of microorganism

Prior to the isolation, the laboratory work area and the containers of the yogurt were swabbed thoroughly with 70% ethanol before opening to avoid contamination. The yogurt samples which have assumed room temperature were shaken vigorously to suspend microbial content. To clean test tubes containing sterile distilled water, 1ml of the yogurt sample was transferred into it and diluted serially in one-tenth stepwise to 10^{-8} dilution factor. Each (1ml) of the dilution 10^{-8} and 10^{-10} were plated into the four different culture media (Nutrient Agar (NA), Potato Dextrose Agar (PDA), Eosin Methylene Blue (EMB), de Man Rogosa and Sharpe agar (MRS)) in triplicate using the pour plate method. NA, EMB, and MRS plates were then incubated at 37°C for 24hours while PDA plates were incubated at 25°C for 3-5 days according to the methods described by (Nester et al., 2004).

After incubation, the colonies on NA plates were counted and used to determine the Total Viable Bacterial count of the yoghurt samples (cfu/ml). EMB (total coliform count), MRS (total lactic acid bacteria count), and PDA (total fungi count) the representative colonies or the distinct colonies on the different medium plates were then purified by sub-culturing on fresh media. The pure cultures obtained were observed for their morphological characteristics and further biochemical identification.

Biochemical characterization

Pure bacterial isolates obtained from the yogurt samples were biochemically characterize and presumptively identify using the methods describe by (Cheesbrough, 2006).

Identification of fungal isolate

The fungi isolates were characterized by checking their surface and reverse color or pigmentation, their hyphae, presence or absence of spores, color and structure of spores, also the characteristics of the mature fungi fruiting bodies were checked. Microscopically fungi isolate were characterized by staining (Moreira et al., 2001). For this staining procedure, a grease free slide was placed on the slab and a drop of cotton blue in lactophenol was placed on it. With the aim of a sterile innoculating needle, a part of the fungal mycelium was placed on the slide and mixed to form a smear. The slide was covered with a cover slip and viewed under ×10 and ×40 objective lens of a binocular light microscope.

Sensory evaluation

According to (Obi et al., 2010), the yogurt samples were evaluated for their organoleptic characteristics (color, taste, flavor and texture) and overall acceptability by panelists who comprise of microbiology undergraduate students and students from other departments and some teaching and non-teaching staff members of Federal University of Technology Akure, Ondo State, Nigeria. Using nine point hedonic scale ranging from excellent or extremely like (score = 9) to very poor or extremely dislike (score = 0) as extremes (Obi et al., 2010), following the method stated by (IDF, 2002).

Statistical analysis
The data obtained were statistically analysed using SPSS version 20, the results obtained were statistically analysed using analysis of Variance (ANOVA), and the tests of significance were carried out by Duncan’s multiple range test at $p \leq 0.05$. The results obtained were computed as mean of triplicate ± standard deviation.

III. RESULTS AND DISCUSSION

Yogurt Pack Information

The information on the yogurt samples were noted and documented in Table 1. Out of the 12 yogurt brands evaluated, two lacks NAFDAC number, one lacks production and expiry date, and three of them have unattractive packaging.

Table 1: Yogurt Pack Information

<table>
<thead>
<tr>
<th>Information</th>
<th>Number of yogurt</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAFDAC Number</td>
<td>12</td>
<td>10 (83.3)</td>
<td>2 (16.7)</td>
</tr>
<tr>
<td>Production date</td>
<td>12</td>
<td>11(91.67)</td>
<td>1 (8.33)</td>
</tr>
<tr>
<td>Expiry date</td>
<td>12</td>
<td>11 (91.67)</td>
<td>1 (8.33)</td>
</tr>
<tr>
<td>Batch number</td>
<td>12</td>
<td>11 (91.67)</td>
<td>1 (8.33)</td>
</tr>
<tr>
<td>Manufacturing address</td>
<td>12</td>
<td>12 (100)</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>Package Attractiveness</td>
<td>12</td>
<td>9 (75)</td>
<td>3 (25)</td>
</tr>
</tbody>
</table>

Total Microbial Count

The total viable count of the various yogurt samples was obtained by inoculating the sample on nutrient agar (NA). The number of isolates obtained vary from one yoghurt to the other, sample C has the highest bacterial count in cfu/ml (60.00 ± 1.00 × 10^8), while sample H has the least viable bacterial count (6.00 ± 0.50 × 10^8) (Table 2). The lactic acid bacteria counts also vary from one yoghurt to the other. Sample E, H ,I and J has the least lactic acid bacteria count in cfu/ml (1.00 ± 0.00 × 10^8), on the other hand sample F has the maximum count (9.00 ± 0.50 ×10^8) (Table 2). Sample A, F, G, K, L do not have coliform bacteria, samples J, H, B, C has the least count (1.00 ± 0.50 × 10^9) while sample E has the highest (5.00 ± 0.50 × 10^9) cfu/ml, (Table 2). Samples A, F, H, K have no fungal growth at 10^9 dilution, the least fungi count was seen in samples E, H, I, L (1.00 ± 0.00 ×10^8) (Table 2) and sample C has the highest (5.00 ± 0.50 × 10^9).

Table 2: Total viable bacteria count, total lactic acid bacteria count, total coliform count and total fungi count.

<table>
<thead>
<tr>
<th>Sample</th>
<th>TVB (cfu/ml × 10^8)</th>
<th>TLC (cfu/ml × 10^8)</th>
<th>TCC (cfu/ml × 10^8)</th>
<th>TFC (cfu/ml × 10^8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20.00 ± 0.50</td>
<td>2.00 ± 0.50</td>
<td>0.00 ± 0.00</td>
<td>0.00 ± 0.00</td>
</tr>
<tr>
<td>B</td>
<td>12.00 ± 0.00</td>
<td>4.00 ± 0.50</td>
<td>1.00 ± 0.00</td>
<td>2.00 ± 0.50</td>
</tr>
<tr>
<td>C</td>
<td>60.00 ± 1.00</td>
<td>3.00 ± 0.76</td>
<td>1.00 ± 0.50</td>
<td>5.00 ± 0.50</td>
</tr>
<tr>
<td>D</td>
<td>40.00 ± 0.50</td>
<td>6.00 ± 0.50</td>
<td>2.00 ± 0.00</td>
<td>3.00 ± 0.50</td>
</tr>
<tr>
<td>E</td>
<td>22.00 ± 0.00</td>
<td>1.00 ± 0.50</td>
<td>5.00 ± 0.50</td>
<td>1.00 ± 0.50</td>
</tr>
<tr>
<td>F</td>
<td>50.00 ± 1.00</td>
<td>9.00 ± 0.50</td>
<td>0.00 ± 0.00</td>
<td>0.00 ± 0.00</td>
</tr>
<tr>
<td>G</td>
<td>35.00 ± 0.50</td>
<td>5.00 ± 0.50</td>
<td>0.00 ± 0.00</td>
<td>2.00 ± 0.50</td>
</tr>
<tr>
<td>H</td>
<td>6.00 ± 0.50</td>
<td>1.00 ± 0.00</td>
<td>1.00 ± 0.50</td>
<td>1.00 ± 0.00</td>
</tr>
<tr>
<td>I</td>
<td>10.00 ± 0.50</td>
<td>1.00 ± 0.20</td>
<td>2.00 ± 0.20</td>
<td>1.00 ± 0.20</td>
</tr>
<tr>
<td>J</td>
<td>30.00 ± 0.40</td>
<td>7.00 ± 0.20</td>
<td>1.00 ± 0.00</td>
<td>3.00 ± 0.50</td>
</tr>
<tr>
<td>K</td>
<td>25.00 ± 0.00</td>
<td>4.00 ± 0.10</td>
<td>0.00 ± 0.00</td>
<td>0.00 ± 0.00</td>
</tr>
<tr>
<td>L</td>
<td>20.00 ± 0.20</td>
<td>3.00 ± 0.10</td>
<td>0.00 ± 0.00</td>
<td>1.00 ± 0.20</td>
</tr>
</tbody>
</table>

Values are mean of triplicates ± standard deviation. Values in the same column carrying the same superscript are not significantly different according to Duncan’s multiple range tests at (P < 0.05)

KEYS: TVB = Total Viable Count, TLC = Total Lactic Acid Bacteria Count, TCC =Total Coliform Bacteria Count, TFC = Total Fungal Count

Percentage occurrence of microorganisms isolated from the yogurt samples

Table 3 and 4 gives percentage occurrence of bacterial and fungal isolates respectively. The isolated bacteria were identified as; Bacillus spp, Streptococcus thermophilus, Lactobacillus bulgaricus, Proteus spp, Serratia spp. and Klebsiella spp., Listeria spp., Escherichia coli. Total number of bacteria and fungi isolated is 43 and 18 respectively. The frequency most occurred bacteria are Streptococcus thermophilus 10(23.26%) and Lactobacillus bulgaricus 10(23.26%) while the most occurred fungi is Aspergillus spp 8 (44.5).

Table 3: Percentage occurrence of bacteria isolates

<table>
<thead>
<tr>
<th>Isolated microorga</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>Frequency And</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


### Table 3: Percentage occurrence of microorganisms

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>Percentage occurrence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacillus spp</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6 (13.95)</td>
</tr>
<tr>
<td>Streptococcus thermophilus</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>10 (23.26)</td>
</tr>
<tr>
<td>Lactobacillus bulgaricus</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>10 (23.26)</td>
</tr>
<tr>
<td>Proteus spp</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3 (6.98)</td>
</tr>
<tr>
<td>Serratia spp</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2 (4.65)</td>
</tr>
<tr>
<td>Klebsiella spp</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3 (6.98)</td>
</tr>
<tr>
<td>Listeria spp</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>4 (9.30)</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5 (11.60)</td>
</tr>
<tr>
<td>Total</td>
<td>3 (6.97)</td>
<td>7 (16.28)</td>
<td>9 (19.37)</td>
<td>6 (13)</td>
<td>5 (11.1)</td>
<td>3 (6.2)</td>
<td>3 (6.3)</td>
<td>3 (6.1)</td>
<td>3 (6.3)</td>
<td>2 (4.0)</td>
<td>1 (2.0)</td>
<td>2 (4.0)</td>
<td>43 (100)</td>
</tr>
</tbody>
</table>

Keys: + = present, - = absent, A- L = yogurt samples A to L

### Table 4: Percentage occurrence of fungi

<table>
<thead>
<tr>
<th>Isolated Fungi</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>Frequency and Percentage of occurrence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspergillus spp</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>8 (44.5)</td>
</tr>
<tr>
<td>Candida spp</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>6 (33.3)</td>
</tr>
<tr>
<td>Mucor spp</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2 (11.1)</td>
</tr>
<tr>
<td>Saccharomyces spp</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2 (11.1)</td>
</tr>
<tr>
<td>Total</td>
<td>0 (0.0)</td>
<td>2 (11.1)</td>
<td>1 (5.6)</td>
<td>4 (22.2)</td>
<td>2 (11.1)</td>
<td>0 (0.0)</td>
<td>1 (5.6)</td>
<td>2 (11.1)</td>
<td>3 (16.7)</td>
<td>2 (11.1)</td>
<td>0 (0.0)</td>
<td>1 (5.6)</td>
<td>18100</td>
</tr>
</tbody>
</table>

Keys: - = absent, + = present, A- L= yogurt samples A- L

**pH and Total Titratable Acidity TTA of the yogurt samples**

The pH and TTA values of the yogurt samples are represented in Figure 1, Sample E has the least mean pH value (3.6 ± 0.2) while sample I has the highest (4.6 ± 0.2). Considering the Total Titratable acidity (TTA), sample B has the least value (0.720 ±0.2), while sample F has the highest value (1.350 ± 0.2).
Sensory evaluation of the yogurt samples

Table 5 gives the observed sensory attributes or characteristics of the yogurt samples with reference to (USDA, 2001). The mean scores of the yogurts sensory evaluation conducted by 15 panelists using 9 point hedonic scale were shown in Table 6. Sample E has the least mean score for color and taste, Sample H has the least mean score for flavor, Sample L has the least mean score for texture, Sample D and E have the least mean score for overall acceptability.

Table 5: Sensory characteristics of the yogurts sample

<table>
<thead>
<tr>
<th>Sample</th>
<th>Color</th>
<th>Texture</th>
<th>Taste</th>
<th>Flavor</th>
<th>Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Off white</td>
<td>Smooth</td>
<td>Sweet</td>
<td>Pleasant</td>
<td>Watery</td>
</tr>
<tr>
<td>B</td>
<td>Off white</td>
<td>Rough</td>
<td>Sour</td>
<td>Fair</td>
<td>Fairly thick</td>
</tr>
<tr>
<td>C</td>
<td>Cream</td>
<td>Rough</td>
<td>Sweet and fairly sour</td>
<td>Pleasant</td>
<td>Thick</td>
</tr>
<tr>
<td>D</td>
<td>Off white</td>
<td>Rough</td>
<td>Stale</td>
<td>unpleasant</td>
<td>Watery</td>
</tr>
<tr>
<td>E</td>
<td>Cream</td>
<td>Rough</td>
<td>Bitter</td>
<td>Fair</td>
<td>Too thick</td>
</tr>
<tr>
<td>F</td>
<td>Bright White</td>
<td>Smooth</td>
<td>Sweet and fairly sour</td>
<td>Pleasant</td>
<td>Fairly thick</td>
</tr>
<tr>
<td>G</td>
<td>Bright White</td>
<td>Smooth</td>
<td>Sweet and fairly sour</td>
<td>Pleasant</td>
<td>Fairly thick</td>
</tr>
<tr>
<td>H</td>
<td>Off white</td>
<td>Fairly smooth</td>
<td>Sour</td>
<td>Fair</td>
<td>Thick</td>
</tr>
<tr>
<td>I</td>
<td>Cream</td>
<td>Rough</td>
<td>Fairly sweet</td>
<td>Not pleasant</td>
<td>Thick</td>
</tr>
<tr>
<td>J</td>
<td>Off white</td>
<td>Fairly smooth</td>
<td>Sweet and fairly sour</td>
<td>Pleasant</td>
<td>Thick</td>
</tr>
<tr>
<td>K</td>
<td>Cream</td>
<td>Smooth</td>
<td>Sweet and fairly sour</td>
<td>Pleasant</td>
<td>Thick</td>
</tr>
<tr>
<td>L</td>
<td>Cream</td>
<td>Smooth</td>
<td>Sweet</td>
<td>Pleasant</td>
<td>Watery</td>
</tr>
</tbody>
</table>

Keys: A-L = yogurt samples A-L

Table 6: The mean score of the sensory evaluation with the standard deviation

<table>
<thead>
<tr>
<th>Sample</th>
<th>Color</th>
<th>Taste</th>
<th>Flavor</th>
<th>Textures</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>7.2 ± 0.94</td>
<td>6.93 ± 0.88</td>
<td>7.20 ± 1.26</td>
<td>7.20 ± 0.94</td>
<td>7.13 ± 0.83</td>
</tr>
<tr>
<td>B</td>
<td>6.8 ± 1.57</td>
<td>6.67 ± 0.98</td>
<td>6.00 ± 1.70</td>
<td>6.20 ± 1.08</td>
<td>6.60 ± 0.99</td>
</tr>
<tr>
<td>C</td>
<td>7.93 ± 0.88</td>
<td>7.73 ± 1.10</td>
<td>7.60 ± 1.35</td>
<td>7.40 ± 1.35</td>
<td>7.20 ± 1.52</td>
</tr>
<tr>
<td>D</td>
<td>5.87 ± 1.51</td>
<td>5.73 ± 0.96</td>
<td>5.80 ± 1.26</td>
<td>6.40 ± 1.35</td>
<td>6.13 ± 1.30</td>
</tr>
<tr>
<td>E</td>
<td>5.60 ± 1.59</td>
<td>5.20 ± 1.47</td>
<td>6.33 ± 1.23</td>
<td>6.27 ± 1.10</td>
<td>6.13 ± 1.41</td>
</tr>
<tr>
<td>F</td>
<td>7.00 ± 1.20</td>
<td>7.07 ± 1.03</td>
<td>6.93 ± 1.44</td>
<td>6.73 ± 1.28</td>
<td>7.00 ± 1.07</td>
</tr>
</tbody>
</table>
In the course of sample collection, it was also observed that many of the yogurts purchased from street vendors were not properly handled unlike the ones purchased from supermarkets which were provided with suitable environmental condition that supports the sustenance of their quality. The quality and integrity of yogurt can be checked using microbiological evaluation, and this has proven effective in ensuring the safety of the products (Mbaeyi-Nwaoha and Egbonche, 2012). The absence of NAFDAC number on some of this yogurt is an indication that the yogurt is not produced under standard environmental condition and the integrity of the yogurt is questionable. Yogurt samples marketed in Akure metropolis have good physiochemical quality in terms of pH and total titratable acidity when compared to international and national standards, but the presence of high viable bacteria counts in the yogurt samples makes their quality and safety to be questionable.

Apart from the high microbial load of the yogurt samples, the isolation of pathogenic organisms like Bacillus spp, Klebsiella sp, Serratia sp, Proteus sp, Listeria sp, and Escherichia coli in some of the yogurt brands is an indication of either processing or post processing fecal contamination of the yogurt (Agu et al., 2014), which could be from the raw materials (the milking animal), production lines production personnel, failure in any of the equipments used and contamination from sales personnel. The National Agency of Foods and Drugs Administration Control (NAFDAC) stipulated that E.coli and other coliforms generally must not be detectable in 100 ml of yogurt samples products (Mbaeyi-Nwaoha and Egbonche, 2012). The isolation of Escherichia coli, Serratia sp, Klebsiella sp, and Proteus sp from the yogurt samples, was not surprising considering the low level of hygiene and development involved in the production, distribution and handling of many of these yogurts. The presence of these organisms is of public health concern as these organisms have been implicated as the causal agents of one or more human diseases such as gastrointestinal discomfort or disorders, pneumonia, listeriosis and others. Similarly, the isolation of fungi like Mucor sp, Aspergillus sp, and Candida sp is also a threat to the health of consumers as they have also been implicated as the causal agent of diseases such as aspergillosis, candidiasis and others.

It has been observed that the quality or integrity of a particular food sample can be determined by evaluating its sensory characteristic (USDA, 2001). Considering this, it was observed that some of the yogurts sample conformed to the specification of (USDA, 2001), and that of (Childs and Drake, 2008). As graded by fifteen (15) panelists, the mean score of the organoleptic properties of the yogurts samples were found to vary and differ from each other. These differences could be as a result of variation in the standardization of raw materials and manufacturing techniques employed (Chandan and O’Rell, 2006). However, it was also observed that some yogurt brands were not significantly different from each other. Color, texture and thickness of yogurt are important quality characteristics, but the flavor and taste of the product is generally considered the most critical and important indicator of consumer acceptance (Olugbuiro and Oseh, 2011). As it had been earlier stated by (Olugbuiro and Oseh, 2011) that low score in average overall acceptability is a function of flavor, taste and smell, the results obtained from this research conform to this statement.

V. CONCLUSION

Based on the results of this research, it can be concluded that the fifty percent (50%) of the yogurt samples bought from Akure city were still below stipulated quality standard in terms of their microbial and organoleptic qualities. This is because some of the yogurts do not possess adequate bacteriological and sensory quality which may be due to variations in conditions surrounding the formulation, production, packaging, distribution, storage and sales of the products. Therefore, the food regulatory agencies in charge of yogurt should intensify their effort in the evaluation of yogurts, to accurately ascertain its microbial and organoleptic quality.

References

www.ijsrp.org


Determinant of higher education institutions on promoting students’ entrepreneurship across discipline: Evidence from Dire Dawa, Haramaya and Adama University

Hailay Aregawi Hagos (MSc.) *, Yeshalem Abadi (MBA) **

*Lecturer, Dire Dawa University, Department of Banking and finance  
**Lecturer, Dire Dawa University, Department of Marketing Management

ABSTRACT- Recently in Ethiopia, thousands of graduates are producing from higher education institutions each year. As the current capacity of the national labor market of the country cannot provide adequate jobs, many are found unemployed. As a result, higher education institutions are required to produce an entrepreneurial graduates who can create his/her own job rather than waiting to be hired. In relation to this few studies have been conducted which were mainly focused on business and technology students and the impact of entrepreneurship course only. To fill this gap, this study was conducted on various fields of studies with the aim of investigating the factors affecting higher education institutions on promoting student’s entrepreneurship across discipline in the case of three selected Universities (Dire Dawa, Haramaya and Adama). For the sake of achieving this objective, primary sources of data were collected through structured questionnaire from a sample of 972 students which were selected using a stratified random sampling technique. Moreover, focus group discussions and interview were conducted. While descriptive narrations through concurrent triangulation strategy were applied to analyze the data collected from focus group discussion and interview, data collected using questionnaire were analyzed using descriptive statistics and econometric model (ordinal logistic regression). Hence, University commitment, curriculum, delivery method, assessment method, learning facility were found significant factors in determining the students’ entrepreneurship promotion. Therefore, in collaborating to different stakeholders, higher education institutions should provide wide and continuing programs that promote students’ entrepreneurship through opening a center which facilitate the program. Besides, universities should revise and evaluate their curriculum, delivery method, assessment method and learning facility in relation to its role on promoting students’ entrepreneurship.

Key words: Entrepreneurship, Higher education institution, promotion, students.

1. INTRODUCTION

Similar to other disciplines, the concept of entrepreneurship has long history. It is derived from a French verb called “entreprendre” which means to undertake business (Hebert & Link, 1988; Hinddle & Gillin, 1992; Burnett, 2000). Entrepreneurship can be defined as the process of searching opportunities, risk taking, creating new thing, gathering resources, coordinating and organizing of overall activities in order to obtain new thing or make profit (Penrose, 1963; Leibenstein, 1968; Gartner, 1988; Okpara, 2000). Entrepreneur on the other hand is referred as a person who seek opportunities, take risk, able to gather, coordinate and organize resources, and has a motivation and ability to convert idea into action (Knight, 1921; Di-Masi, 2010; Reiss, 2010; Murphy, 2010). Entrepreneurship is now increasingly becoming the heart of a given country’s economy. It helps in reducing unemployment rate, improve technologies, carer development, growing micro and small enterprises, enhances positive attitudes such as creativity, flexibility, initiatives and cope with uncertainties (Arokiasamy, 2012). Thus, Countries are incorporated in their policies and design different development strategy on it (Obino et. at, 2012).

Higher education institutions are important actors in learning new things and developing innovation and creativity so that helps students in promoting their entrepreneurship. They are not only expected to teach, produce and exchange knowledge, rather they should also be a place where national and international research, innovation and technology are practiced through their three key missions of teaching, research, and community service. They should able to prepare students not only as job seekers but mostly as job creators by becoming self employed. They should also produce massive graduates who create competitiveness in the labour market and self-employed (Koschalzky, 2001;Robinson & Malach, 2004; Mok, 2010). They can achieve this through providing entrepreneurship education, creating structures for sharing knowledge with industry, developing new and innovative approaches to teaching entrepreneurship as well as new frameworks to support knowledge transfers to enterprises, commercialize the results of university research by teachers and graduates and to introduce appropriate activities in their own contexts (Jay, 2008).

However, only in recent time higher education begun to be perceived as an instrument of entrepreneurship promotion. Higher education institutions have structured their curriculum and produce graduates to meet the needs of the labor market. However, the current capacity of the national labor market to absorb new entrants is far from sufficient (European Commission, 2008; ILO, 2009). Moreover, higher education institutions face some challenges such as unclear strategies for its incorporation across faculties and insufficient resources and skill manpower in providing their effort on promoting entrepreneurship (Kalimasi, 2010). Thus, there is a need for entrepreneurial response from higher education institutions.
In Ethiopia the higher education institutions have been expanding both in size and outreach. They expands from two public universities in 1991 to more than 35 public universities this time in which they holds more than 500,000 students learning at different field of studies. Despite the expansions of universities and increment of graduate students, unemployment is high and is one of the socio economic problems in the country. It has been increasing over time (Martha, 2012; Nebil, et. al, 2010).

As it is reported by Ministry of Education (2013) the number of students who seeks to be hired in any private or public organizations is 80 to 90 percent. Besides, as it is reported in the MSEs development agencies, Dire Dawa city administration (2014), in the administration there are more than 10,000 graduates who waits to be hired. Different studies (Brussels, 2012; Byabashaija, et. At, 2010; Charney, et. At. 2000; Hessel, et. At, 2008; Oosterbeek, et. At, 2008)) have also found that the entrepreneurial intention of graduate students is low. This indicates that the graduate students’ entrepreneurial know how is low. Thus, government bodies, higher education institutions, and other concerned bodies required to do on the promotion of students’ entrepreneurship which in turn decrease the rate of unemployment in the country.

A few studies (Brussels, 2012; Byabashaija, et, al, 2010; Charney et. al, 2000; Hessel et. Al, 2008; Oosterbeek, et. Al, 2008; Negash & Amentie, 2013; Zegeye, 2013; Aschalew, 2015; Mekonnin, 2015) have been conducted in this area (entrepreneurship) particularly, in investigating the students’ entrepreneurial intention and attitude. In addition, some studies (Al-mahdi, 2012; Kalimasi, 2010; Koschatchzyk, 2001; Santos et al, 2012; Zhou & Xu, 2012; Potter, 2008; European Commission, 2008; Mok, 2010) made studies on the role of entrepreneurship education given at higher education on students’ entrepreneurship intention and attitude. The focus of these studies were to examine the entrepreneurship program (course) on students’ entrepreneurship intention and attitude by taking the field of studies that incorporate the course entrepreneurship as a target group. Like the traditional business model theory, they ignore the other field of studies that do not incorporate entrepreneurship course in their curriculum. However, recently all graduate students are required to create a job regardless of their field of study. Thus, to fill the specified gap this study is needed to conduct with the aim of the following two objectives:

1. To describe the commitment of higher education institutions on promoting students’ entrepreneurship across discipline.
2. To investigate the factors affecting the higher education institutions on promoting student’s entrepreneurship across discipline in the case of three selected Universities (Dire Dawa, Haramaya and Adama Universities).

2. REVIEW OF RELATED LITERATURE

There are various literatures written by scholars on the concept of entrepreneurship. It was first established in America in the early 1700’s (Hinddle & Gillin, 1992; Hebert & Link, 1988). Then after, various scholars have been given their own definition for the entrepreneurship concept overtimes. It involves on carrying out of new combinations by a person who called entrepreneurs that characterized as risk-bearers, coordinators, organizers, gap-fillers, leaders, and innovators or creative initiators (Schumpeter, 1951). Okpara (2000) also defines entrepreneur as the willingness and ability of an individual to seek out investment opportunities in an environment and be able to establish and run an enterprise successfully based on the identifiable opportunities. Entrepreneurship this time is the heart of the modern business. It is becoming a common issue to many people including researchers, governments, scholars, educators and policy makers. Entrepreneurship initiates innovative businesses and create incremental wealth by individuals which generally considered it as a development strategy in many country’s sustainable economic development (Obino et. at, 2012).

Higher education institutions are important actors in learning new things and developing innovation and creativity. They are not only expected to teach, produce and exchange knowledge, rather they should also be a place where national and international research, innovation and technology are practiced which in turn helps in developing a country’s economy. To this effect, higher education institutions (HEIs) support enterprise creation through their three key missions of research, teaching, and interaction with the wider community. A growing number of institutions are providing entrepreneurship education and creating structures for sharing knowledge with industry (Koschalzky, 2001). Higher education institutions offer and engage in a variety of knowledge transfer activities that promote entrepreneurship, either directly or indirectly. To this effect, they can help individuals to start new firm and transfer knowledge to enterprises in the regions in which they are located in (Jay, 2008). As a result, higher education institutions this time are required to offer entrepreneurship education and other activities that can help graduates in developing their entrepreneurship education. The expected outcome of entrepreneurship education is entrepreneurship capacities which constitute the necessary and sufficient conditions to practice entrepreneurial behavior in response to socio-economic challenges (Gibb, 1998).

Researchers (Hassan, 2012; Negash & Amentie, 2013; Aschalew, 2016) report that the proposition that the intention to become self-employed is positively and significantly correlated to the attitudes of self-employed and to the perceived behavioral control. Chukwujoke et al. (2013) also indicated that entrepreneurial intentions increased with increase in age. Besides, perceived self-efficacy, family background, risk taking propensity and proactive personality are the factors that can affect their entrepreneurial intentions (Mekonnin, 2015; Aschalew, 2016). Supportive university environment is very important to develop entrepreneurial intentions among university’s students as well as unclear strategies for its incorporation across faculties and insufficient resources are the main challenges facing on promoting students’ entrepreneurship (Kalimasi, 2010; Negash & Amentie, 2013; Mekonnin, 2015; Zegeye, 2013). Studies (Hassan, 2012; Byabashaija et al., 2010; Negash & Amentie, 2013) people who are important to someone and closest family and partners were significantly determines once intention toward self-employment.

Some studies (Hassan, 2012; Brussels, 2012; Charney et al., 2000; Yi et al., 2014; Negash & Amentie, 2013; Mekonnin, 2015; Aschalew, 2016) revealed that entrepreneurship education has a positive impact on the entrepreneurial mindset of young people, their intentions towards entrepreneurship, their employability and finally on their role in society and the economy. On the other
hand, the result of other studies (Oosterbeek et al., 2008; Hessel et al., 2008) shows that the program does not have the intended effects: the effect on students’ self-assessed entrepreneurial skills is insignificant and the effect on the intention to become an entrepreneur is even significantly negative. In fact, there is a negative correlation between education and entrepreneurship. The more educated a person, the less likely she or he is to act as an entrepreneur (Arenius et al., 2004).

Entrepreneurial activities may be explained by the influences of the surrounding business environment such as government policy, availability of logistic infrastructure, financial support, and externalities. In addition, physical infrastructure, corporate physical assets, R&D laboratories and intangible (human capital) Education, Skills and training opportunities can foster entrepreneurial intention (Negash & Amentie, 2013). Expected opportunities are also the other factors that can determine students’ entrepreneurship development (Mekonnen, 2015). According to Kristiansens and Indart (2004) lack of access to capital and credit scheme, and the constraints of financial systems are regarded by potential entrepreneur as main hindrances to business innovation and success in developing economies.

2.1. Conceptual Framework of the Study

In line to the theoretical and empirical reviews discussed above, the conceptual framework of the study is given below:

![Conceptual Framework of the Study](image)

Source: Researcher’s own design (2016)

3. RESEARCH METHODOLOGY

The type of research employed under this study was both explanatory and descriptive researches. The target population of the study includes students engaged in various departments as well as management bodies from three selected Universities (Dire Dawa, Haramaya and Adama). To get sufficient and reliable data, the study was incorporated only those students who are at the graduate level. In this study a firsthand qualitative data were collected using primary sources including questionnaire, interview and focused group discussions on a cross-sectional basis. Both close ended and open ended structured questionnaires were prepared and personally distributed by the enumerators for the respondents (students). Further an interview was also conducted with some management bodies of each University specially to describe the commitment of universities on promoting students entrepreneurship. In support to the questionnaire and interview, focused group discussions were also made with some selected student respondents.

In this paper, three universities (Dire Dawa, Haramaya and Adama universities) were conveniently selected. Within each university there were many students who learn at different departments. As a result, in order to avoid the biasness of results occur by concentrating in few selected departments and to generate more accurate results by giving the chance to be included each respondents within a given department, , stratified random sampling technique was applied. With this technique, the sampling frame was organized in to relatively homogeneous groups or strata (i.e. based on the departments). Then by applying the simple random sampling technique, the total sample was selected from each stratum (department) proportionally. Finally, after obtaining the total population, 972 (i.e. 335, 374 and 356 from Dire Dawa Haramaya and Adama University respectively) sample respondents were selected by applying a simplified scientific formula provided by yemane (1997) i.e. $n = \frac{N}{1 + N(e)^2}$ in which $e$ is the level of precision at 5% level of significance.

Once the raw data were processed, they were analyzed using both descriptive and inferential statistical tools. In line to the specific objectives, the collected data were initially analyzed using descriptive analysis techniques such as frequency distribution and statistical measures. Besides, descriptive narration through concurrent triangulation strategy was applied for analyzing the data collected from interview and focus group discussions. Beyond the descriptive analysis, an econometric model which is ordinal logit model was used particularly to test the relationship between the dependent and independent variables and to draw conclusions. Stata, version 11.2 software was used to run the result of the statistical result and the model. In this study the
promotion of students’ entrepreneurship is dependent variable which is measured by five point likert scale (i.e. highly promoted, promoted, undecided, low promoted and very low promoted). The explanatory variables of the study on the other hand includes curriculum, university commitment, delivery method, assessment method, learning facility, entrepreneurship course and field of study. The derived equation of the model in this study which is the function of dependent variable to various explanatory variables is given as:

\[ Y_i = \beta_0 + \beta_{1CU} + \beta_{2UC} + \beta_{3DM} + \beta_{4AM} + \beta_{5LF} + \beta_{6EN} + \beta_{7FS} + \epsilon_i \]

4. RESULT AND DISCUSSION

As it is clearly discussed in the methodology part of the study, 1,065 students were selected as a sample from three universities (335 from Dire Dawa, 374 from Haramaya and 356 from Adama University) who involved across 45 departments. In doing so, 1,065 questionnaires were distributed to respondents by the enumerators. However, at the time of counting and checking the collected questionnaires, 56 questionnaires were found unreturned due to different reasons and 37 questionnaires were found incomplete. This shows that 93 (8.7 percent) questionnaires were excluded from the analysis. In other words, the analysis of this paper is based on a response rate of 91.3 percent. Besides, a focus group discussions with some selected students and an interview questions with some management bodies of the universities were undertaken both at the time of questionnaire distribution and collection. Therefore, data were analyzed based on the data collected using questionnaires from 972 respondents as well as data collected through interview questions and focus group discussions.

4.1. Descriptive Analysis and Discussion

4.1.1. Commitment of Higher Education Institutions on Promoting Students’ Entrepreneurship

In this study, to describe the prevalence commitment of higher education institutions on promoting students’ entrepreneurship, data were collected from three universities (Dire Dawa, Adama and Haramaya Universities) through questionnaire and focus group discussion with students as well as interview questions with few management bodies. In relation to the first method (questionnaire), the following results were obtained.

<table>
<thead>
<tr>
<th>No.</th>
<th>Question/variable</th>
<th>Category</th>
<th>Frequency Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>1</td>
<td>Do you think that your university has been exerting efforts on promoting your entrepreneurship skill?</td>
<td>Yes</td>
<td>225</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>747</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>972</td>
</tr>
<tr>
<td>2</td>
<td>Types of effort</td>
<td>Providing training</td>
<td>204</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arranging conferences, seminars and workshops on entrepreneurship</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Entrepreneurship day/week</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guest lecture/speaker</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Linkage with industry</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Motivating entrepreneur</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other, specify</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>225</td>
</tr>
<tr>
<td>3</td>
<td>Level of university commitment</td>
<td>High</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>152</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>716</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>972</td>
</tr>
</tbody>
</table>

Source: Own survey (2015)

As it is shown in the above table (table 1), majority (77 percent) of the respondents disagree with the commitment of their university on promoting their entrepreneurship skill, while the remaining (23 percent) of the respondents agree with it. For the respondents who agreed with the university commitments were also required to state some of the commitments that their university exerts on promoting of their entrepreneurship. In response, almost all (91 percent) of them agreed with the training that the university provide to students. However, a few (9 percent) respondents agreed with the university linkage to surrounding industries. As it is indicated in the same table, item 3, respondents were also required to rate their university’ commitment on promoting students entrepreneurship on three point likert scale (High, Medium or Low). Accordingly, most (74 percent) of them were evaluated as low, while the remaining 15 percent and 11 percent were evaluated as medium and high respectively. From this we can understand that even if some respondents agreed with universities providing entrepreneurship training and made industry linkage as means of promoting students entrepreneurship, majority of the respondents did not agree that universities are exerting commitments for promoting students’ entrepreneurship.
In line to the above questions, focus group discussions were also made with some selected respondents (students) at each university. They particularly requested to discuss on whether universities are exerting commitments on promoting students’ entrepreneurship and to specify some of the commitments (if any) that have been exerting so far. Accordingly, the response of the participants is summarized in the following two paragraphs.

- Almost all of the participants were disagreed with the commitment of universities on promoting students’ entrepreneurship. Some of them said that “even though we learn the course entrepreneurship, we have not got any difference from the other courses. We learn it like the other courses and similarly we score a given grade”. Besides, participants from some departments of business and economics as well as technology institute reported that “we take a practical attachment (apparentisit) in different service and manufacturing industries for few days usually 15 days to 30 days”. This is given with the aim of looking the theoretical parties that they have learnt in practice. However, as the participants indicated it is not undertaken properly so that it may not help in promoting students’ entrepreneurship. In contrast, some participants especially those who come from law and other social science were reported as they were not even learn the course entrepreneurship; this is our first time to hear it.

- On the other hand, a few participants were agreed with the commitment of universities on promoting students’ entrepreneurship. They reported that currently universities are beginning to exert commitments through offering training that aims at promoting students’ entrepreneurship skill. This is from the program that they observed while the university providing at the end of last few academic years. As a result, they were also waiting to get that training at the end of their academic year. Besides, they were raised the practical attachment given for few days as a means of promoting students’ entrepreneurship.

In addition, an interview were also made with a few management bodies of the selected universities for collecting data on whether their universities are exerting commitments on promoting students entrepreneurship. Accordingly, the response to which is described with respect to each university as follows. Based on the report from Dire Dawa University’ interviewee, the university gives training at the end of each academic year for graduate students with the aim of promoting their entrepreneurship skills. It is also reported that students’ entrepreneurship is expected to be promoted through learning of each courses as well as the practical learning that they may obtained from practical attachments which given for some days in different industries. Besides, the university is on the process of establishing an incubation center. However, the university is found weak in arranging conferences, seminars and workshops on entrepreneurship, entrepreneurship day/week, guest lecture/speaker and motivating entrepreneur/innovators. Hence, even if there are some trying the university is weak on providing different activities and programs that may promote students’ entrepreneurship.

Based on the report from Adama and Haramaya universities interview, similarly both universities provide entrepreneurship training for graduate students at the end of an academic year. Unlike to Dire Dawa University, both universities (Adama and Haramaya universities) already established an incubation center that facilitates an entrepreneurship program. However, the center is weak on offering different activities that may promote students’ entrepreneurship. Besides, both universities are found weak on offering entrepreneurship programs such as conferences, seminars and workshops on entrepreneurship, entrepreneurship day/week, guest lecture/speaker and motivating entrepreneur/innovators. In relation to the overall university commitment level, interviewees were responded their university commitment as “low”.

4.1.2. Factors Affecting Students’ Entrepreneurship Promotion

Taking the university environment specifically, in this study an investigation was made in relation to curriculum, delivery method, assessment method, learning facility, university commitment and entrepreneurship course as the factors affecting students’ entrepreneurship promotion. For the sake of easily presenting, these factors were organized in to two parts. The first part includes the factors such as curriculum, delivery method, assessment method and learning facility whereas the second part includes the remaining factors (university commitment and entrepreneurship course).

Curriculum, Delivery Method, Assessment Method and Learning Facility Related Factors

In this study curriculum, delivery method, assessment method and learning facility were taken as the factors that can affect students’ entrepreneurship promotion. To examine the effect of these factors, respondents were asked to give their opinion based on five point likert scale questions (i.e. 5 = strongly agree, 4 = agree, 3 = undecided, 2 = disagree, and 1 = strongly disagree) on different related variables of the factors. Table 2 summarizes the average, standard deviation, minimum and maximum of the respondent’s response on each of the specific variables.

<table>
<thead>
<tr>
<th>No.</th>
<th>Factors/Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Curriculum related factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Curriculum is not up dated in relation to current situation</td>
<td>4.5</td>
<td>0.7</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Course content of the curriculum are not learner centered and oriented to real life situation</td>
<td>4.2</td>
<td>0.8</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>
The curriculum does not incorporates students’ team and organizational works | 4.3 | 0.8 | 1 | 5
The curriculum does not incorporates use of problem based learning | 4.4 | 0.7 | 1 | 5
The curriculum does not incorporates use of students’ collaborative project work | 4.4 | 0.8 | 1 | 5
The curriculum does not incorporates use of students’ field trip | 4.2 | 0.9 | 1 | 5
The curriculum is designed to meet the needs of the labor market | 4.6 | 0.7 | 1 | 5
The curriculum excludes relevant courses | 4 | 0.9 | 1 | 5
The curriculum includes irrelevant courses | 4 | 0.9 | 1 | 5
Grand | 4.3 | 0.3 | 3.3 | 5

### Course Delivery Method Related Factors

Instructors focused on lecturing of theoretical part | 4.6 | 0.5 | 2 | 5
Instructors focused on covering of topics rather than equipping students with real world | 4.7 | 0.5 | 2 | 5
Instructors have not capacity to convert theory to practice | 4 | 0.9 | 1 | 5
Instructors have not enough experience to teach the courses | 4 | 0.8 | 1 | 5
Instructors have not commitment to equipped students with entrepreneurship | 3.8 | 1 | 1 | 5
Instructors follow direct lecture method | 4.5 | 0.7 | 1 | 5
Instructors cover large portion per class | 4.5 | 0.7 | 1 | 5
Grand | 4.3 | 0.3 | 3.3 | 5

### Assessment Method

Instructors assess us to fulfill the grade | 4 | 1 | 1 | 5
Instructors follow irrelevant assessment method | 4.3 | 0.8 | 1 | 5
The way of asking are not related to practice | 4.1 | 0.9 | 1 | 5
The nature of the assessment are not appropriate | 3.5 | 1.5 | 1 | 5
The content/part of the assessment are not varied | 3.5 | 1.5 | 1 | 5
Grand | 3.9 | 0.5 | 2 | 5

### Learning facility factors

Inadequate learning facilities | 4.4 | 0.7 | 2 | 5
The available learning facilities are out dated | 3.2 | 1.4 | 1 | 5
Lack of manpower to undertake the facilities | 3.5 | 1.2 | 1 | 5
Inadequate class rooms | 4 | 0.9 | 1 | 5
Grand | 3.8 | 0.6 | 1.75 | 5

Source: Own survey (2015)

As indicated in table 2 the mean responses of respondents to the factors revision of curriculum to current situation, course contents of curriculum, inclusion of students’ team and organizational works, problem based learning, students’ collaborative
project work, students’ field trip, labor market, exclusion of relevant courses and inclusion of irrelevant courses were 4.5, 4.2, 4.3, 4.4, 4.4, 4.2, 4.6, 4, and 4 with a standard deviation of 0.7, 0.8, 0.8, 0.7, 0.8, 0.9, 0.7, 0.9 and 0.9 respectively. Based on this “curriculum is designed to meet the needs of the labor market” was the foremost factor affecting students’ entrepreneurship promotion which followed by “curriculum is not up dated in relation to current situation, curriculum does not incorporates use of problem based learning and curriculum does not incorporates use of students’ collaborative project work”. On the other hand, the exclusion of relevant courses and inclusion of irrelevant courses were the least factor affecting the students’ entrepreneurship promotion. The total average effect of these variables related to curriculum on students’ entrepreneurship promotion was seen as 4.3 at a standard deviation of 0.3.

As it is shown in table 2, item 2, course delivery method is the second variable that expected to affect students’ entrepreneurship promotion. The average result of instructors focused on lecturing of theoretical part, instructors focused on covering of topics rather than equipping students with real world, instructors have not capacity to convert theory to practice, instructors have not enough experience to teach the courses, instructors have not commitment to equipped students with entrepreneurship and instructors cover large portion per class was 4.6, 4.7, 4, 4, 3.8, 4.5 and 4.5 with the given respective standard deviation respectively. From this we can understand that “instructors focused on covering of topics rather than equipping students with real world” was the foremost factor affecting students’ entrepreneurship promotion which followed by “instructors focused on lecturing of theoretical part”. On the other hand, “instructors have not commitment to equipped students with entrepreneurship” was the least factor affecting the students’ entrepreneurship promotion. To sum up, the total average effect of these variables related to course delivery method on students’ entrepreneurship promotion was given as 4.3 at a standard deviation of 0.3.

Assessment method was also the other factors which expected to affect the students’ entrepreneurship promotion. The result presented in table 2, item 3 shows that “following of inappropriate assessment method” was the main factor which accounts a response rate of 4.3 and at a standard deviation of 0.8. This followed with the variables of “the way of asking are not related to practice, instructors assess us to fulfill the grade, the nature of the assessment are not appropriate and the content/part of the assessment are not varied” which accounts a mean of 4.1, 4, 3.5 and 3.5 with a standard deviation of 0.9, 1, 1.5 and 1.5 respectively. On average the assessment method variable was found as a significant factor affecting the students’ entrepreneurship promotion at a mean and standard deviation of 3.9 and 0.5 respectively.

Learning facility was the last but not the least variable in this category which expected to have a relationship with students’ entrepreneurship promotion. As revealed in table 2, item 4, out of the given four specific variables, inadequate learning facilities have the highest effect on students’ entrepreneurship promotion which accounts 4.4 average response rates and standard deviation of 0.7. It followed with inadequate class room at an average response rate of 4 and standard deviation of 0.9. The remaining variables including “lack of manpower to undertake the facilities and the available learning facilities are out dated” were significant at a response rate of 3.5 and 3.2 with a standard deviation of 1.2 and 1.4 respectively. Generally, learning facility factor which is described with the above specified variables have a positive significant effect on the students’ entrepreneurship promotion at a grand average of 3.8 with a standard deviation of 0.6.

Even though all of the aforementioned factors discussed above are positively affecting the students’ entrepreneurship promotion, it does not mean that all factors have equal impact. As it is clearly shown in table 3, curriculum and course delivery method related factors were the two topmost factors that affect the students’ entrepreneurship promotion in the selected area. This followed by assessment method and learning facilities related factors.

### Table 3: Comparison of the specified factors on students’ entrepreneurship promotion

<table>
<thead>
<tr>
<th>No.</th>
<th>Factors</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Curriculum</td>
<td>4.3</td>
<td>0.3</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Course delivery methods</td>
<td>4.3</td>
<td>0.3</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Assessment methods</td>
<td>3.9</td>
<td>0.5</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Learning facility</td>
<td>3.8</td>
<td>0.6</td>
<td>4</td>
</tr>
</tbody>
</table>

**Source:** Own survey (2015)

### University Commitment and Entrepreneurship course

These variables were also the other factors that expected to affect students’ entrepreneurship promotion. To explain the effect of university commitment on students’ entrepreneurship promotion, respondents were initially required to rate the prevalent commitment of university on promoting students’ entrepreneurship and then create the relationship with their scale of entrepreneurship promotion. As it can be seen in the below table (table 4), most (74 percent) of them were evaluated as low, while the remaining 15 percent and 11 percent were evaluated as medium and high respectively.

With regard to entrepreneurship course, respondents were required to state whether they have taken an entrepreneurship course or not. To this effect, almost half (50.5%) of the respondents were taken the course entrepreneurship and the remaining (49.5%)
were not taken the course. Again to explain the effect of entrepreneurship course on students’ entrepreneurship promotion, the result is run in relation to their entrepreneurship promotion level. Table 4 summarizes the respondents’ response to each variable and its effect on students’ entrepreneurship promotion.

Table 4.8: Students’ entrepreneurship promotion in relation to University Commitment and Entrepreneurship course

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Observation</th>
<th>Entrepreneurship Promotion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>1. Level of university commitment</td>
<td>High</td>
<td>104</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>152</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>716</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>972</td>
<td>100</td>
</tr>
<tr>
<td>2. Taking of entrepreneurship course</td>
<td>Yes</td>
<td>490</td>
<td>50.5</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>482</td>
<td>49.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>972</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Own survey (2015)

As it is depicted in the above table (table 4), there is positive relationship between university commitment and students’ entrepreneurship promotion. For instance, almost all (94) of the respondents who responded “High” with university commitment were said highly promoted and promoted, while the remaining 3 respondents who said “High” showed low and very low promotion. On the other hand, most (648) of the respondents who agreed with low level of university commitment were said low and very low promotion. As it is seen in the same table item 2, there is also a positive relationship between taking of entrepreneurship course and students’ entrepreneurship promotion. For instance, when we compare the respondents who said “highly promoted” 56 of them were taken the course and 6 of them were not taken the course. On the other hand, for those who said “very low promoted” 199 of them were not taken the course, while 81 of them were taken the course.

4.2. Regression Analysis

Beyond the descriptive statistical analysis discussed above, in this study an econometric model (ordinal logistic regression analysis) was also used particularly to test the statistical significance of each independent variable on explaining the dependent variable. For explanatory variables such as university commitment and entrepreneurship course, dummy variables were created. And for those variables which measured using five point likert scales (i.e. curriculum, delivery method, assessment method and learning facility) were reduced to two categories: “agree and disagree” based on the mid point. That is the average response of respondents less than 2.5 were categorized as “disagree” and the average response of respondents greater than or equal to 2.5 were categorized as “agree”. This is mainly for the sake of easily managing the variables of the study.

4.2.1. Result of the Model (Ordinal Logistic Regression)

After variables were ready in type, code and value, the next activity is regressing of the dependent variable against the independent variables with the help of stata command. To obtain the result of the model, two stata commands were run. The first command shows the coefficient of ordered log-odds and the second command shows the coefficients in terms of proportional odds. Table 4 generally summarizes the two results (marginal effect and odds ratio) of the model.

Table 5: Result of the model (Ordinal Logistic Regression)

<table>
<thead>
<tr>
<th>variable</th>
<th>Marginal effect</th>
<th>P&gt;(z)</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>promoLikert</td>
<td>UC</td>
<td>Medium</td>
<td>1.064786</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>3.214982</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Curriculum</td>
<td>3.998849</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Delivery method</td>
<td>4.158185</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assessment method</td>
<td>1.039336</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learning facility</td>
<td>1.751281</td>
</tr>
</tbody>
</table>

Number of obs = 972
LR chi2(7) = 1119.22
Prob > chi2 = 0.0000
Pseudo R2 = 0.4203
University commitment was one of the variables incorporated in this study. As it is revealed in table 5, coefficients of ordered log-odds (marginal effect) and proportional odds (odds ratio) is given for those who said medium and low with the level of university commitment, while the response for high is considered as a reference criteria. As a result, the coefficients of ordered log-odds and proportional odds for those who said medium are 1.065 and 2.9 respectively; and coefficients of ordered log-odds and proportional odds for those who said low are 3.2 and 24.9 respectively. This indicates that the ordered logit for those who said medium university commitment being in a lower entrepreneurship promotion is 1.065 higher than those who said high university commitment, given other variables held constant. In other words, other things remain constant, the odds of highly promoted versus the combined other low categories (promoted, neutral, low promoted and very low promoted) of those who said medium is 2.9 times lower than those who said high or the odds of the combined categories of highly promoted, promoted, neutral and low promoted versus very low promoted is 2.9 times lower for those who said medium compared to those who said high, given the other variables are held constant.

With regard to the second predictor (low) of the variable, other variables held constant, the ordered logit for those who replied low university commitment being in a lower entrepreneurship promotion is 3.2 higher than those who replied high university commitment. With the result of the proportional odd, the odds of highly promoted versus the combined other low categories (promoted, neutral, low promoted and very low promoted) of those who replied low is 24.9 times lower than those who said high or the odds of the combined categories of highly promoted, promoted, neutral and low promoted versus very low promoted is 24.9 times lower for those who said low compared to those who said high, given the other variables are held constant.

The coefficients of ordered log-odds and proportional odds of those who agree with the curriculum related problem is given as 4 and 54.5 respectively. This implies that other things remain constant, the ordered logit for those who agreed with the curriculum related problem being in a lower entrepreneurship promotion is 4 higher than those who didn’t agree. Based on proportion odds, the result of the model shows that for those who agreed with the curriculum related problem, the odds of highly promoted versus the combined other low categories (promoted, neutral, low promoted and very low promoted) are 54.5 times lower than those who didn’t agree, given the other variables are held constant. Likewise, the odds of the combined categories of highly promoted, promoted, neutral and low promoted versus very low promoted is 54.5 times lower for those who agreed compared to those who didn’t agree, given the other variables are held constant in the model.

As it is shown on table 5, the coefficients of ordered log-odds and proportional odds of those who agree with regard to delivery method factor are 4.2 and 64 respectively. This means that other things remain constant, the ordered logit for those who agreed with regard to delivery method factor being in a lower entrepreneurship promotion is 4.2 higher than those who didn’t agree. In relation to proportion odds the result of the model shows that for those who agreed, the odds of highly promoted versus the combined other low categories (promoted, neutral, low promoted and very low promoted) are 64 times lower than those who didn’t agree, given the other variables are held constant. Likewise, the odds of the combined categories of highly promoted, promoted, neutral and low promoted versus very low promoted is 64 times lower for those who agreed compared to those who didn’t agree, given the other variables are held constant in the model.

Furthermore, assessment method was also found positively significant at 1 percent level of significance. Its coefficients of ordered log-odds and proportional odds of those who agreed were 1.04 and 2.8 respectively (see table 10). This implies that other things remain constant; the ordered logit for those who agreed with assessment method related problems being in a lower entrepreneurship promotion is 1.04 higher than those who didn’t agree. Based on proportion odds the result of the model shows that for those who agreed, the odds of highly promoted versus the combined other low categories (promoted, neutral, low promoted and very low promoted) are 2.9 times lower than those who didn’t agree, given the other variables are held constant. Likewise, the odds of the combined categories of highly promoted, promoted, neutral and low promoted versus very low

<table>
<thead>
<tr>
<th>Entrepreneurshipcourse</th>
<th>2.291771</th>
<th>5.817447</th>
<th>11.596</th>
<th>15.04208</th>
</tr>
</thead>
<tbody>
<tr>
<td>cut1</td>
<td>.8861596</td>
<td>2.425796</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cut2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cut3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cut4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Ordinal Logistic Regression result from own survey (2015)
promoted is 2.9 times lower for those who agreed compared to those who didn’t agree, given the other variables are held constant in the model.

Availability of learning facility was another variable used in this study. As per table 5, the coefficients of ordered log-odds and proportional odds of those who agree with regard to learning facility variable are 1.8 and 5.8 respectively. This can be interpreted as other things remain constant, the ordered logit for those who agreed with regard to learning facility variable being in a lower entrepreneurship promotion is 1.8 higher than those who didn’t agree. In relation to proportion odds the result of the model shows that for those who agreed, the odds of highly promoted versus the combined other low categories (promoted, neutral, low promoted and very low promoted) are 5.8 times lower than those who didn’t agree, given the other variables are held constant. Likewise, the odds of the combined categories of highly promoted, promoted, neutral and low promoted versus very low promoted is 5.8 times lower for those who agreed compared to those who didn’t agree, given the other variables are held constant in the model.

Finally, entrepreneurship course was the last variable which affects students’ entrepreneurship promotion at 1 percent level of significance. Its coefficients of ordered log-odds and proportional odds of those who said “no” were 0.88 and 2.4 respectively (see table 5). This implies that other things remain constant; the ordered logit of those who didn’t take the course entrepreneurship course being in a lower entrepreneurship promotion is 0.88 higher than those who taken it. Based on proportion odds, the result of the model shows that those who didn’t take the course entrepreneurship course, the odds of highly promoted versus the combined other low categories (promoted, neutral, low promoted and very low promoted) were 2.4 times lower than those who taken it, given the other variables are held constant. Likewise, the odds of the combined categories of highly promoted, promoted, neutral and low promoted versus very low promoted is 2.4 times lower of those who didn’t take the course entrepreneurship course compared to those who taken it, given the other variables are held constant in the model. Generally, based on the above inferential analysis curriculum, delivery method, assessment method, learning facility, university commitment and entrepreneurship course were found statistically significant factors that determine students’ entrepreneurship promotion.

5. CONCLUSION AND RECOMMENDATION

Conclusion

Although universities provide entrepreneurship training for graduate students, arrange a practical attachment for students and try to establish an incubation center that may help to facilitate the activities of entrepreneurship program, respondents agreed that many activities are remained uncovered that can help students on promoting their entrepreneurship. The surveyed higher education institutions’ commitment on promoting students’ entrepreneurship is low. The lower the commitment of higher education institutions on promoting students’ entrepreneurship leads lower scale of students’ entrepreneurship promotion. The curriculum related factors including “curriculum is designed to meet the needs of the labor market, curriculum is not up dated in relation to current situation, and curriculum does not incorporates use of problem based learning and use of students’ collaborative project work” were the foremost factor affecting students’ entrepreneurship promotion. Thus, it is found as a significant factor affecting the students’ entrepreneurship promotion.

Instructors’ focusing on lecturing of theoretical part, covering of topics rather than equipping students with real world, low capacity, experience, and commitment to convert theory to practice, and covering of large portion per class were the course delivery related factors that may lowering the students’ entrepreneurship promotion. The assessment method related factors including following of inappropriate assessment method, the way of asking are not related to practice, instructors assess us to fulfill the grade, the nature of the assessment are not appropriate and the content/part of the assessment are not varied were also the other factors that can significantly affecting the students’ entrepreneurship promotion. In addition, learning facilities related factors such as inadequate learning facilities, inadequate class room, lack of manpower to undertake the facilities and the available learning facilities are out dated were the other factor affecting students’ entrepreneurship promotion. Students who take the course entrepreneurship have high probability of promoting their entrepreneurship than those who didn’t take that course.

Recommendation

Higher education institutions should provide different entrepreneurship programs that promote students entrepreneurship skill. They should establish and strengthen an incubation center that facilitates and promote entrepreneurship activities for students. They should begin an entrepreneurship clubs, day, week. Other programs such as motivation, workshop, guest lecture and experience sharing should be arranged. Curriculum should be continuously revised in a way that can promote students’ entrepreneurship instead of solely meeting the labour market. Various teaching methods such as cooperative work, company visit, practitioner work, guest lecturer should be included in teaching of a given course. Students should also be assessed in a way that can promote their skill of entrepreneurship rather than fulfilling any grade points. Higher education institutions should also provide adequate and updated learning facilities. Higher education institutions should give emphasis on the way of delivering the course and expand to all programs. Students should be given trainings, guest lectures and experience of entrepreneurs while they are teaching that course as well as they should be assessed on more practical way. Finally, policy makers in general and higher education institutions in particular should design a policy that students continuously applied in line to their regular teaching learning process. Students should be given guidelines that can motivate them to cooperate, save capital and generate idea while they are in campus so that they will directly convert their idea in to practice once they graduated.
REFERENCE