ARCA



CONFERENCE

5TH APPLIED RESEARCH CONFERENCE IN AFRICA
25-27 August 2016, Pempamsie Hotel, Cape Coast, Ghana.

CONFERENCE PROCEEDINGS BOOK

Editors
Prof. Joseph N. Mojekwu
Dr. Gabriel Nani
Prof. Lawrence Atepor
Prof. Rexford Assasie Oppong
Dr. Lucy Ogunsumi
Prof. (Mrs.) Olutoyin M. Adetunji
Mr. Uriah Stonewell Tetteh
Mr. Eric Awere
Mrs. Sophia Pardie - Ocran
Mr. Emmanuel Bamfo-Agyei

Conference Proceedings Book of the 5thApplied Research Conference in Africa (ARCA) 2016, Cape Coast, Ghana, 25 – 27 August 2016

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Correspondence
All correspondence relating to the ARCA Conference should be addressed to:

Emmanuel Bamfo-Agyei
African Applied Researchers' Association
P.O. Box AD50
Cape Coast
Ghana
Email: arcaafrica2015@gmail.com

DECLARATION

All papers in this publication have been peer- reviewed involving initial screening of abstracts, review by at least two referees, modifications of papers by authors and re-evaluation of re-submitted papers to ensure quality of content.

FOREWORD

Welcome to Cape Coast, the ancient capital of Gold Coast, now called Ghana. It is the capital of the Central Region of Ghana, the hub of tourism and centre of education.

This city, Cape Coast is privileged to host the 5th Applied Research Conference in Africa (ARCA) organized by the African Applied Research Association (AARA) in collaboration with Cape Coast Polytechnic and Kwame Nkrumah University of Science and Technology, Ghana.

The role of research in the development of the African continent has been challenged on several platforms. It is believed that in Africa, research has no significant bearing on development. The African Applied Research Association (AARA), however, believes that research should contribute to the socio-economic development of the continent. Thus, the aim of the Applied Research Conference in Africa is to provide a platform for capacity building and networking among researchers in Africa. The theme of the 5th Research Conference is: "**Achieving Sustainable Development Goals (SDGs) In Africa through Applied Research**." Researchers from Africa would be presenting their scientific papers at the conference. Seventy (70) peer-review papers relating to the following disciplines but not limited them would be presented: Engineering, Built Environment, Hospitality and Tourism, Food Science, Oil, Gas and Energy, Medicine, Statistical Modeling, Information and Communication Technology, Applied Sciences & Arts, Business, Social Sciences and Humanities.

We are privileged to have the Secretary to the Sokoto State Government (SSG), in the person of Prof. Bashir Garba, as Special Guest of Honour. It is also a delight to have the Honourable Central Regional Minister, Hon. Kweku Ricketts Hagan and a member of the Cape Coast Polytechnic Governing Council, Mrs. Marie-Acquiline Barton-Odro joining as for the Conference. Other guests of honour are the Guest Speaker Dr. Papa Kwesi Nduom, President of Group Nduom, Rectors of the Polytechnics in Ghana and Rectors of Sokoto and Kebbi Polytechnics in Nigeria. We shall listen to three high profile keynote speakers. They are: Prof. Dr. Ing. Emanuel A.M. Mjema of the College of Business Education, Dar es Salaam, Tanzania, Dr. Kwesi Aning of the Kofi Annan International Peacekeeping Training Centre, Ghana and Prof. Olivia A. T. Frimpong Kwapong, University of Ghana. The Chairman for the opening ceremony is Professor Joseph N. Mojekwu (University of Lagos, Nigeria).

Distinguished ladies and gentlemen, we appreciate your taking time off your busy schedules to be with us.

I also wish to express my gratitude to all the Scientific and Review Committee members who spent their time and effort to assist in the review of the papers. The Conference Secretariat and the Local Organizing Committee are to be commended highly for their efforts.

Enjoy your stay in Cape Coast. May we have a successful Conference and a safe journey back home.

Prof. Lawrence Atepor
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We wish to thank the following people who carried out the review of abstracts and papers for the ARCA 2016 edition in addition to the members of our Scientific Committee.

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Thank you very much for your time and effort.



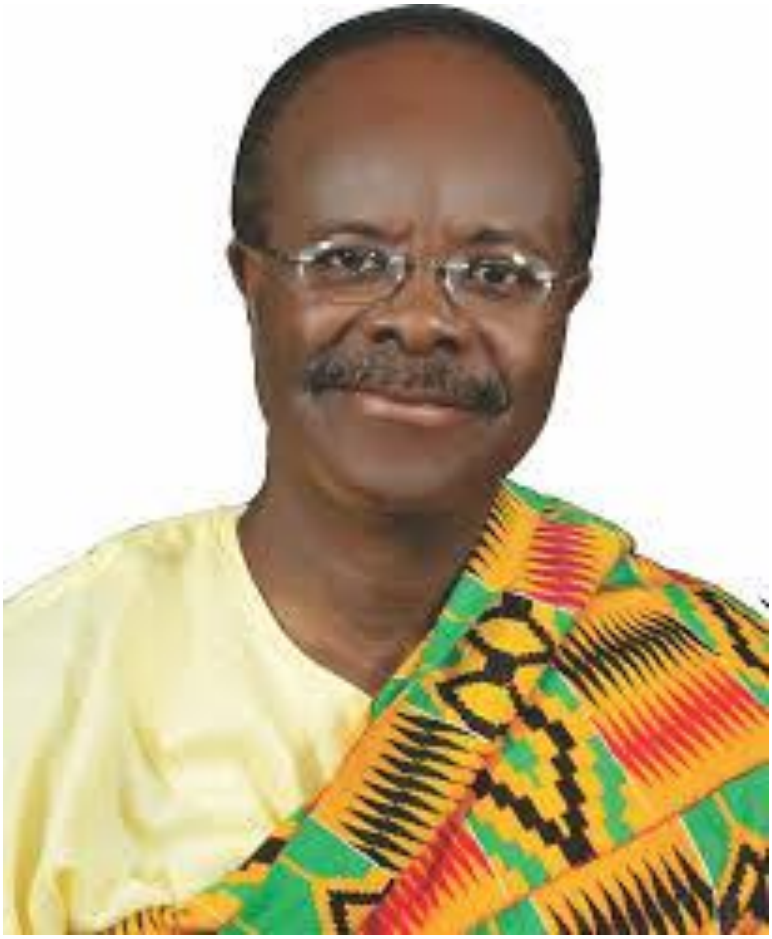
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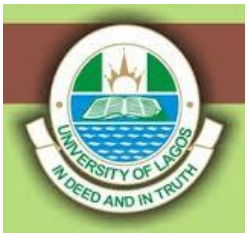





























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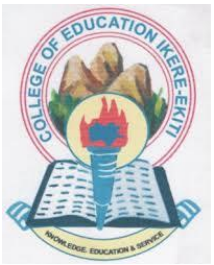
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PROFILE OF PROFESSOR BASHIR GARBA
SECRETARY TO THE SOKOTO STATE GOVERNMENT (SSG)



Prof. Bashir Garba was born on 6th June, 1966 at Minanata Area, Sokoto, Nigeria. He began his educational career at Magajin Rafi Primary School, Sokoto in 1973, which he completed in 1979. From 1979 to 1984 he was at Government Secondary Technical School, T/Mafara for his Secondary School Education. He completed his studies with amazing excellent results and proceeded to University of Sokoto, where he obtained his B.Sc. (Hons) Degree in Applied Chemistry in 1988.

His yearning for education spurred him to immediately get admission for postgraduate Studies at the University of Jos where he obtained Masters Degree in Applied Organic Chemistry in January, 1994. He also obtained Ph.D. in Applied Chemistry at Usmanu Danfodiyo University in November 1998. Other academic qualifications he obtained include; Postgraduate Diploma in Management (PGDM) in May, 2000, Advanced Certificate in Desktop Publishing (ACDP), April, 2008 and Postgraduate Diploma in Education (PGDE) in 2003. In 2002, he became Professor of Renewable Energy. He is arguably the youngest Professor in that field to have hailed from Northern Nigeria.

Bashir Garba also attended various short courses abroad which include: International Course on Cost Effective Planning and Design for Small Hydro Power project at Alternate Hydro Energy Centre, Indian Institute of Technology, University of Roorkee, India, from 1st to 14th February 2002, Training on Renewable Energy sponsored by Chinese Government from 21st October to November 4, 2009 in Beijing, China, International Higher Education Executive Training Programme, 15th – 20th June, 2015 at University of Houston, Texas, Unietd States. He had at many times represented the country either as Member or Head of Delegation outside the country .

He began his working career as Graduate Assistant at Usmanu Danfodiyo University, Sokoto in 1989 and served diligently for one year before he was upgraded to Assistant Research Fellow in 1990, a position he held for three years. He rose through the ranks of Research Fellow II, Research Fellow I and Senior Research Fellow between 1993 and 2002. Having successfully satisfied all the requirements for promotion, the Senate of the University approved the promotion of Bashir Garba as Professor of Renewable Energy in October 2002.

He held numerous academic and administrative responsibilities and has published 4 books and published about 100 articles in journals within and outside the country. He has also

presented numerous Conference/Workshop Papers. Prof. Garba is a member of various professional bodies which include the following:-

Fellow, Chemical Society of Nigeria (FCSN), Fellow Institute of Chartered Chemists of Nigeria (FICCON), Fellow, Solar Energy Society of Nigeria (FSESN), Fellow Institute of Industrialist and Corporate Administrators (FIICA), Fellow Institute of Classical Entrepreneurship Nigeria (FICEN), Chartered Chemist and Member Royal Society of Chemistry, England and Graduate Member, Royal Society Chemistry (GRSC) England, Member New York Academy of Science. He was visiting Professor to many Universities across Nigeria and has travelled very wide across the globe. He had also supervised more than forty (40) postgraduate programmes (M.Sc. and PhD) to successful completion.

In the course of his meritorious years in service, Prof. Garba was appointed Director, Sokoto Energy Research Centre, Usmanu Danfodiyo University Sokoto, and was later appointed Director Energy Management Training and Manpower Development, Energy Commission of Nigeria, Abuja, from April 2006 to March 2010. He served in various capacities as Chairman, Co-chairman or Member of a number of Committees.
It was in consideration of his sterling qualities and pedigree as a Scientist of repute that the Sokoto State Government appointed prof. Bashir Garba as Rector of the State Polytechnic on 31st August, 2012. While in office as Rector, Prof. Bashir brought in a lot of developments in the Polytechnic through TETFUND intervention in both human resources and provision of infrastructure.
In September 2015, Prof. Bashir's record of service was forever changed when he was appointed Secretary to the Sokoto State Government (SSG) by Rt. Hon. Aminu Waziri Tambuwal, CFR (Mutawallen Sokoto), Governor of Sokoto State. He is now to assist the Governor with quality advice and services that will improve the quality of lives of the good people of Sokoto State, Nigeria.

An academician, a technocrat, a humble and dedicated Public Servant, a gentleman par excellence, a dependable and loyal partner, a philanthropist of repute, Prof. Bashir is a recipient of many awards and certificates merit from a number of Organisation some of which are the prestigious National Honours Award of Member of the Order of Federal Republic (MFR) conferred to him by the former President, Dr. Goodluck Eebele Jonathan, GCFR on 14th November, 2011, he also appeared in the 16th edition of Marquis' Who is who in the world (Science and Engineering), in 1998, he was nominated International Man of the Year 2000 by International Biographical Centre, Cambridge, United Kingdom, Meritorious Diamond Award for National Development by Corporate and Media Africa Communication on 24th September 2005.

He was also honoured with the traditional title of **TAFIDAN MINANATA** by Ardon Minanata, Sokoto, in July, 2010 in recognition of his contributions to the development of that community.
Prof. Bashiru Garba, **MFR** is happily married with children.

PROFILE OF PROFESSOR MOJEKWU, JOSEPH NNAMDI
CHAIRMAN ARCA SCIENTIFIC COMMITTEE



Born on 23rdJune, 1960, to the family of Mr. and Mrs. Benjamin Dibiaezue Mojekwu and the 5th child among his other seven siblings, Professor Nnamdi Joseph Mojekwu began his quest for western education at St. Andrew's Primary School, formerly Awor Community Primary School. Thereafter, he moved to Enugu to join his elder brother where he eventually completed his primary education at Christ Church Primary School at Uwani, Enugu. He proceeded to the Government Trade Centre, Enugu, where he was awarded the City and Guilds (Intermediate) Certificate and the Federal Trade Test, Grade II in 1974. He also obtained the West African School Certificate (WASC) with a Grade I in 1976 from the Oriafite Secondary School in Anambra State.

Having been awarded a special scholarship for science students from the Anambra State Government, after his post secondary education, the intellectually promising Mojekwu proceeded to the University of Ife, Ile-Ife (now Obafemi Awolowo University) where he obtained a Bachelor of Science Degree in Statistics in 1981 graduating with a Second Class honours. In 1986, He obtained a Master of Science Degree in Statistics and a Master of Business Administration (MBA) in 1996 from the University of Lagos.

This thorough bred Professor also holds a Master of Arts Degree in Population Studies from the University of Ghana, Legon-Accra which he obtained in 1988, having been given a United Nations Scholarship in 1988. Because of his love for Education, Professor Mojekwu went on to obtain a Doctorate Degree in Social statistics at the University of Agriculture, Abeokuta (now Federal University of Agriculture, Abeokuta).

The erudite scholar's vast years of experience as a teacher can be traced back to 1981 when he observed the compulsory one year National Youth Service Corps Scheme, teaching Business Statistics, Mathematics and Social Statistics at the Rivers State University of Science and Technology, Port Harcourt.Thereafter, he worked for a year under the Anambra State School Management Board as an Education Officer VIII, teaching Mathematics, General Science and Further Mathematics at Agulu Boys Secondary School, Anambra State (1982-1983). From there, he moved to the Federal Office of Statistics in Lagos where he was a Statistician I until 1990 (7years) before gaining employment at the Federal Polytechnic, Ilaro, where he was a Senior Lecturer / Head of the Mathematical Unit, teaching Business Statistics from 1990-1995. He joined the services of the University of Lagos as Lecturer II and steadily rose through the ranks to Lecturer I in 1998, Senior Lecturer in 2005, Associate Professor in 2011 and Professor in 2012.

He had his Inaugural Lecture at the University of Lagos, Akoka, Yaba, Lagos in 2015 it was on the theme **"**Data Sufficiency: Solution to complexity of Society."
This versatile don has served the university in several capacities. To mention just a few: member of the University of Lagos Senate (2004-2006), Acting Head, Department of Actuarial Science and Insurance, Faculty of Business Administration (2006-2007) & (2008-2009) Academic Sessions; Member of the Board of School of Postgraduate Studies, 2008/ 2009 Academic Session and from the 2010/2011 -2011/2012 Academic Sessions, he Co-ordinated the Actuarial Unit in the Department of Actuarial Science and Insurance; he was also, in that session, a member of the Faculty of Pharmacy Students/Academic/Examination Misconduct Panel and, in 2009/2010, was the Assistant Co-co-coordinator of the MBA Programme in the Faculty of Business Administration. Examination Officer, Faculty of Business Administration, 1998/1999, 1999/2000 and 2000/2001 sessions.

Professor Joseph Nnamdi Mojekwu observed his sabbatical leave at the Redeemers University, Mowe, from March I, 2010 –February 28th 2011. He served as an Examiner and Consultant to the following Professional Bodies: Advertising Practitioners Council of Nigeria (APCON) from 1994 to date, Institute of Chartered Accountants of Nigeria (1995); National Institute of Marketing of Nigeria (1996 to date), Chartered Institute of Personnel Management (2002) and the Chartered Institute of Bankers of Nigeria (2013 to date).

He has also served as External Examiner to several institutions, including Department of General studies, Federal Polytechnic, Ilaro (2005/2006)and 2009/2007) Academic Sessions); Department of Statistics, Yaba College of Technology, Yaba (2008/2009) and 2009/2010 Academic Sessions and Department of Insurance, Lagos State University, Ojo (2007/2008 and 2008/2009 Academic Sessions)

He has supervised over 85 master students and two PhD. Students.

Outside the University of Lagos, this distinguished Professor has served as Research Executive on the Panel established by the Federal Government of Nigeria on the Restructuring of the Central Bank of Nigeria (Okigbo Panel, 1993); Consultant to the United Nation (2006) on the survey conducted on Small Scale Industries at the Computer Village, Ikeja, Lagos. Internationally, he was a visiting Lecturer in the University for Development Studies, Tamale, Ghana, under the Association of African Universities Exchange Programme (2004 /2005, 2007/2008 and 2008/2009 Academic Session)

He is also an External Examiner to the department of Actuarial Science and Demography at the University of Energy and Natural Resources, Ghana. Professor J.N. Mojekwu designed the Synopsis for the establishment of the Department of Actuarial Science at the University for Development Studies, Tamale, Ghana.

Professional Bodies:

1. Member Nigerian Statistical Association (NSA).
2. Member Academy of Management of Nigeria.
3. Fellow Royal Statistical Society, United Kingdom.
4. Chartered Statistician (CStat), United Kingdom.
5. Senior Associate Member Risk Managers Association of Nigeria (RIMAN)

Professor Mojekwu, who is widely published in books, articles and monographs in learned Journals, has delivered a number of conference papers, and attended several local and international workshops, conferences and several seminars. Currently, he is working on two research projects namely: "The Study of Maternal Mortality Data: A Study of Lagos state and "Actuarial Analysis of Patterns and Causes of Deaths among Lagosians".

The true son of Oraifite in Anambra State has served as the Financial Secretary and Auditor of the Lagos Branch of the Oriafite Improvement Union and Ifite-Oriafite Progressive Union, respectively. In January2013, Professor Mojekwu was honoured with the title of the "Ochendo of APU" by his age grade. Also, he was honoured by his village in recognition of his philanthropic activities in Awor Community in December, 2013.

Being a man of action and prowess, Professor Mojekwu is a promoter of education and mentoring at the grassroots. His commitment to this cause was brought to the fore when he chaired the "Ifite-Must-Go-To–School Movement." He also initated the "Awor Community Primary Schools Awards",known as the Professor J.N. Mojekwu Prize, which is given annually to promote the development of education at the grass-roots level in his hometown, the Awor Community.

Recently, in Honour of Professor Mojekwu, a house, in one of the schools in his village, was named after him as "Professor Joseph Nnamdi Mojekwu House".

Professor Mojekwu is blessed in marriage with his amiable wife, Madam Christy Nkiru Chinyere and three lovely children.

PROFILE OF PROFESSOR LAWRENCE ATEPOR
CHAIRMAN ARCA LOCAL ORGANISING COMMITTEE



Prof. Lawrence Atepor was born to the late Mr. Bonaventure Kwame Aklamanu Atepor and Mrs. Eugenia Ama Atepor of Sovie, in the Volta Region of Ghana.

Prof. Atepor attended Opoku Ware Secondary School (now Opoku Ware Senior High School), Kumasi, where he obtained his Ordinary and Advanced level certificates.

He undertook his compulsory National Service after Sixth form from 1983-1984 at the Soil Research Institute, Kumasi as a Laboratory Technician. After spending a year (that is, 1984 to 1985) at the University of Ghana, Legon, he left for the USSR to pursue a programme leading to the award of a Master of Science (M.Sc) degree in Mechanical Engineering (Machinery Option) at the Tashkent Institute of Engineers of Irrigation and Agricultural Mechanization.

Prof. Atepor returned to Ghana, and from 1993 to 1995 he did his National Service at the Public Works Department (PWD), Ho, in the Volta Region of Ghana where he served as the Regional Mechanical Engineer; and as substantive Mechanical Engineer at the same office (PWD) from 1995 to 1997.

He joined the service of the Cape Coast Polytechnic in 1997 as a Lecturer in the Department of Mechanical Engineering. By dint of hard work, he was appointed to Head the Mechanical Engineering Department. He served as the Dean of School of Engineering from 2003 to 2005 and as a member of the Governing Council of the Polytechnic. He served a full term of three years on the Council where he worked with others to provide leadership to the Polytechnic in its search for excellence. He also lectured at Kwame Nkrumah University of Science and Technology (KNUST) and University of Cape Coast (UCC) for several years.

In 2009, Prof. Atepor was awarded a Doctor of Philosophy (PhD) degree in Mechanical Engineering from the University of Glasgow, United Kingdom, the first ever Mechanical Engineering Department in the United Kingdom, where he did extensive work on vibration control in rotating machines and structures. He showed that it was possible to reduce vibration by using smart materials like Shape Memory Alloys and Piezoelectric materials.

He became a Senior Lecturer in 2009 and an Associate Professor in 2013.

Prof. Atepor also holds other professional qualifications. These include: Member of the American Society of Mechanical Engineers (MASME); Member of the Ghana Institution of Engineers (MGhiE); Associate Member of IMechE and CEng, AMIMECHE and Member of the Institute of International Education, America (MIIE).

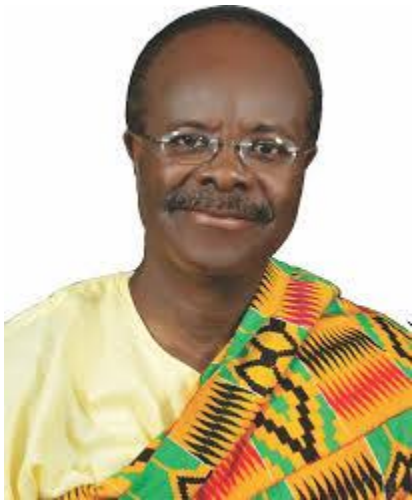
Professor Atepor is a distinguished researcher. He has many Peer- Reviewed Journal articles, Refereed Conference publications and (1) Book to his credit. He is a member of the Governing Council of the Ghana Institution of Engineers and editor of many international scientific journals.

He has attended many national and international conferences and workshops. Professor Atepor delivered the first ever Convocation lecture at the Polytechnic of Sokoto State, Nigeria, at which event he was also appointed Fellow of the Polytechnic of Sokoto State. As a result of his passion for Technical and Vocational Education and Training (TVET) Professor Atepor has spoken on many platforms as guest speaker, both within Ghana and internationally.

He has supervised many students' research projects. Currently, despite his heavy work schedule, he is supervising three (3) PhD students from the University of Johannesburg, South Africa.

Professor Atepor is the first staff of Cape Coast Polytechnic to occupy the High office of the Rector. At a personal level, he is soft spoken and has excellent human relations. He is a committed Christian, a brilliant scholar, an outstanding intellectual, accomplished administrator, prolific author, a man of great ideas and inventions as well as a distinguished man of exemplary character. Prof. Atepor is married to Mrs. Josephine Happy Atepor and they are blessed with three children.

PROFILE OF DR. PAPA KWESI NDUOM
PRESIDENT GROUP NDUOM



Dr. Paa Kwasi Nduom was born in Elmina on Sunday, February 15, 1953. He was given the name Papa Kwesi Nduom by his parents, Mr. Joseph Hubster Yorke and Mrs Monica Yorke. Dr. Nduom was also named Joseph Hubster Yorke Jr. by his parents.

Papa Nduom is a well-known name in the Yorke family. The Yorke family can be found in many towns and villages in Ghana particularly in Elmina, Tarkwa and Gomoa Dago. Mr. Samuel Yorke the grandfather of Dr. Nduom was instrumental in laying the foundation for what has become St. Augustine's College at Cape Coast in the Central Region of Ghana.

Dr. Nduom's mother is one of the Mensah-Brown brothers and sisters from Elmina.
Dr. Nduom's grandfather's annual family gatherings that took place in Tarkwa when he was alive, was instrumental in building a foundation for the extended family interaction, community spirit and caring that he exhibits currently.

Dr. Nduom attended the St. Joseph's Catholic Boys School in Elmina and the St. Augustine's Practice School in Cape Coast. In 1966, he entered St. Augustine's College, Cape Coast. In 1970, he won an American Field Service scholarship and spent one year with an American family in Cokato, Minnesota. He obtained a high school diploma from Cokato High School. While in Cokato, he participated in debate, American football, athletics and soccer. He credits the year he spent in Cokato with teaching him the necessity of strong family values.

He returned to St. Augustine's to complete Sixth Form education from 1971 to 1973. In Sixth Form, he won the prize as the best - student. st Augustereo Economics and motivated his interest in economics, business and professionalism. It is during the Sixth Form period that his interest in democracy was awakened by a new arrangement for students to vote for their prefects. Dr. Nduom campaigned hard and was elected the School's Protocol Prefect for the 1972-73 academic year.

Dr. Nduom returned to the USA in August, 1973. He worked his way through the Milwaukee Area Technical College, Marquette University and ended up at the University of Wisconsin where he obtained a BA degree in Economics in December, 1975. He obtained an MS in Management from the School of Business and a Ph.D. in Service Delivery Systems (USI

Program) all from the University of Wisconsin. Dr. Nduom's university education was self-funded through jobs in a meat factory, a parking lot, a cannery and an internship with Northwestern Mutual Life Insurance Company, all in Milwaukee, Wisconsin.

Dr. Nduom's active role in politics began in 1997 when he was elected as a member of the Komenda-Edina-Eguafo-Abirem District Assembly for the Akotobinsin Electoral Area. In December 2000, he contested the Ghanaian parliamentary elections for the Komenda-Edina Eguafo-Abirem constituency on the ticket of the Convention People's Party (CPP). He lost to the incumbent Member of Parliament, Ato Quarshie of the National Democratic Congress by a margin of 2.6% of the valid votes cast. He was later appointed by President John Kufuor as the Minister for Energy. He also served during this period as the Chairman of the National Development Planning Commission.

In 2004, he contested once again for the Komenda-Edina-Eguafo-Abirem parliamentary seat and won with 33.6% of the valid votes cast. At the time, he served as the chairman of the Organizing Committee of the CPP. Early in President Kufuor's second term of office, Nduom became the Minister for Public Sector Reform. He is the flag bearer of the Progressive People's Party (PPP).

Dr. Nduom has created 65 businesses around the world, with the bulk of it operating in Ghana. His businesses fall mostly in the banking/finance, hospitality and media categories. He recently acquired a bank, ISF Bank, in the USA.

PROFILE OF PROFESSOR ING. EMANUEL A.M. MJEMA RECTOR OF THE COLLEGE OF BUSINESS EDUCATION (CBE) DAR ES SALAAM, TANZANIA

Prof. Ing. Emanuel A.M. Mjema is currently the Rector of the College of Business Education (CBE) since February 2013. Before becoming the Rector of CBE Prof. Mjema was employed by the University of Dar es Salaam since 1987, where he started as a Tutorial Assistant then went up the ladder of academic ranks up to the position of Associate Professor in 2005.

Prof. Mjema completed Bachelor degree at the University of Dar es Salaam, Tanzania specialising in Mechanical Engineering, Master degree from the University of Alberta, Canada majoring in Management and Doctorate degree from the University of Technology Aachen, Germany majoring in Information Technology and Computer Simulation. Prof. Mjema attended a special training programme on Innovation and Competitiveness at Harvard Business School in Boston, MA.

Prof. Mjema has published 1 Book, 29 Journal Papers in International and Tanzania Journals and 16 conference papers. He has also supervised successfully 42 Masters' Degree students and 10 PhDs. Prof. Mjema also has successfully conducted 78 consultancy assignments.

Prof. Mjema started the Industrial Engineering degree program when he was the head of department of Engineering Management and Entrepreneurship at the University of Dar es Salaam. Also he introduced three specialisations of Masters of Engineering Management at the University of Dar es Salaam at the same department.

During his tenure as the Manager of UCB, the Bureau worn a number of major consultancies such as "Developing Verifiable Performance Indicators (VPIs) for the Bank of Tanzania (BoT)"; Evaluation of TISCAN Performance under Destination Inspection Contract and TRA Preparedness to Assume their Operations" as well as "Mid-Term Review of ANGAZA ZAIDI Programme". During Prof. Mjema tenure, the income of UCB shot up to almost TZS 2billion per year from the income of around 200 million when he took over the Bureau.
He is married with three children.

PROFILE OF DR. EMMANUEL KWESI ANING (DIRECTOR, FACULTY OF ACADEMIC AFFAIRS AND RESEARCH KOFI ANNAN INTERNATIONAL PEACEKEEPING AND TRAINING CENTRE)

Dr Emmanuel Kwesi Aning was born on 22nd April, 1962. He attended the University of Ghana and completed with a Bachelor of Arts (BA) Honors Degree in 1986. He proceeded to the University of Copenhagen, Denmark for a Master of Philosophy in the 1990. He completed a Doctor of Philosophy (Ph.D.) at the same university in 1998.

Dr Aning has worked with a number of institutions prior to joining the KAIPTC and these have included: The Governance Unit, Institute of Economic Affairs, Accra, Ghana where he was Director from 15 July 2000 - 30 June 2001; African Union Commission, Addis Ababa, Ethiopia as an Expert on Common African Defence and Security Policy & Counter-terrorism from 4 July 2005 – 2007; Center for Security Studies, Accra, Ghana as Senior Fellow from January 2005 – June 2005; Legon Centre for International Affairs, (LECIA), University of Ghana; and Research Director, African Security Dialogue and Research, Accra from 1 July 2001 – January 2005; Visiting Professor, European Peace University, Stadtschleining, Austria from May – June 2003; Institute of Economic Affairs, Governance Unit, Accra, Ghana as Director from 15 July 2000 – 30 June 2001

Dr Kwesi Aning's rich experience in security issues has been tapped by a number of organizations including the United Nations (UN), African Union (AU),and Economic Community of West Africa States (ECOWAS) where he has held the following Non Academic Positions: Member, Senior Advisory Panel on Haiti and Liberia, UN, January-February 2010; Leader, Foreign and Commonwealth Office (FCO-UK) team to suggest restructuring of the Conflict Management Division of the Peace and Security Directorate, African Union, October 2008; Senior Consultant to the Under-Secretary General of the UN Department of Political Affairs, UN Secretariat, NY on drafting a Report of the Secretary-General on the relationship between the United Nations and regional organizations, in particular the African Union, in the maintenance of international peace and security. August – December 2007

Dr Aning has also been an Associate Professor in International Politics for a number of institutions in Denmark, UK, and Nigeria and has taught with the following Universities: Legon Centre for International Affairs (LECIA), Accra, Ghana; Ghana Armed Forces Command and Staff College (GAFCSC), Teshie, Accra; Institute of Political Science, University of Copenhagen, Denmark; Aarhus University, Denmark.

Dr. Aning, who has written numerous dissertation and books, monograph and articles in several journals, has also contributed to numerous chapters in a number of books.

He is currently a member of the Economic Forum's Council on Conflict Resolution. He is married and has two children.

PROFILE OF PROFESSOR CLINTON AIGBAVBOA



Dr Clinton Aigbavboa holds a Master's degree in Construction Management and a PhD degree in Engineering Management respectively. He also holds a certificate in Good governance in Africa from the Thabo Mbeki Africa Leadership Institute in the University of South Africa (UNISA).

His field of expertise and research specialisation is sustainable human development, with the focus on: sustainable housing regeneration (urban renewal and informal housing), Life Cycle Assessment in the Construction Industry, leadership in low-income housing, post occupancy evaluation and green job creation.

His research draws concurrently and is applicable to construction industry development via the development of emerging contractors, the economics of infrastructure development, and the adaptation of building information modelling as a solution to the eradication/minimisation of urban and rural housing shortages. During the past five years, he has authored/co-authored more than 10 accredited journal articles, 110 peer-conference papers and 3 book chapters in the specialised area as stated above.

Also, he facilitates an academic excellent/development programme to high schools in Krugersdorp-West Rand, through an NGO based in Krugersdorp. He is actively involved in postgraduate (BTech, Masters and Doctoral) students' supervision. He has supervised/co-supervised 8 Master's students to completion. Currently, he is supervising/co-supervising 14 doctoral students and 19 Master's students.

He is currently the editor of the Journal of Construction Project Management and Innovation, accredited by the South Africa Department of Higher Education and Training. He is a member of the Chartered Institute of Building, Member, association of Quantity Surveyors, South Africa.

ACHIEVING SUSTAINABLE DEVELOPMENT GOALS (SDGS) IN AFRICA THROUGH APPLIED RESEARCH

Prof. Bashir Garba, Mfr

Secretary to the State Government, Sokoto State, Nigeria

PREAMBLE

I am delighted to be at this important Annual Applied Research Conference in Africa and to make this keynote address on Sustainable Development. The theme for this year's annual Conference, "Achieving Sustainable Development Goals in Africa through Applied Research" is very appropriate in view of the recent global concern on sustainable development.

I wish therefore to start by expressing my profound gratitude to the organisers for giving me the opportunity to prepare and deliver this keynote address.

Distinguished participants, ladies and gentlemen. It is generally believed that, the global political and socio-economic landscape is experiencing rapid changes.

There is no doubt, we are living in an age in which the power of research results becomes evident every day. Globalisation is creating considerable opportunities and challenges. Its impact on national economies is driven by significant progress in applied research and development initiatives as exemplified by a plethora of breakthroughs in biotechnology, space research, and energy development among others.

Thus, applied research plays a fundamental role in sustainable development such as in wealth creation, improvement in the quality of life and real economic growth and transformation in our society. It is through research and development that we can harness the forces of nature and to transform the raw resources with which nature endows mankind into goods and services for better quality of life.

In fact, the wealth, influence and power in the world political scene of any nation depend largely in her capacity and capability to utilise its Applied Research results for socio-economic benefits. Advances in Applied Researches can help to diversify the economy, by improving productivity in sectors like Agriculture.

[1]bgarba2002@gmail.com

Bashir, G.(2016) Achieving Sustainable Development Goals (SDGs) In Africa Through Applied Research In: Mojekwu, J.N., Nani G., Atepor, L., Oppong, R.A.., Adetunji, M. O., Ogunsumi, L., Tetteh, U.S., Awere E., Ocran, S. P., and Bamfo-Agyei, E. (Eds) Procs 5th Applied Research Conference in Africa. (ARCA) Conference, 25-27 August 2016, Cape Coast, Ghana. 1-7

It is in view of this and in line with our various national policy on research and development that I considered the theme for this year's conference as apt and in line with Africa's interest to develop and commercialise Research and Development Results, especially through emphasis on sustainable development and self-reliance.
The performances of Applied Research results have in the recent times became topical issues. Various stakeholders have called for concerted efforts for repositioning of the economy with clearly defined roles for R & D.
While government and its agencies ensure the establishment of an enabling environment and creation of the constitutional framework to stimulate investment in R & D, the private sector also plays the pivotal role of identifying and nurturing investment in R & D which will eventually create the much needed employment and wealth for sustainable development.

Sustainable Development Targets/Goals

The concept of sustainable development has evolved as a result of some decades of debate on the International scene as to how the earth's resources should be managed. This is in recognition of the fact that no sustainable development could be achieved without coherent Applied Research output/activities.
The World Commission on Environment and Development (WCED) provided the baseline conceptualisation of sustainable development. In 1992, world leaders under the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro provided a framework for actions needed to make transition towards sustainable development.

A decade later, the global community embarked on another global effort to rekindle interest and commitment to the implementation of sustainable goals through the World Summit on sustainable development in Johannesburg in 2002.

In the United Nations Millennium Declaration, world leaders committed themselves to achieving a broad-range of time-bound (2000 – 2015) international development objectives for which sustainable development provides a unifying framework "Millennium Development Goals, the MDGs. However, there is general agreement that progress towards sustainability has been slow. The MDGs are no doubt of the social sustainability approach. Sustainable development has become part of the lexicon of modern policy making.

Unfortunately, no matter how we look at sustainable development in this continent of ours, it remains clear that we have not done much. Many of the African countries started funding the MDGs five years late or even more. The MDGs target have been attained without achieving much in the African continent and this led to the introduction of Sustainable Development Goals (SDG).

[1]bgarba2002@gmail.com

Impacts of Applied Researches

Industrialisation

The Economic development of a nation is tied to its industrial development, which in turn is a product of applied research and technological development. This under-spins, the importance of empirical research in science and technology to national development.

In this regard, Governments should be responsible in making applied research the engine of growth in every aspect of development. Our various governments should provide policy guidelines and strategies for research that are sustainable. The Government is also responsible for establishing Research Institutes so as to enhance the development of indigenous technology, private skills acquisition, information technology, human resources development, decentralise science and technology activities to grassroots.

Industrialisation involves extensive technology-based development of the productive system of an economy. Industrial development, therefore, represents a deliberate and sustained application and combination of suitable technology, management techniques and other resources to move an economy from the traditional low level of production to a more automated and efficient system of mass production of goods and services. Rapid industrial development has become the main focus of economic development because of its potential benefits.

Industrialisation tends to propel economic growth and quicken the achievement of structural transformation and diversification of economies. It enables a country to utilise fully its sector endowments and to depend less on the external sector for its growth and sustenance. Through industrial development, an economy gains the versatility and resilience that enables it to raise the standard of living of its people and cope better with internal stress and constrains.

Before our various nations independence, our economies were mainly agrarian, both in production for domestic consumption and exports. Industrialisation was not part of the colonial economic policy, which was anchored on making the colonies producers of primary raw materials for foreign industries and importers of manufactured goods. Therefore, the task of the first indigenous administration set for itself on attaining political independence was the transformation of the continent into a modern industrial economy. The post-independence governments of various African States embrace this same aspiration.

However, from Independence to date, there is no significant improvement in Africa's industrial sector largely due to poor energy supply.

[1]bgarba2002@gmail.com

Energy

Energy is an important factor to the economic and social development of any nation. It plays a major role in reducing poverty, improving productivity and enhancing the general quality of lives of the people. Today, approximately a large percentage of Africans lack access to modern energy services.

The per capita electricity consumption of most African nations particularly West Africa is very low. In some cases 4 times less than the African average and about 19 times less than the world's average. None of the Sustainable Development Goals (SDGs) and other development targets can be met without major improvement in the quality of energy services.

Continent/Country	Per Capita Electricity Consumption (kWh/capita)
World (Average)	2,596
Africa (Average)	563
Nigeria	157
Kenya	144
Senegal	152
Ghana	271
Gabon	932
Egypt	1,226
Libya	3,336
South Africa	4,848

Access to energy has been identified as major challenges and appears to be a consensus that "provision of affordable reliable, and socially acceptable energy services is pre-requisite for achieving the United Nations Millennium Development Goals (MDGs), now known as SDG's.

A pressing concern is that some two Billion people, mostly in rural areas of developing countries like Africans, do not have access to affordable modern energy services that could help them break out of cycles of poverty, ill-health and deprivation. It would be an enormous mistake, on moral, political and economic grounds to ignore the plight of this deprived segment of humanity.

In order to ensure sustainability in the rural and semi-urban areas of African nations, energy access needs to be enhanced through the utilisation of renewable sources of energy (essentially Biomass, Solar, Wind, Small and Micro Hydro), taking into account the development priorities of the Governments and suitability of different energy sources for different applications. It is also likely that such energy systems, based on decentralised and cleaner energy, are better suited to meet the needs of the rural poor.

[1]bgarba2002@gmail.com

While promoting renewable energies, energy efficiency should not be forgotten. Efficient use of energy in general and that of RE in particular, help to generate income and make renewable energies affordable and sustainable. These alternatives energy are no doubt the products of applied research being conducted worldwide.

Thus, Electricity is required for such basic developmental services as pipe-borne water, healthcare, telecommunications and quality education. The poverty eradication and UBE programmes require energy for success and RE is capable of providing.

The absence of reliable energy supply has not only left the rural populace socially backward but has left their economic potentials untapped. For instance, in rural communities small business outfits like barbing saloon, tailoring and provision stores are closed up by sunset because of absence of electricity.

Agriculture

The spectre of hunger, poverty and malnutrition continues to stare at mankind. It represents a multi-disciplinary challenge of no small magnitude and therefore requires a multi-disciplinary approach to find a solution. Applied Researches have been able to make meaningful contributions to socio-economic development only when they have acted in an interdisciplinary manner to solve the problems.

Despite the emphasis on raising agricultural production, shortages of food continue, showing that such efforts must in future follow a different course. In addition, much greater efforts are needed on the next phase that of post-harvest conservation and processing which applied research is capable of providing.

Health Sector

Applied Research is responsible for the future of our continent. We should therefore all fight for the maintenance and improvement of our research institutions for it is their existence that grants the development of products meeting the demands, especially of our most needy people. Applied research is responsible for a better quality of life, the advancements in medicine and public health have doubtlessly contributed to an increase in the life expectancy world over.

Environmental Sustainability

The major environmental problems related to human activities in the continent are mainly deforestation and pollution. These will result in negative impacts on the environment, such as soil erosion, desertification, loss of biodiversity, micro-climatic change and flooding. Most of

[1]bgarba2002@gmail.com

these impacts are already evident in different ecological zones in the continent, amounting to huge economic losses.
Pollution is one of the major environmental concern. Combustion of fossil fuels, especially in the transport and industrial sectors, contributes greatly to air pollution in our major cities. The combustion products (CO_2, NO_2 etc.) are greenhouse gases (GHG) and lead to global warming, with attendant negative consequences on agriculture, water supply, forest resources, sea level rise, health etc.

Applied Research will help us to understand our environment better and also to achieve sustainable environmental condition. Applied Research has enabled us to develop the technology of capturing emission gases (such as CO_2) and transporting them from emission points followed by storage in appropriate geological formations. This process will play a significant future role of climate change mitigation if the storage can last for hundred years. The captured gases can be injected into partially depleted or loss productive oil and gas reservoir to improve recovery.

ICT Sector
In furtherance to the various government support for applied research in Africa, Information and Communication Technology (ICT), which is a product of applied research is adopted by our respective governments' policies to all levels of education due to its prominent role in advancing knowledge and skills necessary for effective functioning in the modern world. Thus, government shall provide necessary infrastructure and training for the integration of ICT in the school system in recognition of the role of ICT in advancing knowledge ands skills in the modern world.

Conclusion
It is interesting to note that Applied Researches are globally recognised as critical in socio-economic development and for better well-being such that those nations where Applied Research are given top priority support are the ones making waves in all sectors of the economy.

Since provision of most goods and services depend largely on effective utilisation of the products of Applied Researches, the plain truth is that unless we are able to improve upon our capacity, capability and utilisation of applied research results, our hopes for industrialisation, technical and sustainable development are likely to remain just that hopes!

In a nutshell, developing countries like the African countries cannot prosper in an increasingly competitive global economy and open trading system if we do not fund and conduct applied researches to produce more value-added goods and services. I can therefore

[1]bgarba2002@gmail.com

confidently say that Applied Research is the dividing line between developed and developing nations.

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[1]bgarba2002@gmail.com

STRENGTHENING THE MEANS OF IMPLEMENTATION AND REVITALIZING THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT THROUGH APPLIED RESEARCH

Mjema, E. A.

College of Business Education, Dar es Salaam, Tanzania

1. INTRODUCTION

1.1 Background Information

The 2030 Agenda forms the new global development framework anchored around 17 Sustainable Development Goals (SDGs) with a total of 169 targets covering economic, social development, and environmental protection. The Poverty eradication is the overarching goal of the new agenda which is taking a far more ambitious approach than the Millennium Development Goals (MDGs) by promising to address the unfinished business of the MDGs and meet the growing challenges in the interlinked economic, social and environmental dimensions of sustainable development. The overall aim of the SDGs is to provide guidance and contribute effectively to transformative changes "in support of a rights-based, equitable and inclusive approach to sustainability at global, regional, national and local levels" (UNECA, AU, &AfDB, 2013). Poverty eradication is the greatest global challenge facing the world today and an indispensable requirement for sustainable development. Therefore, the SDGs should look into poverty eradication by emphasising on the changing of unsustainable patterns of consumption and production while promoting sustainable patterns and protecting and managing the natural resource base of economic and social development.

The consultations on the post-2015 development agenda for Africa were initiated by four institutions: the United Nations Economic Commission for Africa (UNECA), the Africa Union Commission (AUC), the African Development Bank (AfDB) and the United Nations Development Programme's Regional Bureau for Africa (UNDP/RBA) sanctioned by African governments during the AU Heads of State Summit in July 2012. The consultations led to the development of an "Outcome Document" that summarizes the African priorities for the post-2015 development agenda into five pillars: (i) structural economic transformation and inclusive growth; (ii) science, technology and innovation; (iii) people-centred development; (iv) environmental sustainability, natural resources management, and disaster risk management; and (v) finance and partnerships (UNECA, AU, AfDB, & UNDP, 2013).

The Goal no.17 of SDGs states "Strengthen the means of implementation and revitalize the global partnership for sustainable development". The universal nature of the agenda provides an opportunity for engagement and a new type of partnership to address the global challenges. In particular, Africa can take advantage of this universality of the 2030 Agenda to create partnerships across the goals and ensure effective implementation. The African countries should look at new kinds of partnership that will enhance sustainable development. Therefore, in this keynote address, the author shall present means of implementation and revitalization of the global partnership for sustainable development.

Successful implementation of the 17 SDGs depends on a comprehensive funding framework that goes beyond official development assistance commitments, the emphasis here should be global partnership and not development assistance. Alongside the public and private funding, the political sphere will also be expected to make a greater contribution to achieving the goals in question. In July 2015, the international community agreed to a new framework for financing and implementing sustainable development known as the Addis Ababa Action Agenda (AAAA).

The Goal no. 17 calls on developed countries to renew their commitment to allocate 0.7% of their gross national income to official development assistance. It aims for a greater mobilisation of domestic resources to reduce dependence on foreign support, as well as enhanced international collaboration in science, technology and innovation, and the promotion of an equitable multilateral trading system. Goal 17 also advocates enhancing macroeconomic stability and policy coherence in the interests of sustainable development.

Therefore, the important elements of Goal 17 that shall be discussed in this paper include the recognition of multi-stakeholder partnerships as important vehicles for mobilizing and sharing knowledge, expertise, technologies; and financial resources to support the achievement of the sustainable development goals in all countries, particularly developing countries.

1.2 Objective

The main objective of this keynote paper is to present the ways and means for achieving the SDGs through applied research.

2. CONCEPTUALISATION OF SDGs

The Sustainable Development Goals (SDGs), also known as 2030 Agenda, is a plan of action for people, planet and prosperity that also seeks to strengthen universal peace in larger freedom. The SDGs came into effect on 1 January 2016 and it will guide the decisions making over the next fifteen years. The predecessor of SDGs (i.e. the MDGs), provided an important framework for development and significant progress has been made in a number of

areas. However, it was observed that the progress has been uneven, especially in Africa, in least developed countries, in landlocked developing countries, and in small-island developing States. It was also observed that some of the MDGs remained off-track, particularly those related to maternal, new-born and child health and to reproductive health. Therefore, it was necessary to come out with a new framework that goes beyond the MDGs, thus the new SDGs came into effect.The SDGs has 17 goals, which are enumerated as follows:

Goal 1: End poverty in all its forms everywhere

Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3: Ensure healthy lives and promote well-being for all at all ages

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5: Achieve gender equality and empower all women and girls

Goal 6: Ensure availability and sustainable management of water and sanitation for all

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10: Reduce inequality within and among countries

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12: Ensure sustainable consumption and production patterns

Goal 13: Take urgent action to combat climate change and its impacts*

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development

In this key note paper, the author shall concentrate on Goal number 17 to see how applied research could contribute to sustainable development. The paper shall dwell mainly on two aspects: a) recognition of multi-stakeholder partnerships as important vehicles for mobilizing and sharing knowledge, expertise, technologies; and b) the importance of applied research for the implementation and for the attainment of the targets for the SD goal number 17.

The Goal number 17 has 19 Targets, which are grouped into five categories: finance; technology; capacity building; trade; and systemic issues.Therefore, in this keynote address the author shall discuss the ways in which applied research can be used to attain the majority of19 targets. However, this does not mean that all of the 19 targets could be achieved through applied research, but the majority of them could be effectively being implemented through applied research.

3.0 SITUATIONAL ANALYSIS

Sustainable development has been defined in many ways, but the most frequently quoted definition is from the Brundtland Report[1]:"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". This definition contains within it two key concepts:

- the concept of **needs**, in particular the essential needs of the world's poor, to which overriding priority should be given; and
- the idea of **limitations** imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

The idea of a Commission on Sustainable Development (CSD) was first floated in the lead-up to the Rio Earth Summit in 1992. The CSD idea proposed to create a powerful body—on a par with the UN Security Council—that would defuse threats to sustainable development the way the Security Council tries to with threats to peace. However, there were no consensus supported that level of ambition, and the CSD was placed solidly under the UN Economic and Social Council (ECOSOC), the central UN platform for addressing the world's economic and social issues. This was a downgrading that virtually guaranteed its lack of effectiveness[2].

The Global Sustainable Development Report (GSDR) is a United Nations publication aiming to strengthen the science-policy interface at the High Level Political Forum (HLPF) on Sustainable Development, which replaced the Commission on Sustainable Development after Rio+20 as the main United Nations platform providing political leadership and guidance on sustainable development issues at the international level[3].The HLPF on Sustainable Development is United Nations central platform for the follow-up and review of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals, adopted at the United Nations Sustainable Development Summit on 25 September 2015[4].

[1] http://www.iisd.org/topic/sustainable-development
[2] Mark Halle (2016) found in http://www.iisd.org/blog/how-avoid-repeat-commission-sustainable-development
[3] https://sustainabledevelopment.un.org/globalsdreport
[4] https://sustainabledevelopment.un.org/index.php?menu=1556

One of the functions of HLPF as outlined in the Rio+20 outcome document[5], include the following: "strengthen the science-policy interface through review of documentation bringing together dispersed information and assessments, including in the form of a global sustainable development report, building on existing assessments". The GSDR will therefore adopt an assessment-of-assessments approach, documenting and describing the landscape of information on specific issues that are policy-relevant in field of sustainable development.

In September 2015, UN Member States adopted the 2030 Agenda for Sustainable Development, which gives the GSDR a role in the follow-up and review of the new Agenda[6], and released the document "Transforming our World: The 2030 Agenda for Sustainable Development". The 2030 Agenda announces a plan of action for the people, planet and prosperity. It highlights strengthening universal peace in larger freedom,and recognizes eradicating poverty in all its forms and dimensions (UN, 2015a).

The chapter on Means of Implementation (MoI) in the 2030 Agenda says it clearly that "…we recognize that we will not be able to achieve our ambitious Goals and targets without a revitalized and enhanced Global Partnership and comparably ambitious means of implementation. The revitalized Global Partnership will facilitate an intensive global engagement in support of implementation of all the Goals and targets …" Therefore, the international collaboration in applied research cannot be overemphasized as one of the important means of implementation of the SDGs.

The MoIfocuses on three interrelated issues of finance, technology and capacity development. It specifies the relationship between the Addis Ababa Action Agenda (AAAA) and the post-2015 development agenda. The MoI underlines that the AAAA's supports complements and helps contextualize the 2030 Agenda's MoI and targets. In addition to a stand-alone goal on the MoI for the 2030 Agenda, specific means are tailored to each of the goals[7]. Also the call for the establishments of a global infrastructure forum to bridge the infrastructure gap resonates with one Africa's priorities (UN, 2015b).

The Africa continent provided a Common African Position (CAP) regarding the agenda 2030. In fact, Africa is the only continent that has consistently provided a common position on issues addressed in key global summits and conferences. These common positions represented a shared African position in presenting the continent's ambitions and expectations and informed related debates at all levels, and, laid out the relevant issues for the Africa (AU, 2014).

[5] The Future we Want, found in https://sustainabledevelopment.un.org/futurewewant.html
[6] https://sustainabledevelopment.un.org/globalsdreport
[7] http://www.un.org/en/africa/osaa/peace/sdgs.shtml

The CAP called for an integrated, prosperous, and peaceful Africa, driven by and managed by its own citizens basing on six pillars for sustainable development (AU, 2014):

- Structural economic transformation and inclusive growth;
- Science, technology, and innovation;
- People-centred development;
- Environmental sustainability, natural resources management and disaster risk management;
- Peace and security; and
- Finance and partnerships.

The Common African Position (CAP) is articulated in depth in "Agenda 2063, the Africa we want" (AUC, 2014). The CAP model was successfully used in the preparatory process for Rio+20 whereby Africa adopted a "Consensus Statement" for the intergovernmental processes. The CAP recommended that the SDGs be coherent with integrated into the UN development agenda beyond 2015[8].

Using the six pillars the CAP addressed a wide range of economic, social, environmental and peace and security concerns challenged the international community to pursue a transformative agenda. The aim here was to ensure that the new global development agenda adequately reflect Africa's development priorities. Consequently, the CAP priorities, including structural economic transformation, people-centred development, environmental sustainability and peace and security are all reflected in the SDGs. Indeed, there is synergy between the SDGs and Africa's ambitious Agenda 2063.

The CAP also stressed the need for the post-2015 development agenda to reflect an appropriate balance of development outcomes and enablers, such as (ibid.):

- Institutional capacity development;
- Domestic resource mobilization;
- Participation and ownership at the community;
- Local and global levels;
- Social inclusiveness and equality;
- Governance and leadership;
- Peace and security;
- Regional integration and trade;and
- Infrastructure development and global cooperation and partnership.

[8]http://www.un.org/en/africa/osaa/peace/sdgs.shtml

4.0 APPLIED RESEARCH AS MEANS OF ACHIEVING SDG

4.1 APPLIED RESEARCH AS MEANS OF GETTING CORRECT DATA REGARDING POVERTY

The overarching goal of in SDGs is poverty eradication; however poverty cannot be eradicated without having proper data regarding poverty. The availability and access to high quality data regarding the extent of poverty, gravity of the problem as well as means for eradication of poverty are important in measuring and achieving the SDGs. Currently there are two big global challenges for the current state of data (IEAG, 2014):

- The challenge of invisibility (gaps in what is known from data, and when to find out); and
- The challenge of inequality (gaps between those who with and without information, and what they need to know make their own decisions).

Therefore, one of the means of implementation and revitalize the global partnership for sustainable development is through collaborative applied research. Through the international collaborative applied researches it will be possible to achieve the following (IAEG, 2014):

- Supporting the multi-stakeholder data collection initiatives, which are connected to the achievement of the SDGs;
- Building of a capacity of the local players to generate, share, and use available data at local levels;
- Contributing in filling the data gaps by using original data as well as new data in achieving SDGs;
- Developing and building support for international principles tying together the data, as well as sharing and leveraging the current privately held data; and
- Increasing international connectivity, collaboration, and innovation towards achieving and measuring the SDGs by organizing local, regional, and global data events.

Accordingly, by getting appropriate data, the applied research strategy will be achieving target number 18 of the SDG goal number 17, which states that, “By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts”. Applied research shall also help in attaining target 19 of the SDG goal number 17, which states that, “By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries”.

4.2 APPLIED RESEARCH AS ALTERNATIVE SOURCE OF FINANCING OF PROJECTS

International collaboration applied research can also become source of financing of project for eliminating poverty. It is agreed that the successful implementation of the 17 SDGs depends, to the large extent, on a comprehensive funding framework that goes beyond official development assistance commitments, the emphasis here should be global partnership and not development assistance. Therefore, global partnership should be in a form of international collaboration in applied researches that address directly the local needs. The funding could be given out in terms of contracted applied researches or action researches. Action research is either research initiated to solve an immediate problem or a reflective process of progressive problem solving led by individuals working with others in teams or as part of a "community of practice" to improve the way they address issues and solve problems.

Therefore, international collaboration applied researches could be used to attain target 3 (i.e. Mobilize additional financial resources for developing countries from multiple sources.) and target 5 (i.e. Adopt and implement investment promotion regimes for least developed countries) of Sustainable development goal number 17. Applied researches can be considered as an additional financial resource instead of using the traditional donor funding of projects.

4.3 APPLIED RESEARCH AS MEANS OF ENHANCING INTERNATIONAL COOPERATION IN SCIENCE, TECHNOLOGY AND INNOVATION

Regarding the technological issues, it is through international collaboration applied researches that target 6 (i.e. Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms), can be achieved. R&D institutions in the South should have a direct linkage to the R&D institutions in the North for improved access to science, technology and innovation. Similarly, the R&D institutions in the South should have collaboration among themselves to share knowledge and innovation. Faster technological developments can be achieved when there is international collaborations among the researchers.

Likewise, target 7 (i.e. Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed) can also be achieved through collaborative applied researches. Focused applied researches shall enhance the development, transfer, dissemination and diffusion of technologies that are appropriate for a particular environment. Local researchers will be in a better position to define the appropriate environmental sound technologies for their local situation rather than using researchers from abroad.

For target 8 (i.e. Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology), the best way to operationalize the technology bank and science, technology and innovation capacity building is through applied research. The applied research shall show appropriate way for least developed countries to use enabling technologies, especially in ICT.

4.4 APPLIED RESEARCH AS PART OF CAPACITY BUILDING

Capacity Building can be defined as (UNDP, 1991):

- the creation of an enabling environment with appropriate policy and legal frameworks (Institutional and legal framework development, making legal and regulatory changes to enable organizations, institutions and agencies at all levels and in all sectors to enhance their capacities);
- institutional development, including community participation (Organizational development, the elaboration of management structures, processes and procedures, not only within organizations but also the management of relationships between the different organizations and sectors – also women issues in particular);
- human resources development and strengthening of managerial systems (the process of equipping individuals with the understanding, skills and access to information, knowledge and training that enables them to perform effectively).

Therefore, from the definition of the capacity building and the target number of 9 of SDG 17 (i.e. Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular cooperation), it is clear that one of the means of capacity building is through applied research. International collaborations through applied research is the best way of implementing capacity building in developing countries by creating an enabling environment. Applied research shall help in creating appropriate policy and legal framework in the creation of enabling environment. The local researchers will be in a position to come out with appropriate solution relevant to the development of their countries, but at the same time increase their capacity to carry out researches for national developments.

In addition, the Member States of the UN committedthemselves in paragraph 109 b and 109 c of the 2030 Agenda document “to strengthen their national institutions to complement capacity-building” and “ensure the inclusion of capacity-building and institution-strengthening, as appropriate, in all cooperation frameworks and partnerships and their integration in the priorities and work programmes of all United Nations agencies providing assistance to small island developing States in concert with other development efforts, within their existing mandates and resources.” Therefore, it is the opinion of the author that, the

implementation of this commitment through international collaborations through applied research could bring better results than other means of capacity building. The engagement in international researches itself is part of capacity building, and the results of the researches shall be also components of capacity building.

4.5 APPLIED RESEARCH IN SYSTEMIC ISSUES OF SDG NUMBER 17

4.5.1 POLICY AND INSTITUTIONAL COHERENCE

When discussing the policy and institutional coherence it is important to try to answer the following:

1. What are the drivers/incentives for greater policy and institutional coherence at all levels of governance?
2. What is the value added of policy coherence?
3. Are there indicators that adequately measure policy and institutional coherence?
4. How can bilateral partnerships and regional agreements facilitate greater policy coherence?
5. How can development organizations and UN agencies support policy coherence?

To get the responses to the above questions, it requires the conduction of appropriate applied research. This shows that applied research can be used as one of the means of implementation of SDG's targets.

Regarding target 13, which states, "Enhance global macroeconomic stability, including through policy coordination and policy coherence" as well as target 14, "Enhance policy coherence for sustainable development", and target 15, "Respect each country's policy space and leadership to establish and implement policies for poverty eradication and sustainable development", it is clear that proper applied research in appropriate areas could bring better policy coordination and policy coherence.

4.5.2 MULTI-STAKEHOLDER PARTNERSHIPS

Regarding target 16 of SDG 17, which states, "Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries", and target 17:"Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships", it obvious that all of them can be achieved through international collaborations in applied research.

5.0 CONCLUSION

This keynote paper revisited the SDG number 17 with a focus on how applied research could be used to achieve the targets of this particular SDG. From the foregoing discussion in section 4, it is obvious that the means of implementation and revitalize the global partnership

for sustainable development can be strengthen through international collaboration in applied research. It was shown that most of the targets of SDG number 17 could be achieved through applied research and international collaborations in research. It is only the component on "trade" where the author could not see the directly linkage between the applied research and the targets in "trade" component.

6.0 RECOMMENDATION

From the discussion on the achievement of the 19 targets of SDG number 17 it was found that applied research has a major role to play. Therefore, the leaders of Africa countries should be argued to insist on implementation of the through applied research. Applied research will help to get the appropriate data to address the poverty gravity;revitalize the global partnership for sustainable developmentrevitalize the global partnership for sustainable development;promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries as well as implement effective and targeted capacity-building in developing countries.

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UNDERSTANDING THE THREAT OF AND RESPONSES TO ORGANIZED CRIMINALITY IN WEST AFRICA

Pokoo, J. M. and Aning, K

ABSTRACT

The body of international legal agreements dealing with illicit drugs control securitizes the narcotic drugs market/trade and its actors, requiring extraordinary measures to respond to the challenges posed by the narcotics menace. Such measures are usually devoid of accountability and transparency processes, methods and results. In regions such as West Africa, securitization of the illicit drug market and the criminal gangs who control the trade presupposes political will and resilient operational structures. However, West Africa is noted as the hub of illicit drug trafficking and its states characterized by poverty, conflicts, weak institutions and limited reach of the state. Furthermore, insecure environments undermine legitimate businesses and create ideal conditions for illicit activities. The paper explores the implications of using available political and security infrastructures to combat the illicit drugs trade in West Africa and argues for an improved demand reduction strategy which complements the on-going efforts as a potential option for the sub-region instead of the outright decriminalization of the consumption of illicit drugs.

A PEEP INTO THE CONFERENCE ROOM: RE-EXAMINING THE DEBATE ON AFRICANIZING AFRICAN LITERATURE WRITTEN IN ENGLISH

Derx-Techie, C.[1] Tetteh, U. S.[2] and Okyere, D.[3]

[1&2]*Dept. of Liberal Studies, Box AD 50, Cape Coast Polytechnic, Cape Coast, GHANA*
[3]*Dept of English, University of Cape Coast, Cape Coast*

ABSTRACT

The on-going debate on whether African literature should be written in the various indigenous African languages from where the stories are emanating or be written in the English language as had been the case presently, takes centre stage in this paper. Two different schools of thoughts are highlighted, each taking a polarised view on the subject matter. The paper highlights the views of different African writers like Chinua Achebe, and Wole Soyinka, Ezekiel Mphahlele all of whom share a similar view on the issue, and draws a juxtapositioning of other views of writers like Ngugi wa Thiong'O, Abiola Irele, Obiajunwa Wali, and Mazisi Kunene who oppose the former. Inferring from the arguments of the writers, the paper takes a serious look at the points raised by Obiajunwa Wali and agrees with him to draw the conclusion that despite the fact that clearly, African literature expressed in African languages offers the advantages of bringing its readers closer to the land and its people, it is still not satisfactory to cut many readers out because of language barriers. The paper, therefore, recommends that despite these beautiful debates, there is still the need for a common ground in breaking stereotypes and highlighting the power of the lessons from the written word as long as it can be read by everybody who will take home something from each story that he or she reads.

Keywords: colonialism, African literature, arguments, writers, African languages.

INTRODUCTION

Formal African Literature has attracted attention since its launch into the world of literature. Its content and form have generated arguments among critics and writers alike. The interest in African literature can be attributed to the antiquity that surrounds the continent. It is, therefore, not surprising that of all the elements that make up literature such as language, plots, characters, subjects and themes, none has engendered as much curiosity as has the language in which African literature is written.. This argument on the most appropriate language for African literature was in existence long before the 1962 African Writers of

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

English Expression Conference in Makarere. Ngugi (2000) tells us in his paper, "Europhonism, Universities, and the Magic Fountain: The Future of African Literature and Scholarship," that

> "… the answer to the question as to whether African languages occupy center stage or the periphery is still relevant as Africa struggles for a more equitable place in the economic and political map for the global community of the twentieth century." (p.2)

Timeworn as it may seem, the topic of the most appropriate language for recording and transmitting African literature is even more relevant today than ever. Several critics and writers have expressed their views on the literature of Africa, even after the Conference of African Writers of English Expression, held in Makerere College, Kampala, in June 1962.

The Problem

The argument on the language of, or rather for, African literature has been between two main groups of thought. One group, championed by scholars like Chinua Achebe, Wole Soyinka, Ezekiel Mphahalele and Christopher Okigbo are of the position that literature implies an artistic use of words for the sake of art, and that traditionally, Africans do not separate art from teaching. This group opines that, the writer and most especially, the novelist is a teacher as well as an artist whose ability to communicate and reach his/her people is paramount rather than the means by which he/she does so. Chinua Achebe, particularly, has termed the language situation "fatalistic logic" of the unassailable position of English in African literature. This view stems from the earlier realization by early African writers like Senghor (1993) that it took a European instrument in skilled African hands to shock the world into greater awareness of the humanity of colonized black people. Therefore, rather than being sentimental about the language, the African writer must educate as many people as possible in the language that is popular with them.

Adversely, though, other writers saw the situation differently. The other group, made up of the likes of Abiola Irele, Obiajunwa Wali, and Mazisi Kunene and championed by Ngugi Wa Thiong'o is of the position that African literature must be produced by Africans in African languages. These agreed with their colleagues on the one half of the argument, the part on the damage done to the people of Africa and also on the need to right the wrongs, but to do it on their own and from their own African resources. They, therefore, have strained every nerve to convince everyone that Africans can manage and find solutions to their literary problems their own way, without resorting to using the colonizer's mechanisms. To them, the harm that has been done to Africans and their languages must be corrected, not using the same weapons that were used in overturning the cultures.

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

This second group of African scholars believe that African languages are being pushed to the periphery and so, challenge African writers to abandon writing in European languages, and write in their native languages to give African literature its own genealogy and grammar and in order to reach the very people from whom and for whom the art is created.

The Views from the 1962 African Conference of African Writers

The scholars who met at the first conference of African Writers of English Expression, held in Makerere College, Kampala, in June 1962 undoubtedly were torn between two thoughts. The question was how to use the language and technology they had acquired to continue rendering their services as chroniclers and transmitters of culture and traditions for and to their people. They realized the change in political affairs on the continent and so, spelt it out even in the title chosen for the conference. This called for a language that was common to all the different people of the continent; at least if not all, a larger number of people. For example, the writers who met after tasking themselves with the obligation of finding a lasting definition for African literature came to the conclusion that it was better for an African writer to think and feel in his own language and then look for an English transliteration approximating the original (Wali, 2007).

At the beginning of this intellectual feud, both groups agreed on two things: that there has been some damage done to the cultures of Africa and that there was a need to mend the broken ways. Again, they also agreed that the most important of all the factors that have influenced the choices of the African writer is colonialism.

The bone of contention has been, however, the mode that the correction should take. In order to understand the fundamental factors and experiences that the various groups have encountered and which informs their beliefs and decisions, a good look needs to be made at the underlying factors that have led to this debate on the language of African literature.

Africa as a Multilingual Continent

A cursory look at the background of the group of African critics who insist on doing away totally with the foreign language in the transmission of African culture through literature are mainly those from East Africa and the French-speaking countries. These are the groups who were acculturated through assimilation. Colonization was harsher on them and so, they have cause to feel some nostalgia for their lost cultures, especially, their language. It is, therefore, not surprising that the group that is agitating more aggressively for a total rejection of the European languages as a means of transmitting African literature has more members from the French –speaking and East African countries.

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

The multilingual situation in the continent is another factor that influenced the choices of African writers to take sides with the feuding factions on the language of African literature. Africa is made of so many ethnic groups. These groups vary in culture, especially, language. As a result, choosing a particular language as the medium of transmission for the people who belonged to different ethnic backgrounds and language communities has its own problems (coming with it). First, whose language among the lot was going to be used? If one language is chosen instead of another, the speakers of that language would be advantaged over the others whose languages were not chosen. Those whose languages would not be chosen may feel belittled and may not agree to the deal. On what basis was that "selected" language to be chosen? The one that is most popular, most complex, simplest or easiest?

Secondly, every language is steeped in a culture, so if one language and the culture that comes with it is chosen, what happens to the cultures of the rejected languages? The situation would bring African writers back to square one; for the European languages are being rejected as mediums of literary transmission for the reason that they may stifle the cultures of rejected African languages.

Again, the era in which the writers find themselves - the postcolonial era - also, is a factor that has led to the language dilemma. Most of the writers, especially those from English - speaking West Africa, realize that colonialism is over and so are the literary procedures that favored the attack of the colonial master. Protest writing during the colonial period had exhibited the worth of African writers as intellectually creative people to the Europeans enough. So some of the writers feel it is time Africans get on with their lives and leave the Europeans who have been driven out anyway, to their fate. In other words, whether the European understands the strategies for combating the negative effects of colonial impact on Africans, because those strategies have been stipulated in the European languages or not, is beside the question. The language or medium should preferably be European to enable writers exploit the well developed literary theories and writing systems that come with the use of the European languages. Their aims by now have gone from beyond proving their abilities to think, to proving their abilities to write seriously like Europeans or more.

In addressing the question on the most appropriate language for African literature in his paper, "The Dead End of African Literature?" in African Literature: an Anthropology of Criticism and Theory, Wali ((2007) shows thoughtfulness and insight; however, in his eagerness to expose what he sees as, "African literature as now understood leading nowhere", he demonstrates a superficial understanding of the language issue and misses the central import: African literature exists and survives through the language of the day. This, probably, is because his essay dates way back to the time after the 1962 conference of African Writers of English Expression, when the world had not yet been thought of as a global village. And that is why a re-examination of this rebuttal of the debate has been captioned **"A Peep into the Conference Room…"** This essay will, therefore, like a debate, take a second look at the

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

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points raised by Wali and his colleagues who agree with him and re-examine those points squarely. A conclusion will then be drawn at the end to summarize the ideas collected and to suggest further solutions to the problem.

The Case Put Forward by Obiajunwa Wali

To begin with, Wali (2007) sees African literature as merely a minor appendage in the mainstream of European literature. He cites the 1962 Conference of African writers of English Expression as leading nowhere as far as African literature is concerned because it offered opportunities for some writers such as Wole Soyinka and Christopher Okigbo to scorn concepts like negritude and classify it as sterile. Obviously, Wali seems aggrieved by the fact that African writers have neglected negritude and its forerunners such as Leopold Senghor, Aime Cesaire and Amos Tutuola. He believes the Conference itself marked the utmost derision. He further upheld the view that negritude is now dead. He made these remarks when he judged from the confident tones of the remarks and decisions made at the conference".

That is the first lead he gives his readers as a writer who sides with the group of writers who project the use of African languages as the medium for African literature. Negritude in its pursuit of recovering lost African values and so idealizes Africa and its culture to the point of romanticizing about everything African (including language). This makes the movement a capricious one that turns a blind eye to reality. Besides, Negritude was put forth as a movement to oppose the colonial powers that governed and exploited the colonized Africans. As at 1960, the time that the first conference on African literature's language was held, most African countries had had their independence and their writers were grappling with "themes like the clash between Africa's past and present, tradition and modernity, between individualism and community, socialism and capitalism.

As Gyasi (1999) in African Literature Today remarks ""There is always an unconscious interference of the mother tongue in any individual's actualization of a second language. This interference is often realized at the syntactic level where the structure of the second language is influenced by the mother tongue of the bilingual speaker.

This is a clear indication that the strength and survival of African literature does not depend on the local majority being uninformed participants but better off with informed contributors of the African culture. Therefore, African literature in African language appears less prevalent not because it takes cue from European literature and is limited to a few European–oriented African–University–graduates who are steeped in it, but because reading and writing has not been the African's custom. The fact that literature is not only written but also oral and symbolic and that African literature is predominantly made of "oral and non-alphabetic writing systems" confirms that the majority local audience, with little or no European

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

education, participate in this kind of literature and therefore African literature is self–enriching (Ricard, 2007). Wali (2007) again points out that "The whole uncritical acceptance of English and French as the inevitable medium of Educated African writing is misdirected and has no chance of advancing African literature and culture." (p. 282).

Moreover, when Wali (2007) says "the ordinary local audience with little or no education…has no chance of participating in this kind of literature" (African literature in English language), it presupposes that those local audience cannot read English but can read their own local languages well. However, it is obvious that those who cannot read English would hardly be able to read their local language. They simply cannot read because they have not learnt to do that. So the issue of having no chance in participating in literature or advancing African literature and culture is not based on the writing of African literature in English or any European language for that matter, but simply on edification. And this education, whether formal or informal, would help transmit the culture of the people.

At the 1962 Conference (which Wali condemns as not serving the purpose of encouraging writers to write in African languages), the language spoken was English. What would have happened if the participants from all parts of Africa had presented their papers in their local languages? The total chaos that would have ensued from misunderstanding each other's language would have been great. Wali contends that thinking in one's language and then looking for an English transliteration approximating the original would amount to using a copy of the original and is therefore unwise and unacceptable. This is in line with what Ngugi (1986) says in 'The Language of African Literature' culled from Decolonizing the Mind…that "The choice of language and the use to which language is put is central to a people's definition of themselves in relation to the natural and social environment, indeed in relation to the entire universe." (pp. 4-5).

Again, Wali (2007) disapproves of the strategy of starting from outside and then working towards the inside, and cites European writers such as Spencer, Shakespeare, Donne and Milton who wrote in English even though Latin and Greek were the classical languages. But he loses sight of the fact that many of these writers also wrote in Latin and Greek. Besides, English was then a cosmopolitan language as well and was even considered a fresher language than the classical. So, why would anyone in the name of class opt for a dying language like Greek and Latin when he/she has a contemporary, fresh language to write in?

Similarly, in the case of Eliot, Spencer and Shakespeare, they were only propitious that the native language, in this case English, was the language in vogue and cosmopolitan. It was the world's most popular language. That is quite different from the African situation because unlike English, African languages are mostly spoken in small packets of societies and a couple of towns away. What Gyasi (1999) in his "Writing as Translation: African literature and the challenges of translation" has to say about the issue makes it evident. He says:

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

> Obviously, writing in a foreign language has not been exclusive preoccupation of African writers. Many great literary figures have, at one time or another expressed themselves in tongues other than their own. If Kafka, a Jewish intellectual living in Czechoslovakia and one of the few Jewish writers who spoke fluent Czech, Hebrew and Yiddish, wrote German, he never forgot the influence of his mother tongue on his other languages. In one of his journals translated into French he writes: "voyez–vous, je parle toutes le langues, mais en Yiddish" (p. 207) 'See, I speak all the languages, but in Yiddish". Writers like Nabokov, Borges, Conrad and Becket wrote some of their major works in foreign languages… (p. 82)

Like Ten (2011) says in "Vehicle for Story: Chinua Achebe and Ngugi on Defining African Literature, Preserving Culture and Self", "It is neither necessary nor desirable to learn to use English like a native speaker, but we should rouse to the "reality of the present day Africa" and reinvent the language of European to tell their (Africans) own stories!" "Literature after all, is the exploitation of the possibilities of language", argues Wali (227). And he defends the statement by arguing that it is the virgin African language which requires to be exploited especially in the area of creative writing and not the European languages that are already advanced and overworked. The ability to mold one language to fit the experiences, aspirations and stories of another is the highest mark of putting both languages to the fullest use. Wali seems puzzled by the inconsiderable work in Africa on creative writing and asks: "If linguistic science devotes so much energy and attention to African languages in spite of their tribal and limited scope, why should imaginative literature which in fact has more chances of enriching the people's culture, consider it impossible to adventure in this direction?"

Wali's observation is quite obvious and the reasons and answers are equally not out of reach. What he seems not to have inferred from his observation is that creative writing or imaginative writing, unlike linguistics or the other aspects of language is an art for, as the name suggests, imagination and creation. This means that it is a skill that requires talent or giftedness. It has been so since Adam. In the pre–colonial era, and even today, not any person could be a custodian of the customs and history of the people. We have 'griots', 'raconteurs' and 'kyerɛmas' who specialize and have exceptional abilities or traits, sometimes running through family lines, of relating stories. These have been the custodians of culture. People with endowments have been few even in the western world.

It is the same with these contemporary times. Few people have that special gift of being able to capture and transfer cultural experiences that takes years to imbibe in the pages of a book and through another language. Let us find out how many African writers can competently

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

capture the cultural essences of their African societies in their works in English like Achebe, Soyinka, Ama Atta Aidoo, Ayikwei Armah, and the lots of others who do it so well? These few writers are able to make one understand a culture as though one has lived with the people. For example, Abodunrin (2008) has this to say about Ayikwei Armah's writing:

> "Armah's role as a modern equivalent of these historical griots and imbongi has been designed to continue this long tradition of dismantling all 'tight little tribal' affiliations and speak directly to black people in general. Thus, whether carrying out a revaluation of African independence which he regards as a mystification or reacting to equally outdated issues such as "Our language problem" – Armah maintains the belief that "African writers are born to an impressive legacy of problems, from dependence on foreign publishers to a parallel dependence on foreign languages." (p.64)

And this phenomenon is not limited to Africa. There are reports of literary novelist going extinct. Therefore, if much seems not done in the area of creative writing in African literature, as in other areas such as linguistics, then, the reason could be attributed to factors such as the emergence and dependence on technology, identification of talented writers for training and not to the underutilization of imaginative literature. For, the possibilities of the language are amply exploited by writing and presenting African cultural experiences in any language one studies. The national exploitation of the possibilities of African languages can be distinguished from the ethnic level as Chinua Achebe suggests in his Morning Yet on Creation Day and says they are both important. To him, at the ethnic level the possibilities of the language can be exploited in the local languages while the national level takes care of the African experiences expressed in English.

Wali (2007) describes criticism done in African writing in English and French as "sounding so dull, drab, and flippant, mainly because there is no opportunity for original thinking". In other words, African writers writing in European languages are handicapped because they try to replace cultural, geographical, as well as physical phenomena present in their environment with ones absent in their environment of the European languages they communicate in and vice versa. This state, Wali opines, can lead to a gradual death of African languages. The type, he cites, is described by Huanani-Kay (1999) on the death of languages in her book, From a Native Daughter. Huanani-Kay (1999) contends that indigenous languages replaced by colonial ones result in the creation of dead languages. But what is dead or lost is not the language, but the people who once spoke it and transmitted their mother tongues to succeeding generations.

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

Wali consequently advises that a good knowledge of "some of the important African languages be known before generalizing and formulating all kinds of philosophical and literary theories, so that African literature will become a serious business" (p. 283). The truth about this point is unquestionable. Wali could not be more right on this point. Literature is about people, their society, their culture, and their institutions; so, playing with it means toying with the lives of a whole social order.

The second place position occupied by African literature in African Education systems currently is woefully and so rightly lamented by Wali in his paper. According to him, attempts at including African languages in the curriculum of some African universities have not yielded much fruits because "all that is available even at the university level is the usual string of proverbs, a few short stories on the tortoise and tiger, and a number of inadequate grammar books written by untrained linguists. For novels, plays and poems, educational institutions in Africa are bankrupt, not even translated versions are available. It is all because it is as though African writers have pledged not to write in their own local languages but rather, put all their talents and efforts in producing literature only in English."

Again, Wali is right to say that the second place occupied by African literature in African languages and in African Educational Institutions is pathetic. Conversely, rather than blame it on the African writers writing in English, those who insist that the writing of literature be done strictly in African languages should be answerable. Not only does that arrangement not work, it also discourages the few competent writers from writing. They shy away from literature in African languages because the system itself has not been conditioned to approve of its progress. It should not come as a surprise if students of African literature prefer to write in English; it is better and safer to tread on known paths.

In Wali's own words, "This programme will certainly have no future" (talking of the introduction of African languages in university curricula). Yet, African educational institutions are generally doing well in literature. New literary artists like **Chimamanda Ngozi Adichie and Buchi Emecheta of Nigeria,** Aminatta Forna of Sierra Leone and Uwem Akpan of Nigeria have emerged and there are more to come. Limiting such emergent literary artists to writing in African languages will place them in a tight corner because they will be denied the joy and exuberance that comes with having their work read by many, which serves in a way as impetus for new writers. Lack of followers will definitely kill the interest of any writer. In the Sunday 24th November, 2013 edition, a report by Lucas Mo'thibedi in SABC News captioned "Apathy towards African Language Discourages Writers" said, 'renowned African writers say they have ceased writing as a result of lack of interest by society in indigenous languages.

Later, writers interested in the works of other writers can always translate those texts written in English by Africans into any African dialect of their desire to reach whichever audience they target. As well, looking at the cost of production of books, writers hope to reach a larger

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

audience, in order to make up for the cost and also earn their living through their writing. It is no hidden fact that European languages have a larger audience than African languages in Africa. For example English is spoken by about sixteen countries in Africa and no African language covers that much space. Writing in the European languages therefore would afford writers more opportunity, financially and socially than writing in African languages.

The sad observation made by Wali close to the end of his paper concerning the most talented or gifted African writers not writing in their native languages is touching enough. He cites Wole Soyinka not considering Yuroba suitable for his The Lion and the Jewel or The Dance of the Forest. He explained that it is right for any African to be concerned about this. But again, much as Africans would like their writers to write in their indigenous languages, the writers cannot be forced into doing what they themselves would not want to, or perhaps, cannot do. So, instead of insisting African writers write in African languages, it is better they are allowed to write and present the African contents in European languages. Africans should bear in mind also, that the European language employed by African writers in their works can always be adapted to suit whatever culture they wish to portray.

Finally, Wali predicts that African languages are at risk of inevitable extinction, if they do not embody some kind of intelligent literature and also if Africans continue in their present illusion that they can produce African literature in English and French. According to him, every language is backed by some literature and the literature is in turn backed by critical theory, so that, in order to study language, develop it and keep it going, the literature of that language must be studied critically not in another tongue but in the one spoken by the people or owners of the language.

Wali concludes by stating that "the only concrete achievement of the Makerere junketing was that it gave African writers and their patrons the opportunity to get to know one another." Again, he pinpointed that the various presentations on the debate sought to empower the African writer to face the reality of the language situation – that Africans cannot help but write to express their experiences, ideas and transmit their cultures through the medium of European languages. This , Wali points out is the reality of the situation, an assertion this paper strongly identifies with.

Conclusion

From the discussions that have ensued in the debate of this paper, so far, it is clear that African literature expressed in African languages offers the advantages of: bringing its readers closer to the land and its people, standing on its own as literature on its right and not as a subset of mainstream European literature, granting the intellectual freedom of thinking and writing in one's own language and culture among others. The argument by the African

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

writers who stand for European languages have also publicized that even though we need to sensitize African concepts in Africans, it is important also to realize realities of the African situation. Africans should understand that the European languages have come to stay whether they like it or not and, therefore, Africans should embrace it and use it to their own advantage. Some other points raised in favor of this group in this debate include:

i) educating future African writers to be able to capture the African essence in their works even if they write in English or French,
ii) writing in English or French which is popular in order to arrest the problem of multiplicity of African languages,
iii) limitation of the audience to small patches of tribal groups, and
iv) questions of orthography, among others.

It is widely known that many writers of some nationalities have learnt and written in other national's languages so this does not pertain to only Africa as their counterparts make it seem. Again, it is a fact that people are attracted to the language that is cosmopolitan rather than the narrow–minded and so, it is better if Africans moved along with the world than be drowned in the darkness of one corner of the world.

With the debate on the language of African literature escalating in tension, several scholars, critics and writers have also joined in the discussion and have expressed their views on the subject. Most of these writers are concerned about where the language issue has brought us today. It is no secret that in the present day, many Africans cannot read and write their own local languages or dialects. Some have also suggested that Africans need to unite as one people with a common language in order to be identified as one people. But then others are quick to draw attention to the fact that the selected language then would be functioning just as English is already doing now - a language that is used for communication by many people from different linguistic backgrounds. Yet, a balanced alternative that has been articulated by some writers like Menang (2011) is that some African languages should be raised to the national level so that those languages would compete with the European languages for popularity and consequently, displace them. There is also the proposal of a case for linguistic integration based on complementary languages. This strategy for resolving the African literature language problem specifies that Africans adopt an African language in addition to English and French.

Of the numerous essays that have expressed opinions on the issue of which language should best be applied for the transmission of African literature, that of Obiajunwa Wali strikes a reader as commanding because of the potent arguments he raises, focusing on the effects of European languages on the creativity of African critical theories for African literature, pedagogy, publicity, documentation, content and form.

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

Recommendations for Common Ground Solutions

The two sides reviewed side by side, it becomes obvious that the group of African writers championed by Ngugi Wa Thiong'o relates their arguments more to the ethnic groups and are interested in development of writing at the ethnic and national level, while the group championed by Achebe have a national and international perspective. African literature should be written in any language that the writer feels competent enough in to be able to express his/her themes, styles, characters and any other element that will make it possible for him/her to do so. The world is now a global village. Transfer and exchange of ideas, concepts and even cultures have become common. Languages now borrow foreign words than some decades back. In February 2013, the world record of the most popular language in the world shifted from the English language to Chinese. In the future, traces of Chinese words would be found in other languages of the world and writers may even translate literary works into Chinese in order to reach a larger audience. The focal recipient destination of African literature should be everybody rather than a few people. Writers, therefore, should be encouraged to write in Europeanized African languages.

Achebe's group wanted fame probably as individual literary stars in Africa. It is of little surprise that it was they who mostly won Nobel awards and have been the most renowned authorities on African literature. They, therefore, can be accused of selfishness just like the Europeans. Nonetheless, the accusation would not last, because the African literary scholar has been pushed to the wall. The best if not the wisest way to survive is to fight back using whatever weapons are available; even the enemy's weapons. The bravery and ingenuity of making use of one's enemies' weapons when pushed to the wall to defeat them is an admirable feat. And that is why the group that advocates the use of European languages for the transmission of African literature must be lauded.

African literature needs to be presented in European language for the sake of uniformity and to avoid chaos because with the endorsement of a couple of languages as national languages to represent Africa, those languages would soon face the same accusations from non–native speakers of those languages just like the European languages are facing. Abodunrin (2008) makes a suggestion which seems relevant and deserves to be quoted at length to end this paper.

> "Unlike those who have called upon Africans to write in their respective national languages, Armah agrees that although a thousand linguistic flowers would bloom, in the specific field of African literature alone, however, if this call were answered, the end result would be more chaos and misunderstanding

[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

among Africans and their black counterparts in the Diaspora, Angela Smith's East African Writing in English, opens with a graphic account of the confusion that we might expect if the call to write in national languages were heeded without removing first the major obstacles to African unity. At a conference called "New African Writing" in 1984 Ngugi Wa Thiong'o gave the keynote address; "He was unpretentious but eloquent as he praised enterprising publishers in Zimbabwe who employed people to translate from one African language to another, from Gikuyu to Kiswahili for example. He spoke with mounting intensity for a long time. Eventually he finished and the Chairman invited questions. From a darkened row at the back of the auditorium came a voice speaking Xhosa, an African language that much of the audience and Ngugi did not understand, asking an extremely long question. Confusion was over–taken by laughter. Ngugi laughed with the rest of the audience, guessed the meaning of the question, and answered in English. The questioner proved to be Lewis Nkosi…" Unlike Lewis Nkosi who understands and has just acted out the confusion that 'tight little tribal' affiliations could generate but translates this understanding as 'one of the benefits conferred by imperialism', Armah believes that primary solution to Africa's language problem will come only through "the international medium, around which the smaller national and ethnic languages would orbit". (p. 64 – 65)

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dan.okyere-darko@ucc.edu.gh

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[1]Cynthiaderx477@gmail.com,
[2]ustetteh@yahoo.co.uk,
dan.okyere-darko@ucc.edu.gh

THE EFFECTS OF CURING ON THE CARBONATION OF CONCRETE

Alhassan, A. Y.

Department of Civil Engineering, Federal Polytechnic Idah, Nigeria

ABSTRACT

Carbonation is the primary cause of initiation of corrosion for reinforcing steel embedded in concrete structures situated in the inland environments. The processing (curing) of concrete influences the rate of carbonation of concrete thus corrosion of embedded steel. It is therefore important that designers of reinforced concrete structures respond to this problem through appropriate specifications to ensure that structures perform satisfactorily over their intended service lives. This research, reports on the results of a study undertaken to assess the carbonation of concretes exposed to a range of processing effects and exposed to different inland environmental conditions. Concretes samples were prepared using three binder types representing variations in blends with FA, and GGBS and four w/b ratios, ranging from 0.4 to 0.75. The produced concrete samples were then subjected to different degrees of initial water curing prior to exposure. These concrete samples were then placed in three exposure conditions: indoors in a basement parking garage, outdoor sheltered from rain and sun and outdoor fully exposed to the elements. The depths of carbonation of these samples were monitored over a period of 24 months in order to determine the rates of carbonation. The results show that for concrete with similar mixture and exposure conditions and given prolonged curing effects exhibited lower depths/rates of carbonation. This effect is however pronounced for plain concretes at the short run while in the long term the blended concretes perform better. The effects of processing on the concretes were not significant for samples on the outdoor exposed sites as all samples presented similar rate of carbonation. The results from this study will assist designers of reinforced concrete structures on the choice of processing and concrete type for the different exposure conditions.

Keywords*: Carbonation; Corrosion; Service life; Inland environment; Blended concrete.*

INTRODUCTION

The most common cause of deterioration in reinforced concrete structures is the corrosion of the steel reinforcement. In concrete, steel is protected from corrosion by a passive layer of gamma ferric oxide (Mehta and Monteiro, 1993). However, the steel may become susceptible to corrosion in the presence of chloride ions or if it becomes depassivated when the alkalinity

alhassanay@gmail.com

of the concrete at the location of the steel is reduced by carbonation (Tutti, 1982). The rate of advance of the carbonation front in concrete depends on the permeability of the concrete and the quantity of the hydroxides, which are, in turn, controlled by the characteristics of the concrete making material and its processing, for example curing and compaction. In addition, carbonation rates also depend on the concrete exposure condition environments (Kobayashi & Uno, 1990; Neville, 1981; Roberts, 1981; Wierig, 1984). While the permeability of concrete depends on many factors among which are the water/binder ratio and processing of the concrete which influences its hydration, the amount of hydroxides (CH) available in the concrete depends on the type and content of the binder used. The study aimed at developing knowledge of the rate of carbonation of different concrete that are treated to varying degree of initial moist curing and then exposed to an inland environment.

Materials and Methods

Materials

The binder types used in producing concrete were selected to ensure that the concretes produced and tested reflected concretes commonly used in construction projects. Three binder types were used (CEM I, FA, and GGBS), with each complying with the requirement of SABS. In the selection of the water/binder (w/b) ratios, it was decided that concrete ranging from high strength structural concrete to low strength mass concrete should be considered. This is to ensure that concrete grades tested reflect concrete commonly used on construction project. Hence, the following w/c ratios were selected to produce these concretes - 0.4, 0.5, 0.6, and 0.75. The fine and coarse aggregates used were granite crusher sand and crushed granite respectively. The maximum size of the coarse aggregate was 19 mm and the fineness modulus of sand was 2.70. The aggregates complied with the requirement of ASTM C 33-93. The same batch of binder and aggregates were used for all the concrete mixtures.

Table 1 shows the mixture proportions for all the concretes assessed in this study. A consistent procedure was used for mixing and compacting the concrete into the sample moulds. The intention was to produce concretes under similar processing influence. This is because the degree of concrete compaction affects its microstructure and this may in turn create variability in the permeation properties of the concrete as well as its carbonation processes.

Table 1 Mixture proportions (kg/m^3) of the various concretes used

Binder combination	Concrete mixture label	Binder			Aggregate		Water content	Water/ binder ratio	Slump (mm)	28 day compressive strength (MPa)
		CEM I	*FA*	*GGBS*	Coarse	Fine				
100% CEM I	PC-40	450	-	-	990	800	180	0.4	30	75.93
	PC-50	400	-	-	990	877	200	0.5	60	64.5
	PC-60	350	-	-	1015	869	210	0.6	100	49.23
	PC-75	300	-	-	1050	810	225	0.75	140	36.00
70/30 CEM I-FA	FA-40	315	135	-	990	800	180	0.4	40	62.80
	FA-50	280	120	-	990	877	200	0.5	85	52.13
	FA-60	245	105	-	1015	869	210	0.6	170	37.80
	FA-75	210	90	-	1050	810	225	0.75	185	28.10
50/50 CEM I-GGBS	SL-40	225	-	225	990	800	180	0.4	25	61.10
	SL-50	200	-	200	990	877	200	0.5	40	48.40
	SL-60	175	-	175	1015	869	210	0.6	60	30.83
	SL-75	150	-	150	950	900	225	0.75	110	22.87

The solid materials were weigh batched on a laboratory balance to an accuracy of 50 g. The water and plasticizer was volume batched using appropriate measuring cylinders. Mixing was carried out in a 50 liter pan mixer by first introducing the dry materials into the mixer in the order of stone, binder and sand. The mixer was then activated and water added over the second minute of mixing and mixed further for one minute. At the end of each mixing cycle, the mix was manually distributed in the pan using a hand-held scoop. This ensured a uniform distribution of the material as some segregation was noticed resulting from the operation of the mixer.For some mixtures, the amount of admixture was varied to bring the concrete to a required workability. A slump test was then performed to ascertain if the mix fell within the desired slump range. If the slump criterion was not met, plasticizer was incrementally added and mixed for 1 minute before repeating the slump test. This procedure was repeated until the desired slump range was obtained. The 100 mm cube moulds were loosely filled with concrete and compacted by holding each mould onto a high-speed vibrating table, then topped-up during vibration. The vibration period varied from 20 – 30 seconds. The compacted concrete moulds were then marked and placed in a laboratory room where the temperature and relative humidity were at prevailing laboratory condition (23±2 ^{o}C for temperature and 60±5 % for relative humidity) and were covered with plastic sheet.

The concrete cube samples were de-moulded after 22 days ± 2 hours, grouped into three sets and each set subjected to different durations of initial water curing conditions. The samples were cured in a water curing tank at 22±1 ^{o}C for the next 2, 6 and 27 days. At the end of the water curing duration, the concrete cubes were stored in laboratory air at the prevailing temperature of 23±2 ^{o}C and relative humidity of 60±5 % for 14 days in the laboratory roombefore exposure to carbonating environments. It was reasoned that exposing the concrete cubes samples to the same laboratory air preconditioning for 14 days would stabilize

alhassanay@gmail.com

the internal moisture conditions of the concrete and the effect of an unusual weather conditions when first exposed outdoors will have similar effect on all concretes. While the concrete samples were in the laboratory room prior to exposure, concrete cube samples for carbonation depth testing were surface-dried and four contiguous surfaces of each cube were coated using water based epoxy (sold as “Stonehard”, manufactured by StonCore Africa (Pty) Ltd. South Africa). The four coated surfaces included the top and bottom surfaces as cast. Two coats of the epoxy were applied, with the second coat being applied approximately 24 hours after the first. At the end of the preconditioning period the samples were taken to the different exposure sites and arranged such that carbonation of the concrete cubes took place through two opposite formed faces. The concrete cubes were arranged with a spacing of at least 50 mm between neighbouring concrete cubes.

Test methods

To determine the carbonation depth, concrete cube samples were split in a plane parallel to a coated surface by applying a line load in compression on two opposite faces of the sample. This was achieved using a loading platen with a welded 10 mm mild steel bar, on the top and bottom of the sample. A solution of 1 % phenolphthalein in ethanol was sprayed ontothe freshly broken surface of the concrete. A plastic container fitted with a nozzle was used to give a fine spray of the phenolphthalein solution. The carbonated zone was indicated by the absence of colour change of the cement paste phase. The depth of the uncoloured zone (carbonation depth) was determined by taking the average of six measurements from the surface of the uncoated face (three on each face). The depth of this zone was measured to an accuracy of 0.5 mm using a vernier caliper. Obvious distortions, such as the presence of aggregate particles or air voids near the surface were avoided when the six measurements were taken.

alhassanay@gmail.com

Results and Discussion

Compressive strength results

The compressive strength results of the concrete mixtures presented in Table 1 are plotted as shown in Figure 1.

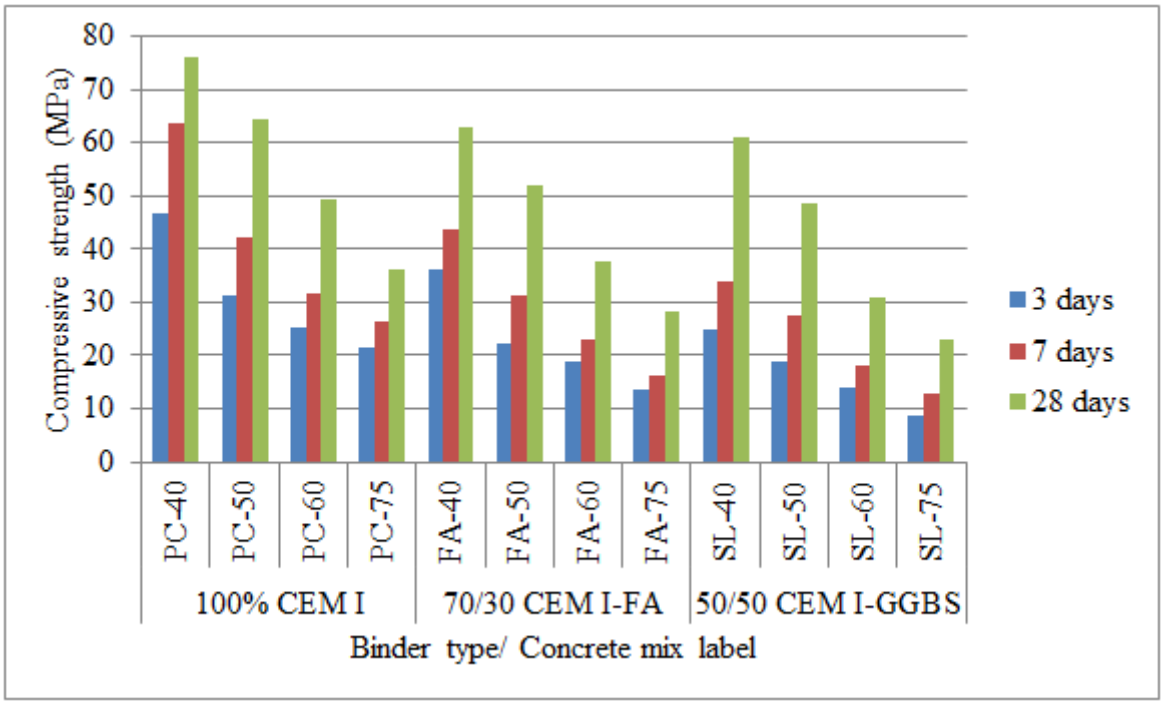


Figure 1 Compressive strength vs concrete mix label

The use of different binder types influenced concrete strength development, with decreasing w/b ratio resulting in improved strength. From the compressive strength plots shown above (see Figures 1, it can be seen that compressive strength decreases with an increase in w/b ratio for all concrete types and for all moist curing ages investigated. From the figure, it can be noted that blended concretes presented reduced compressive strength in comparison to the CEM I concretes at all w/b ratio and curing ages. Similar influences have been found in results for paste and concretes systems published elsewhere (Alexander & Magee, 1999; Alexander & Moyo, 2012; Ballim, 1994; Khan et al., 2000; Mehta & Gjørv, 1982; Bruno, 2010).

Note that as the moist curing age of the concrete increases, hence the hydration of its binder components, the gain in compressive strength with blended concretes becomes more apparent (see Figure1) especially at low w/b ratio. Analyzing the ratios of the 28 days and 7 days compressive strengths for all the concrete types tested, the FA, GGBS concretes presented higher values compared to the CEM I concretes. Increased compressive strength gain at later ages for these supplementary cementing materials (SCM) can be attributed to their slower

alhassanay@gmail.com

hydration rate and chemical pozzolanic effect (especially for FA), as well as to the physical effect of the generally tiny SCM particles. Detwiler and Mehta (1989) and Goldman and Bentur (1993) suggested in their work that the improvement in compressive strength in blended cement concrete is primarily dependent on the micro filler effect of the SCM.

Due to the higher replacement level used and its inherent slower rate of hydration, a slight reduction in compressive strength occurred for the GGBS blended concretes at all ages compared to the FA concretes especially at higher w/b ratio. Similar observations were also noted by other researcher (Alexander & Magee, 1999; Ballim, 1994; Mackechnie, 1996; Bruno, 2010). It can also be noted from the figure that the difference in compressive strength between the FA, GGBS and the CEM I concretes are higher at early ages (3 and 7 days) compared to later age (28 days). The reduced compressive strength presented by the FA, GGBS concretes can be attributed to either the slower rate of hydration of the SCM components in the concretes, their calcium hydroxide depletion tendency or the dilution effect of the SCM in the concrete mixture.

Carbonationdepthresults

The carbonation depths results of the concrete mixtures presented in Table 1 are plotted as shown in Figure 2.

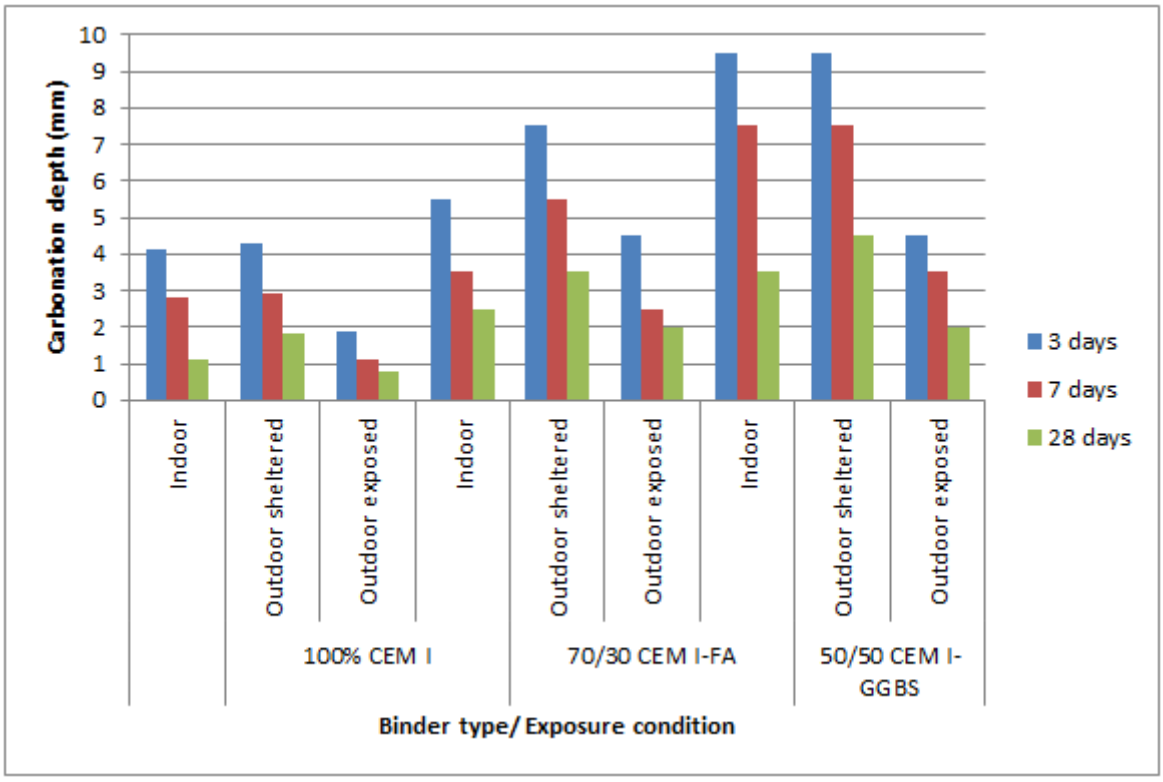


Figure 2 Natural carbonation depth vs. concrete mix label

Concretes of lower w/b ratio had better resistance against the diffusion of CO_2, possibly due to the denser pore structure and higher $Ca(OH)_2$ content. Similar findings in relation to the effect of w/b ratio on carbonation have also been reported in the literature (Houst & Wittmann, 1994; Sulapha et al., 2003; Wee et al., 1999). The decrease in the carbonation rates of the concretes at lower w/b ratio can be attributed to the fact that the cumulative pore volume and the amount of pores are lower compared to a higher w/b ratio concrete. Although the pore structure of blended concretes is denser as a result of the finer particle size and filler effects of SCM, the carbonation rates of blended concretes are higher. This suggests that pore structure is not the only parameter that controls the rate of carbonation in concretes, but also the amount of $Ca(OH)_2$ present within the hydrated cement paste of the concretes. The presence of $Ca(OH)_2$ in concrete results from the hydration reaction of C_2S and C_3S, which are the main components of cement. In the presence of SCM, the amount of $Ca(OH)_2$ available to react with CO_2 is lower, for two reasons; firstly, less CaO is added to the concretes and secondly, some of the $Ca(OH)_2$ produced reacts with the SCM present.

The effects of the initial water curing duration of the concrete on its carbonation rates can be observed in Figure 2. It can be noted from the figure that a longer initial moist curing duration generally resulted in a lower carbonation rate. This is attributed to the fact that as curing increases hydration in concrete, the pore spaces in concrete reduces, particularly in the near surface zone. Additionally, curing influences the chemical properties of the concrete, for instance in unblended concrete it increase the $Ca(OH)_2$ content of the concrete thereby improving its buffering effect against CO_2. Curing, however reduces the $Ca(OH)_2$ content in blended concretes but improves the concrete microstructure. For example, in plain concretes, the carbonation rate decreased significantly with curing age within the first seven days. In the case of concrete containing supplementary cementing materials (SCM), the carbonation rate continued to decrease even after 7 days of curing again pointing to the later hydration effect of these SCM(Wierig, 1984; Detwiler, & Mehta, 1989).

From the carbonation rate plots for all the concrete types presented in Figure 8 for the outdoor sheltered exposure conditions, it can be noted that the carbonation rate increases with an increase in w/b ratio irrespective of the initial moist curing period or binder type. It is also evident from the Figure, that the effect of w/b ratio is more significant than the moist curing duration effect as the carbonation rates increases significantly as w/b ratio varies. This is attributed to increased pore connectivity of the concrete since w/b ratio primarily determines the gel/space ratio, the capillary porosity and thus the permeability of the concrete (Mehta & Monteiro, 1993; Wierig, 1984). Concretes of lower w/b ratio had better resistance against the diffusion of CO_2, possibly due to the denser pore structure and higher $Ca(OH)_2$ content. Similar findings in relation to the effect of w/b ratio on carbonation have also been reported in the literature (Detwiler& Mehta, 1989; Detwiler& Mehta, 1989; Khan et al., 2000)

alhassanay@gmail.com

Conclusions and Recommendations

The main aim for this study was to determine the rate of carbonation of different concrete types in inland environments as the concrete processing effects are been varied. Through the carbonation study several conclusions can be drawn.

a. Increasing the duration of moist curing and reducing the amount of addition of SCM has a significant effect on decreasing the rate of carbonation in concrete.
b. For concrete prepared at the same workability and compressive strength there is no significant difference in the rate of carbonation between plain and blended cement concrete. This is explained by the fact that the increased tendency to carbonate by blended cement concrete, because of the lower content of carbonatable material, is offset by the decreased permeability effects of most supplementary cementitious materials.

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alhassanay@gmail.com

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alhassanay@gmail.com

ATTAINING SUSTAINABLE DEVELOPMENT THROUGH THE USE OF RESEARCH AND TECHNOLOGY

Ngosa, P. E.

The Technical and Vocational Teachers' College (TVTC), Luanshya, Zambia.

ABSTRACT

There has been massive acknowledgement and appreciation from various sections of the society on the African continent that sustainable development on the continent can be realised for the benefit of the majority of the people through Research and Development (RD) and Information and Communications Technology (ICT). The aim of this work was to explore ways in which sustainable development can be realised through the use of technology with focus on the Zambian scenario and what has been achieved there with the use of ICT in education, health, agriculture, commerce as well as in governance. A number of questions were explored to try to establish the impact of research and technology and at the same time establish inhibitors and enablers for the potentiality of research and ICT to be fully realised. In order to achieve the aforementioned, a one-to-one structured interview was used to collect the qualitative data with some data being collected from available literature. The interviews were conducted at selected institutions that are using ICT for research and this has provided a clear picture on how these have impacted on their activities. The following inhibitors were found to be in existence in most institutions. The first is the lack of technology itself, such as computers and other gadgets. The second, being the lack of electricity connectivity. So, this translates into a number of learners in rural schools not having access to electricity without which they cannot use the computers even if these were available. The third inhibitor is the lack of computer literacy among the very teachers that are supposed to impart the technological literacy among the pupils. Funding of research and development and of computer technology is another inhibitor that was expressed by most respondents during the interviews. It was concluded that if research and development and Information and Communications Technology are to be successfully used as drivers for sustainable development in Africa, they must be seriously looked at in line with the normative anchors as suggested herein.

KEY WORDS:*Research and Development; Information and Communications Technology; E-Governance; eWaste; mHealth*

INTRODUCTION

In the past few years most African countries have seriously taken research in the use of technology in education, agriculture, health, environmental sustainability, governance and

commerce being the key factors to development. A majority of these countries have realized the positive impact that technology is having in these areas. The use of technology is being viewed as a way of advancing these sectors taking into account the direction of its positive impact. One area that countries in Africa ought to increase their research on is the issue that affects the agro-sector in many ways and that is climate change. (Cooper and Schindler). There is need for most countries on the continent to venture into research on gathering and sharing information on monitoring climate change as its effects can be very devastating on selected regions of the continent as has been witnessed in the southern regions of the African continent where crop production has adversely been affected this year 2016. There is dire need for countries to form synergies in research and innovation to use ICT to monitor and forecast climate through the use of meteorological-satellite and indeed oceanographic radars to provide each other with information on early warning systems on impending adverse climatic changes. Such information would help the continent alleviate some of the adverse catastrophic consequences of climate change. The ICT data would also help in analysing information on the trends in changes in biodiversity and ecosystems. This would empower the farmers with vital information on what climatic changes to expect year in and year out. (Davis and Davidson, 1993).

In the area of commerce, particularly banking, most of African countries have leapfrogged the communication infrastructure divide to having widespread cellular networks. For instance in Zambia, this has allowed the rapid spread of mobile banking services, enabling people to make secure transactions and secure small business loans. People are now able to make money transfers because of this kind of technology thereby making transactions more affordable, quick and reliable. The ever growing use of technology has motivated a lot of businesses to transact on-line where people are now able to buy and sell on-line. This is the trend known as e-commerce. This trend has had a transformational effect on how people conduct their business and has helped business entities to promote their products on-line and attract customers on-line thereby creating a pull marketing effect in their marketing mix. (MOE, 2008).

In governance the introduction of E-Governance has created more opportunities for citizens to participate in governance issues. For instance in Zambia the republican president launched the E-Governance system in October 2015 with a view of strengthening the participation of both the private sector and civil society in supporting transparency and accountability in government and at the same time help in designing effective modalities to execute government policies in its quest to reduce poverty and enhance development. E-Governance initiates the digital migration to a more effective and efficient service delivery by the government. It improves the capacity for service delivery and enhances engagement and participation by the citizens for government institutions to be accountable to society.

In the area of health ICT can provide immense accessibility to information to health workers with vital benefits in the healthcare ecosystem by according the caregivers with key diagnostic support even in the remotest areas of rural Africa. Research in this area or sector is of extreme importance if increase to health services by women and children on the continent has to be realised to acceptable levels. Through mHealth this can be achieved due to the potential of ICT.(Zhao, 2015). The achievement of sustainable development goals in Africa through applied research requires the creation and strengthening of academic institutions and their research facilities. With the absence of adequate research institutions and facilities as well as inadequate funding from the states, development in many sectors of the economy in most African states will not make any meaningful strides. Only adequate investment in Research and ICT can result in fuelling sustainable economic growth and reduce poverty and its offshoots. A strong foundation in applied research lies in the education system of any country. Improvements of existing products and services in most countries in Africa can only take root within the legislative context of respective states in as far as funding for research and innovation are concerned. Some governments may be apprehensive in spending substantial amounts of their national budgets on research and innovation because they primarily are not sure about the impact the research and innovation would have on national development. But are there normative assumptions about the expected impacts that would justify the funding or lack of it in research and innovation? Sustainable national development can only be possible when there is political willpower from the state machinery when they develop a deliberate policy on funding applied research and innovation and when there is a realisation that their impact will bring forth economic development and prosperity and yield positive results such as job creation and further economic growth for the benefit of the country. (Schomberg, 2013). It is therefore important to remove all barriers to research and innovation as a matter of necessity. In this regard there is need for more expenditure on Technology particularly ICT because of its ever growing relevance in manufacturing and industry in the global domain as has been seen in Asia's China, Indonesia, India and Malaysia to mention but a few countries.

As far as the expected positive impacts of Technology and innovation are concerned we can look at them in line with the following suggested normative anchors as given in the diagram bellow;

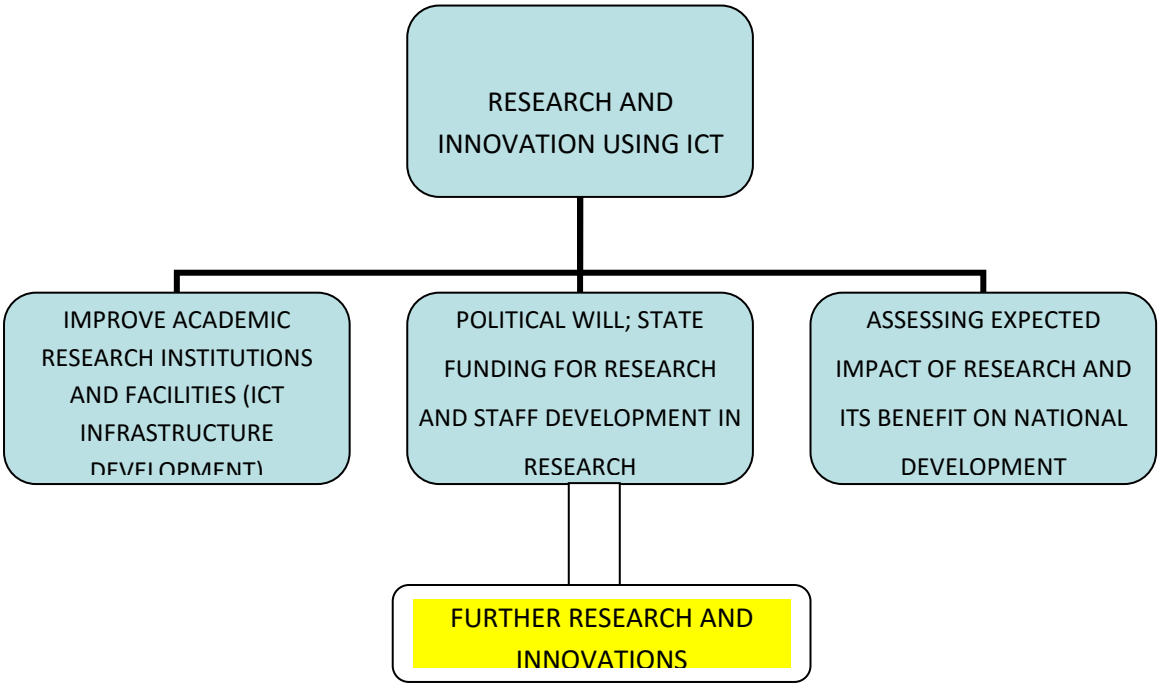


Figure 1. Normative Anchors For Sustainable Research with the use of ICT

The critical role of ICT as a catalyst for sustainable development can be seen in the global interconnectedness that it has created leading to accelerated development in areas such as education, commerce, agriculture, health communication and transport to mention a few among the many others. This can indeed lead to ICT transforming the way people live their lives as it is also being transformed. There are three components that have transformed ICT into a powerful tool for development. (Madden and Weibrod, 2008)

Three Major Components of ICT

ICT has three major components; 1. The Network, 2. The Appliances and 3. The Content. The most important component if the ICT infrastructure is the network. Network is the conduit through which information is transmitted, what one would term as the information super high way. There are several networks which are made up of wireless pathways, satellites, wire, optic fibres and cables. Then there are appliances. These are gadgets that are required for either sending or receiving information. These include mobile cellular phones, radios, telephones, computers, television sets and faxes. These are the appliances which are the entries and exits to the super highway of communication. In Africa the most accessed technology gadget is the cellular phone which can be found in the remotest parts of the continent and it has proved to be a very powerful tool for use in education in some countries;

e-mobile learning. However, other technologies are not easily accessible and the lack of access to such appliances has continued to widen the fault lines between those who are benefiting in the knowledge economy and those that do not.
The third and final component is the content which is the information or data that requires encoding and decoding. This is the message that moves through the super highway known as the network between the sender and the receiver. The improvement, designing and accessibility to these ICTs are proving to have significant effect on the way social and economic activities are being conducted.

The lack of internet infrastructure is indeed a severe constraint in most African countries. The technologies that are available now are proving to be amenable to aggregated demand such as business, education, public and civil administration as well as in health. This is what makes their development imperative. However, there are a number of inhibitors to the successful implementation of the technological changes that are taking place in most African countries. These inhibitors are the ones that pose a challenge that require ways and means to ameliorate the status quo.
For instance, the Zambian education system has now introduced Information and Communications Technology (ICT) as a stand-alone subject to be taught and examined starting from primary education through to secondary education. This means that all schools both in the urban and rural areas are expected to teach ICT and prepare the learners for examinations at the end of the year. This has created a big challenge and confusion to schools in both the rural and urban areas where computers and the internet and electricity connectivity are not available. The move by the Ministry of Education to introduce ICT in the general education sector was a good one and well intended as it is being appreciated by most people in the country that technology improves education and is being embraced by most higher learning institutions who are beginning to appreciate that it has subsequently become the panacea to revolutionising the economy of the country. At the same time ICT has proved to be a tool for increasing accessibility to education, improving the quality of pedagogies as well as the hands-on job skills and modes of delivery. However there are inhibitors that work negatively against the well intended goals.

The first inhibitor, as stated above, is the lack of technology itself, such as computers and other gadgets, especially in the rural areas because some learners have not seen a computer at all or having a feel of it. The second inhibitor is the lack of electricity connectivity. This translates into a number of learners in some rural schools not having access to electricity without which they cannot use the computers even if these were available. The third inhibitor is the lack of computer literacy among the very teachers that are supposed to impart the technological literacy among the pupils. For some teachers it is because of the lack of affinity for technology and others it is just the lack of interest.

Technology and education can change the way Africa is doing business, e-commerce; the way learning and access to education is improving, e-learning and the way agriculture is being conducted such as the introduction of five (5) technologies in the fishing process that are meant to reduce post-harvest losses incurred in the fish industry in Western Zambia and these technologies are being introduced through the post-harvest fish value chain innovations. Another technological innovation in the agriculture industry in Zambia has been the introduction of the e-voucher system for small-scale farmers. This is an electronic method of procuring and distributing agricultural inputs for small-scale farmers in Zambia. The long term intention of the introduction of this facility is to improve the efficiency of the distribution and purchase of farming input by the farmer under the Farmer Input Support Programme (FISP), create more jobs by agro-dealers and subsequently disengage government from taking any role in the provision of agricultural services thereby allowing for more private sector involvement and subsequently helping to create more jobs. The e-voucher has also helped the government to identify 'ghost' farmers and this has gone a long way in eliminating the incurring of extra costs on the part of the government treasury.

The Four Phases in Transformation of Technology

Technology will continue to be the core to rapid economic change due to the various stages of transformation. Technological transformation always goes through four major phases. The initial phase is that of development of the previous technology, which is responsible for the early levels of economic development. The second phase is the one which the drivers responsible for the acceleration of growth in the economy are transformed from incubation to catalysts of implementation until they reach the maturity stage which is the third stage. During the third stage symptoms of stability in the economy are manifested in a less dramatic form in terms of growth. The last phase, the fourth phase is the phase in which growth starts to slow down and you now have to start thinking of developing other new technologies to further continue with the growth at acceptable levels. This is the innovative phase (Davis and Davidson, 1993).

These four phases of technology would require investment in technology, education and research which are responsible for the creation of new knowledge. The trouble with technology is that it has several drivers of change amongst which are; new materials, e-commerce, robotics, e-learning and biotechnology innovations. These are the drivers to development and amongst these the one that has had significant impact is the telematics driver. This is the convergence and exponential growth and development of Information and Communications Technology (ICT). This has further been accelerated by the growth in the power of computers and the migration from analogue to digital formats in the way data and information can be stored and transmitted making ITC to become the primary driver of the sustainable economic change in Africa.

SIDE EFFECTS OF EMBRACING ICT.

Access to ICT to as many people as possible on the African continent may sound very progressive but has its own dire consequences if not checked. One such consequence is electronic waste (eWaste). There is a very serious need to have open discussions about the environmental implications that electronic waste (eWaste) may have on our terrestrial environment. Mechanisms ought to be put in place to allow for effective recycling of ICT devices. Most African countries have inherited the Western-style of consumerism. This destructive tendency may lead to most ICT consumers in Africa to render their nations to become the world's leading destinations for electronic waste. One way of avoiding this is to allow manufacturers of ICT hardware and software to open up industries on the continent to avoid the inevitable consequence of turning most African countries into electronic waste (eWaste) dumping grounds of overused and obsolete gadgets. The other way is to design and create recycling processes as a way of dealing with electronic waste (eWaste) toxic materials such as Lead, Cadmium, and Beryllium that may adversely affect our terrestrial ecosystem. (Pablo, 2010).

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PROXIMATE COMPOSITION OF SOME COMMERCIAL FISH FEEDS AVAILABLE IN MAIDUGURI, BORNO STATE, NIGERIA

Bello, M. M.[1] and Atadiose, J.[2]

[1&2] *Department of Fisheries, Faculty of Agriculture, University of Maiduguri, Maiduguri, Borno state, Nigeria*

ABSTRACT

Fish feed is important in a successful aquaculture production, because the natural food nutrients available in ponds cannot give the desired fast growth within the expected period. In order to determine the capability of available fish feed to supply the needed supplemental nutrient, this study was undertaken to analyse and compare the proximate composition of some commercial fish feeds available in Maiduguri, with the manufacturers' declared composition. The fish feed investigated have different sizes of 2.0, 3.0, 4.5, 6.0, 8.0 and 9.0mm from Coppens Feed for Aquaculture (CF), Euro Feed (EF), Multi Feed (MF), Vital Feed (VF), and an Unnamed Local Feed (UF). The proximate composition of the different feeds were analysed in triplicate. The results revealed that moisture contents were not declared by most manufacturing company. Protein content in CF ranged between 1.3 and 7.5; 6.2 and 7.5 in EF, 1.2 and 4.2 in MF, 1.9 and 5.0 in VF in all the sizes while lipid content ranged between 0.7 and 1.5 in CF, 0.0 and 1.0 in EF, 0.6 and 2.0 in MF; VF 8.0 and 9.0% respectively, while UF had no written specification; therefore, the difference cannot be quantified. The variation between the analysed and the company declared values has no significant difference ($P \geq 0.05$). Therefore, commercial fish feed available in Maiduguri, had lower proximate composition compared with the manufacturers' declared values. The paper, thus, recommends that proper monitoring is required in the fish feed industry.

***Keywords**: fish feed, proximate composition, fish culture, Maiduguri, commercial feeds.*

INTRODUCTION

The world population is on the rise, as well as the demand for aquatic food products (fish). Production from capture fisheries at the global level is leveling off and most of the main fishing areas have reached their maximum potential. Sustaining fish supply from capture fisheries will therefore, not be able to meet the growing global demand for aquatic food (fish). At present, the aquaculture sector contributes a little over 40 million tonnes (excluding aquatic plants) to the world aquatic food production (Olin and Paul, 2005). As fish feed is very important for a successful aquaculture production, the natural food nutrient available in the pond cannot give the desired fast growth within the expected period. Growth, health and

mmbello@unimaid.edu.ng

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reproduction of fish and other aquatic animals are primarily dependent upon adequate supply of nutrient, both in terms of quality and quantity. Supplied inputs such as feeds and fertilizers have to be ensured, so that the nutrients and energy requirements of the species under culture could be met and the reproduction goals of the system achieved (Hassan, 2001).

Nettleton et al., (1990) reported that the nutrient profile of catfish showed that it is highly nutritious, high in protein, low in fat and cholesterol and a good source of certain vitamins and minerals. Thus, if the fish is fed with a feed that affects the nutrient composition of the fish, the residual low level of protein in the flesh of the fish is passed unto the consumer which consumes a fish with poor quality nutrient in its flesh and which makes the fish a poor source of quality animal protein that it is supposed to be. When talking of quality of a fish feed it takes into consideration the pellet firmness and quality, that is its durability in water as fish feed of low quality disintegrates easily in the ponds thereby polluting the water and causing wastage of the feed (Esuga, 2004). Fish feed should be packaged such that it will be free from of mycotoxins and aflatoxins in storage and is also free from contaminants (Esuga, 2004). This study was undertaken to analyse and compare the proximate composition of some commercial fish feeds available in Maiduguri, with the manufacturers' declared composition.

MATERIALS AND METHODS

The study was carried out in Maiduguri, the Borno–State capital. The samples of the commercial fish feed were bought from retail shops within the Maiduguri Metropolis. The different feeds available at the time of the study were: Coppens Feed for Aquaculture (CF), Euro Fish Feed (EF), Multi Feed (MF), Vital Feed (VF), and locally produced fish feed (Unnamed). Samples were collected in their varying sizes (in millimetres) which were targeted towards different culture stages depending on the size (age) of the fish. Table 1 shows the type of commercial fish feeds, their country of production and available pellet sizes.

Table 1: Feed available in Maiduguri, Manufacturer's name, Country of manufacture and Pellet sizes.

Manufacturer's name	Country of manufacture	Pellet size (in millimetres)							
		2.0	3.0	4.0	4.5	5.0	6.0	8.0	9.0
Coppens feed	Holland	√	√		√		√	√	
Multi feed	Israel	√	√	√			√		
Euro fish feed	Lebanon	√					√		
Vital feed	Jos, Nigeria			√			√		√
Local feed	Maiduguri, Nigeria				√				

The proximate composition of the different commercial fish feeds were analysed according to standard procedures given by Association of Official Analytical Chemist (AOAC, 2006), at the National Agency for Food and Drugs Administration and Control

mmbello@unimaid.edu.ng

(NAFDAC) laboratory. The proximate composition of the fish feed were analysed in triplicate for moisture, protein, lipid, and ash contents.
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Moisture
Moisture was determined by keeping feed samples in a thermostat oven at 105^{o}C for 24 hours.

Crude protein
Samples (0.5g) were digested on digestion unit for 45 minutes. The digester was then distilled in a distillation unit. Finally, it was titrated with 0.2N HCl and crude protein was obtained by multiplying the total nitrogen by a conversion factor of 6.25.

Crude lipid
Crude lipid was determined by extracting a weighed quantity of sample with acetone in Soxhlet extraction unit.

Ash
Ash content was determined by igniting feed samples in a muffle furnace at 450^{o}C overnight. Weight of ash was obtained after burning the organic constituents of the feed samples.

Results and Discussion
Analysed proximate composition and standard deviation of different commercial fish feeds available in Maiduguri was presented in table 2.

Table 2: Analysed proximate composition and standard deviation of different commercial fish feeds available on Maiduguri Nigeria (% dry matter basis).

Name of the Feeds	Size of the feed (mm)	Moisture content (%)	Crude Protein (%)	Lipid (%)	Ash (%)
A Local Fish Feed	4.5	5.0±0.01	37.5±0.08	15.0±0.13	11.4±0.08
Coppens Feed for aquaculture	2.0	5.4±0.33	40.6±1.36	14.0±0.78	11.0±1.13
	3.0	6.2±0.43	40.7±1.14	13.7±0.75	14.2±1.28
	4.5	5.6±0.30	38.8±0.38	13.0±0.70	10.2±1.54
	6.0	5.6±0.27	37.5±0.71	12.0±0.86	12.8±1.64

mmbello@unimaid.edu.ng

	8.0	5.4±0.16	38.8±0.71	13.5±0.73	8.8±1.34
Euro Fish Feed	2.0	5.0±0.13	38.8±0.74	8.0±0.58	9.6±1.21
	3.0	5.0±0.09	38.8±0.74	8.0±0.87	9.6±1.05
	4.5	5.1±0.40	37.5±0.67	7.0±0.35	11.7±0.91
	6.0	5.1±0.57	37.5±0.67	7.0±0.15	11.7±1.11
Multi Feed	2.0	4.0±0.57	43.8±0.96	13.0±0.71	10.3±1.09
	3.0	4.2±0.37	41.9±0.91	12.6±0.99	12.5±1.06
	4.0	4.6±0.13	42.6±1.05	14.0±0.79	10.2±0.29
	6.0	5.3±0.15	40.8±0.05	14.0±0.87	10.5±0.41
Vital Feed	4.0	5.4±0.14	33.1±1.42	15.0±0.50	10.5±0.50
	6.0	5.3±0.12	31.3±0.71	15.6±0.28	10.9±0.71
	9.0	5.1±0.10	30.3±0.53	16.0±0.10	9.9±0.32

The producers declared specification was represented in table 3.

Table 3. Producer's declared composition.

Name of Feeds	Size of the feed (mm)	Moisture content (%)	Crude Protein (%)	Lipid (%)	Ash (%)
A Local Fish Feed	4.5	NA	NA	NA	NA
Coppens Feed for aquaculture	2.0	NA	42.0	13.0	9.5
	3.0	NA	42.0	13.0	9.5
	4.5	NA	42.0	13.0	9.5
	6.0	NA	45.0	12.0	9.5

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	8.0	NA	45.0	12.0	9.5
Euro Fish Feed	2.0	NA	45.0	8.0	8.0
	3.0	NA	45.0	8.0	8.0
	4.5	NA	45.0	7.0	8.0
	6.0	NA	45.0	7.0	8.0
Multi Feed	2.0	NA	45.0	12.0	8.5
	3.0	NA	45.0	12.0	8.5
	4.0	NA	45.0	12.0	8.5
	6.0	NA	45.0	12.0	8.5
Vital Feed	4.0	12.0	35.0	7.0	NA
	6.0	12.0	35.0	7.0	NA
	9.0	12.0	35.0	7.0	NA

*NA – Not available.

The differences observed between analysed and producer's specification was presented in table 4.

Table 4. Differences in value between producer's specification and analysed composition.

Name of the feed	Size of the feed (mm)	Moisture content (%)	Crude Protein (%)	Lipid (%)	Ash (%)
A Local Fish Feed	4.5	NA	NA	NA	NA
Coppens Feed for aquaculture	2.0	NA	1.4	1.0	1.5
	3.0	NA	1.3	0.7	4.7
	4.5	NA	3.2	0	0.7

mmbello@unimaid.edu.ng

	6.0	NA	7.5	0	3.3
	8.0	NA	6.2	1.5	0.7
Euro Fish Feed	2.0	NA	6.2	0	3.6
	3.0	NA	6.2	0	3.6
	4.5	NA	7.5	1.0	3.7
	6.0	NA	7.5	1.0	3.7
Multi Feed	2.0	NA	1.2	1.0	1.7
	3.0	NA	3.1	0.6	4.0
	4.0	NA	2.4	2.0	1.7
	6.0	NA	4.2	2.0	2
Vital Feed	4.0	12.0	1.9	8.0	NA
	6.0	12.0	3.7	8.6	NA
	9.0	12.0	5.0	9.0	NA

*NA – Not available.

Moisture content

The analysed moisture contents varied between 5.4 to 6.2% in CF, 5.0 to 5.1% in EF, 4.0 to 5.3% in MF, 5.1 to 5.4% in VF and 5.04% in the unnamed local fish feed.

Most of the collected feed samples do not declared their moisture content except for VF which the declared moisture content was higher than the analysed value (Tables 2 and 3). The environmental condition in Maiduguri which has low humidity might be responsible for the difference in values. Soorensen (2003) reported that moisture content reduced to below 8% increase shelf-life during storage. The National Research Council (1981) reported that feed stored in an area with high moisture and/or high temperatures will cause per oxidation of the lipid and degradation of vitamins. New (1987) considered that a safe moisture level is that which develops at a relative humidity of about 75% and the feeds must be stored for a shorter time.

mmbello@unimaid.edu.ng

Crude Protein

The analysed crude protein contents for CF, EF, MF, VF and an unnamed fish feed as presented in table 2, ranged between 40.6 to 37.5%; 37.3 to 38.8%; 40.8 to 43.8%; 30.0 to 33.1% and 37.5% respectively. Protein is a major growth promoting nutrient in feeds. The protein requirements of fish are influenced by various factors such as fish size, water temperature, feeding rate, availability and quality of natural foods and overall digestible energy content of diet (Satoh, 2000; Wilson, 2000). The crude protein levels in most of the analysed data are more or less similar to the company declared values. The crude protein content of most of the commercial feeds industries analysed are within the acceptable range (30.3±0.53 and 43.8±0.96%) recommended for fish (NRC, 1983). Wilson (2000) reported that most of the commercial channel catfish feeds contain 32% crude protein. Boonyaratpalin (1988) estimated the protein requirement for tropical catfish to be 35 – 40%, 25 – 35% and 28 – 32% for fry, grow – out and broodstock, respectively. Watanabe et al., (1990) observed that catfish production was increased through the use of high protein feed (35% or more) and that phase feeding may be more profitable.

Lipid or Crude fat

The analysed lipid or crude fat contents of different fish feeds varied considerably among the feed manufacturers. The mean range of crude lipid recorded are 12.0% to 14.0% in CF, 7.0% to 8.0% in EF, 40.8% to 43.8% in MF, 15% to 16% in VF and 15% for local fish feed (Table 2). Except for 4.5mm in EF and 6mm in CF, all other feeds had higher lipid content than the minimum content declared by the company. However, the analyzed feeds had about 1-2% less lipid content compared to the company declared values. Lipids are primarily included in formulated diet to maximize their protein sparing effect (Hassan, 2000) being a source of energy. The analysed lipid content of the different commercial feeds ranged from 7.0 to 16.0% which was higher than the company declared lipid content except in EF. This lipid values are lower than that of Cowey and Sargent (1979) who reported that in general, 10 – 20% of lipid in most freshwater fish diets gives optimal growth rates without producing excessively fatty carcass. On the other hand, Wilson (2000) reported that lipid level in catfish feeds should be 5.0 to 6.0%. Luquet (2000) also stated that dietary lipid levels of 5.0 to 6.0% are often used in Tilapia diet.

Ash

The analysed ash contents of the collected commercial fish feed samples were in the range of 8.8 to 14.2% in CF, 9.6 to 11.7% in EF, 10.2 to 12.5% in MF, 9.9 to 10.9% in VF and 11.4% in local fish feed (Table 2) which was higher than values of 5.33-9.45% reported by (Ayuba and Iorkohol 2013).

CONCLUSION

Growth, health and reproduction of fish and other aquatic animals are primarily dependent upon an adequate supply of nutrient, both in quality and quantity, irrespective of the culture systems in which they are grown. Conclusively, the manufacturers declared nutrient composition was quite different from the values obtained when analysed. All the analysed feeds had their values within the recommended range for catfish production as recommended by the manufacturers Therefore, supply of inputs (feeds) has to be ensured so that the nutrients and energy requirement of the species under cultivation are met and the production goals of the systems are achieved.

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mmbello@unimaid.edu.ng

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mmbello@unimaid.edu.ng

THE EFFECTS OF DESIGN ON THE VENTILATION OF CAMPUS HOSTELS IN UNIVERSITY OF LAGOS, NIGERIA: A CASE FOR SUSTAINABLE APPROACHES IN THE PROVISION OF CAMPUS HOUSING IN THE TROPICS

Oginni, A.[1] and Oginni, F.[2]

[1&2] *Department of Architecture, University of Lagos, Nigeria*

ABSTRACT

The fundamental goal in the design of educational facilities is the provision of spaces that enhance and encourage learning, development and the achievement of optimum performance by students in their academic pursuits. The IEQ, indoor environmental quality of these spaces, therefore, cannot be overemphasized. From the educational standpoint, ventilation levels of a building can have significant effects on the health and indirectly impact on the learning and performance of students. The aim of this research is to assess the perception of the users of 4 hostels, ventilation levels of their rooms and levels of the different hostels. 30 samples of both male and female hostels were randomly chosen and evaluated vis-à-vis a POE evaluation of the occupants to determine the relationship between the design of the structures and the responses of the occupants. The study revealed that the perception of thermal comfort was also influenced by external factors such as environmental and behavioural factors. Recommendations were made for a holistic approach to the design of future facilities and the inclusion of passive techniques to ensure adequate IEQ for the students housing facilities.

Keywords: *IEQ, Campus housing, POE, Energy savings, Design. BIU assessment*

INTRODUCTION

The epileptic supply of power from the grid has necessitated the constant use of alternative power supply such as, the generator or inverter system. This is the prevailing issue evident in Nigeria. The discomfort of heat in these parts of the world has necessitated the use of electrical fans and air conditioning for ventilation. In the event of shortage of power supply and PMS, the result is a poor indoor thermal comfort or quality for most of these spaces. The University of Lagos can be a model of excellence in environmental sustainability and academic performance. This research is a drive towards achieving this by assessing the issues of sustainability and revealing potentials for possible improvement of the Campus structures.

*oginniadeyemi@gmail.com
folarinoginni@gmail.com

Oginni, A.[1] and Oginni, F.[2] (2016) The Effects Of Design On The Ventilation Of Campus Hostels In University Of Lagos, Nigeria: A Case For Sustainable Approaches In The Provision Of Campus Housing In The Tropics In: Mojekwu,J.N., Nani G., Atepor, L., Oppong, R.A.., Adetunji,M.O., Ogunsumi, L., Tetteh, U.S., Awere E., Ocran, S.P., and Bamfo-Agyei, E. (Eds) Procs 5th Applied Research Conference in Africa. (ARCA) Conference, 25-27 August 2016, Cape Coast, Ghana. 59-71

In a movement towards a sustainable future, retrofitting of old buildings will conserve already-existing resources rather than producing more and depleting the natural reserves. The aim of this research is to evaluate the design of some selected hostels and assess the IEQ levels of these buildings, and the objectives are to analyse the physical characteristics of the selected hostels, examine the socio-economic and cultural characteristics of students and teachers in these selected schools in Lagos, to evaluate the responses of the users to the indoor environment of their rooms and to analyse the relationship between the indoor environmental quality, the users' responses, and the climatic conditions of the study area.

More research should be carried out prior to design and construction of building structures to determine how architectural forms and façades can be used to enhance indoor environmental quality of buildings within the campus environment.

Very little research has been carried out on post occupancy evaluation of student housing buildings with respect to their IEQ in schools in South Western Nigeria. This is the main issue which this research seeks to address.

The resultant information presented in this study will go a long way to influence the approach to the design of housing facilities for the students and staff residences within the campus environs. .

Literature Review

The Indoor Environmental Quality of classrooms is very crucial. Its impact on the performance of pupils has been researched into in various scientific studies, however they are limited. In the field of Architecture, a lot is left to be desired. There is an increase in the awareness of the impact of the environment on health, generally; indoor environmental quality being an integral part of a building's performance (Wong, Mui and Hui, 2008).

In this section, the discussion follow in these sub sections; Introduction; General information of school residences in University of Lagos, Nigeria , Indoor environmental quality and the relevant factors, , Review of past theories, Current trends and models.

1. General information on the Status of institutional facilities in Nigeria.

Previously, environmental influence had not taken a prime consideration as one of the factors that influence productivity of users in schools, workplaces and offices in Nigeria.

A lot of research has been done world over, on the relationship between (ITC) indoor thermal comfort, the building and its environment, as well as the impact on performance of its users, Humphreys (2005) the energy performance paradox, Hausman (1979), heat stress and its effect on concentration and thermal satisfaction, Macintosh and Steemers (2005), Aynsley (1967), etc.

The current state of performance of pupils in the education sector leaves so much to be desired. Similarly, the performance of pupils in the Tertiary levels is at a decline.

*oginniadeyemi@gmail.com
folarinoginni@gmail.com

There are various factors that could be responsible for this; Family background and socio-economic conditions, differential access to facilities, and inherent ability, teachers' motivation or skill etc, typically impact on much of a student's test performance, making it hard to disentangle what portion of the student's performance is attributable to the hostel environment.

The state of institutional facilities in Nigeria, being deplorable, is a result of high demand and the pressure on the existing facilities and this has led to the inefficient running of such systems. With this pressure on the existing facilities, they usually depreciate at a faster rate.

Formerly, lot of emphasis has been on the teacher/student relationship. Current study shows that it could be due to several factors, the indoor environmental quality of living spaces being one of these. IEQ is composed of several factors amongst which are indoor thermal comfort (ITC), air quality, acoustics, lighting, relative humidity, etc. ventilation (ITC), is the primary focus in this regard.

Much ado is being made presently about the high consumption levels of municipal facilities in Nigeria. Improved IEQ will have short term benefits (improved IEQ) as well as long term benefits with respect to energy savings.

Indoor Environmental Quality and physical related factors

An individual expresses satisfaction or comfort in a space that meets his or her physical, psychological, emotional or physiological needs. The concept of indoor environmental comfort consists of several variables; the air temperature and quality, visual, acoustics, lighting, ventilation, relative humidity, and velocity; all these impact favourably or otherwise on the performance of various tasks carried out in them.

They can be categorized into four in terms of the quality of a space - thermal comfort, indoor air quality (IAQ), visual comfort and acoustic comforts. Under thermal comfort, ventilation is the main focus in this research

The building's indoor characteristics is determined by the architecture of the enclosed space. This is the envelope or external walls that shield the internal spaces away from the harsh exterior environment.

The building indoor environment houses the following specialized fields, namely; Architecture, HVAC, thermal comfort, indoor air quality, lighting, acoustics, control systems. Architecture (an art and science of creating and designing buildings) is therefore at the crux of determining the satisfaction or comfort derived buildings. Its influence on their task performances therefore cannot be overemphasized.

A building's indoor comfort conditions is determined primarily by the design of the building, as well as its energy efficiency. A building's indoor comfort is as a result of the interactions between the climate, the region and the structural elements of the building, the HVAC

*oginniadeyemi@gmail.com
folarinoginni@gmail.com

systems, controls and user behaviour (dynamic relationship between building, control and building use), Catalina and Iordache (2012). One of the greatest challenges of modern design of buildings is to create thermally comfortable spaces through the study of various factors (Katafygiotou, Serghides, 2014).

Various fields in which this topic has been expounded or researched into - Education, psychology, sociology and the humanities

The schools' environment whether physical (or intangible factors -home background), inadequate school facilities, misuse of technology advancement and school climate such as teacher-student relationship plays major role in the life of every individual whether students, teachers, employers or employees.

In psychology, the concept of comfort and satisfaction, how the environment can impact on the ability of the individual to be stimulated positively to perform tasks optimally. Certain aspects of the subconscious mind can be stimulated to give an individual the desire to carry out activities optimally in such spaces. Table 1 below shows review of related literature and the various models postulated.

Past theories which inform these trends

Thermal comfort is one of the most important parameters of the indoor environmental quality of spaces, and is defined by ISO standard 7730 and ASHRAE standard 55 as 'the state of the mind which expresses satisfaction with the thermal environment in which it is located'.

Fanger (1970), in characterizing the thermal conditions of an indoor space, developed a model to express the relationship between the human body and its environment by using subjective and objective means. He derived a 7 point scale ranging from cold (-3) to hot (+3). This was based on the PMV (Predicted Mean Vote, which is the average comfort vote) and PPD indicators (Predicted Percentage of Dissatisfied).

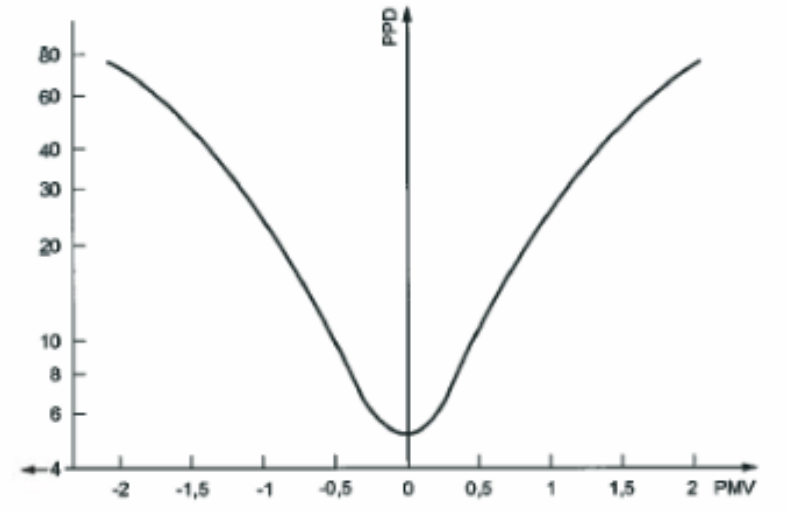


Figure 2: Predicted percentage dissatisfied as a function

*oginniadeyemi@gmail.com
folarinoginni@gmail.com

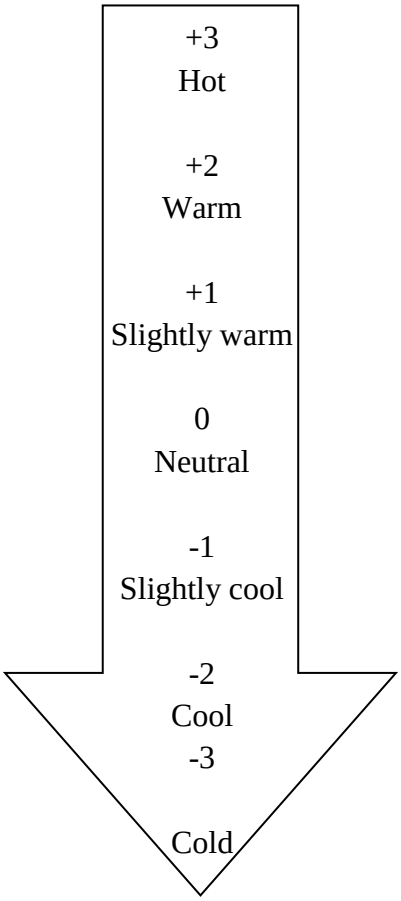


Figure 3: SEVEN-POINT THERMAL SENSATION SCALE

Source; De Giuli, V., Da Pos, O. and De Carli, M. (2012): Indoor environmental quality and pupil perception in Italian primary schools

Fanger's comfort equation was derived from extensive climate chamber research. The responses of over a thousand European and American subjects to the thermal conditions in a well-controlled environment were used to expand this equation into the PMV model. This equation and the PMV model are intended for use in the design of HVAC systems (Ter Mors,2011).

Fanger and Toftum (2002) introduced an improvement on the PMV model called the expectancy factor (e), usually 0.5- 1.0 and it is determined by location and frequency of warm periods. This improvement is to cover for discrepancies in the model with respect to non-air-conditioned spaces and warmer climates where people already expect the indoor climate

*oginniadeyemi@gmail.com
folarinoginni@gmail.com

levels to be low and adjust to even warmer temperatures predicted uncomfortable by the PMV models.

Another limitation is that PMV was developed using adults and not young children and it takes into account physiological conditions but not psychological. These leads to certain variations in predictions and comfort calculations. The ISSO 7730 states these viability intervals clearly, but when values fall outside of them, the results are likely to be unreliable, (Nicol and Humphreys, 2007). This is in favour of Humphrey's model which takes into consideration the variability of the PMV models.

Recently, Katafygiotou and Serghides (2014) carried out a research aimed at investigating the thermal conditions of classrooms (indoor and outdoor) for a typical secondary school in Cyprus. The AT (air temperature) and RH (relative humidity) were focused on mainly and compared with international standards (ASHRAE and ISO standard 7730). Results showed that indoor climatic conditions (especially air temperature and humidity levels) were unsatisfactory for occupants in most instances; differences exist between the harsh outdoors and indoor temperatures were low, and there were differences in thermal comfort between males and female genders. It was advocated that future studies should focus on problem solutions of classrooms quality and the significance of the environmental variables, investigating their impacts (temperature, humidity, metabolic rate and clothing levels).

Also, Almeida and Freitas (2014) researched into the indoor environmental quality of South European schools in order to assess the impact of retrofits on the indoor environmental quality of school buildings. The results confirmed that the IEQ in the non-retrofitted school buildings was not adequate, the classrooms are thermally uncomfortable, with records considerably below the reference temperature specified in regulations, and the CO2 concentration exposed a very poor IAQ.

Another research by Lee and Mui et al (2012) investigated IEQ and learning performance in air-conditioned university teaching rooms. The results showed strong associations of the overall IEQ votes with the environmental parameters A comfort model for satisfaction of users with their workspaces is another approach in environmental quality research.

While all these studies have methodological limitations, they all point to the fact that the environmental quality has a marked impact on students and thus similarly may as well impact their academic performance.

Environmental Evaluation Research

Evaluation studies allows the researcher determine the quality of the environment with respect to the task required of these spaces. Its aim is to use evaluation as a diagnostic tool to assess the functionality of workspaces and improve their effectiveness for its use.

Environment evaluation looks primarily at the physical characteristics of the space, as factors that affect human activities and interactions amongst themselves. Its early studies started off

*oginniadeyemi@gmail.com
folarinoginni@gmail.com

with housing and homes with respect to the needs of users and user attitudes. The aim was to understand the effect of the built environment on users – whether positive or negative and integrate these findings into planning and designs of future housing (Michelson 1975; Preiser, Rabinowitz and White, 1998). This was carried out after the Second World War 11 on Government subsidized housing.

Environmental evaluation first started in the field of environmental psychology, and it expounded typically on two main areas- the identification of ways in which ambient environmental conditions affect the performance of tasks, and second, how workers perceive and assess these conditions.

POE is one of the methodologies used for assessment of buildings especially newly occupied ones by getting the responses of occupants via survey or questionnaire. It is for the acquisition of data and research information. The BPE (Building Performance Evaluation), is where the performance of a building is assessed in basically three areas- thermal performance, energy performance and environmental performance. The BIU (building-in-use assessment) which is an adaptation of both POE and BPE), is action based as results from the field surveys carried out can be used directly for design decisions and policies.

The BPE model of environmental evaluation attempts to match users' satisfaction and comfort ratings in a given environment with technical measures of ambient environmental conditions. Hence the BIU is appropriate for both subjective and objective measures in determining indoor environmental quality. See diagram 3

Methodology

The method of study involved physical observations, recording and data collection and analysis for each of the halls by the researcher, in collaboration with students of the University of Lagos.

For the purpose of this study, ventilation, as focus is the principal variable in this housing type. Being one of the most important factor for thermal comfort, it contributes to the wellbeing of the occupants and the quality of the indoor environment of a building.

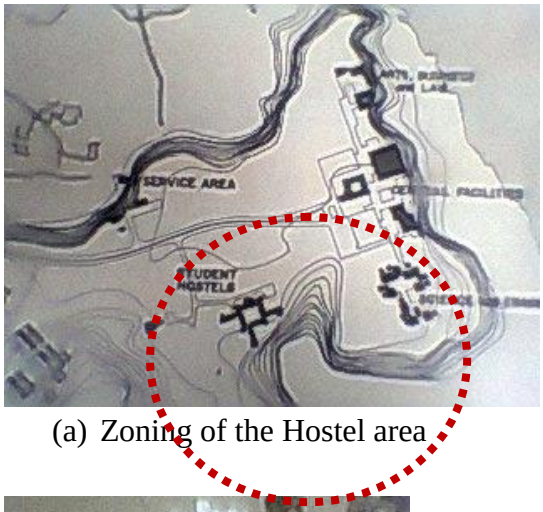
To come up with a realistic assessment of the present status and potentials for improvement of the Campus structures, the halls chosen were of different ages- Erastus Akingbola (Postgraduate hall)-2006, Mariere Hall-1974 and King Jaja Hall (male undergraduate halls)-1974, Moremi Hall(female hall)-early sixties. The characteristics of each hostel in terms of Architectural Design are thus:

Moremi Hall comprises of three units of single loaded corridor apartments with open courtyard spaces in each. Windows are louvered windows with horizontal hoods on the opposite elevation without the balcony. The forth wing consists of a double loaded corridor system.

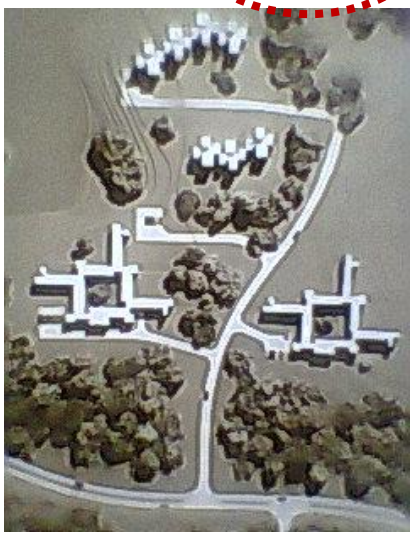
*oginniadeyemi@gmail.com
folarinoginni@gmail.com

King Jaja Hall- Jaja hall has 3 floors with single loaded corridors with spaces surrounding the courtyard directly. This optimizes the use of sunlight very well. It also makes use of louvered type windows.
Mariere Hall- 3 storey building with N/S orientation. It has both single and double loaded corridors. Sunlight doesn't enter directly into the spaces. Corridors are dark during the day time. It makes use of horizontally projected windows.

All the hostels except the Postgraduate building all were designed with a Quadrangle principle as the concept. All elevations had either horizontal (Moremi,), or egg-crate (King Jaja, Mariere) type of shading devices to reduce direct solar insolation. Erastus Akingbola has neither. Below is the Location plan, site and proposed plans for male and female hostels designed by Roberts and McMillan in 1963.

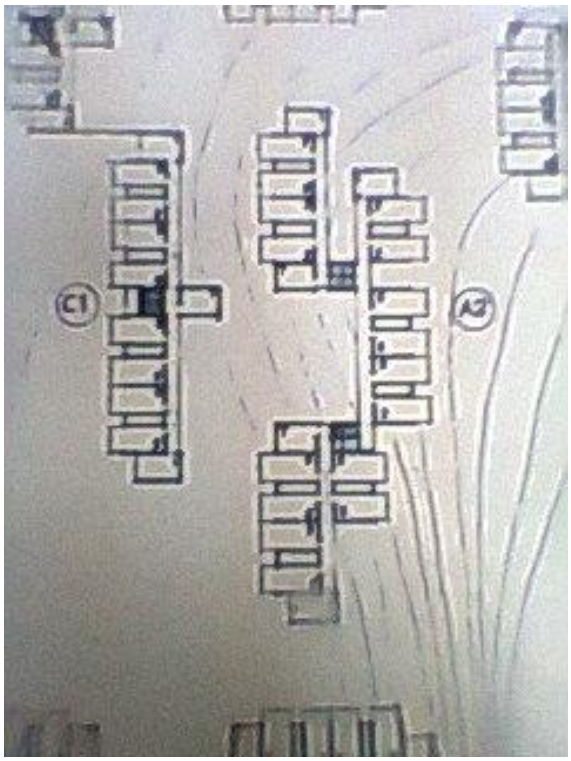


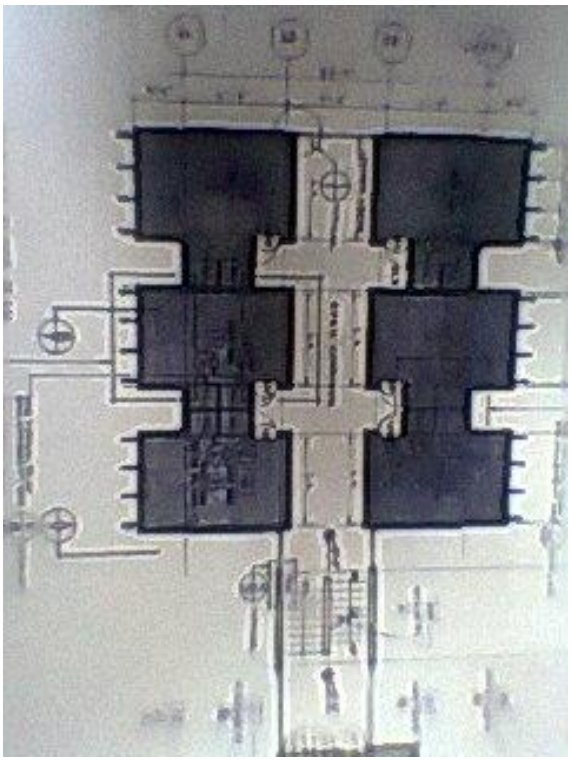
(a) Zoning of the Hostel area



(b)Zoomed in, we have Moremi by the left (adapted), and Mariere on the right.

*oginniadeyemi@gmail.com
folarinoginni@gmail.com



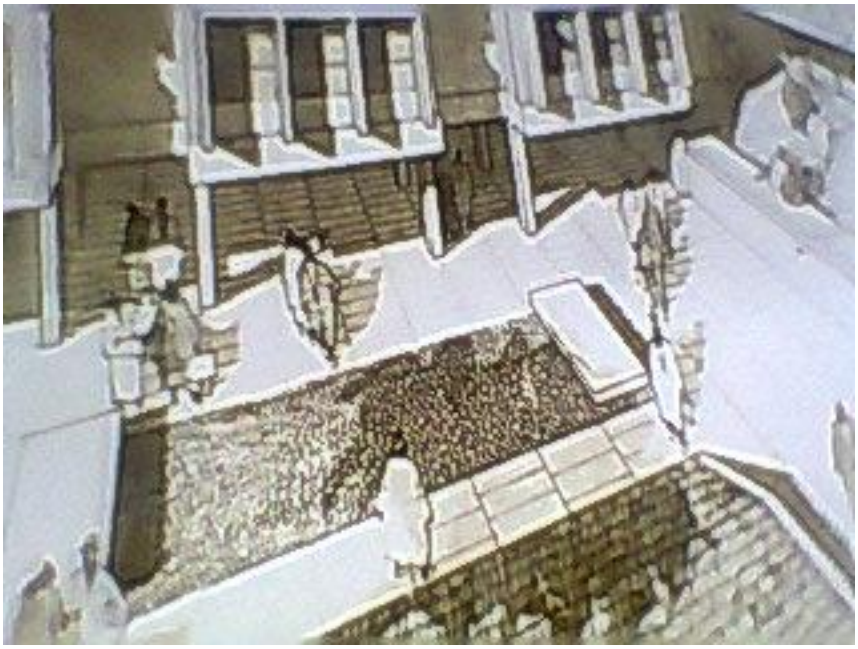


(c) a typical array of rooms around a court space (d) one wing of the female hostels



(d) a drawing of Mariere Hostel.

*oginniadeyemi@gmail.com
folarinoginni@gmail.com

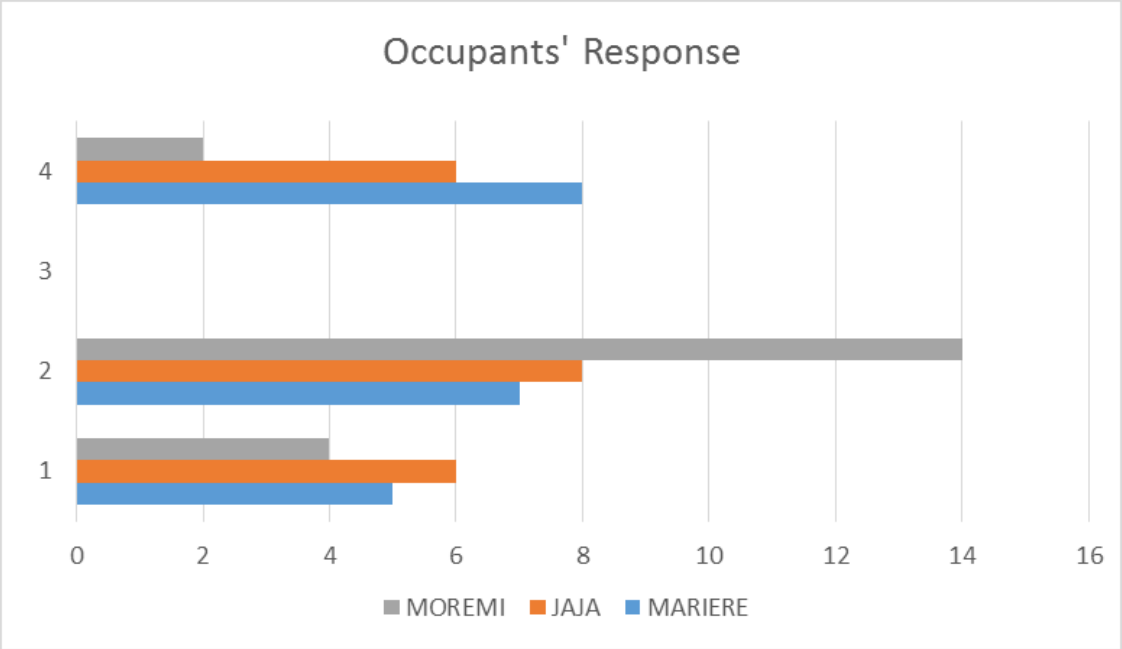


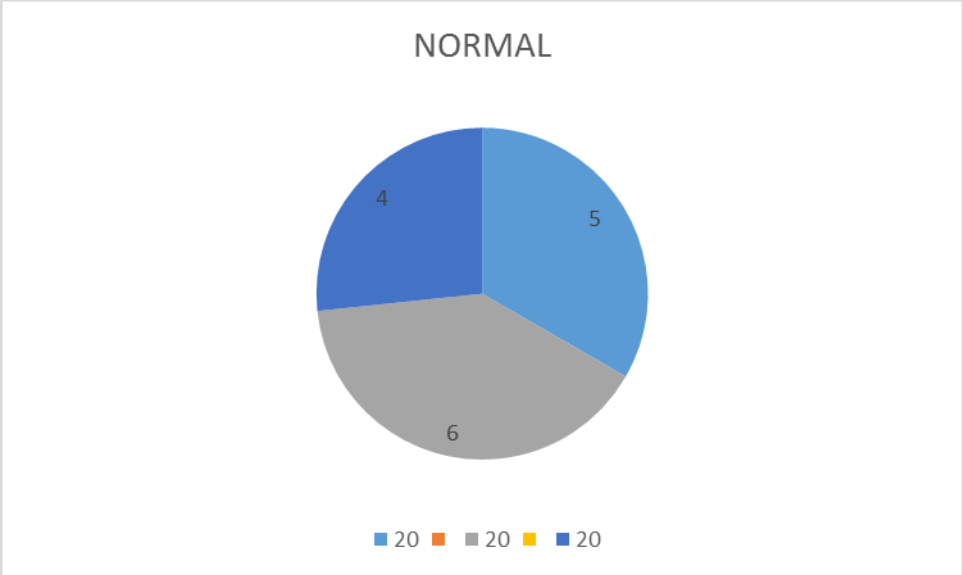
4. Data Collection

Random sampling of 10 from each of the pilot hostels was used, making 40, of which not all questionnaires was returned , while only 20 was conclusive. Two sets of data were collected- the architectural drawings and plans and physical survey of the buildings. The information from the interviews and online electronic surveys of the responses of the occupants. With these, the assessment was carried out.

S/N	HOSTEL	RESPONSE				
		NORMAL[0]	COOL[-1]	INDIFFERENT	HOT[1]	TOTAL
1	MARIERE	5	7	8	0	20
2	JAJA	6	8	6	0	20
3	MOREMI	4	14	2	0	20

*oginniadeyemi@gmail.com
folarinoginni@gmail.com





Discussions

The research carried out showed that personal/ contextual factors to a large extent influenced the perception of users of the thermal comfort of such hostels. Behavioural practices was also noted which influenced the comfort levels of the hostels. Poor maintenance of the windows and fittings were additional impediments to the overall satisfaction achieved by the occupants. Inability to access controls to the windows also hindered adaptation by the occupants of the buildings. A building that is run in a well suited mode to its users will

*oginniadeyemi@gmail.com
folarinoginni@gmail.com

naturally be environmentally responsive and thereby require much less to run or operate. This in itself is a solution to the 'performance gap' between predicted and actual energy usage in buildings.

Several researches have been carried out in developed countries from which the awareness of such needs have been conveyed, yet very little of the scenarios are applicable in developing nations with unstandardized educational systems. Yet the realities of climate change are evident to all and sundry. Such economies can only do as much- cultivate a user-centric approach in general building provisions, in this case- in campuses, by understanding what their behavioural responses are to their living environment (as exemplified by their housing facilities; socio-economic, culture, lifestyle driven, etc)

This will have positive implications on built IEQ studies in institutional facilities for the Tropics, specifically, in Nigeria.

Further research should be carried out in determining the most significant factors in environmental quality research for housing in campuses as well as suitable tools in evaluating their performances.

The perception of pupils is largely influenced by their cultural background, environmental awareness level of the students (Khan and Kotharkar, 2012).

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*oginniadeyemi@gmail.com
folarinoginni@gmail.com

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*oginniadeyemi@gmail.com
folarinoginni@gmail.com

THE EFFECT OF AGGRESSIVE ENVIRONMENTS ON REINFORCING STEEL EMBEDDED IN CONCRETE

Ekere, J. T.[1], Alhassan, A. Y.[2] and Atama, E. O.[3]

[1,2]*Department of Civil Engineering, Federal Polytechnic Idah, Idah, Kogi State, Nigeria*
[3]*Department of Metallurgical and Materials Engineering, Federal Polytechnic Idah, Idah, Kogi State, Nigeria*

ABSTRACT

The corrosion of reinforcing steel in reinforced concrete has been established as the major factor causing widespread deterioration of concrete structures. Corrosion of reinforcing steel in concrete leads to reduction of bond strength between steel and concrete, reduction of steel cross-sectional area, cracking and loss of serviceability. This study investigates the effects of different aggressive environments on steel reinforcement embedded in concrete. In the study, 16 mm diameter reinforcing steel bars were embeddedat a uniform cover of 40 mm in 150 mm x 150 mm x 600 mm concrete beam and the concrete member cured for 28 days. At the expiration of the 28 days moist curing period, the beams were loaded in flexure causing cracking of the concrete thereby exposing the steel reinforcements. The cracked reinforced concrete beams were then immersed in different aggressive solutions HCl (Muriatic Acid), H_2So_4 (sulfuric Acid), HNO_3 (Nitric Acid), NaOH (Caustic Soda) and NaCl (Common Salt)) for a duration of seven months. At the end of this curing period, the embedded steel reinforcement were removed and cleaned of attached concrete and then tested for weight loss, change in diameter and loss in strength. The results obtained for the different aggressive environments for weight loss shows that the reinforcing steel bar in NaOH environment presented the least change in weight of (23%). The change in reinforcing steel diameter were very pronounced for all the environments, with steel in the NaCl environment presenting the worst case at the end of the 7 months exposure. A value of 14.2% was recorded. The results obtained for the change in strength was pronounced for reinforcing steel exposed to the HCl environment (14.6%).

Keywords: *Reinforced concrete, Corrosion, Aggressive environment, Deterioration.*

1. Introduction

Reinforced concrete uses steel to provide the tensile properties that are needed in structural concrete. However, when reinforcement corrodes, the formation of rust leads to loss of bond between the steel and the concrete and subsequent delamination and spalling of the reinforced concrete (Varpetic, 2008).Steel in concrete is usually in a non-corroding, passive condition. But in a harsh environment like elevated temperature, relative high humidity, and exposure to

chemicals such as carbonation, chloride and other acidity agents that reduce their alkalinity to the extent that ions start to release and initiate anode and cathode which starts the corrosion process (Al Zubaidy and Al Tamini, 2012). Thus, corrosion of reinforcement in concrete structures can be likened to the action which take place in a flash battery (ACL, 1992).

Corrosion of steel in concrete is a serious problem in the world today. According to the conservative estimates in developed countries, one-half of engineering structures are deteriorating due to corrosion of reinforcement and billions of dollars are required to repair or rehabilitate the damaged structures (Treadway, 1982). Several studies have shown that the annual direct cost of corrosion to the industrialized world economy is approximate 3.1% of the country's Gross National Product (GNP) (Barbara and Robert, 2006). Repair, maintenance and replacement of concrete structures damaged by corrosion require a huge amount of investment that must be reduced to the lowest possible value. The study of corrosion and its effect as a whole is very important because preventive and monitoring measures of corrosion of steel go a long way in reducing some of the effects thereby ensuring the safety of lives and properties. Corrosion of steel reinforcing bars is the most prevalent deterioration mechanism in reinforced concrete structures (Mehta & Monteiro, 2006; Broomfield, 1997). Corrosion can be define as a thermodynamically, spontaneous and unavoidable reaction of metals which is adverse to the metallurgical process of the production of metals from raw ores. DIN EN ISO 8044 (2015) simply defines it as the physiochemical interaction between a metal and its environment that results in changes in the properties of the metal, and which may lead to significant impairment of the function of the metal, the environment or the technical system of which they form a part. Most metals, especially steel which are iron based are very likely to suffer from corrosion depending on the environmental medium and steel properties. The corrosion of steel can only be delayed or slowed down by special measures (i.e. preventive/protective method). It can never be "stopped" in a natural environment without any protection (Arup, 1983; Sandberg, 1995; Hanson et al., 1998). Existence of high resistance, layers in concrete conductivity of formed corrosion products, the age of concrete reference electrode position, cement type and presence of cracks were reported as factors affecting the half cells potentials (Elsener and Reilem, 2003)

Several studies have shown that the annual direct cost of corrosion to the industrialized world economy is approximately 3.1% of the country's Gross National Product (GNP), (Barbara and Robert, 2006; Blankvoll, 1997).For reinforced concrete structures, because of the high alkalinity of the pore solution in the concrete, and the barrier given by the cover against the aggressive species, the reinforcement is believed to be "non-corrodable". Corrosion products occupy more space than the original iron atoms in the steel and as they build up the area around the reinforcement the concrete tries to expand. Since concrete is relatively weak in tension, this expansion causes cracks to develop in the concrete (Sennour, Wheat and Carrasquillo, 1994). Eventually, these cracks reach the surface allowing a clear part from the external environment to the surface of the steel bars. In addition to the cracking of the

concrete, the corrosion products also reduce the bond strength between the steel and concrete leading to the degradation of the concrete through cracking (Treadway, 1982; Taylor, 1990; Ramachandra, 1984).

According to Raupach and Schiessi (1990), Song and Saraswathy, (2007), corrosion of reinforcement is a major factor causing premature deterioration of concrete structure, especially of those located in the costal environment. Corrosion of reinforcing steel usually starts with the ingress of chloride ions and carbon dioxide to the steel surface. Corrosion products (iron oxides and hydroxides) are usually deposited in the restricted space in the concrete around the steel. This formation within restricted space sets up expansive stress, which crack and spall the concrete cover resulting in progressive deterioration of the concrete. There have been a large number of investigations on the problems of deterioration of concrete.Proper monitoring of structures for corrosion performance and suitable measures should be taken at the appropriate time to save costs. Gowers et al., (1994) developed a programmed linear polarization meter for on-site measurement; this made the linear technique more widely applicable to the corrosion of steel reinforcement in concrete.Thus, the present study is aimed at the effects of different real life aggressive environments on the corrosion of embedded reinforcing steel in concrete.

Experimental Procedures

Materials

The cementitious material used was CEM I, 45.5N, of the Dangote brand. Thecement complied with the requirement of Standard Organisation of Nigeria (SON). The chemical composition of the cement is presented in another paper. The fine and coarse aggregates used were river sand and crushed granite respectively. The maximum size of the coarse aggregate was 19 mm and the fineness modulus of sand was 2.70. The aggregates complied with the requirement of ASTM C 33-93. One mixtures consisting of 100% CEM I, with water/binder (w/b) ratio of 0.6was used in casting the concretes beams.

Specimen preparation and testing

The concrete mixture was prepared manually. A consistent mixing sequence was adopted in which fine and coarse aggregates were first mixed with half of the mixing water. After this initial premixing, binderwas blended with the aggregates and mixed further. The remaining waterwere added in small increments and the mixing process was continued until a consistent mix was attained. After mixing, the concrete mixture was placed in the molds in one lift, compacted on a vibrating table and cured for 24 h under a polythene sheet. The mould is150mmx150mmx600mmin dimension and fitted with 16 mm reinforcing steel bars at a cover of 40 mm. For each mixture two 100 mm cubes were cast for compressive strength testing, to monitor quality of the mixture. All of the specimens were demolded after 24 h and the concrete cubes and beams were moist cured for 28 days. At the end of the curing periods, the cubes were tested for compressive strength while the beams were subjected to a two point

loading in flexure with the intention of exposing the reinforcing steel. The artificially cracked reinforced concrete beamswere totally immersed different solutions (acting as corrosive environment) in plasticcontainers for a duration of seven months. The chemical used for preparing the aggressive solutions are; hydrogen tetraoxosulphate (vi) acid (H_2SO_4),hydrochloric acid (HCl), sodium hydroxide (NaOH), hydrogen trioxonitrate (v) acid (HNO_3), and sodium chloride. At the expiration of the seven months, the concrete cubes were removed from the solution wiped dry andsplit into two, the reinforcement steel were brought out and cleaned up. The reinforcing steels were then tested for weight loss, change in diameter as well as change in strength.

Results and Discussion

At the end of the immersion of the reinforced concrete samples in the various aggressive solutions for a period of seven months, the results obtained from the experiment are plotted in terms of loss of weight, change in reinforcement diameter and change in reinforcement strength for the different aggressive environments investigated as presented in Figures 1, 2 and 3.

Figure 1 shows the effects of weight loss for the embedded reinforcing steel in concrete in the different aggressive environment.

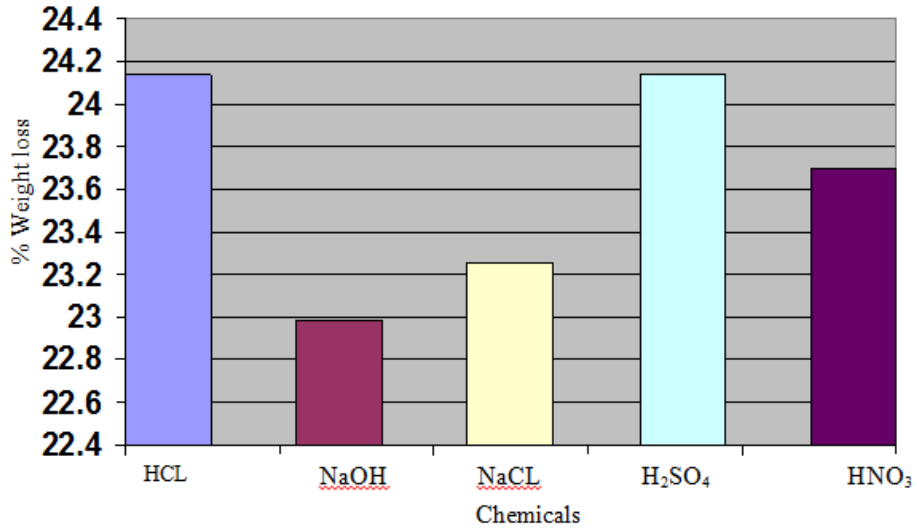


Figure 1: Percentage loss in weight for the different exposures

From the figure presented above, the effects of the different aggressive exposure on the weight loss of the reinforcing steel embedded in the concrete are varying. The highest weight loss were noticed on reinforcing steel embedded in concrete exposed to HCl and H_2SO_4 environment while reinforcing steel in concrete exposed to the NaOH environment presented the least change in weight loss.The reason for the varying changes in weight is because of the

corrosive nature of HCL and H_2SO_4 and their level of concentration. NaOH are less corrosive and therefore cannot attack the steel at the same rate with HCL and H_2SO_4.
Figure 2 present the effects of the exposure on the change in diameter of the reinforcing steel embedded in the concrete.

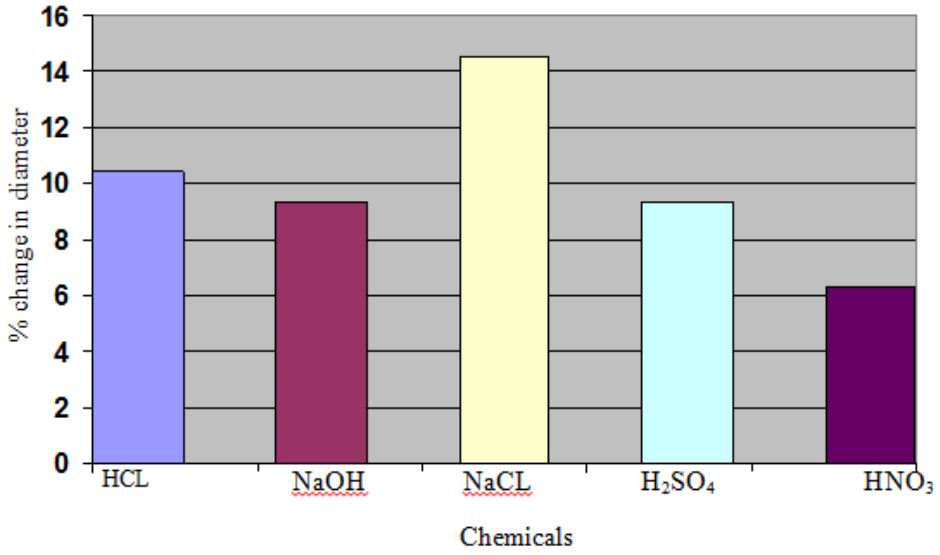


Figure 2: Percentage change in diameter for the different exposures

Corrosion of the embedded reinforcing steel in the concrete exposed to the different environment is evident as noticed from the varying change in diameter. However, the NaCl exposure environment presented the worst effect on the reinforcing steel in terms of diameter change of the reinforcing steel thus corrosion. While the least effect on the embedded reinforcing steel was noted for the HNO_3 exposure environment. Exposure to NaCl environment presented a worst scenario because common salt attacks steel structure more aggressively. There are much chances of Na ion replacing the ion of Fe easily, therefore, leading to more ion of Fe being lost. Common salt when exposed freely in air equally produced water vapour easily which will lead to corrosion. Hydrogen ion (H^+) cannot easily replace Fe^{+2} ion and quick corrosion in the presence of HNO_3 is not very easy.

Figure 3 shows the effects of the exposure environment on weight loss of the reinforcing steel embedded in the concrete.

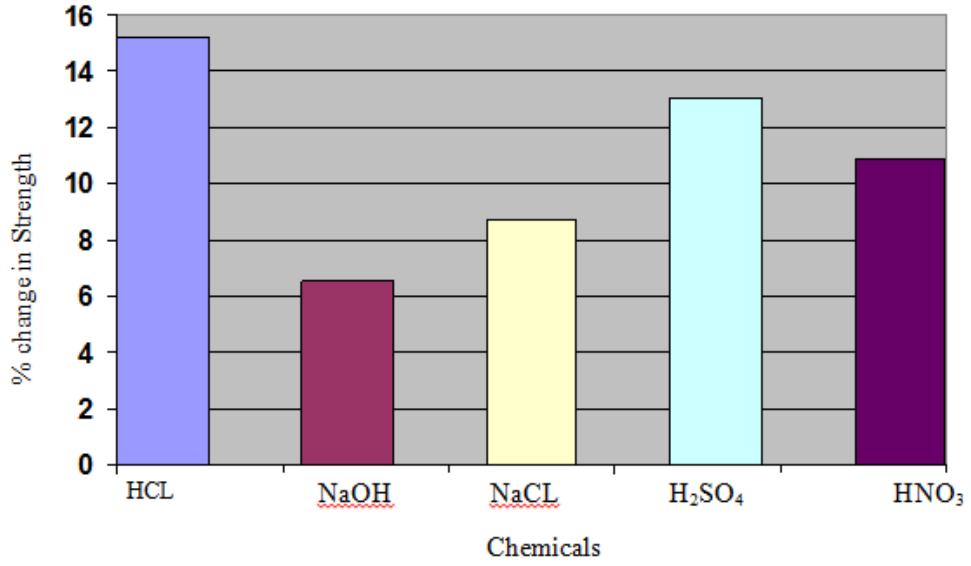


Figure 3: Percentage change in Strength for the different exposures

From the figure above, it is evident that corrosion of the embedded reinforcing steel in the concrete exposed to the different environment occurred as evident in the loss of strength. The NaOH environment presented the worst effect on the reinforcing steel in terms of strength while the HClexposure effect is minimal. The acids HCl, H_2SO_4 and HNO_3 are prone to attack the steel structures at very high rate thus having higher effects on strength changes. NaOH and NaCl are not acids but alkalis, thus they may act as corrosion inhibitors.

Conclusion

The following conclusions can be made from the investigation carried out on the effect of different aggressive environments on reinforced concrete structures:

- The effect of corrosion caused reduction in bond strength as a result of reduction of cross-sectional area of the steel.
- Formation of cracks in reinforced concrete creates pathway for the ingression of oxygen and water into the concrete that causes corrosion.
- Hydrochloric acid (HCl), hydrogen tetraoxosulphate (VI) acid (H_2SO_4) and hydrogen trioxonitrate (v) acid (HNO_3) have higher effect on weight loss on embedded reinforcing steel while sodium hydroxide (NaOH) and sodium chloride (NaCl) has the least effect.
- Hydrochloric acid (HCl) has less effect onthe strength of embedded reinforcing steel compared to the hydrogentetraoxosulphate (vi) acid (H_2SO_4) and hydrogen trioxonitrate (v) acid (HNO_3).

Acknowledgement

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ELECTRICITY CHALLENGES ON SMALL BUSINESS ENTERPRISES IN NIGERIA

Jelani, S.

Department Of Business Administration, Federal Polytechnic, Kaura Namoda, Zamfara, Nigeria

ABSTRACT

The paper is on electricity challenges on small Business Enterprises in Nigeria. It looks at electricity challenges facing the small business enterprises with respect to their sustainability in their various industries. The erratic electricity supply has led to the collapse of so many small business enterprises in the Nigerian economy. An empirical research design was adopted for the study with the instrument for gathering data for the study being the questionnaire. The population sample is 120 small business firms within six geo-political zones across the country. The findings indicated that erratic electricity supply is highly responsible for the low performance of small business enterprises in the Nigerian economy; it leads to self-generated electricity which results in higher cost of production. It is recommended that government should privatize both generating and transforming stations so as to give chance for competition among the companies.

Keyword; *competition, erratic electricity, privatization.Small business enterprises*

INTRODUCTION

A business in Nigeria has been classified as small, medium and large enterprise. It's said to be the major bedrock of a nation's economy, with employment generation, provisions and facilitate exportation of goods and services to boost the nation's foreign exchange. This can only be sustaining when the available infrastructural facilities within the country in question are excellent. Electricity has a major impact on every aspect of our socio-economic life. It plays a vital role in the economic, social and political development of our nation. Inadequate supply of energy restricts socio-economic activities, limits economic growth and adversely affects the quality of life. Wamukonya (2003) explains that despite Nigeria's abundance in energy resources, there are still constant powers outages. Industries and individuals cannot rely on electricity from the national grid for high productivity. Nigeria's electricity market, dominated on the supply side by the state-owned Power Holding Company of Nigeria (PHCN) formerly called National Electric Power Authority (NEPA) has been incapable of providing minimum acceptable international standards of electricity service reliability, accessibility and availability for the past three decades. The nature of the poor record in

jelanisidi@gmail.com

electricity supply is apparently causing an abysmal situation in small business enterprise development in Nigeria.

In a more recent study of the Nigeria's power sector, Barros et al (2011) posit that the Nigerian economy is characterized by large informal sectors that rely heavily on electricity power to operate. This failure of the national power source to provide stable and adequate power supply pave way for alternative though, expensive private arrangements had to be made to remain in production for those that could afford them, entrepreneurs who could not cope with the expensive alternatives had no other choice than to seek exit.

The objective of this study is to provide empirical evidence of the influence of electricity challenges on small business enterprises in Nigerian. The study contributes to knowledge in an effort to finding lasting solutions to problems of electricity in Nigeria and it would also be of significance to policymakers in developing small business enterprises to boost the economy.

STATEMENT OF THE PROBLEM

Regular power supply is the prime mover of technological and social development. There is hardly any enterprise or indeed any aspect of human development that does not require energy in one form or the other. Nigeria is richly endowed with various energy sources: crude oil, natural gas, coal, hydropower, solar energy, fissionable materials for nuclear energy. Yet, the country consistently suffers from energy shortage - a major impediment to industrial and technological growth. The National Electric Power Authority (NEPA)1 , a government parastatal, has the sole responsibility for managing the generating plants as well as distribution of power nationally.

However, the actual power available at any given time is less that 40 percent of the total capacity due to poor maintenance; hence there is a perennial shortage. This situation is aggravated by a grossly inefficient, poorly maintained distribution system. Industry can only cope with power outages by resorting to internal generating plants (Adegbamigbe 2007). However, when electricity goes on and off five times in an hour, this creates serious problems for manufacturing and industrial sectors. Equipment are damaged by power flows that usually accompany epileptic power supply and goods at various stages of manufacturing are damaged. Industry's response has been to run permanently on internal generating plants and use NEPA supply as standby. It is ironical that, in spite of the enormous power generation potential, about 60 percent of the country still has no access to electric power supply (UNDP 2001).

OBJECTIVE

The research work is to really find out the extent at which erratic electricity supply wreaking small business performance in Nigeria.

jelanisidi@gmail.com

HYPOTHESIS:

H0**:** Erratic electricity supply is not responsible for small business low performance in Nigeria.

H1: Erratic electricity supply is responsible for small business low performance in Nigeria.

LITERATURE REVIEW

Electricity and small business enterprises development are two major challenges facing Nigerian economy. Ayodele (2001) argues that the development of the Nigerian economy as an emerging market is technically a function of adequate provision and supply of electricity power. Similarly, Okafor (2008) argues that poor power generation represents a major setback for the small business development in Nigeria. Asaolu and Oladele (2006) argue that infrastructural decay is the major problem confronting Nigeria and that electricity generation is one of the instances of the infrastructural decay in Nigeria. In the same vein, Rabiu (2009) posits that for three decades, inadequate quantity, quality and access to electricity service remain a big challenge to the Nigerian economy and the resolution of the challenge would boost the economy, reduce unemployment and the resultant social vices.

Okafor (2008) noted that since most small businesses are too weak to provide alternative power source, the epileptic electricity supply situation in Nigeria has drastically reduced capacity utilization, causing (in addition) damage/loss of equipments and ultimately total demise of many small businesses. For the few that have continued to weather the power storm, their high cost of production has resulted in loss of product price competitiveness. Generally speaking, Nigeria is known as a high cost origin and this explains why the country is not doing well in the export market – be it of goods or services.

According to a 2005 Manufacturers' Association of Nigeria (MAN) survey report, the generation of power by its members was responsible for 36 percent of production cost. As a result of this, 10 per cent of its members were operating at 48.8 per cent, 60 percent at varying stages of coma while 30 percent had completely closed down. If this was the case for Manufacturers Association of Nigeria (MAN) members, most of which are medium to large enterprises, then the case of micro/small businesses in the face of epileptic power supply can only be imagined. The available power supply is too low, and its transmission and distribution dismal. The table below brings Nigeria electricity supply in sharp contrast with other countries in the world.

Sambo (2008) posits that the Nigerian power sector operates well below its estimated capacity. According to PHCN, the country's peak electric demand in February 2006 was 7600 megawatts (MW), but actual generation capability was 3,600 MW. This gives rise to supply and demand imbalances. Christiana (2013) disclosed that for decades, many small business and large ones have come to depend on power generators as source of electricity supply to be able to carry on with their enterprises and make ends meet, the problem of

epileptic or lack of power supply is not new to Nigerians such that even children know the difference and are always on hand to shout 'NEPA' whenever power is restored but that is not where this misery ends for Nigerians. People have now become more alarmed at the speed with which the nation's overall electricity output and supply is dropping. In today's business environment, constant supply of infrastructural input like electricity power is vital to business survival because it determines a firm's effectiveness and ability to create a sustainable competitive advantage over competitors (Afonja, 2003). The importance of energy in the development process of any nation is well known and cannot be overemphasized. Adequate energy is an important factor in the production process and an indispensable factor in social and economic development related with overall quality of life of the population. Unfortunately, the supply of electricity, undoubtedly, the key energy source for industrial, commercial and domestic activities in the modern world, falls short of demand in Nigeria.

One of the major challenges of SMEs in Nigeria is the high cost of electricity generation from private electricity power generators (Onugu, 2005, Ajanaku 2007) as a result of the inadequate and erratic supply from the Government source. The SMEs and macro-businesses (barbering and hair salons, electronic repairs, business centres, welding, vulcanizing, etc) cannot run profitably on power generating sets in a highly competitive and open economy like Nigeria because of the high costs of fuel and maintenance. Ordinarily, the power generating gensets which have now become the primary source of electricity supply to industries ought to serve as backups in the event of disruption from government sources (Okereke, 2010), but because of government inefficiency, the backups are serving as the primary source. Christiana (2013) argued that small and medium businesses play key role in driving the economy of Nigeria and every country in the world. The overall electricity supply across the country is below what is necessary to sustain most businesses, it is clear that power supply is still far from what is needed to make the Nigerian entrepreneur smile because electricity supply is between 4,000-4,500MW and the truth is that this is not enough.

Nigeria's economy has been described as a "Fossil Generator Economy" and small and medium scale businesses incur extremely high overhead cost maintaining their expensive economically, environmentally, and health wise – fossil fuel powered generators (Christiana, 2013). Nigerians are currently generating over 6,000 Mega Watts of electricity through the use of generators in their homes, corporate offices and industrial places, far more than what the Federal Government is producing through the power stations across the country. Rahaman (2013) disclosed that an estimated 6000 MW is generated via individual and corporate outfits to meet their minimum demands for electricity, He further stated that Nigeria was far behind in its 2013 target of 16,000 MW of power generation, blaming it on over-reliance on oil, gas and hydro resources in power generation, at the detriment of other useful resources such as coal, new and renewable energy sources among others in Nigeria. Sambo (2008) also confirmed that the nation is losing N135 billion annually to inefficient power system which could be more as billions of Naira is spent on generators and the fuel for

powering them. The Central Bank of Nigeria (2005) Small and medium enterprises can be defined as those entrepreneurial units in business operations which operate and serve at a limited scale in limited vicinity, with limited means for operations, usually owned and controlled by single individual as owner-manager and sometime owned as family business. Small and Medium Enterprises (SMEs) as defined by the National Council of Industries refer to business enterprises whose total costs excluding land is not more than two hundred million naira (N200, 000,000.00) only.

SME and Economic Development in Nigeria

Unlike the large-scale industrialization strategy, which is the category of import-substitution? Strategy practiced by Nigeria without any success, small-scale industrialization has made a veryglaring impact on the economy of nations. Abiodun (2014) identified the roles of SMEs in economic development as:

Technological/ industrial development: They have short-term gestation period and high potentials for quick yield on investment. They therefore provide promising alternatives for countries that desire the fast option for industrialdevelopment.

Employment Generation: It has been observed that more jobs per unit of investment capital and per unit energy consumed are created worldwide by SMEs than large -scale enterprises.

Technological Acquisition: They provide opportunities for the development of local skills and technological acquisition.The "Aba made" syndrome is a clear manifestation of such technological acquisition and ifencouraged will give rise to rapid economic development.

Capacity building: They provide a training avenue for the creation of local entrepreneurs in several areas ofeconomic activities. They are regarded as the 'university' where a large class of Nigerian entrepreneurs usually receive training. It is therefore more important to lay a good foundationof an industrial class by promoting small entrepreneurs than it is to build a few large factories.

Promoting Growth: Most are involved in primary and secondary economic endeavors that rely heavily on locallysourced materials, equipment and parts. As a result they achieve high local value addedoperators.

Increased standard of living: Sound development of SMEs has positive implications for improved standard of living of thecitizenry and generates foreign exchange for further development of the economy.

Industrial Dispersal or spread: They could easily be located in rural areas because they can survive on rudimentary industrialinfrastructure. Consequently, they serve as major facilitators for industrial dispersal and ruraldevelopment and thus help in mitigating the rural-urban drift.

Serving of large -scale industries; Raw material and goods are supplied to the large -scale industries while they engage indistribution of finished product from such industries to consumers.

Export promotion: Most SMEs engaged in manufacturing serve as channels for import substitution and exportpromotion.

Structural Transformation of rural areas. When they are cited in rural areas, they help to improve rural infrastructure and the livingstandard of the people. Social amenities such as: road, electricity, pipe-borne water, telecommunication facilities, etc, are attracted to the area as a result of the presence of SMEs inthe community.

Flexibility: They react swiftly to changes in the operating environment. They therefore provide good testingground for new products and nascent production technique.

Low Take-off requirements: Take-off capital requirements are low. Small-scale industrialization therefore widens the scopefor participation in industrial activities by individuals with limited capital. They are effectiveinstruments of mass participation in industrial development.

EFFECT OF ELECTRIC POWER GENERATOR ON THE ENVIROMENT

Environmental impact =Two very important developments on the globe: increased carbon dioxide release into the atmosphere and ozone depletion of the stratosphere, have given much concern to the modern world. Evidence of climatic change in the distant and recent past is pursued both on a world scale and on local scale (Agu, 1994). At the local scale not less than 84 million Nigerians i.e. 60 percent needs electricity which cannot be serviced by the PHCN (Power Holding Company of Nigeria). This population has no option but to depend on petrol or diesel driven generators and considering the fact automobiles also depends on the same source. The attendant environmental effects are summarized below according to Idiata, et al (2007).

Acid Rain =Acid rain is a phenomenon that occurs when the rain that falls from the atmosphere is acidic in nature. Acid rain is caused from the burning of fossil fuels. The acidic gases produced from such burning gets into the atmosphere where it reacts with water or rain to form an acidic solution. This acidic gas gets into the atmosphere from exhaust pipes of industrial machines and processes and automobiles.

Poor Visibility - Inorganic particles: the particulates or particles e.g. Dust, smoke, soot and ash released during burning can cause poor visibility, fog and mist due to the formation or condensation of water around the particles in very low vertical heights. In March 2010 due to poor visibility aircrafts were grounded for days in Nigeria.

Global Warming =Greenhouse effect: this phenomenon is caused principally by the presence of Carbon dioxide and Water Vapor in the atmosphere which trap large fraction of the infrared rays emitted from the earth's surface to the atmosphere. This trapped radiation heat thus increases the temperature of the globe causing global warming.

Methodology

This study used a descriptive survey design with a targeted population of Small Business Enterprise in six geopolitical zones of Nigerian and a case study of one hundred and twenty (120) in totality, 20 respondent each were sample randomly from each zone of south East (SE), south south (SS), south west (SW), North west (NW),North East (NE) North central (NC) zones in Nigeria. Of these participants, 42% were females while 58% were males. Their age ranges from 25-60 years, with a mean age of 38years and average business experience of 8years were drawn from the food and beverage, repairs and services, agricultural, transport and communication sector of the economy. The academic qualification of the participants ranges from SSCE, OND, NCE, B.Sc., B.Ed., M.Sc., and M.A.

A structured questionnaire was employed as the instrument of the study. The questionnaire was divided into two parts of background and attitude and perception of the respondents, with regards to electricity as a serious challenge to SBE performance in Nigerian economy using a 5-point Lakers' scale: Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly Disagree (SD). There various responses were quantified and analyzed using chi-square statistical packages for management scientist in order to establish the nature of the relationship between electricity supply and SBEs performance in Nigeria.

Result and Analysis

This is done using the chi-square test of dependency. The contingency table of chi square is as shown below.

Table 1: Contingency Table of Chi Square

COE	1	2	3	4	5	6	7	8	9	10	Total
SA	62	12	70	50	10	52	38	60	37	5	396
AG	40	15	30	28	20	36	49	40	39	10	307
UND	0	13	2	2	0	0	0	0	0	0	17
DIS	8	50	8	30	34	18	23	12	18	25	226
SDA	10	30	10	10	62	14	10	8	26	80	260
Total	120	120	120	120	120	120	120	120	120	120	1200

HYPOTHESIS

jelanisidi@gmail.com

Ho: Erratic electricity supply is not responsible for small business low performance in Nigeria.

H1: Erratic electricity supply is responsible for small business low performance in Nigeria.

At 95% level of confidence i.e. $\alpha = 0.05$ and degree of freedom

$$(r-1)(c-1) = (5-1)(10-1) = (4)(9) = 36.$$

$X^2_{\alpha=0.05,36} = 43.77$ Therefore $X^2_{tab} = 43.77$

$$X^2_{cal} = \sum_{i=1}^{r} \frac{(o_{ij} - e_{ij})^2}{e_{ij}}$$

$where\ o_{ij} = the\ observed\ frequency$

$e_{ij} = the\ expected\ frequency$

The expected frequency can be estimated with the formula

$$n_{ij} = \frac{R_i \times C_j}{N}$$

$where\ R_i = row\ i\ total\ and\ C_j = collumn\ j\ total$

$N = is\ the\ ground\ Total$

$$n_{11} = \frac{R_1 \times C_1}{N} = \frac{396 \times 120}{1200} = 39.6$$

Table 11

S/N	O_{ij}	e_{ij}	$(O_{ij-}e_{ij})$	$\frac{(o_{ij}-e_{ij})^2}{e_{ij}}$
1	62	39.6	22.40	12.67
2	12	39.6	-27.60	19.24
3	70	39.6	30.40	23.34
4	50	39.6	10.40	2.73
5	10	39.6	-29.60	22.13
6	52	39.6	12.40	3.88
7	38	39.6	-1.60	0.06
8	60	39.6	20.40	10.51
9	37	39.6	-2.60	0.17
10	5	39.6	-34.60	30.23
11	40	30.7	9.30	2.82
12	15	30.7	-15.70	8.03
13	30	30.7	-0.70	0.02
14	28	30.7	-2.70	0.24
15	20	30.7	-10.70	3.73
16	36	30.7	5.30	0.91
17	49	30.7	18.30	10.91
18	40	30.7	9.30	2.82
19	39	30.7	8.30	2.24
20	10	30.7	-20.70	13.96
21	0	1.7	-1.7	1.70
22	13	1.7	11.3	75.11
23	2	1.7	0.3	0.05
24	2	1.7	0.3	0.05
25	0	1.7	-1.7	1.70
26	0	1.7	-1.7	1.70
27	0	1.7	-1.7	1.70
28	0	1.7	-1.7	1.70
29	0	1.7	-1.7	1.70
30	0	1.7	-1.7	1.70
31	8	22.6	-14.6	9.43
32	50	22.6	27.4	33.22
33	8	22.6	-14.6	9.43
34	30	22.6	7.4	2.42
35	34	22.6	11.4	5.75

36	18	22.6	-4.6	0.94
37	23	22.6	0.4	0.01
38	12	22.6	-10.6	4.97
39	18	22.6	-4.6	0.94
40	25	22.6	2.4	0.25
41	10	26	-16	9.85
42	30	26	4	0.62
43	10	26	-16	9.85
44	10	26	-16	9.85
45	62	26	36	49.85
46	14	26	-12	5.54
47	10	26	-16	9.85
48	8	26	-18	12.46
49	26	26	0	0.00
50	80	26	54	112.15
total	1206	1206	0	545.13

X^2_{cal} =545.13

Decision rule: Reject H_0 if $X^2_{cal} > X^2_{tab}$

X^2_{cal} =545.13

$X^2_{tab} = 43.77$

CONCLUSION

Since$X^2_{cal} = 545.13 > X^2_{tab} = 43.77$, we reject H_0 and conclude thatErratic electricity supply is responsible for small business low performance in Nigeria.

FINDINGS

From the above table 1 and 11, the hypothesis is tested using chi-square statistical instrument, it is indicated that calculated figure which is 59.4538 is greater than tabulated figure which is 31.41, and is a strong indication that alternative hypothesis should be accepted and reject that of null.

CONCLUSION AND RECOMENDATIONS

The study showed that erratic electricity supply is highly responsible for small business enterprise low performance in Nigeria. The epilepsy electric power supplied to growing and existing small business enterprises necessitated production bellow the break- Even margin and the outcome of it, is the feeble economic situation Nigerian are facing now. They spend more on self generating electricity which lead to high cost of production and this make it impossible for SME export their goods or compete with goods in the international market. In order to solve the electricity problem facing small business enterprises, the researcher recommend that:

1) The government should privatize both generating and transmitting stations so as to encourage competition among the companies, for better service delivery.
2) More generating and transmitting stations should be build within the six geo-political zone in the country, to avoid overloading on the facilities.
3) There should be a diversification for energy generation, by considering other sources like coal, solar, oceanic waves and wind energy so that over reliance on gas will be reduce.
4) There should be a replacement of facilities that are weak (transformers, poles, wires and meter) with new and promising one.
5) Qualified and dedicated team of engineers should be put in place for proper monitoring and control.

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jelanisidi@gmail.com

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IMAGERY IN GHANAIAN POETRY: AN EXAMINATION OF THE POETRY OF KWESI BREW

Tetteh, U. S.[1], Derx-Techie, C.[2] and Okyere, D.[3]

[1 & 2]Dept. of Liberal Studies, Box AD 50, Cape Coast Polytechnic, Cape Coast, GHANA
[3]Dept. of English, University of Cape Coast, Cape Coast, GHANA

ABSTRACT

The use of imagery in any line of poetry helps in the full appreciation of that poem. It is a widely acknowledged fact that poets choose imagery that they are familiar with and can identify with. Many a poet chooses images that will better serve their purpose in reinforcing their themes and subject matter in their poems. Like all poetry, this is the situation with Ghanaian poetry. The study purposively zooms down on Ghanaian poetry with a special look at Kwesi Brew and examines the type of imagery he uses to further his messages in his poetry. The study revealed that Kwesi Brew, like many Ghanaian poets uses images predominantly associated with disillusionment and traditional ideas to drive home his message to his audience. As such, three poems titled "The Executioner's Dream", "The Dry Season", and "A Sandal on the Head" were chosen to discuss images associated with tradition, while three other poems titled "The Wife", "The Mesh" and "Mending Those Nets" were chosen to discuss images associated with disillusionment. The study finally concludes that Brew's choice of these images make him unique as a poet since they help to properly reinforce his themes in a very extraordinary manner.

Key Words: *tradition, Kwesi Brew, images, disillusionment, culture*

Introduction

Poetry, according to Arp (1997) occupies a very important place in the imaginative life of people. It is important to recognize that in many parts of the world, and most especially in Africa, most occasions lend themselves to the utterance of poetry (Derx-Techie and Tetteh, 2016). Instances when poetry comes to the fore include periods of entertainment like children's plays on moonlit nights, during festivals, and work songs of farmers and fishermen at work. On other occasions, there are instances when poetry is broadly recognized with the expression of deep emotions, especially during ceremonies which bring together the living and the dead; during pouring of libation or when the supernatural is being invoked (Okpewho, 1992). Notably, poetry is also recited during naming and outdooring of children, crowning of traditional leaders, puberty and marriage ceremonies, among a host of others.

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

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It is evident that all these form part of oral poetry, which is noted to be a literary form normally stored in the minds of the composers and performed orally. In recent times, however, there is a new emergence of poetry which is scripted or codified in written form, especially from the periods after World War II. This kind of poetry emerged as a result of the introduction of western education and culture in most West African countries. This came to be known as Modern African Poetry. A great number of these poems were modeled along Christian hymns or were greatly influenced by political undertones.

Some modern poets in West Africa have expressed their belief in the validity of tradition of African cultures. They, therefore, write in the modern European languages but are still deeply rooted in their expression of emotion towards African elements and images. This, thus, becomes the main impulse behind their extensive use of traditional elements and seemingly sentimental expression of nostalgia. Most modern African poets, especially those from West Africa believed that the white man exploited the African in a profound spiritual way that it affected the psyche and emotion of the African. They believe that it was the wish of the white colonial masters to remould the African into a being that they could tolerate and control in all aspects. It is against this significant background that the stage was set for the writing of contemporary West African poetry in English that sought to focus on emancipation from the nineteenth century cultural imperialism resulting in a holistic adoption of a new twentieth century style of writing poetry.

The Problem

Many Ghanaian poets have received worldwide recognition and have been cited widely and received tremendous critique in many available scholarly works. Some of these poets include Okai, Awoonor, Anyidoho, Laing, Sutherland, Acquah and Parkes, One poet, however, who even though has contributed tremendously to creative writing, especially in the area of the poetic genre but has not received very wide attention and critique is Brew. His writings cover predominantly pre and post colonial Afro-centric and pan-African interests. In driving home his message to his readers in his poetry, he carefully employs imagery in a very profound way making his art more unique than other poets from his generation. His literary style of blending different images in his poetry to appeal to all the senses of his readers/listeners clearly separates him from other poets of his generation. The paper seeks to focus on Brew in order to bring attention to his poetry by examining how he explores imagery to develop the subjects of tradition and disillusionment in his poems. This, to a very large extent, will help to project Brew as a unique Ghanaian poet who deserves attention like many others of his generation.

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

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West African Poetry

In line with this task of creating art, Ryan (2013) explained that West African poetry, in the first place, is primarily preoccupied with the people and their culture. The various aspects of life and their ramifications – religio-politico-socio-cultural are largely considered in all forms of West African poetry. It clearly demystifies certain aspects of life of the West African, which hitherto were shrouded in mystery. A critical look at the poetry of Okai, Anyidoho and especially Awoonor all from Ghana, for instance, helps to unearth the meaning of most rites of passage and cultural elements of the Ghanaian people (Ryan, 2013). Clearly, without these presentations of these poets, most of these cultural traditions would not have been exposed to most people around the globe.

There is also the major issue of colonialism and neo-colonialism that resonates in various aspects of early West African poetry. Interestingly, this major theme is conveyed through an extensive use of imagery by most West African poets. As such, poems in this category are largely dominated by images of violence, fear, and oppression. There are readily available examples of poems like "The Vultures" by David Diop and "The Weaver Bird" by Kofi Awoonor. Murphy (2008), especially, focuses on Senegalese writings and examines how Diop uses the image of the scavenger bird, the vulture to represent the ruthless colonialists showing how violent they were in their maltreatment of the poor African people before and after they colonized them. In the case of Awoonor, Smith McKoy (2002) even though places emphasis on Awoonor's Comes the Voyager at Last, brings readers close to realizing the psychologically destructive effects of colonialism on Africa. Finally, there is also the example of Diop when he highlights the image of a slave to show the extent of damage done to Africans through colonialism in his poem "Africa". It is as a result of such resistant literature that most French writers came up with the idea of resistance that became "Negritude." Negritude, according to Jachec (2010) and Ekpo (2010) and Barker (2015) refers to the consciousness of the black man that he is black and that thought alone has values which are good to the whole of mankind. This movement was led by Leopold Sedar Senghor of Senegal.

The Life and Poetry of Kwesi Brew

Kwesi Brew who was born in Ghana, formerly the Gold Coast wrote poems that have a semblance of poetry written around the time he was born: poetry that instilled nationalistic tendencies and traditional Ghanaian orature and traditions.

Kwesi Brew was born in 1928 at Cape Coast in the Central Region of Ghana to Fante parents. He became an orphan at the death of both parents at a very early age. He was adopted and

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

brought up by K. J. Dickens, an English education officer in the British colonial administration. It was under his guardianship that Brew learnt the art of writing poetry. Dickens was an accomplished scholar who loved classical literature. He encouraged Brew to love the art of writing without realizing it. It was, therefore, not surprising that Kwesi Brew began writing poetry at the tender age of fourteen when he wrote one of his most famous poems, "The Dry Season".

Kwesi Brew excelled through school and became an accomplished administrator and diplomat in the administrative and diplomatic service of his country. He served in many African, European and South American countries until his death in July 2007. Brew's impact on the Ghanaian and the African literary scene will be felt by many people who come into contact with his poetry for many years to come. He had written anthologies like Shadows of Laughter (1968), African Panorama and Other Poems (1981), Return of No Africa (1995) and has several poems in many poetry collections.

It is relevant to state that the nurturing and training given to Brew in his formative years by Dickens and his career as an administrator and diplomat greatly influenced his writing interest as a poet in his later life. His use of traditional ideas in his poetry shows how close he chose to be to tradition and his respect for the culture of tradition. Aside this, Brew employs a tonal ambivalence, which according to some writers like Dawes (1996) "vacillates between an instinct toward pessimism – a certain jaundiced anticipation of catastrophe and hopelessness – and a peculiar peace about the political calm (or, some would say, stasis) that seems to pervade Ghanaian society today." (p1014) His poetry is, therefore, on a whole, a reflection of his personality in a changing society (Dawes, 1996).

Theoretical Framework

The theoretical framework on which the study will rest is the Reader-Response Criticism. It is expedient to note that most theories clearly overlap in a number of ways in terms of the focus on the work. However, in the case of the Reader-Response theory, Tompkins (1980) explained that much attention is placed on the experiences of the reader in relation to a literary work and this is in sharp contrast with other theories that primarily place attention on the author of the work as well as the form or style.

In the early works of writers like Fish (1980), Holland (1968), Iser (1974) and Rabinowitz (1987), the theory of reader-response became more enforced. The Reader-Response theory recognizes the reader as an active personality who imparts "real existence" to any work that he or she has read or seen and tries to make it meaningful based on his or her own interpretation. Tyson (1999) in the first edition of her book Critical Theory Today: A User-

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

Friendly Guide carefully examines this theory by postulating that literature should be seen as a performing art that enables readers to create their own unique interpretation based on their own personal experiences and worldview.

It is important also to emphasise that in the second edition of her book Critical Theory Today: A User-Friendly Guide, Tyson (2006) goes on further to emphasise that because the reader is allowed to do his or her own interpretation of the text before him, many different kinds of theories may apply. A reader may decide to analyse a text using the New Criticism, Psychoanalysis, Feminist or Structuralist theory and they may still be said to be on the right track. In order words, it depends on the lens with which the reader is seeing the text as long as he or she stays true to the text.

In that light, when we carefully analyse the various poems of Brew, it comes to light very clearly that many different interpretations could be given to each poem under consideration based on how the study sees it. For example, the poem "The Dry Season" has been interpreted by some scholars to represent the gradual approach of death during old age due to the choice of the image of the tropical dryness that results from the seasonal movement of the North-East trade winds in the harmattan period. Others also have interpreted it to represent, as this paper postulates, the behavior of African leaders in relation to the ordinary citizenry. Clearly, therefore, it is okay to employ the Reader-Response theory as the framework for this study, since every poem analysed in this study is done purely from the researchers' perspective.

Types of Imagery in Brew's Poetry

In examining the images used by Brew, many images come to mind. It is relevant to state that the images associated with Brew's poetry are carefully explored from a purely African perspective. These images appeal to different sensory emotions of the reader: tactile (touch), taste (gustatory), smell (olfactory), sight (visual), and hearing (auditory). It is for this reason that Shaw (2008) becomes relevant in this paper since she helps in concluding that all forms of imagery resonate with the mental experience which becomes a pervasive form of subjective experience that structures and creates order with powerful mnemonic and hypermnesic potential.

Images Associated with Tradition

Kwesi Brew's Poems exhume African traditions, especially, of the Akans of Ghana. The poems are woven around traditional sayings and beliefs of the Akans that urge the need to see beyond the physical world. Brew's background plays a very significant role in why he explores lots of traditional traits and elements in his poetry. This section of the paper takes a

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

careful consideration of three poems of Brew that clearly employ imagery to develop the dominant subject of tradition in his poems.

The Executioner's Dream

The poem recounts an eye - the power to see beyond the physical, into the spiritual realm given to the persona. An eye found in the first three lines symbolizes a seer. In the traditional Akan language, if one is said to have "an eye", it means that the person can see beyond the physical world. The person could be a witch. In a combination of simile, oxymoron and biblical allusion, the eye is further likened to a dull onyx set in a crown of thorns. The use of this image holds a resemblance to the weird images that recent Nigerian poetry displays. Egya (2011) in his paper "Imagining the Beast: Images of the Oppressor in Recent Nigerian Poetry in English" highlights that one of the peculiarities of recent Nigerian poetry is their deployment of animal images, specifically the use of ugly, destructive, carnivorous animals as metaphors in the construction of the figure of the oppressor.

The eye being referred to as onyx (a jewel) suggests that though it is strange or even horrific, it is valuable. In the traditional sense those who have 'an eye" or a "third eye" or the ability to see into the spirit world are important because they are able to mediate between the living and the dead, as well as between gods and humans. They are, therefore, accorded some reverence.

Having "an eye" otherwise known as a third eye, therefore, is a valuable asset in the traditional sense. The "eye" was a gift from a dead relation of the person who was an executioner when alive. Obviously, possessing the eye gave the narrator the ability to see what the executioner had seen or could see whilst alive. There are also visions of tortured men tongue tied with "sappor". "Sappor" is a traditional sponge. Executioners were important people in the olden days. They were revered because they were seen as next to the gods. An executioner could take one's life or give it back if he so pleased. Not just anyone could be an executioner in the Akan Society.

An executioner must have 'an eye'. That is, he must be someone who can see spiritually or beyond the physical. He must be very courageous, brave, and skillful and trustworthy. The king or chief confided only in the executioner since he knows who to deal with and when to take him or her for human sacrifices. In the work of the executioner, elimination of people for the removal of epidemics, curses or even enemies or traitors of the stool or throne is not farfetched. It was a prestigious and powerful position. Today, however, in this age of rights, the executioners' prestigious position in society and his ability to see beyond the physical is of little relevance. Traditions have changed. This makes the gift of 'an eye' in the poem

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

ironic. 'The eye' which some years back, would have been seen as a great gift is finally referred to as a little gift at the end of the poem.

The eye that glitters in the old tradition is sickening in today's tradition. The eye is an onyx but a dull one to the youth of today. It's a crown in the old tradition but today it is that of thorns. What was attractive in the old traditions is today disgusting. It is a dead tradition full of horrors.
Yesterday's admirable bravery exhibited by the ability to torture men by inflicting pains on them by locking their jaws with 'sappor' is no longer admired. The strength to look into the eye of dying men in pain and feel no pity would be seen today as a mark of weakness. In fact, in the modern tradition, the executioner is depicted as a little child who knows nothing about emotions, life or death and, therefore, is oblivious about its loss or gain. The executioner, just like a lifeless being, one without feelings, sees the people he murdered as they died just as some lilies tossing their heads not in darkness but in full broad light.

Indeed, the dropping of the heads of innocent people as they died gave the executioner gladness. This is expressed in "… bouncing gaiety…" so that the painful sounds that came from the victims as they died were only like crisp chirping of crickets in the undergrowth to him. This excitement obviously is expressed in the description of the terrifying moment when death came to the victims as they gave up the ghost in that final struggle before life left the victims' bodies; a gruesome sight that is most profoundly disturbing as "surf-boats splintering waves". The executioner saw it as colourful and so smiles at this supposedly frightening sight. This is unequivocally expressed by the poet as:

> And as the surf-boats splintered the waves,
> I saw the rainbow in your eyes,
> And the flesh of your teeth;
> As crystal shone. (p10)

The victims of the executioner were usually captives from wars (royals), traitors, militant women/men who go against the king; and these are ambitious people with various gifts and hence images about the executioner's 'eye' in the light of the narrative of tradition. Unfortunately, one would expect that the death of people should call for a moment or period of mourning as portrayed in the poems of Kofi Anyidoho in "Elegy for the Revolution" (Okunoye, 2005). In assessing the debt of a leading poet in Ghana, Kofi Anyidoho to the poetic traditions of the Ewe people in West Africa, Okunoye (2005) explores the meaning of the ritual of mourning as expressed in Anyidoho's "Elegy for the Revolution." He explained that mourning in the Ewe tradition is a necessary ritual to peacefully severe relations between

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

the living and the dead. However, the executioner in Brew's poem shows no remorse for his actions, hence sees no reason for the kind of mourning done for the dead in Anyidoho's world.

Brew's style of juxtaposing the old tradition to that of the modern tradition to reveal irony is remarkable. Images that support the old traditions include: "wet and sickening eye", "dull onyx", "crown of thorns", "dead executioner", "human sacrifice", "tortured men", "men sitting in pain through the night", "men whose jaws have been locked with 'sappor' and gazing within plain eyes", and "fallen stars".

Images that support modern tradition include "white lilies", "moon-steeped ponds", "bouncing gaiety", "crisp chirping of crickets", "rainbow in eyes", "flashing of crystal shining teeth" and "a surprised child playing the marbles". Brew's ability to bring these images together in oxymoronic expressions like "dull onyx", "crown of thorns", and metaphors like "pretty eye … glittering wet and sickening", "horrors were your flowers" eventually portrays the irony tradition expressed by the poem that the seeming strengths of the old tradition are the weaknesses of the modern tradition. It further reveals the paradox which is responsible for the complexity of human experiences, illuminated by the poem – that, what have been made by traditions to appear right may be wrong by some other tradition. Humans are driven by traditions.

The Dry Season

The poem describes the dry season (Harmattan) as occurs in Africa (Ghana) at the end of the year through the early New Year. It is the time that people go through difficult times. The dry weather is unfavourable and uncomfortable for both humans and animals. However, the poem echoes the African saying that "when all living things suffer unfavourable conditions, the weaker ones suffer the plight of being bullied by the stronger ones" (Anonymous). One is, therefore, inclined to think of the unfairness of life.

Superficially, the poem portrays the effect of the dry season on living things but deeply, it is a political criticism on the effect of the end of radical political reign on the ordinary citizenry in Africa. Others also believe it is symbolic of the gradual approach of death when all is done for the human being. The first is the position of this paper as far as the poem's interpretation is concerned. This is being done against the backdrop of the reader-response theory on which the study is based. It is the tradition that in the difficult times when people cannot find or lose comfort, or when their term of office approaches its end, they become suspicious and then try to find out who says or has said what about them. People who were once companions or even allies to them suddenly become the objects of suspicion of being their enemies.

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

Their ways and means are exposed. Their possessions acquired by dint of their positions are no longer viable like the "straw gold hues of dryness". They are only left with the memories of better times. And then finally, when they are faced with their exits [that is the fires], they would go after those subordinates that they can intimidate to get back what they have left. These subordinates of theirs would also bully those under them – the ordinary citizens on the street. Unfortunately, since these last ones have no one to bully because they are the weakest in society, they would only run for their lives like the rats and other crawling rodents in the grass when the bushfires start to spread.

The image of the dry season presents a picture of emptiness and this is echoed by expressions like "The year is withering", "the wind blows down the leaves", "… cold dry wind," "half bare trees," "grasses are ... tinted," "… hues of dryness," and "ghosts of the dreaming year." All these present an image of death and an end to happiness. It is, therefore, accurate to point to the subject of disillusionment in this instance judging from all the events and image of despair being explored in the poem.

A Sandal on the Head

Kwesi Brew's "A Sandal on the Head" can be viewed as a poem of tradition since it discusses the culture and experience of social injustice and political dictatorship that pertain to African people. The image of a sandal on a head in itself may appear ironic to a casual reader, but in the traditional Akan society, it is a symbol of the overthrow of a chief. When a chief is destooled, His sandals are placed on his head. It is a final action that terminates a chief's appointment. It shows a reversal of the normal order of power. Once this action is conferred on a chief, he can no longer assume his position as chief.

Social injustice and dictatorship which the poem criticizes are the very faults for which Kwame Nkrumah, the first president of Ghana, the writer's country of origin, was accused of and for which reason, he was finally overthrown. Judging by the period in which Kwesi Brew wrote his poem, 1967, which marks the period of the dethronement of Nkrumah, it is not farfetched to reason that the poet was insinuating at Nkrumah's reign and overthrow. Tradition, especially of the Akans of Ghana pervades the poem. With a style of the use of contrast, typical of Kwesi Brew's images that depict a reversal of normal order, images that depict what the actions of the strong ones are contrasted with their effect on the weak.

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

Images	Contrasted Images
The strong had sheltered in their strength The swift in their speed	The tired/weak heaped out of the way The crippled heaped out of the way unto the ant hills
The Rough and ready Matter of the house cracks his whip in the realms of laughter and light and mops his brow with silk.	tired of dancing to monotonous tune becomes matter of rags, stays on rocks and rummages in rubbish heap

The contrast in images reveals the issues of political sycophancy in the "rough and ready", the swift seeking life in their speed and the strong sheltering in their strength. "The matter of the house mopping his brow with silken cloth presents one strange unfamiliar tune that depicts corruption and political dictatorship. Images of the crippled and tired being heaped out of the way onto ant hills to be eaten bit by bit by termites and that of the matter cracking his whip in the realm of laughter and light suggests social injustice.

Finally, images of dancers tired of the strange tune, goats slipping home at evening and broken bones that cannot be made whole, suggest the end of a reign. Termites represent social vices created from corruption against the poor. The poem discusses through these images the reasons for the overthrow of the "master"; yet, leaves the answer to the gods. This means that, to the masses who could not critically analyse the situation, they leave it to the gods as is the tradition in most African countries and typical of the Akans in Sub-Saharan Africa.

"It is only the gods who know why…." The elderly are also believed to know everything even when they do not in the traditional Akan society. It is, therefore, not surprising to find these traditional images employed by Kwesi Brew in "A Sandal on the Head" to reflect the tradition of dictatorship, corruption, social injustice and political sycophancy that come with the reign of the African president after independence and which led to the overthrow of that power.

Images Associated with the Subject of Disillusionment

The selection of the poems that have been discussed in the section on Brew's use of images of tradition clearly emphasized their importance in highlighting their socio-cultural values. The persona places immense value on these traditional ideas because he exemplifies them as very significant to the social milieu and cultural heritage of his people. Obviously, reading the selected poems so far, it is clearly relevant to re-iterate the poet's frustration about the imminent loss of value of these traditions and cultural heritage of the people amid the gradual

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

infiltration of western culture. It is these forms of loss that have resulted in the issue of disillusionment that keeps creeping into the poet's works.

The influx of western culture resulted in many Africans trying to find their feet at the sign of the disappearance of the precious African traditions. Sadly, it was the sense of this loss that led to the feelings of disillusionment most Africans felt, including the poet. It was, therefore, not surprising that most of these poets that lived and wrote around the period Brew lived wrote poems that are infused with images of disillusionment.

There was a steaming cultural conflict that ensued around this period between indigenous traditional habits and the invading foreign culture. This conflict permeated the very heart of cultural existence; as such, it became an important subject that permeated the writings of most writers. This section of the paper discusses Brew's exploration of imagery to portray the subject of disillusionment in some of his poems; specifically, "The Wife", "The Mesh" and "Mending Those Nets".

The Wife

In writing the poem "The Wife" Brew seems to appreciate the feelings of despair and disillusionment that have permeated all aspects of family life. With this feeling, readers of the poem appreciate the role and sacrifices that wives have to play and make respectively in order to make their marriages succeed. It could be argued that focus is placed on the wife in this poem to capture the disappointments that most wives feel after many years of marriage and accepting fully that most of the marital bliss and promises they were given by their husbands have become a mirage. These wives become disillusioned and tend to rebel as a result of that. As such, they tend to violate most of the traditionally accepted roles of women to respect their husbands at all cost no matter the circumstance. In this poem, however, there is a sharp reversal of this situation. The wife is seen putting in every effort to make the marriage work despite her disillusionment. It is, therefore, not surprising that she says to her husband in a very candid tone:

> "Here are your cigarettes;
> Your shirt is on the bed;
> Don't forget to take your purse;
> And please light the lamp
> Before you go away tonight"(p32)

Because of the tone used by the wife to address the husband, one begins to understand the pain in her heart due to the disharmony that exists in this marriage. The poem illustrates the

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

frustration that the wife is going through because the husband leaves home and mostly comes back very late at night. The wife stays up all night waiting for the husband to return. This is clearly illustrated in the advice she gives him to light the lamps, hence she says:

> "You will need it
> When you are coming back home
> And all the houses
> Show no sign of waiting
> But yours!" (p32)

She is clearly disillusioned because of her utmost disappointment in her husband. The disillusionment is illustrated in the use of visual images like "cigarettes", "lamp", "light". These images of light seem to weave into the hope narrative of the woman that there is still light at the end of the tunnel. The poet is represented in the poem by the wife. The problems in the society bother the poet, hence the source of his disillusionment. It can be said that the poet succeeds in using the images of habitation also to explore his disillusionment even further. He uses word like "home", and "houses" which appeal to the readers' sense of sight. These two words are used interchangeably in the same poem to illustrate semantically two different places of abode; a "home" where there's supposed to be affection, tranquility, love and peace of mind; and "houses" where there is only a building built with bricks and mortar without any love. It is for this reason, the wife (persona) cautions: "…When you are coming back home" as against the expression used again by the same wife (persona): "…And all the houses…Show no sign of waiting…But yours!" (p32). Clearly, reading through the poem, one will agree straightaway that the poet succeeds in using imagery to highlight the subject of disillusionment in the poem "The Wife".

The Mesh

Brew's "The Mesh" is a short poem that discusses the point of making very crucial decisions in one's life in order to achieve something. The opening verse of the poem clearly says it all:

> "We have come to the crossroads
> And I must either leave or come with you…" (p14)

When readers read the first two lines, they immediately recognize the confusion the persona is facing at a crucial decision-making point which probably is causing him to be disillusioned. The image of the traveler(s) is enforced by the choice of the following diction: "we", "crossroads," "leave," "come," and "road." Even though the poem simply describes an ordinary confusion that two people are faced with in their journey, and how they came to a

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

compromise to move together along the same path, a deeper meaning exposes a major challenge that humans face in life in taking crucial personal or corporate decisions. It could be political, social, cultural or economic.

The persona explores the image of skepticism to further develop the subject of disillusionment by choosing words like "lingered," "choice," "darkness," and "doubt." He says:

> "But I lingered over the choice
> And in the darkness of my doubt…" (p14)

The major conflict that arises as a result of the feeling of confusion is brought to a point of solution when the image of a shiny bright light is introduced to end the problem. This image of light is highlighted by the choice of words which appeal to the reader's visual sense like "darkness" "lamp" and "saw". There are predominant figurative images brought into sharp focus here. The use of the contradictory words: "darkness" and "lamp' connotes an oxymoron. There is also the major reference made to the metaphorical expressions in "…lamp of love" and "darkness of my doubts". The choice of the words "darkness" and "lamp" reinforces the biblical allusion written in John 1:5, Luke 1:79, 2 Cor. 4:6, 1 Thess. 5:5, and Job 18:18. These figurative imageries are successfully used by Brew to help highlight the unique mental pictures he hopes to create in the mind's eye of his readers. Clearly, they help to successfully develop in a very apt manner the subject of disillusionment which the poem portrays.

Mending Those
Nets

The poem "Mending Those Nets" is dominated by the image of fishing which helps to reinforce the subject of disillusionment. The poem begins on a note of despair when the nets of the fishermen in the figurative image of a paradox catch only winds instead of fish. This is a clear depiction of disappointment leading to a feeling of disillusionment. The poet mentions "winds", "nets", "sea", "traps", "harvest", and "black-striped mackerel", all of which are associated with fishing imagery.

The fishermen caught nothing and probably alludes that to the problem of torn fishing nets. It is as a result of this that the art of mending the torn nets come into being. The poet mentions that the nets are mended by unseen hands, which invokes the idea of a Supreme Being working in the affairs of men when all seem not to be going well. This, obviously, is reminiscent of the poet's belief in a Supreme deity that works to put things right in the lives

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

of men. This linkage is more common in children's literature where the presence of a Supreme Being is always portrayed as a solution to all of man's problems (Yitah and Komasi, 2010)

The poet mentions that these hands "have felt the mornings and evenings of the sea." This also represents experience on the part of the fisherman. However, with all the experience, man is bound to face odd times and challenges that could outweigh him. This image of despair helps to reinforce the theme or subject of disillusionment. This further highlights the idea that Africans in general have been trying to achieve their aims for so long since independence but have been facing challenges (Dawes, 1996). The argument is made clear that until the torn nets are mended or attitudes are changed, they can never achieve that. That then calls for the poet's use of the image of a Supreme Being also coming to the aid of these fishermen, and for that matter these Africans. The image of the torn nets is illustrated in:

> "the strings that have snapped
> and gone unstrung
> Are the years the fish have eaten" (p23)

The image of the fish is used by the poet to symbolize the colonialists who were sent off by the new African leaders without leaving behind for the latter the art of managing the State, the economy and all other areas of public life. It is this grey area that is represented by the torn nets that need to be mended.

There is also the employment of the visual image of "the traps" which shows a viable path towards solving the problem. Traps are symbolic of hunting imagery in the Ghanaian rural setting and they represent the plausible futuristic advantage that the fishermen have when the season of plenty approaches. This may bring a solution to the situation to overturn the issue of disillusionment that the fishermen or Africans are experiencing. This age of happiness is highlighted when the poet says:

> "blue heavens wild with black
> striped mackerel.
> Flashing in the furrows of
> their foreheads."(p23)

This clearly connotes the image of fishing in that it is superstitiously believed by native Ghanaian fishermen that fish come from the skies, i.e. heavens above us. Of course, the view is that there is a supernatural hand that throws down the fish from the heavens to feed his

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

children, a real symbolic inspiration that there is no need for the disillusioned to continue feeling that way because hope is still possible to bring an end to all setbacks.

Conclusion

The paper has focused primarily on imagery in Ghanaian poetry and special attention was placed on the poet Kwesi Brew. Two distinct subjects, tradition and disillusionment were brought to light with a view to exploring how the poet, through his chosen persona uses imagery to develop them. Brew's humble background, as this paper has portrayed, enabled him to show his intense interest in traditional African concepts and cultural values and his deep concern about their decadence as a result of western values and intolerable dealings of corrupt African leaders.

Clearly, Brew tried in varying degrees to exhibit his frustration and despair about the seriousness of these situations and their influence on the very existence of African culture and tradition. This is what he believes has caused the various forms of feelings of disillusionment which most Africans today experience either emotionally or psychologically. Brew's use of imagery is profound and helps the reader of his poems to appreciate the two subjects of tradition and disillusionment. He explored images that range from the dry season, a housewife, fishing, traveling, chieftaincy, domesticity, hunting, human sacrifices and a host of others. All these images help to create strong feelings which appeal to almost all the human senses as one reads his poems. These forms of appeal to the senses propel readers to appreciate fully the very experiences Brew seeks to invoke.

Brew's power of description cannot also be overlooked. His commitment to details explains his careful choice of imagery which clearly displays his line of thoughts at every part of his poems. His language and diction is one reason why his poems have a universal appeal. A very good reason why this is so is found for instance in his use of words like "sappor" and "adoma". Even though these two words have a unique Ghanaian flavour, Brew uses them in a context which almost clearly gives away their meaning without any difficulty from his readers.

It can, therefore, be concluded that Kwesi Brew was successful in using imagery in a very unique way to vividly show a changing trend in the African society; from colonization through post colonization to an ex-colonial system undergoing problems with fighting a new cultural influx that posits to overthrow the social order of African cultural traditions. In using imagery, Brew is able to explore the resultant feeling of disillusionment through poems like "The Wife", "The Mesh," and "Mending Those Nets" in such a way that his readers are well positioned to feel first-hand the emotional, physical, psychological and mental pressure that

[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

the people in a changing Africa are going through. As such, one is inclined to believe that Brew, like his contemporaries need to be recommended highly to critics for them to turn their attention towards his works.

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[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

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[1]ustetteh@yahoo.co.uk
[2]Cynthiaderx477@gmail.com
[3]dan.okyere-darko@ucc.edu.gh

HEAT TRANSFER AND DISTRIBUTION IN THE CORE OF GHANA RESEARCH REACTOR-1 (GHARR-1) USING STAR-CCM+ CFD CODE

Mohammed, S.[1], Agbodemegbe,V.Y.[2], Debrah, S.K.[3],and Ampomah-Amoako, E.[4]

[1]*Physics Unit, Department of Physical Sciences, Niger State Polytechnic, Zungeru. Niger State, Nigeria*
[2,3&4] *Department of Nuclear Engineering, School of Nuclear and Allied Sciences, College of Basic and Applied Sciences,University of Ghana.*

ABSTRACT

The operation of a nuclear reactor under normal condition requires that all the heat generated in the core be removed effectively by the reactor coolant. The effectiveness of the coolant system is one of the most important factors in the design considerations and safe operation of a nuclear reactor. In the present study, a single phase flow system with natural convection cooling mechanism as present in the Ghana Research Reactor-1 (GHARR-1) was modeled and simulated using STAR-CCM+ CFD code. The geometry modelling was achieved by utilizing the 3D-CAD parametric solid modeler embedded in STAR-CCM+. The core geometry was segmented into 21 axial segments and discretized by the use of appropriate meshing models. GHARR-1 operating conditions were adopted and imposed as boundary conditions for the STAR-CCM+ simulation conducted. Heat flux specific to individual axial segment that were computed based on segments power peaking factors and surface area was applied to the wall of the flow channel. Standard k-ε turbulence model was adopted for the solution of the turbulent kinetic energy and its dissipation rate. Thermal hydraulic parameters in the core of the GHARR-1 were studied. The results obtained were validated with experimental data from GHARR-1 operation and observed to be in appreciable agreement. The plots of the evaluated flow parameters show that the code appreciably predicted the measured parameters and the result also confirms the efficient heat transfer from the fuel surface to the coolant and the effective temperature distribution that prevails within the coolant. The code was used to analyze the mean flow velocity and turbulent intensity for simulations at 5kW to 30 kW. In conformity with GHARR-1 Safety Analysis, results showed that, turbulence becomes more improved as the flow progresses along the domain and it is greatest at the upper part of the fuel elements. Trends and values of the studied parameters attests to the safe operational conditions present at the GHARR-1 facility.

Keywords: *STAR-CCM+; CFD; CAD; GHARR-1; Heat transfer; Turbulence.*

salmedangle@yahoo.co.uk

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BACKGROUND

A clear understanding of the thermal hydraulics associated with heat removal resulting from the nuclear fission is key to controlling and ensuring normal reactor operation. In GHARR-1 heat is produced in the nuclear fuel through fission reaction resulting from neutron bombardment of feasible isotope of uranium. The produced heat is conducted and removed by the coolant. GHARR-1 is a tank-in-pool type, low power research reactor, which is under-moderated with 10 irradiation sites (Annafi et al., 2014; Akaho et al., 2006) GHARR-1 uses 90.2% enriched U-Al alloy as fuel. The maximum thermal neutron flux at its inner irradiation site is 1×10^{12}n.cm^{-2}.s^{-1} . It is cooled and moderated with light water, and light water and beryllium act as reflectors. The fuel cage consists of 344 fuel pins, 4 tie and 6 dummy rods, a central control rod guide tube, upper and lower grid plates as presented in Figure 1.

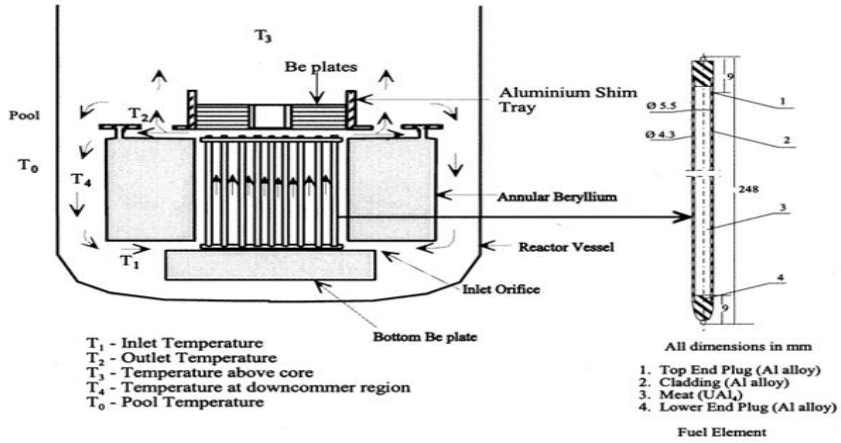


Figure 1: heat transfer mechanism in GHARR-1 (Ampomah Amoako, et al., 2009)

GHARR-1 thermal hydraulic associated with heat removal

The core region of GHARR-1 is located 4.7 m under water close to the bottom of a watertight reactor vessel. The quantity of water is 1.5 m^3 in the vessel, which serves the purpose of radiation shielding, moderation and as primary heat transfer medium. In addition, heat can be extracted from the water in the vessel by means of a water-cooling coil located near the top of the vessel. The water-filled reactor vessel is in turn immersed in a water-filled pool of 30 m^3. Cold water is drawn through the inlet orifice by natural convection. The water flows past the hot fuel elements and comes out through the core outlet orifice. The hot water rises to mix with the large volume of water in the reactor vessel and to the cooling coil. Heat passes through the walls of the container to the pool water (Ampomah-Amoako et al., 2009). Previous research (Apiah, 2011; Talha et al., 2012; Akaho et al., 2003; Okon et al., 2013) conducted on core heat transfer for GHARR-1 were performed using 1-D codes namely PARET and PLTEMP thermal hydraulic codes. However, these 1-D codes do not provide detailed information on the variation of the trends of flow field parameters at specific locations within the core. Also, previous studies offers no explanation on turbulent intensity

salmedangle@yahoo.co.uk

of GHARR-1 core coolant. However, the application of the STAR-CCM+ is deemed to provide analysis with more reliable and detailed results. STAR-CCM+ also has theadvantage of 3-D visualization and hence offer improved appreciation of the results.

Researchers has paid attention to thermal hydraulic studies in MNSR generally and GHARR-1 in particular with the view to among others explain in terms of trend and magnitude of flow parameters. Thermal Hydraulic Behavior of Research Reactor during Natural Convection Cooling Mode was studied by Kamal-Eldin et al (2012). Annafi et al (2014) developed a mathematical model of the transient heat distribution within Ghana Research Reactor -1 (GHARR-1) fuel element and related shutdown heat generation rates. Okon et al. 2013) employed an analytical approach of the general heat conduction differential equation in cylindrical coordinate to solve the temperature distribution and heat flux for the nuclear fuel element. Kyei et al (2014) determined the velocity profile of coolant flow in the Ghana ResearchReactor-1 (GHARR-1).

Experimental

The experimental data to be used for validation of simulation results were obtained using the Ghana Research Reactor-1 at Ghana Atomic Energy Commission Research Reactor facility Centre.The experiment was conducted for normal operating conditions at different power levels (5 kW to 30kW at interval of 5 kW). Six readings were taken at an average of 30 minutes interval for each power level and the inlet and outlet temperatures were

Geometry Modeling

The geometry adopted for the flow channel is coherent with the core configuration of GHARR-1 and is obtained as shown in figure 2. Modifications were made on the geometry used in the work of Ampomah et al (2009) by using 3D CAD model available in the STAR-CCM$^+$CFD code. The modification however did not include the radius of the geometry. The reduction in the length by a factor of 10 gives rise to a geometry of total length 0.023cm. The geometry modification was based on the availability of limited computational memory. The resulting length was further sectioned into 21 segments.

Figure 2 shows the modified geometry adopted for the present work.

salmedangle@yahoo.co.uk

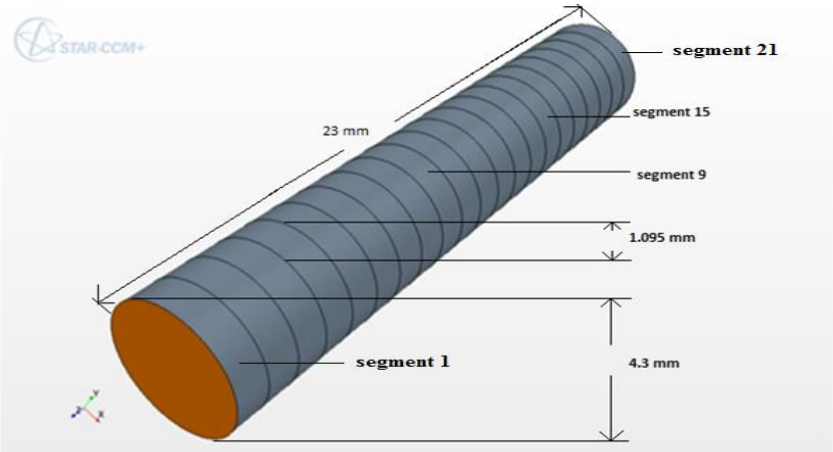


Figure 2: GHARR-1 core coolant modified geometry

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Table 1: Meshing Models

S/No	Mesh Models	Specification
1	Base Size	0.12mm
2	Prism Layer Stretching	1.11
3	Prism Layer Thickness	0.5 mm
4	Number of Mesh cells	553928
5	Surface growth rate	1.3
6	Number of Prism Layers	20

The mesh generated after applying the above mesh models for the modified geometry is presented in Figure 3.

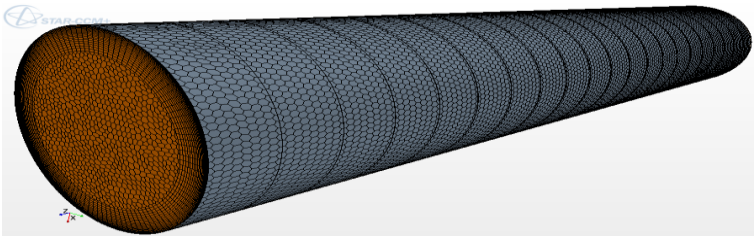


Figure 3: Mesh scene

Physics models and boundary conditions employed for the present work are shown in Table 2.

Table 2: Physics Model

S/No	Physics Model	Specification
1	Space Model	Three Dimensional
2	Time Model	Steady State
3	Material Model	Water
4	Flow Model	Segregated Flow
5	Energy Model	Segregated Fluid Isothermal
6	Viscous Regime Model	Turbulent
7	Turbulent Model	K-Epsilon
8	K-E Model	Standard K-E Turbulence
9	Wall Function	All Y+ Wall Treatment
10	Convection Scheme	2nd Order

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The solution were monitored to converge by assessing the residuals and the trend of the outlet temperature. Computation of GHARR-1 power peaking factors was done by Ampomah et al. (2009) using equations 1 and 2.

$$F_{hs} = \frac{T_{hot}}{T_{cA}} \quad (1)$$

$$F_{As} = \frac{T_{avr}}{T_{cA}} \quad (2)$$

In the present work, the power peaking factors (Ampomah et al., 2009) were used to calculate heat flux for each segment using equation 3.

$$\Phi_s = \frac{P_s}{A_s} \quad (3)$$

Where A_s is the surface area of the segment, Φ_s is the segment heat flux and P_s is the segment power given by equation 3.6

$$P_s = \left(\frac{f_s}{f_T}\right) * P_R \quad (4)$$

Where $P_s$is the segment power, f_s is the segment power peaking factor, f_T is the total power peaking factor and P_R is the reactor power considered.

RESULTS AND DISCUSSION

Results of the simulation were obtained over constrained planes and line probes. The constrained planes were placed at the inlet and outlet of each segment.The line probes were placed at different points on the surface and within the fluid.

In order to determine the extent of prediction of the experimental data, plots of outlet temperature against power for the simulation were compared with data obtained experimentally. “Out Temp Exp”, “Out Temp Sim Hot” and “Out Temp SimAvr” used in the legend are abbreviations for experimental outlet temperature, simulation outlet temperature for hottest channel and simulation outlet temperature for averaged channel respectively. In the present work, hottest channel is the channel whose segment heat fluxes are calculated using the GHARR-1 power peaking factors for hottest and averaged channel respectively.

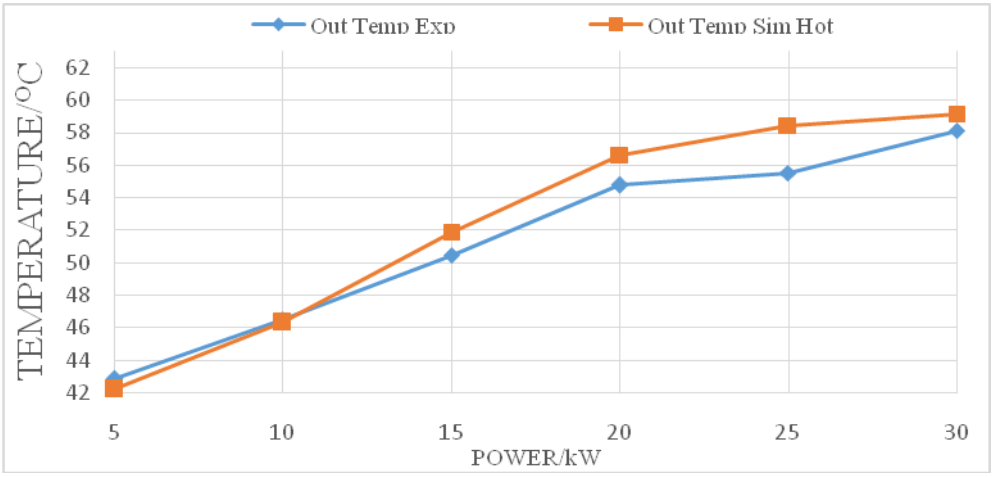


Figure 4 a: Graph of outlet Temperature versus Power for hottest channel

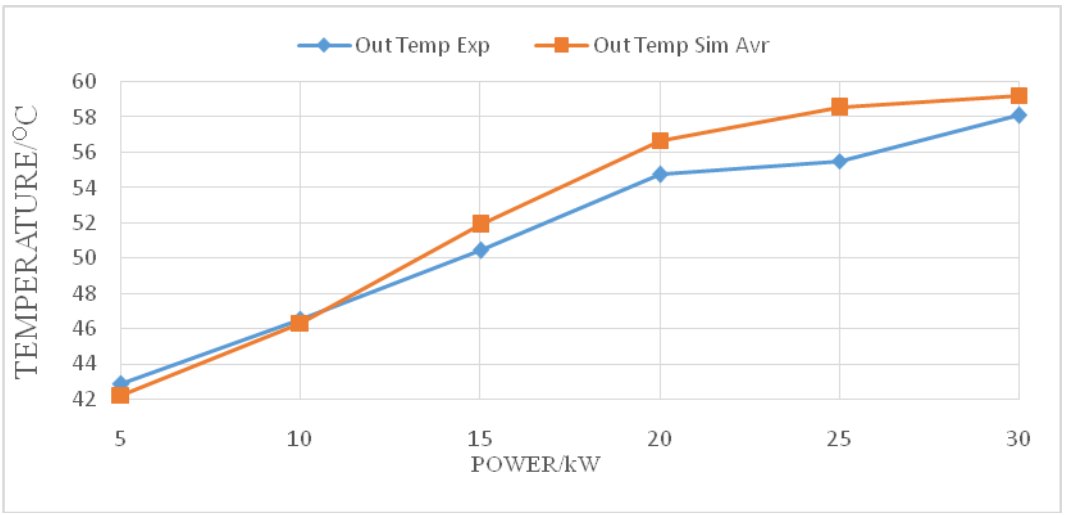


Figure 4 b: Graph of outlet Temperature versus Power for averaged channel

The values of outlet temperature for experimental measurements are lower than those calculated by STAR-CCM+ CFD code by a deviation of 1% - 1.6%. With this variation, taking into consideration meshing model dynamics, it is concluded that STAR CCM+ has predicted the studied physical parameters.

BULK AVERAGE TURBULENT INTENSITY

The fluid bulk turbulent intensity was calculated as an average over each segment to investigate the degree of turbulence in the various segments of the GHARR-1 core. The turbulent intensity was computed using equations 5 and 6 and the results evaluated are plotted in Figures 5 a. and 5 b.

$$I = \frac{\acute{\upsilon}}{\tilde{v}} \quad (5) \qquad where, \tilde{v}\ is\ the\ mean\ flow\ fluid\ velocity$$

$$\acute{\upsilon} = \sqrt{\frac{2}{3}k} \qquad (6)$$ (CD_ADAPCO, 2011)

Where k is the fluid bulk turbulent kinetic energy

Figures 5 a. and 5 b. show a graph of turbulent intensity versus position for hottest and averaged flow channels respectively."TI 5kW_hot and TI 5kW_avr" used in the legend are abbreviations for turbulent intensity taken over each segment for the simulation at 5 kW for the hottest channel and averaged channel respectively.

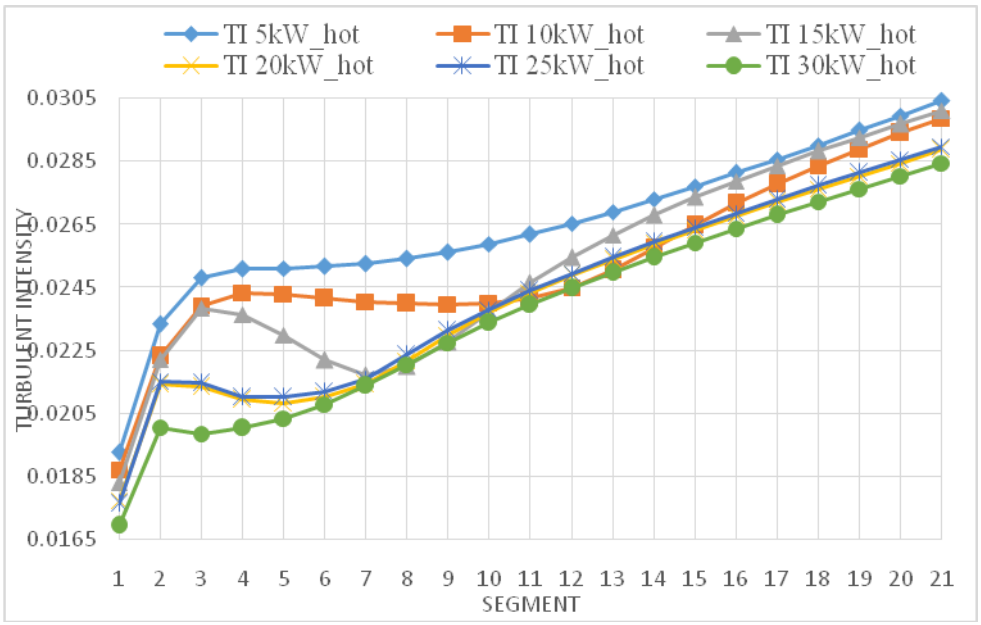


Figure 5 a: Bulk Average Turbulent Intensity versus Position for hottest channel.

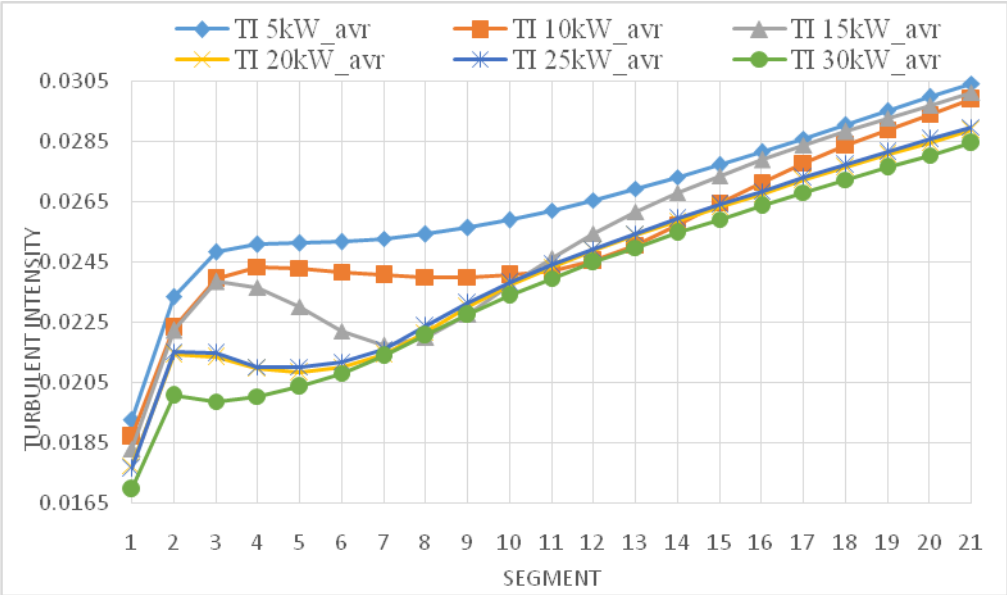


Figure 5 b: Turbulent Intensity versus Position for averaged channel.

The trend for simulations at 5 kW, 10 kW and 15 kW shows a sharp rise between segment 1 and 3. Simulations at 5kW and 10 kW continued with a similar trend reducing slightly between segment 3 and 10 before continuing with an upward trend to the outlet. The trend for simulation at 15 kW dropped lower than 5 kW and 10 kW between segment 3 and 7 before a continued sharp rise between segment 7 and 21.

The simulations at 20 kW, 25 kW and 30 kW shows a sharp rise between segment 1 and 2, this is followed by a reduction in turbulence intensity in simulations at 20 kW and 25 kW between segment 2 and 4 before a continued rise between segments. The 30 kW simulation shows a reduction in turbulent intensity between segment 2 and 3 accompanied by a rise between segment 3 and 21.

The turbulent intensity increases with increase in power. The observed trends suggests a turbulence surge at the inlet accompanied by a turbulence drop while the fluid stabilizes followed by another rise which is maintained to the exit of the domain. The observed trends are the same for both hottest and averaged channels.

CONTOUR PLOTS FOR HOTTEST CHANNEL SIMULATION AT 30 kW.

Contour plots are presented over constrained planes in other to visualise the heat transfer and distribution from the surface to the bulk fluid at different positions in the domain. The plots taken at inlet, outlet and middle segments are presented in Figures 6 a to 6 c.

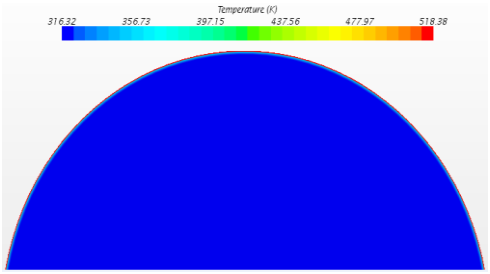


Figure 6 a: Inlet segment temperature distribution

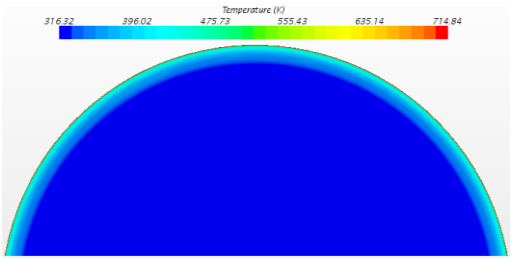


Figure 6 b: Temperature distribution in the middle segment

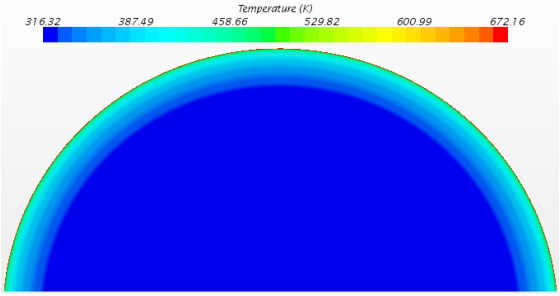


Figure 6 c: outlet segment temperature distribution

Figure 6 a. shows a uniform distribution of temperature over the interface. The interface temperature was observed to be the same as the inlet temperature.Figure 6 b. shows an increase in temperature from the surface to the bulk of the fluid. It also shows the effectiveness of the coolant to remove heat from the fuel rod surface. This can be seen in the manner at which high surface temperature is removed without heating the bulk of the fluid. Compared to Figure 6 a. there is a build of temperature at the region around the wall boundary in Figure 6 b.Figure 6 c. shows a boundary temperature development of greater magnitute than those observed in Figures 6 a. and 6 b. This implies that the temperature close to the walls increases along the domain.

The contour plot of domain surface temperature shows temperature distribution on the surface of the flow channel. Figure 7. gives the contour plot for domain surcae temperature.

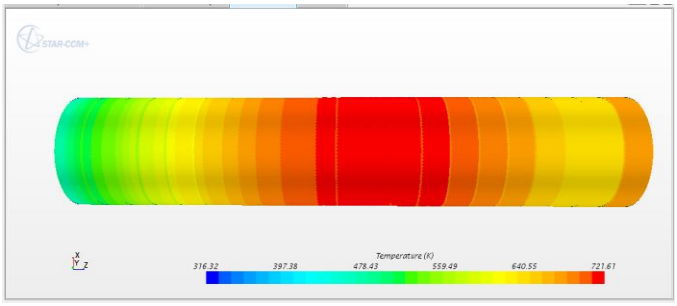


Figure 7: Surface temperature distribution

The contour shows the surface temperature is least between segment 1 and 9 peaking at the middle of between segment 10 and 15 before dropping to a lesser temperature between segment 16 and 21. The surface temperature distribution follows the same trend as calculated power peaking factors

CONCLUSION

A study of heat transfer and distribution was conducted to evaluate the thermal hydraulic behavior of GHARR-1 core under natural convection cooling.

1. STAR-CCM^{+}CFD code is able to predict heat transfer and distribution in the core of GHARR-1 at the power levels considered as fluid develops from inlet to outlet of modified GHARR-1 core. This provides more insight about the distribution of mean and turbulent flow parameters for GHARR-1 core.
2. Lateral distribution of temperature from the surface to the fluid centerline shows an effective heat transfer through the fluid.
3. There is a general increase in the turbulent intensity over the domain from inlet to outlet which also increases with increase in power. This suggest that as the flow develops, there is a build-up of turbulence in the domain. The observed trends suggests a turbulence surge at the inlet accompanied by a turbulence drop while the fluid stabilizes before an even greater rise in turbulent intensity. This observation conforms to GHARR-1 Safety Analysis that the closer the coolant gets to the upper part of the fuel elements, the stronger the turbulence becomes (Akaho et al., 2003).

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salmedangle@yahoo.co.uk

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salmedangle@yahoo.co.uk

HOUSEHOLD WILLINGNESS TO PAY FOR IMPROVED SOLID WASTE DISPOSAL SERVICES IN OSUN STATE, NIGERIA

Adetunji, M. O.[1] and Adelegan, B.G.[2]

Agricultural Economics Department LadokeAkintola University of Technology, Ogbomoso, Oyo state, Nigeria.

ABSTRACT

This study examined the willingness of household to pay for improved solid waste disposal services in Osogbo and Olorunda local government areas of Osun State. A systematic random sampling technique was used to select respondents from both areas. Well structured questionnaire were administered to the one hundred and twenty (120) household heads sampled in two local government areas and data were collected. Descriptive statistics and logit model were used to analysis. From the analysis, the findings showed that 50.0% had tertiary education. About 34% and 26% were civil servants and traders respectively. Majority of these household heads lived in rented apartment (534%) , about 35% earned an average of ₦ 38,000 monthly, while 33.3% earned more than N75,000. Only 10.8% patronized the improved solid waste disposal management in Osun State (OWMA), while 35.0% dispose their waste by burning, open dump site (40.8%) and by burying their waste in the soil (5.8%). The respondents that patronized OWMA revealed that they paid either ₦5,000 per annum, ₦ 500 per month or ₦ 150 weekly and the service was usually once a week. The study further revealed that 70.8% were willing to pay for the services of the improved solid waste disposal management, if they are consistent and competent. The results from the logit model showed that level of education ($p< 0.01$) and household monthly income ($p< 0.01$) had positive relationship with willingness to pay for improved solid waste disposal services while cost of service ($p< 0.05$), age ($p< 0.05$), and household size($p< 0.05$) were inversely related with willingness to pay. In conclusion, the study affirmed that age, level of education, household monthly income, household size and cost of the service affected willingness to pay for improved solid waste disposal.

The study therefore recommended that more awareness and advert should be made in order to reach larger populace especially the non-learned, the cost of the service should also be maintained at a minimum rate.

Keywords ; solid waste, willingness to pay, disposal services, household, Osun .

INTRODUCTION

Background of the study

Solid wastes by definition include refuse from households, non-hazardous solid waste from industrial and commercial establishments refuse from institutions market waste, yard waste,

oadetunji@lautech.edu.ng

Adetunji, M. O.[1] and Adelegan, B.G.[2] (2016) Household willingness to pay for improved solid waste disposal services in osun state, Nigeria In: Mojekwu,J.N., Nani G., Atepor, L., Oppong, R.A.., Adetunji,M.O., Ogunsumi, L., Tetteh, U.S., Awere E., Ocran, S.P., and Bamfo-Agyei, E. (Eds) Procs 5th Applied Research Conference in Africa. (ARCA) Conference, 25-27 August 2016, Cape Coast, Ghana. 122-136

and street sweepings (Cointreaus-lavine et al, 1994). Broadly, Household wastes otherwise known as residential or domestic wastes are made up of wastes that are consequences of household activities. According to CASSAD (1998), these include food preparation, sweeping, cleaning, fuel burning and gardening wastes. Old clothing, furnishings, retired appliances, packaging and reading materials are also solid wastes. In Nigeria, many metropolises are faced with the problems of rapid expansion due to population increase and this, no doubt, brought increasing strain on urban infrastructure facilities. One area in which this strain has become obvious is in waste management where the existing system appears to be incapable of coping with the heap of waste generated on daily basis. The urban centers are experiencing an increased rate of environmental deterioration, with refuse dumped along drainage channels. Most cities in Nigeria are faced with waste management problems, and Osun state is no exemption.

Alabi, (2004) explained that wastes that are not well managed can affect the environment in terms of the contamination of the atmosphere, soil and water. This can cause severe problems for humans and animals population. It can also affect human health in particular by causing convulsion, dermatitis, irritation of nose/throat, anaemia, skin burns, chest pains, blood disorders, stomach aches, vomiting diarrhoea and lung cancer which may lead to death The open waste piles create health problems and leachate pollutes the underground water, ultimately causing waterborne diseases. According to Sarraf (2004) the cost of leakage of leachate from unsanitary landfill sites in Morocco was about US $ 25 Million per year. According to Mustafa, et al. (2007) the World Bank report criticized that situation of solid waste in Pakistan is neglected and greater threat to environmental degradation. The annual estimated cost of environmental and resource degradation is about six percent of the GDP.

According to Oyeniyi (2011), waste management has become serious environmental and public health problem worldwide, particularly in developing countries. Changing economic trends, greater expansion of urban agricultural and industrial activities stimulated by rapid population growth produce solid and liquid wastes that pollute the environment and destroy resources and complicate solid waste management. Consequently, solid waste is not only increasing in quantity but also changing in composition.

Statement of the Problem

Solid waste disposal is a very serious problem facing most urban centres in the developing countries today, rapid urbanization has in no small measure contributed to waste generation and sanitation problems in our cities. These waste and their products are the cause of great deal of environmental problems. Unfortunately, methods of solid waste disposal are not well defined while the management is grossly in adequate in Nigeria (Ajiboye, 2011).

oadetunji@lautech.edu.ng

Also there are linkages between poor solid waste management, environmental disaster and health status of the household. Yusuf (2007) affirmed that improper collection and disposal of solid waste leads to water, air, land and general environmental pollution and consequently to spread of communicable diseases, causing obnoxious conditions and spoils biosphere as a whole. On the other hand, proper solid waste management bring about better environmental condition which in turn leads to reduced illness and improve household savings as a result of reduced treatment cost.

Collection of waste used to be the responsibility of municipal authorities in the past but now with the local government. In short, waste collection is the constitutional responsibility of the local government. This responsibility is not mutually exclusive, because, there is no local government area in Nigeria that can afford the huge financial, technical, administrative and human resource requirements to effectively carry out this constitutional responsibility (Alabi, 2004). The collection of solid wastes in many Nigerian cities has always until very recently, been dominated by government agencies; it has been concluded that it is the responsibility of government to solve the waste collection problems, as part of government obligations to the citizens.

An explanation for the inability of the government to manage solid waste collection effectively arose perhaps from the misconception of this task as a public good. Irrespective of the fact that government gave waste collection a priority in their development objectives, their ability to curtail the problems of waste collection deteriorates with time, due to rising capital costs for plant and equipment, increasing operation and maintenance costs. Considering the rapid spatial and population growth of most urban areas with decreasing coverage levels and with increase in level of waste generated, confronted by increasing public demand for improved services (Salifu, 2001). The need arises for the involvement of the private sector and the civil society in the provision of municipal solids waste service. It should be noted, however, that it is only in the large urban centers of Nigeria e.g. Lagos, Ibadan, Osogbo, Warri, Suleja amongst others that the activities of formal private sector are recorded Alabi, (2004). In majority of the small cities and towns, they are either totally absent or being substituted with the informal refuse collectors such as cart pushers. This therefore brings up the reasons why the populace need to willing to pay for effective service of well-organised and improved solid waste disposal services

In line with the above stated problem the study therefore raises the following research question. What are the socio-economic characteristic of the respondents? Are the household willing to pay for improved waste management? What are the factors affecting willingness to pay for improved solid waste disposal

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Objectives of the study.

The overall objective of this study is to assess the household willingness to pay for solid waste disposal in Osogbo and Olorunda local government in Osun state. In other to achieve the overall objectives the study, the specific objectives of the study are to:

1. Describe the socio-economic characteristics of the respondents
2. Describe the household structure, monthly income and expenditure.
3. Identify the existing solid waste disposal used household in the study area.
4. determine the Household willingness to pay for improved solid waste disposal
5. Examine the factors affecting willingness to pay for improved solid waste disposal

Significance of the study

Unwillingness to pay could lead to illicit burning and dumping, hence, in their study, Adewuyi and Oyekale (2013) were of the opinion that household collection should be subsidized in order to prevent such external environmental costs resulting from illegal dumping. The research work aimed at investigating the perception and willingness of household to pay for waste proper disposal. There is need to investigate the household awareness and participation in waste disposal. Findings from this study will contribute to existing literature on household waste disposal. Also, it will be instrumental for policy makers, planners and other environmentalist in understanding the extent of environmental education approach to waste disposal. Nevertheless, it will inform stakeholders, particularly policy makers on the best approach for designing and implementing environmental education programmes that will encourage or enhance household's participation in waste disposal.

LITERATURE REVIEW

Solid waste can be defined as any substance or article which requires to be disposed of as broken, worn out, contaminating or otherwise spoiling. Again it can also be defined as any material which constitutes a scrap material or other unwanted surplus substances arising from the application of any process. Solid waste is differentiated by their origin, physical form, detailed composition and risk potential. The quantity and the composition of some types of solid wastes, such as municipal waste, vary from day to day, season to season and from locality to locality (Adewuyi and Oyekale 2013; Yusuf, et al 2007).

Solid Waste is classified based on their origin, treatability and risk potential. Based on the origin, solid waste can be sub-classified into food waste, rubbish, ashes and residues, demolition and construction waste, municipal waste, industrial process waste and agricultural waste. Food wastes are the animal, fruit and vegetable residues resulting from the handling, preparation and eating of foods. They are putrescible and decompose rapidly causing malodor. The rubbish waste comprises combustible and non-combustible solid wastes of households, institutions of commercial activities etc. excluding putrescible materials. The combustible rubbish consists of materials such as paper, cardboard, furniture parts, textiles,

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and rubber, leather, wood and garden trimmings. Non-combustible rubbish consists of items such as glass, broken crockery, plastic, discarded tins, aluminum cans and materials made of ferrous and non-ferrous metals. Ashes and residues are materials remaining from the burning of wood, coal (Furedy and Lardinios, 2000). Coke and other combustible wastes in homes, stores, institutions, industrial and municipal facilities for the purpose of heating and cooking and above all the remains of combustible wastes are categorized as ashes and residues (Harris et al., 2001).

Solid waste management is an important facet of environmental hygiene and it needs to be integrated with total environmental planning its storage, collection, transport, treatment and disposal can lead to short term risks. In the long run there may be dangers arising particularly from the chemical pollution of water supplies. Seow (2009) said that the problems connected with refuse storage in buildings were, insects, rats, fire, and odor. These problems are also associated with other problems of human health and aquatic systems which are atmospheric, water, environmental and visual pollution.

Willingness to Pay

Willingness to pay is the amount of money a person is willing to pay for higher level of environmental or commodity quality (Hartwick and Olewiler, 1998). For Golan and Kuchler (1999), willingness to pay measures the resources an individual is willing and able to give up for a reduction in probability of encountering a hazard that compromises their health.

Willingness to pay for waste disposal service is very important to the success and improvement of private sector participation in solid waste management. The will to or not to pay have direct impact on success or reliability of any solid waste management strategies. (Rahman et al., 2005). Willingness to pay can be affected by peoples' knowledge of inherent danger in lack of efficient waste disposal, government policy, size of household, age and educational status. Sarraf, (2004) stated that when a community perceived a new facilities that provided a service higher than the existing management, they are more willing to pay higher contribution. However, this does not apply to our rural folks, who may not understand the environment implication leave alone alternative sanitation. The rapid growth of population as well as rising per capital income would pre suppose an increase demand in the provision of required infrastructure and public services Moghadam, et al (2009). Solid waste disposal is one major public services that is under the threat of this rapid population growth and in a bid to improve the efficiency of solid waste management service, the willingness from the side of the demand need to be studied.

Willingness to pay is generally used to consider the evaluation of the potential benefits of an environment. Willingness to pay approach is based on the idea that it arises from the impact of the actual costs that are not profitable and look at the overall perception of society would be willing to pay to avoid losses (Knetsch, 1990). Willingness to pay for environmental

goods or services based on household income increase at the optimum level for improving the quality of the environment from pollution (Bruce and Ellis, 1993). A study showed by paying the cost of increasing garbage, recycling will reduce the overall waste disposal in an area (Skumatz, 2002). It was found that the cost charged to users (community) is large comparable with the waste produced. Therefore waste generation is reduced to avoid the costs incurred. In a study conducted by (Mustafa, 2007), Willingness to pay depended on monthly income, age, gender, race, the last education, recycling, environmental protection tendencies and types of households.

The study conducted by Tanrivermis, (1998) found that factors of socio-economic had a significant influence on willingness to pay for improve environmental quality. Regression analysis used is Ordinary Least Squares (OLS) to assess the factors that affect willingness to pay for better environmental management, including income level sand several demographic factors. The results showed that the stated willingness to pay was positively correlated with income levels. Respondents with higher incomes were more willing to pay the costs or higher taxes. While the age of the respondents have a negative relationship with willingness to pay. Education levels of respondents appear to correlate positively with Willingness to pay. The mean for WTP for male respondents were significantly larger than the female respondents. (Zulkiflee, 1997) found that the total weight of waste per household varied according to the different types of houses in Bandar Baru Bangi. The study conducted by Akinwale, (2005) found that 20 percent of respondents were willing to pay additional cost if the quality of waste management services can be improved. The willingness to pay at reasonable rate is important to manage waste to meet the expenses of repairing and buying better equipment. (Seow , 2009) studied solid waste management issues and dump trucks to see the different views between men and women. This is because women are more sensitive to the issues of solid waste and garbage vehicles compared to men due to the solid waste management is usually organized by women. Moghadam, et al. (2009), studied a picture of urban solid waste management in Rasht Gilan Province, Iran, and provided recommendations for improvement of the system.

The above literature analyzed solid waste management and willingness to pay in various countries and all agreed that solid waste has increased drastically over the years and if not managed properly would cause many negative effects on the population. Hence their effective management is of extreme important. It was also found that in some places the cost charged to users (community) is large compared with the waste produced. Nevertheless, the percentages of waste recycled have increased significantly. Therefore the study on willingness to pay for improved solid waste management is important so that better services could be provided.

METHODOLOGY

The study was carried out in Osogbo and Olorunda local government area of Osogbo metropolis, Osun State, Nigeria. Osogbo metropolis consists of 3 local governments; Osogbo,

oadetunji@lautech.edu.ng

Olorunda and Egbedore Local Government Areas (LGAs) with a total population of approximately 350,000 people (NPC, 2006). Osogbo is situated on Latitude 9.7^0N and on Longitude 4.5^0E of the equator. The area is marked by two seasons, the raining season which starts from April and terminates in October, and dry season which prevails from October to March. The town with an annual rainfall of about 0.6 meters lies mainly in the deciduous forest area which spreads towards the grassland belt of Ikirun, north of Osogbo. Osogbo is situated on a raised land which is well over 500 meters (800 feet) above the sea level and is drained by the Osun River and its tributaries. Even though farming is the traditional and major occupation of the people of Osogbo, industrial activities are commonplace. The city is blessed with average number of Christians and Muslims while view traditionalist is found in this area. The monthly mean temperature varies between 20^01^0C and 32^08^0C while the monthly maximum varies between 30^0C and 32^0C. The relative humidity is generally high all year round. Systematic random sampling was used to select 120 households in the two LGAs. This means that sixty respondents were selected from each LGA. The study used primary data and the data was collected through the aid of a well-structured questionnaire for the literate respondent and administered as interview schedule to illiterate respondents. Descriptive Statistics and Logit model was used to determine the willingness to pay for waste disposal service by households. The logit model which is based on the cumulative probability function will be adopted because of its ability to deal with a dichotomous dependent variable on a well-established theoretical background.

Factors influencing willingness to pay by household: To identify the factors influencing willingness to pay for waste disposal by households. The regression logit model is specified as:

$$Y = \frac{1}{1+\text{EXP}^Z}$$

Where Y = responses of household to WTP questions which is either 1 if Yes and 0 if No

$Z = ß_0 + ß_1 X_1 + ß_2 X_2 + \ldots\ldots\ldots\ldots + ß_7 X_7$

X_1 = Sex (Dummy: Male=1, Female= 2)

X_2 = Age (yrs)

X_3 = educational level. (No of years spent in school) (yrs)

X_4 = Marital status

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X_5 = Household size (number)

X_6 = monthly income (₦)

X_7 = price paid for improved waste disposal (₦)

The chi-squared (that is the log likelihood ratio stratistics) and McFadden pseudo R squared were used to measure the goodness of fit of the model. Also the significance level of the chi-squared was used to evaluate the significance of the model

RESULTS PRESENTATION

The Socio-economic Characteristics of the Respondents

As shown in Table 1, 54.2% of the respondents are male while 45.8% are female. This implies that there are more male-headed households in the study area, 40.0% of the respondents were within the age of 31-40years old, the mean age of the household was 39 years, implying that most respondents were in their active age group. It was also revealed that 63.3% of the respondents are married and 50.0% had tertiary education. Educational distribution of respondents indicated that 22.5% of the respondents have no formal education, 10.0% had primary education. Those that completed secondary education constituted about 20.0%. This result showed that respondents are educated. About 34% and 26% were civil servants and traders respectively. The distribution of respondents by household size revealed that 34.8% of the respondents had average of 3 members in their household while 65% had 8 members in their household. The number of members within a household contributes in a way to the level of waste generated.

Table 1.0 : Socio economics characteristics of the respondents

Variables	Frequency	Percent
Gender		
Male	65	54.2
Female	55	45.8
Total	**120**	**100.0**
Age		
≤ 30	25	20.8
31-40	48	40.0
41-50	39	32.5
>51	18	15.0
Total	**120**	**100.0**
Marital status		
Single	25	20.8
Widowed	6	5.0
Divorced	10	8.3

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Separated	3	2.5
Married	76	63.3
Total	**120**	**100.0**
Educational status		
No formal education	27	22.5
Primary Education	8	6.7
Secondary education	24	20.0
Tertiary Education	60	50.0
Others	1	0.8
Total	**120**	**100.0**
Household size		
≤ 5	34	28.3
6-10	78	65.0
≥ 11	8	6.7
Total	**120**	**100.0**
Primary Occupation		
Civil servant	41	34.2
Trading	31	25.8
Artisans	13	10.8
Others.	35	29.2
Total	**120**	**100.0**

Source: Field survey, 2015

Monthly income, expenditure and house type

Majority of these household heads lived in rented apartment (53.3%). Some in flats (46.7%) and face to face (32.8%), about 35% earned an average of N38,000 monthly, while 40.0% earned more than ₦75,000. Monthly expenditure of about 36.9% of the respondents was an average of ₦38,000 while 32.5% spent less than ₦25000 per month. The implication of this is that they earn fairly enough to cater for basic needs.

Table 2.0 Distribution of the respondents by monthly income, expenditure and house type

Variables	Frequency	Percent
Ownership of house		
Owned	44	36.7
Rented	45	37.5
Official residence	10	8.3
Inherited	14	11.7
Others	7	5.8
Total	**120**	**100.0**

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Type of household		
Face to face	39	32.8
Flats	56	46.7
Bungalow	6	5.0
Duplex	10	8.3
Others	9	7.5
Total	**120**	**100.0**
Monthly income		
≤25000	28	23.3
26000-50000	42	35.0
51000-75000	10	8.3
≥76000	40	33.3
Total	**120**	**100.0**
Monthly expenditure		
≤25000	39	32.5
26000-50000	53	36.9
51000-75000	12	10.0
≥76000	16	13.3
Total	**120**	**100.0**

Source: Field survey, 2015

Method of waste disposal

Only 10.8% patronized the improved solid waste disposal management in Osun State (OWMA), while 35.0% dispose their waste by burning, open dump site (40.8%) and by burying their waste in the soil (5.8%). This implies that about half of the respondents do not properly dispose their waste. The respondents that patronized OWMA revealed that they paid either ₦ 5,000 per annum, ₦ 500 per month or ₦ 150 weekly and the service was usually once a week. Table 3 also revealed that 59.2% of the respondents waste is generated from food, 26.7% from paper, 7.5% from metals and 7.2% from other ways. This implies that almost all respondents generated waste from food.

Table 3.0: Distribution showing how respondents dispose waste

Variable	Frequency	Percent
Waste Disposal		
Burning	42	35.0
Open dump site	49	40.8
Bury in the soil	7	5.8
Others	22	18.4
Total	**120**	**100.0**
Component of waste		
Food	71	59.2

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Paper	32	26.7
Metal	9	7.5
Others	8	6.7
Total	**120**	**100.0**

Source: Field survey, 2015

Determination of household willingness to pay for improved solid waste disposal

The study further revealed that 70.8% were willing to pay for the services of the improved solid waste disposal management, if the services meet their satisfaction (table 4).

Logit regression analysis was used to determine the factors that influence the household willingness to pay for improved solid waste disposal and the result is shown clearly in Table 5. The chi-squared (which is the same as the LR statistics) shows that the overall goodness-of-fit of the model was statistically significant at 1% level. The McFadden pseudo R squared indicates that 56.7% of the variance was explained by the independent variables. The independent variables of this model are gender(G), age(Ag), marital status (Ms), household size(Hs), level of education(Le), monthly income (Mi) and cost of service(Cs) . The cost of service means the amount paid for the use of improved solid waste disposal.

The results showed that level of education(Le) and household monthly income (Mi) had positive impact on willingness to pay for improved solid waste disposal at 1% level of significance while age(Ag), cost of service(Cs) and household size (Hs) related to willingness to pay negatively at 5% level of significance. To explain further, the likelihood of household willingness to pay for improved solid waste disposal services decreases as respondents' age increases. The marginal effects on probability of household willingness to pay for improved solid waste disposal services with respect to age is -0.03842, this means that as the age of the household head increases by one year the likelihood for paying for the service decrease by 0.03842. The likelihood of household willingness to pay for improved solid waste disposal also decreases as respondents' household size increases, this means that as the number of household member increase by one the probability of paying for the service decrease by 0.13454. The probability of household willingness to pay for improved solid waste disposal also decreases as the price to be paid by the respondent (that is the cost of the service) increases, this means that as the cost of the service increase by one naira the probability of paying for the service decrease by 0.02826.

On the other hands, Likelihood of household willingness to pay for improved solid waste disposal increases as respondents' level of education increases. The level of education is measured by the years spent in school. The marginal effects on probability of household willingness to pay for improved solid waste disposal services with respect to level of education is 0.45312, this means that as the level of education of the household head increases by one year the likelihood for paying for the service increases by 0.45312. The probability of household willingness to pay for improved solid waste disposal also increases

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as monthly income of the household heads increases, this means that as the income increase by one naira the probability of paying for the service increase by 1.24899.

Table 4.0 Distribution showing the Existence of improved waste disposal

Willing to pay	Frequency	Percent
Yes	85	70.8
No	35	29.2
Total	120	100.0

Source: Field survey, 2015

Result of Logit regression analysis showing the marginal effects on probability of household willingness to pay for improved solid waste disposal

Variable	**Coefficient**	**z-value**	**P>|z|**	**Significant Level**
Constant	3.24269	1.51	0.0032	
Gender (G)	0.32547	0.43	0.664	Not significant
Age (Ag)	-0.03842	-0.96	0.037**	Significant
Marital status (Ms)	0.59262	2.15	0.332	Not Significant.
Household size (Hs)	-0.13454	-3.53	0.045**	Significant
Level of education (Le)	0.45312	1.26	0.0022***	Significant
Monthly income (Mi)	1.24899	1.65	0.0019***	Significant
Cost of service (Cs)	-0.02826	-2.19	0.0470**	Significant

Source: Field survey, 2015

LR chi-squared (7df) = 70.67, Probability > chi-squared = 0.00992,

Log likelihood = -26.631681, Pseudo R squared = 0.5669

* Statistically significant at 10%

** Statistically significant at 5%

*** Statistically significant at 1%

CONCLUSION AND RECOMMENDATION

Majority of the respondents are married which indicates a large household size, and it also influences their willingness to pay for improved solid waste disposal. Most of them also are educated at one level or the other, which makes them aware of the danger of dirt/waste accumulation and inappropriate waste disposal.

Based on the findings of this study the following recommendations are made

- Households heads and members should be encourage to get involved in more income generating jobs in order to improve their monthly income and be able to afford the cost of improved solid waste disposal services.
- More awareness should be created on the danger associated with having accumulated dirt/waste around residential areas.
- More private companies should be encouraged to invest in this sector of the economy.
- The available solid waste disposal vehicles should be kept in a good and effective condition. Some incentives like dms, sacks should be provided in order to encourage service patronage. The service should also be provided at a subsidized rate so as to encourage low income earners to be able to have access to the service.
- The well-established open dump sites provided by the government should be fenced and well maintained so as to deter environmental pollution.

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oadetunji@lautech.edu.ng

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oadetunji@lautech.edu.ng

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oadetunji@lautech.edu.ng

EFFECTS OF PRE-PROCESSING METHODS ON PHYSICAL PARAMETERS OF JACKBEAN (Canavalia ensiformis) SEEDS.

Odedeji, J.O.[1] and Akande, E.A.[2]

[1]*Osun State Polytechnic, Iree. Osun State, Nigeria.*
[2]*Ladoke Akintola University of Technology, Ogbomosho. Oyo State, Nigeria.*

ABSTRACT
Jackbean (Canavalia ensiformis) like any other legumes in Africa is of high nutritional value. The peculiar problems of prolonged cooking time, hard testa and presence of some antinutritional factors have placed the crop as an underutilized legume. There is also paucity of information on the effects of different pre-processing methods on the physical parameters of this seed. This hinders the industrial processing (machinability) of this economic produce. Effects of these methods on the physical parameters of Jackbean seed was investigated. The bean was subjected to three pre-processing methods (roasting, autoclaving and malting). The physical parameters evaluated include length and width by the use of ruler, thickness by the use of venier calliper, sphericity index by the use of formula and aspect ratio which is the ratio between length and width. The results of physical characterization revealed that all the pre-processing methods used had effects on the seed. With autoclaving and malting, there was increase in length (0.019-0.022, 0.019-0.024mm), width (0.013-0.016, 0.013-0.018 mm), thickness (10.75-11.10mm), sphericity index (4.65-5.89, 4.65-5.92%) respectively as the pre-processing time increased. However, there was decrease in all these parameters with roasting. The aspect ratio decreased with pre-processing time for all the treatment methods used. Kernel density (g/cm^3), bulk density (g/cm^3) and density ratio for the untreated seed were 1.24, 0.73 and 0.59 respectively. These results are very useful in designing of processing equipment for the Jackbean seeds thus encouraging the industrial utilization of the seed. The looming problem of extinction of this economic produce will be alleviated.

Keywords: *Jackbean, pre-processing, parameter, roasting, autoclaving, malting, sphericity index*

INTRODUCTION

Legumes are all plants of the pea and beans family (Leguminoceae) which comprises of the Caesalpinacea (Senna family), Mimosaceae (Locust bean), and Pappilionaceae (Apyanwu, 1981). They are of economic importance as sources of protein, energy and other nutrients in diets in most developing countries worldwide. Legumes seeds contained as high as 20 to 50 % protein, which in general runs well above twice the level found in cereal grains and

significantly more than the level in conventional root crops (Chel-Guerrero, et al., 2002). The protein is high in lysine content, a factor of much nutritional importance when combined with cereal proteins that have lower level of this amino acid (Duranti and Gaius, 1997).

Legumes surpass meat in most nutrients except for their low fat content (which makes them healthier) and vitamin B_{12}. No other food is as rich in protein as legumes in their natural state. The protein contained most of the essential and non-essential amino acids in proportions very similar to those of animal protein. They therefore form a healthy alternative for obtaining proteins compare with animal food such as meat (NSRL, 2002). Legumes are generally anti-diabetic, raise blood glucose level insignificantly, prevent constipation by promoting proper bowel function due to their high fibre content, and prevent arterial hypertension because of high potassium and low sodium levels. They equally combat iron-deficiency anaemia (Akande et al., 2013). They contain phytochemicals and reduce the risk of colon cancer due to their fibre contents. The carbohydrate content is about 60 (%) in which starch constitutes the major portion (Sathe and Salunkhe, 1981; Okon, 1983).

Legumes are of two major categories, the major and minor legumes. The major legumes include soybean, groundnut, cowpea, African locust bean etc. The minor ones (Bambara groundnut, Lima beans, Pigeon peas, Lablab, Jackbean) are miscellaneous, neglected, and underutilized legumes (Aremu et al., 2006; Omitogun et al., 2001 and Adebooye, 2008). The major legumes have received much research attention unlike the minor legumes.

Jackbean (Canavalia ensiformis) – "Sese nla" in Yoruba language, is one of the common tropical legumes that does well in Nigeria but it is neglected (Okonkwo and Udedibie, 1991). It is native to tropical America, Southern United State. The seeds are rich in most essential amino acids, including those deficient in wheat (Lawal and Adebowale, 2005). It has potential in product development and consumption, which is on the low side because of its peculiar nature, beany flavour, and long cooking time (Akande et al., 2013).

Studies have shown that pre-processing methods such as germination, soaking/fermentation, blanching or roasting could enhance the quality of seeds and grain products (Ade- Omowaye et al., 2003; Kirbaslar and Erkmen, 2003; Carmelia et al., 2007). The ascorbic acid content, riboflavin and niacin are reported to increase in sprouted soybean (Iwe, 2003). These pre-processing methods equally affect the physical parameters of the seeds and grain products. The physical parameters of seeds are very important in the designing of equipment for industrial processing of crops. This study therefore aimed at investigating the effects of different pre-processing methods (autoclaving, roasting and malting) on the physical parameters of Jackbean seed.

RESEARCH METHODS

Materials

The seeds of Jackbean (Canavalia ensiformis) with Accession Number: TCe4 locally referred to as "sese nla" was procured from the Genetic Resources Centre of International Institute of Tropical Agriculture (IITA), Ibadan, Oyo State Nigeria. The seed was multiplied in Ladoke Akintola University of Technology, Ogbomoso Oyo State experimental farm. The fruits (pods) after maturity were harvested from the parent plants and sundried. The seeds or beans were removed from the pod by shelling. The equipment used were obtained from the Department of Food Science and Engineering, Ladoke Akintola University of Technology, Ogbomoso and Department of Food Technology, Osun State Polytechnic, Iree, Osun State.

Methods

Physical characterization of the beans

Length and width measurement

The length and width of the seed was determined by randomly picking and measuring with tread and ruler 50 seeds from every 500 of the lot. This was repeated five times. The arithmetic mean was used to compute the length and width. This was reported in millimetre.

Thickness measurement

This was determined by randomly picking and measuring the thickness of the seed using venier calliper. 50 seeds from every 500 of the lot. This was repeated five times and the average taken.

The Sphericity index (SI)

The size of the seeds was measured by taken 100 each of randomly picked seeds for their length (L), width (W) and thickness (T). The sphericity index was obtained using the formula below:

$$SI = \frac{(L \times W \times T)^{1/3}}{L} \times 100\%$$

(Mohsenin, 1980)

The mean value was calculated for each of the sphericity index obtained using equation

$$X = \frac{\Sigma X}{N}$$

The aspect ratio (AR)

This is the ratio between the length and the width of the seeds. It was determined for each of the 100 randomly picked seeds and the mean was calculated, using the method described by Maduake and Faborode (1990). (3.3)

RESULTS AND DISCUSSION

Effect of Autoclaving on the Physical Parameters of Jackbean Seeds

The physical properties of kernels, grains and seeds are necessary for the design of equipment to handle, transport, process and store the crop (Adelakun, 2009). These properties are very important in design and operation of specific equipment or machines in food materials handling (Akande, 2008). The Physical characteristics measured include the length, breadth, width, sphericity index, aspect ratio and density characteristics. The values obtained for these parameters are as presented in Table1.0

There was gradual increase in length of the seeds as the autoclaving time was on the increase. The untreated sample (T_o) recorded 0.019mm, this increased to 0.021mm when the autoclaving time was 30mins and to 0.022mm at 60mins of autoclaving. There was no further increase in the length of the seed after this time. The increase might be due to the absorption of water (hydration) as a result of increase in temperature (Odedeji, 2010) leading to swelling of the seed. Maximum increase in length was recorded at 60mins of autoclaving as a result of maximum absorption of water. The recorded values for autoclaving at 60, 90 and 120mins were not significantly different from one another but were significantly different from untreated sample (T_o) and sample autoclaved for 30mins.

The same trend was observed for width and thickness. It was observed that the width was on the increase as the autoclaving time was on the increase. The value recorded for untreated sample (T_o) was 0.013mm. There was no increment when the sample was autoclaved for 30mins but the width increased to 0.014mm at 60mins and 0.016mm at 90mins. There was no further increase in the width at 120mins of autoclaving. This might be also due to maximum absorption of water at this level. The untreated sample (T_o), T_1 and T_2 were not significantly different at $P \leq 0.05$. T_3 and T_4 were not equally significantly different from one another but significantly different from T_o, T_1 and T_2 respectively.

There was steady increase in the thickness of the seeds as the autoclaving time increased. The value recorded for T_o was 10.75mm which steadily increased to 10.79mm at 30mins (T_1). Maximum thickness was recorded at 120mins (11.10mm) of autoclaving. This might be due to swelling of the seed. The values recorded were all significantly different from one another at $P \leq 0.05$ except at T_2 and T_3.

The sphericity index (%) for T_o was found to be 4.65%. There was steady increase in this parameter as the autoclaving time increased. The recorded values ranged between 5.92 and

4.68 for treated samples. The highest value was recorded at 120mins of autoclaving. All the values were significantly different from one another at P≤0.05. The sphericity index was found to be higher than the value recorded for locust bean seed (0.83), which was interpreted as presenting difficulty in getting locust bean seed roll easily (Olajide and Ade-Omowaye, 1991). The higher values recorded for untreated and treated Jackbean seeds suggest that it will roll easily. This property is important in the design of hoppers and dehullers for the seed (Olajide and Ade-Omowaye, 1991; Oyelade et al., 2005).

The aspect ratio, which is the ratio between the length and the width of the seed 1.43 for sample To which increased to 1.62 for sample T_1 and reduced back to 1.43 for sample T_2 and there was further reduction to 1.38 for T_3 and slightly increased to 1.44 presenting a serpentine order. Sample To was not significantly different from T_1 and T_3 at P 0.05 respectively.

Table1.0 Effect of Autoclaving on Physical Parameters of Jackbean Seeds

Parameters	T_o	T_1	T_2	T_3	T_4
Length (mm)	0.019±0.01$_c$	0.021±0.01$_b$	0.022±0.01$_a$	0.022±0.01$_a$	0.022±0.01$_a$
Width (mm)	0.013±0.01$_b$	0.013±0.01$_b$	0.014±0.01$_b$	0.016±0.01$_a$	0.016±0.01$_a$
Thickness (mm)	10.75±0.01$_d$	10.79±0.01$_c$	10.86±0.01$_b$	10.88±0.01$_b$	11.10±0.01$_a$
Sphericity Index (%)	4.65±0.01 $_e$	4.68±0.01$_d$	5.07±0.01$_c$	5.88±0.01$_b$	5.92±0.01$_a$
Aspect Ratio	1.43±0.01$_c$	1.62±0.01$_c$	1.43±0.01$_{bc}$	1.38±0.01$_d$	1.44±0.01$_b$
Kernel Density (g/cm^3)	1.24±0.02	ND	ND	ND	ND
Bulk Density (g/cm^3)	0.73±0.01	ND	ND	ND	ND
Density Ratio	0.59±0.01	ND	ND	ND	ND

Values are means and standard deviation of triplicate determinations (n=3)
Means followed by the same alphabet within the same row are not significantly different (P≤0.05) according to LSD test
ND Not determined

Effect of Roasting on Physical Parameters of Jackbean Seed

The result of effect of roasting on physical parameters of Jackbean is as presented in table 2.0. It was discovered that the length for untreated sample (R_o) recorded 0.019mm, which gradually decreased as result of roasting. Roasting as a form of pretreatment incorporates high temperature to food products and may lead to alteration on the basic structure of the raw material. Roasting is a dry heat treatment leading to moisture removal and consequent shrinkage of the seed (Knoor, 1999; Fellow, 2000)

This is responsible for the decrease in length of the seed. The length was found to reduce steadily as roasting time was on the increase. It reduced from 0.019mm in R_o to 0.018mm in R_1 and R_2 and 0.016mm in R_3 and R_4 and finally to 0.015mm in R_5. Sample R_o, R_1, R_2, R_3 and R_4 were not significantly different at P≤0.05 but significantly different from R_5. However, R_3, R_4 and R_5 were not equally significantly different at P≤0.05. There was gradual dehydration of the seed because of increase in roasting time, which might be responsible for the reduction in length.

The same trend was observed for width and thickness. Due to the dehydrating effect of roasting as a form of pre-treatment, there was a steady decrease in the width of Jackbean seed. The seed recorded the same value for R_o and R_1, R_2 and R_3 and R_4 and R_5 respectively with steady reduction in that order. R_o and R_1 recorded 0.013mm, R_2 and R_3 recorded 0.012mm while R_4 and R_5 recorded 0.011mm. R_o, R_1, R_2, and R_3 were not significantly different similarly R_4 and R_5 were not significantly different but the latter were significantly different from the former at P≤0.05.

The thickness reduced from 10.75mm in R_o 10.55mm in both R_4 and R_5 respectively. R_1 recorded 10.77mm, R_2 10.62mm and 10.60mm in R_3. Samples R_2 and R_3 were not significantly different from one another but were significantly different from R_o, R_1, R_4, and R_5 respectively. In the same vein samples, R_4 and R_5 were not significantly different from one another at P≤0.05.

Sphericity index (%) equally displayed the same trend of reduction. There was reduction from 4.64 in both R_1 and R_2 to 4.24 in R_3, 3.86 in R_4 and finally to3.87 in R_5. Samples R_o and R_1 were significantly different from R_2 and R_3 and R_4 and R_5 at $P \leq 0.05$. The paired samples in each group were not significantly different. All the values recorded for sphericity index were greater than 0.83 that was reported for locust bean seed. This revealed that the seed would roll easily inside hopper of dehuller in the industrial processing of the seed. This will be needed in designing of this processing equipment for the seed (Oyelade, et al., 2005; Olajide and Ade-Omowaye, 1991).

There was serpentine order of presentation in the aspect ratio of the samples. There was slight decrease in value from 1.43 in Ro to 1.39 in R_1 and sudden increase to 1.46 in R_4 and finally reduction to 1.34 in R_5. All the samples were significantly different from one another at $P \leq 0.05$.

Table 2.0 Effect of Roasting on Physical Parameters of Jackbean Seeds

Parameters	R_0	R_1	R_2	R_3	R_4	R_5
Length (mm)	$0.019\pm0.01_a$	$0.018\pm0.01_{ab}$	$0.018\pm0.01_{ab}$	$0.016\pm0.01_{bc}$	$0.016\pm0.01_{bc}$	$0.015\pm0.01_c$
Width (mm)	$0.013\pm0.01_a$	$0.013\pm0.01_a$	$0.012\pm0.01_a$	$0.012\pm0.01_a$	$0.011\pm0.01_b$	$0.011\pm0.01_b$
Thickness (mm)	$10.75\pm0.01_a$	$10.70\pm0.01_b$	$10.62\pm0.01_c$	$10.60\pm0.01_b$	$10.55\pm0.01_d$	$10.55\pm0.01_d$
Sphericity Index (%)	4.65±0.01a	$4.64\pm0.01_a$	$4.64\pm0.01_b$	$4.24\pm0.01_b$	$3.86\pm0.01_c$	$3.87\pm0.01_c$
Aspect Ratio	$1.43\pm0.01_c$	$1.39\pm0.01_d$	$1.50\pm0.01_a$	$1.33\pm0.01_f$	$1.46\pm0.01_b$	$1.34\pm0.01_e$

Values are means and standard deviation of triplicate determinations

Means followed by the same alphabet in a row are not significantly different ($P\leq0.05$) according LSD test

Effect of Malting on Physical Parameters of Jackbean Seeds

The result of the effect of malting on the physical parameters of Jackbean is as presented in table 3.0 . Malting is a natural biological process of all superior plant by which seed comes out of its latency stage, once the minimal environmental conditions needed for its growth and development, such as humidity, temperature, nutrients etc are provided.(Sangronis and Machado, 2005).

There was gradual increase in the length of the seed as malting period increased. There was no noticeable change in length of the seed on the first appearance of sprout but there was increase in the length of the seed from 0.019mm to 0.021mm in D_2 . The gradual increment continued to D_4 of malting (0.024mm). This became steady at D_5. The increase in length might be due to hydration of the seed during sprouting of the seed leading to temporary swelling and bulging of the seed. Samples D_0 and D_1 were not significantly, samples D_2 and D_3 and samples D_4 and D_5 were not significantly different from one another but each pair is significantly different at $P \leq 0.05$.

There was gradual increase in the width of the seeds as the malting day progressed. Maximum increase (0.018mm) was recorded at the maximum period of malting (D_5) while the least (0.014mm) was recorded at the first day of sign of sprout D_1. Samples D_2, D_3, D_4 and D_5 were not significantly different from one another but significantly different from samples D_o and D_1. However, samples D_o and D_1 were not significantly different from one another. Moisture uptake (hydration) might equally be responsible for the increase in width.

The thickness was equally increasing steadily as the malting day progressed. Maximum increase in thickness was recorded at D_2 and D_3 (11.10mm). It was observed that there was slight decrease in the thickness in D_4 and D_5 respectively (11.05mm). This might be due to uptake of nourishment from the parent seed and photosynthetic process of the sprout for survival. It was observed that the colour of the sprout at this period was becoming more green making it suitable for photosynthesis. All the treated samples (D_1 to D_5) were not significantly different from one another but were significantly different from the untreated sample (D_o) with the exception of sample D_1. All the treated samples recorded higher values for sphericity index compared to untreated sample (D_o). There was gradual increase in sphericity index from 4.65% recorded for D_o to 5.16% in D_1, 5.55% in D_2 and D_3 and 5.89% in D_4 and D_5 respectively. Samples D_2 and D_3 were not significantly different from one another. In the same vein, samples D_4 and D_5 were not significantly different from one another but the two pairs were significantly different from samples D_o and D_1 respectively at $P \leq 0.05$. The values recorded for sphericity index were greater than 0.83 reported for locust bean seed (Olajide and Ade- Omowaye, 1991). The serpentine order as were observed in the other two pre-treatments (autoclaving and roasting) for aspect ratio was equally observed for malting. All the samples were significantly different from one another except sample D_3 and D_5. Maximum value (1.50) for this parameter was recorded at D_4 while the least value (1.35) was recorded at the first day of sign of sprout (D_1).

Table 3.0 Effect of Malting on Physical Parameters of Jackbean Seeds

Parameters	D_o	D_1	D_2	D_3	D_4	D_5
Length (mm)	$0.019\pm0.01_c$	$0.019\pm0.01_c$	$0.021\pm0.01_b$	$0.022\pm0.01_b$	$0.024\pm0.01_a$	$0.024\pm0.01_a$
Width (mm)	$0.013\pm0.01_d$	$0.014\pm0.01_{cd}$	$0.015\pm0.01_{bc}$	$0.015\pm0.01_{ab}$	$0.016\pm0.01_{ab}$	$0.018\pm0.01_a$
Thickness (mm)	$10.75\pm0.01_b$	$10.80\pm0.01_{ab}$	$11.10\pm0.01_a$	$11.10\pm0.01_a$	$11.05\pm0.01_a$	$11.05\pm0.01_a$
Sphericity Index (%)	$4.65\pm0.01_d$	$5.16\pm0.01_c$	$5.55\pm0.01_b$	$5.55\pm0.01_b$	$5.89\pm0.01_a$	$5.89\pm0.01_a$
Aspect Ratio	$1.43\pm0.01_c$	$1.35\pm0.01_e$	$1.40\pm0.01_d$	$1.47\pm0.01_b$	$1.50\pm0.01_a$	$1.46\pm0.01_b$

Values are means and standard deviation of triplicate determinations

Values with similar alphabet are not significantly different ($P\leq0.05$) according to LSD test

CONCLUSION

The results of physical characterization of Jackbean seed revealed that the seed had a higher value of sphericity index which suggest that it will roll easily. This property is important in equipment design especially hoppers and dehuller. The density characteristic of the seed is very useful in calculating the through-put capacity of processing machine. Bulk density is very useful for separation equipment, determination of packaging requirements, materials handling and application in wet processing in food industry. The total solid content result for the raw Jackbean flour was high i.e. 91.20. This indicates the dry nature of the flour. The product thus has relatively longer shelf life in this form. These results therefore present Jackbean seed as a crop of high industrial potentials.

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CONTENT ANALYSIS OF MENTORING OF NEW ENTRY EMPLOYEES IN THE SOUTH AFRICAN CONSTRUCTION INDUSTRY

Nkomo, M.W, [1]and Thwala, D.W. [2]

[1&2] *Department of Construction Management and Quantity Surveying*
Faculty of Engineering and Built Environment, University of Johannesburg, Johannesburg. South Africa.

ABSTRACT

Construction industry is quite complex and congested which distinct it from other industries. The fact that this industry is quite complex and congested gives rise to effective mentoring of new entry graduates in order to make sure that one stays on top and competes with the best. Universities require students to go through in-service training before graduation. In-service training can and should serve as a platform for senior employees to mentor new entry employees. However, most senior employees miss this point by giving graduates work instead of mentoring them. The problem to be investigated in this research is to find out, are this new entry graduates experiencing any form of mentoring. Securing an effective mentor can be an easy task but making sure the mentoring relationship does not fail may be a challenge. It is important to critically analyse the concept and to highlight the distinctive elements of graduates or new entry employees mentoring, in the construction industry. The aim of this paper is to look at the experiences and problems contributing to mentoring of new entry employees within construction companies. This study examines mentoring of new entry graduates within organizations, whether they are being mentored or not in the construction industry, as compared to their non-mentored employees; within their companies, it looks at the important characteristics of mentors, potential negative outcomes or problems in mentoring of new entry employees. Furthermore it finds the ways in which mentoring contributes to producing motivated new entry construction employees within the industry. The study is mainly a literature review with a special focus on the human resource management and leadership, the data used in the report is mainly qualitative, based on the content analysis, case studies and historical data. The study indicate new entry employees are being motored, they are involved in any form of mentoring, within their construction companies, others are not and that communication skills, knowledge sharing, and correcting mistakes/giving negative feedback are important for an effective mentor in the construction industry. The results from this study can be used to augment current mentoring research and provide a starting point for mentor-assisted development in construction industry.

Keywords: *Youth Mentoring, Young Graduates workers, New entry employees.*

mnkomo@uj.ac.za
didibhukut@uj.ac.za

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Introduction

Mentoring nowadays is a key element within national and local strategies for working with graduates, especially those who are viewed as 'socially excluded (Philips, 1983). As yet, few methodical evaluations of new entry employees have taken place in UK to enable contrasts to be made between projects and with other forms of graduate's involvement, in this new entry construction employees. Hence, some groups of young people are often constructed as a threat rather than as a resource for the future (Jeffs and Smith, 1999), meaning giving more information to the graduate, knowledge transfer, they will know further than their mentors. Simultaneously concern about the defencelessness of graduates has led to unprecedented levels of observation over some groups (Clark et al, 2000), this can be a black or white group. Though it is only recently that mentoring has become a feature of social policy, people were not aware of it; it is a notion that has been around for an extensive period of time. Most modern interest has derivative from the business world, where mentoring is used in the orientation of new entry employees into the culture of the organization, in educating communicationbetween different levels of management, and in positive access for groups that are traditionally left out from senior management positions (Clutterbuck, 1985), mentoring can also be used as an instrument to communicate with those employees that are not open, in regard to their performance, to break down the ice in an employee.

Objective of the study

- To examine the ways in which mentoring benefits contributes to producing motivated young construction workers within the industry.
- To investigate the mentoring of young graduates construction workers within organizations, whether they are being mentored or not.
- To determine the important characteristics of mentor's, potential negative outcomes or problems in mentoring young graduates.

Methodology

The study is essentially a literature review with a special focus on the human resource management and leadership, the data used in the report is mainly qualitative, grounded on the content analysis, case studies and historical data. The type of historical data used is secondary sources, running records and recollections. The study concentrated on the most common problems, experiences and challenges on mentoring of new entry construction employees, which will show whether or not this graduate's employees are they being mentored or not, are they involved in any arrangement of mentoring. The data used in the report is mainly qualitative, based on the content analysis, case studies and historical data

mnkomo@uj.ac.za
didibhukut@uj.ac.za

Literature Review Findings

Over the past three decades, mentoring in the workplace has become the focus of much research and discussion (Ploeg et al., 2008). (Raabe and Beehr, 2003). Mentoring can be well-defined as a developmental and supportive relationship among a senior, more experienced employee and a junior, less experienced employee (Kram, 1985). Mentoring has been linked with salary increase and promotion (Chao et al., 1992), higher job satisfaction and self-respect (Allen and O'Brien (2006); Underhill, 2006), and higher organizational commitment (Donaldson et al., 2000). The above findings have underlined the need to identify the characteristics that are necessary to be an effective mentor. Though, most studies on mentor characteristics to date have concentrated on white-collar workers in industries such as education, health care, technology, finance, and communications (Milner and Bossers, 2004; Smith et al., 2005).

Due to its vibrantnature and complex organization of work, the construction industry is different from other industries (Ringen et al., 1995b), particularly from typical white-collar jobs. Previous research has suggested mentoring as a key component of construction work and has recognized the necessity for mentoring programs to develop leaders in the construction industry (Rogers, 2007). Yet, no empirical research to date has thoroughly examined and identified the critical characteristics of mentors in the construction industry, which would offerultimate information for the development of mentoring programs. Seeing that the construction industry plays a major role in national economies (Behm, 2008), and its trade training is primarily constructed upon a mentorship model for apprentices (Melia´ and Becerril, 2007; Sobeih et al., 2006), the present study tries to identify what constitutes an effective mentor from the perspective of construction professionals. Discovering the answer to the above question is critical to the success of any mentoring program, as it can escort program developers in their decisions about whom to target, what content to include, and the methods needed to develop capable and effective mentors in the construction industry. In this study, we methodically identified and examined a list of characteristics that distinguished, good from average and poor mentors in the construction industry, drawing on mentoring, coaching, and emotional intelligence writings.

One of the objectives of this study is to determine the important characteristics of mentors in the construction industry, to examine the ways in which mentoring benefits and contributes to producing young motivated employees. In the following section, we debate the definition and benefits of mentoring. Then, we review past research literature on mentoring characteristics and the starring role of mentoring in the construction industry.

Mentoring benefits and definition

The word "mentor" and the conception of mentoring date back to Greek mythology, when Odysseus assigned his son, Telemachus, to a close friend, who would watch over not only his professional development but also his personal and social growth (Hamilton, 1942). This

mnkomo@uj.ac.za
didibhukut@uj.ac.za

friend named Mentor, has since become a symbol of physical, intellectual, social, and administrative development (Clawson, 1985). The present study used Kram's (1985) new and adequately broad definition of a mentor as a senior more experienced employee, who serves as a role model and helps in the relationship, has been recognized as an alliance that increases the competency and performance of protégés through the spread of formal knowledge such as the organization's politics.

Mentoring has been positively linked with many career and psychosocial outcomes (Allen and O'Brien, 2006; 2004; Chao et al., 1992; Underhill, 2006). For example, Chao et al. (1992) found that employees partaking in informal mentorships stated more career-related support, advanced salaries, and higher job satisfaction than those who had no mentoring relationships. In their meta-analysis, Allen and O'Brien (2006) similarly found positive associations between mentorship and job and pay satisfaction. In another current meta-analysis, individuals who had been mentored felt more respect from their co-workers, had a further positive self-image, and felt less work stress and work-family scuffle (Underhill, 2006). In addition, mentored individuals incline to feel more job security and have more positive views of technical and distributive justice than non-mentored individuals (Scandura, 1997). Research has similarly examined the benefits of having a mentoring program in an organization. The presence of a formal mentoring program is now being used as a criterion for determining the "Best Companies to Work For" (Branch, 1999). Constant with this, Allen and O'Brien (2006) found that job searchers are more fascinated to organizations that have formal mentoring programs compared to those that do not have them.

Mentoring is predominantly valuable within the context of the Employment Equity and Skills Development legislation. Due to the dissimilarity of the South African managerial profile, the reality is that the majority of managers are white and the majority of employees are black. In order to amend this profile, transferences of skills are critical and this is exactly where mentoring can play an imperative role. In fact, without effective mentoring most companies will brawl to achieve their employment fairness targets. The worth of mentoring lies in the circumstance that mentoring is the quickest way to transfer skills and thus quickening empowerment in the workplace. No quantity of formal training and informal courses can accomplish what mentoring can do. Through mentoring a member of a labelled group targeted for a higher-level position can work with a mentor to attain the skills necessary to function at a more senior level. A mentor's role is dual: firstly (1), to offer career development opportunities such as coaching, giving challenging assignments, sponsoring advancement, and nurturing the protégé's prominence; secondly (2) they offer psychosocial support such as counselling, support and role modelling. Without a mentor, a new entry employee (graduate) will learn not as much of, more slowly or not at all.

mnkomo@uj.ac.za
didibhukut@uj.ac.za

Mentoring of new entry employees in the Construction Industry

Mentoring is a key component in construction work (Rogers, 2007). For example, it is very mutual on construction jobsites to have experienced workforces, who oversee and mentor less experienced employees. Though, the relationship between a mentor and his/her protégé´ in the construction industry may be dissimilar from the mentoring relationships typically observed in other industries, due to continually changing work environment and crews, dissimilar and rapid tasks, and the short-term relationships that protégé's have with their mentors (Ringen et al., 1995b). Jobs in the construction industry can be from a few days to a few years, so the length of any mentor-protégé´.

Characteristics of mentors in the construction industry.

Though the studies stated earlier generated lists of characteristics important for mentors in the construction industry, these lists were not the same, and it is therefore possible that these lists were not comprehensive. Thus, to create a complete list of characteristics for this study, additional literature linked to mentoring characteristics was accessed. Evidence from research on executive coaching suggests that the characteristics for both mentors and executive coaches are comparable; though, executive coaches also retain characteristics such as being interpersonally understanding, having a customer focus, and taking appropriate action during crisis (Brotman et al., 1998). Preceding, an examination of each of the lists of characteristics revealed that all of them affected on the idea of emotional intelligence as being essential, for example by affirming that characteristics such as "empathic," "understands others," "interpersonally understanding" and "articulates emotions naturally" were important. The concept of emotional intelligence states to the ability of a person to monitor one's own and others' feelings and emotions, to discriminate among them, and take appropriate actions based on these observations (Salovey and Mayer, 1990). Emotional intelligence was later well-defined as consisting of four separate parts: appraisal and expression of emotion in oneself, appraisal and recognition of emotion in others, regulation of emotion in oneself, and usage of emotion to facilitate performance (Mayer and Salovey, 1997).

In the construction industry, the constricted deadlines, working with and around other trades and the prospective dangers of the job can create an atmosphere of tension and apprehension. A mentor in construction with emotional intelligence could possibly control these emotions and balance them, while meeting deadlines and finalizing tasks safely. A study directed by Law et al. (2004) supports this impression, as peers' rankings of emotional intelligence were analytical of supervisory ratings of in-role and extra-role enactment in an employee sample. Past research from these parts will assist in the development of a comprehensive list of possible characteristics for mentors in the construction industry. In addition to making a distinctive list that syndicates different literatures, the current study takes a marginally different method to detect the key mentor characteristics as perceived by construction professionals.

mnkomo@uj.ac.za
didibhukut@uj.ac.za

Although these limitations, the consequences from the current study indicate that communication skills, knowledge sharing, and correcting mistakes/giving negative feedback are significant for an effective mentor in the construction industry. The results from this study can be used to enhance current mentoring research and afford a starting point for mentor-assisted development in construction. The outcomes on new knowledge workers perspective towards their mentors' characteristics is in in agreement with the studies of Gray and Smith (2000) and Elzubeir and Rizk (2001). The findings designated that mentors should be welcoming, self-confident, show desire to be a mentor, provide honest feedback, self-knowledgeable and being committed to mentoring, were viewed to be extremely significant characteristics. The other characteristics, that are, being a visionary, exposing the protégé to future prospects, understanding, respectable, patient, being a good role model, compassionate and showing reliability were seen as significant characteristics for the mentor to have.

Potential negative outcomes or problems in mentoring new entry employees.

Although the benefits of mentoring indicated in the literature, this does not prevent the possibility that mentoring relationships involve problems or negative outcomes (Eby et al., 2000). Early research on social-psychological and interpersonal relationships summaries that hostile incidents are common and often are neglected aspect of all relationships, these ranges from insignificant episodes, such as quarrelling, to serious incidents, such as physical or psychological abuse (Marshall, 1994).Eby et al. (2000) in there study on negative mentoring capability revealed that protégés experience: Divergent personality and habits, mismatch within the dyad, self-absorption, work style, distancing behaviour, manipulative behaviour, unfortunate delegation of duty, intentional exclusion, credit taking, politicking, that is, self-promotion, technical incompetence, lack of mentor expertise, that is, interpersonal incompetency, sabotage of any efforts, general dys- functional, that is, bad attitude, personal problems and deception. The researchers supported the need for further research in the area of negative mentoring in individual disciplines which might be different from one industry to another.

Problems or negative outcomes were uncommon between mentors and new entry or knowledge employees, apart from dissimilar personality and habits which was seen as a problem or negative outcome demonstrating that this problem happened fairly many times. General dysfunctional, that is, bad attitudes, personal problems for example, alcohol abuse, family problems etc. and deception, that is, not being truthful were never a problem to the new entry or knowledge workers as there predisposition was towards occasionally and never occurring.(Agumba and Fester, 2010). As per the finding it can be noted that if mentoring functions are sufficiently achieved then problems or negative outcomes are infrequently experienced. Studies conducted by Eby et al. (2000) and Ragins et al. (2000) on dysfunctional mentoring relationships are not fully sustained by this finding.

mnkomo@uj.ac.za
didibhukut@uj.ac.za

The problems or negative variables in a mentoring relationship were acquired from related literature review, directed by Nkado and Mbachu (2002), that new knowledge workers or new entry employees (graduates) seldom experienced problems during mentoring. Dissimilar behavior and habits, was seen as the main problem as it fell in the mean band between 2.60 - 3.40 representing that it happens fairly many times. General dysfunctional, that is, bad attitudes, personal problems for example, alcohol abuse, family problems etc. and deception, that is, not being truthful were never a problem to the new knowledge workers as they clear-fell in the mean band between 1.00 - 1.80.

CONCLUSION AND RECOMMENDATIONS

Although these limitations, the results from the current study designate that communication skills, knowledge sharing, and correcting mistakes/giving negative feedback are important for an effective mentor in the construction industry. The results from this study can be used to enhance current mentoring research and offer a starting point for mentor-assisted development in construction.We are compatible in our understanding of the role that race and racism play in the construction industry and society. We recognize that although our racial differences are a necessary part of our daily interaction, we also can connect as people. We have learned that the first step in getting beyond the barriers and boundaries of race is not to pretend that they do not exist.

This study is predominantly the authors' description of the extensive learning and development process for graduate engineers that has been advanced and embedded within Kentz Engineers and Constructors and other construction companies. Though, some evaluative conclusions can reasonably be drawn. These are:

- In global engineering and construction skills scarcities are real and the largest constriction on growth in the sector.
- Companies are contending for skills and within this context those seeking to be
- "Favoured employers" are investing in learning and development and the infrastructure to upkeep career development. Engineering graduates are in a strong spot when choosing employers.
- The effort necessary to sustain the process should not be undervalued – it is an exercise in organization, expectancy, and will, supported by systems and infrastructure. For example, a prudently planned experiential learning programme is vital, yet challenging to sustain without a combination of on the ground buy-in and support with reporting and observing.

Some of the best business decisions are made in times of insufficiency when the value of resources becomes fully understood. Investment in the development of graduate engineers or new entry employees and indeed in all Kentz employees and other construction companies is a strategic importance, and the organization is the better for it. Kentz mentoring process is a work-in-progress – all mentoring processes will continue works-in-progress if they are to

mnkomo@uj.ac.za
didibhukut@uj.ac.za

remain applicable to changing business needs. It is to be hoped that the experiences related will vibrate with others, and that lessons learned may have more general application, although every organization will have its own exceptional needs and circumstances. Among these lessons are that mentoring has permanent benefits, but that formal programmes can be unsuccessful to mirror this. An organization-wide mentoring process needs to balance the needs for consistency with elasticity, needs to foster responsibility, and needs to be refined in the light of practical actualities. Above all it needs people who are committed to stick with the process in order to guarantee its success.

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mnkomo@uj.ac.za
didibhukut@uj.ac.za

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mnkomo@uj.ac.za
didibhukut@uj.ac.za

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mnkomo@uj.ac.za
didibhukut@uj.ac.za

INFLUENCE OF PERCEIVED JOB INSECURITY AND JOB COMMITMENT ON CRIME PREVENTION BY LAW ENFORMENT AGENTS

Adetula G. A.[1] and Adetula, A.[2]

Department of Pure and Applied Psychology Faculty of Social and Management Sciences

Adekunle Ajasin University Akungba-Akoko Ondo State Nigeria

ABSTRACT

This study investigated the relationship between perceived job insecurity, job commitment and crime prevention by the law enforcement agents. With the use of questionnaire administered to 463(273 males and 190 females) Nigerian law enforcement agents, Pearson Product Moment Correlation, regression and t-test statistical analyses, were used to analyze hypotheses, and the major findings obtained showed that; There was negative relationship between job insecurity and crime prevention ($r = -0.58$ $p>.05$). Job commitment had a significant positive relationship with crime prevention ($r = 0.30$ $p<.001$). There was no significant gender difference in job commitment ($t = -1.76$, $df=461$, $P>.05$), and that, there was no significant gender difference in job insecurity ($t=-.51$, $df=461$, $P>.05$). The indicators are that law enforcement agents perceived less importance to job insecurity, with this immunity, they have a positive outlook in attitude towards job commitment and crime prevention. Governments, private organizations and agencies should therefore entrench policies at boosting law enforcement operatives' morale for job commitment in order to be effective and efficient at societal crime prevention.

Key word: *Job insecurity, job commitment, crime prevention and law enforcement agents.*

INTRODUCTION

Increase in violence, crime and delinquency rates have all become a common report in the developing countries, like Nigeria. The frequency has brought about distrust among the citizenry and undermining the efficacy of the police service. Alemika and Chukwuma (2000) reported that, the relationship between the Nigeria Police and the citizens was largely characterized by suspicion, prejudice, mutual disrespect, conflict and violence. He reiterated further that this has culminated to inability of the police to relate well with residents as a result of their (police) widely reported pretense and criminal acts. In essence, this has separated them from the public.

[1]ade_adetula@yahoo.com
[2]adeyemiadetula1@gmail.com

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On ‘Creating a Better Police Image’, the Nigeria Police Information Booklet (1981) further outline some causes of public distrust to men and officers of the Force:

- dissatisfaction in handling of reports due to the public ignorance of police methods and the law;
- rude treatment of citizens who come to the police with cases;
- an overbearing attitude and an attempt to deflect the ego of the citizen in public;
- discourteous approach of policemen controlling or checking traffic in the cities;
- unpleasant tone of voice;
- unnecessary show of force and bestial pleasure to hurt people while controlling crowd;
- rough treatment of suspects and other offenders;
- taking advantage of other citizens when driving police vehicles such as breaking speed limits and jumping of lanes;
- showing partiality to women, friends and relations in handling cases;
- assumption of proud airs by policemen to cover their shortcomings;
- drinking in uniform while on duty;
- unkempt and careless dress and appearance; and
- tendency to expect unmerited rewards for performing lawful duties (Alemika and Chukwuma, 2000).”

Several other researchers have attributed this development to the uncontrollable nature of change in countries police force at her developing stages, removal of repressive security apparatuses used by previous authoritarian regimes in controlling crime and the unequal socio-economic opportunities brought about by economic liberalization programs (Shearing &Kempa 2000). Nigerian experience has not been different. The first four years of transitional democracy in the country witnessed perceived and real increase in violent crime and disorder, so much so that safety and security issues ranked very high among citizen’s priority concerns. Public commentary on police performance in crime prevention and crime control was adverse. However, the comments dwelt very little on solutions to the crime problems and focused heavily on police deprecation.

Attitudinal research in psychology today has taken variety of dimensions; however, in the area of crime and crime prevention it entails a lot of discriminating responses. From lay man to law enforcers (such as police) there has been different opinion about crime at large. A basic principle underpinning modern crime prevention is that it requires the practical application of research and evaluation findings in the development and implementation of strategies to reduce crime (Australian Institute of Criminology, 2012; UN Council for Economic and Social Development, 2002). Evaluation is therefore an important prerequisite for effective crime prevention. A good evaluation can determine whether a program has been

[1]ade_adetula@yahoo.com
[2]adeyemiadetula1@gmail.com

implemented as planned (and if not why not), what outcomes have been delivered as a result, whether the stated objectives of that program have been achieved and the reasons that a program did or did not work. This can inform improvements to that program, as well as decisions about whether it should be continued. It also contributes to the development of a sound evidence base that can be used by policymakers and practitioners in deciding what to do (and how to do it) to address the crime problems that confront them.

However, one would be thinking of what the attitude of law enforcement personnel would be towards crime prevention, job insecurity and job commitment in democratic Nigeria. Due to insurgency in the Northern part of Nigeria for example, it is assumed that police would rather stay without being promoted and maintain their position outside the dreaded area than be moved to the next rank and be posted to the troubled zone. This type of attitude towards community policing as sworn to protect and serve might not have been outside their perceived job security and commitment reasons.

LITERATURE

The ghost of losing one's job as a result of corporate restructuring, mergers and acquisitions, or organizational downsizing looms in the foreground for many of today's workers. For instance, Fortune's 500 companies have reduced their total workforce from an aggregate 14.1 million employees to 11.6 million between 1983 and 1993.With approximately 500,000 U.S. employees facing job loss each year as a result of this development (Simons, 1998). Job satisfaction arising from job security is a major factor affecting the quality of the employer-employee relationship. Job insecurity perception by the employee is the major source of stress that can lead to poor work performance. Some studies have empirically confirmed the expectation that lower levels of job security would be associated with decreases in self-rated performance (Armstrong-Stassen, 1993; Ojedokun, 2008). There is, however, another view on performance in relation to job security level, which suggests that employees who perceive risk of layoffs may increase their work efforts in order to be more valuable to the organization, and therefore not be made redundant (Sverke & Hellgren, 2001). However, the relationships between job security level and employee reactions may not be as clear-cut as implied by this brief review. Several issues need further research attention before any valid conclusions as to the implications or consequences of job security level can be drawn.

However, job security can be measured in a number of ways. According to Weiling (2001), job security is the likelihood of keeping a job until the person decides otherwise, or it can be measured in terms of unemployment prospect. According to research evidence, self-reported job security was treated as one variable among many which, when taken together, reflected an individual's overall sense of satisfaction in the work situation. Sverke, Hellgren, and Naswall (2002) described job insecurity as the subjectively experienced anticipation of a fundamental and involuntary event. Other researchers use combinations of various

[1]ade_adetula@yahoo.com
[2]adeyemiadetula1@gmail.com

Adetula G. A.[1] and Adetula, A.[2] (2016) Influence of Perceived Job Insecurity and Job Commitment On Crime Prevention by Law Enforment Agents In: Mojekwu, J.N., Nani G., Atepor, L., Oppong, R.A.., Adetunji, M.O., Ogunsumi, L., Tetteh, U.S., Awere E., Ocran, S.P., and Bamfo-Agyei, E. (Eds) Procs 5th Applied Research Conference in Africa. (ARCA) Conference, 25-27 August 2016, Cape Coast, Ghana. 160-172

definitions in their research. For example, Mohr (2000) discussed four different types of job insecurity: (1) job insecurity as a state of public awareness which involves a high degree of unemployment in society; (2) job insecurity at the company level which refers to unstable and insecure conditions in the organization; (3) acute job insecurity involving the concrete subjective experiencing of a threat to employment, and; (4) anticipation of job loss which applies to a situation where layoffs have already begun to be carried out in the organization in which the individual is employed. Job insecurity can therefore either be experienced at a personal level or attributed externally, such as in those situations where the researcher defines the population under investigation as being uncertain of how their future employment will progress (Ferrie, 2001).

In a study comparing the consequences of objective and subjective types of job insecurity, De Witte and Näswall (2003) found that, amongst those experiencing a high degree of job insecurity; it was the permanent rather than the temporary employees who reported lower levels of both job satisfaction and organizational commitment in comparison with the temporary employees. These authors went on to argue that job insecurity cannot only be defined from characteristics of the situation but should contain an element of subjectivity (Naswall & DeWitte, 2003). Studies have shown that job insecurity among employees leads to job dissatisfaction. Kaiser (2002) investigated cross-national differences in the determination of job satisfaction by different types of contract, namely full-time permanent, full time fixed-term, part time permanent, part-time fixed term, and self-employment. Workers in permanent full and part-time jobs with the highest level of job security appear to also enjoy high job satisfaction. In contrast, those in fixed-term jobs and self-employment were found to have low job security and low job satisfaction. Souza-Poza and Souza Poza (2000) studied the determinants of job satisfaction and showed that job security significantly increases the individual's job satisfaction and it is ranked 7th in importance among all the determinants of job satisfaction. Studies have shown that job insecurity among employees' leads to job dissatisfaction (Ashford, Lee, &Bobko, 1989; Davy, Kinicki, &Sheck, 1991), an increase in negative physical health outcomes (Dooley, Rook, & Catalano, 1987; Kuhnert, Sims, &Lahey, 1989; Roskies& Louis-Guerin, 1990), and higher reports of psychological distress (Dekker &Schaufeli, 1995; Probst, 2000). In addition, employees with perceptions of low job security are more likely to engage in work withdrawal behaviors (Probst, 1998/1999) and report lower organizational commitment, which often leads to employee turnover (Ashford et al., 1989; Davy et al., 1991).

Job insecurity among Nigerian police may be attributed with the known pretense practices her members engage in. Increasing global competition, the rise of outsourcing, cost-cutting pressures, and the implementation of lean production environments are but a few of the factors that have led to widespread corporate layoffs, workplace restructuring, and a heavier

[1]ade_adetula@yahoo.com
[2]adeyemiadetula1@gmail.com

reliance on the contingent workforce. Due to these phenomena, specifically, employees of the new millennium must contend with the reality of mounting job insecurity and the ever-present potential for unemployment and redundancy (Probst and Strand, 2010).

Workplace has changed dramatically in the 21st century. Today's workers are better educated, increasingly mobile and are constantly seeking empowerment. In policing, the ever-changing technology, increased competition and globalization have created a new workplace that bears little resemblance to the businesses of the past. In the workplace of the future, many employers are realizing that the only constant advantage that they will have is their people – their intellectual capital. There is this new competitive battle and struggle among employers to retain a skilled and committed workforce from an increasingly limited pool of available talent also known as the battle for workforce share (Probst and Strand, 2010).

Newstrom and Davies (2002) define employee commitment as the degree to which an employee identifies with the organization and wants to continue actively participating in it. Like a strong magnetic force attracting one metallic object to another, it is a measure of the employees' willingness to remain with a firm in the future. It often reflects the employees' belief in the mission and goals of the firm, willingness to expend effort in their accomplishment, and intentions to continue working there. Commitment is usually stronger among longer-term employees, those who have experienced personal success in the organization, and those working with a committed employee group. Cohen (2003: xi) states that "commitment is a force that binds an individual to a course of action of relevance to one or more targets". According to Cohen (2003:3), organizational commitment "as a research topic is important regardless of its setting because a better understanding of the phenomenon may help us to better understand the nature of the psychological process through which people choose to identify with different objects in their environment and how they find purpose in life". This general description of commitment relates to the definition of organizational commitment by Arnold (2005:625) as "the relative strength of an individual's identification with and involvement in an organization". Werner (2007:14) and Adetula, (2015) also indicate that an employee who is engaged to the organization is emotionally, cognitively and personally committed to the organization and its goals by exceeding the basic requirements and expectations of the job.

Miller (2003:73) also states that organizational commitment is "a state in which an employee identifies with a particular organization and its goals, and wishes to maintain membership in the organization". Therefore, organizational commitment is a state of being in which organizational members are bound by their actions and beliefs that sustain their activities and their own involvement in the organization (Miller & Lee 2001). Organizational commitment

[1]ade_adetula@yahoo.com
[2]adeyemiadetula1@gmail.com

is therefore, the degree in which an employee is willing to maintain membership due to interest and association with the organization's goals and values.

In other words, this commitment is an attitude about employees' loyalty to their organization and is an ongoing process through which organizational participants express their concern for the organization and its continued success and well-being. Miller (2003:72) describes an attitude as "evaluative statements or judgments – either favorable or unfavorable – concerning a phenomenon". The organizational commitment attitude is determined by a number of personal (age, tenure in organization, and dispositions such as positive or negative affectivity, or internal or external control attributions) and organizational (the job design and leadership style of one's supervisor) variables. Even non-organizational factors such as the availability of alternatives, after making the initial choice to join an organization, will affect subsequent commitment. Meyer and Allen's (2007) three-component model of commitment was created to argue that commitment has three different components that correspond with different psychological states namely: affective, continuance and normative commitment. Commitment can be seen as an affective point of reference towards the organization (affective commitment), acknowledgement of the consequences of leaving the organization (continuance commitment), and an ethical responsibility to stay with the organization (normative commitment). It is believed that affectively committed employees will continue to work with great devotion on voluntary basis, continuance commitment ensures that employees retain their organizational membership, however those who are normatively committed usually feel obligation on their part to stay in the organization (Ogunleyem,Odebiyi,and Olaoye, 2013).

To this end, job commitment and insecurity as well as attitude of police personnel towards crime prevention models does affect how the (police) operate efficiently and effectively. To have a crime free community, and a relatively lasting solution to advancement in crime there is need to visit the core of the police human resources department in the country. Police like every man at work desire and feels something in need, no doubt they are equally an emotive subject like every one of us. Hence, this literary quest in understanding the attitude of law enforcement personnel towards crime prevention, job insecurity and job commitment in democratic Nigeria might be providing us with the answer that we long awaited in the sphere, of Crime. Hence, this study tested the following research hypotheses:

1. There is a significant gender difference in perception of law enforcement agents on job insecurity.
2. There is a significant gender difference in law enforcement agents' perception of job commitment.
3. There is a negative significant relationship between job insecurity and crime prevention.

[1]ade_adetula@yahoo.com
[2]adeyemiadetula1@gmail.com

4. There is a positive significant relationship between job commitment and crime prevention.

METHODS

The descriptive survey design was adopted for the study. The total population of study was approximately 1,500. These included officers of law enforcement agencies in Akure, the State capital and agents working in the city metropolis of Ondo State, across all gender of the division's, rank, and file. The sample was 463 law enforcement and security agents drawn from government and other work organization settings, including police, custom, military, immigration and other security officers, within Akure metropolis. Convenient sampling technique was utilized to select these 463 participants. The justification for the appropriateness of the sample was based on Small Sample Size Techniques (1970); Morgan and Krejcie (1970) affirmation that in a finite population that ranges between 1,000, 000 – 264,000,000, the representative sample size at 95% confidence level and .05 margin of error equal 384.They consist of 273 (59%) male and 190 (41%) female law/security officers. While majority of the respondents 343(74.1%) falls into age category between 21-40 years others 120(25.9%) are between the ages of 41 and 65 years old. This research was not ethno centric as variety of ethnic groups participated in the study, 197(42.5%) of the study population were Yoruba, 108(23.3%) Igbo, 73(15.8) were Hausa, however, 85(18.4%) were from other ethnic groups (minority). In respect to respondents' marital status, 228 (49.2%) were single; 194(41.9%) married, divorced 24(5.2%), and 17(3.7%) of the respondents were widowed. 272(58.7%) had degree, 96(20.7%) possessed diploma certificate, while 95(20.5) of the study sample had secondary school certificate. Among the respondents we have 197(42.5%) within officer rank while 266(57.5%) of the sample population were from other ranks.

The researcher adopted the use of questionnaire as instrument for data collection. The research instrument was divided into four sections including the socio-demographic section: job insecurity, job commitment and crime prevention.

Section A: Socio-demographic information: This section include the bio-data such as; Age, Gender, Marital Status, Educational qualification, rank and Tribe. Section B: Job Insecurity; Job insecurity was measured using job insecurity scale by Ashford, Lee, and Bobko (1989). The subscale of 10 items was adopted in this study. Sample items from the scale are include the following: You may be laid off for a short while; You may lose your job and be moved to a lower level within the organization; you may be moved to a different job at a higher position in another geographic location etc. The response format is a 5 point Likert format from Strongly Agree to Strongly Disagree. Section C: Job Commitment; Job commitment was measured by Meyer and Allen (1996) Job commitment scale. It is a 5point Likert scale with response option ranging from Strongly Disagree to Strongly Agree. It contains 15 items (statement) such as "Things were better in the old days when people stayed with one

[1]ade_adetula@yahoo.com
[2]adeyemiadetula1@gmail.com

organization for most of their careers." "I believe that these days, people move from one company to another too frequently." Section D: Crime prevention; In order to measure crime prevention, the researcher developed a scale labeled crime prevention scale out of past literature. A pilot study was conducted on it with a 20 items loaded and factor analysed. However, the result generated a 6 item scale (extracted based on the principal component analysis) with a 5-point response format ranging from 1= Strongly Disagree; to 5= Strongly Agree. The example of items includes: Law enforcement officers' welfare program should be an improvement improved on for a crime free community, the military has major role to play in preventing crime in the community; The stop and check(s) has been very effective in preventing crime in the community. This study however reported a Cronbach alpha coefficient of 0.93.

The procedure for data collection was done solely by the researcher. This study covered all law enforcement agents from across board. Copies of questionnaire were taken to the law enforcement officers work settings by the researcher. Only the participants that gave their consents participated in the study. The participants were assured of their confidentiality. In order to further conceal participant's identity, they were not to indicate their names. Senior officers assisted in distributing the copies of questionnaire to the participating officers. Some days were given for the officers attached to the banks to fill the questionnaire to return their completed questionnaires. In all, total of 463 copies of questionnaire were administered.

The research adopted Pearson Product Moment Correlation (PPMC) method of statistical analysis to test for relationship among the study variables. Additionally, t-test statistical analysis was also used to test for differences in some variables.

RESULTS

Hypothesis 1: There is no significant gender difference in perception of law enforcement agents on job insecurity.

Table 1 shows the result of the hypothesis.

Table 1: Gender Differences in Perception of Job Insecurity

Variable	N	Mean	SD	Crit-t	Cal-t	df	p
Male	273	27.48	5.45				
Female	190	27.76	6.18	1.96	-0.51	461	>.05

Table 1 above shows that there was no significant difference between male or female law enforcement personnel's in the perception of job insecurity (Crit-t = 1.96, Cal-t = -0.51, df = 461, >.05 level of significance). Therefore, hypothesis one was rejected. With the finding showing a score slightly below the average mean scores of the both gender (males,

[1]ade_adetula@yahoo.com
[2]adeyemiadetula1@gmail.com

27.48; females, 27.76), it was an indication that both male and female law enforcement personnel shared similar perception on job insecurity.

Hypothesis 2: There is a significant gender difference in law enforcement agents' perception of job commitment.

Table 2 shows the result of this hypothesis.

Table 2: Gender Differences in Perception of Job Commitment

Variable	N	Mean	SD	Crit-t	Cal-t	df	p
Male	273	41.24	6.65				
Female	190	42.28	5.64	1.96	-1.76	461	>.05

The Table 2 above showed that there was no significant gender difference between male or female law enforcement personnel's perception of job commitment towards crime prevention. (Crit-t = 1.96, Cal-t = -1.76, df = 461, >.05 level of significance). Therefore, hypothesis two was rejected. With the mean scores of males, 41.24 and females, 42.28 nearly the same, the result indicated that both male and female law enforcement personnel shared similar perception on job commitment.

Hypothesis 3: There is a negative significant relationship between job insecurity and crime prevention

Table 3 presents the result of the hypothesis.

Table 3: Relationship between job insecurity and crime prevention

Variable	N	Mean	Std. dev.	r	p
Job insecurity	463	27.60	5.75		
Crime prevention	463	68.10	15.37	-0.58	.05

It was observed from Table 3 above that there was no a significant but negative relationship between job insecurity and crime prevention (r = -0.58; p>.05 level of significance). Since the negativity was significant, therefore, the hypothesis was accepted. Meaning that job insecurity has a great impact with contribution to crime prevention, the less the job insecurity is lowered the more inspiration to prevent crime. Since the result revealed a negative relationship, this confirms the hypothesis; hence it was accepted and retained in this study. This shows that that job insecurity has a great impact with contribution to crime prevention, the less the job insecurity is lowered the more inspiration to prevent crime.

[1]ade_adetula@yahoo.com
[2]adeyemiadetula1@gmail.com

Hypothesis 4: There is a positive significant relationship between job commitment and crime prevention.

Table 4 shows the result of the hypothesis.

Table 4: Relationship between job commitment and crime prevention

Variable	N	Mean	Std. dev.	r	p
Job commitment	463	41.67	6.27		
Crime prevention	463	68.10	15.37	0.299	.05

It was observed from the Table 4 above that there was a significant positive relationship between job commitment and crime prevention ($r = 0.30$; $p<.05$ level of significance). Therefore, the hypothesis was accepted. This means that when employees are committed to their jobs, there is the tendency that crimes are prevented.

DISCUSSION

The researcher examined the perception of law enforcement agents towards job insecurity, job commitment and crime prevention. Findings revealed that irrespective of the gender (either male or female), of member of the law enforcement agency, their perception of job insecurity still remains the same. This result supports the findings of Clark and Bradley (2004) who found that temporaries and permanents which include males and females experience similar levels of job insecurity.

Both male and female members of the law enforcement agency have equal perception about their job commitment. The result supports the findings of Tella, et al (2007) who found that correlation exists between perceived motivation, job satisfaction, and commitment, although correlation between motivation and commitment was negative. No difference was observed in the perceived motivation of professional and non-professional library personnel in terms of gender.

Hypothesis three which stated that, 'There will be a negative significant relationship between job insecurity and crime prevention' was accepted as the result gave a high negative significant relationship between job insecurity and crime prevention. This implies that, either a member of the law enforcement agency perceives job insecurity positively or not, this has no negative impact in their perception of crime prevention. This result negates the findings of Goksoy (2012) who found out that job insecurity, role ambiguity; self-monitoring and perceived fairness of previous change had impact on readiness for change which affects the competency of the employee.

[1]ade_adetula@yahoo.com
[2]adeyemiadetula1@gmail.com

The study also revealed that the more committed the member of law enforcement agency is toward the job, the better their crime prevention.

CONCLUSION

This research has provoked insights about past studies concerning perception of law enforcement agents on job insecurity, job commitment, particularly among Nigerian law enforcement agents. There has been supposedly early assumption in past literature by scholars who have associated a positive perception of job insecurity to effectiveness on the job. This study rather has dismissed the claim that perception job insecurity or of being sent out of job, would mean or suggest incompetency among Nigerian law enforcement agents. The perception of job insecurity could also be a result of some other factors beyond the scope of this study. The study also revealed the fact that gender has nothing to do with how both male and female officers perceived insecurity as hindrance to their commitment to crime prevention.

This study recommends that governments and private security agencies and outfits must try hard to encourage their workforce performance by putting in place some motivational cues to dispel job insecurity.

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[1]ade_adetula@yahoo.com

[2]adeyemiadetula1@gmail.com

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[1]ade_adetula@yahoo.com

[2]adeyemiadetula1@gmail.com

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[1]ade_adetula@yahoo.com

[2]adeyemiadetula1@gmail.com

ASSESSMENT OF HOUSEHOLD DEMAND ON LOCUST BEANS (PARKIA BIGLOBOSA) IN SOUTH WEST, NIGERIA

Adetunji, M. O.[1], Oladejo, J. A.[2] and Ojedokun, I. K.[3]

[1,2&3]*Agricultural Economics Department, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria*

ABSTRACT

This study assessed household demand of locust beans in the south western zone of Nigeria. Oyo and Osun states were purposively chosen in the zone, two local government areas were also selected randomly in each state and one hundred and eighty (180) household heads were sampled systematically in the four Local Government Areas (LGAs). Structured questionnaires were used to collect data from the respondents. The Linear Approximate of Almost Ideal Demand System (LA/AIDS), regression analysis and descriptive statistics were the analytical tools used. The AL/AIDS model results revealed that the budget share of locust beans increases with an increase in price of maggi (1%), price of knorr (5%) and price of onions (1%), but it decreases with an increase in price of curry (1%), thyme (5%) and total household expenditure (5%). The estimated own price elasticity was less than one and negative (-0.5743) meaning that its demand was inelastic, the positive signs of cross-price elasticity indicated a substitute relationship between locust beans and other condiments (maggi, knorr, curry and thyme) except onions. Expenditure elasticity of locust beans was less than one (0.2244), this confirmed that it is inelastic and normal good. The result from the ordinary least square regression analysis showed that amount spent on other condiments (-42.85), age (14.140) and household size (16.05) had effects on household demand for locust beans at some levels of significance. Some of the respondents preferred to use locust beans because of medicinal (60%), and nutritional values (40%), while others rejected it because of odour (68%). Improvement on locust beans processing is needed in order to eliminate the odour.

Key Words: Locust beans, household demand, prices, elasticity

INTRODUCTION

The natural range of the African locust beans (parkia biglobosa) tree covers a broad area extending from Senegal in the West to Uganda in the East and includes Sudanians as well as Guinea-Congolese zone (Janick, 2008). The genius; parkia biglobosa belongs to the mimosaceae family (leguminous) which contain about 30 species. The genus is of considerable evolutionary interest because its species are pollinated by different groups of bats in different area. Only two of the genus Parkia is found in Nigeria namely: Parkia bicolor

oadetunji@lautech.edu.ng

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and Parkia biglobosa (Oyewole, 2004). Parkia biglobosa is common around villages in savannah areas of West Africa.

The African locust beans (parkia biglobosa) comes from a para-tropical tree and it is one of the Non-Timber Forest Products (NTFPs). The tree is about 7-20cm high and bears pods that occur in large bunches and vary between 120-300m in length (Odunfa, 1985). The girth is about 3m, the bole is usually short with twisted spreading branches forming a wide crown (Oyewole, 2004). The bark is dirty brown in colour and rough with leaflets which are elongated with more or less parallel margins (Oyewole, 2004). The locust beans tree normally flowers between December and March appearing with new leaves or slightly before the leaves. The flowers are deep red with head dangling downwards whereas the individual flowers are tightly packed. It normally fruits between Feburary to July, the fruits range between 15-30cm long and 2-50cm broad. When ripe the fruit is brown in colour containing numerous black seeds embedded in yellowish sweet tasting pulp (Oyewole, 2004).
In West Africa, particularly Nigeria, the most common use of the tree is the fermentation of its seeds to make condiments for soups and foods (Appiah, et al, 2012). The process involves labor-intensive stages such as harvesting, de-podding, removal of the yellow pulp, cleaning, boiling, de-hulling, rewashing, and fermentation (Akande, et al, 2010). The seed, which is a grain legume, has other food and non-food uses. When processed, the end product becomes a black, highly aromatic, tasty paste that has high protein content and it is used as a spice or condiment in the entire savannah region of West Africa and beyond.
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The name of the condiment varies depending on the country and local language, this include ‘dawadawa’ in Niger and northern Nigeria and Ghana, ‘ iru’ in southern Nigeria and ‘soumbala’ in Burkina Faso, Mali, Cote d’Ivoire and Guinea, ‘afitin’ in Benin, ‘kinda’ in Sierra Leone, ‘nététou’ in Gambia (Sacande and Clethero, 2007). Locust bean which is also known as carob, is one of the common cooking condiments that is gradually disappearing from dinning table of many families.

Findings from research has shown that locust bean helps to promote good sight and drives away hypertension and diseases conditions like stroke and diabetes. Locust bean also contains tannins, astringent substances found in many plants. Foods rich in tannins are often recommended for treatment of diarrhoea. The portion of carob that is made into locust bean gum contains soluble fibre in the galactomannan family. Like other forms of soluble fibre, it has shown potential benefit for enhancing weight loss and controlling blood sugar levels (Sacande and Clethero, 2007).

The African locust bean tree is highly valued and is commonly left standing when woodlands are cleared, the pulverised bark of the tree, for instance, is employed in wound healing and

serves as one of the ingredients that are used in treating leprosy. Locust beans is added to everything – not only because it tastes good and can serve as a tastier alternative to other spices cubes, but also due to its health benefits among which are vision improvement, digestion aid and much more (Alabi et al,. 2005).

On a moisture-free basis, the fermented locust bean contains about 40% protein, 32% fat and 24% carbohydrate (Campbell-Platt, 1980). Thus, apart from being a food condiment the fermented bean also contributes to the calorie and protein intake. According to Diawara et al; (2000), it has essential acids and vitamins and serves as a protein in the diet of poor families. Dawadawa is used in soups, sauces and stews to enhance or impart neatness (Klanjcar et al., 2002). According to Omafuvbe et al(2004) the fermented Africa locust bean has the following composition of different stages of fermentation period (in hours) in the table 1 below.

Table 1 Composition of Fermented Africa Locust Bean at Different Stages of Fermentation Period (In Hour).

Fermentation Period (Hr)	Moisture Content (%)	Ash (%)	Ether Extract (%)	Crude Protein (%)	CHO (%)	PH (%)	Total Toco pherol	Acid Value	Iodine Value
24	55.7 ±0.8	3.6 ±0.1	32.6 ±0.7	31.7 ±0.4	25.1 ±1.1	8.3	17.2 ±0.0	1.46	134.5
48	55.5 ±0.4	3.5 ±0.1	35.2 ±0.1	31.3 ±0.2	21.0 ±0.4	8.4	17.1 ±0.0	1.57	131.7
72	52.0 ±5.0	3.6 ±0.1	37.2 ±0.2	32.9 ±0.1	16.3 ±0.8	8.4	17.2 ±0.0	1.63	125.2

Source: Pakistan Journal of Nutrition 3 (3):142-143, 2004.

These values recorded in the table 1 were higher than the values reported for cowpea (Ojimelukwe, 1999). The condiment is also known to contribute to the calorie intake (Umoh and Oke, 1974), more so the nutritive value of 'iru' is also compared to that of monosodium glutamate based salts (Omafuvbe et al.,2004).

Demand of Locust Beans in Nigeria.

African locust beans as one of the non-timber forest products (NTFPs) plays central role in the socio-economic life of Nigerians (Osemeobi and Ujor, 1999). Because locust bean condiment 'iru' is a low-cost meat substitute by low-income families in parts of Nigeria (Odunfa,1985). And it is affordable by the general public. The condiment 'iru' after

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processing can be kept for months when common salt is added to it and sun-dried (Kitchikeesic, 2002). This makes it available all-year round despite the fact that Parkia biglobosa is a seasonal plant crop. It has attained national acceptance status (Osemeobi and Ujor, 1999) which enables it to have high consumption rates.

Unfortunately, increasing importation of foreign seasonings and the manufacture of local ones have continued to undermine the traditional processing of African locust beans seeds (Akande et al., 2010). The demand for locust beans in Nigeria is generally influenced by the price of the close substitutes like seasonings (maggi, knorr, onga, curry, thyme etc) , among other variable factors like taste, cultural heritage, market, geographical location and so on. Most of the ultra-modern markets in some part of Nigeria do not encourage the sale of locust beans which in turn affect the demand of locust beans in the urban region in Nigeria, because locust beans is still widely processed and marketed traditionally in Nigeria. (Adisa, et al .,(2014)

PURPOSE FOR THE STUDY

Household demand for locust bean has often been under-rated or neglected. The reasons for the negligence probably may be because it is an indigenous food processed using traditional innovation, sold at local markets are traded through traditional routes. More so, there is an increasing realization that household demand studies should go beyond the realm of mere academic exercises to having an impact on people (Yusuf and Rahji 2012). It is worth nothing that Nigerian household experienced large increases in prices of food and non-food products which led to the reduction in the household purchasing power and relative price effect that forced the poor household to seek substitute for more expensive household goods. Locust beans serve as low-cost condiment substitute for the relatively expensive condiments like seasonings. This product has the potential for commercial development both at national and international level if there is favourable market condition that can create allowance for its export.

Proper current study is therefore needed to record the household demand pattern of locust beans in order to note it demand influence on its own price changes and prices of other substitutes.

Main objective is to assess the household demand of locust bean in the study area.

The specific objectives of the study are to;

- find out the household income and the proportion used in purchase of locust bean by different households in the study area.
- ascertain the household demand pattern on locust bean in the study area.
- estimate own price, cross price and income elasticity of demand for locust beans in the study area.

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- identify the determinants of household demand for locust beans

METHODOLOGY

The sample of this research study was taken from the population of households in south western zone of Nigeria. Oyo and Osun states were purposively chosen in the zone, two local government areas were also selected randomly in each state: Osogbo and Olorunda Local Government Areas (LGAs) were chosen from Osun state and Ogbomoso North and Ogbomoso South LGAs from Oyo state. Systematic sampling procedure was used to select one hundred and eighty (180) household heads in the four LGAs this means that forty five household heads were sampled from each LGA. Structured questionnaire were used in the collection of primary data from the sampled household heads. The data from the survey were analysed and discussed using descriptive, ordinary least square technique and the Linear Approximate of Almost Ideal Demand System (LA/AIDS).

The analytical tool (LA/AIDS) is written as follows…

LA/AIDS was used to estimate own price, cross price and income elasticity of demand for locust beans in the study area.

Own price elasticity = $-1 + (\alpha ij / \omega i) - \beta i$

Cross price elasticity = $(\alpha ij / \omega i) - \beta i(\omega j / \omega i)$

Expenditure elasticity = $1 + (\beta i / \omega i)$

Where αij = expenditure coefficient of the ith commodity

ωi = geometric means of the budget share (dependent variable)

ωj = geometric means of price of each of the other condiments

βi = coefficient of the household expenditure.

RESULT PRESENTATION AND DISCUSSION

Socio economic characteristics of the respondents.

The result of the findings showed that majority of the respondents were male (80%), middle aged (40%) i.e between 31- 40 years old and married (68%). Larger percentage (65%) of the household heads had average of 8 members in the family and 86% had one form of formal education or the other, with about 40% of them having secondary school certificate. Concerning their occupation, 60% of the respondents were traders, 10% were artisans, 15% farmers. About 22.2% had an average of ₦ 20,000.00 as their monthly income, while 40% had up to ₦ 40,000.00 as their monthly income. Only 10% had ₦ 70,000.00. This results indicate that majority of the respondents sampled are male household heads, middle-aged,

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married and educated. They have large household size and they are involved in various types of occupations but they still earn low income .

Table 2. Summary Of Socio Economis Characteristics Of The Household Heads In The Study Areas

Variables	n(180)	% (100)
Gender		
Male	144	80.0
Female	36	20.0
Age		
≤ 30	10	5.6
31-40	72	40.0
41-50	36	20.0
>51	62	34.4
Marital status		
Single	-	
Widowed	18	10.0
Divorced	10	5.6
Separated	30	16.7
Married	122	67.7
Educational status		
No formal education	24	13.3
Primary Education	36	20.0
Secondary education	72	40.0
Tertiary Education	45	25.0
Others	03	1.7
Household size		
≤ 5	45	25.0
6-10	117	65.0
≥ 11	18	10.0
Occupation		
Farming	27	15.0
Trading	108	60.0
Artisans	18	10.0
Others	27	15.0
Monthly income		
≤ ₦10,000	14	7.8
₦ 10,001 – ₦ 30,000	40	22.2
₦ 30,001 – ₦ 50,000	72	40.0
₦ 50,001 – ₦ 70,000	36	20.0
≥ ₦70,001	18	10.0

Source; field survey 2015

Purchase of locust beans and other condiments

Apart from the household head's monthly income, it was discovered that other members of the household contributed some amount of money for the upkeep of the household. About 40% of the respondent did not collect any money from the household members while 30% received an average of ₦8,000/month. Only 1.7% collected more than ₦ 15,000 from other household members. The finding further revealed that 90% of the respondents spent some amount on locust beans monthly; 40% of the respondents spent ₦ 200 on locust beans in a week, 10% did not spend any money all while 2.8% spent over ₦400 on the same product per week. This indicates that most people in the study area regardless of their income spent at least considerable amount of money on the locust beans in a week. The respondent also spent some amount of money on other condiment apart from locust bean, such condiments are maggi, knorr, curry, thyme, onions, garlic and ginger. About 60% of the respondents used locust beans as their main condiment , they also used other condiments in combination with locust beans. Some of the respondents preferred to used locust beans as part of cooking recipe because of its taste (30%) medicinal (60%), and nutritional values (40%),while others rejected it because of odour (68%), taste (54%), storage (45%) and appearance (59%). The multiple responses were also revealed in table 3.

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Table 3; Proportion of income used in Purchase of locust beans and Its preferences

Variables	n(180)	% (100)
Contributions from other members of household/ month		
None.	72	40.0
≤ ₦1,000	27	22.2
₦ 1,001 – ₦ 5,000	36	30
₦ 5,001 – ₦ 10,000	08	4.4
₦ 10,001 – ₦ 15,000	03	1.7
≥ ₦15,001	03	1.7
Amount spent on locust beans/week		
None	18	10.0
≤ ₦100	58	32.2
₦ 101 – ₦ 200	72	40.0
₦ 201 – ₦ 300	18	10.0
₦ 301 – ₦ 400	09	5.0
≥ ₦ 401	05	2.8
Amount spent on other condiments/week		
None	30	16.7
≤ ₦100	72	40.0
₦ 101 – ₦ 200	54	30.0
₦ 201 – ₦ 300	18	10.0
₦ 301 – ₦ 400	06	3.3
≥ ₦ 401		
***Condiments used**		
Locust beans	108	60.0
Maggi	90	50.0
Knorr	72	40.0
Curry	68	37.8
Thyme	54	30.0
Onions	153	85.0
Garlic	32	17.8
Ginger	18	10.0
***Reasons for using locust beans**		
Taste	54	30.0
Medicinal value	108	60.0
Nutritional values.	72	40.0
***Reasons for not using locust beans**		

Appearance	42	23.3
Taste	54	30.0
Odour	72	40.0
Storage	23	12.8
Others	-	-

Source; field survey 2015

The household demand pattern on locust bean

The Almost Ideal Demand System was derived by Deaton and Muellbauer (1980) from an expenditure or cost function and is not based on an explicit consumer utility function. Using this model, the demand equation for locust beans was estimated without imposition of any restriction. From table 4, the result of the test showed that in locust beans consumption, homogeneity condition was significantly violated, Durbin Watson statistics was within the plausible region. The adjusted R^2 is 76%. The budget share of locust beans (Lb) was taken as dependent variable and budget share of other selected condiments such as maggi $\mathbf{X_1}$, knorr $\mathbf{X_2}$, curry $\mathbf{X_3}$, thyme $\mathbf{X_4}$, onions $\mathbf{X_5}$, as independent variables.

The findings revealed that there is a direct and significant relationship between the prices of maggi (1%), knorr (5%), onions (1%) and budget share of locust beans (1%) while there is significantly indirect relationship between the total household expenditure (5%), curry(1%), thyme(5%) and budget share of locust beans. The statement means that the budget share of locust beans increases with an increase in price of maggi, price of knorr and price of onions, but the indirect relationship indicates that the budget share of locust beans decreases with an increase in price of curry, thyme and expenditure. In actual fact the budget share of locust beans has little or no significant effect on the total household expenditure, in the sense that small quota of the household budget is used for the purchase of locust beans which in turns makes its demand to be consistent.

Table 4 : **Unconstrained parameter estimate and test of homogeneity for household demand for locust beans**

Commodity	**Constant**	**Locust Beans.. L**	**Maggi X_1**	**Knorr X_2**	**Curry X_3**	**Thyme X_4**	**Onions X_5**	**Expenditu**	**R^2**	**DW**
Locust Beans	0.1532** (12.470)	0.0002* (3.541)	0.007** (4.116)	0.032 * (2.252)	-0.004** (-3.025)	-0.006* (-2.652)	0.12** (2.945)	-0.0159* (-2.316)	0.763	1.9873

Source; computed from field survey 2015
* represents 5% level of significance
** represents 1% level of significance
Values in parenthesis represents t-values

Estimation of own price, cross price and income elasticity of demand for locust beans in the study area.

Table 3 reveals the estimation of own price elasticity of locust beans . The value which was -0.5743, was less than one and negative. This implies that locust beans has inelastic own price elasticity, an increase in the price of locust beans by 1% will decrease its demand by 0.57%, The changes in price of locust beans do not affect its demand.

The negative sigh conforms to the law of demand and it's in line with the findings of Adetunji and Rauf (2011) who reported that own price elasticity of beef was -0.827, Ogunniyi et al,. (2012) reported -0.68 for processed fruit. This indicates that households in this study area are insensitive to locust beans price changes because they consider the product as an essential one.

The positive sign of cross price elasticity shows that there exist a substitute relationship between locust beans and other condiments except the onions which has a negative sign.

expenditure elasticity has a value of 0.2244 which is also less than one and positive. When the figure is less than one it shows that the expenditure elasticity is inelastic and the sign indicate whether the product is a luxury (if negative) or necessity good (if positive). This implies that locust beans is a normal good (necessity) and expenditure inelastic, meaning that as the price of locust beans increases, consumers tends to spend proportionately less on it.

Table 5: Own price, cross price and expenditure elasticity for locust beans demand

Elasticity	Locust Beans	Maggi	Knorr	Curry	Thyme	Onions
Own- price	-0.5743	-	-	-	-	-
Cross Price		0.3683	0.0948	0.1924	0.2899	-0.234
Expenditure	0.2244	-	-	-	-	-

Source; computed from field survey 2015

Determinants of Household Demand for Locust Beans

The result from the OLS regression analysis in table 6 showed the influence of some variables such as age (AG), marital status (MS), household size (HS) and amount spent on other condiments (AC) on the household demand for locust beans (HD). Household demand for locust beans which is the dependent variable is measured by the amount spent on locust

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beans monthly. The findings revealed that the amount spent on other condiments (5%) and the household size (5%) and age(1%) had effects on household demand for locust beans, This means that as the amount spent on other condiments increases the demand for locust beans decreases and vice versa, this is because the variable carries negative sign. Meanwhile as the age of the respondent and household size increase, the demand for locust beans will increase. All this are presented in table 6.

Table 6: Regression Results On Determinants Of Household Demand For Locust Beans

Variables	**B**	**t-ratio**	**Significance**
Constant	-153.34	-0.23	0.981
Age (AG)	14.140	3.139	0.001**
Marital status (MS)	3.86	0.319	0.75
Household size (HS	16.05	2.211	0.041*
Amount spent on other condiments. (AC)	-42.85	-2.476	0.038*

Source; computed from field survey 2015
Adjusted R-squares= 62.02%
Significant level at 5%----- *
Significant level at 1%----- **

Conclusion and Recommendation

In conclusion, the findings revealed most household heads in Oyo and Osun states demand for locust beans by spending some amount of money on it monthly. They preferred to used locust beans because of its taste, medicinal and nutritional values while others rejected it because of odour, taste, storage and appearance.

It was discovered in the study areas, that the amount of money allocated for the purchase of locust beans usually increase with an increase in prices of maggi, knorr and onions, but decrease with an increase in prices of curry and thyme. Its demand was inelastic and created a substitute relationship with other condiments except onions. Household demand for locust beans is also affected by the age of the household heads and household size and the amount spent on the selected condiments.

It is therefore recommended that more awareness should be created about the nutritional and health benefits of locust beans, there should be improvement on locust beans processing and packaging in order to eliminate the odour, add value to the taste and appearance.

oadetunji@lautech.edu.ng

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oadetunji@lautech.edu.ng

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GENERAL COMMENTS

Concerning the review of this paper.

1. The reviewer commented that 'questionnaire' should be changed to 'questionnaires'. I disagree .

The word 'questionnaire' remain the same whether singular or plural.

2. The reviewer also said her preferred 'purposive sampling' to be used to select female – headed households. I disagree.

My reasons

a. this work is not on gender and its not only women that demand for locust beans.
b. the study is an household survey and the best sampling technique for this type of survey is Systematic random sampling.
c. If women-household head, wives or widows are purposively selected, we maynot be able to generalise the results in the study on all the households the two states. The study will be biased and the goals maynot be accomplished.
d. Men (husbands, fathers) are the decision makers in the home, so basically they influence demand for good and services. For instance if they dislike locust beans the wife (woman) will not buy or use it. Therefore men (household heads) are also good respondents for this study.

oadetunji@lautech.edu.ng

CHALLENGES INVOLVED IN THE IMPLEMENTATION OF BUILDING REGULATIONS: A CASE OF KPESHIE SUB – METRO DISTRICT ASSEMBLY IN GHANA.

Arthur-Aidoo, B.M.[1], Ansary, N.[2] and Aigbavboa, C. O.[3]

[1,2&3]*Department of Construction Management and Quantity Surveying, University of Johannesburg South Africa.*

ABSTRACT

This study was embarked upon in order to discover challenges involved in the implementation of building regulations at the district assembly level precisely at the Kpeshie Sub – Metro District Assembly in Ghana. Review of relevant and available literature on the subject matter was made to gain better insight into the topic in obtaining the needed information. The method used was field survey and it was supported by the distribution of questionnaires to the district assembly. In all, thirty-five structured questionnaires were administered to the built environment personnel who work with three zonal capital towns and three sub-towns of the district assemblies via random sampling. The analysis of the data collected from the District Assembly revealed that 66.7% remarked they lack enough personnel to see to the proper implementation of the Building Regulation. 100% response from Town and Country Planning showed the various challenges they encounter including lack of ownership (title to land) of developers, Poor compliance to design standards, Poor site description and Poor presentation of design proposals. The study recommends the following among other things that the District Assembly must institute and organize educational programmes such as symposia, community seminars regarding Building Regulations and other relevant themes to broaden the knowledge of both their personnel and the community. Also, the monitoring team of the District Assembly must ensure that approved building drawings are in compliance with the building regulations during the construction stage of the project.

Keywords: *Assessing, building regulations, implementation construction industry*

INTRODUCTION

The interrelationship of the various elements of the built environment in the majority of town and cities is a result of historical development on the basis of economics and convenience.

However, the recent attention to Town and Country Planning has brought the various relationships under examination, and new towns are now designed on a more selective basis with consideration being to the interrelationship of man's several activities. Building regulation is the statutory instrument which sets out the minimum performance standards for

the design and construction of the building is paramount to Ghana's economy. According to municipal council ordinance by the ministry of works and housing (1953), No building shall be erected or any work carried out without the approval of the town engineer or health officer who may enforce full complainant with the regulation in the case of building materials and construction. The fact that the regulation has been in existence and controlled by Town and Country Planning Department of the District assembly, the majority of building and structures constructed are not in compliant with the building regulations. The effort to meet the increasing population on the issue of unauthorised structures in Accra metropolis has not been adequate. The Kpeshie Sub-metro District Assembly is one of the six sub-districts under the Accra Metropolitan Assembly, which came created in 1988 by the Provisional National Defence Council National Democratic Congress (P.N.D.C/NDC) Government. A lot of residents who live around the Kpeshie Sub-metro District Assembly have not realised the importance of the building control regulations. This is because of how they have ignored the regulations and have built haphazardly without conforming to their approved drawings. Observations of the unauthorised location of structures that have sprang-up across selected areas in the sub-metro show that only a few structures are in conformity with the originally approved designs. Despite all the strenuous efforts by the Town and Country Planners and the District Assembly engineers in checking structures without documentations, the structural problems and encroachment of service reserve areas for markets, schools among others, still building construction goes on without complying the proper the proper control measure and by-laws. Also, unauthorised and unapproved locations of structures at space to create access during fire outbreak have as well being occupied. This study, therefore, seek to ascertain the challenges involved in the implementation of building control regulations at the district assembly level precisely the Kpeshie sub – metro assembly in Ghana.

AIM OF THE STUDY

The aim of the study is to assess the challenges involved in the implementation the building regulations.

OBJECTIVES OF THE STUDY

The primary objectives of the study includes:

i. To establish why unauthorised buildings are built at unapproved locations
ii. To find out what causes delay in the approval of building permits.

METHODOLOGY

The study adopted a mixed method of both qualitative and quantitative technique. The qualitative technique made use of review of relevant literature on building control regulation via existing government gazettes and publication supported by other published resources. The quantitative method on the other hand adopted the use of questionnaire survey. In all, thirty-

five semi-structured questionnaires were administered to the targeted population who work with three zonal capital towns and three sub-towns of the district assemblies via random sampling technique. The main respondents of the questionnaires were the built environment professionals including, 10 real estate managers, 10 building owners, 7 site engineers, 5 town planners, 13 Building inspectors and 5 Architects who were randomly selected. The entire administered questionnaires were however retrieved. The questionnaires were of the semi-structured format that allowed the inclusion of respondent opinion.

Response Rate of Respondents

Professional	Questionnaires issued	Responses	Percentage
Real estate Managers	8	4	50%
Site engineers	3	3	100%
Town and country planners	2	2	100%
Building owners	7	7	100%
Building Inspectors	10	10	100%
Architects	5	5	100%
Total	35	31	89%

Table A: Classification of study population

Professionals	Total number
Real estate Managers	10
Site engineers	7
Town and country planners	5
Building owners	10
Building Inspectors	13
Architects	8
Total (N)	53

The sample size for the study was the proportion of the selected professionals. This is because it was impossible to distribute the questionnaires to all professionals. There was the need to obtain a representative sample size for all the respondents. The formula recommended by Kish (1965) was used to obtain the representative sample. These include using a census for a small population, limiting a sample size of similar studied using formulas to calculate a sample size.

For critical sampling, however, the Kish Formula was used to compute the number of questionnaires to be given to the workers sampled under the simple random sampling.

The computation is done as follows: $n = \frac{n}{(1+\frac{n}{N})}$

And $n = \frac{S^2}{V^2}$

Where

n= Sample Size
N= Total population
S^2=Max standard development of population element (using max variability of p=0.5 at confidence level of 95%)
V =the desired level of precision ±5% =(0.5)
P = the proportion of population element that belong to the define class.

S^2=P (1-P)

=0.5(1-0.5)

=0.25

$n' = \frac{S^2}{V^2}$

$0.25/0.05^2$

=100

$$n = \frac{n}{(1+\frac{n}{N})}$$

$$n = \frac{100}{(1+\frac{100}{53})}$$

=34.6

n= 35

Therefore, thirty five (35) questionnaires were distributed randomly among respondents.

FINDINGS OF RESULTS

The validity of the questionnaire supported by the responses established the following results. The analysis of the data collected from the District Assembly revealed that 66.7% of the respondent remarked they lack have enough personnel to see to the proper implementation of the Building Regulation. 100% responds from Town and Country Planning shown the various challenges they encounter including; lack of ownership (title to land) of developers, Poor compliance to design standards, Poor site description and Poor presentation of design proposals.

100% of the respondents stressed that the problems associated with the citing of unauthorized structures at unapproved locations can be solved in the communities when the Legislative instrument (LI) 1639 (1996) of the building regulations is adhered to strictly. Also, 33% of the respondents expressed the sentiments that the District Assembly must enforce a penalty fee for encroachers and defaulters or demolish the structure. On the issues of problems building owners encounter during application process for their development permits, 95% of the respondents indicated following as some of the challenges they encounter during the acquisition of the building permits: Lack of ownership (title to land) of developers, Poor compliance to design standards, Poor site description and demarcation and Poor presentation of design proposals. Findings on issues regarding the bylaws within the scope of the national building regulations in the district two respondents representing 66.75 pointed they have the bylaws. While one respondent representing 33.3% indicated, he has no knowledge of the laws. Also, 100% respondents indicated that the processes involved in the acquisition of the building permit are too long and as a result, it compiles building owners to ignore the lengthy process and construct their buildings without regard to the regulations. This implies that work such as structures, drainage, and sanitation; streets and sign boarding among others will be poorly constructed.

CONCLUSION

This studies into the challenges involved in the implementation of building control regulations at the Kpeshie Sub Metro concludes on the following:

i. The proper implementation of the Building Regulation by the sub-Metro District is not being achieved.
ii. The composition of the District Planning Authority has an excellent task on them.
iii. The Sub-metros lacks qualify expertise because they fail to attract Planning Professionals.
iv. There is a fair amount of confusion as to whether or not LI 1630 is playing the role of Building Regulation.

v. The District Planning Authority for the impact on the Regulations has not fulfilled education for the general public within the communities.
vi. The haphazard positioning of building in the communities usually accompanied by flooding, the fire which causes loss of properties, the District has not demolished such unauthorized structures.
vii. The haphazard positioning of building in the communities often accompanied by flooding, the fire which causes loss of properties, the District has not demolish such unauthorized structures.
viii. Issuance of development and Building permit do not conform to the physical structure on the ground after being approved.
ix. Custodians of lands in the District Assembly ignore expert advice before developing their lands leading to misuse of the land.

RECOMMENDATIONS

The following recommendations are drawn to enhance effective planning and development of the district with the aim of instituting proper implementation into the community development.

i. The Sub Metro District Assembly should see to the proper implementation of the Building Regulation by enforcing the law on the community developers from day one.
ii. The greater task on the compositions of the District Planning Authority is to help in fighting against unauthorized developers by bringing all the ideas of the technicality from the various departments, i.e. the Town and Country planning, Metro Works, Roads, Survey department, Housing and water Company.
iii. The building inspectors have a great task for carrying out their duties properly to ensure that buildings under construction conform to specifications as prescribe by permit, to stop unauthorized development and to examine building materials properly to ensure that buildings under construction conform to specifications as prescribe by permit, to stop unauthorized development and to examine building materials properly.
iv. There should be qualified expertise in the District Assembly to exhibit human resources of building the discipline of integrity high reputation to oversee the total planning development.
v. The confusion whether or not LI 1630 is playing the role of building Regulation, or Town and Country Planning both laws are operating side by side. It is hereby recommended that a building Regulation law should be promulgated to see the standard in a proper building code.
vi. Due to inefficient by the District Assemblies to educate the community members either by using the media, patrolling the communities with information van and by a demolishing exercise, most of the opinion leaders has also not felt the impact and the development plan the authorities has set up for the communities.

vii. District Assembly must institute and organize educational programmes such as symposia, community seminars regarding Building Regulations and other relevant themes to broaden the knowledge of both their personnel and the community.

viii. The Assembly should embark on a demolishing exercise to put a stop to the haphazard positioning of buildings in the communities. The assembly should enforce that the approved building permit conforms to what is pertaining structure.

ix. Custodians of lands in the district should constantly be advice through by the District Planning Authority before developing their lands in order not to lead to misuse of the land.

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AN EXPLORATORY FACTOR ANALYSIS OF SAFE ACTS OF WORKERS TOWARDS HEALTH AND SAFETY COMPLIANCE

Zakari, M.[1], Aigbavboa, C. O.[2] and Thwala, D.W.

[1,2&3]*Department of Construction Managemnet and Quantity Surveying, Faculty of Engineering and the Built Environment, Johannesburg, Republic of South Africa.*

ABSTARCT

Workers inability to act according to laid down rules and regulations within the industry have invariably contributed to their unsafe actions leading to accident. The purpose of the study was to determine safe acts of workers towards health and safety (H&S) compliance. Delphi survey method of data collection was adopted for the study. Experts were asked to complete the Delphi questionnaire survey based on the impact of given factors in predicting safe act of workers towards Health and Safety compliance. The ratings were based on either the impact was considered to be very high or high. Data obtained was analysed and results were presented in a table and a chart. Findings from the study show that only three measurement variables (ensure equipment or tools are in good condition before usage, ensure the use of personal protective equipment (PPE) and ensure proper positioning of tasks) were considered by the experts to have reached consensus with IQD cut-off (IQD ≤1) score. Further findings showed strong consensus with very high impact (VHI: 9.00-10.00).Results from the Exploratory Factor Analysis (EFA) showed that only five indicator variables (SAW10,SAW 16,SAW7, SAW8 and SAW9) were considered as determinant of Health and Safety compliance. Further findings showed that one indicator variable (PPE) was found to be common in the Delphi survey and EFA results.The factor loadings for all items were greater than 0.5593.This findings indicate that high priority was given to SAW 10 in determining Health and Safety compliance in the construction industry.

Keywords: *Exploratory factor analysis, safe acts of workers, compliance, health and safety.*

zakari.mustapha1967@gmail.com

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INTRODUCTION

The construction industry is among the industries with unreasonable rates of accidents both permanent and non-permanent disabilities and even fatalities. Mustapha et al. (2015) were of the view that not all accidents are preventable, since risk is beyond the human intervention. Mustapha et al., (2015) opined that majority of accidents happen when workers do not abide by safety rules leading to their unsafe acts. Moreover, when management are adamant to unsafe conditions within the work environment. Health and safety in the construction involves all level of the workforce. Boshoff (2015) asserted that in creating a positive safety culture in any work environment requires participation of all workforce, effective communication and trust between the all role players. This implies that culture is very paramount in any work environment. Othman (2012) argued that "technical failure and inadequate training coupled with harsh work environment and unsafe methods of working inter alia are among the causes of non-compliance with OSH regulations in developing countries". Idubor and Osiamoje (2013); Windapo and Oladapo (2012) and Adenuga et al.(2007) supported this argument with lack of adequate training as a hindrance to OSH regulations compliance and further indicated that safe work environment can determine how issues of compliance with OSH regulations are taken care of by construction firms. Idubor and Osiamoje (2013) posits that adequate Occupational Health and Safety (OSH) training and education enhance the OSH performance e.g., compliance with OSH regulation.When all the necessary OHS requirements are met, then workers will perform their duties diligently to prevent any accident from occurring or minimise it. The paper attempts to enumerate how safe act workers will contribute to H&S compliance in the construction industry in Ghana.

RESEARCH DESIGN/METHODOLOGY

Twenty (20) experts made up of academicians and construction professionals from Building Technologists, quantity surveyors were selected at random from West African Built Environment Research (WABER), International Conference on Infrastructure Development in Africa (ICIDA) and Applied Research Conference in Africa (ARCA) were invited during the first stage of the study. Thirteen (13) experts responded to participate and completed the first round, but only nine (9) experts remained throughout the study. The nine experts were considered adequate based on literature recommendations from scholars who have previously used the technique. Hallowell and Gambatese (2010) suggested a minimum of eight panellist since most studies incorporate between eight and sixteen panellists. The size of a panel is also related to the characteristics of the study, number of experts' available, geographical representation and capacity of the facilitator. The experts were made up of academics and construction professionals. The rating of the questionnaires was based on the impact of other factors in predicting safe act of workers towards H&S compliance. Microsoft EXCEL, spread-sheet software was used in the analysis of the data obtained. The results were presented in a form of a bar-chart.

zakari.mustapha1967@gmail.com

Further, Social Sciences (SPSS) version 20 software Package was used to evaluate the reliability, discriminant validity and convergent validity of the instrument. The Exploratory Factor Analysis (EFA) was based on269 cases and discussion on Safe Act of Workers (SAW) With five (5) indicator variables as shown in Table 2. The factor extraction method used to determine the unidimensionality of the elements during the EFA was Principal Axis Factoring with Oblimin Rotation (PAF Oblimin).The Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was based on the method used by Farrington et al. (2009) to assess the factor-analysability of data. KMO should range from 0 to 1 and a minimum value of 0.60 was suggested as good for factor-analysis (Tabachnick & Fidell, 2007). A value greater than 0.50 as a minimum cut-off value and a desirable cut-off value of 0.80 or higher was recommended by Kaiser (1970).Hair et al.(2006) suggested a cut off value of KMO greater than or equal to 0.70.

Instruction for Experts

If the impact is considered to be high, then **'X'** should be marked under the '**7**' or **'8'** box depending on whether your opinion is inclined more towards high or very high impact.Please use your experience, expertise and judgement to rate what you perceive the average negative or positive influence of the various features are for Health and Safety compliance and the Ghanaian SMEs contractors at large would be if the described elements were lacking or present.

Table 1. Impact scale

No impact		Low impact		Medium impact		High impact		Very high impact	
1	2	3	4	5	6	7	8	9	10

SAFE ACTS OF WORKERSS

Workers are responsible for their health and safety and any unsafe act of a worker may not negatively impact or endanger others (Boshoff, 2015).Hence, workersare expected to act according to laid down rules and regulations within the industry to any unforeseen.The OHS Act enshrined all employers to provide and maintain a safe and healthy work environment that has no risk to employees (Boshoff, 2015). Smallwood et al. (2008) asserted that compliance with OSH regulations brings about benefits not limited to avoiding direct and indirect costs. Therefore, it is the duty of the employer to ensure that workers are provided with everything required in relation to OHS and all benefits to encourage them to perform safe acts within their work environment

zakari.mustapha1967@gmail.com

FINDINGS AND DISCUSSION

From the sixteen measurement variables shown in Figure 1, only three attributes (ensure equipment /tools are in good condition before usage, ensure the use of personal protective equipment (PPE) and ensure proper positioning of tasks) were considered by the experts to have reached consensus with IQD cut-off (IQD ≤1) score. This score implies the measurement variables have very high impact (VHI: 9.00-10.00) on safe act of workers towards H&S compliance and indicates strong consensus. Consensus was also reached on nine other measurement variables with IQD cut-off (IQD≥1.1≤2) score. The IQD score indicates good consensus for the nine measurement variables and the impact on H&S compliance was high (HI: 7.00-8.99). Four measurement variables reached consensus with IQD cut off (IQD≥2.1≤3) score, which indicates weak consensus on the measurement variables and impact on H&S was medium (MI:5.00-6.99).

Using the median as a means of reaching consensus, fourteen (14) attributes were considered to have reached consensus, with the exception of two measurement variables (avoid annoyance and horseplay at the workplace and do not service equipment that is in operation) which did not reach consensus as shown in Figure 1.

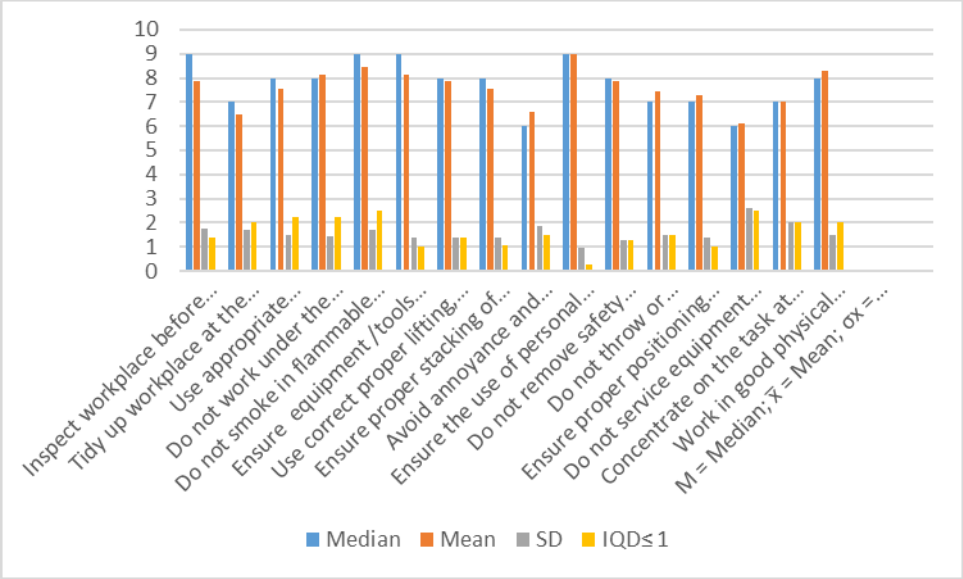


Figure 1: Safe Acts of Workers (SAW)

Results from the study revealed that the following sixteen factors or measurement variables were considered by the experts to have varying impact on the safe acts of workers towards Health and Safety compliance.

1. Inspect workplace before commencing any activity (HI)
2. Tidy up workplace at the end of any activity (HI)
3. Use appropriate tools/equipment (MI)

zakari.mustapha1967@gmail.com

4. Do not work under the influence of alcohol and other drugs (MI)
5. Do not smoke in flammable materials store (MI)
6. Ensure equipment /tools are in good condition before usage (VHI)
7. Use correct proper lifting, handling or moving of objects (VHI)
8. Ensure proper stacking of objects /materials in safe locations (HI)
9. Avoid annoyance and horseplay at the workplace (HI)
10. Do not service equipment that is in operation (MI)
11. Ensure the use of personal protective equipment (PPE) (VHI)
12. Do not remove safety guards from the workplace or equipment (HI)
13. Do not throw or accidentally drop objects from high levels
14. Ensure proper positioning of tasks (VHI)
15. Concentrate on the task at hand (HI)
16. Work in good physical conditions (HI)

From the impact ratings of the factors, findings revealed that three of the factors or measurement variables have a very high impact (VHI: 900-10.00), while nine other factors or measurement variables have high impact (HI: 7.00-8.99) and four other factors or measurement variables have medium impact.

The measures of reliability, convergent and discriminant validity for each of the five items of Safe Acts of Workers (SAW) realised through EFA (Table 2) are discussed. Table 2 shows that the corrected item-total correlation was greater than the suggested cut-off value of 0.30. This implies that the items were good measures of the element and the Cronbach alpha was greater than0.739 at 0.800indicating acceptable internal reliability (Nanually and Bernstein, 1994). The Kaiser-Meyer-Olkin (KMO) of 0.886 with Bartlett's Test of Sphericity of $p<0.000$ were also obtained, indicating consistency with the recommended KMO cut off value of 0.70 and Bartlett's Test of Sphericity of $p<0.05$ suggested by Hair et al., (2006). These results suggested that factor analysis could be conducted with the data. The communality were also above 0.3 and the in Total Variance Explained fourteen (14) factors were above 1.00. Eleven items (SAW 1 – SAW 6 and SAW 11-SAW 15) were dropped during the EFA. The factor loadings for all items were greater than 0.5593 as reported in Table 2, which were greater than the recommended value of 0.40 as suggested by (Field, 2005; Hair et al. 2002).

Table 2: Safe Acts of Workers (SAW)

Item	Variable	Factor loading	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SAW 7	Ensure the use of personal protective equipment (PPE)	0.5593	0.573	0.778
SAW 8	Work in good physical conditions	0.6391	0.487	0.800
SAW 9	Use proper means of lifting, handling or moving of objects	0.7122	0.690	0.739
SAW10	Ensure proper stacking of objects/materials	0.7105	0.666	0.749
SAW16	Avoid annoyance and horseplay at the workplace	0.6898	0.567	0.779

CONCLUSION AND FURTHER RESEARCH

The purpose of the study was to examine safe acts of workers that will contribute to Health and Safety compliance. Most of the factors or measurement variables have either very high impact or high impact on safe acts of workers towards Health and Safety compliance. Even though, IQD was used to reach consensus for the study with varying impacts, but the median ranging from (7.00-10.00) can also be used to reach consensus. All the five items had factor loading close to 1.00 indicating consistency. The dropped items had their total correlation less than the suggested cut-off value of 0.30 which suggested that the items were poor measures of the element SAW for CFA to be conducted. Further research will be conducted to evaluate the validity of the factors.

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THE THREAT OF INSURGENCY TO THE ATTAINMENT OF UNIVERSAL BASIC EDUCATION IN NORTH- EASTERN REGION OF NIGERIA

Abdulmumin T. M.[1], Iyere,M.J.[2] Ledawo, S.[2] and Abubakar, F.U.[3]

[1,2,3&4]*General Studies Department, School of Education, Federal College of Education, Zaria*

ABSTRACT

One of the major challenges faced by most contemporary societies of the world today is the problem of insecurity, a situation that has lead to wanton social unrest and destructions of live and properties, mostly in the developing countries of the world. The worrisome situation is the educational system that has become the theatre of absurd by the activities of insurgence and threat of insecurity. However, achieving Universal Basic Education in most developing societies as contain in 2000, United Nations developmental plans on Millennium Development Goals, has continue to suffered setback. It is against this background, the research study attempt examine the insecurity situation in the North-Eastern Nigeria as a threat to the achievement of Universal Basic Education. The objectives are to identify causes and sources of insecurity, Identify the effect of insecurity on education, identify the strategies in achieving UBE in north-east. Questionnaire was administered on 1200 subjects in three states of north-eastern Nigeria, Borno, Adamawa and Yobe as sample frame, using stratified random sampling in ten (10) schools among the selected target groups in all the three states mentioned aboveas sample size through primary source to elicit opinions that provided understanding into the phenomenon of problem of insecurity on the achievement of Universal Basic Education, while secondary source, deals with review of relevant literatures on the subject matter. The study chooses the afore mentioned states because of their volatility to insurgency, as a result of porous borders that influence influx of migrants, whose activities are rather inimical. The study revealed that there is no significant correlation between insecurity and the achievement of Universal Basic Education in North-Eastern Nigeria. Hence, we accept the null hypothesis and conclude that Universal Basic Education has not achieved its goals in education at the basic level. And suggest that new strategy be adapted with a view of ameliorating the attainment of education for all in the year 2030.

Keywords: *Insecurity. Achieving, UBE, North-East*

Background to the Research Study

Insecurity situation in the global context is a major source of concern, in both academic circle and the general public, while most part of the third world societies are volatile to the violent

abdulmuminmuhammad@gmail.com

threat of insurgency, a process taking an unprecedented dimension. Education as the bedrock of socio-economic development has become a serious target for heinous violent threat, hampering the realization of educational activities in the affected societies. Insurgence attacked on Garissa University, Kenya and an attempted attack on Abdulmumin University, Niger with numerous assassinations of school teachers, attacked on schools with high profile of death toll/abduction of students, are worrisome situation a process that have virtually paralyzed academic activities at the basic level of Education in most part of the North-Eastern Nigeria are such few scenario of insecurity on Education. However, achieving Universal Basic Education in line with the policy strategies designed by the United Nations on Millennium Development Goals (MDGs) in the year, 2000 to cater for developing countries with problems of illiteracy, gender disparity, poverty, low health status and quality of life among others, are not without challenges (Adetunji,2015). It is within this premises, the research study attempt to examine the problem of insecurity in achieving Universal Basic Education in North-Eastern Nigeria, being a region of an educationally disadvantage, bedeviled by high level of poverty with low level economic income and diversification. The greatest threat to the nation peace and development is the prevalence of insecurity, channeled towards destruction of educational system. According to Egbe (2010) cited in zieba (2004) is of the opinion that education is the philosophy that empowers the individual with broad knowledge and transferable skills and strong sense of values, ethics and civic engagement. A situation of inaccessibility by school age pupils to basic education in north-eastern Nigeria remain a serious danger on the upcoming generations as the region may continue to suffer perpetual marginalization in terms of requisite knowledge and transferable skill, prerequisite to socio-economic development, based on Millennium Development Goals (MDGs) plans in eradication of illiteracy and poverty.

Justification for the research

Understanding the insecurity situation in the North-Eastern Nigeria and the fact that the region is bedeviled with backwardness in education, influx of trans-border ideologies and high-level poverty, achieving Universal Basic Education is worrisome as it will require best form of strategies in its policy drive, towards enhancing desire transferable skills and strong sense of value with civic engagement that will boast individual commitment in requisite knowledge and socio-economic participation of the region.

Aims and Objectives

The research study is to examine the threat of insurgency in attainment ofUniversal Basic Education of North-Eastern Nigeria, as it affects education. Other specific objective will be to:

1. Identify causes and sources of insecurity
2. Identify the effect of insecurity on education in north-east

abdulmuminmuhammad@gmail.com

3. Identify the strategies in achieving UBE in north-east

Research Questions

This study will address the following research questions:

1. What are the causes and sources of insecurity?
2. What are the effects of insecurity on education in north-east?
3. What are the strategies in achieving UBE in north-east?

Research Hypothesis

This study has put forward the following hypotheses:

1. Ho: there is no significant relationship between insecurity and the achievement of Universal Basic Education.
2. Ho: nature of insecurity has no significant relationship with Universal Basic Education.

Insecurity and Its Causes

Insecurity has being viewed from different perspectives; there is no agreement among scholars on the concept of insecurity, even though there is no disagreement on its manifestations and impact in the society. The problem of definition is further compounded when it is realized that insecurity is multi-dimensional, such as conditions inimical to physical, emotional, psychological and any other form of harm, attack, terror injurious or undesirable to human existence. This being the case, there is no grand or universal theory to analyze the issue properly. In trying to examine the concept, scholars have avoided definitions and are rather trying to operationalise the concept. Johnmary (2010) sees insecurity as a condition in the society. An action, natural or social which may cause structural damages leading to destruction of human capital development, such may be viewed as threat of insecurity. In the words of Vornanen et al. (2009) Insecurity is a feeling of inferiority by the individual threat of loneliness, a subjective and objective experience which may affect connection between inner experience and outer conditions; such may be as a result of environmental threat or risk. The concern of this paper is insecurity in regards to threat to human lives and properties by the activities of insurgency or terror group and their attack in north-eastern Nigeria thereby exposing the region to continuous loss of human lives and capital, which impacts negatively on the human capital index. Many schools and physical structures in most institution of learning, have suffered violence attacked from insurgency with wanton loss of lives and destruction of properties among others. Udoidem (1997) argues that insecurity in Nigeria is deeply rooted in the negating values and predilections that are of ethno-religious origins. For instances, insecurity problems confronting Nigeria breath

abdulmuminmuhammad@gmail.com

economic depression and political malaise and the rise of religious crises. However, situation of Insecurity has being viewed from the perspective of an aggressive tendency to act out destructive behaviours against others, inform of violence such as, harmful or injurious to human, animals and properties. Namadi, (2006) who believed Nigerian State has remained an insecurity generating mechanism, rarely shedding its colonial attributes. Repression, suppression and intimidation have remained its enduring features. Hence, the establishing of hegemony, consensus building, dialogues, negotiations and respect for human rights and the rule of law is largely alien to its modus operandi. The causes of insecurity in the north-eastern Nigeria could be viewed from both the remote and the immediate causes. The remote cause of insecurity in the words of Omoyibo&Akpomera (2005) from the political and historical development of Nigeria with an abandonment of its sovereignty to a group of military and political cabal whose exercise of authority lack legal recourse to the populace in lieu of an acceptable referendum and constitution, a process that relegate Nigerian state and its national security perspective to a source of threat, as there are no core values to defend except corruption. In the same vein, Namadi (2006) observed that the British colonial administration encouraged communal sentiments among Nigerians. It's seized every available opportunity to spread the myth and propaganda that they were "separated from one another by the distance, differences of history and traditions, and by ethnological, racial, tribal, political, social and religious barriers". This situation leads to the harvest of ideological permutation and social crises being the source of insecurity. The analysis of the above scholars on the causes of insecurity, attempt the failure of country's political structure which either represent a mere geographical expression or manipulation of mere sentiment by the privilege few. But understanding the immediate cause of insecurity, it could be attributed to the fallout of parental control of their children/wards, as a result of broken-home/homelessness, being the major contemporary challenges in the globe as most parents lack the impetus on impacting the requisite socialization/moral discipline among others, leading to emergence of sub-groups of antagonism with conflicting ideology and system incompatibility.

Sources and Nature of insecurity in the North-Eastern Nigeria

The greatest threat to the nation peace and development is the activities of insurgency which is eroding educational system (western education) in the north-eastern Nigeria, even though the region is regarded as educationally backward region, a gap the universal basic education was set out to fill. However, the incessant insecurity problems and the activities of insurgency which leads to assassination of school teachers, bombing of schools, attacks/abduction of students are such worrisome scenario as it has paralyze educational activities, rendering the set out goals of universal basic education unattainable among others. The major sources of insecurity in the north-eastern Nigeria could be attributed to the fallout of numerous porous borders in Nigeria, believed to have being amounted to 663 routes(Dukku, 2015). This process creates opportunity for the influx of alien immigrants from some economic and

abdulmuminmuhammad@gmail.com

political war torn zones in Africa, these situations further breed religious ideological permutation with various cross border crimes along north-east porous geographical boundaries. Borno state could also be said to be a source of breeding theatre of absurd with hubs and vary degree of religious ideological permutation based on its pedigree as a center for education (Islamic) from the time immemorial of trans-Sahara trade of Kanem-Borno empire. A scenario that creates influx of peoples from both international and national communities, such as the northern part of Cameroun, the southern part of Chad and Republic of Niger; others are Adamawa, Gombe, and Yobe state within the north-eastern Nigeria. The consequence of these cross-border ideological permutations is the harvest of ethno-religious crisis, with greater influence on the youths with family disconnection, such as broken home; orphans, war victims and children of marital/family conflict among others, being such scenario of youths left on their own volition. Gital (2007) opine, they are widely involved in deviant behavior when it comes to finding of their economic viability and other anti-social activities. In a similar vein, Mebude (2015) posit, such youths are easily recruits into crime forming syndicates which organize gangs for pick pocketing, burglary, drug trafficking, prostitution and even terrorist activities. In another development, the problem of insecurity as affect the achievement of universal basic education, instance of north-east has being viewed, as arising from the cultural held belief and perception that the concept of western education is 'Haram' meaning forbidding or fake knowledge which has been extant in northern Nigeria for over a century. It was this derogatory name tagged on western education 'iliminboko' meaning fake education, as a result of held believe that the philosophy of western-Christian education was alien to African traditional culture and Islamic belief, due to prolong existence of Islamic form of education in the north, before the advent of western education. Also the fact that the emergence of western education was championed by Christian missionaries with the sole aim of training clergymen and based on the formation of early schools as western-Christian orientation, such as St. John, Catholics, Methodists among others, which signify Christian dominance over the system. According to Abdurrahman &Canhan, (1979:58) the contributing factors to menace of the northern cultural conception of western education as 'iliminboko' were based on the behavior of the early educated ones which involve alcoholism and lack of concern for religious activities with alien characters among others. This scenario tends to create the southern-northern dichotomy in education, a cultural situation that has failed to be rename as 'iliminzamani meaning modern education which is responsible for the misconception and misinterpretation that stir the psyche of most contemporary northern youths, rather gave rise in 'Almajiri' system of Islamic education leading to clash of civilization on the concept of modernity in most developing societies of the world and northern Nigeria in particular. This situation impacted more on doctrinal difference, leading to more often recorded sectarian crisis. Instance of these were the 'maitatsine' riot which struck Kano in December, 1980, Maiduguri in 1982, and Kaduna in 1983 with Yola in 1984 are such instances. There had been 'Fanshakara' insurgence in 2000 in Kano, the current

abdulmuminmuhammad@gmail.com

embattle 'Boko-haram' and the recent clashes of 'Shi'ite movement with the Nigerian army in Zaria which led to the partial disruption of academic activities, are such numerous threat of insecurity to educational development in the northern Nigeria. (Garba & Uchenna, 2009)

Education

Education has been viewed from various perspectives among scholars, such as process of liberation of human from the cloche of illiteracy and poverty, process that unlock human civilization among others. Egbe (2012) viewed education as the philosophy that empowers the individual with broad knowledge and transferable skills and strong sense of values, ethics and civic engagement.Obasanjo (1999) defined education as the sum total of culture values and attitude which each generation systematically transmit to those who are desirable, adapt this continuously to meet the exigencies of changing times. In a related development, Garba & Uchenna, (2009) are of the opinion that education is a life-long process of learning which beings at birth and ends with death. It was based on this premise Islam reiterated the significance of knowledge as revealed by numerous Hadiths on the significance of learning. Thus:

> "He dies not he who seek for knowledge""Seek knowledge even though in China""To be present in a circle of learned men is better than oneself in prayer a Thousand time or visiting a thousand sick persons and attending a a thousand funeral" Garba .A et'al(2009) cited in (Hossain, 1979: 93-4).

The views of these scholars justified education as prerequisite in reposition the individual(s) mind in creative activities that will engender social sanity and egalitarian environment towards socio-economic development among others. North-eastern Nigeria's disadvantage position in requisite education with current ravaging in educational activities by the insurgency is viewed within these premises of afore mentioned scholars view on education.

Universal Basic Education

Universal basic education (UBE) as founded in 1999 in Nigeria is a scheme of renewal vigor from universal primary education (UPE) initially lunched in the country in 1976 to address the problem of distortions in basic education with the aimed of eradication of illiteracy, ignorance and poverty. In the word of Anaduaka & Okafor (2013) the need for a more responsive/robust education in Nigeria became inevitable, following the outcome of the Jomtien World Conference held in 1990 and the declaration of Education for All (EFA) by the year 2000 at the conference and later the Millennium development Goals (MDGs) which re-emphasized the EFA message.

abdulmuminmuhammad@gmail.com

> Tsafe (2013) universal basic education(UBE) is the type of education in quality and content that is given in the first level of education. The concept UBE changes from country to country. The UBE in Nigeria is intended to be universal, free and compulsory. Basic education according to Federal Government of (1999) is the foundation for sustainable life-long learning. It provides reading, writing and numeracy skills. It comprises a wide variety of formal and non-formal education activities and programmes designed to enable learners to acquire functional literacy, such as six years of primary schooling, three years of junior secondary school, learning up to 15 years of age.

It was within the afore mentioned premises universal basic education is founded with its specific objectives that will impact positively on cradles towards life-long functional process of sustainable knowledge, that will remain an indelible archive in mental possession of an individual for optimum application.

Objectives of UBE

Yusuf &Ajere (2015) cited (UBEC) (2004) the Universal Basic Educations' objectives of its programme among others are:

> Developing in the entire citizenry a strong consciousness for education and strong commitment to its vigorous promotion;
>
> The provision of free, Universal Basic Education for every Nigerian child of school-going age; reducing incidence of drop-out from the formal school system (through improved relevance, quality and efficiency); and ensuring the acquisition of appropriate level of literacy, numeracy, manipulative, communicative and life skills, as well as ethical, moral and civic values needed for laying a solid foundation for life-long learning.

North-eastern Nigeria is backward in terms of western education, even though the concept of universalization of primary education has begun in the Western Region since 1954 and subsequently Eastern Region of Nigeria popularly referred to as universal Primary Education (UPE) with the recently re-introduction of Universal Basic Education (UBE) that repudiate UPE, due to its ineffectiveness (Labo-Popoola et'al 2009). Hence, the attainment of basic education for the school age pupils in the north-eastern Nigeria as MDGs' affirmation on education for all, has continue to attract debates within the academic cycles and public discus on the continuous disruption of academic activities and ravaging of school infrastructures by the activities of insurgency in the region, among others.

abdulmuminmuhammad@gmail.com

Millennium Development Goals Policies

The millennium development goals (MDGs) were designed to cater for developing countries led by United Nations in the year 2000. The conceived goals of MDGs were in line with the problems of illiteracy, gender disparity, poverty, low health status and quality of life among under-developed low income countries. Thus:

i. Eradication of extreme poverty and hunger;
ii. Achieving of universal primary education;
iii. Promoting of gender equality and empowerment of women;
iv. Reduction of child mortality;
v. Improving of maternal health;
vi. Fighting against HIV/AIDS, malaria and other diseases;
vii. Ensuring environmental sustainability; and,
viii. Development of a global partnership for development (Adetunji, 2015)

Sustainable Development Goals Policies

The sustainable development goals (SDGs) is set to achieved a broad range of sustainable development issues, these included ending poverty and hunger, improving health and education, making cities more sustainable, combating climate change and protecting oceans and forests. Sustainable development goals is the successor to the millennium development goals, transforming the world, being 2030 agenda for sustainable development, contained in paragraph 54 United Nation Resolution A/RES/70/1 of 25 September, 2015.

The above goals were designed with specific targets, and related with quantifiable indicators in line with the requirements of the Millennium Development Goals and Sustainable Development Goals. However, the major concern of this research study is the attainment of millenniumand sustainable development targets in north-eastern Nigeria as education play pivotal role in national development. In the word of Anaduaka & Okafor, (2013) the emergence of UBE in Nigeria was a source of development by the country's administration towards achieving the MDGs and to meet the agitations and needs of the Nigerian populace for an educational system that would be more useful to the socio-economic, political and cultural process of the society among others. However, SDGs give right to education been recognized by some government including at the global level. Article 13 of the United Nation such as international covenant on economic, social and cultural rights recognizes a universal right to education.

It is against this background, that it become worrisome by the scenario of insurgence in most sub-Sahara African countries, Nigeria and north-east in particular, as the insecurity situation continue unabated understanding the backwardness of education in the north-eastern with

abdulmuminmuhammad@gmail.com

current insecurity hindrance in attainment ofMDGs/SDGS on universal education plan, a truly practical plan for achieving the MDGs/SDGs has to be based on recognition of the existing approaches to identifying the best alternative developmental strategies in achieving a desire universal educational goals in the region, as hundred percent gross enrollment rate, eradication of adult illiteracy and general improvement in the quality of education remain unattainable.

Effect of insecurity on education in North-Eastern Nigeria

The incessant insurgency in north-eastern Nigeria has creates psychological trauma, phobia and fear, apart from wanton destruction wreck on lives and properties, living people in perpetual fear of uncertainty and misfortune.

Many people are subjected or confined to refugee camps (IDPs) in their birth place across states boundaries as most economic activities are on the decline. Educational structures, either newly built or renovated schools structures by ETF has been destroyed amidst abduction of school pupils, elimination of some school teachers leading to disruption of academic activities as school age pupil are either made to stay home or flew their various communities among others.

Theoretical Approach

Social Disorder/Disorganization Approach Theory

Social disorder/disorganization theory was founded in early 1900s at the Chicago University and was developed by Flynn and Conrad, (1978).Holborn and Haralambos (2004)attempt to account for the effect of industrial revolution as a mitigated ecological perspective on social disorganization characterize by problem of urbanization, migration, poverty, unemployment, over-crowding given rise to various degree of crimes. The consequent of these scenarios created weaknesses in law enforcement in the social arena, due to high level of social disorder and disorganization among people. The theory however, seems to analyze the various degreeof situationsin the north eastern Nigeria, ranging fromconcentration of peopleof questionable characters, the emerged complex environment with little accessible to scares resources, uncontrollable cross-borders migration with divergence ideologies. The theory furtherattempt to explained the vulnerability of certain situation in the north-east, which may be a propensity in weaken the activities of law enforcement agencies, such asbroken-down in the family system, either as a result ofhigh level divorce rate, poor economic participation and backwardness in western education among others. In a similar vein, Kubrin and Weitzer (2003) cited in Thomas and Znaniecki 1920, on social disorder/disorganization theory, which attempt to explain a situation ofweak social relationship and communication difficulties, arises from culturally diverse populations. The formation of city leading to concentration of people in certain areas, as a result of influx migration of people to urbanism, with its adverse effect was informed by arising competition

abdulmuminmuhammad@gmail.com

over resources. The over whelmed scenario of Social disorder/disorganization was rather expressed via the degree of certain lapses or failure in the family functional system,which the theory laid claimed as a situation thatgave rise inthe formation of sub-social groups, due tothe incapacitation of law enforcement agencies to offered community based services. Others are insecure nationalgeographical/regional boundary in regulatingboth the influx and the activities of an individual(s) harboring criminal tendency, leading toall sort of slums in the neighborhood environment, shaping behaviors (undesirable) among members of the society. Braithwaite (1988) wrote thatthe tranquility and wellbeing of a society are the pre-conditions for security, which naturally promotes human capital building.

Methodology

Brief History of the Study Area

The study area is North Eastern part of Nigeria, located within the border region sharing with other African countries, such as Niger, Chad and Cameroun. North east comprises of Borno, Yobe, Adamawa, Taraba, Bauchi, and Gombe. The region share major routeslinking other sub-Sahara Africa to Nigeria, which served as trans-Sahara trade that linked the famous KanemBorno with the Magrib states and other parts of African countries from pre-colonial era. Prior to the advent of insurgency, it has been a relatively peaceful, multicultural and dynamic region in Nigeria. Apart from its landlocked, vast desert, a small unevenly distributed population of diverse origin, religion and ways of life. The escalation of insurgency further served as impediment to the achievement of basic education, even though the region could be attributed to the under-developed economy with low level educational accessibility among most of its rural communities.

Research Design

Descriptive research method was used for this study that access first hand data from the respondents, describing the nature of condition as it was existed at the time of the study period, to discover the causes of particular occurrence and it gives greater options in selecting the instrument for data gathering.Multi stage sample method was employed for the study. First of all, purposive sampling was used, which enables the researchers to select the population for the study. Stratified sampling wasused because of the large size of the population.

Sample Size and Sample Technique of the study

Stratified sampling technique was used in identifying respondents in the three states of the north-east. Three local governmentswere randomly selected from each of the states. Purposive sampling techniques were used to select parents while staff and students were

abdulmuminmuhammad@gmail.com

randomly selected. 10 schools were derived from Borno State in three Local governments (Bama, Shani&Biu Local government Areas), 10 schools were derived from Yobe state in three local governemnts(Damaturu, Yusufari, &Gaidam Local government Areas), and 10 schools were derived from in three Local governments(Yola, Numan&Madagali Local government Areas) The total sample size of the study was 1200 respondents. Table.1. 1 below shows the sample frame for the study.

Table 1.1 Sample Frame of Respondents in the study area

RESPONDENTS	BORNO	YOBE	ADAMAWA	TOTAL
STAFF	50	35	40	125
PARENTS	250	160	230	640
PUPILS	200	106	127	435
TOTAL	500	301	399	1200

Borno State has the highest respondents (500), because the state is highly volatile in terms of destruction on education by the activities of insurgence, followed by Adamawa with (399) respondents and Yobe (301) respondents.

Methods of Data Analysis

The researchers analyzed the data using descriptive, frequency tally and simple percentage. Analysis of Variance (ANOVA) was used to test the null hypothesis.

Data Analysis

Table 4.1 Problem of Threat of Insurgence on the Attainment of Universal Basic Education in the North-East

Item Statement							
Causes and sources of insecurity	Categories of respondents	Strongly agreed	Agreed	Undecided	Disagreed	Strongly disagreed	Mean
The activities of the influx of trans border ideologies	Staff	15	15	8	1	6	9.0
	Parents	85	73	2	4	6	34.0
	Pupils/Students	48	40	10	13	2	22.6
Weak socio-economy activities and break down in family system	Staff	25	22	6	5	1	11.8
	Parents	70	71	2	30	20	38.6
	Pupils/Students	90	62	2	10	2	33.2
Negative perception of socio-cultural belief on	Staff	10	8	1	1	1	4.2
	Parents	2	10	10	85	75	36.4

abdulmuminmuhammad@gmail.com

western education	Pupils/Students	15	48	5	35	20	24.6
Assessing Insecurity on Education							
There is phobia due to threat of fear of unknown among populace	Staff	25	15	5	6	1	10.4
	Parents	85	73	5	6	6	35.0
	Pupils/Students	90	62	2	10	2	33.2
People are displace and accessing education is difficult	Staff	15	22	8	6	1	10.4
	Parents	70	71	2	30	20	38.6
	Pupils/Students	45	38	5	15	10	22.6
Abduction of pupils, killing of teachers and destruction on schools is a major obstacles	Staff	8	10	1	1	1	4.2
	Parents	108	90	10	15	25	49.6
	Pupils/Students	80	36	10	13	2	28.2
Strategies Required to Achieve Universal Basic Education							
The need for ICT security networking in educational institutions with community policing	Staff	12	10	6	1	1	6.0
	Parents	38	98	0	2	1	27.8
	Pupils/Students	90	62	2	10	2	33.2
Domestication of traditional school system 'Al'majiri into conventional school	Staff	15	15	8	1	5	8.8
	Parents	45	50	10	15	25	29.0
	Pupils/Students						
Correction of misconception of socio-cultural belief on western education by way of enlightment	Staff	10	3	0	7	1	4.2
	Parents	10	11	2	80	75	35.6
	Pupils/Students	45	38	5	15	10	22.6
Government and Private participation on wealth creation to engage school leavers	Staff	10	10	1	6	4	6
	Parents	102	73	0	3	1	35.8
	Pupils/Students	80	36	10	13	2	28.2

Test of Hypothesis

Hypothesis one: The insecurity situation has significantly affects the achievement of UBE/MDGs.

Table ANOVAComputation Table

GROUP	SA	AG	UD	DA	SDA	TOTAL	MEAN
BORNO	130	200	35	30	105	500	100.0
YOBE	90	96	40	38	37	301	60.2
ADAMAWA	102	120	79	56	42	399	79.8
TOTAL	322	416	154	124	184	1200	240.0

Source: Field Survey 2016

Source of variation	Sum of square	DF	Means square	F	P-value
Between groups	6602.889	2	3301.444	0.677361	0.677361
Within groups	47620	6	7936.667		
Total	54222.89	8			

DISCUSSIONS OF FINDINGS

Based on the objectives, 85 respondents among parents strongly agreed that the activities of influx trans-border ideologies are the causes of insurgency and 90 respondents among pupils/students strongly agreed that weak socio-economy and break down in family system also contributed to the activities of insurgency.

The effects of insurgent on education in north-east 90 respondents among pupils/students strongly agreed that the abduction of pupils, killing of teachers and destruction on schools are the major obstacles in attaining basic education in the region.

The strategies among the respondents' pupils/students, 90 strongly agreed on the need for ICT security networking in educational institutions with community policing.
Also 102 respondents' parents strongly agreed that government and private participation in wealth creation to engage school leavers is critical

The essence of this study is to examine the insurgence problem in attaining universal basic education in north-eastern Nigeria. The analysis of the study was on the effect of insurgence

on the attainment of universal basic education in the north-east. The following are the major findings.

First, our finding revealed that weak in socio-economy activities/break down in family system with the activities of the influx of trans border ideologies had significantly negative effect on the achievement of universal basic education. This is in agreement with Holborn et'al (2004) on theory of social disorder/ disorganization on the effect of insecurity in achieving basic education in the north-east, owning to the mitigated ecological environment characterize by migration, poverty, unemployment and uncontrollable cross-border activities with negative divergence ideologies among others.

Second, it also revealed the abduction of pupils, killing of teachers and destruction on schools as a major obstacles couple with phobia as a result of fear of unknown among populacehad significantly affect the achievement of basic education. In the same vein as put forward, in work of Labo-popoola et'al (2009) who believed that the continuous disruption of academic activities, ravaging of school infrastructures includes abduction and killing by insurgencies may likely to hinder the attainment of universal basic education as contained in MDGs affirmation on education for all. However, in line with SDGs 4 goals, it was to ensure inclusive and equitable quality education and promote lifelong learning opportunity for all being extension of MDGs goals, such as: An effort on the over view concerning an enormous progress in achieving the target of universal primary education. Be it the total enrolment rate in developing regions and the worldwide number of children out of school. The goal pre-empt the challenges being faced in developing regions due to high levels of poverty, armed conflicts and other emergencies, resulting to increase in the proportion of children out of school. Instance of this scenario could be seen on the threat of insurgent on education in the north-eastern Nigeria.

However SDGs 4 goals is channel in achieving inclusive and quality education for all reaffirms the belief that education is one of the most powerful and proven vehicles for sustainable development. This is to ensure that all girls and boys complete free primary and secondary schooling by 2030. It also aims to provide equal access to affordable vocational training and to eliminate gender and wealth disparities with the aim of achieving universal access to a quality high education. It is against this background, the research study concern itself on the best strategies to adapt by SDGs in tackling the situation of universal basic education in the north-eastern region of Nigeria

Third, our finding also revealed that,the best strategic approach lies ingovernment and Private participation on wealth creation to engage school leaversand the need for ICT security networking in educational institutions and community policing, that will guarantee successful execution of basic education in the north-east region .

abdulmuminmuhammad@gmail.com

CONCLUSION

Understanding the global insecurity situation and the ravaging of the north-eastern Nigeria, leading to wanton destruction not only on lives and properties butalso on educational activities and facilities, being new strategies of the insurgencies of wrecking on the attainment of basic education, however, this process has called for adoptionof new paradigm shift in tackling the activities of insurgency. Hence, if most developing societies of the world must be ride of illiteracy in 2030 as a driven motive of SDG's, there is need for robust re-strategize in universal basic education drive on its programmes and activitiesto make its goals a realistic process.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations has being advocated in order to make programmes and activities of basic education accessible and available to the target groups, (young school age groups) in volatile areas, not only in the north-eastern Nigeria, but also in most affects insecurity areas of the world.

1. There is need for an even economic infrastructural distribution by government and private sector in encouraging/engaging most teaming youths in meaningful ventures that will bring about balancing in nation's economic developmental indices and resource allocation.
2. Building human capacity is central to securing security and socio-economic development, the need to co-opt 'Almajiri' (Islamic traditional system of education) into universal basic educational programme activities, is crucial such as its modification into conventional school system through expanding its funds utilization, while strengthen adult literacy education in most hinter/periphery part of the north-east region, as these segment of people are easily aided or abetted by the insurgent activities due to their low level education and awareness as could easily be swayed by vary ideologies.
3. There is need for the collaboration of government and non-governmental agencies to strengthen ties in correcting the socio-cultural ill-perception on western education as 'iliminboko' or 'boko haram', meaning forbidding of fake education, as a commonly held belief in the north-east and northern region in general, so as to erode negative conception on western education, through process of campaign and enlightenment, using educated elites in the academic arena among others.
4. There should be private-public alliance in the transformation of the country's security system through ICT-based security networking, to handle over 663 routes linking nation's porous borders and community policingshould be instituted with sustain collaboration of present involvement ofwhat is known as 'Civilians Joint Task Force' (CJTF) with conventional law enforcement agencies in north-eastern Nigeria. Security

post should be mounted in every five kilometers away from each established schools or academic institutions of learningin the north-east among others.

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abdulmuminmuhammad@gmail.com

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DEVELOPMENT OF A SCALE FOR ASSESSING DETERMINANTS OF CONSTRUCTION WORKERS' FOOD CHOICES

Okoro,C.[1], Musonda, I.[2] and Agumba, J.[3]

[1,2,&3]*School of Civil Engineering and Built Environment, Department of Construction Management and Quantity Surveying, Faculty of Engineering and the Built Environment University of Johannesburg*

ABSTRACT

Research on the factors influencing construction workers' food choices and overall nutrition is limited, in South Africa and indeed Africa. The aim of the present paper is to develop and validate a questionnaire of factors influencing construction workers' food choices. A quantitative, purposive approach was used in the study. Fourty-two items, divided into six constructs, were used to develop a field survey questionnaire after an extensive literature review. Principal components analysis (PCA) was conducted to examine the structures and validity of the constructs. Cronbach's alpha test and mean inter-item correlations were used to examine internal consistency reliability. After repeated factor analysis, the questionnaire of food choice factors revealed seven different factors: food context, biological factors, nutritional knowledge, personal ideas and systems, economic factors, resources and cultural background. These factors explained 60.09% variance. Cronbach's alpha coefficients ranged from 0.62 to 0.85, indicating good internal consistency reliability. The factors which influence construction workers' food choices are important considerations when designing and implementing nutrition interventions in the South African construction industry. Future research can adopt the instrument when conducting psychometric assessments of construction workers' food choices.

Keywords: c*onstruction workers, factors, food choice, health, reliability, validity*

INTRODUCTION

Nutrition is an occupational health and safety concern (Wanjek, 2005). It has been generally acknowledged that nutrition is an integral part of workers' health and overall wellbeing. It has also been recognized that the health and wellbeing of workers impacts on their safety and productivity. According to Wanjek (2005), as far back as a thousand years ago, the paramount role of workers' nutrition in producing high-quality work was understood. The International Labour Organisation (ILO) has been concerned with adequate nourishment of workers, food safety and education for general health, safety and work productivity since its establishment (Wanjek, ibid.). The benefits of healthy eating and overall workers' health and well-being, including inter alia, improved morale, sense of well-being, and productivity as

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

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well as reduced absenteeism, health care costs, stress, and staff turn-over, are greater for low-paid workers in high risk occupations and settings, such as the construction industry (World Health Organisation (WHO), 2015).

Improving nutrition is even more important in the construction industry given the physically demanding and dangerous nature of construction work and the ever-increasing demand to improve the execrable image of the construction industry with regard to its health and safety (H&S) performance (Okoro, 2015). Safety on construction sites is linked to working conditions (Rawlinson and Farrell, 2008). For instance, while building the Eiffel Tower, not one life was lost. This was partly attributed to the working conditions at the site whereby a subsidized canteen that rose with the tower was established to provide workers with healthy food while at work. It therefore follows that a workforce furnished with adequate and healthy food would remain healthy in mind and body, and able to perform their tasks. Improving construction workers' nutrition is therefore of paramount importance if their health, safety, wellbeing and indeed productivity are desired. Individuals' food choices, eating behaviours and resulting nutritional health are influenced by a number of complex and inter-related individual, collective and policy-related determinants (European Food Information Council (EUFIC), 2005). Improving nutrition of a particular group requires an understanding of the factors which determine their food choice decisions (EUFIC, 2005; Okoro et al., 2016).

A plethora of studies have dwelt on food choice determinants. Some had a broad scope and employed qualitative methods (Sobal and Bisogni, 2009; Rose et al., 2010). Some studies presented reviews without focusing on construction workers (Arganini et al., 2012); others focused on only young construction apprentices in Australia (Du Plessis, 2011; 2012); and another literature recently examined the influence of nutrition determinants on food choices (Okoro et al., 2016). It appears, however, that few studies have been devoted to factors which could possibly influence construction workers' food choices, in South Africa and indeed Africa.The current study therefore develops a theoretical framework of food choice factors and assesses its validity and reliability as a measure.

In summary, the objectives of the study are to combine evidence, from extant literature, of factors which could possibly influence construction workers nutrition; and to examine the validity and reliability of the theoretical constructs. The ultimate goal of the study is to improve the nutrition of construction workers in the Gauteng Province of South Africa by highlighting the factors which influence their food choices. Hence, their health, wellbeing, safety performance and productivity at work could be enhanced.

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

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REVIEW

The choices people make about food determine which nutrients enter their bodyand these choices are influenced by many interrelating factors including biological mechanisms, genetic profiles, knowledge, social and cultural factors (Arganini et al., 2012). Psychological, economic, religious and demographic factors were also indicated to be influential on food choices. Further, gender was noted to be a primary factor underlying many decisions made about food. Gender differences and stereotyping were found to influence people's habits, health consciousness, weight control, degree of resistance to nutrition education and body self-perception. Context (in terms of time, place or location and company, was also indicated to influence food decisions (Arganini et al., ibid.).

In another review, it was indicated that food choice decisions are based on economic factors (including cost, income and availability), physical factors (such as access, skill (for cooking), education and time), biological determinants (including hunger, taste and appetite), social factors, including culture, family, peers and meal patterns), psychological factors (such as mood, stress and guilt) as well as attitudes, beliefs and knowledge about food (EUFIC, 2005). Cultural influences lead to the differences in the habitual consumption of certain foods and in traditions of preparation, and in certain cases can lead to restrictions such as exclusion of meat and milk from the diet but they are amenable to change.

Social (including family and co-workers), cultural and economic, personal (including gender, genetic predispositions to diseases, taste, personality and preferences) determinants as well as equipment, skill, knowledge, relationships, values and traditions, mass media, climate and physical structures were depicted as important determinants in a comprehensive model of food choice factors (Sobal and Bisogni, 2009). The study employed qualitative methods to explore the perceptions of the participants. It had a very broad scope incorporating factors relating to life course events and experiences such as changes in family through marriage, changes in residence through migration, etc.

In a related study, Rose et al. (2010) reported that environmental influences (including location and accessibility to shops) determine food choice and consumption. Other factors were indicated to be social acceptability, promotional or advertising effects, cost and availability of foods. This study reviewed existing research conducted on food access, and developed a model which depicted relationship between food choice and neighbourhood food access (Rose et al., 2010). Similarly, a mixed methods research study in Canada revealed that knowledge of value to health influences what is eaten (Bruner and Chad, 2014). The study also indicated that variations existed amongst generations since older people preferred traditional foods which were healthier than conventional foods. This suggests that some food

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

choices depend on preference, age and health consciousness. Other factors were found to be taste, cost and availability of food. This study focused on women.

Studies conducted in the construction industry also express that availability and cost of healthy food alternatives on site or nearby, wages, work schedules (including length of meal breaks, since people generally do not make healthy food choices when they are rushed), work-related and welfare facilities (such as provision of eating areas), and the economic environment influence workers' food choices (Wanjek, 2005).

Additionally, construction apprentices' food choices are determined by nutritional knowledge and cooking skills, familial factors (socio-economic status of parents and parental influence), peer influence, food supply and acquisition (e.g., at home, work or through fast-food outlets) demographic factors (age and gender differences, income, ethnicity and cultural variables); dietary restraint (conscious choice to regulate body weight), work and financial responsibilities, unhealthy childhood and adolescent food practices which endure into adulthood (Du Plessis, 2011). The other factors were found to be media and stereotypical views about nutrition (since men generally view nutrition and cooking as socially prescribed for women and are relatively unconcerned about health and diet). In a related study, which explored these factors using focus groups and thematic analysis, apprentices' dietary practices were reported to be moderated by convenience, availability and cost of foods, nutritional beliefs, significant others, colleagues in the workplace and body image (Du Plessis, 2012). However, Du Plessis' studies focused on only on apprentices in the construction industry and therefore their results may not be generalized.

Literature reviewed in this section, seemed to suggest that there are a multitude of factors which determine food choices and uptake. The studies which dealt with construction workers' nutrition also identified the factors which influence the nutrition of construction workers in particular. Some nutrition factors were indicated to be economic, social and environmental elements. Other factors were indicated to be physiological, cultural, and religious in nature. Summarizing the classifications and views expressed in the above-discussed studies, the food choice determinants are theorized to be nutritional knowledge, economic factors, environmental factors, social factors, psychological factors and physiological factors. Table 1 presents a summary of the factors and their indicators, as extant literature revealed.

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

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METHODS

Food choice factors questionnaire development

Based on the literature reviewed in the previous section, several factors which could possibly influence construction workers' food choices were identified. A 5-point likert-scale questionnaire was developed from the synthesis of the extant literature, with a scale from 1=strongly agree to 5= strongly agree. New instruments could be developed when available instruments do not measure some or all key aspects (Kimberlin and Winterstein, 2008). The questionnaire consisted of 42 questions divided into six constructs, inquiring about factors which determine food choice. The questionnaire was pilot-tested. Pilot-testing was done in order to identify problematic or complex questions in terms of the wording and structure of questions and the range of answers on the likert scale. Afterwards, some questions were reviewed and revised by experts before being self-administered to construction workers on construction sites.

Table 1: Food choice factors

Factor	Measures
Nutritional knowledge	knowledge of what an adult should eat in a day
	knowledge of the sources of nutrients
	knowledge of the sources of energy
	knowledge of health benefits (consequences of eating or not eating particular foods)
	knowledge of nutritional requirements for body size
	knowledge of nutritional requirements for age
	knowledge of nutritional requirements for existing health status
	knowledge of nutritional requirements for the type of work engaged in
	knowledge about nutritional requirements for gender
	cooking skills
Economic factors	wages/income
	availability of food
	cost/price of food
	marketing strategies/advertisements
	brand name
	discounts and subsidies
Environmental factors	location
	seasonality
	time constraints
	on-site eating facilities

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

	facilities for food preservation on site
Social factors	friends/colleagues' influence
	familial influence (family norms and traditions)
	social media and networking
	social class
Psychological factors	culture
	belief that killing animals for food is not good
	belief that avoiding meat keeps one healthier
	belief that avoiding meat save money
	belief about adequacy of diet
	fact that healthy eating increases productivity
	fact that healthy eating prevents accidents and injuries
	body image
	cynical attitude towards nutrition promotions
	mood
	eating habits
Physiological factors	hunger
	taste
	satiety
	quality
	appetite quality of food
	palatability/appearance

Data collection

Effort was made to include workers from different construction establishments involved in building, civil engineering and general construction projects in order to enhance generalizability of the results. Five building construction sites and three road construction sites were chosen heterogeneously in Johannesburg, Midrand, Samrand and Centurion. Participants at the site were chosen purposefully and conveniently. They included those who were actively engaged in construction activities, as opposed to managers and supervisors. Prior to administering the questionnaires, permission was obtained from the site manager/supervisor and/or the safety officer at each setting. A cover letter was included to enlighten the respondents and their supervisors on the purpose of the study. The cover letter also provided assurance of anonymity, confidentiality of responses and voluntary participation. The participants included construction site workers comprising electricians, brick-layers, tilers, painters, carpenters, steel-fixers, plumbers, pavers and unskilled workers. Out of a total of 220 questionnaires distributed, 183 were returned and used for empirical

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

analysis. Table 2 shows the response rates from the sites which were sampled. Table 3 shows the demographic details of the subjects.

Table 2: Response rates from selected sites

Description of setting		Distribut	Received
Building	Trading centre (new construction)	40	24
	Office property sites (new additions at	60	47
	New hospital site (7 two-storey hospital	75	67
	Students' residence (new construction)	16	16
	Residential property (renovation)	10	10
	Total	201	164
Road	One extension and two maintenance projects	19	19
Total		220	183

Table 3: Demographic characteristics of the study sample

Demographic characteristic	Response category	% frequency
Age (in years)	24 and below	26
	25–34	47
	35–44	21
	44 and above	6
Education	Primary school	32
	High school	39
	Training college	23
	Others	3
	No response	3
Specific job on site	Bricklayers	16
	Electricians	14
	Carpenters	10
	Steel-fixers	9
	Plumbers	10
	Unskilled workers	21
	Pavers	5
	Others (bobcartoperator, glass-fitter, manhole specialist, tiler, painters and cleaners)	15
Organization	Building construction	48
	Civil engineering	18
	General contractor	24
	No response	10

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

Validity and reliability evaluation

Validity

Some of the measures undertaken to ensure validity of the study results have been highlighted above. Pilot testing and expert/professional content reviews served to enhance face and test content validity (van Teijlingen and Hundley, 2001; Ro et al., 2015). Test content refers to the extent to which a scale's items, in the aggregate, constitute a representative sample of the topic's content domain (Ro et al., ibid.).

Good internal structure (construct validity) of constructs was achieved through the application of factor analytic techniques (specifically, principal components analysis) to determine whether a factor represents the construct which it is intended to measure and does not represent others that are theoretically different (Ro et al., 2015). Including workers from different locations in Gauteng served to enhance external validity (good generalizability) (Trochim, 2006).

Reliability

Internal consistency, which gives an estimate of the equivalence of sets of items from the same test and the reliability of measurement based on the assumption that items measuring the same construct should correlate, was assessed (Kimberlin and Winterstein, 2008). Cronbach's alpha coefficient α and mean inter-item correlations were applied to assess internal consistency reliability. Cronbach's alpha is a function of the average inter-correlations of items and the number of items in the scale. Cronbach's α coefficient is used when questions are rated on internal scales such as five-point likert scales and represents average correlations among items (Lin et al., 2008). Cronbach's α values should ideally be above 0.7 (Pallant, 2013). Because α values are sensitive to the number of items in the scale, the mean inter-item correlations could also be reported, ranging from 0.2 to 0.4 (Pallant, ibid.).

Data analysis

Raw data were subjected to Principal Components Analysis (PCA) using Statistical Package for Social Sciences (SPSS) version 22 software.

Data cleaning and screening

Preliminary descriptive analysis of data was conducted to check for normality. Outliers were identified and removed before analysis. Missing data were excluded using listwise deletion. The suitability of data for factor analysis was also assessed. The correlation matrix was inspected for evidence of coefficients greater than 0.3 (Pallant, 2013).

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity were applied to assess the factorability of the data set. A KMO index of 0.6 is the suggested minimum value for a good factor analysis. Bartlett's test of sphericity should be significant ($p < 0.05$) for the factor analysis to be considered appropriate (Pallant, 2013).
Principal components analysis

As mentioned earlier, PCA was done in order to test the structures and composition of the theorized food choice factors. The forty-two items were subjected to repeated PCA. Principal axis factoring and direct oblimin rotation were used. Two frameworks emerged from the PCA. One was adopted as the final framework. The results are presented in the next section. Outputs from the PCA (principal components) were thought to contribute to the variance in the data set. They were obtained using the Kaiser's criterion (retaining eigenvalues above 1) and scree test (retaining factors above "breaking point") (Pallant, 2013).

RESULTS

Preliminary results

Preliminary descriptive analysis of data revealed a normal distribution. Inspection of the correlation matrix revealed the presence of many coefficients with 0.3 and above. The Kaiser-Meyer-Olkin value was 0.743, exceeding the minimum recommended value of 0.6 for a good factor analysis and the Bartlett's Test of Sphericity reached statistical significance ($p = 0.000$), supporting the factorability of the correlation matrix (Pallant, 2013), indicating that correlations existed among the factors and correlation was not unit matrix (Lin et al., 2008).

Construct validity

In accordance with the principles described above, the 42 items were subjected to two rounds of PCA. In the first analysis, eleven components exceeded eigen values above 1 (10.679, 4.145, 2.879, 2.241, 1.883, 1.818, 1.592, 1.432, 1.377, 1.300 and 1.117), explaining 25.43%, 9.87%, 6.85%, 5.34%, 4.48%, 4.33%, 3.79%, 3.41%, 3.28%, 3.10% and 2.66%, respectively of the variance, and accounting for a total variance of 72.53%.
However, after the second run, seven common factors were extracted. Interpretation revealed that items loaded evenly on the seven factors (principal components) (table 4). The table also evinces that the seven factors accounted for 60.09% of the variance in the data set. These factors comprised food context, biological factors, knowledge, personal ideas and systems, economic factors, resources and cultural background. The names were assigned to the factors, with reference to literature, based on the items which loaded on the factors.

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

Table 4: Loading matrix and percentage variance of the seven principal components extracted

Constructs	Measures	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Food context	brand name	**.726**	.180	.065	.074	-.013	-.153	-.147
	food in season	**.694**	-.027	-.024	.084	.056	.024	.123
	time I have before work and during breaks	**.551**	.051	.017	-.067	.027	-.134	.373
	location of where the food is sold	**.540**	.046	-.065	.118	-.073	-.123	.064
	cooking skills	**.482**	-.029	.038	-.061	.078	.013	.369
	the way the food is advertised or marketed	**.469**	.178	.020	.133	-.010	-.158	.121
	what I am used to from home and family traditions	**.279**	.113	-.016	.129	.201	-.137	.106
Biological factors	the taste of the food	.156	**.765**	.283	-.093	-.030	.139	.110
	my appetite for particular foods	.186	**.623**	-.007	.020	-.081	-.086	.054
	how presentable the food is	-.002	**.612**	-.323	.067	-.043	-.243	.122
	the feeling of fullness I get from the food	.015	**.576**	-.046	.005	.346	.060	.012
	the quality of the food	-.096	**.564**	.009	.115	.031	-.142	-.061
	how hungry I am	-.016	**.507**	.108	.149	.307	.158	.057
Nutritional knowledge	what I know will give me energy	-.177	.046	**.786**	.085	.172	.149	.074
	what I know would give me different nutrients, eg., proteins, carbohydrates, vitamins and minerals	-.123	.105	**.721**	.069	-.094	-.163	-.091
	what I know can happen to my health if I eat or	.228	.206	**.427**	-.128	.178	-.270	-.099

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

	don't eat particular foods							
	what I know an adult should eat in a day	.180	-.138	**.404**	-.043	-.030	-.086	.122
Personal ideas and systems	my eating habits, eg. adding salt no matter what, having my food with beer or juice instead of water, eating something sweet after a meal, eating the same cereal everyday	-.058	.256	-.124	**.610**	.023	-.010	.038
	my idea that particular foods are advertised for the benefit of the sellers or advertisers	.142	-.206	.084	**.574**	.165	-.021	-.088
	my mood, eg. happy, sad, stressed, etc.	.196	.226	.018	**.538**	.110	.027	-.075
	the fact that healthy food will help me concentrate on my work and avoid accidents and injuries	-.331	.020	.064	**.521**	.104	-.182	-.092
	what my friends choose for us to eat	.104	.276	.011	**.483**	-.036	.075	.213
	the need to belong to a particular social group	.002	.114	-.068	**.471**	.013	-.112	.248
	social media and networking	.315	.277	.032	**.471**	-.102	-.034	.005
	my belief that avoiding meat will keep me healthier	.204	-.163	.080	**.448**	-.278	-.188	.313
	my belief that killing animals for food is not good	.328	-.047	.159	**.429**	-.106	.043	.268
	my belief that my current diet is adequate	.072	-.066	.258	**.358**	-.114	-.081	.093
Economic factors	the cost/price of the food	.049	-.168	.074	.118	**.845**	.051	-.127
	the foods available	.062	.074	-.014	-.249	**.729**	-.198	.100
	the wages I am paid/income I make	-.254	.069	.005	.079	**.636**	-.154	.233
	the foods on special offers or discounts	.333	.122	.006	.204	**.464**	.190	.011
Resources	the facilities on site for storing and heating up my	.466	.034	-.100	.106	.041	**-.633**	-.065

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

	food							
	the eating facilities provided on site, eg. benches, tables, washing bowls/sinks, etc.	.355	.033	.074	.120	.042	**-.616**	-.026
	what I know my body needs for my current health status	.174	.036	.237	-.080	-.071	**-.564**	.138
	what I know my body needs at my age	-.114	-.048	.151	.100	-.062	**-.558**	.300
	the fact that healthy food will help increase my productivity at work	-.188	.131	.055	.073	.232	**-.525**	-.112
	what I know my body size needs	.144	-.175	.212	-.059	.074	**-.413**	.263
	my idea that I will add or lose weight with particular foods	.047	.173	-.131	.298	.110	**-.318**	.020
Cultural distinctions	what I know I should eat as a man or woman	.202	.035	-.002	-.011	.014	.003	**.652**
	what I know my body needs for the type of work I do	-.222	.232	.109	-.059	.091	-.062	**.560**
	my belief that I should only eat food from my culture	.109	.027	.049	.396	.015	.022	**.515**
	my belief that avoiding meat will save money	.251	-.206	-.252	.367	-.097	-.138	**.427**
Eigen value		10.68	4.15	2.88	2.24	1.88	1.82	1.59
% variance explained by each factor		25.43	9.87	6.85	5.34	4.48	4.33	3.79
Cumulative %		25.43	35.30	42.15	47.49	51.97	56.30	60.09

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

Internal reliability

The reliability of the results was assessed using the Cronbach's alpha values and the mean inter-item correlations. The initial theoretical constructs had alpha values ranging from "0.71 to 0.84", indicating good internal consistency.[16]It is notable that one of the indicators of food context (what I am used to from home and family traditions) had a low item loading (0.279) and was therefore excluded from reliability testing.

Alpha coefficients of the eleven empirical constructs ranged from 0.54 to 0.84. However, these values improved with regard to the seven constructs. The alpha values for the seven emerging constructs ranged from 0.62 to 0.85, as shown in table 5. The mean inter-item correlation coefficients are also presented.

Table 5: Cronbach's alpha and mean inter-item coefficients of the seven-factor solution

	Factor	Alpha values	Mean inter-item correlations	Number of items
1	Food context	0.850	0.487	6
2	Biological factors	0.817	0.428	6
3	Nutritional knowledge	0.623	0.304	4
4	Personal ideas and systems	0.841	0.341	10
5	Economic factors	0.740	0.430	4
6	Resources	0.797	0.357	7
7	Cultural background	0.713	0.379	4

DISCUSSION

The loading of items on the seven factors extracted seemed to suggest that there was convergence amongst the measures, i.e., testing the seven constructs resulted in certain items converging together on each construct (component) (Brown, 2010). Where questions had a high loading on the same factor, it may suggest that respondents who gave a particular answer to one of the questions tended to give a similar answer to the other questions Foods Standards Agency (FSA), 2008). Similarly, the converging items did not load as heavily on any other factors. This means that there was also sufficient discrimination amongst items which are thought to be unrelated in reality. Thus, the pattern of item loadings provides support, in real data, for the validity of the seven constructs (Brown, 2010).

With regard to internal reliability, the recorded indices (Cronbach's alpha and mean inter-item correlations) suggest that the constructs meet the requirements for internal consistency

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

of constructs. “Family norms and traditions” was too minor to suggest practical importance and was therefore excluded during the internal consistency analysis. The constructs and their indicators are adequate for psychometric assessment of construction workers’ food choice factors.

Some of the constructs identified in the current study are similar to previous studies (Sobal and Bisogni, 2009; Rose et al., 2010; Eertmans et al., 2001; Grunert et al., 2010). Food context encompassed the physical surroundings, social climate and specific foods supply factors such as types, sources and availability of foods (Sobal and Bisogni, 2009). Likewise, decisions on food choices are ideally determined by personal ideas and systems comprising previously resolved deliberations and values which may stem from considerations of health status, managing relationships, society’s ideologies about food, family environments, media and personal experiences, and which become habitual over time(Eertmans et al., 2001).

Furthermore, nutritional knowledge indicators correspond with a study which reported that nutritional knowledge was essentially based on awareness of what a healthy diet means, sources of nutrients, nutritional requirements and consequences of consuming or avoiding certain foods (Grunert et al., 2010). However, this finding is slightly different from a more recent research which found that nutritional knowledge is indicated by three factors, namely: knowledge of diet-disease relationship, of nutrient content of foods and of dietary guidelines (McKinnon, 2012).

Summarily, the results demonstrated that items in the questionnaire seemingly have good and acceptable internal consistency and validity in measuring what they were intended to measure amongst the subjects.

CONCLUSION

Research on the factors influencing the food choices of construction workers has hardly been conducted in South Africa. More importantly, whether the factors examined for workers in general and world over, can be used to assess construction workers’ food choices is poorly documented. This study therefore sought to identify, develop and assess the validity and reliability of a scale for assessing construction workers’ food choice factors. The identification and separation of correlated and uncorrelated variables as necessary was possible through PCA.

Although, the study was conducted in only one province of South Africa, the results are generalizable to construction workers in other parts of South Africa and could be applicable in other geographical regions which may share similar views with the study population. In

[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

addition, due to time constraints, only eight construction sites were sampled. Future studies could sample more sites in order to improve generalizability of results.

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[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

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[1]chiomasokoro@gmail.com,
[2]imusonda@uj.ac.za and
[3]jagumba@uj.ac.za

THE INFLUENCE OF CORPORATE GOVERNANCE ON FIRM VALUE: EVIDENCE FROM QUOTED NIGERIAN PETROLEUM COMPANIES.

Abu, N. I.

Department Of Banking And Finance, University Of Lagos, Akoka, Yaba, Lagos

ABSTRACT

In this study, the author investigated the relationship between corporate governance and firm value of Nigeria quoted petroleum companies. This study used seven quoted petroleum companies in Nigeria that have consistently published their audited annual financial reports between 2008 to 2013 and to ensure adequate observation for statistical testing, researcher adopted a panel multiple regression analysis to identify how the possible firm's specific corporate governance attributes influence firms value in the selected Nigerian quoted petroleum companies. To this end, researcher conducted descriptive statistics, correlation matrix and panel regression analysis. In drawing the conclusion, researcher used the random effect panel regression based on the hausman test. Researcher observed that Directors shareholding had an insignificant and negative influence on the value of quoted petroleum companies in Nigeria. Board Size had a positive and significant influence on the value of petroleum listed companies in Nigeria. In the case of Board gender, researcher discovered that larger number of female in the board had a positive but insignificant impact on firm value of listed petroleum companies in Nigeria. Board Independence was also found to be positively impacting on firm value but its impact was statistically insignificant. We also observed that ownership concentration which is a strong issue in corporate governance had a negative but insignificant influence on firm value of petroleum quoted companies in Nigeria. In the case of our control variables, the Log of total assets which proxy's firm size had negative and significant impact on the firm value.

***Key Words**: Board Size, Firm Value, Corporate Governance, Board Gender and Ownership*

INTRODUCTION

The country assessment of 2008 on Nigeria's Corporate Governance Report on the Observance of Standards and Codes (ROSC) benchmarks, laws and practice against the Organization for Economic Cooperation and Development (OECD) principles of corporate governance focused primarily on the firms listed on the Nigeria Stock Exchange (NSE).The ROSC examined the set of rules and incentives by which management of firms are directed, controlled. Also the relationship among the board of directors, controlling shareholders, minority shareholders, and other stakeholders (Black, 2001).

iabuosa@gmail.com

International good corporate governance practice revolves around four key elements: strong and professional boards of directors, strong shareholder rights, together with high levels of transparency and disclosure, all supported by a strong legal and enforcement framework. As such good corporate governance can enhance investor trust, attract outside investment, and demonstrate a country's commitment to observe international standards. Ultimately, good corporate governance contributes to sustainable economic development through enhancing the performance of firms thereby increasing their access to outside capital (Black, 2001).

A sound corporate governance practice is particularly significant and important for the Nigerian petroleum industry considering that its operations are volatile and riskier than many other types of firms; the character of assets and liabilities are more opaque, leading to an asymmetry of information, less transparency and a greater ability to obscure existing and developing problems. In its full implementation, we believe good corporate governance should protect the interests of stakeholders, build and maintain public confidence, and ultimately contribute to the integrity and stability of the Nigerian petroleum industry. In several studies as by Black (2001), Gompers, Ishii and Metrick (2003), Wolfgang, Gugler and Hirschvogl (2004) and Bauer, Frijns, Otten and Tourani-Rad (2008), they had argued that the quality of governance components in the form of an efficient board of directors and appropriate ownership structure in a firm can increase firm value, as such, Black (2001) concluded that there are significant effects of the quality of governance components to firm value especially in countries with weak laws and weak governance behavior.

\ The foregoing underscores the vast investments potentials of the Nigerian petroleum industry, hence, investment decisions in the industry is likely to be influenced by firm value- which is the firms' economic performance, and financial accounting information reported in annual financial statements which contains various variables and measures that indicates performance, and these variables and measures serve as yardsticks for the assessment of firms in the Nigerian petroleum industry by various stakeholders (Lehmann et al, 2000). These indicators as observed by Brennan and Schwartz (1985), Breuer (1999) and Xie, Davidson and DaDalt (2003) relative to some pre-established benchmarks, rules, and mechanisms influence the integrity of the financial statements as the primary source of information that captures firm value and ensures protection for shareholders, investors and suppliers.

The integrity of the financial statements depend largely on the quality of the financial information it contains. As such a new code of best corporate governance practices was introduced in the United States of America (US) in 2002 by the Serbanese-Oxley Act and was also introduced in Nigeria in 2003. The code was introduced with a view to improving the monitoring of managers and protecting shareholders' investments.

Corporate governance in the form of index had been widely used by researchers. Grzybkowski and Wojcik (2006) in their study of governance components for information technology firms mentioned that the rating methodology used by the rating agency was far from transparent, as such Grzybkowski et al, (2006) then proposed a model for measuring the governance component implementation quality, called the Internet Based of Corporate Governance (IBCG) rating, which was fixed based on the OECD principles of corporate governance. The IBCG rating model which is an interaction between corporate governance with internet technology consisted of 120 criteria divided into five major components: board of directors, executive management, shareholders, transparency and technical accessibility.

LITERATURE REVIEW

Governance Components and Firm Value

Corporate governance is an important factor that affects firm value. The components play an important role in affecting firm value by decreasing the agency cost (Yammeesri, et al, 2010). The Organization for Economic Cooperation and Development (OECD) principles for corporate governance (1999) emphasized achieving social and economic sustainability by creating ample job opportunities in the economy, therefore firms can improve shareholders value and provide benefits to society by following the principles of corporate governance. Further, the disclosure of transparent financial information, the maintaining occupational health and safety, and developing the social and economic culture in an organization can also generate value for the shareholders.

Corporate governance components stress that the control of the board is affected by several factors such size, composition and the audit committee independence. The ownership structure component of firm governance includes institutional shareholding, ownership concentration, managerial shareholding and foreign ownership. Consequently, corporate governance encompasses the board of directors and an ownership structure (Makhija and Patton, 2004).

Board Size and Firm Value

The board of directors and its effectiveness as a governance component is one of the most widely studied topics in corporate governance literature, and this refers to the number of directors on the board. As a variable widely used in the literature of firm governance, its value is found by counting the number of directors on the board in a firm . Several research had focused on board characteristics such as size, composition, diversity, CEO duality and frequency of meetings and their relationship to firm value, with size and composition being the aspects most studied. Literature presents contradicting arguments on the relationship between board characteristics such as board size and composition and firm value (Adams, et al 2002, Davidson et al, 2004; and Lee, 2010).

On the other hand we agree with Coles, Daniel and Naveen (2008) who provided evidence that both very large and very small board sizes affect firm value. They believed that this happens due to business complexity. In support of Coles, Daniel and Naveen (2008), Raheja (2005) suggested that there is no optimal board size, since board size tends to depend on either advising or monitoring needs and this changes from firm to firm.

This is because of the consistent conflicting arguments supported by equally inconclusive empirical results that characterize the discussions regarding an effective board size. Board size as a widely used variable in the literature of corporate governance is found by counting the number of directors on the board of a firm.

Board Independence and Firm Value

The management of any firm requires a board with strategic vision, in addition to efficient monitoring. Prior studies as those by Kogan and Wallach (1966) and Moscovici and Zavalloni (1969) on group decision making showed that it is generally harder for larger groups to reach an agreement, therefore final decisions of larger groups usually include more compromises which tend to be less extreme in smaller groups

Literature on board composition and its relationship to firm value is mostly focused on board independence as measured by the proportion of non-executive directors on the board. On board composition, the Sarbanes-Oxley Act (2002) following agency theory principles proposed and set a requirement of a larger percentage of non-executive directors, because it was believed that a larger proportion of non-executive directors lead to greater board independence and better monitoring.

To this end, Hermalin et al (2003) found no significant relationship between non-executive directors and firm value as measured by Tobin's Q, given that the monitoring and advisory functions of the board differ with firm characteristics and across industries. Thus, larger, growing and older firms devote more effort to stakeholder interest and less to monitoring managers (Adams, 2003). On the other hand, similar firms in the same industry have similar board structures, giving rise to similar governance practices among firms with similar characteristics (Macey & O'Hara, 2003).

To close the gap between board composition and firm value, an examination of the board effectiveness is necessary. Kaplan (1994) showed that German boards are effective in replacing management board members when performance is poor. Although governance literature offers no conclusive results concerning the effect of appointing independent directors (Hermalin and Weisbach, 1991; John and Senbet, 1998), a positive relation is expected with the presence of non-executive directors.

However in a survey of the study carried out on board composition and performance by Coles, et al, (2008), it was confirmed that this problem had no stringent impact on firm value. This builds on Raheja (2005) who argued that the optimal board structure is determined by the trade-off between maximizing the incentive for insiders to reveal their private information, minimizing coordination costs among outsiders and maximizing the ability of outsiders to reject inferior projects.

Composition of the board of directors is measured by using the proportion of non-executive directors, which is defined as the number of non-executive directors out of the total number of directors. Non-executive directors are often nominated for their beneficial impact on firm value, since their independence should minimize the inherent conflicts of interest between managers and shareholders (Linck et al, 2005).

Board Gender and Firm Value

Diversity on the board is clearly well encouraged in corporate governance literature. Such diversity as is often advocated include: combination of executive, independent and non-executive directors, diversity of experience and expertise and skill (Rhodes and Peckel, 2010). Other areas of diversity often ignored include: Social diversity, racial diversity and gender diversity.

Board gender diversity is becoming a strategic issue as some institutional investors are beginning to see gender diversity as a crucial criterion of the investment policy (Carter, Simikins & Simpson, 2003). Some research studies have shown that boards gender diversity falls within the scope of the so called "business case" of diversity that was introduced by Cos & Blake (1991) and Robinson & Dechant (1997). It is argued that board gender diversity will benefit the firm in financial terms which should be regarded in the context of shareholder value (Dang, et al, 2012). Women ordinarily are more careful and this may be brought to bear on risk taking and this is likely to lead to better protection of the firm's investments and assets. They are also sometimes more painstaking and this may lead to better investment decisions.

The findings of prior empirical studies strongly support more women on the board of directors. Oba (2013) found that female directors' presence had a positive statistical significance on financial performance using return on capital employed (ROCE) as a proxy for financial performance.

This is supported by the results of the findings by Man and Kong (2011) and Burke (2000) which suggest that the presence of women directors and firms' performance are correlated positively. Also, Dang, Ngurjen &Vo (2012) found that firms with at least three (3) women on corporate boards have a better performance, as measured by Tobin's Q and returns on assets (ROA), and they are significantly large in terms of sales.

What this many mean is that the mere presence of females on corporate boards does not add to performance but how the females on the boards are able to use their different skills, experience and expertise to bring about positive improvement in the performance of such boards.

Directors Shareholding and Firm Value

There has been much studies which indicated that managerial ownership affects firm value, because equity holding by management could motivate managers to make financial decisions for their own benefit or shareholders' interest thereby leading to increase or decrease in firm value (Morck et al, 2005). Thus, the effectiveness of incentives is potentially a function of the level of managerial ownership in the firm (Davies et al, 2005).

We agree with Jensen and Meckling (1976) and Demsetz and Lehn (1983) who argued that managerial equity ownership will provide managers incentives to maximize firm value. Using U.S. data, Morck, Shleifer, and Vishny (1988) empirically showed a non-linear relation between firm value and managerial ownership where firm value increases up to a certain level of managerial ownership of about 5% and then decreases as management holdings further rise. Similar results were also found in McConnell and Servaes (1990) and Hermalin and Weisbach (1991), but no evidence was found of a non-linear relation between firm value and managerial ownership from their study of Japan. However they found that firm value was positively related to managerial ownership in Japan which is consistent with the prediction by Jensen and Mecking (1976).

In an empirical research in contrast to that from studies using U.S. data, Kroszner and Philip (2001) attributed the less pronounced entrenchment effect to the large inter-firm shareholdings and firm ownership structure in Japan. They also found that at low to moderate levels of firm equity ownership, Tobin's Qfalls as firm equity ownership rises, and at higher levels of firm ownership this relation is reversed at some specifications. Cho (1998) found that managerial ownership impacts upon firm value because shareholding motivates management to make investment decisions on their own or for the shareholders' benefit, which consequently affects firm value.

In support of the study by Holderness and Sheehan (1988), they posited that where a large-block shareholder is an outsider, driven by the incentives from external supervision, this shareholder will endeavor to monitor managerial performance; that such external supervision can result in an improvement of firm value, and however according to Demsetz and Lehn (1985), substantial shareholding is not significantly correlated with firm value. Since Shleifer et al, (1999) proposed the concept of cash flow rights and control rights, issues associated with ultimate control, pyramid structures, and cross-shareholdings have been much emphasized. Besides, according to the convergence of interest's hypothesis, if the managerial

shareholding is high, the interest of the management will be more consistent with that of external shareholders. (Mehran, 1995) Therefore, if the controlling shareholders have higher cash flow rights, there will be stronger incentives for them to accept supervision (La Porta et al, 2002).

However, literature previously cited largely focused on the relationship between managerial shareholding, financial policies and firm value in developed economies, but debate on whether such a relationship has universal relevance in firms within emerging markets is not yet resolved (Lins et al, 2005). All of these studies found that there is a nonlinear relationship between managerial ownership and firm value in a large number of firms in emerging economies, thus revealing that management and insiders have the ability to engage in expropriation of shareholders' benefits.

Ownership Concentration and Firm Value

This refers to the proportion of a firm's shares owned by a given number of the largest shareholders. The link between firm value and ownership structure is often viewed as going through the interaction and power distribution between the owners and managers of firms. In this context, the issue that has received major attention without resulting in a consensus, is whether concentrated or dispersed ownership is more conducive to good governance.

A high concentration of shares tends to create more pressure on managers to behave in ways that are value-maximizing, and in support of this argument, Morck et al, (1997) suggested that at low levels of ownership concentration is associated with an increase in firm value, but that beyond a certain level of concentration the relationship might be negative. Majority ownership provide the owner the rights to staff management and alter supervisory boards, or transfer firms' assets and adopt strategic decisions at general shareholders' meeting. Through management and supervisory boards, majority ownership also allows more direct executive control over the firm.

Blocking minority ownership gives the right to block a number of decisions, such as those related to increasing or reducing assets and implementing major changes in business activities which the majority shareholder may strive to implement at the general shareholders' meeting. Similarly, legal minority ownership is potentially important since the law entitles the holder of such a stake; at the general shareholders' meeting where such holder can obstruct its decisions at the general shareholders meeting by delaying implementation through lengthy court proceedings. Thus, effective legal minority shareholders may use their ownership position to delay or completely block the implementation of decisions by the majority shareholder(s).

Following the above another form of ownership structures that have gain attention in literature is Institutional Shareholding; Ownership structure also involves a number of factors

such as director's shareholding, managerial shareholding, substantial shareholding, and institutional shareholding. Several studies had pointed out that insider shareholding and firm value exhibit a non-linear relationship. McConnell and Servaes (1990) discovered that insider shareholding and firm value have a parabolic relationship, and similar to Morck, Shleifer and Vishny (1988), Hermalin and Weisbach (1991) also presented the same findings. But Demsetz and Len (1985) argued that ownership structure is an endogenous outcome of a competitive selection in which various cost advantages and disadvantages are balanced to arrive at an equilibrium organization of the firm, as such a firm's ownership structure is not correlated with firm value.

The agency problem occurs when there is a conflict between cash flow rights and control rights. Previous studies had indicated that the degree of control right deviation can be used to measure the quality of corporate governance components (La Porta et al., 2000). The larger the deviation, the more controlling shareholders will be motivated to erode the assets of the firm as well as the interests of external investors.

However, Vafeas (1999) using Tobin's Q as a proxy for firm value while studying the relationship between foreign ownership and firm value found that domestic financial institutions are poor monitors, while foreign institutional investors serve valuable monitoring functions. In that same study, Tobin's Q was positively correlated with the presence of foreign institutional ownership and negatively correlated with the presence of domestic institutional ownership. They further pointed out that when domestic financial institutions are less transparent, they are more likely to engage in questionable practices which may be detrimental to the minority shareholders. In support of the views expressed in these empirical findings which are consistent with the theoretical framework of Coles, et al, (2008) that explained that an increase in the fraction of foreign ownership possibly indicates a general decline in equity ownership.

Foreign institutional investors can be considered as major outside investors up to a certain level of ownership. This view is consistent with the theoretical prediction by Shleifer and Vishny (1986) where they argued that large shareholders are expected to effectively monitor management using enough voting control to reduce the agency problems. On the other hand, at high levels of foreign ownership, we may consider a foreign management's entrenchment hypothesis which is an extension of the work of Chhaochharia and Grinstein (2007).
At very concentrated foreign ownership levels, it is assumed that both ownership and managerial control are closely associated. It may therefore be possible to predict that significantly increased foreign ownership may allow foreign owner-managers to become entrenched and pursue non-value maximizing managerial behaviors.

Methodology

In this study the Ordinary Least Square (OLS) multiple regression model as a tool for data analysis was used to reveal the relationship between corporate governance components, control variables and firm value. The regression specified the relationship among the dependent variable, independent variables and control variables. This method is very relevant and has dominated empirical research especially where the dependent variable is continuous.

Model Specification

The study examined the relationship between corporate governance components and firm value. The general multi-factor valuation model is:

$$VOF = f(CGC, \varepsilon) \quad \ldots\ldots(1)$$

Where: VOF = value of a firm

CGC = corporate governance components

ε = error term.

The model shows that the dependent variable firm value (regress and) can be affected by the independent variables (regressors) which are the corporate governance variables.

Two (2) control variables, return on assets and return on equity are included to control for exogenous factors in view of their direct relationship with firm value. Thus;

$$VOF = f(CGC, COV, \varepsilon) \quad \ldots\ldots(2)$$

Where VOF, (firm value) will be measured by Tobin's Q, CGC (corporate governance components) stands for board size, board composition, audit committee independence, institutional shareholding, ownership concentration, managerial ownership and foreign ownership, while COV (control variables) represents return on assets and return on equity.

The functional relationship suggests that firm value can be affected by corporate governance components and the control variables. It specifies that the firm value (Tobin's Q) depends on the corporate governance components and the control variables for the sampled firms. The functional relationship between the variables is given in the following regression equation as:

$$Yi_t = a+\beta_1 X_{it} + \beta_2 X_{it} + \beta_3 X_{it} + \beta_4 X_{it} + \beta_5 X_{it} + \beta_6 X_{it} + \beta_7 X_{it} + \beta_8 X_{it} + \beta_9 X_{it} + \varepsilon_{it} \quad \ldots\ldots(3)$$

iabuosa@gmail.com

By incorporating the dependent and independent variables into the equation, the model of the study is as follows:

$$\text{Tobin's } Q = a + \beta_1 BSZ_{it} + \beta_2 FBD_{it} + \beta_3 BOIND_{it} + \beta_5 OWC_{it} + \beta_6 DIRHOD_{it} + \beta_9 SIZE_{it} + \varepsilon_{it} \quad \ldots\ldots(4)$$

Where: Tobin's Q = Value of firm i at time t

BSZ = Board size of firm i at time t

FBD = Female in the board of directors of firm i at time t

BOIND = Board independence of firm i at time t

OWC = Ownership concentration of firm i at time t

DIRHOD = Directors shareholding of firm i at time t

SIZE = Log of total asset of firm i at time

a, β = Parameters to be estimated

ε = error term

The sign of β_1 is negative as literature suggests a negative relationship between firm value and a bigger board. β_2 being the coefficient of board composition has a negative relationship with firm value. β_3, β_4, β_5, β_6, and β_7 are positive as audit committee independence, institutional shareholders, ownership concentration, managerial shareholding and foreign ownership did not harm firm value. Similarly, β_8; and β_9 are positive as return on assets and return on equity has a positive relationship with firm value for the sampled firms.

Data presentation and analysis

Tobin Q_1 – Corporate Governance Model

While Tobin Q is the major dependent variable for this study, we also attempted to see if these same corporate governances and our control variables can be useful in understanding the behavior of Tobin Q_1 of our sampled companies. The firm's value (Tobin Q_1) panel data regression results obtained is presented in Table 1.

Table 1: TobinQ1panel regression results

	Expected Sign	TobinQ (Fixed Effect)	TobinQ (Random Effect)

C		**4403.561**	**1591.933**
		(2.792002)	(1.874869)
		[0.0092]	[0.0692]***
DIRHOD	+	**-261.7084**	**-86.98237**
		(-1.098883)	(-0.509461)
		[0.2809]	[0.6136]
BSZ	+	**-7.656474**	**31.52426**
		(-0.353523)	(2.00202)
		[0.7263]	[0.0531]***
FBD	+	**65.84795**	**31.20917**
		(1.101487)	(0.559961)
		[0.2797]	[0.5791]
BOIND	+	**-10.33796**	**123.966**
		(-0.049643)	(0.855946)
		[0.9607]	[0.3978]
OWNC	+	**-55.13926**	**-154.0045**
		(-0.239548)	(-0.939473)
		[0.8124]	[0.3539]
Log SIZE	+	**-556.1017**	**-238.8427**
		(-2.850213)	(-2.081569)
	+	[0.008]*	[0.0448] **
R-Squared		0.419	0.179
Adj-R-Squared		0.179	0.0388
F-Statistic		1.74(0.107)	1.27(0.29)
Hausman Test (Chi-Sq)		-	12.004 (0.062)***
N(n)Unbalanced Observations		42(7)	42(7)

Source: Author (2015)

Note: (1) Parentheses ( ) are t-statistic while bracket [ ] are p-values

(2) * 1%, ** 5%, ***10% level of significance

In Table 4.4, we presented the two panel data estimation techniques results (fixed effect and random effect) for Tobin Q_1. A cursory look at the F-statistics, R-squared and adjusted R-squared values for both the fixed and random effect model clearly shows that corporate governance and our control variables provide a similar results with the Tobin Q model, we therefore based our results interpretation on the Tobin Q panel regression..

In Table 4.3, we presented the two panel data estimation techniques results (fixed effect and random effect). The results revealed difference in their coefficient magnitudes, signs and the number of insignificant variables. In estimating the fixed effect panel regression method we follow the assumption of no correlation between the error term and explanatory variables in the panel model while in the case of random effect we assume that the error term and explanatory variables are correlated. In selecting from the two panel regression estimation techniques, the Hausman test was conducted and the test is based on the null hypotheses that the random effect model is preferred to fixed effect model. A look at the p-value of the Hausaman test (0.04) shows that we should reject the null hypotheses and accept the alternative hypotheses at 5% level of significance. This means that we should adopt the fixed effect panel regression results in drawing our recommendation. This also implies that the fixed effect results would be more appealing statistically when compared to the random effect.

Following the above, we will therefore discuss the fixed effect results from Table 4.3. In Table 4.3, we observed that from the fixed effect results. The R-squared and adjusted R-squared values were (0.4388) and (0.206). This indicates that all the independent variables and cross-sectional dummy of each company jointly explain about 20% of the systematic variations in Tobin Q of our sampled companies over the six-year period (2008-2013). This means that any model that includes cross-sectional dummy variables to our selected corporate governance and control variables would be able to explain about 20% of what happens to Tobin Q. The above average R-squared value is realistic as it clearly shows modeling the heterogeneity effect of each company can help in better understanding the behaviour of earnings per share (EPS). The F-statistics (1.88) and its p-value (0.079) show that the EPS panel fixed regression model is generally significant and well specified. The F-Statistic also shows that the overall Tobin Q panel fixed regression model is significant at 5% levels.
In addition to the above, the specific finding from each explanatory variable from the fixed effect panel regression models are provided as followings:
Directors shareholding (DIRHOD), based on the coefficient of -794.22 and p-value of 0.24 was found to have a negatively impact on Tobin Q and this was not statistically significant at 5% and 10% levels. This result, therefore, suggests that we should accept hypothesis four (H_4), which suggests Managerial shareholding has no significant impact on firm value of listed petroleum firms in Nigeria. This negate the findings of Morck, Shleifer and Vishny (1988) Using piecewise linear regressions to estimate the relationship between Tobin's Q and the shareholdings of the board of directors for 371 Fortune 500 firms in 1980 found a positive relation between ownership and Tobin's Q in the 0% to 5% board ownership range which was dominated by the convergence of interest effect of management; while there was a negative and less pronounced relation in the 5% to 25% range in which the entrenchment effect overpasses the convergence of interest The justification for our findings is based on the argument that in emerging market like Nigeria, directors' holdings has a nonlinear

relationship with firm's value.. Our argument can be related to the findings of Lins (2003), Wei, Xie and Zhang, (2005) previously cited largely focused on the relationship between managerial shareholding, financial policies and firm value in developed economies, but debate on whether such a relationship has universal relevance in firms within emerging markets is not yet resolved. All of these studies found that there is a nonlinear relationship between managerial ownership and firm value in a large number of firms in emerging economies, thus revealing that management and insiders have the ability to engage in expropriation of shareholders' benefits.

Board Size (BSZ), based on the coefficient -21.091 and p-value of 0.73**,** appears to have a negative influence on our sampled quoted companies' Tobin Q performance and was statistically insignificant at 10% since its p-value was greater than 0.10. This result, therefore, suggests that we should accept hypothesis one (H_1), which stated that Board size has no significant impact on firm value of listed petroleum firms in Nigeria. This support the finding of Wintoki (2007) and Coles, Daniel and Naveen (2008) contented that size is not related to firm value by arguing that size is dependent on each individual firm's need of advising or monitoring, size, and age. While the argument of positive relationship was based on premise that the larger the board sizes the better the chances that more quality ideas and better decisions would be made for the benefit of the shareholders. In Nigeria case, we argued from our findings that large board are not significantly useful for better value performance rather they lead to higher directors cost and decrease earnings performance. This means that large board increase cost rather than improving cost efficiency in most Nigeria companies.

Number of female on the boards (NUWOMEN), based on coefficient of 188.67 and p-value of 0.269 also appeared to have had a positive and insignificant influence on our sampled quoted companies' Firm's value (Tobin Q). This result, therefore, suggests that we should accept hypothesis three (H_3), which suggests that female directors on the boards have no significant influence on firm value performance. This means that the inclusion of women on a company board although had a positive influence but was insignificant in improving value for shareholders. This finding does not conform to the works of Nguyen & Vo (2012), Man & Kong (2011) and Burke (2000) which suggest that the presence of women directors and firm financial performance are significantly and positively related, but supports the findings of Shukeril, Shinl & Shararil (2012) which conclude that there is no significant relationship between board gender diversity and firm value performance. The possible explanation for this is that the mere presence of females on the board does not guarantee higher firm performance without reference to the quality of skills, education, experience and contributions of the females on the board.

Board Independence (BIND), based on the coefficient of -27.191 and p-value of 0.96 was found to have a negatively impact on firm's value (Tobin Q) and this was not statistically

significant at 5% and 10% levels. This result, therefore, suggests that we should Accept hypothesis five (H_5), which suggests that board independence is not significantly related to firm value in Nigeria petroleum industry. This negate the findings of Rosenstein and Wyatt (1990) and Byrd and Hickman (1992) that firms with high proportion of outside directors will perform better. It also rejects the findings that better performed firms are dominated by outsiders' boards of directors (Pfeffer & Salancik 1978; Vafeas, 1999). The justification for our findings is based on the argument that in Nigeria, directors' compensation is very high and sometimes not properly fix by the remuneration committee. Therefore, more outside directors means more cost and earnings drop drastically. Our argument can be related to the findings of Weisbach (1988); Daily and Dalton (1992); Daily and Ellstrand (1996); Klein (1998); Weir and Laing (2001) and Bhagat and Bolton (2005) who said that no positive significant relationship exists in terms of accounting profits performance and board independence.

Ownership Concentration (OWNC), based on the coefficient of -154.767 and p-value of 0.8119 was found to have a negatively impact on firm's value (Tobin Q) and this was not statistically significant at 5% and 10% levels. This result, therefore, suggests that we should accept hypothesis two (H_2), which suggests Ownership Concentration has no significant impact on firm value of listed petroleum firms in Nigeria. This negate the findings of Shleifer and Vishny (1997) which focused on the agency problem arising from the separation of ownership and control, they argued for the desirability of concentrated ownership because it results in better monitoring of managers, maximization of shareholder value while providing external finance for firms. A high concentration of shares tends to create more pressure on managers to behave in ways that are value-maximizing, and in support of this argument, Morck, Shleifer and Vishny (1988), Gorton and Schmid (1996) and Shleifer and Vishny (1997) suggested that at low levels of ownership concentration is associated with an increase in firm value, but that beyond a certain level of concentration the relationship might be negative.

Firm Size (LOGSIZE=0.0068) which was measured using the log of total asset had a negative but significant impact on firm's value (Tobin Q). This means that large quoted companies in Nigeria do not necessarily generate high value than smaller companies in our sample. This clearly shows that size though a significant factor but is not the only strategy for competitive advantage in delivering better firm's value (Tobin Q) results to shareholders in Nigeria. Our finding on firm size, is consistent with the findings of Hudaib & Haniffa (2006), Alzharani, Ahmad & Aljaaidi (2011) and Choi, Han & Lee (2012) but negate the findings of Aljifri & Moustafa (2007) that there is no positive relationship between firm size and firm performance. But though there are gains from increased size of firms, those gains can be lost if the firm is not creative and responsive enough to stay competitive and sustain such results.

Conclusion and Recommendation

This academic project has examined the relationship between some measures of corporate governance and firm value using evidence from seven sampled petroleum listed companies in Nigeria over the period of 2008 to 2013. The measures of corporate governance used in the study are: board independence, board size, number of women on the boards of directors, director's shareholding and ownership concentration. Firm size was used as a control variable. The study used two measures of firm values Tobin q and Tobinq1; while most other past studies have the ratios of market capitalization to book value of equity (Tobinq1) in this study will also use (Tobin q) book value of total assets less book value of equity, and market value of equity divided by total assets as suggested by Doidge, Karolyi and Stulz (2001). From the study we can concluded and inferred that large board have the tendency to increase firm value significantly among the sampled petroleum listed companies in Nigeria while board independence, board gender, directors shareholding and ownership concentration had insignificant influence on firm value, we also observed that large petroleum listed companies in Nigeria are more likely to witness loss in firm value than small ones. Finally we conclude that predicting firm value of petroleum companies in Nigeria with corporate governance variables may not yield any reliable statistical conclusion due to the fact that corporate governance is only a small subset of the problems most petroleum companies faces in Nigeria. We therefore recommend an optimal board size of eight (8) based on our descriptive statistics results to petroleum listed companies in Nigeria. This support the argument that spending on large board is a major decreasing factor to earnings and firm value. We also therefore recommend that to revert the insignificant positive influence of board gender on firm value, that SEC and NSE should develop codes of best practices that foster board gender diversity, but this should be done in such a way that there is guaranteed meaningful gender diversity on the boards so that females are not elected to the boards just as symbols on the boards or as tokenism and legitimacy since the presence of female directors on corporate boards does not, in itself, affect performance; females should be on the board only if they are qualified **a**nd have something to offer.

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DIMENSIONAL APPROACHES TO THE CHALLENGES OF VOCATIONAL TECHNICAL EDUCATION IN NIGERIA.

Onwenonye, C.

ABSTRACT

The paper is advocating for dimensional approaches to the challenges of vocational technical education programme in Nigeria. It ex-ray the definition of vocational technical education, the philosophy and the national policy on vocational technical education, societal attitudes towards vocational technical education, challenges and prospects of vocational technical education and found that the programme is not meeting the needs of the society. It identified the problems to have emanated from the government, society, parents, teachers and learners. It summarized and suggested that there should be a positive change in attitude, purposeful investment and full commitment to the various aspects of the programme and the use of a new approach of triangulation method that will involve the industries, trainers/educators and trainees in its planning to move the country to the next level of technological advancement.

Key Words: challenges, triangulation, societal attitude, vocational technical education, technology, multifarious, suicidal and change.

Introduction

Despite the problems facing vocational technical education in Nigeria, its prospects are overwhelming that it would be suicidal to relegate it to the background. The problems are multifarious and complex in nature. It ranges from the government, society, parents, teachers and individual learners. A number of researches and articles has been carried out and published all geared toward improvement of vocational technical education in the country, yet the problems keep lingering. This paper is therefore meant to re-direct the attention of all stake holders on how to get these problems solved and enjoy the full benefits of this aspect of educational programme as a nation and as individuals because the nature of the programme is such that it benefit not only the recipients but also the community in which they live and render their expertise skilled services which they have acquired through training. This paper will therefore be looking at the definition of vocational technical education; the philosophy and national policy on vocational technical education, societal attitudes on vocational technical education, challenges and prospects of vocational technical education.

Definition

The term vocational technical education has no single definition but has key elements that could be used to assess any definition to be acceptable or not. These key elements can be summarized as skill acquisition and transfer through teaching and learning process; and willingness and ability to cope with required training and progression in the chosen field of

specialization. Any definition that contradicts the above elements or that fail to incorporate it should not be taken as an accepted definition of vocational technical education. The definition of the term by different scholars and educators is a direct function of their level of understanding of the field of vocational technical education and should be pardoned for their unacceptable definition or understatement because no man can operate above his level of understanding nor can give what he does not have. This aspect of definition is very crucial and can't be over emphasized. This is because of the devastating effects of the myopic views of some scholars and educators who are not specialist in the field have done to the field today.

The definitions of the concept by some authors are stated below. According to Okolocha (2012), vocational technical education can be defined as an educational training which encompasses knowledge, skills, competencies, structural activities, abilities, capabilities and all other structural experiences acquired through formal, on-the-job or of-the job training which is capable of enhancing recipients opportunity for securing jobs in various sector of the economy or even enabling the person to be self-dependent by being a job creator. Odu (2011) defined vocational technical education as any kind of education which has the main purpose of preparing one for employment in recognized occupation. Ethel (2014) described vocational and technical education as an aspect of education that is geared towards the training of students for skilled performance, training and retraining of individuals, acquisition of skills, and competences. The Federal Republic of Nigeria in Osam (2013) described it as that aspect of education that leads to the acquisition of practical skills as well as applied scientific knowledge. Dantawaye (2012) saw it as a process of training/equipping learners with occupational and manipulative skills for employment in recognized occupations. Onwenonye (2013) defines it as the aspect of education that gives the recipients an opportunity to acquire practical skills as well as some basic knowledge which fits the individual for gainful employment in recognized occupation as semi-skilled worker, technician or sub-professional.

The Philosophy and National Policy on Vocational Technical Education in Nigeria

Philosophy has to do with the understanding of values, concepts, fundamental beliefs and purpose. Federal Republic of Nigeria (FRN, 2004) in her National Policy on Education (2004) states the philosophy and values of education in Nigeria to include the following:

1. Integration of the individual into a sound and effective citizen.
2. Respect for the worth of the individual.
3. Faith in man's ability to make rational decision.
4. Moral and spiritual values in interpersonal and human relations.
5. Shared responsibility for the common good of the society and;
6. Social cultural, economic, scientific and technical progress.

Homby (2000) defines philosophy as a particular set or system of beliefs resulting from the search for knowledge about life and the universe.

The philosophy of vocational technical education according to Okorie (2004), are:

1. The occupational choice of individuals should be based on the orientation of the individual such as interest, aptitude, ability e.t.c
2. All honorable and honest occupations are worthy of considerations in making the decision about life's work.
3. Each individual should have the opportunity to select an occupation in harmony with his orientation and the opportunities for employment in that occupation.
4. The worth of an individual to society grows out of his contribution of skills, knowledge and applied productive capacity to tasks that need to be completed, rather than out of artificial status connotation to some glamorous jobs.
5. Resources for education must be provided to develop all human resources: otherwise, some individuals may possibly menace other individuals.
6. Allocation of resources must reflect the needs of people. Priorities must be adjusted to provide resources in direct proportion to the cost the investments required.

Another philosophy of vocational technical education is stated by Prosser (1949) in Odu (2007). The items in the philosophy are:

1. For vocational technical education and training to be effective, the training should be fashioned in the same way, same operations using the same tools and machines in respect of the occupation being prepared.
2. Vocational technical education is effective to the extent that the individual is trained directly and specifically in the thinking and manipulative habits required in the desired occupation.
3. The environment in which the trainee is prepared should resemble the environment he must eventually get employed in.
4. For every occupation, there is a minimum level of preparation needed in order to enable the trainees obtained and retain employment in that occupation and if the preparation is not attained up to that level, the occupation will neither benefit the trainee nor the society.

The philosophy of technical and vocational education in Nigeria hangs mainly on the above stated philosophy of education. This implies that any programme that will qualify as "education'' in Nigeria should not just offer ''certificates'' but must be work – oriented. This will go a long way in solving under-employment/ un-employment and the attendant problems. It will also empower the graduates to become relevant producers of goods and services as well as become sensible consumers of same. The philosophy of vocational

technical education is basically to enhance human dignity and enthrone work and labour by making individuals acquire and /or develop enough saleable and employable skills, competencies, attitudes as well as knowledge to enable them gain and maintain basic employment or self- reliance for a comfortable living. The Nigerian dream of building a truly egalitarian society can only be achieved through the effective use of vocational technical education. It offers life-long education to all types of learner and enables them realize and develop their self-potentials maximally. Special and adult educations also rely heavily on vocational education. The five main national objectives of Nigeria, which it expects to achieve through the instrument of education, are the building of:

i. A free and democratic society.
ii. A just and egalitarian society
iii. A united, strong and self-reliant nation
iv. A great and dynamic economy
v. A land of bright and full opportunities for all citizens.

One of the major philosophies of education in Nigeria is based on the integration of the individual into a sound and effective citizen. This and most of the national educational arms, objectives and values can only be achieved through a functional education for "life'' and for "living'' –vocational education.

According to the Federal Republic of Nigeria (2004) in her National Policy on Education, some of the national educational aims and objectives to which the philosophy is linked are:

1. The inculcation of the right type of values and attitudes for the survival of the individual and the Nigeria society.
2. The acquisition of appropriate skills, abilities and competencies both mental and physical as equipment for the individual to live in and contribute to the development of the society.

However, the philosophical concepts of vocational technical education among others should include:

i. Vocational education (or programmes) should be developmental and terminal. It should provide maximum options for learners to advance or branch out into gainful employment.
ii. Vocational technical education is needed to make liberal or general education concrete and understandable while general education should point out the vocational implication of all educational experiences.
iii. There is need for pre-vocational orientation of pupils in the word of work.
iv. The development of attitudes, basic education skills and habits appropriate for work is imperative just like training in skill competence.

v. Vocational technical education should satisfy the demands of the society that is technology-oriented and the needs of man for liberalizing experience in his educational growth and similar undertakings.

Theoretically, the Nigerian philosophy and policy on vocational technical education is good and wonderful when viewed from the outside. And one will be tempted to say that the country should be heaven on earth in terms of vocational technical education, while in reality the country is technologically sick and is in hell on earth. Nigerians according to Okolocha (2012), formulates viable policies but the implementation of such policies has been the major bane to vocational technical education development. It is worthy of note and painful to say that vocational technical education programme in Nigeria is as good as the National Policy on Education and the Nigerian Constitution. Nigerian constitution is marvelous, wonderful and excellent but the real life situation in the country is at variance in many ways and aspects of public life. It is better experienced than explain and something has to be done in the right direction before it crash land technologically. Hence the need to look into the societal attitudes towards vocational technical education not just for academic exercise but to see what could be done as individual members of the society, parents, vocational technical educators, vocational technical trainees, government agents, policy makers and implementers to change their negative attitude and move the country technologically forward.

Societal Attitudes

Since vocational technical education will not operate in isolation, it has become necessary to consider the attitude of the society in which it operates and meant to serve. In Sub-Saharan Africa, formal vocational technical education programmes are school based. In some countries, training models follow those of their Colonia masters. Students enter the vocational education track at the end of primary school, corresponding to 6-8 years of education as in countries like Burkina Faso and Kenya, or at the end of lower or junior secondary schools which corresponds to 9-12 years of what is called basic education in countries like Ghana, Nigeria, Mali and Swaziland. The vocational education track has the unenviable reputation of being a dead end so far as academic progression is concerned and fit for those pupils who are unable to continue to higher education (African Union, 2007).

According to Onwueme and Ugbor (1994), middle – class children are enrolled in academic programmes that lead to good occupations, while lower-class children are stirred into vocational programmes that lead to menial low paying jobs. This misconception may not be far from that of some other members of the society who may not have been well informed and may be responsible for the poor enrollment of students into the vocational and technical education programmes when compared to other programmes in the various institutions of higher learning: Polytechnics, Colleges of Education and Universities (Onwenonye, et al,

2014). The misconception that vocational and technical education is for the never to do well or for the low class children as conceived by some members of the society was refuted by Olaitan et al (1999), which states that vocational and technical education is not for the lazy and unintelligent persons, hence it helps only those who help themselves. Vocational technical education according to them is a lifelong and self sustaining education and does not believe in protracted theories and forecast, but on practical realities. In addition, Ekpenyong (2014) writing on UNESCO Global monitoring report 2013/2014, states that technical and vocational education is an educational process, when it involves in addition to general education, the study of technologies and their related sciences and acquisition of practical skills and knowledge relating to occupations in various sectors of economic and social life. This kind of education does not only prepare you for gainful employment but also to be self-employed and an employer of labour. Onwenonye (2015), states that the nature of vocational and technical education demands that teachers in the subject areas should be perfect and well equipped with the art and practice of the profession in their various areas of specialization. It is worthy of note that education in Nigeria before the advent of the colonial masters and modern civilization was vocational. This rich heritage is gradually being eroded with white collar jobs which lay emphasis on certification for recognition, employment and better pay. And all talented gifted members of the society who were supposed to sustain the rich heritage of vocational technical education has now drifted to embrace the theoretical aspect of western education for certification, recognition, employment and better pay. It is quite unfortunate to note that the society is trying to relegate vocational technical education to the background by not according it its rightful place. Priority should be given to vocational technical education by encouraging highly gifted and talented young and old males and females into it with incentives which should be enticing and rewarding.

Challenges and Prospects of Vocational Technical Education

The world is a global village inhabited by people with continuous change in taste and fashion. The increase demand for comfort and easy life requires improvement in technology education which houses vocational technical education. This aspect of education in Nigeria is facing a number of challenges that requires urgent attention. These challenges are multifarious in nature. Onwenonye et al, (2014), state that vocational technical education has presently assumed amorphous dimension, as its goals are now passed with unpredictable and unidirectional blind alleys with remarkable evidence of poor organization and implementation of functional policies, which has evidenced the down-ward trends in the quality, both in process and products of the programme, due mostly to the increased demand for access, reduction in public and private funding, diversification of institutions and courses, growing internationalization and the persistence of the employment crises in many economic sectors and communities. These facts according to them have contributed immensely in

shaping the actual experiences of vocational technical education which are obviously different from students' expectations.

Okoye (2014), states that many graduates in Nigeria lack relevant marketable skills that will make them adapt to the current social and economic challenges in the world of work. They lack skills that would enable them to either secure paid employment or become self – reliant. This results in high level of unemployment in Nigeria. He also added that lack of experts in technical vocational education and training (TVET) programmes has been a long standing issue that militates against adequate training in TVET.

Idialu, (2014), identified some of the challenges facing vocational technical education to include: lack of / deteriorating infrastructure, funding the image of vocational and technical education in the society, shortage of manpower, ineffective administration/supervision of teaching and learning vocational and technical education in schools and low training quality.

Okolocha (2012), states that for vocational technical education in Nigeria to compete with their world counterparts in the changing economic order, they must address the following key challenges: putting in place workable policies and strategies, advocating vocational technical education as a key element in the education industry, learning in authentic and real world environments, encouraging continuity in vocational technical education and training, putting in place coherent guidance and counseling system which will help to put students in proper career path, encouraging the development and usage of qualified trainers, creating awareness through image building, vocational attractiveness and participation in vocational technical education in Nigeria, setting up ambitious and realistic goals that will enable Nigeria to be the most competitive and knowledge based economy by the year 2020, creating and sensitizing the Nigerian populace on the need and vision of vocational technical education, maintaining approved school age and exit in order to pave way for physical and mental maturity required for the acquisition of vocational skills, encouraging investment in quality vocational technical education system, tackling the issues of insufficient and lack of data for assessment of progress in vocational technical education, adopting stringent measures for proper and efficient execution of policies regarding vocational technical education, adopting uniform standard and certification in vocational technical education at all levels.

Onwenonye, et al, (2014), opined that the short comings of vocational and technical education programmes should be looked into with a view of finding lasting solutions to them. This will involve re-visiting of the contents of training programmes with a view of making it relevant to the needs of the society; full implementation of the policy statement of the National policy on education (Revised) 1981 and 2004; setting up of monitoring team to see that the guidelines in the National Policy on Education in respect to vocational technical

education is being followed religiously at the various levels of education; and there should be public awareness creation on vocational and technical education programmes throughout the country using the various mass media.

There are several techniques which planners and teachers can employ to help a programme achieve effectiveness. Some of these technique as identified by Onwenonye, et al,(2014), include: good planning of programme, preparation for teaching, organization of facilities, arrangement of facilities, sequence learning, impart learning knowledge before skills, relate teaching to work situation, provide work experience, provide for evaluation and review programme based on feedback information. When all these are taken care of, Nigerian will enjoy the dividends of vocational technical education and will compete favorably with the rest part of the world that is already ahead of them technologically.

Summary

From available literature, there is no doubt that vocational technical education programme in Nigeria is not new but is gradually becoming unpopular, uninteresting and not worth going into by those who want to be recognized, acquire higher certificates, get better pay and enjoy the prestige of being among the educated elites in the society in which they live and contribute to its sustainability.

The identified problems facing vocational technical education programme in Nigeria is common to those facing some developing countries and even some developed countries in the world. But one of the major issues of concern that need to be addressed is the attitude of the Nigerian society to this all important programme that has the potentials of solving most of her disturbing challenges of insecurity, food production and storage, unemployment and poverty. Nigerian should therefore embrace the call for a positive change in her attitude toward vocational technical education programme, invest in it with the whole of her strength and might and in no distant time it shall meet up and even over take some of those countries ahead of her technologically.

Recommendation

Having looked at a number of researches and articles that has been published on vocational technical education in Nigeria and the persisting problems facing it, this paper is recommending attitudinal change in a positive direction, full investment and involvement in every aspect of the programme, and a new approach of triangulation. In this approach, the three sides of the triangle must inter relate for effectiveness and efficiency. These three sides are: the labor market otherwise known as the employers of labor, the material and human resources, and finally the learners. In applying triangulation method, the learning experiences of learners should be tailored towards that of the experiences of workers in the industries in which they will fit into on graduation. The material and human resources that will be

provided should not be at variance with that which is in the industries. The workshops should be equipped with the same tools and machines that are in the industry of a similar trade or profession and the instructors should not be a novice to what is happening in the industries. As a matter of fact they should have up to date knowledge of industrial revolution. The learners should be made to have free access to the industries as they have to their instructors. Industrial attachment should not be for a short specific period but should be an integral part of the training programme where students/learners will have their industrial training at least once a week throughout their training programme. By the time the big gap between the learning environment and the industrial working environment is bridged, most of the problems facing vocational technical education programme in Nigeria will naturally disappear.

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DEVELOPMENT OF A COMPUTER-BASED PROCESS CONTROL FOR HIGHER PRODUCTIVITY IN MANUFACTURING COMPANIES

Ifekoya, I. A.[1] and Simolowo, O. E.[2]

[1, 2] *Department of Mechanical Engineering, University of Ibadan*

ABSTRACT

The Statistical Process Control (SPC) is a numerical procedure that is widely used in performance and productivity monitoring in manufacturing companies. However, the length of time, tedium and cumbersome chat-generation processes associated with this method has necessitated the development faster and more reliable techniques for the analyses of products parameters. The objective of this work is to improve the SPC procedure by developing a faster and more accurate Computer-based Statistical Process Control (CSPC) to be used in analysing manufacturing outfits for higher productivity. The CSPC combines numerical computations, graph-generation, and interactive result presentation to produce a more reliable and a lesser time consuming process. The CSPC was applied to a case study of a Coca- cola bottling company. The net content of the beverage bottle was taken as data and analysed using the CSPC. The charts of the control limits were generated. The lower and upper values obtained for the warning and action limits of the mean chart were 47.78, 51.05, 46.97, and 51.86 respectively. Those for the range chart were 0.972, 6.466, 0.335 and 8.61respectively. The result obtained showed that the process is in control. However the process capability was less than one, indicating that the process was incapable of producing according to the specification of the operation. Strategies such as resetting and complete overhauling of filler equipment were proposed to ensure that process was in control**.**

Keywords: *Statistical process monitoring, control limits, Computer-based approach, Manufacturing, Higher productivity,*

NOMENCLATURE

SPC=Statistical process control; **n**=sample size; $\bar{\bar{x}}$=Mean; μ= Process or grand mean; $\bar{R}$= Mean Range; σ= Standard deviation; **SE**=Standard; Error; d_n *or* d_2= Hartley's constant; **UAL**= Upper action Limits; **LCL**=Lower Action; Limits; **UWL**= Upper Warning Limits; **LWL**= Lower Warning Limit; **T**=Tolerance; **RPI**= Relative process index; C_p=Process capability; **USL**= Upper Specification Limits; **LSL**=Lower Specification limits; **GUI**= Graphical User Interface; **RPI**=Relative Precision Index

esimmar@yahoo.com

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INTRODUCTION

One of the common practices in manufacturing industry is statistical process control. Statistics has been defined as the use and development of theory and methods for the application in design, analysis and interpretation of information in any substantive field of human endeavour (Bamiduro 2005). The investigation on quantitative mechanisms as an aid to control process variation gave rise to the application of SPC since 1930s. Statistical process control (SPC) is the general term used to describe the application of statistics to determine whether observed performance is within the expected variation of the process. This is done by repeated sampling of measurements, or counts, to predict results. Under Statistical Process Control, a process behaves predictably to produce results with the least possible waste. Key tools in SPC are control charts, a focus on continuous improvement and designed experiments.

Much of the power of SPC lies in the ability to examine a process, for the sources of variation in that process, by using tools which give weight to objective analysis over subjective opinions and which allow the strength of each source to be determined numerically. Variations in the process, which might affect the quality of the end-product or service can be detected and corrected, thus reducing waste as well as the likelihood that problems will be passed on to the customer. With its emphasis on early detection and prevention of problems, SPC has a distinct advantage over other quality methods, such as inspection, which apply resources to detecting and correcting problems after they have occurred.

Problem Statement

Industrial process analysts face difficulty in numerical analysis of the data collected from product sample attributes due to lots of data to be analyzed. Numerical analysis of data takes longer time, complex in compiling and there is a high probability of errors. Developing a software package speeds up process control analysis and also solves problems of variation in product quality in manufacturing industries.

Objectives

The objectives of this work are as follows: (i) Develop a graphical user interface using MATLAB as the software for data analysis in process control.(ii) Apply the software by taking a manufacturing company as a case study (iii) Identify the state of product, that is, if the process is in control or not in control (iv) If the process not in state of control, make necessary correction and recommendation.

BACKGROUND STUDIES

The origin of statistical quality control is traced to the work of some early researchers at the Bell Telephone laboratories, which developed theories behind many of the quantitative tools

esimmar@yahoo.com

of statistical quality control. Dodge and Romig (1959); Edward (1982, 1984) individually and collectively did much developmental work in the areas of Acceptance Continuous Sampling plans and Process Capability Analysis. Others have also made contributions in the application of statistics in engineering (Montgomery, (1991); Montgomery & Runger, (2011); Montgomery, (2001); Montgomery, (2003); Montgomery, (2007); Gordon, et.al, (1994)). Control is obtained when a statistical measurement such as means of a group of products are within certain control limits drawn on the statistical process chart. For these charts, there are certain set of rules to follow that will tell the technicians when a process may be out of control. When these conditions are observed, the technicians are expected to stop the manufacturing process so that corrective actions can be taken. (Dougles 2003). SPC has been widely used in manufacturing industries in order to control variability and improve processes.SPC is comprised is a method that utilizes process data and very basic statistical analyses to determine process stability. SPC is comprised of a group of charts and diagrams that can determine, with respect to time, process efficiency, number and frequency of deviant products, and boundaries of chosen process variables. Some of the main analytical tools are flow charts and control charts

Software Application

Application of Statistical Process Control to Software Processes by Lantzy (1992), presents one of the earliest studies on the debate of applying Statistical Process Control to software processes. In this paper, he summarizes the concept of SPC and gives some practical examples from manufacturing industry. Then he offers a set of transformations on these principles via software quality characteristics revealing the uniqueness of software products. After giving the process-product relationship, Burr and Owen (1996) in their work Statistical Methods for Software Quality, described the statistical techniques currently available for managing and controlling the quality of software during specification, design, production and maintenance. This book is one of the very few resources in the area as it is a full reference on statistical methods from technical background of statistics and measurement to managerial concerns in software industry. The main focus is given to control charts as beneficial SPC tools and guidelines are provided for measurement, process improvement and process management within software domain.

Control Charts

Various works have been done on quality controls generally (Juran, (2003a); Juran, (2003b). Kaoru, (1986)); Kaoru,(1985)). Control charts are used to identify process variation over time. All processes vary. The degree of variance, and the causes of the variance, can be determined using control charting techniques. While there are many types of control charts, the ones we have seen the most often are the X-bar and R charts. These charts use variable data where the sample size is small. They can also be based on a large sample size greater

than or equal to ten. X-bar stands for the average of the data collected. R stands for the range (distribution) of the data collected.

RESEARCH METHODOLOGY

The methodology applied in this work involved: (i) Numerical analyses of SPC using Coca-cola bottling company as a case study (ii) development of the CSPC for improved analyses using MATLAB. The state of production process of Coca-cola bottling company was analysed to ascertain its process control and capability. The various quality control techniques and activities were thoroughly observed. Checks were carried out on net content parameter of the coca-cola 50cl bottle and recorded over a period of time. The net contents taken were used for numerical data analysis. A Graphical User Interface (GUI) was developed and also applied in analyzing the data. The two analyses were compared for easy learning and interpretation of result. The outcome of the results is further discussed

Numerical Analysis of Net content

The fill-height test was carried out from the samples taken from the production line at one hour interval. The specification for net content is 2.5% of package. In this case of net content, coke 50cl was chosen. The specification limit $=\frac{2.5}{100}\times\frac{50}{1}=1.25\text{cl}$

Numerical analysis for the mean chart $(\overline{\overline{X}})$

$$\mu=\overline{\overline{X}}=\sum_{i=1}^{k}\overline{X}i/k=\frac{1235.13}{25}=49.41\text{cl} \quad (1)$$

$$\overline{\overline{R}}=\frac{\sum_{i=1}^{k}R_i}{k}=\frac{83.85}{25}=3.35\text{cl} \quad (2)$$

$$\text{Action Limits}=\overline{\overline{X}}\pm A_2\overline{R} \quad (3)$$

Then the action and warning limits are to be determined based on the mean range:
Mean range calculated: ($\bar{\bar{R}}$) = 3.35

Table 1: Net content of 50cl coca-cola

Subgroup no.	X_1	X_2	X_3	X_4	Average (X)	Range
1	50.15	48.75	50.25	45.52	48.67	4.73
2	49.05	48.95	47.83	50.25	49.02	2.42
3	51.21	48.75	46.75	51.05	49.44	4.46
4	45.62	48.92	50.85	51.05	49.11	5.43
5	50.25	51.05	51.25	47.44	50.00	3.81
6	47.55	51.15	51.25	51.15	50.28	3.72
7	50.25	46.85	45.95	50.25	48.33	4.31
8	51.25	50.12	50.15	50.02	50.39	1.23
9	51.21	50.12	50.15	49.06	50.14	2.15
10	50.15	50.02	48.37	50.08	49.66	1.78
11	50.06	50.12	50.25	49.02	49.86	1.23
12	50.15	50.15	51.05	48.55	49.98	2.51
13	51.21	50.21	50.65	50.12	50.55	1.09
14	50.05	47.65	50.05	50.12	49.47	2.47
15	49.75	48.13	48.05	50.12	49.01	1.99
16	45.94	50.01	48.75	50.15	48.71	4.21
17	50.14	50.03	49.15	51.25	50.14	2.11
18	50.05	50.12	44.85	51.23	49.06	6.38
19	49.95	51.25	46.83	51.07	49.78	4.42
20	48.75	45.37	50.45	50.62	48.79	5.27
21	48.82	48.95	50.35	47.87	49.00	2.48
22	50.12	48.95	48.75	47.24	48.77	2.88
23	44.93	48.75	50.15	50.05	48.40	5.22
24	50.45	50.25	45.61	50.05	49.09	4.84
25	50.02	47.54	50.12	50.25	49.48	2.71
				Total	**1235.13**	**83.85**

Hartley's constant (from standard tables when the sample size n=4): d_n= 2.059
Sample range constants (from standard tables: (Appendix 1) when the sample size n=4): A_2 =0.73

Sample range constants (from standard tables: (Appendix 1) when the sample size n=4): = $^{2}/_{3}$ A_2 =$^{2}/_{3}$ X 0.73= 0.49

Upper warning limits ($\mathbf{UWL}_{\bar{\bar{X}}}$) =$\bar{\bar{X}}+ {}^{2}/_{3} A_2 \bar{R}$ (4)

$$49.41 + \frac{2}{3} \times 0.73 \times 3.35 = 51.05$$

Upper action limits ($\mathbf{UAL}_{\bar{\bar{X}}}$) =$\bar{\bar{X}}+A_2\bar{R}$ (6)

$$49.41 + 0.73 \times 3.35 = 51.86$$

Lower action limits ($\mathbf{LAL}_{\bar{\bar{X}}}$) = $\bar{\bar{X}}-A_2\bar{R}$ = **(7)**

$$49.41 - 0.73 \times 3.35 = 46.97$$

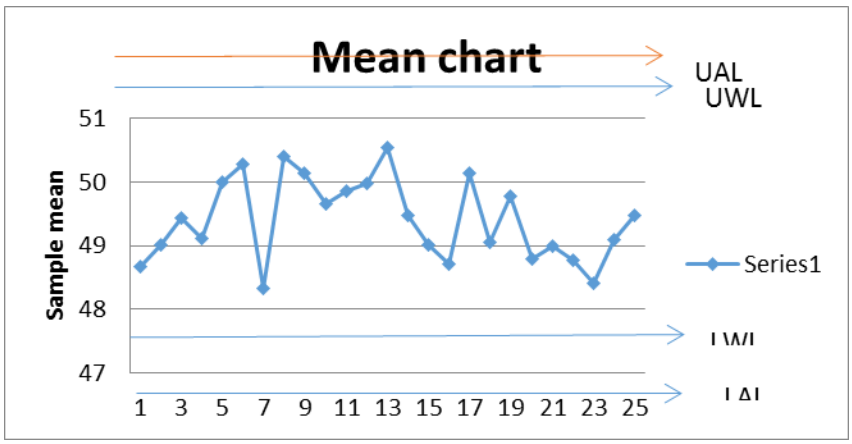


Figure.1 mean control chart for net content

Numerical analysis for the range chart ($\bar{R}$)

The action and warning are determined based on mean range and constants:
From standard tables (Appendix 2): $D'_{0.001}$ = 2.57; $D'_{0.999}$=0.10; $D'_{0.025}$ =1.93; $D'_{0.975}$ = 0.29

Upper warning limits ($\boldsymbol{UWL}_{\bar{R}}$) =$D'_{0.025}\bar{R}$ (8)

$1.93 \times 3.35 = 6.466$

Lower warnimg limits ($\boldsymbol{LWL_{\bar{R}}}$) = $D'_{0.975}\bar{R}$ = **(9)**

$0.29 \times 3.35 = 0.972$

Upper action limits ($\boldsymbol{UAL_{\bar{R}}}$) =$D'_{0.001}\bar{R}$ = (10)

$2.57 \times 3.35 = 8.61$

Lower action limits ($\boldsymbol{LAL_{\bar{R}}}$) = $D'_{0.999}\bar{R}$ = **(11)**

$0.10 \times 3.35 = 0.335$

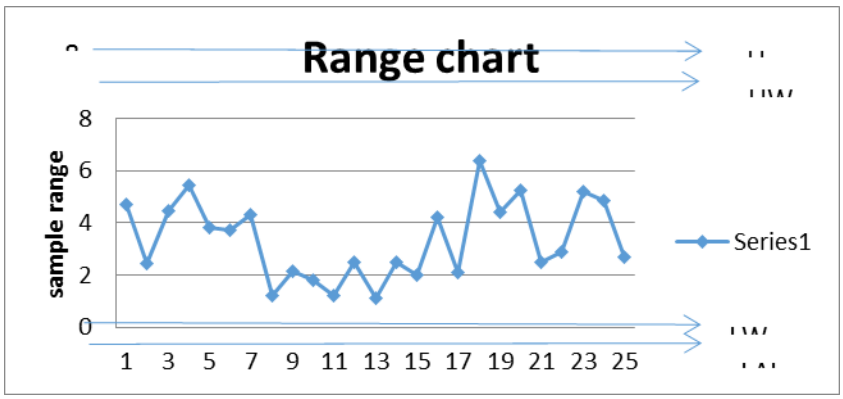


Figure 2: Range control chart for net content

Standard deviation (σ) can also be expressed in terms of the mean range and hartley's constant (d_n or d_2)

$$\sigma = \bar{R}/D_2 = \bar{R}/D_n \qquad \text{Therefore, } \sigma = \frac{3.35}{2.059} = 1.63 \qquad (12)$$

Also, standard error (SE) of means is defined as the

$$SE = \sigma/\sqrt{n} \qquad \text{Therefore, } SE = \frac{1.63}{\sqrt{4}} = 0.815 \qquad (13)$$

Capability Index

This shows the predictability of the process to perform within specifications. From the calculation below, it is observed that the value of c_p is less than 1. This shows that the process is incapable of producing within the set specification

$$C_{P=}\ \frac{USL-LSL}{6\sigma}=\frac{2T}{6\sigma} \quad (14)$$

USL= net content + specification limit.

USL= 50+1.25 = 51.25; LSL= net content − specification limit. LSL=50−1.25 = 48.75

$$C_{P=}\ \frac{51.25-48.75}{6\times 1.63} = \frac{2.5}{9.78} \quad \textbf{(15)}$$

$C_p = 0.26$

Relative Precision Index (RPI)

$$(RPI) = \frac{2T}{\bar{R}} \quad (16)$$

Where T is the tolerance band 2T=1.25; $\bar{R}$is the mean range = 3.35

$$(RPI) = \frac{1.25}{3.35} = 0.37 \quad (17)$$

Development of Computer-Based Statistical Process Control Analyses

The analysis obtained using graphical user interface developed using MATLAB (Gilat 2004; Hunt et. Al., 2001) is discussed in this section. The radio button of the graphical user interface was used to create function and call back for the mean of the variation, range, standard deviation and standard error by clicking the push button named “calculate”. For the mean chart and range shown in Figs 3 and 4 below, this push button computes the mean and the range. The axes control charts displayed showing the sample mean of the variables to the sample number (Fig. 5) and also the sample range of variable to the sample number (Fig. 6). The actions and warning limits are specified on the axes of the control chart. In Fig. 4 and Fig. 6 the chart below shows the mean control chart and mean range chart respectively with their various control limits. The yellow asterisks shown on the graph represents the upper action limits (UAL), the green line represents the lower Warning limits, the lower action and action chats denoted by the blue and red respectively. The data were input and the result was

displayed below showing the process mean (PM), upper action limit (UAL), upper warning limit(UWL), lower warning limit(LWL), lower action limit (LAL).The data were input and the result was displayed below showing the mean range ($\bar{R}$), upper action limit (UAL), upper warning limit (UWL), lower warning limit(LWL), lower action limit (LAL). when the standard deviation radio button is click , it displays the value for standard deviation and standard error as shown in Fig. 4.7 and 4.8 respectively. The mean range also displays the value for process capability as shown in Fig.. 4.9

RESULTS AND PROCESS CORRECTION.

From the mean and range chart in Figs 5 & 6, it is observed that, the points lies within the limits i.e. the action and warning limits and no points lie outside the limits. Therefore it has no out –of –control points. The process is said to be in control but out of specification due to a process capability less than one. Since some outcomes of Net Content entered Quarantine, the following actions need to be taken by the management. The Filler (an Equipment that fills the bottles to specific amount) needs to be reset. The Checkmate of the Critical Control Part which controls the over filled and under filled bottles of the Production Line I where the samples are taken needs to be repaired. Probably overhaul machine. However, if it is still out of control action must be taken to increase the mean. In order to ensure that the specified products are obtained the control of the equipment, materials and production methods have to be in place.

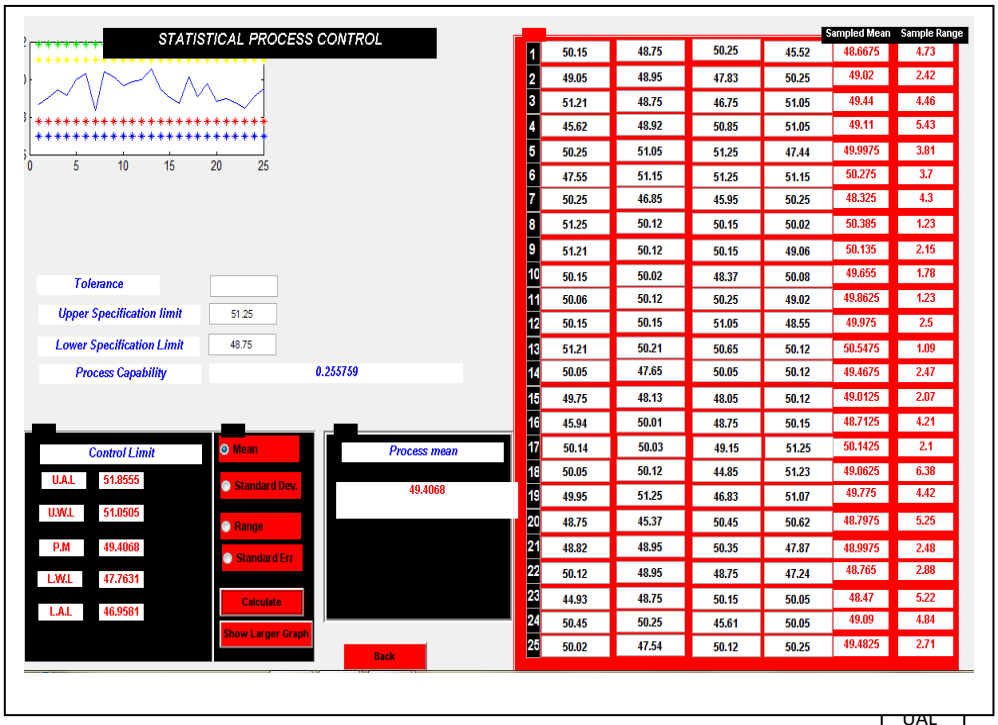


Figure 3: Result of the GUI computed for the process mean

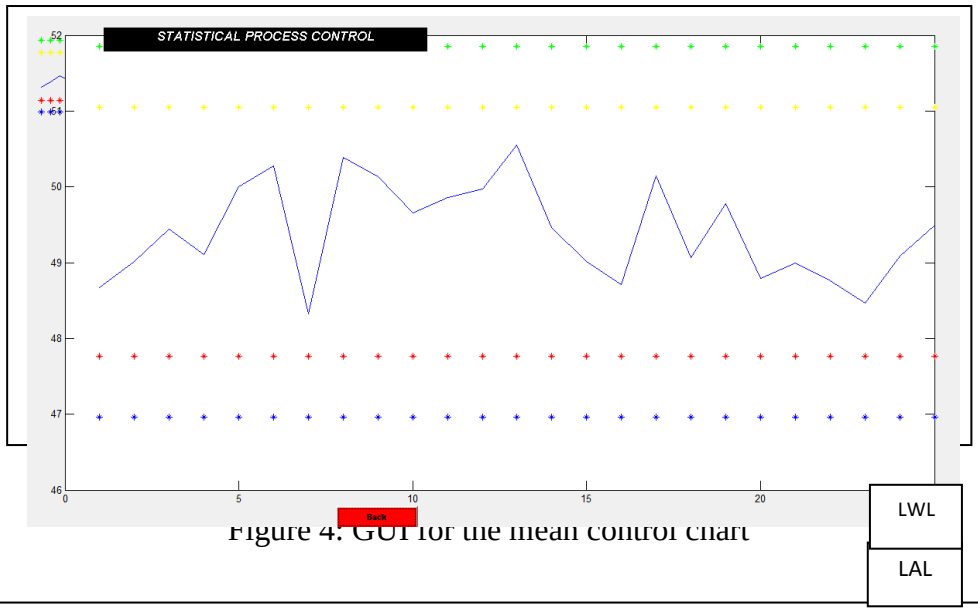


Figure 4: GUI for the mean control chart

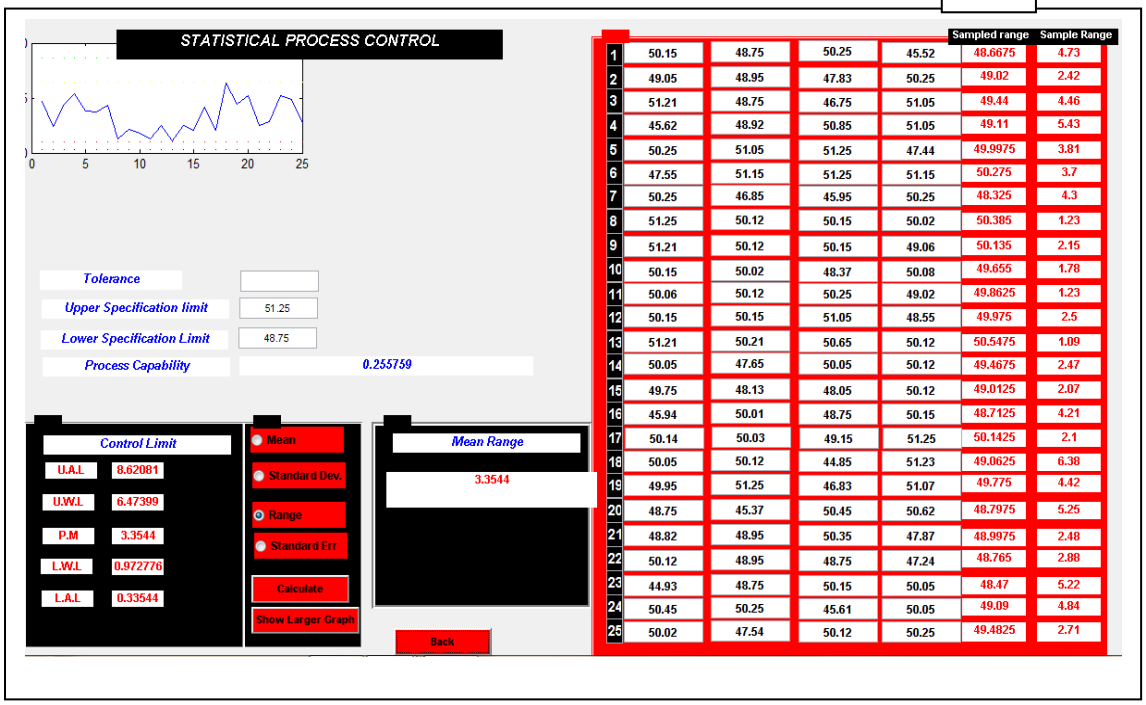


Figure 5: GUI computing the result range

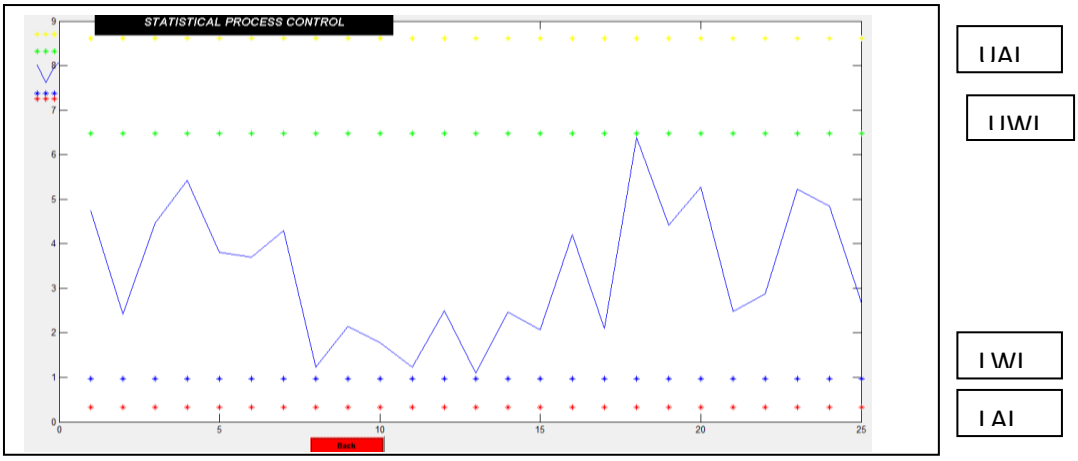


Figure 6: GUI for range control chart.

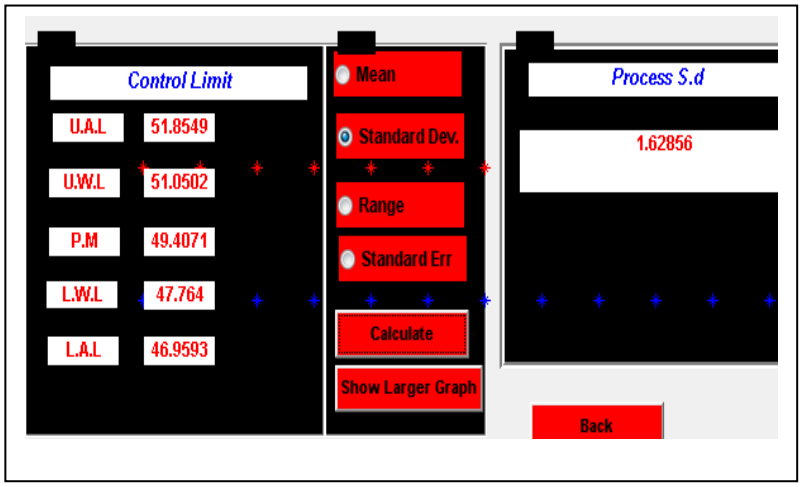


Figure 7: GUI computed result for standard deviation using mean control limit

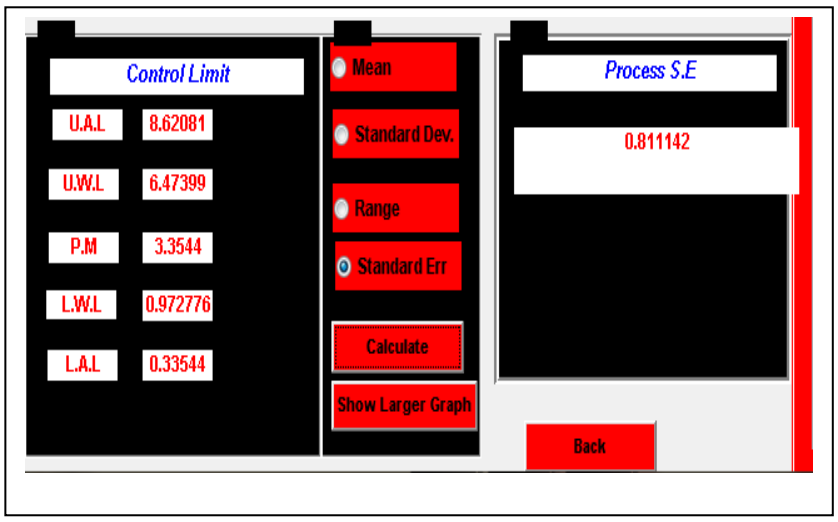


Figure 8: GUI computed result for the standard error using range control limit

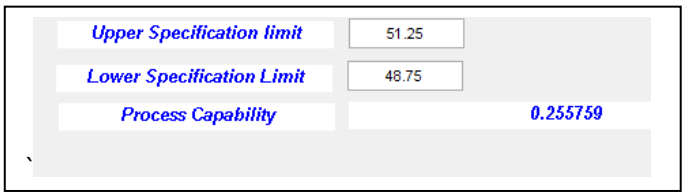


Figure 9: GUI showing Process Capability

CONCLUSION

Due to the high expectations from consumers and competitive market due to substitute product, it has become a priority to ensure that products are being produced to consumer's satisfaction. Therefore, it is necessary to provide highly qualitative production by continuous monitoring of process parameters which implies monitoring process stability. The development of a computer-based statistical process control done in this work and its application to a major company shows that process monitoring can be improved with the aid of software. From the observation, analysis and the conclusions made in this study, it is recommended that the software developed should be applied by manufacturing industries for easy and fast analysis of product sample parameters in other to continuously check if products are being produces to specification and if process is in control. In its application in manufacturing companies, the following recommendations are suggested for proper implementation of the software: (i) new staff, either temporary or permanent should be thoroughly trained on the software before being allowed to carry out his or her designated functions. (ii) Control charts should be placed at strategic location or points in the company where it can be seen by operators and supervisors (iii) Out of control points should be critically analyzed to determine causes of variation before sending products to the customer.

esimmar@yahoo.com

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Appendix 1: Constants A_2 and $2/3A_2$ for the use with Sample Range

Sample size (n)	Hartley's constant (d_n or d_2)	Constant for the use with sample range A_2	$2/3A_2$
2	1.128	1.88	1.25
3	1.693	1.02	0.68
4	2.059	0.73	0.49
5	2.326	0.58	0.39
6	2.534	0.48	0.32
7	2.704	0.42	0.28
8	2.847	0.37	0.25
9	2.970	0.34	0.20
10	3.078	0.31	0.21
11	3.173	0.29	0.19
12	3.258	0.27	0.18

Appendix 2: Constants for use with Mean Range

Sample size(n)	$D'_{0.999}\,\overline{R}$	$D'_{0.001}\,\overline{R}$	$D'_{0.0975}\,\overline{R}$	$D'_{0.025}\,\overline{R}$
2	0.00	4.12	0.04	2.81
3	0.04	2.98	0.18	2.17
4	0.10	2.57	0.29	1.93
5	0.16	2.57	0.37	1.81
6	0.21	2.34	0.42	1.72
7	0.26	2.21	0.46	1.66
8	0.29	2.11	0.50	1.62
9	0.32	2.04	0.52	1.58
10	0.35	1.93	0.54	1.56
11	0.38	1.91	0.56	1.53
12	0.40	1.87	0.58	1.51

esimmar@yahoo.com
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EXTENDING MANAGEMENT ACCOUNTING TECHNIQUES AND MARKETING STRATEGIES: STANDARDIZATION OF NIGERIAN INDIGENOUS PRODUCTION FOR EXPORT

Omorogbe, C. E.

Department of Accounting and Finance, Crawford University, Igbesa, Ogun State, Nigeria.

ABSTRACT

Nigerian reserves have depleted terribly that the economy is at its brink. Import dependence has being found to account for this quagmire. For sustainable growth and development, Nigeria needs to turn the wheel of the clock. This paper examined the state of indigenous production specifically the 'Aba Made' (AM) goods that are cheap to buy but viewed as inferior quality, with a view to proffering ways for improving the standard to internationally acceptable quality for export. The study suggested the application of management accounting techniques and marketing strategies (MA-MS model) in the standardization process to manage cost of transformation of AM to national and internationally competitive product. The study assessed the primary data source to ascertain the citizenry outlook on 'AM' goods as compared to foreign fairly used goods known as 'Tokunbo' (Toks). The primary instrument, the questionnaire was analysed using the non-parametric statistical tool-Wilcoxon signed rank test. Results from the field work revealed that majority of the respondents are aware of 'AM' products but prefer to buy 'Toks'. Several reasons were adduced for that choice ranging from durability to cuteness. The hypothesis tested revealed that there is no statistical difference in the perception of preference for Toks against AM products among consumers and traders of Tokunbo. The study recommended among others, government's intervention in terms of policy implementation of Research and development, collaboration partnership, create enabling environment, Tariff-free importation of machines needed by such indigenous firms; and Improve quality for durability, rebranding and packaging to world's best benchmark.

***Keywords**: Techniques, Marketing, 'Aba-Made', MA-MS model, Standardization*

INTRODUCTION

The quality of indigenously manufactured products and poor economic condition has contributed to shift in consumption patterns of individuals as evidenced by the economic condition in Nigeria. The economic situation in Nigeria has continued to grow at a rapid 6-8% per annum (pre-rebasing), driven by growth in agriculture, telecommunications, and services. Economic diversification and strong growth have not translated into a significant decline in poverty levels. Statistics have it that over 62% of Nigeria's over 170 million people lives in extreme poverty (Economywatch, 2016). In terms of standard of living using the

omorogbece@yahoo.com

dollar per day measurement approach where those living on less than US$1 per day are in the poverty line, 51.6% of Nigerians were living below US$1 per day in 2004 increased to 61.2% in 2010 (see Appendix 1) (Kale, 2012). This state of affairs might have produced a fertile environment for indigenous companies to thrive in the production of substandard products (by relative comparison to products from developed countries), consumed by Nigerians.

This inward looking of these companies has had a multiplier effect on the economy's GDP and reserves. This downward trend has been described by Okeke, (2015: 5) as "the economy that could slip into recession in 2016 if proactive steps were not taken to revive growth in key sectors of the economy" (See Appendix 2).

Reviving the economy involves overhauling, restructuring, diversifying several key areas of the economy. One area of possible revamping is in the indigenous manufacturing sector. ABA-Made (AM) Products (locally produced) are popular nationwide, produced by firms in the Eastern part of Nigeria. The innovations and ingenuity in AM products are impressive. The products range from households to industrial needs. Unfortunately, these products are yet to make significant impact in the local and global market (Ojukwu, 2003).

AM products are not patronised by most Nigerians especially the affluent class. This has been adduced to lack of durability of AM products. Those who cannot buy the brand new products (often called Shabe) settle down for the fairly used products (often called Tokunbo or Toks). In the wind change mantra, the president of the Nigerian Senate Bukola Saraki said government should use legislative actions and policy initiatives to protect the local industries as a deliberate way of riving the economy and ensure local industries are patronised by government agencies. The 8th Senate determined to amend the procurement law to ensure that government agencies patronize made in Nigeria products; and work at all laws and help to create an enabling environment for local business to thrive in Nigeria (Saraki, 2016). The issue now is how can the status of AM products be improved upon so that it can have both local and international relevance and value?

Standardization has being recommended as the key to value addition in marketing research. Standardization is depicted as a repositioning strategy, where quality of goods and services are designed to occupy a meaningful and distinct competitive position in the target customer's mind, which would translate into great growth potentials on the economy (Oniki, 2003). Although some researchers support the fundamental precepts of build-to-order and mass customization (Anderson, 2015), others are of strong opinion that markets are becoming

more similar and progressively more global and it is believed that the key for survival is companies' ability to standardize (Vrontis & Thrassou, 2007).

The process of alteration to standard could be tedious and financially tasking especially for firms with inferior quality. Hence, proper cost management is essential so that total standard processing cost is not passed on to the final consumers. Contemporary management accounting (MA) techniques (Value analysis and value engineering) have been identified in providing strategy for cost effectiveness (Gerdin, 2005; Adeniji, 2009).

Hence this paper proposes the MA-MS model which is the application of management accounting techniques (value analysis & value engineering techniques) and marketing strategies (Product quality control & quality assurance tests and tactical knowledge) to repositioning AM products for economic growth. This Model is based on the theory of value chain where a manufacturing company is viewed as a system, made up of subsystems each with inputs, transformation processes and outputs and adding value even thereafter, at **outbound logistics level,** m**arketing and sales** level and s**ervice level as value adding will inevitably** determines higher quality attracts high patronage, while managing cost and influence profit (Cambridge, 2013); and theory of reengineering that emphasised the need for alignment of mission and strategic goals in order to reduce cost and achieve quality produce and services. The model would assist in the standardization process in ensuring that AM products are domestically and internationally competitive. It is pertinent to observe that success in domestic market does not necessarily translate automatically to success in international markets, as success in international markets requires adequate preparation at the domestic level and knowledge of the operation and situation at the international market. MA-MS model would support the standardization process toward earning Foreign exchange without sacrificing quality for huge profit.

This study proposes the following:

(i) AM's product quality could be internationally standardized with minimum cost
(ii) MA techniques can foster cost-effectiveness in the standardization process
(iii)MS can assist in standardizing AM product and international marketing
(iv)When AM products are standardized export will increase
(v) That the application of MA-MS model in product and market standardization will reduce standard cost, increase sales/revenue and increase FOREX earnings for the country.

The objectives therefore, are specifically to (i) determining citizenry response to acquiring Aba Made; (ii) ascertain taste preference between Aba Made and fairly used products

(Tokunbo); (iii) ascertain whether there are response differences in the perception of preference for Toks against AM products among consumers and traders of Tokunbo; (iv) determine the process to standardization of Aba Made quality; (v) exhibit how the MA-MS model application can reduce cost associated with standardization.

One hypothesis was constructed and tested in this study:

H_0: There are no differences in the perception of preference for Toks against AM products among consumers and traders of Tokunbo.

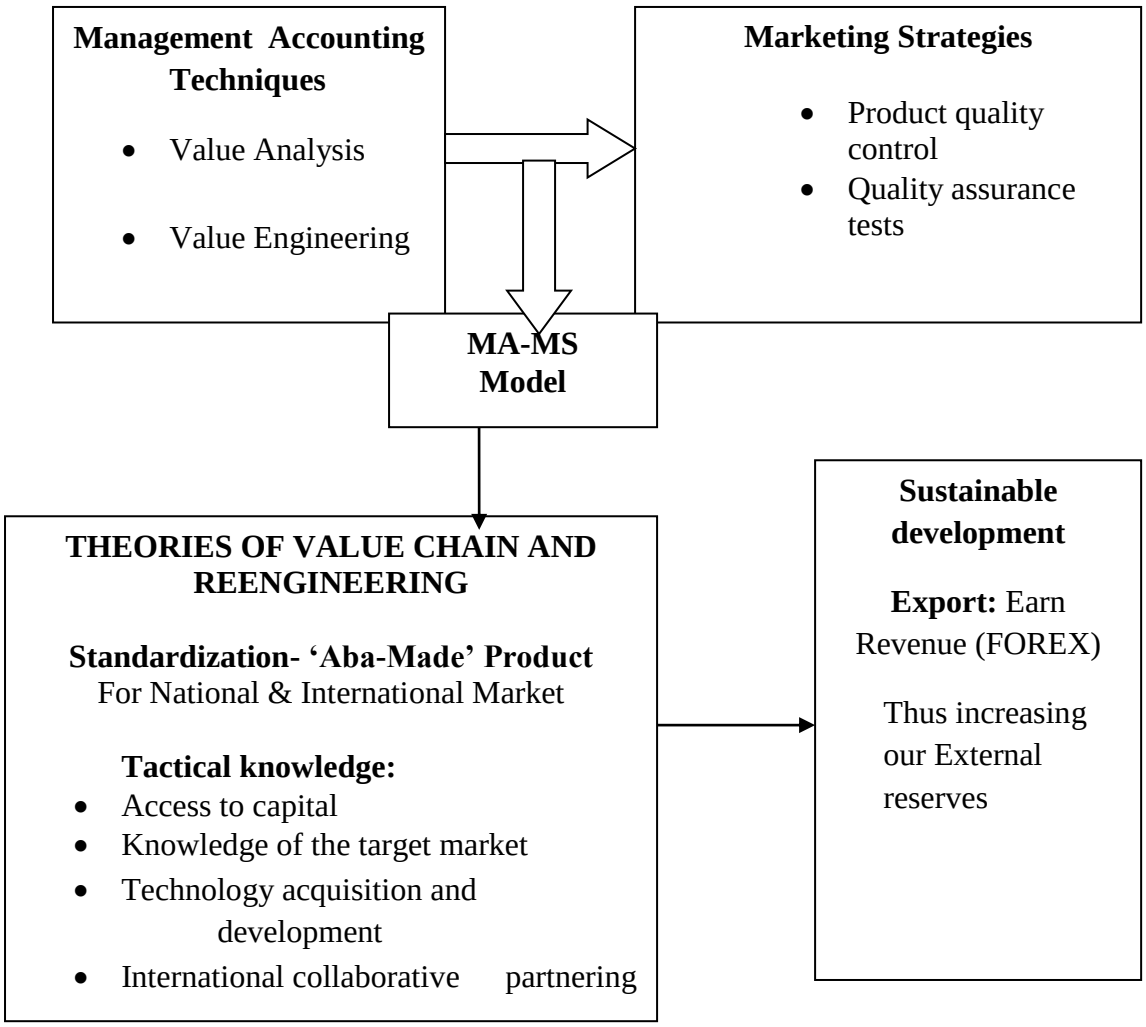
MA-MS Model application to Product and Market Standardization of 'Aba-Made' for Export

The interaction of systems and processes in the application of management accounting techniques, in this case, in terms of value analysis and value engineering techniques; and marketing strategies in terms of product quality control and quality assurance tests is described in the model. This type of interaction is common in various forms of theoretical fit that have been used in contingency-based research: selection, interaction and systems (Drazin & Van de Ven, cited in Asel, 2009).

The MA-MS model depicts the application of knowledge in value analysis and value engineering to product quality control and quality assurance test. The dividend of such exercise in the standardization of product and market, would produce goods at affordable prices, and with international quality achieved, they would be exported and thus earn Foreign exchange (FOREX) for Nigeria for sustainable growth and development. Figure 1 below shows the conceptual model with unidirectional arrows. The broad arrows depict relationship that creates the model while the narrow arrows depict impact.

Figure 1: A Conceptual Model of MA-MS application to Product and Market Standardization of 'Aba-Made' for Export

MA-MS Model



Source: Author- Omorogbe 2016

LITERATURE REVIEW

This review is based on the components of conceptual model of this study- the MA-MS model.

MANAGEMENT ACCOUNTING TECHNIQUES

Standard Cost Reduction Techniques are in variety in Management accounting. Appropriate management of product and process cost, requires a combination of Value engineering and Value analysis techniques. These techniques would provide cost structure and restructuring at onset of production and in the course of production.

Value Engineering and Value Analysis

Value analysis and value engineering techniques in MA provide a platform to increase the worth of a product by reducing the cost in a conscious manner. Value analysis is performed during production stage and value engineering techniques is performed at the end of a process (Adeniji, 2009).

Blocher, Chen and Lin, (1999) and Drury (2005) depicted value engineering as a systematic interdisciplinary examination of factors affecting the cost of a product or service in order to devise means of achieving the specified purpose at the required standard of quality and reliability at the target cost. This proceeds by empowering a cross-functional team to find out the most optimal processe(s), materials used; tooling and capital investment requirements and to decide whether to make or outsource the product or service. Cooper and Slagmulder, (1998) and Adeniji (2009), described value analysis as a planned, scientific approach to cost reduction, which reveals the material composition of a product and production designs; modification and improvement can be made without reducing the value of the product to the consumers or users. Value analysis involves the examination of each part of a product, service, or system in order to reduce costs without degrading quality.

These techniques when combined in the standardization process of AM products, generates cost reduction that gives economies of scale, selling large quantities of the same, and buying components in bulk reduce the cost-per-unit. Similar analyses can also be carried out on standardization of the marketing process in consonant with marketing strategies (MS) so that advantages relating to economies of scale which includes improved research and development, reduction in marketing operational costs, and lower costs of investment can be obtained.

MARKETING STRATEGIES

Product Quality Control

Quality control is a process by which entities review the quality of all factors involved in production. Controls include product inspection of every product visually, and often using a stereomicroscope detail before the product is sold into the external market. Quality control emphasizes testing of products to uncover defects and reporting to management who make

the decision to allow or deny product release. Quality Control makes sure the results of what you've done are what you expected. Control is product-related.

Quality Assurance Tests

Quality assurance attempts to improve and stabilize production (and associated processes) to avoid, or at least minimize, issues which led to the defect(s) in the first place. Quality assurance (QA) is a way of preventing mistakes or defects in manufactured products and avoiding problems when delivering solutions or services to customers. This defect prevention in quality assurance differs subtly from defect detection and rejection in quality control and has been referred to as a shift left as it focuses on quality earlier in the process (Pyzdek, 2003). Quality Assurance makes sure you are doing the right things, the right way. Assurance is process-related. It advance standardized products and save companies from costs associated with poor quality; such as non-conformances and failure to meet requirements cost. Two principles included in quality assurance are: "Fit for purpose" (the product should be suitable for the intended purpose); and "right first time" (mistakes should be eliminated).

STANDARDIZATION PROCESS

Product standardization and market standardization are important. As companies make effort in standardizing production, they also make effort in standardising channels of distribution of such products.

Product standardization

Product standardization is the homogenization of items available to consumers, by manufacturers following the technical standards and guidelines in order for such product to qualify for sale. This process is intended to help consumers make up their minds more easily and create informed decisions. Acevedo, (2015), identified three areas of concern: components, packaging, and quantity. The basic components of all products should be standardized. When products are properly modified, similar components can be used across several products; Slight changes in packaging can help standardize products offered globally.

Market Standardization

When a small company chooses to market itself internationally, it faces a unique set of challenges. While the company no doubt wants to maintain a consistent image across different markets, it must also take into account the cultural context into which its marketing material is entering. A message that works in the United States may be received very differently in, say, Sudan. Therefore, even a small company should standardize marketing internationally but also leave room for flexibility (Wolfe, 2014).

In developing a standard marketing strategy that could be applicable to all markets, a company should identify its goals. While the ultimate goal is to generate revenue, the company should ruminate on the kind of message it wishes to send to consumers across all markets about the company. Once this central message has been identified, then it can be tailored to different audiences in different countries based on their cultures. The company should identify certain branding signifiers' colors, images, sounds, that will resonate internationally. In as much as the company is able, these branding signifiers should have global consistency, so that the company presents a coherent, standard image to everyone, no matter the language or nationality.

Standardization of AM Products

Aba-Made product standardization would involve a total overhauling, from raw material need through process and mode of processing to finished products. For instance, Anderson, (2015) highlighted the part standardisation as here described.

Raw Materials Standardization: When done, the production processes would be flexible enough to make different products without setting up multiple processes; Machinery/ Tool Standardization: determines how production machine and the many different tools required for assembly, alignment, calibration, testing, repair, and servicing are brought to international standard. Company-wide machinery and tool standardization can be determined through analyzing tools used for existing products, determine modern ones existing and their efficiency rate, then decide on preferences; Process Standardization: Standardization of processes results from the concurrent engineering of products and processes to ensure that the processes are actually specified by the design team, rather than being left to chance or to be determined later. Processes must be coordinated and common enough to ensure that all parts and products in the mass customization platform are built without the setup changes that would undermine flexible manufacturing.

It is suggested that the zero based approach to standardization allows thoroughness in the procedures. Literally, it starts at zero and adds only what is needed, as opposed to reducing parts from an overwhelming list. An analogous situation would be cleaning out the most cluttered compartment and removing unwanted parts, would take much effort, and still might not be very effective; whereas zero-based approaches exclude the clutter from the beginning. The clutter is the unnecessary aspects that could be avoided if products were designed around common parts (Anderson, 2015).

Standardization Benefits

Standardization brings benefits such as cost reduction in the areas of purchasing costs reduction through purchasing leverage, inventory cost reduction, floor space reduction,

E-mail: omorogbece@yahoo.com

ordering expense avoided when common parts are simply drawn as needed from spontaneous resupply, and overhead cost reduction; Quality of product is another benefit that comes with continuous improvement. Flexibility as a benefit arises from eliminating duplicating setup, inventory reduction, simplifies supply chain management, internal material logistics, bucks truck deliveries, and flexible manufacturing. Responsiveness comes with standardization in the areas of build-to-order, parts availability, quicker deliveries from vendors (Anderson, 2015). In Public service, they can simplify the legal passage of production, establish quality, environmental and safety policies, assist economic development and facilitate the business.

Tactical Knowledge

Tactical facts are required in marketing strategies useful in the standardization process. It refers to the ingenuity of companies to utilise available information for growth and development of products and market; it is the ability that tends to invent.

Tactical knowledge as a marketing strategy in AM standardization process would encompass- (i) Access to capital: there is need for easy access to capital as standardization of AM products is an effort at repositioning indigenous companies' ingenuity. Financial institution's contribution toward this process in mobilising and delivering investment resources is indispensible. Given Nigeria's peculiar situation of access to loan or corporate funding, government would need to ameliorate the problems associated with accessing loan, procedure and interest involved for AM manufacturers; (ii) Knowledge of the target market: Identifying the product quality required by a particular target market is imperative. **In order to maximize sales, companies need to understand their customer and define the target market.** A Target Market is a specific group of consumers at which a company aims its products and services. A well-defined target market is the first element to a marketing strategy. This is achieved through segmentation. Two important factors to consider in selecting a target market segment are the attractiveness of the segment and fit between the segment and the firm's objectives, resources and capabilities (Netmba, 2015); (iii) Technology acquisition and development: A zero approach to standardisation is one bane of this study. It requires introduction of more sophisticated technology while discarding the current ones if any. It has been identified in literature that positioning companies for economic development would demand modern technology for transplantation and adaptation of diverse field of production possibilities. Technology would facilitate domestication, indigenisation and diffusion internationally, leading to the country's control over supply of products and services (Ojukwu, 2006); and (iv) International collaborative partnering: For standardization of AM product to be globally relevant and competitive, international collaboration is crucial as no single economy is self-sufficient in its entirety. Foreign inputs in various forms in these AM companies would energise growth potentials. Ehinomen and

Adeleke, (2012) admitted that, repositioning small and medium enterprises in Nigeria for global competitiveness is to embark on international partnering.

THEORETICAL CONSIDERATION

The Theory of Value Chain

The theory of value chain empowers a company to design, produce, marketing, delivery and supporting its product. The idea of the value chain is based on the process view of companies, the idea of seeing a manufacturing (or service) company as a system, made up of subsystems each with inputs, transformation processes and outputs. The manner by which value chain activities are carried out determines cost and affects profit (Institute for Manufacturing, 2016). In practice, most companies since 2013, utilize a combined value chain as no progressive company can afford to remain stuck to any one of these value chains to improve the ongoing products/services or to develop some new product/service (Porter, 1985).

The implication of the value chain theory is that the AM companies must realize that acceptability whether nationally or internationally goes with value adding at each point. From Porters value chain viewpoint, consumers have assurances in products or services offered as value is added primarily at l**ogistics level,** o**perational level, outbound logistics,** m**arketing and sales** level and s**ervice level.**

Theory of Reengineering

Reengineering is the "fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measure of performance, such as cost, quality, service and speed," according to Hammer and Champy in (White 2015, web pp). Business Process Reengineering (BPR) is the practice of rethinking and redesigning the way work is done to better support a company's mission and reduce cost.

Reengineering starts with a high-level assessment of the company's mission, strategic goals, and customer. It requires giving answers to some basic question, such as: Do we have need to redefine the company's mission? Do we have strategic goals that are properly aligned with our set mission? Have we identified our customers? Reengineering is particularly essential when a company finds out that it is operating on questionable assumptions, especially in terms of the wants and needs of customers. A company's next line of action is to rethink on what it should be doing, and how best to do it.

The corollary of reengineering theory lies in the fact that AM companies would need to be restructured, and in doing this, they must ensure that their mission and strategic goals are in perspective, with the aim of achieving impressive improvements in critical performance measures, such as cost, quality, service, and speed.

METHODOLOGY

This study adopted the descriptive method in examination of standardization of Aba-Made products to internationally acceptable standard qualified for export. A cross-sectional survey method was adopted in gathering perception data on knowledge of AM and fairly-used or Toks products; their preference, and reason(s) for choices made between AM and Toks products.

A questionnaire which was the primary data source was constructed to ascertain the citizenry outlook on AM goods and Toks products; while the secondary data source, provided information on MA-MS model application to the process of product and market standardization.

A total number of 112 copies of questionnaire was administered to consumers in the academic environment; consumers as well as traders in Toks markets. A total number of 79 valid copies were received from the field and analysed using the frequency descriptive statistical tool. The hypothesis was tested using the non-parametric tool of Wilcoxon signed rank test. This test was adopted to determine relatedness of responses.

RESULT

A seventy- one percent (71%) response rate was achieved. The data analysed revealed that respondents were about fifty-one percent (51%) male and forty-nine percent (49%) female (Table 1). This composition shows a near balanced mix of respondents which is expected to translate into almost equal contribution to the issue under examination.

About forty-six valid percent (46%) of the respondents were graduates and would be graduates from University. This was remarkable as suggestions of ways to standardization of AM products were scholarly. About 4 percent (4%) of the respondents had no schooling; about nine valid percent (9%) had primary schooling and about twenty-three valid percent (23%) had secondary education while about eighteen valid percent (18%) had college of education and polytechnic education (Table 2). A blend from this various categories in the society gave a spectrum of viewpoints which when articulated culminated in valuable suggestions towards internationalisation of AM products.

E-mail: omorogbece@yahoo.com

Table 1: SEX OF RESPONDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	40	50.6	50.6	50.6
	FEMALE	39	49.4	49.4	100.0
	Total	79	100.0	100.0	

SOURCE: SURVEY 2016

Table 2: HIGHEST LEVEL OF EDUCATION OF RESPONDENTS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOSCH	3	3.8	3.9	3.9
	PRIMARYSCH	7	8.9	9.1	13.0
	SECSCH	18	22.8	23.4	36.4
	COLLEDU	11	13.9	14.3	50.6
	UNIV	35	44.3	45.5	96.1
	POLY	3	3.8	3.9	100.0
	Total	77	97.5	100.0	
Missing	System	2	2.5		
Total		79	100.0		

SOURCE: SURVEY 2016

Large integers of respondents have knowledge of AM products. About ninety-six valid percentage (96%) of the respondents was familiar with both Aba-Made products and Tokunbo products. Table 5 (Appendix 3) revealed that about seventy-seven valid percent (77%) have preference for fairly used (Toks) goods. Reasons for preferring Toks (Table 7, Appendix 3) to the Nigerian Aba-Made products, ranged from last longer, strong, neater, to it being cute and a combination of all the aforementioned (Acronym- LASTRONEAT).

A closer look at the Table 7 (Appendix 3) reveals that about fifty-six valid percent (56%) of those with Toks preference had that choice because they claimed it last longer than the AM

products. Table 6 (Appendix 3) showed that ten percent (10%) of those that preferred Aba-Made product (23%) said they do because it is a form of solidarity to Nigerian producers of such products while nine percent (9%) said they do because they want to encourage the indigenous production.

Test of hypothesis

H_0: There are no differences in the perception of preference for Toks against AM products among consumers and traders of Tokunbo.

The descriptive frequency of consumers is fifty-four representing 68% while traders of Tokunbo goods are twenty-five representing 32% of the total respondents (Tables 8 & 9; Appendix 3)

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between consumersReasonToks and traderReasonToks equals 0.	Related-Samples Wilcoxon Signed Rank Test	.320	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

This non-parametric test shows that (p >.05) there is no significant difference between consumers and traders of Toks on preference of Toks against AM products. The null hypothesis of no significant difference in preference is thus not rejected.

CONCLUSION AND POLICY IMPLICATION

The details from the sampled economic picture evidenced that there is greater need for diversification of the Nigerian economy. This study proposed the standardization of AM products for sustainable development of the Nigerian Economy through international marketing of standard AM products to earn foreign exchange that would improve the Nigerian foreign reserves. This would be accomplished through the application of the MA-MS model. A model that combines the use of value analysis and value engineering to monitor the cost associated with conversion from crude to stand product quality that meets

international standard that are exportable; viz-a-viz product quality control and quality assurance tests, while putting to good use tactical knowledge to be able to penetrate the international market.

The response from the survey shows that most of the citizenry do not acquire Aba Made; as their taste preference is higher for fairly used products (Tokunbo). The hypothesis tested revealed that there are no significant differences in the perception of preference for Toks against AM products among consumers and traders of Tokunbo. The implication of this is that, there is need for enlightenment and education for the citizenry to patronise indigenous products. This awareness will be very necessary when the products have being standardized.
Respondents made several suggestions on how to improve AM products to internally and internationally acceptable standard. The suggestions will be useful for policy formulation and implementation:

(i) There is need for government intervention in the following areas: Research and development, collaborative partnership, ensuring enabling environment and funding support;
(ii) Improve quality for durability, rebranding and packaging to world's best benchmark;
(iii) Tariff- free importation of machines needed by such indigenous firms;
(iv) Stop importation of foreign made products and smuggling of goods that falls within this category, while creating awareness and encourage local patronage of AM products;
(v) Create uniqueness in AM products but with international outlook;
(vi) Quality control board should be up and doing to stop imitation production; Effective monitoring of standard by the Standards Board of Nigeria (SON); checking the right mix and material for production.
(vii) Certification of companies complying to standards;
(viii) Sanction companies producing sub-standard products;
(ix) Specialised training for manufactures of such products, including training on the use of modern technology;
(x) Labelling and branding should be Nigerian;
(xi) Innovation and creativity should be given priority;
(xii) Competition should be encouraged in the industry;
(xiii) Interest rate on loan for such firms should be single digit;
(xiv) Land Moratorium in terms of acquisition cost and occupancy fee so as to attract more companies into this production for exportation.

Limitation of this study

Outside of the methodological limitation of generalisation impossibility due to the research design, the conceptual model formulated- the MA-MS model was only theoretically examined. The practicality of this model is yet to be tested. This aspect is left for subsequent study.

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APPENDICES

Appendix 1: Although the world bank standard is now US$1.25 the old reference of US$1 was the standard used in Nigeria at the time that the survey was conduct.

Appendix 2: Table 1 below

Table 1: A Sample View of Nigeria's Dwindling Economic Picture

Index	Opening Figure	Ist Quarter	2nd Quarter, 2009	2nd Quarter. 2010	2nd Quarter, 2014	2nd Quarter, 2015	January 2016
External Reserves	$53 billion	$47 billion	$43.20 billion	$42.40 billion	$37.3 billion	$29.1 billion	34.38 billion
Crude Oil Prices	$37 per barrel	$60 per barrel	$72 per barrel	$67 per barrel	$62 per barrel	$43 per barrel	$27.7 per barrel
Average Naira Exchange rate to a dollar	142.34	145.71	146.43	148.50	158.55	197.12	199.9
Capital Market Capitalisation (Naira)	5.91 trillion	5.2 trillion	4.69 trillion	8.22 trillion	10.0 trillion	9.85 trillion	9.757 trillion

Source: Premiumtimesng.com/ Okeke, (2009) and (2015)

APPENDIX 3: FREQUENCY DESCRIPTIVE ANALYSIS OF RESPONSES

TABLE 3: KNOWLEDGE OF ABA-MADE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YESFAMILIARAM	75	94.9	96.2	96.2
	NOTFAMILIARAM	3	3.8	3.8	100.0
	Total	78	98.7	100.0	
Missing	System	1	1.3		
Total		79	100.0		

SOURCE: SURVEY 2016

TABLE 4: KNOWLEDGE OF TOKS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YESFAMILIARTOKS	76	96.2	96.2	96.2
	NOTFAMILIARTOKS	3	3.8	3.8	100.0
	Total	79	100.0	100.0	

SOURCE: SURVEY 2016

TABLE 5: PREFERENCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	PREFERNCEAM	17	21.5	23.3	23.3
	PREFERENCETOKS	56	70.9	76.7	100.0
	Total	73	92.4	100.0	
Missing	System	6	7.6		
Total		79	100.0		

SOURCE: SURVEY 2016

TABLE 6: REASON FOR ABA-MADE CHOICE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NOT CHOICE	62	78.5	78.5	78.5
	SOLIDARITY	8	10.1	10.1	88.6
	ENCOURAGE	7	8.9	8.9	97.5
	EMPOWER	2	2.5	2.5	100.0
	Total	79	100.0	100.0	

SOURCE: SURVEY 2016

TABLE 7: REASON FOR TOKS CHOICE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LASTLONGER	30	38.0	55.6	55.6
	STRONG	6	7.6	11.1	66.7
	NEAT	1	1.3	1.9	68.5
	CUTE	1	1.3	1.9	70.4
	LASTSTRONEAT	9	16.7	16.7	87.0
	NEUTRAL	7	8.9	13.0	100.0
	Total	54	68.4	100.0	
Missing	System	25	31.6		
Total		79	100.0		

SOURCE: SURVEY 2016

TABLE 8: CONSUMERS OF TOKS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LASTLONGER	29	53.7	53.7	53.7
	STRONG	5	9.3	9.3	63.0
	NEAT	7	13.0	13.0	75.9
	CUTE	1	1.9	1.9	77.8
	LASTRONEAT	9	16.7	16.7	94.4
	NEUTRAL	3	5.6	5.6	100.0
	Total	54	100.0	100.0	

SOURCE: SURVEY 2016

TABLE 9: TRADERS OF TOKS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LASTLONGER	15	27.8	60.0	60.0
	STRONG	3	5.6	12.0	72.0
	NEAT	1	1.9	4.0	76.0
	LASTRONEAT	1	1.9	4.0	80.0
	NEUTRAL	5	9.3	20.0	100.0
	Total	25	46.3	100.0	
Missing	System	29	53.7		
Total		54	100.0		

SOURCE: SURVEY 2016

TRADITIONAL ARCHITECTURE AND GENTRIFICATION IN KUMASI REVISITED

Twumasi-Ampofo, K. [1] and Oppong, R. A.[2]

[1]*Building and Road Research Institute-CSIR, Kumasi, Ghana*
[2]*Department of Architecture, College of Art and Built Environment - KNUST, Kumasi, Ghana*

ABSTRACT

The crave for property and land for commercial as well as civic purposes has resulted in gentrification of old traditional buildings and public open spaces in the Central Business District (CBD) of Kumasi. This has been seen by many as an enhancement of the urban environment. The paper presents a follow-up study of traditional architecture and gentrification processes conducted along the Odum Precinct, Adum- Kumasi in 2005. The aim of the study is to access the impact of gentrification on the traditional architecture of the CBD of Kumasi. This study adopts qualitative methods to revisit and explore gentrification at the Odum Precinct and some principal streets of CBD of Kumasi. The study in 2005 revealed amongst others that the quest for local inhabitants to acquire and retain affordable housing in the CBD was threatened by the increase in rental prices and property value thereby increasing the plight of the low income earners in the CBD. The study revealed that a large number of the local inhabitants who happened to fall in the low income group were displaced to peri-urban areas of Kumasi. Again it was found that the gentrification processes involved complete demolishing of the traditional buildings rather than refurbishing or remodeling them.

Keywords: *Traditional Architecture, Gentrification, Central Business District, Peri-Urban, Kumasi.*

INTRODUCTION

In 2005, Adarkwa and Oppong investigated into gentrification, use conversion and traditional architecture in Kumasi's Central Business District, by using the Odum precinct as a case study. The study revealed that desire for high income returns moved residents to rent out their properties to private investors who would mostly renovate, refurbish and remodel them for commercial purposes with eventual displacement of residents. According to Adarkwa and Oppong (2005), gentrification may not be occurring but at a very fast pace in Ghana. However, it is still occurring in many settlements in pattern which has not yet been studied extensively to give a clear understanding of its form and dynamics. Most buildings affected

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

by the process of gentrification were traditional courtyard houses basically of Odum in the Central Business District of Kumasi. These existing traditional courtyard houses which exemplified the rich Ashanti culture and history appeared to be fading away by the gentrification practice. There is therefore a clear loss of traditional building identity in respect of their form and function in the Odum precinct. The main reasons for gentrification according to residents as reported by Adarkwa and Oppong (2005) were for commercial, aesthetic, and restoration although the study found out that commercial (economic) reason dominated.

There has always been the necessity to answer numerous questions pertaining to cultural values, history and housing, especially in design and construction of buildings. Hackworth and Smith (2001), examined the process of State involvement in gentrification in three New York City neighourhoods which include Clinton, Long Island City, and Dumbo; and concluded that state intervention has returned for three key reasons. Firstly, continued devolution of federal states has placed even more pressure on local states to actively pursue redevelopment and gentrification as ways of generating tax revenue. Secondly, the diffusion of gentrification into more remote portions of urban landscape poses profit risk that are beyond the capacity of individual capitalists to manage. Thirdly, the larger shift towards post-Keynesian governance has unhinged the state from the project of social reproduction and as such, measures to protect the working class are more easily contested. Smith (2006) researched into gentrification and uneven development and asserted that "gentrification and urban redevelopment are the structure of the capitalist mode of production. In his opinion, gentrification is only a small part of a restructuring of urban space which is, in turn, part of the wider economic restructuring necessitated by the present economic crisis". As stated by Vandergrift (2006), gentrification has become a commonplace word for a period of time and yet, it is not significantly understood wholly and has often become synonymous with displacement.

Gentrification Recapitulated

Slater (2011) argues that "gentrification commonly occurs in urban areas where prior disinvestment in the urban infrastructure creates opportunities for profitable redevelopment, where the needs and concerns of business and policy elites are met at the expense of urban residents affected by work instability, unemployment, and stigmatization". Gentrification is a relatively current form of urban development that involves the social, economic, and cultural transformation of historically disinvested urban neighborhoods (Phillips et al. 2014). Gentrification, the means of neighborhood change that results in the replacement of lower income residents with higher income ones, has changed the character of hundreds of urban neighborhoods in America over the last 50 years (Kennedy and Leonard, 2001). According to Redfern (2003), gentrification is simply "a process of transition," implying an expected

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

process, which presents an understanding that sets itself apart from the automatic criticism that often accompanies the word gentrification. Van Criekingen and Decroly (2003), also describe gentrification as a process sometimes labeled 'yuppification', the metamorphosis of deprived inner-city neighborhood into new remarkable residential and consumption areas brought up by a new class of highly skilled and highly paid residents, typically business service professionals living in small-sized, non-familial households- that results in displacement of the neighborhood initial population. As generically defined by Adarkwa and Oppong (2005), gentrification refers to a physical, social, economic or cultural phenomenon by which core city neighborhoods are converted into more affluent middle class communities through renovation, remodeling or refurbishment and which mostly result in rise of property value and the relocation of the poor.

From the foregoing, one theme running through the definitions of gentrification is displacement. As stated by Biro (2007), displacement occurs when households have to move involuntarily from an area. Wyly and Hammel (2004), Atkinson (2002) and Redfern (2003) are of the view that the positive effects of gentrification come at the expense of displaced citizens. The end results in medium or high city building, increase in purse of property owners, but leaving a boundary between the low-income residents and the investors.

Government, Traditional Rulers and Gentrification

In stabilizing decisions on gentrification, involvement of national leaders is crucial. One may ask: what has been the concern of government and community leaders on the issue of gentrification? Phillips et al. (2014), demonstrated with health impact research data and policy analysis contributed by the Alameda county public health department, on a claim that gentrification has been a nostrum for towns and cities with emphasis on government policies which lead to gentrification and bring about inequitable development. That justifies a statement by Atkinson (2002), that gentrification splits the concerns of policy-makers, researchers and commentators and summarises the impact of gentrification as sho in Table 1.

Table 1. Summary of Neighborhood Impacts on Gentrification

Positive	Negative
Stabilization of declining areas	Community resentment and conflict
	Displacement through rent /price increases
Increased property values	Loss of affordable housing
	Unsustainable speculative property price increases
	Secondary psychological costs of displacement
Reduction of suburban sprawl	Increase in cost and changes to local services

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

	Displacement and housing demand pressures on surrounding poor areas
Increase social mix	Loss of social diversity (from socially disparate to rich ghettos)
Decreased crime	Increase crime
Rehabilitation of property both with and without state sponsorship	Under-occupancy and population loss to gentrified areas
Even if gentrification is a problem it is small compared to the issue of	Gentrification has been a destructive and divisive process that has been aided by capital disinvestment to the detriment of poorer groups in cities.
i. Urban decline	
ii. Abandonment of inner cities	

Source: Atkinson (2002, Pg. 7)

And where some see a huge social costs and the gradual moving of the poor with little if no net gain to cities and the wider society, others see godsend to the public purse and a revitalization of the built environment. Phillips et al. (2014) explain gentrification as an option by the private sector through private development that target the needs of new, higher income residents over existing residents, make the individual movement of more well-off into older urban neighborhoods, the public sector paves the way.

Key Elements and Impacts of Gentrification

Phillips et al. (2014), state some key elements associated with gentrification including the following:

- A history of disinvestment of money, jobs, and other resources from the neighborhoods and the city;
- Speculators or developers buying property inexpensively and "flipping" it to make huge profits;
- Rezoning, subsidies, and other policies to make development of expensive housing easier and to court new, wealthier- and often- White people moving into the neighborhoods; and
- Increasing housing costs that price out poor and working-class people and people of colour to make way for wealthier residents.

Biro (2007) concludes that a clear understanding of the positive and negative effects is important in order to justify or condemn gentrification. "Gentrification is a double-edged sword. It is often a productive by-product of revitalizing city neighborhoods, but it can

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

impose great costs to certain individual families and businesses, often those least able to afford them"(Kennedy and Leonard, 2001). Guerreri et al. (2010) refer to the phenomenon where rich in-migrants push up rent prices causing displacement of poor residents as "endogenous gentrification". Accurate measurement of gentrification is difficult, because most data are collected after gentrification is well underway. Even the economists who argue against gentrification admit that displacement is hard to measure (Biro, 2007).

Gentrification as Government Strategy, social control and social cohesion

Uitermark et al. (2007) report the emergence of gentrification as a global urban strategy as clearly noticed in most Dutch cities and not the local government's measure to strengthen its tax base or developers pursuit of profit. According to Uitermark et al. (2007), gentrification is also not the housing demands of a new middle class and that state-led gentrification is an effort by a coalition of state actors and housing association at generating social order in disadvantaged neighbourhoods as practised in the Netherlands. Gentrification is used to pacify tension and to reduce concentrations that pose a problem of authority. Lees (2008) asserts that gentrification is used to promote social mixing and promote social interaction as against the notion that gentrification leads to social segregation, social polarization and displacement. The movement of middle-income groups into low-income areas creates overwhelmingly negative effects, the most significant of which is the displacement of low income groups (Atkinson, 2002). Walks and Maaranen (2008) have reported a relationship between the timing of gentrification, changes in income structure and shifts in immigrant concentration and ethnic diversity in Toronto, Montreal and Vancouver from 1961 to 2001 with a conclusion that gentrification in these cities was followed by declining and displacement, rather than improving, levels of social mix, ethnic diversity and immigrant concentration within affected neighbourhood.

Gentrification and Displacement

The process of spiky re-urbanization is the driving force behind gentrification and displacement which in effect, are indication of the scarcity of quality urbanism (Florida, 2015). Biro (2007), explains that the end results of gentrification may increase physical properties and amenities, improves the quality of schools, and lowers crime rates. Low income residents may find opportunities to bridge the income gap while achieving self-improvement and greater standard of living. Apart from high income return to investors and property owners, the traditional architecture and historical significance are highly affected. As reported by Kennedy and Leonard (2001), longtime neighbors can take very different positions on gentrification issues. This could be affirmed by members of a community who would stand firm on their rights against any gentrification above their expectations. According to Lang (1982), majority of the cost and benefits of gentrification should be made known to the stakeholders involved. Levy et al.(2006) indicate that the indigenous people

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

finds it difficult to live in gentrified areas due to increase in rents. Growing urban inequality coupled with increase in demand for housing are some factors affecting increase in rents (Feldman, 2014). Furthermore, gentrification-related displacement become a hindrance when housing price increase putting a risk on lower-income households to push out or prevented from moving into certain geographic areas, and this along with restricted economic opportunities (Feldman, 2014). Displacement preventive strategies are influenced by a number of factors including intensity of the housing marketing, local political climate and local organization capacity. Displacement seem to be a critical component of gentrification, however a study conducted by Ingrid et al. (2011) show that the consequences of neighborhood change during gentrification do not appear to be as dire as many assume especially for the original residents.

STUDY AREA AND DATA COLLECTION METHODS

As indicated earlier this is a follow up study of gentrification at the Odum precinct by Adarkwa and Oppong (2005). The study area (Odum Precinct) is located within the CBD of the Ashanti regional capital, Kumasi. The Odum Precinct is bordered by the Guggisberg road and Bogyiwa Street on the East, Prempeh II Street on the North, Stewart Avenue on the West and the State Transport Company (STC) on the South as shown in Figure 1.



Fig. 1 Aerial view of CBD of Kumasi with the study area (Odum) edged red.
Source: Adapted from Google Earth, 2016

This study used the mixed methodology. Surveys, interviews and photographs were used as strategies to obtain data from respondents in the study. Photographs of old buildings that have

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

been gentrified brought reminiscence for the respondents have lived in the study area since the early 2000s to give useful information. A total of about 168 buildings were counted covering an estimated area of eight acres and about 93% have been redeveloped into commercial facilities. The remaining 7% are for residential purposes with relatively low population density of 40 persons per acre as compared to the 2005 study of 60 persons per acre.

The following landmarks were found at the study area:

i. The Adumhene's Palace (Maintained)
ii. The Palace and Mausoleum of the Akyempemhene of Odum (Part Renovated)
iii. The Ramseyer Presbyterian Church

From the survey, the Odumhene's Palace and the Okyeamehene's Palace have been well maintained with part of the Akyenpemhene's Palace partly redesigned for commercial activities. The Kumasihene's palace has been gentrified with a seven-storey building for commercial purposes. In order to make an accurate comparison with the previous study done in 2005, buildings in the study area were categorized into four types from which samples of each building type were selected for the survey as shown in Table 2.

DATA ANALYSIS AND DISCUSSION

Thirteen households and seventy-one residents were interviewed respectively as compared to the previous study of 24 households and 120 residents by (Adarkwa and Oppong, 2005). Table 2 shows the classification of building types for the study which include gentrified buildings (under construction), gentrified buildings (completed), buildings to be gentrified and buildings not to be gentrified with figures showing the trend of gentrification for the past decade.

Table 2: Classification of buildings

Types of Buildings	Number of Buildings		Percentage (%)		Number of Household Interviewed		Percentage (%)		Number of Residents Interviewed		Percentage (%)	
	2005	2016	2005	2016	2005	2016	2005	2016	2005	2016	2005	2016
Gentrified buildings (under construction)	20	13	19	7.76	3	3	12.5	23.1	18	4	15	5.6
Gentrified Buildings (completed)	17	138	16.2	82.1	6	4	25	30.8	29	27	24.2	38
Buildings to be Gentrified	66	12	62.9	7.16	14	4	58.3	30.8	70	30	58.3	42.3

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

Buildings not to be Gentrified	2	5	1.9	2.98	1	2	4.2	15.3	3	10	2.5	14.1
Total	**105**	**168**	**100**	**100**	**24**	**13**	**100**	**100**	**120**	**71**	**100**	**100**

Source: Adarkwa and Oppong (2005) and Field survey, February, 2016

From Table 2 more buildings have been gentrified with a percentage of about 82.1. This compared with previous study of 16.2 percent shows an increment of about 67 percent. Phe and Wakely (2000) are of the view that gentrification is not basically designed to cause displacement rather, there is only a change of preference when high income residents move in and low income residents move out in the neighborhood. Buildings under gentrification were also counted to be 13 in number with a percentage of 7.74 while about 12 have not been gentrified. The respondents claim that land value at the Odum precinct is at a mean rate of about GHc350,000.00 which is relatively very high in Ghana. This has led to the development of storey buildings beyond four-storey for commercial purposes which have eventually reduced the population density. This is confirmed by the total households in gentrified buildings (53.9%) and the total residents interviewed in gentrified buildings (43.63%) which is low with regards to the total buildings gentrified (89.84%). Displacement is apparently reducing the households while the buildings increase especially with the number of storey for commercial purposes.

Buildings under gentrification

Adarkwa and Oppong (2005) recorded about 20 buildings which were under gentrification as compared with 13 in this survey. It indicates that construction due to gentrification take place frequently and these buildings are completed within three years. About 23.08% of households which were undergoing gentrification were interviewed and it was revealed that the gentrified buildings under construction as shown in figures 4-6 were started in the past two years ago except figure 3 which started four years ago.



Fig. 3. Two multi structures under gentrification opposite the Akyampemhene's palace along the Guggisberg road Source: Authors, 2016



Fig.4. some buildings under gentrification along the Guggisberg road Source: Authors, 2016

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk



Fig.5. A building under gentrification next to the "Glory Plaza" Source: Authors, 2016



Fig.6. Some buildings under gentrification opposite the "Aseda house" Source: Authors, 2016

Buildings (candidates) not yet gentrified

These are old and traditional buildings which have stood the test of time. They are candidates for gentrification as the respondents indicated that Figure 7 (the Akyampemhene's palace) with a traditional courtyard has a portion gentrified. Figure 8 clearly shows an old residential building with a new design on a bill board ready to be gentrified. From the survey, nearly 10% of the buildings have not been gentrified. The 2005 study reported about 62.9% of buildings which were yet to be gentrified. A clear comparison indicates an additional gentrified building of about 52.9% in the last decade. There is still high possibility of the rest being gentrified considering their location and future income returns for the owners.



Fig. 7. The Akyampemhene's palace not gentrified along the Guggisberg Road; Source: Authors, 2016



Fig. 8. A residential house along the Guggisberg road on a brink of gentrification showing the new design on a bill board; Source: Authors, 2016

Figures 9 and 10 show old buildings which date back to the 1920s including the S.D. Karam house along the Prempeh II , Accra house and Edward Nassar Building along the Guggisberg road.

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk



Fig. 9. The S.D. Karam house built in 1928 not gentrified along Prempeh II Street; Source: Authors, 2016



Fig. 10. The Accra house and Edward Nassar building not gentrified along Guggisberg road; Source: Authors, 2016

Buildings not to be gentrified

It is significant to conserve and value our culture, tradition and history and architecture's contribution to culture cannot be over emphasised. In an interview with respondents, nearly 2.98 percent of old buildings were reported not to be gentrified. Typical example is the Ramseyer Presbyterian Church building within the precinct as shown in fig 11.



Fig. 11. Ramseyer Presbyterian Church building not to be gentrified; Source: Authors, 2016

This building was constructed in1896 authorities of the church have decided to conserve it due to its architecture. Additional information obtained during the study indicates that decisions have been made by most household owners to give them out to private investors

Gentrified Buildings

A recommendation was made by Adarkwa and Oppong (2005) to conserve the Kumasihene's Palace to help serve as a historic building within the city. However, this study shows that this historic building has been gentrified as shown in figures 12 and 13.

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk



Fig. 12. The Kumasihene's palace
Source: Adarkwa and Oppong (2005)



Fig. 13. Kumasihene's palace gentrified
Source: Authors, 2016



Fig. 14. A Gentrified building (Dufie Towers) along the Guggisberg road. Source: Authors, 2016



Fig. 15. A Gentrified building along the Prempeh II Street. Source: Authors, 2016



Fig. 16. A Gentrified building along the Prempeh II Opposite the Barclays Bank. Source: Authors, 2016



Fig. 17. A Gentrified building (Presbyterian Book Depot)). Source: Authors, 2016

Figures 14-17 above show a number of buildings gentrified within the Odum Precinct including the Dufie Towers behind Aseda house and others with glass façades.

REASONS FOR GENTRIFICATION AT ODUM PRECINT

From the survey, 76.2% of the buildings had been gentrified for economic reason. Respondents thought it wise to take advantage of the high land value and therefore agree with commercial developers to take over. Another reason for gentrification is the lack of maintenance of the traditional buildings by owners due to litigation among extended family members over ownership rights and responsibilities.

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

Table 3. Respondents' reasons for gentrification

Reasons for Gentrification	Number of Buildings		Percentage (%)	
	2005	2016	2005	2016
Purpose Built (Commercial)	1	3	1	1.79
Economic Reasons	80	141	76.2	83.93
Restoration / Maintenance	9	11	8.6	6.55
Aesthetic / Attraction	15	13	14.2	7.73
Total	105	168	100	100

Source: Adarkwa and Oppong (2005) and Field survey, February, 2016

Increase in family size according to respondents called for maintenance and restoration which increased from about 9 residences (8.6%) in 2005 to about 11 residences (6.55%) in 2016. Although there is a reduction in family sizes, there is an increase in number of buildings due to the higher increase in economic preference. This, therefore, shows a level of desire for maintenance and restoration by some of the buildings such as the Adumhene and Akyampemhene's Palaces as shown in Figures 18 & 19. From Table 5, about 1.79 % of the buildings are built for the purpose of commercialization as compared to previous study. There is an increase in the desire for gentrification with economic reasons being the majority (76.2%) in 2005 as compared to (83.93%) in 2016. This shows an increase of 7.73% over a decade.



Fig. 18. Adumhene's Palace being conserved
Source: Authors, 2016



Fig. 19. Akyempemhene's Palace being conserved
Source: Authors, 2016

Sources of Funds for Gentrification

About 53% of gentrification at the Odum precinct is financed by private developers and this confirms the study conducted by Adarkwa and Oppong (2005) which indicated a majority 41.6% funds by private developers (Table 4). This is followed by funds from corporate bodies (company initiative) forming about 15.38% as against 8.3% in 2005. Funding from family and landlord initiatives which used to form about 16.7% each in the past decade has

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

reduced to 7.69% in 2016. This implies that private and corporate participation is gradually taken over building finance in the CBD of Kumasi.

Table 4. Sources of funds for gentrification

Source of Funding	Number of Buildings		Percentage (%)	
	2005	2016	2005	2016
Private Developer	10	7	41.6	53.86
Family Initiative	4	1	16.7	7.69
Corporate Initiative	2	2	8.3	15.30
Landlord Initiative	4	1	16.7	7.69
Neutral (prefer private developer)	4	2	16.7	15.38
Total	**24**	**13**	**100**	**100**

Source: Adarkwa and Oppong (2005) and Field survey, February, 2016

Displaced and Relocation

The survey revealed unavailability of accommodation for residents displaced especially the low income. The low income group form a majority 61.97% of the displaced as against 70% in 2005. However the family members displaced has increased from 10% in 2005 to 21.13% in 2016 which indicates that the landlords (high income) currently vacate the land entirely for the new development either through outright sale or build-operate-transfer (BOT) system. The middle income tenants are the least displaced with 16.9% as they are able to rent the few apartments available as shown in Table 5.

Table 5. Classification of Displaced using Income Groupings

Classification of Displaced People	Number of People		Percentage (%)	
	2005	2016	2005	2016
Low Income (Tenants)	84	44	70	61.97
Middle Income (Tenants)	24	12	20	16.9
High Income (Owners)	12	15	10	21.13
Total	**120**	**71**	**100**	**100**

Source: Adarkwa and Oppong (2005) and Field survey, February, 2016

It was revealed through interview with respondents that the displaced relocate to towns in and around the Kumasi metropolis such as Kwadaso, Santasi, Mamponteng, Ayeduase, Kwamo, Ejisu among others which lead to sprawl of the city with its accompanied challenges.

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

Effects Of Gentrification At The Odum Precinct

Residents showed great concern about the security of the precinct. About 80% of the gentrified buildings are for commercial purposes. Workers come during the day time and leave for their various homes outside the CBD during the night. Previously, when more residents used to live within the CBD, some kind of security was prevalent in the area. Currently, with this current situation where the place is mostly quiet, it is unsafe to walk alone the major streets of the precinct, especially at night. Also, the traditional and old buildings being pulled down destroy the historic architecture of the precinct. The Aseda House, as indicated in the Adarkwa and Oppong (2005) study, was constructed with extensive glass façades. Some current gentrified buildings including "The Glory Plaza" and "Dufie Towers" indicate a new trend of cladding material (glass and alucoboard) for the façades as shown in Figure 20.



Fig. 20 Extensive use of glass and alucoboard in "The Glory Plaza"and"Dufie Towers" Source: Authors, 2016

Adarkwa and Oppong (2005) recommended a proper selection of building materials which are environmentally friendly and welcoming for human settlement. However, this advice seems not to have been considered by property developers as they continue to engender multi-storey buildings with glass in the Odum precinct.

CONCLUSION AND RECOMMENDATIONS

In this paper, we present a direct follow up of gentrification in the Odum precinct in the CBD of Kumasi which was carried out by Adarkwa and Oppong in 2005. This paper concludes that about 90% of both the old residential and traditional buildings found in 2005 are no more existing and those which were susceptible to gentrification as recorded in 2005 have been gentrified notably the Kumasihene's Palace which could have been conserved as a heritage building for generations. There is high Security risk within the precinct while tenants live with the fear of being evicted for private investors take-over. The skyline continues to change predicted by Adarkwa and Oppong (2005) and almost all traditional building materials (Compressed earth blocks with cement- sand rendering and wood) have given way

kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

to the use of modern materials some of which are incongruous to tropical condition but may be aesthetically pleasant such as glass curtain walls, alucoboard and tile cladding.

It is recommended that the city authority and traditional leaders ensure that some traditional buildings such as the Akyempemhene's palace with its courtyard, the Adumhene's palace, the burnt brick Ramseyer Presbyterian building among others are conserved to exhibit the architecture of indigenous people of Kumasi. Rental housing should therefore be incorporated in the new building designs in the precinct to reduce displacement of tenants and eventually reduce the security risk. The issues at hand need a great concern of the government, traditional authorities, property owners, private investors, building designers and the residents to make sustainable policies in satisfying every aspect of gentrifying the area. Even though gentrification has its negative side the effects of aesthetics in the city cannot be over emphasised.

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kktwumasi2002@yahoo.co.uk
assasie2003@yahoo.co.uk

EFFECT OF HUMAN RESOURCE MANAGEMENT PRACTICES ON THE PERFORMANCE OF DEPOSIT TAKING SACCOS IN NAIROBI COUNTY, KENYA

Sagwa, E.V.[1] and Kembu,A.S.[2]

[1]*Department of Business Administration and Management, School of Business and Management Studies, Faculty of Social Sciences and Technology, Technical University of Kenya*
[2]*Department of Management, School of Business and Economics, Mount Kenya University*

ABSTRACT
The Cooperative Movement has evolved over time since the 19th Century to boost the socio-economic wellbeing of humanity. Cooperatives in Kenya are responsible for about 45% of Gross Domestic Product and 31% of national savings and deposits. Several DTSs have collapsed with depositors' money while others have been closed down due to their inability to meet operational standards. The purpose of the study was to establish the effect of Human Resource Management Practices (HRMP) on the performance of Deposit Taking Saccos (DTSs) in Nairobi County. In Kenya, DTSs have been licensed to provide a wide range of products and services to their members and customers. The study was anchored in the Resource Based View (RBV) of the firm. The study hypothesized that there is a relationship between Human Resource Management Practices and organization performance. Descriptive research design was adopted. The study was a census of the 42 DTSs in Nairobi County, Kenya. The target respondents were Chief Executive Officers and Human Resource Managers in the DTSs. A questionnaire was used for data collection. Descriptive statistic was employed for data analysis. The regression results indicate that HRMP have a positive effect on organization performance. This finding is consistent with the results of previous studies. The study recommends that policy makers and managers in DTSs have to ensure that they formulate and implement generic HRMP that can assist their organizations to attain and sustain a competitive advantage in their markets.

***Keywords**: Human Resource Management Practices (HRMP), Performance, Deposit Taking Saccos (DTSs)*

INTRODUCTION
Globally competitive organizations depend on the uniqueness of their human resources and the systems for managing human resources effectively to gain competitive advantage (Pfeffer, 1994; Barney & Wright, 1998). Human resources are not only the drivers and

evans.sagwa@tukenya.ac.ke

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principal value creators of the output of the knowledge industry, but they are also the intellectual capital or the infrastructure investment. As a consequence attracting, training, retaining and motivating employees are critical success determinants for any knowledge-based organization. An organization that aspires to perform well has to ensure that its Human Resource Management Practices (HRMP) practices are synergistic and consistent with its organizational strategy (Nzuve, 2007), like its competitive strategy in order to spur both individual and organizational performance (Schuler & Jackson, 1987).

Organizations can adopt sets of HRMP that suit their operational requirements. According to Pfeffer (1998) there are seven HRMP that influence organization performance. In current times, organizations are faced with intensive and complex competitive pressure. The organizations have to closely examine their structures, especially how they organize employment. This shift in focus to the human side of the business has necessitated the implementation of continuous improvement human resource programs (Waiganjo, Elegwa, & James, 2012; Longenecker et al., 1998). Organizations have shifted towards Strategic Human Resource Management (SHRM) by adopting tactical patterns or choices that are associated with the management of employment relations.

Organization performance can be measured in various ways. These may include but not limited to shares growth rate, market share, productivity and profitability (Ichniowski et al, 1997). Shares growth rate is a ratio that measures the rate of change in shares from time to time or a specified period of time. The utilization of historical growth rates is one of the methods of estimating future growth. Market share is the percentage of a market, which may be defined in terms of either units or revenue, accounted for by a specific entity. Market share is a key indicator of market competitiveness, that is, how well a firm is doing against its competitors.

Deposit Taking SACCOs play a major role in promoting a culture of thrift or saving and credit accessibility in the Kenyan economy. The DTSs are expected to maintain high standards of accounting, resource management and transparency in the management of business. They are also expected to adhere to strict guidelines in all their dealings and operations as they compete in a dynamic business environment that affects their performance. Deposit Taking SACCOs (DTSs) operating in Kenya in general and in the Nairobi County in particular, have to compete in the market place with other banking and non-banking institutions to attract and retain a steady clientele. The licensed DTSs have encountered challenges in regard to their performance contrary to the expectations of the stakeholders who are shareholders in the main SACCO that originate the DTSs and others who include but are not limited to those who patronize the services provided by the DTSs. These firms are expected to increase their share growth rates, expand their market share, increase productivity and profitability, which have not been realized by some of the DTSs. Some of the underpinning factors that influence firm performance may be attributed to the HRMP adopted

evans.sagwa@tukenya.ac.ke

by the DTSs and the type of competitive strategy adopted by the organizations. Hence the focus of the proposed study that sets out to shade light on grey areas and perspectives that had hitherto not been included in previous organization performance empirical studies.

Research Problem

In the current business environment, different organizations including those that are operating in the SACCO subsector are striving for ways and means of attaining and sustaining a competitive advantage over their competitors through the uniqueness of their human resources and operational systems. The HRMP that are adopted by an organization can affect its performance, which can be manifested in terms of shares growth rate, market share, productivity and profitability attained by the organization. The competitive strategy that an organization adopts can provide directions to an organization's efforts. These may take the form of cost leadership, differentiation or focus strategy to compete in the market that it operates in.

Deposit Taking SACCOs compete in a dynamic business environment that affects their performance. The organizations have to formulate and implement sound HRM Practices in order to make optimum use of a workforce that can make them build a sound human resource base. This can be utilized to build an inimitable human resource that can assist an organization to provide goods and services that cannot be easily imitated its competitors. Due to the liberalization of the market in Kenya, organizations are encountering challenges and are unable to operate effectively due to micro and macro-economic circumstances that are adversely affecting business. The DTSs are grappling with reduced market business volumes, declining market share, low levels of productivity and reduced profitability. These challenges can be traced to the kind of HRMP adopted by the DTSs, hence the need for the current study.

Much research over the years has attempted to establish a positive link between HRMP and organization performance (Wan-Jing & Tung, 2005; Pfeffer, 1994; Ulrich, 1997), though doubts have been cast on the validity of some of the findings. Most empirical studies (Delery & Doty, 1996; Guthrie, 2001; Huselid et al., 1997) have shown a positive relationship in the HRMP and organization performance link, the question that remains is how HRMP affects organization performance. Most of the empirical studies (Youndt et al, 1996; Huselid, 1995b; Delaney & Huselid 1996) have used moderating variables. The proposed study will utilize competitive strategy as a moderating variable to attempt to explain how it affects the HRMP and organization performance link. Previous studies (Ahmad & Shreoder, 2003; Ichniowski et al., 1997) have been conducted in the west. A previous study in Kenya by (Sagwa, 2015) on the Nairobi Securities Exchange found out that HRMP that were adopted by the firms had a positive effect on performance. The relationship between HRMP and organization performance, will be examined which had hitherto not been done on DTSs in

evans.sagwa@tukenya.ac.ke

Kenya. Hence the need for the current study, which sets out to answer the question; what is the effect of HRMP on organization performance.

Research Hypothesis

This research study seeks to test the following hypothesis:

H_1 There is a relationship between human resource management practices and organization performance.

Value of the Research Study

The current study intended to provide insights into knowledge about different HRMP needed to make organizations perform successfully. The study will contribute towards filling the gap in the body of knowledge in the practices of HRM in the DTSs in Kenya. The study intends to establish a link between HRMP and organization performance, namely shares growth rate, market share, productivity and profitability. This should not only ensure that the investors who put their capital in the DTSs continue to reap the benefits of their investment, but also boost the confidence of other investors to commit their capital in the Deposit Taking SACCOs.

The study sought to contribute further to previous empirical studies made in the area of HRMP and also generated a new framework for further research relating to the link between HRMP and organization performance. The researchers envisage utilizing HRMP and organization performance variables which have hitherto not been utilized in a single study in the proposed context.

The findings of the current research study will appeal to human resource management practitioners and decision makers in organizations when formulating and implementing HRMP with an intention to improving and sustaining the competitive advantage of their firms through their employees or workers. This should in turn make organizations create operational environments that are conducive to make them achieve superior results.

Theoretical Foundations of the Research Study

The study was anchored in the Human Capital Theory (HCT) and the Resource Based View (RBV) of the firm, there is strong evidence that supports the RBV (Crook et al., 2008). Organizations can attain and achieve a sustained competitive advantage through their employees according to Barney (1991). This can be realized when an organization has a human resource pool that cannot be imitated or substituted by its rivals or competitors. The Human Capital Theory (HCT) according to Schultz (1961) provides a perspective that value addition by people within an organization can contribute to enhancing better organization performance. Human Capital Theory regards people as assets and not a cost within an organization. Human capital according to Bontis (1998) represents the human factor in the

evans.sagwa@tukenya.ac.ke

organization; the combined intelligence, skills and expertise that gives the organization its distinct character that sets it apart from other organizations. The HCT Theory emphasizes the added value that people can contribute to an organization. Boxall (1996) refers to this situation as one that confers 'human capital advantage' to an organization.

The resource based view of the firm (Barney, 1991) provides a key element such that if HRM systems are to create sustained competitive advantage, they must be difficult to imitate. Path dependency characterizes resources that are developed over time such that learning and experience provide cumulative advantage. A competitor cannot simply purchase an equivalent resource from the market. Causal ambiguity describes resources whose content and essential ingredients are so subtle and difficult to fully comprehend that observers outside the firm are not able to reproduce in their own organizations. The causal ambiguity of an appropriately aligned HPWS that embeds effective strategy implementation throughout the firm is a good illustration (Lado & Wilson, 1994; Lengnick-Hall, 1998). This is what helps a firm to create a competitive advantage through its unique human resource. The resource based view has been of common interest for management researchers and numerous writings could be found for same. A resource-based view of a firm explains its ability to deliver sustainable competitive advantage when resources are managed such that their outcomes cannot be imitated by competitors, which ultimately creates a competitive barrier (Smith and Rupp 2002).

Human Resource Management Practices and Organization Performance

The importance of the global or overall HRM system is emphasized because it is believed to be systematic and interrelated influence of HRM policies and practices that provide their inimitability, and therefore provide a strategic lever for the firm that is internally consistent and externally aligned (with the competitive strategy). Much of the work in the area of HRM-organization performance area is organized around several themes and research approaches that set it apart from conventional research in the field of HRM. Perhaps the most important of these differences is that systems of HRMP, rather than individual practices and policies in isolation, have been the level of analysis in much of the recent work. HRM systems are the most appropriate level of analysis because they more accurately reflect the multiple paths through which HRM policies will influence successful strategy implementation, (Huselid, 1995).

Recruiting and retaining outstanding people and 'capturing a stock of exceptional human talent' is seen as an effective way to achieve sustained competitive advantage (Boxall, 1996). Even though employers have always wanted to recruit the best people available, this is nowadays more likely to be systematized through the use of sophisticated selection techniques and taking greater care when hiring. Progressive organizations are increasingly adopting high pay contingent on performance of an employee which impacts on firm

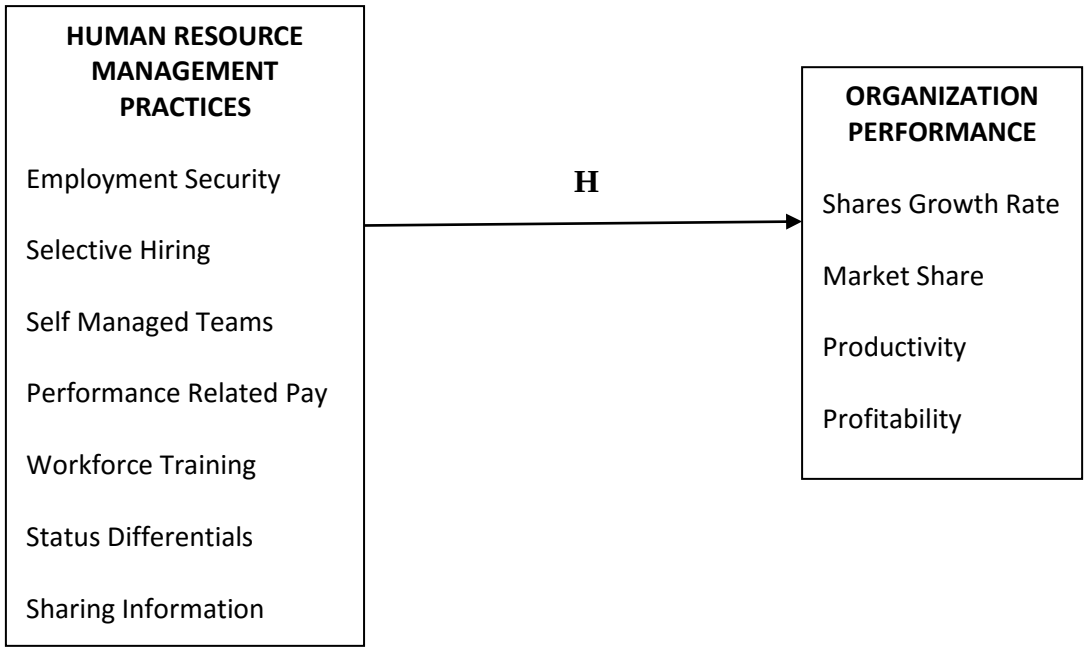
evans.sagwa@tukenya.ac.ke

performance, there are three kinds of compensation plans, base compensation, pay incentives and indirect compensation.

Conceptual Framework

The conceptual model Figure 2.1 presents a schematic picture of the researcher's presumed perception of existing relationship among the variables of the study. The schematic diagram captures the linkages in the literature. The model suggests an interrelationship among the variables of the study namely: human resource management practices – as independent variable and organization performance as dependent variable.

Figure 2.1: A Conceptual Model showing Human Resource Management Practices and Organization Performance



Source: Researchers (2015)

This relationship indicated on Figure 2 is envisaged to exist in organizations, but the application of different human resource management practices like the mode of employee recruitment and selection, employees training and development and compensation management, tend to have implications on the performance of firms. This relationship between HRMP and firm performance was under study to shade light on the aspects that underpin the HRMP – firm performance relationship.

RESEARCH METHODS

Research Design

After considering the various research designs described by different research experts for instance, (Cooper & Shindler 2006; and Mugenda & Mugenda, 2003), as well as the purpose of the study, the philosophical tradition adopted, the topical scope, researcher involvement, time period over which the data was to be collected, the nature of data to be collected and type of analysis to be performed, the research design adopted for this study was a cross-sectional descriptive survey of all Deposit Taking SACCOs in Nairobi County in Kenya. Using the descriptive survey design, the researchers were able to describe the variables of study and derive predictive regression models for predicting dependent variables.

Population of the Study

The population of the study comprised of all the 42 licensed Deposit Taking SACCOs in Nairobi County as listed in the Kenya Gazette (SASRA 2015) County) as at 3RD July, 2015. The study was a census, which involved obtaining information from every member of the population. The study targeted Chief Executive Officers, Managers, Human Resource Managers or other Managers of equivalent level in the DTSs.

Data Collection Instruments and Procedures

Quantitative data was collected to enable the researchers conduct an in-depth study. The researchers used a questionnaire to collect data. Data was collected from informants of the study comprising Chief Executive Officers, Managers, Human Resource Managers or other Managers of equivalent level in the DTSs, because they were considered to be more knowledgeable in the implementation processes of HRMP at their operational areas (Muganda, 2000). The researchers sought authority and obtained a Research Permit from the National Council for Science, Technology and Innovation (NACOSTI) to collect data. The researchers with the help of research assistants administered an Introduction Letter and the data collection instrument mainly through drop and pick later method.

Tests of Validity and Reliability

A pre-test was done by administering the instrument to sixteen human resource managers conveniently selected managers to fill. The sixteen managers were requested to evaluate the statement items for relevance, meaning and clarity. Content validation was also done by dividing the instrument into several sections. Each section was checked carefully to ensure that it conveyed the necessary message and attracted the relevant feedback, as per the tested specific themes of the research objective and hypothesis.

The researchers collected data from chief executive officers, managers, human resource managers or managers of equivalent status in the firms that participated in the study. The

evans.sagwa@tukenya.ac.ke

Cronbach's Alpha coefficient was used to measure the internal consistency of the constructs. The alpha coefficient of .700 or above is an acceptable measure, but the lower threshold can be accepted.

Check for Multicolliniarity

Multicollinearity exists when there is a strong correlation between two or more predictors in a regression model, and poses a problem only for multiple regressions and not on simple regression (Field, 2009). Multicollinearity poses several problems such as increases in standard errors of the β coefficients, meaning that the βs have relatively higher variability across samples and less likely to represent the population. Variance Inflation Factor (VIF) will be used to diagnose the collinearity of the data. The VIF indicates whether a predictor has a strong linear relationship with other predictors with concern raised if VIF is 10 and above.

Data Analysis and Interpretation

Simple linear regression analysis was used to establish the nature and magnitude of the relationship between variables; and to test hypothesized relationships. The coefficient **r** indicates the strength and direction of linear relationship between variables of the study. The relationship is strong where **r**=0.5 and above, moderately strong when **r** is between 0.3 and 0.49, weak when **r** is below 0.29, and a correlation of 0 indicates no relationship.

DISCUSSION

Response Rate, Reliability and Validity Test

Out of the 42 respondents, 39 of them participated in the study. This constitutes a response rate of 92.8 percent. All of these questionnaires were considered usable for the study, and thus represented an adequate response rate for the precision and confidence required in this study.

A pilot study was conducted to find out if the respondents could answer the questions without difficulty. Respondents in the pretest were drawn from one deposit taking SACCO (equating to ten purposively selected respondents) perceived to be knowledgeable in HRMP, competitive strategies and organization performance. They were asked to evaluate the questions for relevance, comprehension, meaning and clarity. The instrument was modified on the basis of the pilot test before administering it to the study respondents.

Cronbach Alpha was used to test reliability of the instrument. A coefficient of 0.7 and above shows high reliability of data (Saunders, 2009). The Cronbach Alpha test of the instrument resulted in a values which is greater than 0.7, thus the questionnaire was reliable.

evans.sagwa@tukenya.ac.ke

Table 1: Reliability and Validity Test

Constructs/Variable	Number of Statements	Cronbach Alpha	Comment
Human Resource Management Practices	22	0.722	Reliable
Organizational Performance	4	0.705	Reliable

Multi-collinearity

Multi-collinearity exists when there is a strong correlation between two or more predictors in a regression model, and poses a problem only for multiple regressions and not on simple regression.

Table 2: Multi-collinearity

Pearson Correlation	Human Resource Management Practices	Competitive Strategy	Organizational Performance	Collinearity Statistics	
				Tolerance	VIF
Human Resource Management Practices	1	.746**	.585**	.443	2.258
Organizational Performance	.585**	.582**	1		

**. Correlation is significant at the 0.01 level (1-tailed).

Demographic Information

This section covers the response obtained from the respondents in terms of the demographic information.

Table 3: Demographic Information

		Ownership of SACCO			
		Kenyan	**Foreign**	**Other**	**Total**
Designation of respondent	Chief Executive Officer				
	Manager	7	0	0	7
	Human Resource Manager	12	0	0	12
	Other Please Specify	19	0	0	19
Total		**39**	**0**	**0**	**39**

evans.sagwa@tukenya.ac.ke

Number of employees	Up to 100	14	1	0	15
	101 to 200	17	0	1	18
	201 to 300	4	1	0	5
	301 to 400	1	0	0	1
Total		**36**	**2**	**1**	**39**
Years of operation in Kenya	10 Years & below	15	1	0	16
	11 to 20	11	1	1	13
	21 to 30	6	0	0	6
	31 to 40	3	0	0	3
	Above 40 Years	1	0	0	1
Total		**36**	**2**	**1**	**39**
Category of Sacco	Teacher based Sacco	3	0	0	3
	Government based Sacco	13	0	0	13
	Farmers based Sacco	3	0	0	3
	Community based Sacco	10	0	0	10
	Others	7	2	1	10
Total		**36**	**2**	**1**	**39**

Study findings in table 3 indicate demographic profiling of respondents and their respective institutions. From the findings that 7 respondents were managers, 12 were human resource manager while majority 19 were from other departments i.e. loan officers, liaison officers. This indicates that a majority of the respondents were designated as human resource managers to handle the human resource function. Such managers would be expected to have a wealth of knowledge in handling human resource issues. It will also be essential to point out that majority of the respondents 37 were Kenyans while only two were foreign. The findings imply that ownership of a listed company may have an influence on human resource management practices and firm performance. The table also shows that 15 institutions have employee population of up to 100 employees; 18 institutions had employee population range of 101–200; five institutions had a population of the employee range of 201 – 300; and only one institution had an employee range of 301 – 400.

On the period they have been operating in the country, 16 firms have been in operation in the country for less than 10 years; 13 had operated for a period of between 11 to 20 years; 6 institution have operated for 21-30 years; 3 firms had operated for 31-40 years; while 1 institution have operated for the last 40 years. The study was also interested in the categories of Sacco's depending on their scope of operation since inception. From the findings, 13 institutions were Government based Sacco, 10 were Community based Sacco, Farmers based Sacco in the study were three and the rest (10) were others, consisting of faith based and profit oriented institutions.

evans.sagwa@tukenya.ac.ke

Descriptive Statistics

Human Resource Management Practices

Table 4: Human Resource Management Practices

Human Resource Management Practices	Mean	Std Deviation
Employment Security (in my Sacco)		
Employees can expect a life-long employment in this Sacco	3.6154	1.26938
It is easy to terminate or dismiss employees in this Sacco	2.2821	1.52088
Job security is almost guaranteed to employees in this Sacco	4.0526	.56699
Selective Hiring (in my Sacco)		
A rigorous recruitment and selection process is applied in hiring	4.0000	.85840
The emphasis in hiring in this Sacco is competence	4.1795	.72081
The emphasis in hiring in this Sacco is merit	4.2308	.77668
Self – Managed Teams (in my Sacco)		
The views of teams are sought before decisions are made in this Sacco	4.3077	.61361
Teams are usually formed to solve problems in this Sacco	4.1538	.81235
Teams/departments are provided with discretion and resources to make decisions in this Sacco	4.2368	.58974
Performance Related Pay (in my Sacco)		
My Sacco provides high compensation contingent to performance	4.1282	.65612
Compensation is aimed at encouraging employees to achieve Sacco goals	4.3077	.46757
My Sacco's compensation recognizes employees who contribute most to the Sacco	4.3590	.58432
Workforce Training (in my Sacco)		
Executive training programmes are provided to employees in my Sacco	4.0000	.76089
Employees usually undergo training every year in my Sacco	4.2564	.63734
Newly hired employees are provided with formal training in my Sacco	4.3684	.54132
In my Sacco employees who are promoted are provided with formal training	4.4474	.64504
Status Differentials (in my Sacco)		
All employees wear ties in my Sacco	4.1026	.85208
In my Sacco all employees wear uniforms indicating different	4.0000	.82717

evans.sagwa@tukenya.ac.ke

positions		
In my Sacco every employee has an individual office	4.3077	.79980
Sharing Information (in my Sacco)		
Information is made available to all employees in my Sacco	4.1026	.75376
My Sacco maintains and implements an open door policy	4.3077	.61361
Employees are encouraged to make suggestions about their jobs in my Sacco	4.2368	.58974
Overall HRMP Mean=4.09; **Overall Cronbach's Alpha=0.891**		

The results of descriptive statistical analysis for the human resource management practices are presented in table 4. This measurement scale consisted of 5 items reflecting the employment security, selective hiring, self – managed teams, performance related pay, workforce training, status differentials and sharing information. Respondents were asked to provide answers on each item that was measured by a five point Likert scale ranging from 1 (very low) to 5 (very high). From the table mean and standard deviation were used to test respondent ideas. From the table the statement that 'In my Sacco employees who are promoted are provided with formal training' has the (mean = 4.4474 and standard deviation = 0.64504); this was found to be the most significant factor on human resource management practices, other significant factors were: Newly hired employees are provided with formal training in my Sacco (mean= 4.3684 and a standard deviation of 0.54132); My Sacco's compensation recognizes employees who contribute most to the Sacco (mean= 4.3590 and a standard deviation of 0.46757) and compensation is aimed at encouraging employees to achieve Sacco goals (mean = 4.3077 and a standard deviation of 0.58432) while the least indicated was the statement that 'It is easy to terminate or dismiss employees in this Sacco' with a mean of 2.2821 and a standard deviation of 1.52088.

Organizational Performance

Table 5: Organizational Performance

Variables	**Mean**	**Std Dev**
Compared to your competitors in the previous year, what is your Sacco's shares growth rate	4.0769	.62343
Compared to your competitors in the previous year, what is your Sacco's market share percentage	4.0256	.62774
Compared to the previous year, what is the level of employee productivity in your Sacco	4.2051	.61471
Compared to the previous year, what is the level of profitability of your Sacco	4.1538	.70854

evans.sagwa@tukenya.ac.ke

Overall mean= 4.12;
Overall Cronbach's Alpha= 0.765

Organizational performance was measured using four items namely; sales growth rate, market share, productivity and profitability. As shown in Table 6, the respondents rated the perceived extent to which the questionnaire items regarding firm performance were applied. A 5 – point Likert type scale was used to collect the responses, where 5 indicated 'strongly agree' and 1 indicated 'strongly disagree,' while 3 was taken as the midpoint. A mean of 3 and above represented agreement or favorable response with the given statement, and a mean of less than 3 denoted less favorable. The most significant factor was the statement that 'Compared to the previous year, what is the level of employee productivity in your Sacco' with a mean of 4.2051 and standard deviation of .61471, while the least significant factor was the statement on market share, with a mean of 4.0256 and standard deviation of .62774. However, the overall mean score for organizational performance as indicated in Table 6 is 4.12 and a Cronbach's Alpha of 0.765.

Hypothesis testing

Effect of Human Resource Management Practices on Organization Performance

Table 6: Hypothesis Results for the effect of Human Resource Management Practices on Organization Performance

Model Summary

Model		R	R Square	Adjusted R Square	Std. Error of the Estimate
1	HRMP	.585[a]	.342	.321	.35574

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.105	1	2.105	16.631	.000[b]
	Residual	4.050	32	.127		
	Total	6.154	33			

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.005	.766		1.312	.199
	HRMP	.763	.187	.585	4.078	.000

*p < 0.05

evans.sagwa@tukenya.ac.ke

a. Predictors: (Constant), Human Resource Management Practices
b. Dependent Variable: Organization Performance

Analysis in table 7 shows that the coefficient of determination (the percentage variation in the dependent variable being explained by the changes in the independent variables) R^2 equals 0.342, leaving 65.8 percent unexplained, implying that there are other factors associated with organization performance, which were not explained in the model. The P- value of 0.000 (Less than 0.05) implies that the model of human resource management practices on organization performance is significant at the 5 percent significance. A significant F test indicates that we can reject the null hypothesis. The P value is 0.000 (Less than 0.005).

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study concludes that generic HRMP have a strong predictive effect on performance of organizations. DTSs need to pursue human resource management practices that are aligned to their generic business operations for the realization of superior performance. Human resource management practices can assist the DTSs to attain competitive advantages through their human resource and compete effectively in their markets.

Recommendations

Based on the conclusions, the study recommends that DTSs need to embrace and improve on their human resource management practices to enhance their performance. Future research can use a longitudinal research design to determine how human resource management practices affect organizational performance.

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evans.sagwa@tukenya.ac.ke

evans.sagwa@tukenya.ac.ke

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THEORETICAL FRAMEWORK ON CONFLICT MANAGEMENT PRACTICES AMONG TERTIARY STUDENTS

Bello, M. M.[1], Aviara, N.A.[2] and Aremu, A.K.[3]

ABSTRACT

The recent increase in student numbers in the various universities in Ghana and the consequent exploitation of limited resources have pushed students to put pressures on one another, resulting in certain unethical behaviours. The study examines the conflict management techniques employed in managing conflicts among tertiary students. Content analysis was adopted in the research on existing research work. The main results of the study are that conflict management techniques mostly employed to manage conflict are accommodating, compromising and collaborating. Whereas there was no significant difference in the use of these management techniques, there was a significant difference among male and female respondents in the use of the competing management techniques.

Keywords: Conflict; Management; Practices; Tertiary; Ghana

INTRODUCTION

Cockburn (2001) states that there are two schools of thought in relation to conflict. There are those who stand above the conflict and look for rational value-free solutions. They talk about conflict arising through unmet human needs. The exponents of the second school of thought prefer to look at the issue with the belief that conflict can sometimes compromise human rights and therefore are very alert when conflict symptoms begin to show.

People tend to view conflict as a negative force operating against successful completion of group of goals. Conflict becomes negative when it escalates and produces accusations and threats, which damage the already existing relationship.

Cooper (2005) explains that besides creating turbulence, conflict can also breed opportunities for significant change; hence people may be able to extract benefits from such turbulence. It is worth nothing that confusions can generate innovations and it can as well provoke actions that do not only reduce the confusion but also improve the lives of individuals or groups caught up in the confusion. In effect, it is almost impossible to get rid of conflict with a group setting because without conflict, individuals will be shallow-minded for lack of stimulation. Groups and organizations instead of growing will remain at standstill and eventually collapse. Societies will also collapse under their own weight because they are unable to adapt to changing circumstances.

Conflict occurs when two or more people or organizations disagree because their needs, wants, goals, or values are different. Hurt feelings, anger, bruised egos, and poor communication are all procedures to conflict. Warren (2005) argues that conflict in the strict sense of the word is a change agent's proposal. These are the results of sharp value and belief differences among the parties. The inability to recognize and deal with issues at stake pushes the conflicting parties to attack personalities instead of attacking the real problem.

However, university setting such as those involving academic freedom, research and the micro managing of personal matters by peers.

Conflict that occurs in institutions need not be destructive, provided the energy associated with conflict is harnessed and directed towards problem solving and improving the situation. However, managing conflict effectively requires that all parties understand the nature of the conflict in the establishment.

Hypotheses

The following hypotheses were tested in the study.

1. H_0: There is no significant difference between male and female in the use of conflict management techniques.
2. H_1: There is a significant difference between male and female in the use of conflict management techniques.

The study aimed at provoking discussion on the topic conflict management practices relating to students in the halls or residence. It is significant to students' representatives, hall masters/wardens, as well as the Office of Students' Affairs because the data obtained from the study could provide valuable information for enhancing policy guidelines and procedures on conflict management among students in the university. They may find the study to be a means of improving decision-making and allocating resources and responsibilities efficiently. It will again help policy makers to formulate comprehensive and workable policies so as to minimize the rate of conflict occurrence among students in one way or the other as much as possible.

REVIEW OF RELATED LITERATURE

Perspectives of Conflict

In the past, people thought harmony was the normal state of relationships hence conflict was regarded as an abnormal condition. People involved in conflict or the engagement of disagreement were considered anti-social. Because of these negative views of conflict, it has been suggested that conflicting parties should always strive to reduce or avoid conflict and it should never be escalated wherever it existed. One reason people responded toward conflict in this manner was because conflict was often seen as a mere clash of personalities.

Three views of organizational conflict (Bacal, 2002) are linked to a different set of assumptions about the purpose and function of the organization in question, and these are: good, bad and ugly.

The Good View

The good view also referred to as functional view of organizational conflict sees conflict as a productive force, one that can stimulate members of the organization to increase their knowledge and skills, and their contribution to organizational innovation and productivity.

There is evidence indicating that conflict can be positively related to productivity. For instance, it was demonstrated that, among established groups, performance tended to improve more when there was conflict among members than when there was fairly close agreement.

Conflict can improve the quality of decisions. At the initial stage of discussing issues of student enrolment, for example, members may disagree about the enrolment level, but the disagreements may come to an end the moment one calls the Registrar's Office and requests for the enrolment information on records. By so doing, group members may have additional information to what they already possess.

This view considers that the keys to organizational success lie not in structure, clarity and orderliness, but in creativity, responsiveness and adaptability. The successful organization, then, needs conflict so that diverging views can be put on the table, and new ways of doing things can be created.

The functional view of conflict also suggests that conflict provides people with feedback about how things are going. Even "personality conflicts" carry information to the manager about what is not working in an organization, affording the opportunity to improve.

Kreitner and Kinicki (2004) in their description of a functional conflict refer to it as constructive. Functional conflict manifests when it

Results in clarification of important problems and issues; Results in solutions to problems; Involves people in resolving issues important to them; Causes authentic communication; Helps release emotion, anxiety and stress; Builds cooperation among people through learning more about one another.

The functional view regards conflict as a challenge to the status quo and thus furthers the creation of new ideas, promotes reassessment of group to change. In any case the more the tasks of the group are non-routine, the greater the probability that internal conflict will be constructive.

The Bad View

The bad view, also known as the dysfunctional view of institutional conflict is embedded in the notion that organizations are created to achieve goals by creating structures that perfectly define job responsibilities, authorities, and other job functions. Conflict was believed to be

the antithesis of cooperation (Hatch, 1997). Hatch says conflict is generally interpreted as a sign of a defective social structure, hence any introduction of conflict implies that the organization is not designed or structured correctly or adequately.
For Kreitner and Kinicki (2004) dysfunctional conflict is the destructive type of conflict. A conflict is destructive when it: takes attention away from other important activities; undermines morale or self-concept; polarizes people and groups while reducing cooperation; increases or sharpens difference; and, leads to irresponsible and harmful behaviour, such as fighting or name-calling.

The Ugly View

The ugly view is seen where the manager and perhaps employees attempt to eliminate or suppress conflict in situations where it is impossible to do so. Symptoms of the ugly view of conflict in an organization are when; Many conflicts run for years; People have given up on resolving and addressing conflict problems; A good deal of private bitching and complaining exist with little attempt to fix the problem; Staff show little interest in working to common goals, but spend more time and energy on protecting themselves.

With reference to the ugly view, there is a tendency to look to the administrator or leader as being responsible for the conflict. That is how most employees would look at the situation. It is true that managers and supervisors play critical roles in determining how conflict is handled in the organization, but it is also true that the avoidance of ugliness must be a shared responsibility. Management and employees must work together in a cooperative way to reduce the ugliness, and increase the likelihood that conflict can be channeled into an effective force for change.

Mulins (2005) in his discussion on the views of conflict mentions the traditional views, which implies a nunitary perspective of the organization. The traditionalist sees conflict as dysfunctional.

Table 1 Pondy's Dynamic Process of Conflict

Stage	Process	Cause of Conflict
First	Latent Conflict	Competition for scares resources when the average number in demand is more than the resources. Desire for autonomy and divergence of subunit goals.
Second	Perceived Conflict	Parties involved become aware of the problem but incompatibility is perceived. It does not necessarily emerge from latent conflict.
Third	Felt Conflict	Occurring as an emotional response to the second

		stage. Felt conflict may find expression in fear, threat, mistrust and hostility.
Fourth	Manifest Conflict	Emerges if nothing is done to resolve the felt. It can result in the exhibition of behaviours ranging from physical or verbal attack to refusal to work.
Fifth	Conflict Aftermath	Follows the fourth stage, which is an open conflict. If there were satisfaction after conflict resolution then further relationships may be more cooperative but if conflict was suppressed then the first stage will reappear.

Source: Adapted from Cook, C.W. & Hunsaker, P.L (2001) Management and Organizational Behaviour Boston McGraw-Hill (p.376).

Sources of Conflict

Baldridge (2000) argues that universities being political organizations as opposed to collegial, bureaucratic or purely rational systems are also a pluralistic system often fractured by conflicts along the lines of disciplines, faculty subgroups, student's subcultures, splits between administrators and facilities, not overlooking rifts between professional schools.

In a study conducted from 25 different departments of employees in the New York University on organizational culture. Otto (1998) found that departments, which identified themselves as having problems with conflict management, had lower quality of rationale in decision-making. The study's findings were that culture variables such as the quality of communication, quality of relationships and rationality influenced the effectiveness of the informal techniques.

According to Hybels, Richard & Weaver II (2001), conflict generally occurs for one of several reasons, their discussion focuses on four sources of group conflict and these are procedure, power, work distribution and substantive conflict. Procedure, which happens to be the first source of conflict mentioned by them, is perhaps the easiest to eliminate. This kind of conflict comes about as a result of differing views on procedure for meetings.

Members sometimes differ with regard to the form the minutes should take and such a conflict can be stopped when issues are resolved properly at the first meeting. The exhibition of differences does not occur in meetings only; there are instances where discrepancies in role performances can lead to difficulties and two people will have to see their own and each other's role differently.

The second source of conflict according to Hybels and others (2001) is the desire of an individual member or members in a group to wield power; a situation which nourishes power struggles. Fisher and others (2000) also say a conflict often centers on the search of power or more of it. The fear of losing power and sometimes the assumption that it is only through power that a successful change can be realized urges group members to reach for it no matter the circumstances.

The type of organizational structure existing in an organization may either promote or prevent minor problems from snowballing into major incidents. The organizational structure if not properly designed and defined may lead to interfering job descriptions and may result in power struggle among members involved.

Autocratic leaders who manage through highly centralized power structures often generate high level of interpersonal friction. At the other extreme, weak leaders also engender interpersonal conflict because the power vacuum at the top encourages subordinates to crave for positions. The ideal situation therefore is balanced power structures where all involved participate in decisions at one level or the other thereby creating a sense of fairness among members in a group.

Even though there are competitions when it comes to electing school representatives, power struggle is not so common in the school setting. Once one person is officially assigned the responsibility of leading, the issue of power struggle reduces. There are five bases of social power and they are:

1. Legitimate power: acquired through the vested in the position.
2. Reward power: acquired through the ability to provide rewards and recognition.
3. Coercive power: acquired through the ability to award punishment and withhold rewards.
4. Expertise power: acquired through the acquisition of knowledge and skills.
5. Referent power: acquired through the ability of personal persuation.

Nonetheless, the use of expertise and referent power yields greater satisfaction and performance of the staff than coercive power, because an organization like the university for instance relies predominantly on symbols rather than coercive or financial reward to influence employees hence moderate levels of power should be exhibited. This is necessary because where power is excessive, as perceived by a less powerful group, one may expect it to be challenged, and causing increased conflict (Robbins, 1997).

Psychologist David McClelland's theory on the need for power reveals that people with a high need for power always want to exercise control over others and are concerned about maintaining their leadership position. The need for personalized power is rather selfish since

people who desire for it use it to advance their career and other personal interest whereas those who cherish the need for socialized power want to use it as a means to help others such as increasing organizational effectiveness (Vredenburgh & Brender, 1998).

Unequal distribution of rewards and recognition can also make one party feel superior to or more powerful than the other party thereby contributing significantly to conflict, especially when there are differences in reward structure for the same category of people working in a department or an organization. In the view of Mullins (2005) the existence of superiority calls for inequitable treatment and practices such as in reward and punishment system thereby leading to the creation of tension and conflict.

Jones, George and Hills (2000) also say that conflict can occur if some individuals, groups or teams are more highly regarded than others in the organization. It is for this reason that managers and administrators of organization have a responsibility to accord each individual, group or team the same level of respect and recognition.
Hatch (1997) using the term ”status incongruity” in her discussion of distribution of rewards and recognition explains that the imbalance among groups does not pose a problem as long as higher groups influence lower status groups but the reverse of it, which is lower groups influencing higher status groups is highly problematic.

Whyte (1949) observed a kind of conflict based on superiority in a study conducted on the activities of waitresses and cooks in the United States of America. In the restaurant where the study was conducted Whyte (1949) found out that the cooks felt reluctant to accept orders hitherto received by waitresses from customers. To the cooks, the receipt of orders from waitresses meant the former was taking instructions from the latter meanwhile the reverse of it was expected because the cook as it were earned higher salaries. This led to a psychological discomfort and the restaurant manager in the bid to manage the conflict decided to eliminate the face-to-face interaction by providing a spindle on which the written orders were placed.
Work distribution is the greatest and the most frequent source of conflict in the school setting, this is because some students often work harder than others. There are times, most often than not when a lot of work must be done but some students do very little, the hard working students feel angered and hostile. This is normally exhibited when students are asked to clean up the halls of residence and their environs prior to all a hall week celebration. This kind of conflict is not easy to resolve since the students will not be willing to reveal pressure is used to persuade the un-cooperating students to change but if this approach does not work then the hall warden or administrator will have to be informed.

Mack (2000) contends that groups may also tend to believe that their way of thinking and doing things is not only the best but also the only right way. Sociologists refer to it as

"ethnocentrism". Ethnocentrism is an important source of and contributing factor to the continuity of conflict. Mensa-Bonsu and Effah (2003) share a similar view that conflict occurs when parties in a state of interdependence perceive a divergence of interests or believe that their aspirations or goals cannot be realized due to scarcity and so it can build unhealthy competition for authority.

McShane and Von Glinow (2004) refer to it as pooled interdependence. According to them, pooled interdependence, which is the lowest among the interdependence have units operating independently except for reliance and a common source of resource or authority. Students experience pooled interdependence when they are lined up at the registration center in a bid to register for their courses before the closing date.

Sequential interdependence occurs when one group's output serves as input for another group and hence the failure of the first group in its output will reflect in the work of the second group's input and if this runs through for all other groups then the indication will be that work output in the organization will be low until such as time that all the conflict relating to differences in goals, perceptions and greater demand for specialties within the groups have been managed if not resolved.

Reciprocal interdependence, the highest level of the interdependence occurs when work output is exchanged back and forth among individual or work units. Due to the exchange of work involved in the reciprocal interdependence the delay of an individual or work unit can affect the performance of the other individual or work unit at the other side.
Snowden and Gordon (2002) are of a different view as regards the sources of conflict. They cite a study conducted by Lindelow and Scott in 1989 outlining the types of social conflict, which are prevalent in schools. According to Snowden and Gordon (2002) four primary sources of social conflict within the schools are communication problems, organizational structure, human factors such as personality and limited resources. They argue that communication problems increase with the absent of feedback. It is true that regular feedback about performance is very important since it boosts morale hence the absence of it may initiate poor morale and negative attitudes resulting in an unwillingness to work.

According to Kreitner and Kinicki (2004) competition for limited resources can also inhibit the desired performance of a school setting. I agree with these authors that inadequate or limited resources can raise tensions as far as students are concerned. This is because students are supposed to operate at every point within a specific time hence the inadequacy of resources be it learning or recreational may lead to students putting pressure on one another in order to be left out of the race.

Boachie-Mensah and Marfo-Yiadom (2005) also agree that the limited resources have always been the source of conflict. It is sometimes surprising to find out that even managers fight for what is best for them and their groups instead of what is good for the organization. This is all because the resources are highly inadequate; a situation which turns into "everyone for himself, God for us all" syndrome. The administrator's job therefore is to provide adequate resources, when it is practically impossible to do so then all groups should be sufficiently informed. The best situation is where the resource distribution have been done fairly thus preventing unnecessary conflict of any sort.

Mullins (2005) is also of the view that rapid and repeated internal changes can be a source of worry, this is because change causes disequilibrium. Some people feel better with change therefore will welcome it whereas change makes other people feel insecure with the inability to ppredict patterns with regard to the unknown.

Conflict Management Techniques

Most certainly, conflict has the potential to become disruptive and violent, unmanaged conflict is a threat to survival of the group and least tends to make the group less effective. For these reasons, it is necessary to provide assistant when students need help in managing conflict.

Conflict management is an expanded view of dealing with unresolved differences in an organization. It includes understanding the nature and sources of conflict as well as costs of conflict, searching for the benefits in conflict situations and using contingency approach to conflict resolution (Kathman & Kathman, 1990).

Contingency approaches to conflict management involve the diagnosis of the situation whereby the necessary action is taken to deal with each and every problem. In dealing with conflict, the contingency view holds that there is no best way of managing conflict under all conditions, but that there are optional ways of managing conflict under certain conditions (Owens, 2004).

Snowden and Gorton (2002) define conflict management as the "efforts designed to prevent, ameliorate, or resolve disagreements between and among individuals and groups" (p.89). Conflict Management is the ability to deal with differences in opinion.

Lorsch and Lawrence (2003) are of the view that much zeal has resolved around the operational benefits of effective conflict management for the organization and has frequently result in conflict management being valued primarily as a tool for managers to use in dealing with peers or subordinates.

But the argument should be advanced that if one seeks to use conflict management as a vehicle for the study and comprehension of organizations then biases and discrimination on the part of management must be looked at seriously. The exhibition of skills at conflict management is seen in the ability to understand conflict situations and the use of appropriate conflict management techniques for each given situation. The conditions generating multiplicity of academic goals, within the context of a potential model of the tactical methods for dealing with conflict between students, faculty and administrators are considered when selecting an approach for conflict management. Various avenues to manage conflict are available to people and these are avoidance, accommodation, completion, compromise and collaboration.

Osgood (2004) believes that one key to managing conflict is to reduce tension and increase trust between the two parties. This can be done by stating an intention to reduce tension, making your intensions loud and publicly announcing the steps that will be taken to reduce the tension, not overlooking the fact that each initiative offered is unambiguous.
Collaboration requires commitment to cooperation by the parties' involved and significant support from the organization. Parties involved in the dispute may lack the skills needed for taking a problem-solving approach. This is why the researcher agrees with Kreitner and Kinicki (2004) when they refer to collaboration as "integrating" or "problem solving". Collaborating with the other party undoubtedly promotes creative problem solving and it is a way of fostering mutual respect and rapport.
Nonetheless, as earlier on indicated, collaborated takes time, and many conflict situations are either very critical or too insignificant to justify the time it takes collaborate (Whetten & Cameron, 2002). Classrooms can serve as laboratories for experiencing with collaboration rather than win-lose conflict styles.

Studies on Conflict Management

Aldag and Kuzuhara (2002) conducted a study on the way people respond to a conflict situation. According to them, people tend to respond to a conflict situation the way they feel like responding rather than the way they should respond. The study was on two teams playing football and at the almost ended game none of the teams had scored the other, therefore, a penalty against any of the team would be a disaster.

In the midst of this, tempers flared between two opponents and one initiated a fight, with the initiation of the fight his team was penalized and a penalty was awarded against them; this led to team losing the game narrowly. The results of the study revealed that, the poor choice of conflict management technique is as well a blunder as the conflict situation itself. The efficient management conflict lie in choosing technique that best fits the situation.

CONCLUSION

The concept of conflict management is not new. Unfortunately, however, most issues in bureaucratic organizations are managed in such as a way that leaves at least one party feeling hurt, confused or angered. The notion that conflict should be avoided is one of the major contributors to the growth of destructive conflict among groups and individuals; the heart of this is a belief that competition is the appropriate approach towards conflict management.

From the findings, it can be concluded that conflict at all levels existed among students in the halls of residence and the various sources of all these conflicts have also been established.

The achievement of institutional and personal goals is dependent upon the effective and efficient interaction among the individuals compromising the whole. Many would argue, correctly, that there have been and certainly still are instances in society when protest and disagreement have led to a better co-existence.

Recommendations for practice

Based on the findings and conclusions drawn from the study, the following recommendations are made:

Conflict should be directed and managed so that it makes both students and the university grow, innovate and improve. Conflict is a normal process, thus there is no need to expend great energy in avoiding it, because by avoiding conflict means that important issues affecting those involved are not being dealt with.

When there is a conflict and one acknowledges that there is a problem, then one has the opportunity to managed this problem. In order to maximize student achievement and complex reasoning, students need to engage in intellectual conflicts. This can be done when students are put into cooperative groups to research on an unfamiliar subject.

The various constitutions having references to rules and regulations binding students must be modified and amended regularly to reflect the demands of the time. Where it is impossible to do so, then the realities on the grounds will have to be addressed instead of adhering to the contents of a rigid and outdated constitution.

It is most effective to intervene in time because it prevents or defuses a conflict. There must also be a programme line out to help students improve on the already existing conflict management skills that they possess. This can be achieved through the counseling services available in the halls of residence. Such management practices as accommodating, compromising and collaborating go a long way to reduce the levels of conflict in halls of residence.

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MODELING OF THIN LAYER DRYING OF CATFISH (CLARIAS GARIEPINUS) IN CONVENTIONAL AND HYBRID SOLAR DRYERS DURING THE WET SEASON

Bello, M. M.[1], Aviara, N.A.[2], and Aremu, A.K.[3]

[1] *Department of Fisheries, University of Maiduguri, Maiduguri, Borno State, Nigeria*

[2] *Department of Agricultural and Environmental Resources Engineering, University of Maiduguri Maiduguri, Borno State, Nigeria*

[3]*Department of Agricultural and Environmental Resources Engineering, University of Ibadan, Ibadan, Oyo State, Nigeria*

ABSTRACT

Mathematical modeling and computer simulation of fish drying make it possible for insight to be gained into the comparative performance of various drying systems. Fish is a perishable food which spoils immediately after harvest especially during the wet season. This work therefore, aimed at providing quantitative description of drying behaviour and to predict quality changes during catfish drying. Thin layer drying of catfish in conventional and hybrid solar dryers (CSD and HSD) was conducted with sun drying(SD) as control. The experiments were conducted in completely randomized design (CRD) with three replicates during wet season. Eight popular thin layer models were selected and tested with the drying data obtained from the fish species. Results indicated that, in all drying methods, the Wang and Singh model was taken as the best model for predicting the moisture ratio with the lowest standard error of estimate and the highest co- efficient of determination R^2in the CSDas 0.063 and0.994;inHSD 0.049 and 0.997 while in SD, 0.042 and 0.982 respectively. The hybrid solar dryer was the best to understand the heat and mass transfer phenomena in the drying of Clarias gariepinus during the wet season.

Keywords: *Conventional, Hybrid, Catfish, Thin layer, Sun drying*

INTRODUCTION

Fish is one of the major animal protein foods available in the tropics. This has made fishery an important aspect of study. According to Olatunde (1989), in Nigeria fish constitutes 40% of animal protein intake; unlike any other animal protein source with one problem of religious taboo or health hazard, fish is eaten across the country. Unfortunately however, fish is one of the most perishable of all stable commodities, and in the tropical climate of most developing countries it will become unfit for human consumption within about one day of capture, unless it is subjected to some form of processing (Ames et al., 1999). According to Abba (2007), Nigeria has the resource capacity (12 million ha inland water and aquaculture)

to produce 2.4 million MT of fish every year with an estimated demand at 1.4 million MT which currently exceeds supply. Fish is highly perishable and can be stored only by proper refrigeration or drying. Since most of the fishermen living at the coastal belt are below the poverty line therefore refrigeration is distinct dream to them. The only alternative available is drying (Senadeeraet al., 2003) which is the most important techniques of food preservation (Menon and Muzumdar, 1987). Drying is defined as a process of moisture removal due to simultaneous heat and mass transfer. It is a classical method of food preservation, which provides longer shelf, lighter weight for transportation and small space for storage (Erteken and Yaldiz, 2004). To reduce the post-harvest losses during drying and retain the quality of dried products, it is necessary to dry fish in an enclosed chamber, by preventing product from dust, insect, larva, birds and animals. Solar drying is a good alternative for fish farmers in Nigeria and other developing countries as the dryers can generate relatively high air temperatures and low relative humidity, both of which are conducive to improved drying rates. Solar drying is a form of convective drying in which the air is heated by solar energy obtained from the sun. However, it differs from sun drying in that a simple structure, with a collector is used to enhance the effect of insulation and minimizes loss to the surroundings. Sun drying is dependent on weather, temperature and relative humidity of the environment. Solar drying has many advantages over sun drying as renewable energy sources and economical, particularly during energy crises, when the cost of fuel energy increases sharply (Saravacoset al., 2002). Drying kinetics of food is a complex phenomenon and requires simple representations to predict the drying behaviour, and for optimizing the drying parameters. The prediction of drying rate of agricultural materials under various conditions is important for the design of drying systems. Researches on the mathematical modeling and experimental studies had been conducted on the thin layer drying processes of various agricultural products (Abalone et al., 2004). However, little information is available on thin layer drying behaviour of fish. The study was therefore undertaken to evaluate the best drying models in describing thin layer drying of Catfish (Clarias gariepinus) in conventional and hybrid solar dryers during the wet season.

MATERIALS AND METHODS

Study Area

The thin layer drying experiment was conducted in North eastern zone of Nigeria. Borno State is a state in north-eastern Nigeria. Its capital is Maiduguri (also known as 'Yerwa'), it lies within latitude 10°N and 14°N and longitude 11° 3^{1}E and 14° 4^{1}E and at an altitude of 280.0 m above sea level. Borno State which has an area of 61, 435sq. km as the largest state in the federation in terms of land mass.It has a two distinct seasons; rainy season with annual rainfall of about 600mm from July- October and a hot dry season from march-July. The dry

season is preceded by a period (November- February) of Harmattan with very low temperature (N.M.A. 2015).

Experimental Solar Dryers

The orthographic projection of the convention solar dryer (CSD) used in this study is shown in figure 1. The dryer consisted of three main compartments: the drying chamber, the collector area and the dryer stand. CSD uses only natural convention to remove moisture from the fresh fish and dry the product to a lower or safe moisture content level.

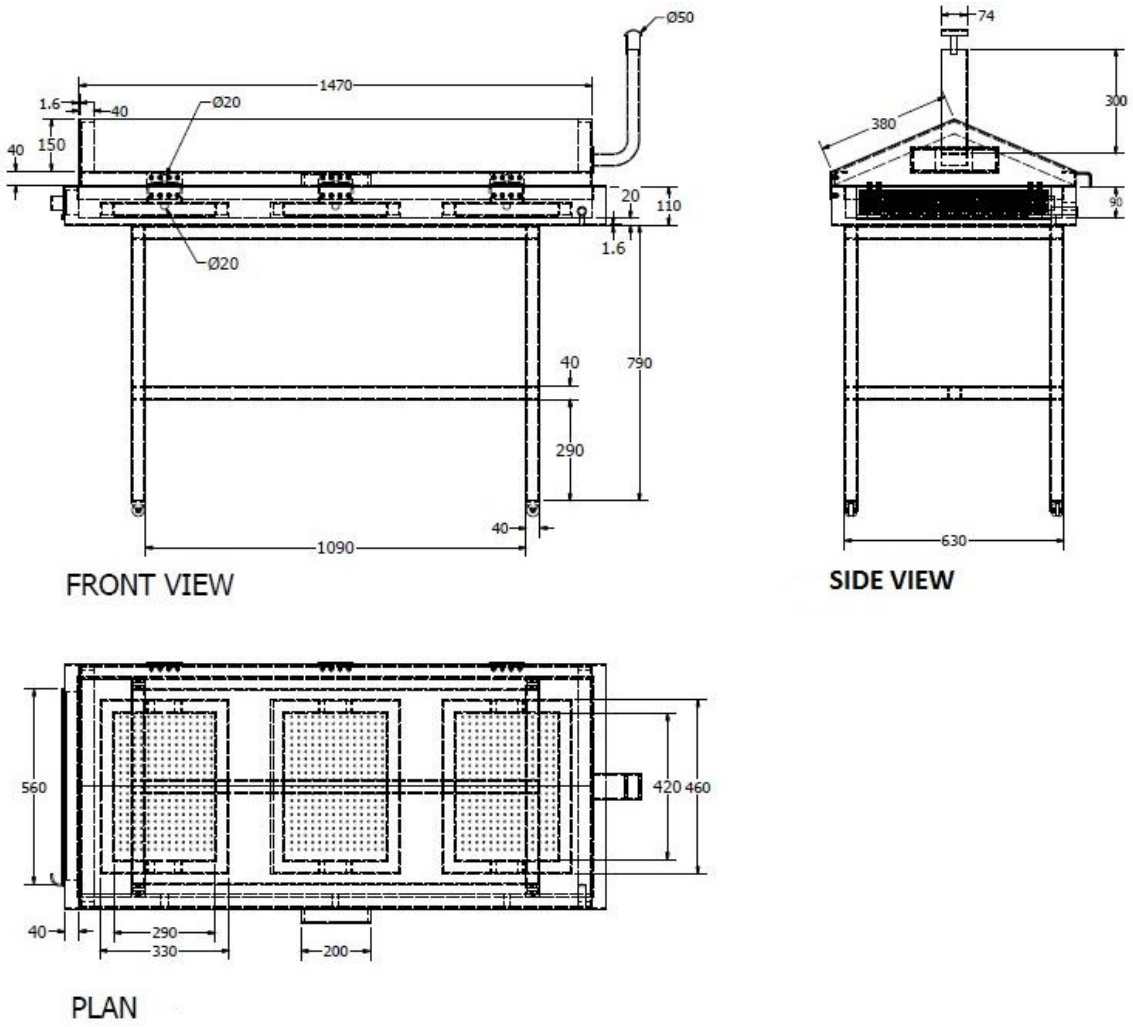


Figure 1:Orthographic Projections of the Conventional Dryer

The hybrid solar dryer (HSD) orthographic projection is represented in figure 2.It is a base-like structure consisting of a solar collector, top drying chamber, absorber base, as well as natural convention air inlet units, a chimney for the exhaust of the moisture laden air at outlet and a stove with connecting duct which utilizes charcoal as fuel. The stove enhanced further

drying during the rainy /cloudy days and when the sun had set to enhance further drying at night. The thermal profile of the dryers was also investigated using laboratory type, mercury-in-bulb thermometer (accuracy ±0.5°C) at the regular interval of one hour between the hours of 6.00 and 18.00 local time for a period of three days.

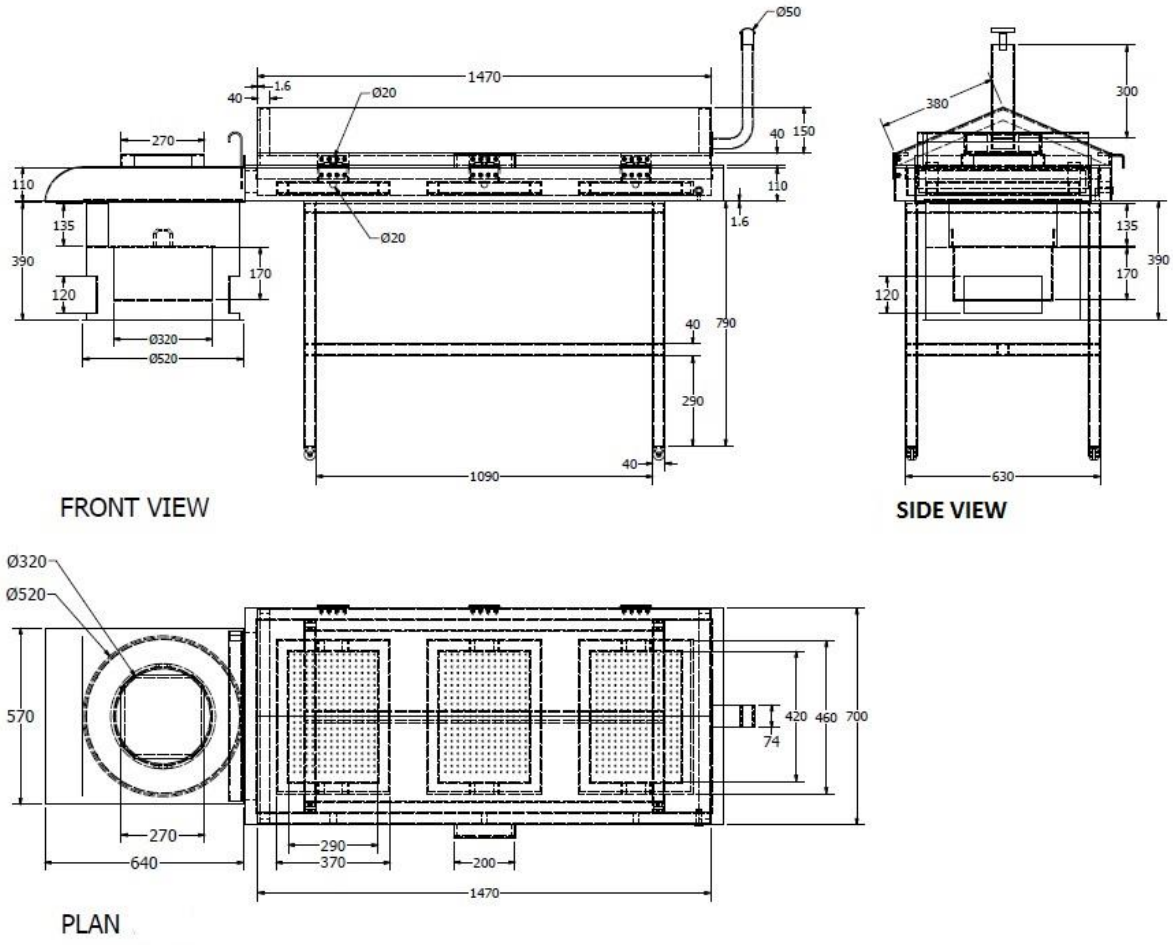


Figure 2**:**Orthographic Projections of the Hybrid Dryer

Sample Preparation and Drying Conditions

Clarias gariepinus were procured from fishermen at the bank of Lake Alau, which is located 12km away from Maiduguri in Konduga Local Government Area of Borno State, Nigeria. The fish was transported in cold flask from the bank to the drying site, to retain its freshness and wholesome conditions prior to drying. The fish was prepared by washing thoroughly inside water, several times until it became clean, free of dirt's and blood. The fish species of 2400g was weighed and divided into three equal parts of 800g each. The 800g fish was

spread in thin layer and the three trays were placed in the drying chamber. The chamber was firmly closed to avoid escape of heat. Through the inlet, dry air enters the chamber, which was heated up by the collector, and the air move over the fish to remove moisture and the moist-laden air was raised and moved out of the chimney. Changes in fish weight were monitored throughout the experiment by weighing periodically using an electronic balance. Weighing of fish samples and temperature readings were carried out with respect to time as follows, 10,30,50… 240minutes (20minutes interval) and subsequent measurement and reading continued hourly until dynamic equilibrium moisture content was attained and drying terminated, the time taken was also recorded. Intermitted turning was also carried out on the fish to ascertain effective drying. The process was the same for the different drying methods, except in the hybrid dryer, where 2kg of charcoal was introduced inn to the stove. Already ignited charcoal was introduced into the middle to ignite other charcoal for gradual burning and the opening for the stove was carefully closed. The charcoal was allowed to burn all through the night until it gets exhausted.

Prediction Accuracy of Thin Layer Models

Thin layer drying is the process of removal of moisture evaporation, in which drying air is passed through a thin layer of the material until the equilibrium moisture content was reached. Numerous mathematical models have been developed by various researchers to describe the rate of moisture loss during the thin layer drying of agricultural products. The moisture ratio (MR) of the fish been dried is presented by Equation 1, where M is the moisture content of the fish at a given time (minutes), Mo is the initial moisture content and Me is the equilibrium moisture content.

$$MR = \frac{M - M_e}{M_o - M_e} \qquad (1)$$

Where,

M =moisture content, % (db) at specified time from the commencement of drying,

M_o = the initial moisture content of the product, % (db), and

M_e =dynamics equilibrium moisture content %(db) obtained at the end of the drying run.

It plays an important role in drying rate and drying time prediction and in the determination of the suitability of a drying model for the description of the drying curve of a given material. The moisture ratio data was obtained for the rainy season, for Clarias gariepinus at different

drying times and temperature. For mathematical modeling, the thin layer drying models in table 1 were tested to select the best for describing the drying behaviour of Clarias gariepinus. Modeling the drying behaviour of different agricultural products often requires the statistical methods of regression and correlation analyses. Regression analyses were done using statistix 10.0 software. The coefficient of determination (R^2), reduced chi-square ($\chi 2$) and root mean square error (RMSE) were used to determine the quality of the fit. The higher the values of R^2, and lower the values of $\chi 2$and RMSE, the better the goodness of fit.

Table 1: Thin layer models considered.

S/n	Model name	Model equation	References
1	Newton's	MR= exp (-kt)	(Henderson 1974)
2	Pages	MR-exp ($-kt^n$)	(Page, 1949)
3	Henderson and Pabis	MR= aexp (-kt)	(Zang and litchfield, 1991)
4	Logarithmic	MR= aexp (-kt) +C	(Karathanos, 1997)
5	Wang and singh	MR=1 + at + bt^2	(Wang and Singh., 1978)
6	Midilli et al.,	MR = aexp ($-kt^n$) +bt	(Midilli et al, 2002)
7	Thompson	t = ALn (MR) +B [Ln (MR)]^2-1	(Thompson et al., 1968)
8	Diffusion Approach	MR=aexp (-kt) + (1-a) exp(-kgt)	(Karathanos, 1997).

Where,

MR= moisture ratio, dimensionless

A,B = constant in the Thompson model

a, c = constant logarithmic model

k = drying constant, min^{-1}

N = index in the page model

T = time, in minutes

Data analysis

The models were subjected to non- linear regression using a software package (Statistix 10.0). The least squares estimate or co-efficient of terms were used as the initial parameter to estimate the non-linear regression procedure. The goodness of fit of the models on the experimental data was evaluated using residual plots, standard error of estimate (SE) and co-

efficient of determination, R^2.A model was considered acceptable if the residuals were uniformly scattered around the horizontal valve of zero showing no systematic tendency toward a clear pattern. A model was considered better than another if it had a lower standard error of estimate and higher co-efficient of determination. The drying constant K and index N of the fishes were then investigated for their relationship with dryers using regression procedure. It has been shown that the mechanism of moisture movement in thin layer drying of fish is mainly diffusion.

Results and Discussion

Table 2 compares the temperatures developed inside the solar dryer and the ambient air for the thermal profile.

Table 2**:** Thermal profile within the solar drying compartments and ambient temperatures

T (hour)	**T_M CSD**	**SD (±)**	**T_M HSD**	**SD (±)**	**T_M AMBIENT**	**SD (±)**
6am	31.3	1.033	32.7	1.722	31.0	1.414
7	36.7	1.966	36.8	1.940	32.5	0.7071
8	33.3	2.422	52.7	3.204	38.0	2.828
9	63.0	3.898	62.5	3.564	39.0	4.242
10	73.8	4.996	75.1	3.920	41.5	2.121
11	81.7	3.669	83.5	3.782	44.0	1.414
12	85.2	4.401	89.7	1.862	45.0	2.828
13	82.7	10.152	88.5	6.625	44.5	2.121
14	78.7	3.777	80.8	2.714	43.0	2.828
15	75.0	3.286	74.8	4.119	42.5	2.121
16	58.5	1.517	59.8	2.041	41.5	0.707
17	48.8	2.041	49.8	2.041	40.5	0.707
18	44.0	0.632	44.0	1.264	40.0	0

Tis the time (hr), **T_M**is the mean temperature (˚C) and **SD**is the standard deviation

The temperatures inside the dryer and the solar collector were much higher than the ambient temperature during most hours of the daylight. The highest mean temperature recorded for conventional dryer (CSD) was 85˚C while the lowest temperature was 31.3˚C while the hybrid dryer (HSD) had 89.7˚C as its highest and 32.7˚C as the lowest and the ambient temperature (SD) had its highest mean value as 45°C and lowest as 31˚C at insolation of 6.46kw/h/m^2/day. This goes in line with the result of Oparaku (2010) which stated that the highest mean temperature that could be attained in dryer was 70°C, while the ambient temperature was 33.5˚C at the insolation of 857.6wm^2.Sengaret al., (2011) reported that the

temperature profile inside the dryer indicated maximum temperature of 57°C and minimum 38.7°C, whereas maximum ambient temperature observed was 35.3°C. In general, these indicates prospect for better performance than sun drying methods. Bello et al., (2006) revealed that unloaded solar dryer had higher mean temperature of 50.4°C compared to sun-drying which was 36.0°C.

In CSD, the Wang and Singh model had the lowest standard error of estimate (0.0630) and the highest co-efficient of determination R^2 (0.9939) which was taken as the best model for predicting the moisture ratio. This was followed closely by Midilli et al., (2002) and logarithmic model. In HSD, the Wang and Singh model has the lowest standard error of estimate (0.0489) and the highest co-efficient of estimation R^2 (0.9968), which was taken as the best for predicting the moisture ratio. This was followed closely by logarithmic model and Midilli et al., (2002) model. Insun drying, Wang and Singh model had the best fit followed by the logarithmic model and Midilli et al., (2002) model.

The reliability of the best model for describing the thin layer drying curves of the Clarias was evaluated by comparing the predicted moisture ratio with experimentally observed moisture ratio in the dryers during the wet season as represented in figures 3, 4 and 5.

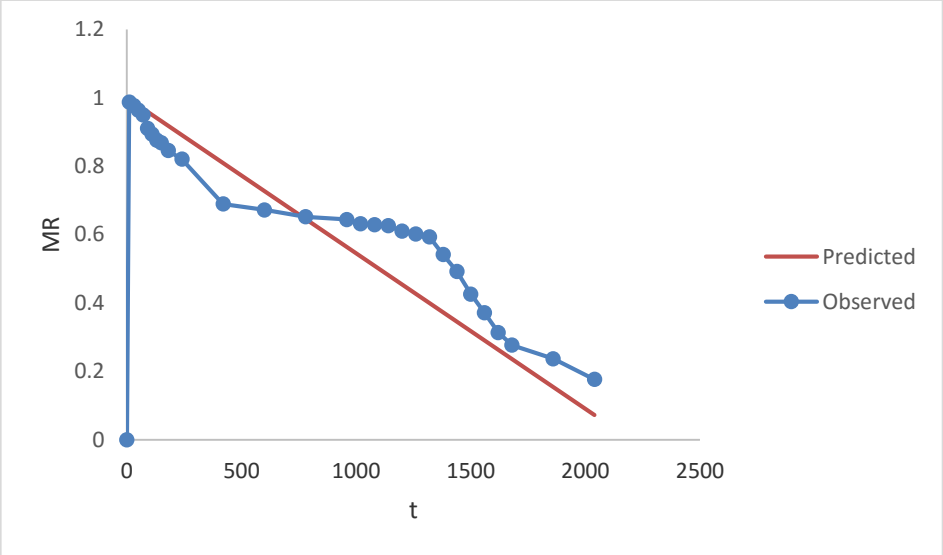


Figure 3: Moisture ratio against drying duration in conventional solar dryer

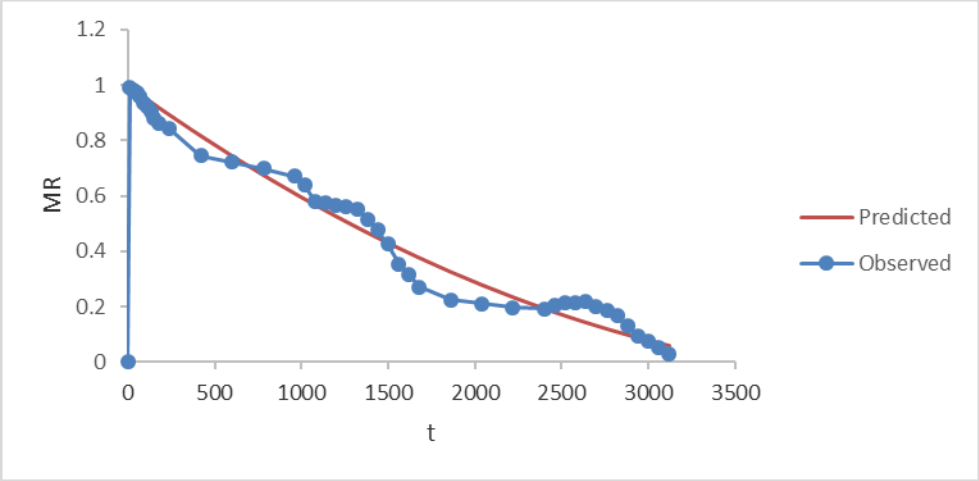


Figure 4: Moisture ratio against drying duration in hybrid solar dryer

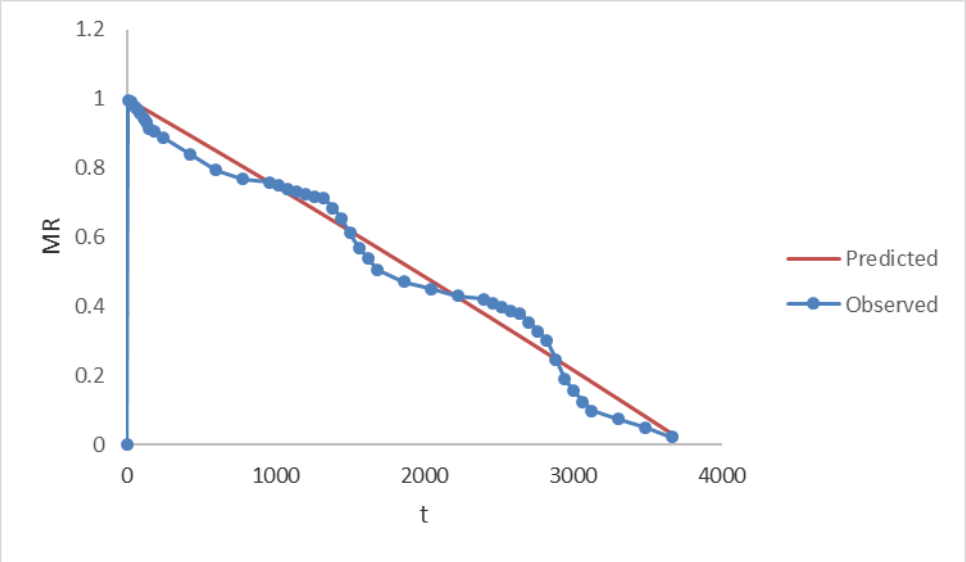


Figure 5: Moisture ratio against drying duration in sun drying

The moisture ratio reduced faster in the beginning than that at the end. This observation is consistent with previous results, as observed by (Kituuet al., 2010; Zhiqiang et al., 2013), that the Tilapia fillets contain a large quantity of bulk water in the beginning, and relatively easier to be transferred to the surface and evaporated. According to Babiker, et al., 2016 Lewis drying model was found to be satisfactorily describing solar drying curves of fish with a correlation coefficient (R^2) of 0.9827 .

CONCLUSION

The observed data for Wang and Singh model in hybrid solar dryer well banded around the straight line representing data by computation, which best describe the suitability of this model in describing the drying behaviour of Clarias gariepinus in the wet season. It therefore, be concluded that the Wang and Singh model best described the drying model of Clarias gariepinus in the hybrid solar dryer and so it can be used to understand the heat and mass transfer phenomena in the drying of the Clarias gariepinus using these dryers.

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EFFECT OF A NATURAL SWEETENER (THAUMATOCOCCUS DANIELLI) ON THE PHYSICO-CHEMICAL PROPERTIES AND SENSORY EVALUATION OF KUNUN-ZAKI.

Ojo, A.[1*], Enujuiga,V.N[2]., Ayo-Omogie, H.[2]and Abiodun, O.A.[3]

[1]*Department of Food Science and Technology, Osun State Polytechnic, Iree, Nigeria,*
[2]*Department of Food Science and Technology, Federal University of Technology, Akure, Nigeria*
[3]*Department of Home Economics and Food Science, University of Ilorin, Ilorin, Kwara State*

ABSTRACT

Effect of a natural sweetener (Thaumatococcus danielli) on the physico-chemical properties and sensory evaluation of kunun-zaki was determined. Proximate and mineral compositions of the natural sweetener, physico-chemical properties and sensory evaluation of kunun-zaki using Thaumatococcus danielli and sucrose were determined. Proximate composition of the aril showed that protein had (33.03%), crude fibre (5.20%), ash content (4.79%), moisture content (12.20%), fat content (0.16%), and carbohydrate (44.17%). The result of mineral obtained for the aril showed the following values potassium (190.00ppm), sodium (167.66ppm), calcium (132.96 ppm), iron (21.59 ppm) and magnesium (14.40 ppm). Physico-chemical composition of kunun-zaki varied with concentrations of Thaumatococcus danielli aril and sucrose pH ranged between (3.90-4.90), total solid (4.95-13.49 %) and titatable acidity (0.78-0.39 %) for Thaumatococcus danielli while kunun-zaki sweetened with sucrose had pH (3.51-4.90), total Solids (4.95-7.43%) and titratable acidity (0.74-0.85) respectively. The sensory evaluation showed that the samples sweetened with Thaumatococcus daniel aril compared favorably with sucrose in terms of colour, taste, aroma and overall acceptability.

Keywords: *Kunun-zaki, Proximate, Mineral, Sensory properties, Thaumatococcus danielli,*

INTRODUCTION

Kunun- zaki is a traditionally fermented non–alcoholic beverage that originated from the northern part of Nigeria, which can be produced either from millet, sorghum or maize. Kunun-zaki is a Hausa word meaning “sweet beverage”, it is now widely consumed in several parts of Nigeria owning to its refreshing qualities (Osuntogun and Aboaba, 2004). Kunun-zaki is generally acceptable and used as substitute for alcoholic drinks (Gaffa and Ayo, 2002). There are several types of kunun-zaki but few have been reported in literature; kunun-zaki, kunun-tsamiyat, kunun-gyada (Nkama et al.,1995) and kunun-akamu (Oyeyiola,

[*]ayo_ojo62@yahoo.com
Funmiabiodun2003@yahoo.com

Ojo, A.[1*], Enujuiga,V.N[2]., Ayo-Omogie, H.[2]and Abiodun, O.A.[3] (2016) Effect Of A Natural Sweetener (*Thaumatococcus Danielli*) On The Physico-Chemical Properties And Sensory Evaluation Of Kunun-Zaki. In: Mojekwu,J.N., Nani G., Atepor, L., Oppong, R.A.., Adetunji,M.O., Ogunsumi, L., Tetteh, U.S., Awere E., Ocran, S.P., and Bamfo-Agyei, E. (Eds) Procs 5th Applied Research Conference in Africa. (ARCA) Conference, 25-27 August 2016, Cape Coast, Ghana. 355-363

1991). Others include kunun-baule, kunun-jiko and kunun-gayamba (Amusha and Ashaye, 2009). Kunun-zaki is the most preferred among the kunun types, reported in the literature Gaffa et al., (2002). Although production of kunun-zaki is in small scale level, the beverages are widely sold in the local market and at resorts. Gaffa et al., (2002) reported that 73% of the population in Nigeria consumes kunun-zaki daily and 26% occasionally. The product cost less compared to conventional carbonated beverages but the products are not usually properly packaged. The product is offered in cups, transparent polyethylene sachets, plastics and glass containers for retail sales. Consumption is all year round with peak production in the season (February – July) when the beverage is served preferably chilled. The production process of kunun-zaki is done with local household utensils with processes varying between individuals, households and localities (Adeyemi and Umar, 1994)

The use of natural sweeteners in food products is encouraged in food industry. Artificial sweeteners like saccharin, aspartame, cyclamate and Acesulfame K are used world-wide as low caloric sweeteners by patients affected by disease linked to the consumption of sugar, e,g diabetics, hyperlipemia ,caries, obesity etc. but they have side effects such as psychological problems, metal disorders, bladder cancer, heart failure and brain tumors (Hagiwara et al., 1984; Nabors, 1988; Kanarek, 1994; Cohen, 2001; Weihrauch et al., 2002). Sweet protein have the potential to replace these artificial sweeteners by acting as natural good low calories sweeteners , as we know proteins do not trigger demand for insulin in the patients whereas sucrose does. There are seven known sweet and taste modifying proteins, namely Brazzein, Thaumatin, Curculin, Mabinlin, Miraculin and Pertaclin (Faus, 2000). Thaumatin is a low calories intensely sweet- tasty protein (Raimi et al., 2011) and flavour modifier (Green, 1999). It consists of 207 amino acids with eight intramolecular disulfide binds and contains no free cysteine residues (Kant, 2005). The aril is of an intensely sweet, non-toxic and heat stable protein. Thaumatin is extracted, used as desserts, chewing gums and pet foods. The seeds of Thaumatococcus danielli also produce a jelly that swells (entrap water) to 10 times its own weight and hence provide a substitute for agar (Yeborah et al.,2003). The thaumatin are first sweet–tasting proteins that have been found in nature and the crystals are about 2000-3000 times sweeter than sucrose and neither allergic nor mutagenic or teratogenic (Yeborah et al., 2003). Thaumatin has been approved for use in many countries as both a flavor enhancer and a high- intensity sweetener (Zemanek and Wasserman, 1995).Therefore, this work determines the effect of a natural sweetener (Thaumatococcus danielli) on the physico-chemical properties and sensory evaluation of kunun-zaki.

*ayo_ojo62@yahoo.com
Funmiabiodun2003@yahoo.com

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MATERIALS AND METHODS

MATERIALS

Pearl millet, sorghum, sucrose were purchased from Sabo market in Osogbo, Osun State. Thaumatocuccusdanielliwas obtained from a farm at Esa–odo,Osun State, Nigeria.

METHODS

Method of Gaffa and Ayo (2002) was adopted and used in the production of kunun-zaki. The sweetener (Thaumatocuccus danielli) and sucrose were added to kunun zaki at different concentrations (2.5, 5.0, 7.5, 10.0,12.5, and 15.0g) while other ingredients were maintained at constant level.

ANALYSES

Proximate and mineral compositions of the sweetener were determined using AOAC (2005) methods. Physicochemical properties of kunun- zaki were done using AOAC (2005) while thesensory quality attributes of kunun-zaki was assessed using 20 panelist. Colour, flavour, taste and general acceptability were based on 9-point Hedonic scale (Iwe, 2000). The rating of the sample ranged from 1 (dislike extremely) to 9 (like extremely).

STATISTICAL ANALYSIS

Data obtained were analysed by Analysis of Variance (ANOVA) using the SPSS (version 17.0) and statistical significance was accepted at 0.05 level of probability. Duncan new multiple test was used to determine difference among means.

RESULTS AND DISCUSSION

Proximate composition of aril of Thaumatococcus danielli

The proximate composition of Thaumatococcus danielli aril is shown in Table 1. The aril had low moisture (12.20%). The moisture content of fruit is very important for it shelf life, since the lower the moisture, the better it storage stability (Butt, et al.,2004). The ash was 4.79% which indicate high level of minerals in the aril. Fibre, fat, carbohydrate and protein contents were 5.20%, 0.61%, 44.17% and 33.05% respectively. The aril had high protein content, which made it a suitable substitute for sucrose.

Table 1: Proximate composition of Thaumatococcus danielli aril

Parameter (%)	Aril
Moisture content	12.20 +0.02
Ash content	4.79+0.06
Fiber content	5.20 +0.09

*ayo_ojo62@yahoo.com
Funmiabiodun2003@yahoo.com

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Fat content	0.61 +0.04
Protein content	33.03 +0.11
Carbohydrate	44.17 +0.20

Mean+Standard deviation

Mineral composition of Thaumatococcus dannielli aril

Table 2 showed the mineral composition of Thaumatococcus dannielli aril. The most abundant mineral in the fruit aril is potassium (190.63ppm) which was in accordance with the report of Oshodi et al. (1999) that potassium is the most abundant mineral in Nigeria agricultural products. Potassium and sodium are required to maintain osmotic balance of body fluid pH of the body, regulate muscle and nerve irritability, control glucose absorption and enhance normal retention of protein during growth (NRC, 1989). Also, values of sodium, calcium, Iron, magnesium were 167.66ppm,132.96ppm, 21.59ppm and 14.40 ppm. The values of mineral contents are dependent on the following factors season, species, soil types, cultural practices adopted during planting (Nkama, et al., 1995).

Table 2: Mineral composition of Thaumatococcus danielli aril

Parameter (ppm)	Aril
Potassium	190.63+0.72
Sodium	167.66+3.48
Calcium	132.96+1.76
Iron	21.59+0.94
Magnesium	14.40+0.21

Mean+Standard deviation

Physico-chemical composition of Thaumatococcus dannielli aril

Physico-chemical composition of Kunun-zaki with sucrose are shown in Table 3.pH ranged from 3.90-4.90. The pH of the control was significantly different ($p < 0.05$) from other kunun-zaki samples. Increase in sucrose concentration reduced the pH of kunun-zaki. The pH of the samples increased as the values of sucrose increased, this may be as a result of the fact that, the samples were freshly prepared and the sugar in samples had not broken down as a result of fermentation. No significant differences ($p < 0.05$) in pH values of sucrose concentration from 2.5 to 10.0 g. pH is a measure of activity of the hydrogen ion and it measures the hydrogen ion concentration. pH is an index of the level of acidity or alkalinity of a sample and this has great effect on the storage period (Dandago, et al.,2004).This is in line with the report of Deans and Ritchie (2005) with pH of 4.67 for pawpaw juice. The titratable acidity of samples with 2.5g, 5.0g, 7.5g, and 10.0g values of sucrose were

*ayo_ojo62@yahoo.com
Funmiabiodun2003@yahoo.com

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significantly different ($p<0.05$) from others, while samples with 12.5g, 15.0g were not significant different ($p<0.05$). The total solids followed the same trend as titratable acidity in all the samples. There were no significant differences ($p<0.05$) in samples 12.5g and 15.0g sucrose. The control sample was significantly different ($p<0.05$) from other samples. Total solid is the amount of dry material remaining after all the water is evaporated.

Table 3: Physicochemical composition of kunun-zaki sweetened with sucrose.

Sample (g)	pH	Total Solids	Titratable acidity
2.5	$3.90^{d}\pm0.1$	$9.15^{c}\pm0.22$	$0.93^{c}\pm0.04$
5.0	$4.00^{cd}\pm 0.00$	$10.23^{c}\pm0.14$	$0.82^{c}\pm0.28$
7.5	$4.15^{bcd}\pm0.07$	$10.10^{c}\pm0.14$	$0.78^{c}\pm0.02$
10.0	$4.40^{bcd}\pm0.14$	$10.12^{c}\pm0.16$	$0.81^{c}\pm0.01$
12.5	$4.45^{b}\pm0.35$	$11.85^{b}\pm0.32$	$1.39^{a}\pm0.14$
15.0	$4.45^{b}\pm0.70$	$13.49^{a}\pm1.29$	$1.10^{b}\pm0.14$
Control	$4.90^{a}\pm0.14$	$4.95^{d}\pm0.11$	$0.80^{d}\pm0.01$

Values with the same superscript down the column were not significant different ($p < 0.05$)

Physico-chemical composition of kunun-zaki sweetened with Thaumatococcus danielli

Physicochemical composition of Kunun-zaki sweetened with Thaumatococcus danielli are presented in Table 4. pH contents ranged from 3.51 to 4.90. There were slight increases in the pH of kunun-zaki with increase in Thaumatococcus danielli addition. The control was significantly different ($p < 0.05$) from other samples in pH.According to Kaanane, et al. (1998) the minimal change in pH can be explained by relationship existing between pH and free acid content. The high pH of a food is used as an indicator of bacterial spoilage i.e the food with high pH is more susceptible to microbial spoilage. At high concentration (12.5 and 15.0 g), the total solids were 7.43 and 7.23 % respectively. There were no significant differences ($p < 0.05$) in these values. Addition of Thaumatococcus danielli to kunun-zaki increased the total solids of kunun-zaki. Titratable acidity ranged from 0.74-0.85 %. Titratable acidity increased with increase in Thaumatococcus danielli concentration but there were no significant differences ($p < 0.05$) among the kunun-zaki.

Table 4: Physicochemical Composition of Kunun-zaki sweetened with Thaumatococcus danielli

Sample(g)	pH	Total Solids	Titratable acidity
2.5	$3.51^{d}\pm 0.13$	$5.33^{de}\pm0.16$	$0.74^{a}\pm0.29$
5.0	$3.70^{d}\pm 0.01$	$5.81^{cd}\pm0.12$	$0.77^{a}\pm0.10$
7.5	$3.57^{d}\pm0.07$	$6.67^{b}\pm0.14$	$0.82^{a}\pm0.01$
10.0	$3.75^{d}\pm0.13$	$6.56^{b}\pm0.15$	$0.85^{a}\pm0.01$

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12.5	3.97^{c}±0.42	7.43^{a} ±0.15	0.85^{a}±0.04
15.0	3.96^{c} ±0.14	7.23^{a} ±0.66	0.83^{a}±0.07
Control	4.90^{a} ±0.14	4.95^{e} ±0.11	0.80^{a} ±0.01

Values with the same superscript down the column were not significant different ($p < 0.05$)

Comparative study on the physico-chemical properties of kunun zaki with sucrose and Thaumatococcus danielli are shown in Table 5.Control had higher pH value which was significantly different ($p<0.05$) from other samples. This indicated that the control had higher tendency to deteriorate than other kunun-zaki. Kunun-zaki with 15.0g sucrose had higher total solid while that with 12.5g sucrose concentrations had higher titratable acidity which were significantly different ($p< 0.05$) from other samples.

Table 5: Comparative study on the physico-chemical properties of kunun zaki with sucrose and Thaumatococcus danielli aril

Sample	Concentration (g)	pH	Total solids	Titratable acidity
Sucrose	2.5	3.90^{cd} ± 0.1	9.15^{d}±0.22	0.93^{c}±0.04
	5.0	4.00^{cd} ± 0.00	10.23^{c}±0.14	0.82^{cd}±0.28
	7.5	4.15^{bc}±0.07	10.10^{cd} ±0.14	0.78^{d}±0.02
	10.0	4.40^{b}±0.14	10.12^{cd} ±0.16	0.81^{cd}±0.01
	12.5	4.4^{b}±0.35	11.85^{b} ±0.32	1.39^{a}±0.14
	15.0	4.45^{b}±0.70	13.49^{a} ±1.29	1.10^{b}±0.14
Thaumatococus	2.5	3.51^{e} ± 0.13	5.33^{gh} ±0.16	0.74^{d} ±0.29
danielli	5.0	3.70^{cd} ± 0.01	5.81^{fgh} ±0.12	0.77^{d} ±0.10
	7.5	3.57^{e}±0.07	6.67^{ef} ±0.14	0.82^{cd} ±0.01
	10.0	3.75^{cd} ±0.13	6.56^{ef}±0.15	0.85^{cd} ±0.01
	12.5	3.97^{cd}±0.42	7.43^{e} ±0.15	0.85^{cd} ±0.04
	15.0	3.96^{cd} ±0.14	7.23^{e} ±0.66	0.83^{cd}±0.07
Control		4.90^{a} ±0.14	4.95^{h} ±0.11	0.80^{d}±0.01

Values with the same superscript down the column were not significant different ($p < 0.05$)

The Sensory Evaluation of Kunun-zaki with Thaumatococcus danielli aril and Sucrose

The mean scores for sensory characteristics of kunun-zaki with Thaumatococcus danielli and sucrose are presented in Table 6. The sensory data revealed that there were no significant differences ($p<0.05$) in the colour and aroma of the kunun-zaki. Taste of kunun-zaki with sucrose at 7.5 g concentration was preferred among the samples. Increase in Thaumatococcus danielli aril improved the taste of kununzaki but the tastes of kunun-zaki at higher sucrose concentration were not acceptable. Overall acceptability signified that kunun-zaki with low

*ayo_ojo62@yahoo.com
Funmiabiodun2003@yahoo.com

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sucrose concentration (7.5g) were more acceptable than other samples followed by kunun-zaki with 2.5 g sucrose concentration and 15.0 g Thaumatococcus danielli aril. This showed that the higher the concentration of Thaumatococcus danielli aril, the higher the acceptability.

Table 6: Sensory Evaluation of Kunun-zaki with Thaumatococcus danielli and Sucrose

Samples	Colour	Taste	Aroma	Overall Acceptability
2.5KZT	2.22^{a}±1.30	2.00^{h} ±0.00	4.00^{a} ±0.87	2.56^{g} ±0.88
7.5KZT	2.22^{a} ±1.30	3.56^{f} ±0.53	4.00^{a} ±0.87	2.78^{f} ±0.83
12.5KZT	2.22^{a} ±1.30	4.60^{e} ±0.88	4.00^{a} ±0.87	4.44^{d} ±0.88
15.0KZT	2.22^{a} ±1.30	6.11^{c} ±0.61	4.00^{a} ±0.87	5.11^{c} ±2.32
2.5 KZS	2.22^{a} ±1.30	7.11^{b} ±0.61	4.00^{a} ±0.87	7.00^{b} ±2.65
7.5 KZS	2.22^{a} ±1.30	8.89^{a} ±0.33	4.00^{a} ±0.87	7.33^{a} ±2.78
12.5KZS	2.22^{a} ±1.30	2.89^{g} ±0.33	4.00^{a} ±0.87	2.56^{g} ±0.53
15.0KZS	2.22^{a} ±1.30	4.78^{e} ±1.40	4.00^{a} ±0.87	3.22^{e} ±0.83
ControlKZ	2.22^{a} ±1.30	5.45^{d} ±0.88	4.00^{a} ±0.87	4.56^{d} ±0.73

Values with the same superscript down the column were not significant different ($p < 0.05$)
KZT=Kunun-zaki with Thaumatococcus danielli, KZS=Kunun-zaki with sucrose and Control=KZ

Conclusions

The result from proximate composition revealed that Thaumatococcus danielli aril has high protein which could be used as substitute for synthetic sugar since it is of calorie free. Also this fruit is one of the underutilized fruits which when processed can replace other sweeteners which can pose health challenge. Addition of more Thaumatococcus danielli aril to kunun-zaki could improve the acceptability of the product.

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ASSESSMENT OF THE QUALITY OF WATER USED FOR IRRIGATION IN KWARA STATE - NIGERIA

Aliyu T. H.[1], Nnamani C.S.[2], Olatinwo L. K.[3], and Aliyu A. S.[4]

[1&2]*Department of Crop, Protection, Faculty of Agriculture, University of Ilorin- Nigeria*
[3] *Department of Agricultural Economics and Extension, Federal University Dutsin-Ma-Nigeria*
[4] *Department of Agricultural Extension and Rural Development, University of Ilorin- Nigeria*

ABSTRACT

The absence of a dependable source and supply of good quality water has become a grave concern among users of water for agricultural purposes. In Nigeria, irrigated agriculture is an important tool for economic growth, food security and poverty reduction during the dry periods of rain-fed agriculture. The concentration and composition of dissolved constituents in water determine its quality for irrigation use. Water quality studies strongly suggest that agriculture is a leading source of water quality problems due to pesticides and other agro-inputs widely used by farmers to improve agricultural productivity. Poor quality irrigation water would therefore obviously affect soil quality and crop productivity. A study was carried out in 2015 to evaluate the quality of water used for irrigation in farm sites across the agroecology of kwara state Nigeria. Water samples were collected from thirty locations and ten locations were randomly selected from each of the three senatorial zones. The samples were analyzed for water quality parameters using standard procedures. The results show that some of the parameters analyzed were within acceptable limits. Others parameters such as alkalinity, turbidity, biochemical oxygen demand, chemical oxygen demand and Sodium adsorption ratio (SAR), were above tolerable range for irrigation purposes. These results indicate the need for the management of water resources for improved agricultural productivity. This shows that the frequent assessment of water quality across Kwara State is often desirable. There is also need for extension agents to educate farmers on regulated use of inorganic chemicals and fertilizers that could cause water pollution. Industries and factories capable of causing pollution should be located far from streams, rivers and water bodies utilized for irrigation purpose.

Keywords: *Agriculture, Agroecology, Effluent flow, Extension agents, Irrigation*

INTRODUCTION

The significance of water to human and other biological systems cannot be over emphasized (Suresh et al, 1991). Agriculture is the major consumer of water and irrigation uses more than two-thirds of water of the World's available freshwater resources (Shady, 1998). It is often

aliyutaiyehussein@yahoo.com

assumed that water supply constitutes the primary limiting constraint to production (Doorenbos and Pruitt 1976).

Pollution is caused when a change in the physical, chemical or biological condition in the environment harmfully affect quality of human life including other animals' life and plant (Okoye et al., 2002). Water pollution occurs when unwanted materials with potentials to threaten human and other natural system find their ways into rivers, lakes, walls, streams, boreholes or even reserved fresh water in homes and industries (Naseem et al., 2010). The pollution of water bodies from pollutant transport through surface run off and uncontrolled discharge of untreated and partially treated sewage and domestic wastes is a major source of water pollution (Izonfuo and Bariweni, 2001).

Agricultural activities can pollute surface and underground water. The primary agricultural pollutants include nutrients and the most common sources of excess nutrients in surface water are chemical fertilizers and manure from animal facilities (Ishaku et al, 2011). Other forms of agricultural pollutants are sediments, animal wastes, pesticides and salts (Gaballah et al., 2005). Pesticides used for pest control in agricultural operations can contaminate surface as well as ground-water resources. Return flows, runoff and leachate from irrigated lands may transport sediment, nutrients, salts and other materials (Yousef et al., 2009). According to the World Health Organization (WHO, 2004) approximately three million people are intoxicated each year as a result of the use of pesticides. In addition to the toxicity to humans, the presence of these products in the environment poses a risk to water quality and the ecosystem (Veiga et al., 2006). The contamination of the environment, food and water quality by pesticides has become a considerable concern in many parts of the world, and has led many researchers to investigate their occurrence, distribution and concentrations in several ecosystems (Shankar et al., 2004).

In irrigation, water evaluation emphasis is on the chemical and physical characteristics of the water (Ayers et al., 1994). The quality of irrigation water is generally judged by its total salt concentration or electrical conductivity (EC), relative proportion of cations or sodium absorption ratio (SAR) and bicarbonate and boron content of water (Michael 1999). The continuous pollution of both surface and underground water sources has reduced the quality and quantity of water needed for general agricultural requirements such as meeting crop water requirements during insufficient rainfall (Sangodoyin, 1991).

Toxicity in plants normally results when certain ions are taken up with the soil-water and accumulate in the leaves during water transpiration to an extent that result in damage to the plant. The degree of damage depends upon time, concentration, crop sensitivity and crop water use, and if damage is severe enough, crop yield is reduced. The usual toxic ions in irrigation water are chloride, sodium and boron. Damage can be caused by each, individually or in combination (Eckenfelder, 1980).

Water quality studies strongly suggest that agriculture is a leading source of water quality problems as a result of pesticides and other agro-inputs widely used by farmers in Nigeria to improve agricultural productivity. Besides affecting crop yield and soil physical conditions, irrigation water quality affects fertility needs, irrigation system performance and longevity, and how the irrigation water can be applied on the drops. Poor quality irrigation water would therefore obviously affect soil quality and crop productivity. This implies that the knowledge of irrigation water quality is critical to understanding what management changes are necessary for long-term agricultural productivity. The study is therefore aimed at assessing the quality of water used for irrigation in Kwara State- Nigeria. The information obtained from the research would be useful in the management of water resources for the improvement of agricultural productivity in the State.

The study Area

Kwara State lies between latitudes 7°45 N and 9°30 N and longitudes 2°30 E and 6°25 E of Greenwich Meridian (Longman, 2000). The State falls under the tropical climate of distinct wet and dry seasons. The wet season lasts from late March/April to late October/early November with a mean annual rainfall of 1318mm. The dry season commences in October through December and ends in late March (Oyegun, 1983). The larger proportion of Kwara state belongs to dry sub-humid while the north-western fringe belongs to semi arid climatic regions (Olaniran, 1988). The mainstay of the state's economy is agriculture and the farmers specialize in arable crops such as groundnut, sorghum, cassava, yam, cowpea, maize, yam and rice (KWADP, 2010).

Materials and Methods

Location for sample collection

Thirty (30) locations within Kwara State were randomly selected for the collection of water samples. This was made up of ten (10) locations from each of the three senatorial zones of Kwara North, Kwara Central and Kwara South senatorial districts. The location and positions on the global positioning system (GPS) of sample collection points are shown in figure 1.

Sample collection

The samples were collected from September to November 2015and this was from rivers, ponds and streams that serve as irrigation sources for agricultural production. Replicate water samples were collected from five different points on each location into 2 litre plastic containers and 200cm^3 reagent bottles. The bottles were properly cleansed with distilled deionised water prior usage. Collection was carried out by careful immersion of the sample containers deep inside the water and sealing with tight fitting corks and stoppers after collection, in order to avoid air bubbles. Samples were transferred in a refrigerator (4°C) to the laboratory for chemical analysis according to the standard tests (APHA, AWWA and

aliyutaiyehussein@yahoo.com

WPCF, 1975). The sodium adsorption Ratio (SAR) was calculated using the formulae according to Michael et al., 2008.

$$\text{S.A.R.} = \frac{Na^{+}}{\sqrt{\frac{1}{2}(Ca^{2+} + Mg^{2+})}}$$

Statistical analysis

Data collected on each parameter were subjected to analysis of variance (ANOVA) using the Statistical Package for the Social Sciences SPSS version 15.0. The locations within a senatorial district were treated as replicates for that zone. The treatment means where significant, were separated using the New Duncan Multiple Range Test at 5% level of probability (Duncan, 1955).

Results and Discussion

Physico-chemical properties

Table 1 shows the result of analysis of the physico-chemical properties of the samples for: temperature, pH, alkalinity, turbidity, Conductivity and total hardness.

(a) Temperature

The temperature values of the water samples showed significant difference between the three senatorial zones. The values recorded were: 23.3^0C (Kwara South), 26.1^0C (Kwara Central) and 28.2^0C (Kwara North). The temperature regimes in this study are within the range suitable for agricultural usage in Nigeria set by the Federal Ministry of Environment. Increased temperature normally facilitates the rate of dissolving of solutes and improves mineral uptake and optimum plant growth (Xu et al., 2004). Brockwell and Gault (1976), confirms a significant effect on growth of legumes by irrigation water temperature treatments below 20^0C than above. This implies that irrigation water temperature in the study area is suitable for the optimum growth of arable crops.

(b) pH

The pH of the water samples was significantly highest in Kwara South (7.2) and was of an average value of 6.0 and 6.2 in Kwara Central and Kwara North senatorial zones respectively. The pH characteristic of irrigation water has significance influence on soil and plant reactions. Irrigation water outside the range of 4.5 to 8.5 according to Arimoro (2007) may contain toxic ions and can cause nutritional imbalance. Bauder et al. (2010) was of the opinion that water suitable for irrigation should have a pH range of 6.5-8.4. The pH values recorded in the present study are within suitable limits for irrigation and agricultural production. The values are similar to those reported by Morriso et al, (2010) but lower than the range of 8.94 -10.34 reported by Akan et al., (2008).

(c) Alkalinity

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The alkalinity levels in the water samples were not significantly different in the senatorial zones and ranged from 729.3 to 752.1 mg/L. Alkalinity provides information on the natural salts dissolved in the water samples and is a measure of the water's capacity to neutralize acids. It is a also an indicator of the productive potential of the irrigation water (Manahan, 1994). The values obtained for this study are far above the WHO (2004) recommendation of standard of 80-120mg/L. The high alkalinity observed in the samples may be due to agricultural and economic activities from overflow of industrial and agricultural wastes. Ogedengbe and Akinbile (2004) attributed high alkalinity levels to increases in the presence of bicarbonates and carbonates from effluents and leachates.

(d) Turbidity

The turbidity value was significantly highest in Kwara Central (22.1 NTU) and relatively lowest in Kwara South (14.1 NTU). Turbidity is a measure of the quantity of solid matter present in the suspended state of the water samples. The turbidity values reported in the study for the districts were far greater than the 5.0 NTU limit given by WHO (2008) and this according to US EPA (2004), could cause pathogenic disease occurrence. Ololade and Ajayi (2009) in a similar study obtained high turbidity values in water samples obtained from major rivers along the highways in Ondo State, Nigeria and attributed this to the presence of decaying organic matter. Adefemi et al. (2007) and Wakawa et al. (2008) had also reported very high turbidity values for some rivers in Nigeria as a result of runoff of pesticides into the water sources. The high values obtained in the present study could also be attributed to the same reason.

(e) Conductivity

The highest conductivity value of 1174.7µs/cm was measured in Kwara North, while the lowest value was measured at Kwara South (1157.8µs/cm). These values fall below FAO (1985), maximum acceptance level of 1200 µs/cm for irrigation water. This indicates that the water sources are not expected to have any salinity problems since the electrical conductivity is a parameter that summarizes the total dissolved solids and shows a correlation with higher alkalinity (Sandgren, 1993). The results found in this study, are similar to those found by Igbinosa and Okoh (2009).

(f) Total hardness

Kwara North presented the highest total hardness of 880mg/L, followed by Kwara Central (640mg/L) and the lowest value was in Kwara South (320mg/L). Based on Tyson and Harrison (1990) classification of harness and softness in terms of mg/L (0-60soft, 60-120moderately soft, 121-180 moderately hard, and >180 hard), the water samples in this study could be classified as hard. Srinivasamoorthy, et al. (2009), are of the view that hardness in water samples is due mostly to the leaching of Ca and Mg ions into the groundwater. Hardness does not affect plants directly, but has indirect impact on plant growth

through the soil. It is assumed therefore that hardness observed in the study was caused by the leaching of ions into the water sources used for irrigation. This assumption is in agreement with Nweke et al. (2013).

Chemical properties and metal concentration in water samples

Table 2 shows the results of analysis of some chemical properties and metal concentration in the water samples. The parameters analyzed were: Total suspended solids (TSS), Total dissolved solids (TDS), Biochemical oxygen demand (BOD), Chemical oxygen demand, Sulphate ion concentration, Nitrate ion concentration and Chloride ion concentration.

(a) Total suspended solids (TSS)

Total suspended solids (TSS) connotes the presence of silt and other dissolved solutes that contribute to the turbidity of a water body and is a warning sign for pollution (Wilber and Clarke, 2001). TSS levels in the water samples were between 10.3mg/L in Kwara North to 90.6mg/L in Kwara South. A positive effect of the presence of suspended solids in water is that pesticides and metals tend to adsorb to them thereby reducing toxicity effects. The levels observed are within the TSS permissible limit of 30mg/L set by the Federal Environmental protection Agency (FEPA, 1991). This implies that there could be reduced incidence of pathogens in the irrigation waters. This is in agreement with Gray et al. (2000), who are also of the opinion that a TSS value above the permissible limit is an indication of the high presence of pathogenic organisms in the waters.

(b) Total Dissolved Solids (TDS)

The Total Dissolved Solids (TDS) value of 70.3mg/L is significantly highest in Kwara North, compared to 80.4mg/L in Kwara South and 30.6mg/L in Kwara Central. The TDS value is a measure of the amount of mobile charged ions and minerals salts in a given volume of water. An elevated TDS value beyond the optimum level can induce toxicity in plants and possibly increase the osmotic potential of the soil water. The consequence of which is increase in the amount of energy plants must expend to take up water from the soil. The TDS range (30.6-80.4mg/L) obtained in the study is far below the permissible range of 450-200mg/L for irrigation water by FAO (1985). Mustapha (2008) obtained similar high TDS values while assessing the Water Quality of Oyun Reservoir in Offa, Kwara State Nigeria.

(c) Biochemical Oxygen Demand

Biochemical oxygen demand (BOD) is the amount of dissolved oxygen in water samples and is an effective indicator of organic quality of water that determines pollution levels (Clair et al., 2003). The results from the study showed that the significantly highest BOD level were recorded in Kwara South (31.4mg/L) and Kwara Central (30.9mg/L) and the lowest value was in Kwara North (13.2mg/L). These values are far above the European Union value of 3.0-6.0mg/L for safe BOD values for irrigation water (Chapman, 1996). This indicates that

aliyutaiyehussein@yahoo.com

the waters are highly polluted, possibly by pesticides and other pollutants. This result is similar to that of Adebayo and Usman (2009), who detected BOD values of between 10 to 20mg/L in Asa – River in Ilorin-Nigeria.

(d) Chemical Oxygen Demand (COD)

The chemical oxygen demand (COD) is the amount of dissolved oxygen and is a measure of the content of oxidizable organic as well as inorganic matter of the given water sample. Tepe et al (2004) linked higher COD values to the possibility of water pollution. The values of the COD in the present study oscillated between 45mg/L in Kwara South, 36.4mg/L in Kwara Central and 23.2mg/L in Kwara North. These values are above the limits of 20mg/L for water bodies and therefore could be classified within the range of polluted waters (Chapman, 1996). Kolawole et al. (2011), while assessing the water quality in Asa River in Kwara State-Nigeria also found a mean COD value of between 5.0-58.4mg/L. This was attributed among other reasons to be due to poorly executed agricultural activities near the river banks.

(e) Sulphate and Nitrate ion concentration

Sulphate ion concentration was significantly highest in Kwara South (7.0mg/L) and Kwara Central (6.8mg/L). Shinde et al., (2011) reported that sulfate ion is a major contributor to salinity in many irrigation waters and although it is rarely a problem, except at very high concentrations when it is leached into water sources and interferes with uptake of other nutrients in the soil. The concentration of sulphur detected in this study is below 250.00mg/L recommended value set by FAO (2005). This could indicate that the farmer's use of fertilizers is restricted and that there are no industries around the study area that use sulphates that can pollute the water sources.

Nitrate ion concentration was also significantly highest in Kwara Central (8.9mg/L) and Kwara South (8.7mg/L), but lowest in Kwara North (6.4mg/L). These values are below 50.00mg/L, which is the maximum limit recommended as standard for good water quality for irrigation by FAO (2005). Nitrogen has been proven to stimulate crop growth and its presence in irrigation water is most frequently as nitrate ions. It is likely that nitrate ions present in irrigation water will have the same effect as soil-applied fertilizer nitrogen. It is therefore assumed that the irrigated plant optimum fertilizer requirement should be observed to obtain expected crop yield. In a similar study, Ogidiaka et al. (2012) also detected low nitrate ion concentration in surface waters of Ogunpa River at Bodija- Nigeria.

(f) Chloride ion concentration

The significantly lowest Chloride ion concentration was recorded in Kwara South (31.2mg/L) and the highest values were in Kwara Central (67.0mg/L) and Kwara North (65.2mg/L). Chlorides are the most stable components in water and its concentration is largely unaffected by most natural physicochemical and biochemical processes (Aremu et al., 2011). Water

containing chloride concentration of less than 150 mg/L of chloride is safe and would support healthy plant growth for most crops, provided that proper irrigation management practices are applied (Landon, 1991)). The chloride concentration in the water samples analyzed is within the safe limits of 250mg/L for irrigation water set by WHO (2006).

Concentration of some other ion nutrients and heavy metals

Table 3 shows the concentration of some other ion nutrients and heavy metals in water samples from Kwara State. Calcium ion concentration was significantly lowest in Kwara South (1.9mg/L), highest in Kwara South (3.1mg/L) and intermediate in Kwara central (2.41mg/L). Sodium concentration was lowest in Kwara South (8.4mg/L) and significantly differed from Kwara central (12.4mg/L) and Kwara North (31.6mg/L). Magnesium concentration was not significantly different in Kwara South (0.67 mg/L) and Kwara Central (0.68 mg/L) but was significantly lowest in Kwara North (0.77mg/L). The average values of the major ions determined fall below the FAO (2005) permissible limits for irrigation water of 25, 200 and 150 mg/L for Calcium, Sodium and Magnesium, respectively.

Phosphate concentration were also below the FAO (2005) permissible limits and significantly highest at Kwara North (0.011mg/L) and lowest at Kwara Central (0.006mg/L). The low concentrations of these elements imply that it could supplement the cost of inorganic fertilizer when used as an irrigation water source. Akpan-Idiok et al. (2012) obtained similar results while assessing water quality of a river source in Nigeria.

Iron concentration did not vary significantly among the locations. Kwara North recorded a mean value of 0.26mg/L followed by Kwara Central (0.23mg/L) and Kwara South (0.17mg/L). These values were however marginally lower than 0.3mg/L, being FAO (2005) threshold value of Manganese concentration adopted for waters used for irrigation. The Manganese concentration differed significantly with Kwara North (0.017mg/L) and Kwara Central and Kwara South senatorial districts with similar values (0.01mg/L). The benchmark set by WHO for Iron concentration in irrigation water for wholesome agricultural purposes is 0.10mg/L.

The Boron ion concentration was not significantly different for all the locations with the concentration values of 0.225, 0.194 and 0.231mg/L for Kwara North, Kwara Central and Kwara South respectively. The values obtained satisfy the boron limit of 1.0Mg/L set by Van Roojen et al. (2005), considered safe for agricultural purposes. Different crops have their limit to boron tolerance, it is therefore important that care should be taken because boron is known to be toxic even at a lower concentration.

The sodium adsorption ratio (SAR) for the three senatorial zones is shown in Table 5. The SAR is defined by US Salinity Laboratory Staff (1954), as Sodium rich water which may cause deterioration of the physical structure of the soil. SAR is therefore an index for determining sodicity hazard in irrigation water (Schwab et al., 1993). Sodium adsorption ratio (SAR) was highest in Kwara North (22.7) and this value differed significantly from other

locations of Kwara Central (10.0) and Kwara South (7.4). Usually a limit of 15 is considered safe for irrigation water quality standard by FAO (2005). The values obtained in this study fall beyond this value only in Kwara North and this could be detrimental to agricultural productivity. This could be due to leaching of inorganic fertilizers and plant protection products from soils into water sources. SAR values obtained from the study are comparable to those reported in earlier studies by Ogunfowokan et al. (2013) and Talabi et al. (2014).

Conclusion

The results of the physicochemical parameters and trace metals determined in the waters used for irrigation in Kwara State – Nigeria, indicate that most of the parameters analysed varied depending on the senatorial zone. While some parameters compared favourably with acceptable standards for safe use for irrigation purposes, others showed levels above tolerable limits. The values of water quality indices particularly the sodium adsorption ratio, was intensely high for locations in the Kwara North senatorial district. The study concludes that elements of water pollution varied with site of collection across Kwara State.

To reduce water pollution level to the point tolerable for agricultural production, it is therefore necessary to carry out a constant assessment of water quality across the State. It is equally important for Government agencies and extension workers to educate farmers on the regulated use of inorganic chemicals, fertilizers and other farm inputs that could cause water pollution. Industrial locations and factories likely to cause water pollution are advised not be sited close to streams and rivers which serve as water sources for irrigation activity.

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aliyutaiyehussein@yahoo.com

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Figure 1: Location and positions of sample collection points

S/n	Location	Global positioning (gps)	Senatorial district
1	Yipata	8.8272N 5.1021E	Kwara North
2	Yana	8.8198N 5.2180E	Kwara North
3	Faigi	8.8529N 5.4164E	Kwara North
4	Sachitagi	8.8469N 5.4096E	Kwara North
5	Dugbanji	8.8667N 5.4364E	Kwara North
6	Belle	8.5059N 5.4211E	Kwara North
7	Gondon	8.3428N 5.3316E	Kwara North
8	Tsaragi	8.3090N 5.3455E	Kwara North
9	Zambufu	8.8135N 5.1664E	Kwara North
10	Gbugbu	8.7854N 5.2970E	Kwara North
11	Afon	8.3166N 4.5333E	Kwara Central
12	Oyun	8.5277N 4.6000E	Kwara Central
13	Awonga	8.5618N 4.5545E	Kwara Central
14	Oke-ose	8.5482N 4.6527E	Kwara Central
15	Unity-bridge	8.4804N 4.5581E	Kwara Central
16	Asa-dam area	8.5275N 4.5533E	Kwara Central
17	Ganmo area	8.4185N 4.6099E	Kwara Central
18	Tanke-area	8.4639N 4.5462E	Kwara Central
19	Eyenkorin	8.4424N 4.5033E	Kwara Central
20	Shao	8.3530N 4.3335E	Kwara Central
21	Idofian	8.3833N 4.7167E	Kwara South
22	Fufu	8.4500N 4.7166E	Kwara South
23	Ijagbo	8.2500N 4.6888E	Kwara South
24	Amodu	8.4166N 5.0066E	Kwara South
25	Omupo	8.2667N 4.8000E	Kwara South
26	Olunlade	8.3038N 4.3518E	Kwara South
27	Babanla	8.5833N 5.1833E	Kwara South
28	Otan	7.5700N 4.4800E	Kwara South
29	Oke-ero	8.1699N 5.2344E	Kwara South
30	Isanlu-isin	8.2323N 5.0833E	Kwara South

Source: field study 2015

aliyutaiyehussein@yahoo.com

Table 1: Physico-chemical parameters in water samples collected from Kwara State

SENATORIAL DISTRICT	TEMPERATURE	pH	ALKALINITY (mg/L)	TURBIDITY (NTU)	CONDUCTIVITY (µs/cm)	TOTAL HARDNESS (mg/L)
KWARA NORTH	28.2c	7.2b	742.7b	15.7a	1174.7	880.3c
KWARA CENTRAL	26.1b	6.0a	729.3a	22.1b	1171.7	640.4b
KWARA SOUTH	23.2a	6.2a	752.1b	14.1a	1157.8 NS	320.7a

Means within a column followed by the same letter(s) are not significantly different using New Duncan Multiple Range Test at P=0.05
NS= not significant

Table 2: Chemical properties and metal concentration in water samples from Kwara State

Senatorial District	Total Suspended Solids (TSS)mg/L	Total Dissolved Solids (TDS) mg/L	Biochemical Oxygen Demand (BOD) mg/L	Chemical Oxygen Demand (COD)mg/L	Estimation of Sulphate ions mg/L	Estimation of Nitrate ions mg/L	Estimation of Chloride ions mg/L
KWARA NORTH	10.3a	70.3b	13.2a	23.2a	4.3a	6.4a	65.2b
KWARA CENTRAL	60.5b	30.6a	30.9b	36.4b	6.8b	8.9b	67.0b
KWARA SOUTH	90.6c	80.4c	31.4b	45.0c	7.0b	8.7b	31.2a

Means within a column followed by the same letter(s) are not significantly different using New Duncan Multiple Range Test at P=0.05

aliyutaiyehussein@yahoo.com

Table 3: Concentration of some other ion nutrients and heavy metals in water samples from Kwara State

Senatorial District	Calcium (mg/L)	Sodium (mg/L)	Magnesium (mg/L)	Phosphate (mg/L)	Iron (mg/L)	Manganese (mg/L)	Boron (mg/L)	Sodium Adsorption Ratio (SAR)
KWARA NORTH	3.11[c]	31.63[c]	0.772[b]	0.011[c]	0.261	0.017[b]	0.225	22.71[c]
KWARA CENTRAL	2.43[b]	12.45[b]	0.682[a]	0.006[a]	0.232	0.010[a]	0.194	10.03[b]
KWARA SOUTH	1.92[a]	8.46[a]	0.672[a]	0.008[b]	0.173	0.010[a]	0.213	7.49[a]
					NS		NS	

Means within a column followed by the same letter(s) are not significantly different using New Duncan Multiple Range Test at P=0.05

URBAN DECAY AND RENEWAL IN BENIN CITY, NIGERIA: IMPACT OF THE QUALITY OF LIFE OF RESIDENTS

Enoma ,P.[1] and Idehen, A.O.[2]

[1]*Department Of Architecture, Faculty Of Environmental Studies University Of Benin, Nigeria*
[2]*Department Of Urban And Regional Planning Edo State Polytechnic, Usen, Nigeria*

ABSTRACT

Cities play pivotal role in the socio-economic and physical development of countries world-over. Unfortunately, many cities especially in developing countries fall short of their expectation as they assume chaotic physical expression of growth. This situation is variously interpreted as Decay, Decline, Rot and Sprawl. Urban decay is the state of urban squalidness and overcrowdings characterized by decrepit structures, poor amenities condition, overcrowding, under provision of amenities and general deterioration of the urban environment. Scholars of the built environment noted that obsolescence and poor planning combine with other factors brought about this urban menace in many cities. Urban renewal involves the redevelopment, rehabilitation, revitalization and regeneration of a degraded urban area. This research looks at the effort by Edo State government, in tackling the problem of urban decay in Benin City, Nigeria, with focus on the cause(s), effect, the strategy adopted for restoration and its' impact on the quality of life of residents. The study was approached by way of field investigations. Data was collected from both primary and secondary sources. Findings revealed that the lack of attention by concerned government agencies and poverty caused the urban deterioration problem in Benin City. The study also showed that urban decline situation in Benin City is largely connected to economic downturn, lack of infrastructure database and, poor planning coupled with nonchalance attitude towards public utilities and lack of environment cleaning culture on the part of stakeholders. However, the research revealed that the effort by government to transforming Benin City which is one of Nigeria's foremost cities was impactful. The study suggested that integrated planning and development is sacrosanct to achieving sustainable urban renewal programme in Nigeria.

Keywords: Decay, Poverty and Poor Planning, Sustainable Renewal

INTRODUCTION

Cities play very significant developmental roles in all countries the world over. However, one of the challenges that hinder their efficient functioning and thereby necessitating urban renewal is the phenomenon of urban decay or urban decline. According to Owoeye and Omole (2012) urban decay is the process whereby a previously functioning city or part of a city falls into disrepair and decrepitude. Often, urban decay manifest dilapidation of public

arthuridehen@gmail.com

infrastructures, de-industrialization, abandoned buildings, high local unemployment, fragmented families, changing population, political disenfranchisement, crime and a desolate, inhospitable city landscape. In some cases, such desolate and inhospitable city landscapes are seen to be of 'urban blight'. Danson (2008) opined that such situations could result from the deterioration and decay of buildings and older areas of large cities, due to neglect, crime or lack of economic support. Abumere (1987), Jinadu (2008) and Eni and Abua (2014) concluded that the implications of urban decay can be viewed from it physical, economic and social dimensions. The physical dimension exhibit urban squalidness and overcrowdings characterized by decrepit structures, poor amenities conditions, and general deterioration of the urban environment. In economic terms urban decay refers to a decline in the productivity of an area of the city, leading to economic dis-investment, downturn, unemployment problem and poverty. The social dimension of urban decay refers to the social-cultural deterioration often associated with physical and economic decline of parts or the entire city such as hooliganism, moral bankruptcy, crime, political unrest, social segregation, internal displacement, kidnapping and assassin.

The deterioration as well as expansion challenges faced by world cities prompted the idea of urban renewal as a comprehensive restoration approach to the menace associated with the growth of cities worldwide. According to Gibson and Langstaff (1984), Couch (1990) and Levy (2009) urban renewal which is also called regeneration or revitalization depending on the country and its transformational focus, involves such strategic options like clearance, redevelopment, rehabilitation/up-grade, conservation, community development and integrated planning. 'Urban renewal is also used to rehabilitate or redevelop a country that is affected by war or natural disaster' (Omole, 2000). Countries like Hong Kong, United States of America, England and South Africa hold success of urban renewal programmes. For instance, in United States of America, the White Plains in New York was transformed to a big commercial centre as an urban renewal project. Many urban renewal projects have been embarked upon in the past and recent times in Nigeria. Some of these renewal projects include that of Isale-Eko, Jos, Uyo, Bodija, Ibadan, Calabar, Enugu, and so on. One of the recent and adjudged successful urban renewal projects in Nigeria is that of Calabar in Cross-River State, which hitherto suffered 'exponential deterioration and dilapidation especially in the older part like Duke town' (Eni and Abua, 2014). In some other parts of Nigeria, the urban renewal projects were however not successful. Example of failed urban renewal programme in Nigeria includes that of Maroko in Lagos state in the early 1980s and the sustainable Ibadan Project (SIP) in 1997 that was sponsored by UNICEF and UNDP in partnership with Oyo State Government (Basorun, 2004), (Omole, 2000) and (Okojie, 2010). Following the foot-step of other States in Nigeria, Edo State government initiated the first ever urban renewal of Benin City in 2008(Seven years and half ago) with a view to tackling the urban decay problem in the ancient city. The intervention covered road rehabilitation and construction, enforcement of physical development control measures, refuse management,

arthuridehen@gmail.com

improvement of health and educational infrastructures, traffic management, flooding and erosion control and general beautification of the city. This research focused on examining the problem of urban decay, causes, and benefits of renewal in Benin City.

Statement of the Problem

Urban decay is experienced in both the cities of the developed and the developing countries, but the approach and successes of the renewal attempt to addressing the deterioration challenges in these countries are far apart in the literature between the formal and the latter. Evidently, many completed renewal projects especially in the developing countries of the world are roundly criticized against the intention and out-come because they were not handled the right way or ill-conceived and have therefore 'induced different social and environmental problems instead'(Omole, 2000).

In the light of the above, Couch (1990) suggested that it is imperative that urban renewal initiative be well articulated by checking and eliminating chances of counter-productivity. In Nigeria, the worlds 'most populous black nation, a number of urban renewal programmes were reported to have failed due to several factors including lack of planning and design, community participation, abandonment, poverty, Poor programme initiation and execution, corrupt practices amongst others. For instance, street cleaning and provision of housing units for the unemployed and the under-employed could not solve the urban derelict situated in central Lagos but created new ones.

Beyond physical development, economic revitalization is one of the modern approaches in urban renewal which plays prominent role in the sustenance of urban renewal development. This concept is of the view that with industrialization and employment opportunities given to all and sundry, people will eat well, think well and reason well and it is upon this that they can remember that it is good for them to live and inhabit a decent environment (Rober and Sykes, 2006) Social renewal is another important aspect of urban transformation which has to do with harmonious evolution of civil society, fostering an environment conducive to the compatible cohabitation of culturally and socially diverse groups while at the same time encouraging social integration, with improvement in the quality of life for all segment of the population. According to Assefa and Frostell (2007) and Colantonio and Dixon (2009) a socially sustainable renewal is the finality of an effective urban renewal while economic and environmental sustainability are both the goals and instrument for its attainment. In view of the benefits of urban renewal and considering the huge financial involvement and socio-psychological and economic effect that do result from a failed urban renewal, an evaluation of this sort is considered apt for the urban renewal in Benin City.

Objective of the Study

The aim of this study is to examine the urban decay situation in Benin City, Nigeria and evaluate the urban renewal impacts on the quality of life of residents.

arthuridehen@gmail.com

Tested Hypothesis

The following hypothesis was tested in the study:

There is no significant difference in the quality of life of residents in Benin City before and after the urban renewal programme.

RESEARCH METHODS

This study utilized data from both primary and secondary sources. Data from primary source was obtained directly from the field. This was collected through the administration of structured questionnaire, scheduled oral interview, field measurements and personal observation. Secondary data for this study was obtained from both published and unpublished literatures. These included textbooks, journals, conference papers, thesis and the internet. Data on the causes of urban blight in Benin City. This was sourced through field observation by the researcher, administration of questionnaire to residents in the study area and interview of relevant government agencies such as the ministry of Housing and Urban Development and the Ministry of Environment and Public utilities and other related ministerial agencies.

Method of Data Collection

At the growth rate of 3%, Ofuokwu, (2010) projected the population of Benin City to be 1,416,561 in 2015.

However in view of the projected large population of the study area as stated above. A sample population of 384 was determined for the study using Fisher's formula for cross sectional descriptive study; where minimum size is calculated using the formula: See table 1

$$N = \frac{z^2 pq}{d^2}$$

Where;

N = The desired sample size

Z = The standard Normal Deviate usually set t 1.96 Corresponding to 95% Confidence Level

P = The Proportion in the Target Population

q = 1- p

d = Degree of Accuracy Desired Set at 0.05

Table 1: Calculated minimum sample size for cross sectional descriptive study

Population	**100**	**500**	**1,000**	**10,000**	**100,000**	**1,000,000+**
10%	50	81	88	96	96	97
5%	80	218	278	370	383	384
1%	99	476	906	4,900	8,763	9,513

Source: Adapted from Bartlett et al (2001) and Ogbeibu (2014).

Method of Data Analysis

- Sourced data was analysed by use of descriptive statistics and other statistical procedures. For the descriptive analysis, detailed explanations by the engagement of such tools like tables, was employed. Also, the Statistical Packages for Social Sciences (SPSS) was used to analyse the returned questionnaires.
- The hypothesis test examined if the difference in quality of urban environment in Benin City before and after the urban renewal programme is significant, using the t-test distribution for two independent samples (pooled). This technique adequately helped to compare the quality of the urban environment before and after the renewal, in view of the projects initiated.
- To achieve this, the researcher compare such transformational goals like educational development, health care delivery, waste management, erosion control, portable water supply, industrialization etc before the period of renewal and after, and compute the mean ($\bar{x}_1$) of the sample before i.e. population 1 and the mean ($\bar{x}_2$) of the sample after renewal i.e. population 2 and then take a decision at:
  df = n1 + n2 - 2 and at the specified $\propto$.

According to Rilwani (2005) the formula for the student's t-test for the pooled two independent samples is given as:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\sigma p\left({}^{1}/_{n_1} + {}^{1}/_{n_2}\right)}}$$

Where: $\bar{x}_1$ = mean score of 1st sample group (Before renewal)

$\bar{x}_2$ = mean score of 2nd sample group (After renewal)

$$\sigma p = \frac{\sum(x_1 - \bar{x}_1)^2 + \sum(x_2 - \bar{x}_2)^2}{n_1 + n_2} \; or \; \frac{n_1 {s_1}^2 + n_2 {s_2}^2}{n_1 + n_2 - 2}$$

Where s1 and s2 are respectively the standard deviation of samples 1 and 2.

Note that $n_1 + n_2 - 2$ is the degree of freedom at which the level of significance is to be taken.

arthuridehen@gmail.com

The null hypothesis is $\mu_1 = \mu_2$, $\mu_1 - \mu_2 = 0$, which means that there is no significance difference between the 1st group and 2nd group.
Alternative hypothesis is $\mu_1 - \mu_2 \neq 0$, $\mu_1 \neq \mu_2$. This implies that the mean of one group is greater than that of the other.

ANALYSIS OF FINDINGS

Test of Hypothesis Result

The statistical analysis was tested at 5% level of significance or 95% confidence level i.e. p-value (0.05) for the various components of urban transformation of the study area as computed in table 2 below. Aside portable water supply and economic improvement, the statistical analysis revealed that there is a significant difference in the quality of the urban environment before and after the renewal programme in Benin City as shown in all other sectors other sectors.

Table 2: Urban renewal performance by sector

Sources of variation	Group Before After	Mean	Mean Difference	t	F	P-Value
URBAN PHYSICAL ENV.	1	3.2753	0.8623	17.281		0.000
	2	2.4130	0.8623	17.281		0.000
HOUSING					3.208	
	1	3.5065	-0.47792	-7.131		0.000
	2	3.9844	-0.47792	-7.131		0.000
WATER SUPPLY					119.893	
	1	3.9974	0.5974	0.715		0.475
	2	3.9377	0.5974	0.715		0.475
ROAD QUALITY					33.68	
	1	4.1325	1.53766	22.298		0.000
WASTE MGT.	2	2.5948	1.53766	22.298		0.000
	1	.3169	-.50909	-7.135		0.000
MASS TRANSIT PROVISION	2	3.8260	-7.135	-7.135		0.000
					5.868	
ECONOMIC GROWTH	1	3.7299	7.213	7.213		0.000
	2	3.2026	7.213	7.213		0.000
TRAFFIC MANAGEMENT					11.231	
	1	3.7299	1.203	1.203		0.229
	2	3.6442	1.203	1.203		0.229
STREET TRADING ACTIVTIES					143.682	
	1	3.8260	9.323	9.323		0.000
	2	3.1403	9.323	9.323		0.000
EDUCATION QUALITY					296.454	
						0.000
	1	1.3584	-1.54026	20.512		0.000
	2	3.8987	-1.54026	-20.512		
HEALTH SERVICE PROVISION					63.375	
						0.000
	1	3.8104	.97403	15.800		0.000
	2	2.8364	.97403	15.800		
EROSION CONTROL					8.551	0.000
	1	3.8208	-1.22597	-20.031		0.000
	2	3.0468	1.22597	-20.031		
	1	3.0571		-.14805		0.030
	2	3.2052		-.14805		0.030

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

1. The investigation revealed that poor physical planning and weak urban governance by successive government mostly contributed to the urban deterioration (decay) in Benin City. As observed, the non-adherence to the city master plan and weak enforcement of development control resulted in the squalid state of the study area.
2. Poverty as a result of economic down tune which is due to weak industrial base and employment opportunity were also noted to be responsible for the growth of slums, hawking by the under age, street begging and touting activities. This category of residents are not able to afford decent housing in the study area.
3. Investigation also revealed that obsolescence of infrastructure contributed in no small measure to the decay situation. Field observation revealed that most of the basic infrastructures/utilities were built during the colonial era and early military regime in Nigeria.
4. The non pro-active attribute of government in the past towards the restoration of the study area resulted in poor health, service delivery, lack of quality education, indiscriminate dumping of refuse at market and other public places and road junction, slow rate of economic growth, lack of portable water supply, flooding and erosion problem and poor urban transportation system.
5. Although the urban renewal of Benin City was well publicized, the benefiting communities were not given the opportunity to contributions at the planning, design and implementation stages of the renewal exercise hence it was not participatory.
6. Investigation revealed that the exercise carried out is not urban renewal per say but public infrastructure up-grade especially in the areas of road construction and storm water project which constitute about 70% of the total work done in the study area.
7. Despite effort to check the activities, the study area still parades destitute, street begging and touts. Also worrisome is the indiscriminate parking, loading and discharging of passenger by commercial bus drivers and the persistent trading activities on the walkway in Benin city.
8. The approach towards the renewal was not strategic and comprehensive as of urban renewal practice in the developed world. Most residents whose property were affected did not get compensation and no resettlement scheme was put in place to house the displaced.

However, the urban renewal exercise was adjudged to have impacted the life of residents in Benin City. This, position is predicated on the decades of neglect by successive government

CONCLUSION

The conclusion of this research is based on the research findings summarized above:

1. Neglect by government and its agencies that are responsible for urban planning and development, coupled with poverty caused the urban decay problem in Benin City.
2. An appreciable effort was made in view of Benin City transformation especially in the area of road rehabilitation, renovation of public schools, reconstruction of the central hospital and erosion control amongst others.
3. However, economic regeneration, portable water supply and electricity supply are yet a big challenge in the study area. As observed, economic activities in the study area is at a low level obviously because of industrialization problem and the closure of most manufacturing and service industries and the relocation of others in the recent past to other state is taking a negative tune on the physical and social transformation of the urban centre.
4. Although the infrastructural development effort and the enabling environment created by government for private and public investment in the state is directed at economic transformation, concerted effort by government to industrialize the study area is not yet at appreciable level considering the years of neglect and the ever increasing rate of urbanization, in view of urban redevelopment sustenance. According to Roberts and Sykes (2006) and Omole, (2000) a hungry man hardly gives priority to living in a decent environment.
5. Urban development proposal or master plan is a public document that spell out the development agenda of government as gazetted, such that the contributions of various stakeholders toward the development proposal is sacrosanct in ensure effectiveness. However, this was not the case in the transformation plans for Benin City by government.
6. The renewal programme did not effectively tackle the problem of destitute, street beggars, touts; pick pocketing and commercial sex workers activities around the central business district (CBD) due to weak enforcement and poor monitoring on the part of government.
7. The issue of compensation and resettlement was not handled properly. While some properties were compulsorily acquired and compensated for, others were left to suffer demolition without any form of assistance.
8. The proposed plan by government to develop New Towns in the three senatorial district in the state is a laudable vision that should be pursued vigorously as it will help to reduce pressure and sustain the level of sanity that have been achieved thus far in Benin City.

RECOMMENDATION

To achieve a sustainable urban renewal that will make meaningful impact in the life of residents in Benin City, the following are hereby recommended.

- Determination of a vision for strategic long term plan that will focus on improving the image of Benin City by extending public services and infrastructure to the entire city coverage area. This will help to maintain a safe living environment.
- Multi-disciplinary professionals should be set up as a team to monitor the city growth and prepare proposal for urban regeneration design that will improve the condition of the built environment from time to time.
- Cultural and historical heritage should be promoted through conservation, rehabilitation and maintenance of building, monuments, open spaces, landscapes and settlement patterns of historical, architectural, religious and spiritual value.
- Sufficient employment opportunities should be generated as well as improvement of the function of the city centre.
- Enhance and sustain access to credit services and land to assist housing provision both for private developer and mortgage institutions to encourage public housing provision.
- Rural poverty should be reduced or possibly eradicated by extension of infrastructure, public services and employment to check rural-urban migration.
- Marginal groups like destitute and street beggars should be given priority when providing basic services.
- The physical planning and development control unit of the Ministry of Housing and Urban Development should be adequately empowered and equipped to carry out their responsibility to monitor, enhance sanity of Benin City. This should be inclusive of other relevant government organ that is connected therewith to the development and sustenance of the built environment.

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arthuridehen@gmail.com

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arthuridehen@gmail.com

WORK PLACE VIOLENCE, AGGRESSIVE BEHAVIOUR AND ORGANIZATIONAL PRODUCTIVITY

Abdul-Sabur, H.

Department Business Administration, Federal Polytechnic Kaura Namoda, Zamfara, Nigeria

ABSTRACT

There are various internal threats that exist within a formal setting which have become a serious problem, these problems seems to be in the form of inflicting injuries in the mind of employee, the study of workplace violence, aggressive behavior and organizational productivity, try to carry out a survey study in order to ascertain whether it affect the level of organizational productivity and the psychological feeling of employee toward the organization, a population sample of 400 staff of Federal Polytechnic Kaura Namoda were randomly selected to represent the entire population of the institution, the data were collected through the use of survey questionnaire and were analyzed, using chi-squire statistical tool, two set of hypothesis were raised and tested, this revealed that workplace violence, aggressive behavior affect the organizational level of productivity .the researcher recommended that organization should foster a supportive, harmonious work environment so as to make workplace comfortable.

Keyword: ***violence, aggression, employee, productivity and organization.***

INTRODUCTION

Conflict is a state of dispute caused by the actual or perceived opposition of needs, values and interests amid people working together in an organization. Conflict takes many shape in organizations, there is the inevitable clash between formal authority and power and those individuals and groups affected. There are disputes over how profits should be sheared, how the work should be completed and how long and hard people should work. There are jurisdictional disagreements among individuals, departments, and between unions and management. There are slight forms of misconstrue involving rivalries, jealousies, personality clashes on task definitions, and strive for power and favor, it's equally within individuals , between challenging needs and demands , which individuals attend to in different ways (Johnson 1976). These conflicts degenerate into aggression which if not checked lead to conflict.

Workplace violence and aggression are deeds or event that may physically or psychologically hurt another person. Violence and aggression are present in position where workers and other

abbdulsaburhassan@gmil.com

people are vulnerable, attacked or physically battered at work. Series of cases relating to violence and aggression in workplace have been dominating so many organizations and consequently, can be counterproductive work behavior (CWB)

Statement of the Problem

Violence and aggression in workplace are so unchecked and have dominated both public and private sectors, where the subordinates and superior, colleagues, juniors and seniors among themselves in the work place are subjecting one another to series of threats and intimidations both physically or psychologically that invariably affected their level of commitments, performance and productivity, workers under this category feels unsecured with their job.

Purpose of The Study

The purpose of this study is to investigate the influence of violence and aggression in workplace.

Objectives

i. To identify the effect of violence and aggression on organizational productivity.
ii. To understand how violence and aggression affect the psychological feeling about the organization.

Research Hypothesis

1. H0; Workplace violence and aggressive behavior do not affect organizational Productivity.
2. H0; Workplace violence and aggressive behavior affect workers psychological Feelings about the organization

Scope and Delimitation of the Study

The study is to be restricted to workplace violence, aggressive behavior and organizational productivity. This study is to assess how these variables affected the level of productivity. The staffs of Federal Polytechnic of Kaura Namoda, Zamfara State of Nigeria are to be covered.

Literature Review

Workplace Health & Safety (1993) "Violence is the excessive or superfluous use of force or power". Workplace violence and aggression are actions or incidents that may physically or psychologically harm another person and these are present in situations where workers and other people are threatened, attacked or physically assaulted at work. Violence or aggression in the workplace can be detrimental to the organizations as well as folks, resulting in reduced competence, efficiency and productivity; increased non-attendance; increased staff mass

abbdulsaburhassan@gmil.com

departure; increased psychotherapy and mediation costs; increased workers' reward claims; or possible legal action (Safety and health 2010).

Workplace violence or occupational violence refers to violence, usually in the form of physical abuse or threat, that generate danger to the health and safety of an employee or multiple employees, Workplace violence includes acts such as physical mugging, as well as spitting, verbal abuse or intimidations, threats with a bludgeon, sexual mugging, theft and destruction. Baron and Neuman, (2010) defined W**orkplace Violence as any occasion where an employee or supervisor is abused, threatened or battered in a situations connected to their work.** Kwicka (1999) Violence in the workplace is defined as occasion where people are intimidated, threatened or battered in a scenario relating to their work, involving explicit or implicit threat to their safety. There is challenge on workers' health related to violence on their work and this posed threat to their future in the organization. Beale et al. (1998) defined work-related violence and adopted by the National Health Service (UK) described as a situation where staff are frighten, threatened or assaulted in a situation connected to their work, involving an explicit or implicit threat to their safety, wellbeing or health.

Workplace violence should be acknowledged as a major workplace hazard. Some of the perils connected with violence in the workplace include physical and arousing distress, low drive, high workers turnover, financial costs, and low output. Rai (2002) aggression can happen in a range of circumstances. One significant sphere to be aware of aggression is in the workplace. Workplace aggression is measured to be a specific type of counterproductive work behavior (CWB) and is defined as any act of aggression, physical attack, intimidating or coercive behavior that inflicted physical or emotional injury in a work setting. Kivimaki, et al.(2009) offered a definition of workplace aggression as behavior by a person or persons inside or outside of an organization that is projected to bodily or emotionally harm an employee or employees and transpire in a work-related environment.

Anderson (2002) defined aggression, is measured to be any manners that is carry out by any human being with the aim to cause harm to another person or group of people. The provoker must think that their actions are destructive to their target(s), and that the target(s) will be aggravated to avoid this conduct.

Inness et al (2005) explained that workplace aggression is a dialectical and inter-personal incident in which exterior realities such as societal division, joblessness, organizational rationalization, organizational composition, work processes, functions and customs, and interior worlds of passions, transitive, purposes, desires, sensitivities, anxiety, and the like run over.

Classification of aggressive behavior

In order to delineate the range of behaviors that can be considered aggressive workplace behaviors, researchers have developed schemes of classification for workplace aggression. Neuman and Baron (1998) offer these three dimensions that encompass the range of workplace aggression:

Expressions of unfriendliness – behaviors that are primarily verbal or symbolic in nature.

Obstructionism – behaviors planned to hinder a worker from performing their job or the organization from realizing its objectives. And overt aggression – hostile acts. In an effort to further break down the extensive series of aggressive workplace behaviors, Baron and Neuman (1996) also categorize workplace aggression based on these three dichotomies: Verbal–physical, Direct–indirect, Active–passive·

Aggressive acts can take any possible combination of these three dichotomies. For example, failing to deny fake chitchat about a coworker would be classified as verbal–passive–indirect. Purposely avoiding the presence of a coworker you know is searching for your help could be considered physical–passive–direct. Other intellectuals offer a classification system based on the aggressor's relationship to the victim Peek-Asa et al.,(2001).

Criminal intent (Type I) – this type of aggression occurs when the aggressor has no any affiliation with the casualty or organization.

Seller/customer (Type II) – **Client- allied violence is expressed as violence or aggression exhibited by a client of a service, towards the employees, when trying to provide sustainable services to the customer.** The aggressor has a relationship with the organization and aggresses while they are being served as a client.

Worker on worker (Type III) – both the aggressor and the victim are workers in the same organization. Often, the aggressor is a supervisor, and the victim is a subordinate.

Personal relationship (Type IV) – the aggressor has a link with an employee in an organization, but not the organization itself. This category includes victims who are battered by a domestic partner while at work. Katryne and Julian (2003) It is also the situation in which male arrives at workplace and aggresses against his estrange partner or spouse.

In the workplace much of the aggressive behaviors performed on main target are considered to be covert in nature. According to Bjorkqvist, et al.,(1994). Covert behaviors are those behaviors that are considered to costume the aggressive behavior or aggressive intentions from the target. Overt aggression, on the other hand, includes behaviors that do not secrete the aggressive target and are open on their intentions. Typically, covert aggression is unwritten, oblique and inactive in nature, while overt aggression reveal the corporeal, express and lively side of the dichotomies.

Predictors of Work Place Aggression and Violence

Sandy et al (2007) stated that the idea that perceived provocation leads to target-specific aggression suggests that target specificity applies to situational but not individual difference variables. Individual differences are not provocations; rather, they reflect factors that predispose individuals to behave in certain ways. Because individual differences are relatively stable across time and situations, one would expect individual differences to predict both interpersonal and organizational aggression. To assess the prediction of interpersonal versus organizational aggression, we examine three individual (i.e., trait anger, negative affectivity, and biological sex) and five situational predictors (i.e., procedural injustice, distributive injustice, interpersonal conflict, situational constraints, and job dissatisfaction). Julian et al.,(2009) structured that there are some predicting factors like gender, age, race, social economic status (education, income and occupation. Moreover, relationship among personality attributes, negative effect, self-esteem constitute a strong predictor. Julian (2009) predicted that both personal factors like alcohol, aggressive history, self-esteem, psychological aggression and, workplace factors like perceived injustice, electronic monitoring and job insecurity play a significant role in determining workplace violence. With the regular retrenchment of workers in both public and private sector of the economy which resulted into job insecurity and job insecurity promote work place violence based on psychological bases and that of physical.

Outcome of Workplace Aggression and Violence

In many ways the outcome of workplace aggression and violence have effect on organization. Julian et al., (2009) expressed that the outcome of workplace aggression and violence can be effective on the basis of individual outcome, organization outcome and societal outcome. Coworker-initiated aggression negatively affected emotional well-being, psychosomatic wellbeing, and affective commitment. Public-initiated violence and aggression predicted perceptions of likelihood of future violence, which in turn predicted fear of future violence. Public-initiated violence also directly predicted employee intent to turnover (Manon et al., 2002). Azizi et al., (2012) Workplace aggression is a deadly problem leading physical, emotional, and psychological damages to employees. Additionally, organizations incur damage such as decrease of performance, employee lack of morale, and economic costs due to this problem. Dorota et al., (2009) It was understood that both supervisor and coworkers aggression or violence towards employees would result in considerable decrease of mental health status and work satisfaction indicators and increase the level of professional burnout.

PRESENTATION AND ANALYSIS OF DATA

This has to do with representation and analysis of responses from four hundred and fifty (450) questionnaire but only four hundred (400) were returned, and it represent 88.9%. Therefore data analysis will be based on the responses from the respondent's i.e four hundred

(400) respondents. The responses were statistically analyzed in order to test the hypothesis under study using chi-square(x^2)

Table 1 Analysis of Hypothesis 1

	S/DIS AGREE 1		DISAGREE 2		AGREE 3		STRONGLY AGREE 4			
VARIABLE	OB	EXP	OB	EXP	OB	EXP	OB	EXP	TOTAL	MEAN
Intimidation	28	20.805	5	6.9825	20	23.37	6	5.8425	57	14.5
Threatened	25	21.9	7	7.35	22	24.6	4	6.15	60	15
Attacked	18	22.63	10	7.595	30	25.42	6	6.355	62	15.5
Verbal abuse	10	10.95	3	3.675	15	12.3	4	3.075	30	7.5
Mugging	11	13.505	4	4.5325	17	15.17	2	3.7925	37	9.25
Sexual Mugging	21	19.71	7	6.615	21	22.14	5	5.535	54	13.5
Assault	14	18.25	5	6.125	22	20.42	5	5.125	50	12.5
Anxiety	19	18.25	8	6.125	17	20.42	9	5.125	50	12.5
TOTAL	146		49		164		41		400	100

Source: Field survey 2013

In summary from table 1,x^2C =38.36 . Which is derived from the formula $x^2C = \frac{=(0-e)2}{e}$

Degree of freedom (df)= (r-1)(c-1)=r=4, c=8

(4-1)(8-1)=3x7=21 :.05,21 = 32.67

X^2C is greater than X^2t. Based on the decision rule, the null hypothesis is rejected. The alternative hypothesis is accepted and this implied that Workplace violence and aggressive behavior affect organizational productivity(38.36 > 32.67).

Null Hypothesis: H0: Workplace violence and aggressive behavior does not affect workers psychological feelings about the organization

Alternative Hypothesis: H_1: Workplace violence and aggressive behavior affect workers psychological feelings about the organization.

abbdulsaburhassan@gmil.com

Table 2: Analysis of Hypothesis 11

	S/DIS AGREE 1		DISAGREE 2		AGREE 3		STRONGLY AGREE 4			
VARIABLE	OB	EXP	OB	EXP	OB	EXP	OB	EXP	TOTAL	MEAN
Mentally	9	9.38	22	19.6	5	6.86	20	20.16	56	14
Emotionally	11	9.5475	19	19.95	7	6.9825	20	20.52	57	14.25
Physically	9	9.38	20	19.6	9	6.86	18	20.16	56	14
Productive	10	6.8675	10	14.35	4	5.0225	17	14.76	41	10.25
Committed To Job	10	7.37	20	15.4	4	5.39	16	15.84	44	11
Job Satisfaction	4	7.5375	11	15.75	9	5.5125	21	16.2	45	11.25
Very Productive	8	8.5425	18	17.5	6	6.125	18	18	50	12.5
Harsh Supervision	6	8.5425	20	17.85	5	6.2475	20	18.36	51	12.75
TOTAL	67		140		49		144		400	100

Source: field survey 2013

To sum up from table 11, x^2C =39.80 . This is derived from the formula

$$x^2C = \frac{=(0-e)2}{e}$$

Degree of freedom (d f)= (r-1)(c-1)= r = 4, c = 8

(4-1)(8-1)=3x7=21 : .05 ,21 = 32.67

X^2C is greater than X^2t. Based on the decision rule the null hypothesis is rejected while the alternative hypothesis is accepted; this implies that Workplace violence and aggressive behavior affect workers psychological feelings about the organization (39.80> 32.67)

CONCLUSION

Based on the researcher's findings, it was realized that Workplace violence and aggressive behavior affect organizational productivity. The researcher found that Workplace violence and aggressive behavior affect workers psychological feelings about the organization. This is

in conformity with the work of Azizi et al., (2012) which stresses on productivity reduction and psychological damages on the employees.

RECOMMENDATION

Based on the findings of this study, the following recommendations were made by the researcher, that:

1. Organization should Foster a supportive, harmonious work environment so as to make workplace comfortable.
2. Organization should Train supervisors and employees how to resolve conflicts in order to reduce the level of injuries.
3. Organization should develop effective policies to protect employees from harassment on their job.
4. Organization should establish procedures for handling grievances among the workers and other people in contact.
5. Provide personal counseling through an employee assistance program – Family, marital and professional bodies.
6. Implement security programs that protect employees and when a worker felt secured him would acted positively.
7. Provide employee safety education programs – In addition to making workers aware of company rules and regulation and principles.
8. Provide job counseling for employees who have been laid off or fired so that frustration would not set in.

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THE ASSESSMENT OF SPEED RAMPS IN THE ROAD TRANSPORT INDUSTRY IN GHANA

Akowuah, E.[1] and Garriba, S.[2]

[1&2]*Mechanical Engineering Department, Cape Coast Polytechnic, Cape Coast, Ghana.*

AB STRACT

The involvement of drivers on road safety policy frameworks and interventions in the transport industry has been overlooked for some time now. A substantive dichotomous issue of concern in the road transport has been the emerging speed ramp policy that seems to reduce road accidents on one side whilst some anecdotal evidence appears to signal its side effect on the transport business. To clear the misconceptions in the minds of policy experts and beneficiaries, a descriptive assessment was conducted in the transport industry to assess the effectiveness of speed ramps in clamping down accident cases and to comparatively assess the associated repercussions that speed ramps have had on the socioeconomic lives of two commercial driver groups. Data collected from nine selected transport stations within Kumasi and Cape Coast cluster of stations were analysed by using descriptive statistics. It is revealed that there exist positive correlations in censure of speed ramps in terms of recalled road accidents during the times before and after the erection of ramps on various access routes used by the commercial drivers. Moreover, there is a retrospective difference in terms of drive time per trip as well as fuel consumption levels and component replacement rates of vehicles for the two commercial driver groups in the transport industry. The recommendations for healthy road safety and sustainable transport business in Ghana are unveiled in this study.

Keywords: *road accident, commercial driver, delay, fuel consumption, sales target.*

1.0 INTRODUCTION

An extensive body of research on road accidents considered in the domain of road transport seems to neglect the full involvement of drivers in the formulation of accident prevention and road safety improvement frameworks and strategies (Rudin-Brown & Jamson, 2013; Christie, 2001). Even though, public concern has recently been aroused over the escalating incidents of road accidents, the gap between road safety policies and the expected policy outcomes continues to widen. Training and awareness workshops for driver sensitization against road accidents as well as speed cameras have been the most effective strategies in reducing road accidents (Noguchi, 1990; Knipling, 2007; Bank et al, 2016).

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

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However, road safety regulators, insurers and transport unions have reneged on their responsibility and have resorted to less effective measures like the use of speed ramps and trained traffic officers to mitigate this national problem (Salau et al, 2004; Chiappori, 1999). Unfortunately, these ramps instead of contributing holistically in solving the problem of accidents have worsened the woes of drivers and travellers in the transport industry. Research has revealed that speed ramps slow down emergency vehicles, increase air pollution, increase vehicle wear (Ojo et al, 2015), and harms the disabled and people with physical ailment (Salau et al, 2004)

Evaluation of policy interventions is one singular issue of importance as far as human lives and economic resources of a country are concerned (Knipling, 2007). The intent of this research was to assess the effectiveness of speed ramps in clamping down accident cases and to comparatively assess the associated repercussions that speed ramps have had on the economic lives of commercial drivers.

MATERIALS AND METHOD

Research Design

A number of road users and stakeholders, who are directly or indirectly affected by traffic and road conditions, are in a limbo in respect of the usefulness of speed ramps on highways and other roads. One cannot explicitly affirm the postulation that speed ramp is truly antidote to over-speeding and subsequently minimize accident cases on roads. Moreover, it is doubtful to signal that speed ramps significantly reduce accidents, when anecdotal evidence suggests that the speed ramps itself is a causative agent of accidents (Mountain et al, 2005). Yet road safety regulators are aggressively championing the course of erecting speed ramps on roads without taking into cognizance the negative economic implications that it pose on the transportation industry. In another analogy, anecdotal evidence suggests that speed ramps is likely to affect fuel consumption, clutch disc and brake band wear rate, replacement rate of suspension components of a vehicle and above all influence the drive time per trip. Primarily, the objective of this study was to conduct a comparative exploratory assessment from the standpoint of accidents versus commercial driver expenses in the transportation industry. And to concurrently, examine the link between commercial driver lifestyle and attitude towards preventable accidents, the various causes and forms of accident that they normally witness on road. The assessment framework (Figure 1) for the study based on accidents and commercial driver expenses that are attributed to speed ramps. It is used as a guide to brainstorm on how key national policy interventions such as the case of speed ramps could be piloted and assessed before its full implementation. The speed ramp intervention needs to be evaluated within the ambit of its entire pros and cons so that it is anchored to a justification that has the modest positive influence on the economic lives of the people.

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

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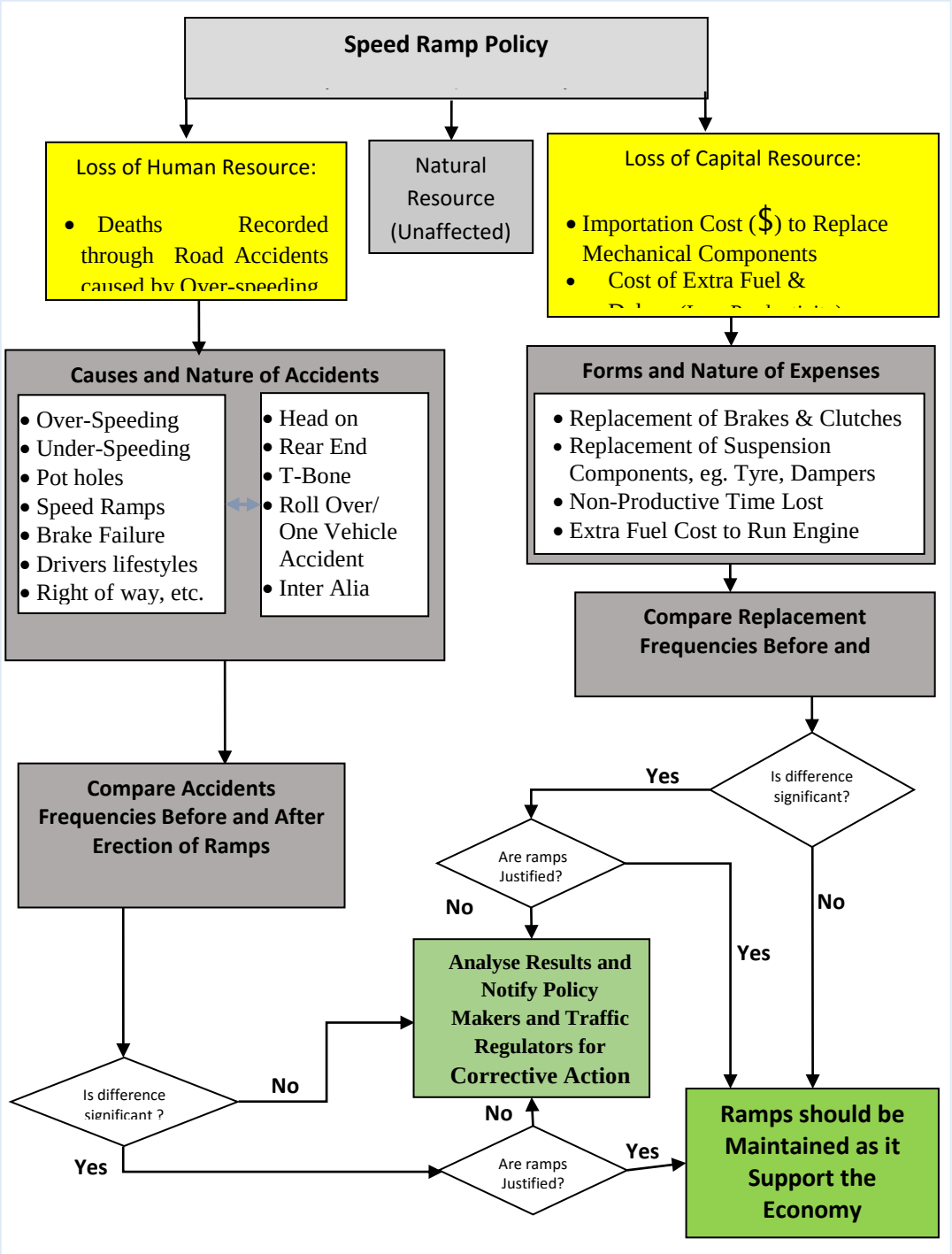


Figure 1: Assessment of Speed Ramps using Accidents versus Driver Expenses

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

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Survey Design

Insofar as a fair and comprehensive assessment on the influence of speed ramp intervention in the transport industry is required, the objectives were tailored towards a comparative evaluation of accidents witnessed by drivers against the economic burden they face as a result of speed ramps on the roads. The questionnaire used for this study was focused on drivers' personal experience on the pervasiveness of accident cases on roads, the nature of these accidents and their causes before and after the speed ramp intervention.

The study sort to blend the perception of drivers within two ideologically and geographically different groups of people who are actively involved in the Ghanaian road transport industry. The Central and Ashanti regions in Ghana were considered as the best groups for a study of this nature based on the fact that drivers within these enclaves of the Ghanaian communities are more likely to give objective views to obtain a representative perception of commercial drivers in Ghana. However, selection of the clusters was also based on the availability of ramps on the inter-regional and regional access routes. The choice of the number of stations within each cluster was related to the population of drivers and or stations in the clusters. Out of the two clusters, nine stations were selected for the study; four for Cape Coast cluster of stations and five for Kumasi cluster of stations. In each of the stations visited, five long-journey commercial drivers and five short-journey commercial drivers were selected at random and interviewed within 10 minutes using a two paged questionnaire.

RESULTS AND DISCUSSION

Speed ramps on roads are meant to check over-speeding on the part of drivers and consequently reduce road accidents. However, when drivers were engaged in the descriptive assessment, it is found that the so called 'speed ramp intervention' is a phantom intervention that could only have a placebo effect on the anticipated outcomes. Drivers felt that it has rather worsened their economic lives because the challenges posed by speed ramps on the access routes far outweigh the marginal phantom benefits associated with it.

Trend and Cause of Road Accidents

When drivers were diligently probed based on a retrospective account of the accident cases within one year before and after erection of ramps, the results on observed accident cases churned out, rather discredited the speed ramp policy. There is a moderate positive correlation of 0.389 at a significance level of 0.01 between road accidents before and after erection of speed ramps. Surprisingly, more observed accident cases were recorded by both driver groups after the erection of speed ramps (78.9%) than that observed before the erection of speed ramps (76.2%) on the same road network they use frequently. More long-journey

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

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commercial drivers (91.1%) than short-journey commercial drivers (66.7%) affirmed that accident cases worsened after the erection of speed ramps on roads as depicted in Table 1.

More so, there existed a strong positive correlation of 0.407 at a confidence level of 99% between the number of accidents before and after erection of speed ramps. Quantitatively, drivers admitted that in one year after the erection of speed ramps, they could recall as high as 10 and above cases (36.1%), seven to nine cases (6.9%), four to six cases (18.1%) and one to three cases (30.6%) of accidents on their usual access routes. Apart from the fact that more drivers were not too sure of the number of accidents cases before erection of ramps (14.7%) than after erection of ramps (8.3%), there existed a relatively similar accident trend by the same drivers in censure of speed ramps for nearly all cases before and after the erection of ramps as presented in Table 2. When the trend was spatially compared using the nine stations within the two clusters, the results were not different from that obtained by the two driver groups. Higher percentages of drivers from Sofoline transport station (80%) and Tantri transport station (71%) respectively within Kumasi and Cape Coast clusters of stations could recall 10 and above accident cases per year after erection of speed ramps on the routes they use frequently.

Drivers were tactfully lured to give an explicit account of the most recent and memorable accidents witnessed within the past one year. It is inferred from drivers' responses that head on collision accounted for 30.9% of accidents and one vehicle accidents (30.9%) were the most profound type of accidents among the recalled cases of accidents. Short-journey drivers recorded higher percentages of accidents for head on collision (42.1%) and one vehicle accident (31.6%) against lower percentages for T-bone (13.2%), unknown (7.9%), and rear end shunt (5.3%). Long-journey commercial drivers on the other hand

Table 1: Recalled Accidents and the Nature of Accidents

Variable		Type of Driver			Significance
		Long Journey Commercial (%)	Short Journey Commercial (%)	Total (%)	
Ever Witnessed Accident Before Erection of Ramps?					0.007**
	Yes	88.4%	63.4%	76.2%	
	No	11.6%	36.6%	23.8%	
	Total	100.0%	100.0%	100.0%	

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Ever Witnessed Accident After Erection of Ramps?				0.004**
	Yes	91.1%	66.7%	78.9%
	No	8.9%	33.3%	21.1%
	Total	100.0%	100.0%	100.0%
Recalled Accidents(in 1Year) Before Erection of Ramps				0.857
	1-3 times	37.5%	32.1%	35.3%
	4-6 times	12.5%	10.7%	11.8%
	7-9 times	7.5%	3.6%	5.9%
	10 & above times	27.5%	39.3%	32.4%
	Don't Know	15.0%	14.3%	14.7%
	Total	100.0%	100.0%	100.0%
Recalled Accidents(in 1Year) After Erection of Ramps				0.351
	1-3 times	22.0%	41.9%	30.6%
	4-6 times	17.1%	19.4%	18.1%
	7-9 times	9.8%	3.2%	6.9%
	10 & above times	41.5%	29.0%	36.1%
	Don't Know	9.8%	6.5%	8.3%
	Total	100.0%	100.0%	100.0%
Mode of Recent/Memorable Accident Witnessed				0.636
	Single Vehicle Accident	39.5%	44.7%	42.0%
	Multiple Vehicle Accident	60.5%	55.3%	58.0%
	Total	100.0%	100.0%	100.0%
Nature of Recent/Memorable Accident Witnessed				0.080*
	Head on Collision	20.9%	42.1%	30.9%
	T- Bone	23.3%	13.2%	18.5%
	Rear End Shunt	20.9%	5.3%	13.6%
	One Vehicle	30.2%	31.6%	30.9%

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

Accident			
Don't Know	2.3%	7.9%	4.9%
Other	2.3%	0.0%	1.2%
Total	100.0%	100.0%	100.0 %

The differences between the recalled accidents for long and short journey commercial drivers were tested using a Pearson's Chi-square Test at 95% Confidence level (2-tailed) in SPSS-version 17.0 Software.

*Significant at 90% confidence interval

**Significant at 99% confidence interval

recorded higher percentage for one vehicle accident (30.2%), followed by equal percentages of 20.9% for head on collision and rear end shunt accidents. T-bone accidents recorded 23.3% whilst unknown type of accidents and other unpopular accidents recorded 2.3% each.

The link between nature of accidents (Table 1) and causes of these accidents (Table 2 below) that were not influenced by human or animal obstruction have concretized the assertion that the nature and causes of accidents are usually inseparable. 45.5% of accidents were likened to over-speeding whilst some 15.0% were also associated with under-speeding especially on the highways as reported by long-journey drivers. It is also interesting to note that the percentage of accidents caused by speed ramps (23.3%) equate that caused by pot holes (23.3%). One would therefore, want to question the wisdom in spending huge sums of money in erecting speed ramps on roads to the neglect of pot holes that pose a serious threat to the social and economic lives of passengers and drivers as well as vehicle owners and insurers in the road transport industry.

Moreover, Figure 2 affirmed that speed ramps have caused significant accidents on roads, and both long and short journey drivers are living testimonies to this fact. Out of the23.3% of accidents caused by speed ramps, the corresponding distributions based on nature of the accidents were 10.0 % for T-bone accidents followed by rear end shunt (6.67%), one vehicle accidents (3.33%) and head on collision (1.67%) and 1.67% for other unpopular accidents.

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

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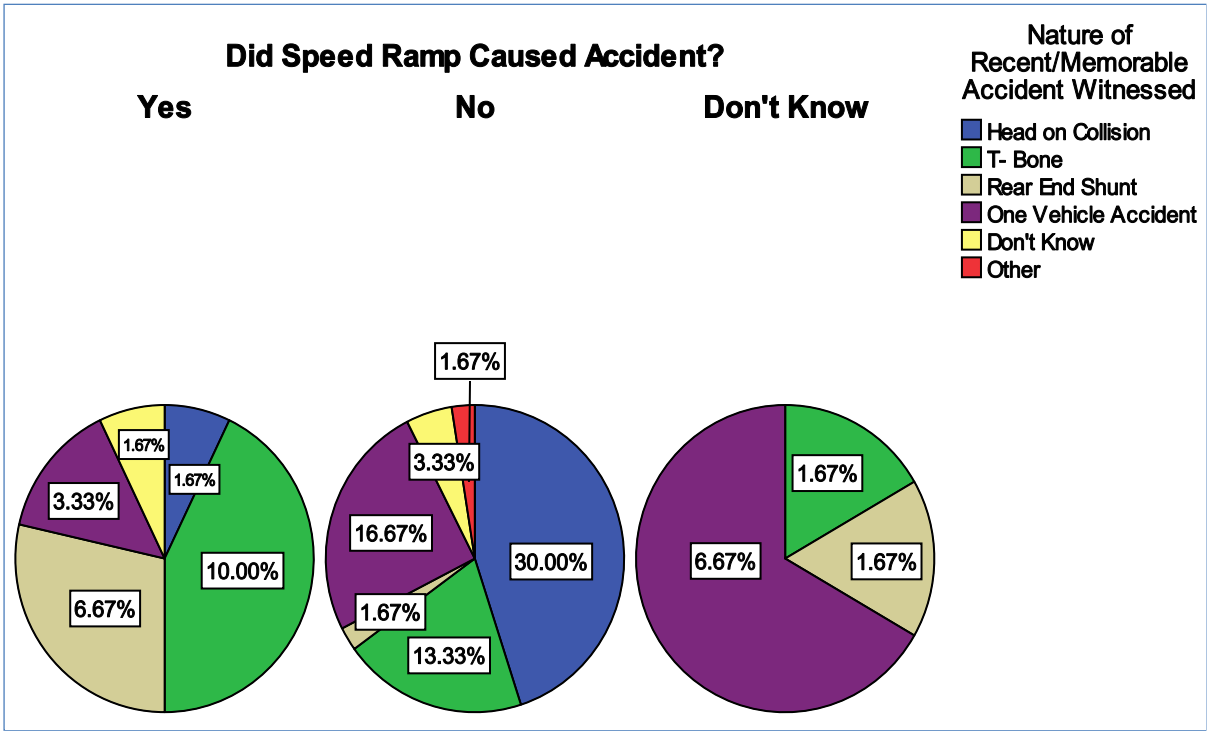


Figure 2: Nature of Accidents caused by Speed Ramps per Two Driver Groups

Table 2: Causes of Accidents Witnessed by Drivers

Variable	Type of Driver			Significance
	Long Journey Commercial (%)	Short Journey Commercial (%)	Total (%)	
Did Over-Speeding Caused Accident?				0.751
Yes	47.1%	42.3%	45.0%	
No	41.2%	50.0%	45.0%	
Don't Know	11.8%	7.7%	10.0%	
Total	100.0%	100.0%	100.0%	
Did Under-speeding Caused Accident?				0.665
Yes	17.6%	11.5%	15.0%	
No	70.6%	80.8%	75.0%	
Don't Know	11.8%	7.7%	10.0%	
Total	100.0%	100.0%	100.0%	

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

Did Poor Lighting Caused Accident?				0.796
Yes	14.7%	11.5%	13.3%	
No	73.5%	80.8%	76.7%	
Don't Know	11.8%	7.7%	10.0%	
Total	100.0%	100.0%	100.0%	
Did No or Poor Road Sign Caused Accident?				0.477
Yes	11.8%	23.1%	16.7%	
No	76.5%	69.2%	73.3%	
Don't Know	11.8%	7.7%	10.0%	
Total	100.0%	100.0%	100.0%	
Did Brake Failure Caused Accident?				0.727
Yes	20.6%	15.4%	18.3%	
No	67.6%	76.9%	71.7%	
Don't Know	11.8%	7.7%	10.0%	
Total	100.0%	100.0%	100.0%	
Did Speed Ramp Caused Accident?				0.651
Yes	26.5%	19.2%	23.3%	
No	61.8%	73.1%	66.7%	
Don't Know	11.8%	7.7%	10.0%	
Total	100.0%	100.0%	100.0%	
Did Pot Holes Caused Accident?				0.651
Yes	26.5%	19.2%	23.3%	
No	61.8%	73.1%	66.7%	
Don't Know	11.8%	7.7%	10.0%	
Total	100.0%	100.0%	100.0%	
Did Run-Off Caused Accident?				0.665
Yes	5.9%	11.5%	8.3%	
No	82.4%	80.8%	81.7%	
Don't Know	11.8%	7.7%	10.0%	
Total	100.0%	100.0%	100.0%	
Did Wrongful Over-taking Caused Accident?				0.468
Yes	8.8%	19.2%	13.3%	
No	79.4%	73.1%	76.7%	
Don't Know	11.8%	7.7%	10.0%	
Total	100.0%	100.0%	100.0%	
Was there Any Other Cause of the				0.873

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

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Accident?			
Yes	14.7%	15.4%	15.0%
No	73.5%	76.9%	75.0%
Don't Know	11.8%	7.7%	10.0%
Total	100.0%	100.0%	100.0%

The differences between the causes of accidents for long and short journey commercial drivers were tested using a Pearson's Chi-square Test at 95% Confidence level (2-tailed) in SPSS-version 17.0 Software.

Drivers Lifestyles and Attitude towards Preventable Accidents

In order to deeply understand the dynamics of accidents and their causes on the roads, it is prudent to also consider the lifestyles and attitudes of drivers towards preventable accidents on the roads. Table 3 below gives a vivid account of how the two cohorts of drivers conform to some driving ethics and best driving practices in their transport business. Per the driving regulations, drivers are expected to drive not more than 10 hours in a day and drivers are expected to rest after every four hour drive (Lisper & Eriksson, 1980). The situation is however awkward in the case of the two driver groups as 18.8% could drive as much as 12 hours and beyond in one day. This reflected in their quick response to questions pose to them on the stressfulness of the job they do. Most drivers (96.6%) opined that they were stressed up after a day's work whilst only 3.4% of drivers exhibited relaxation on the job. From Table 3, out of 61.1% of drivers who would usually resort to energy drinks and or pain killers for stress relief, some 27.8% of them are adamant to the side effects of the substances they take whilst 33.3% of them have no knowledge of what they take.

Table 3: Commercial Drivers' Lifestyles and Attitudes Towards Preventions of Accidents

Variable	Type of Driver			Significance
	Long Journey Commercial (%)	Short Journey Commercial (%)	Total (%)	
Effective Driving Hours in a Day				0.046*
Less than 4 hours	8.90%	15.60%	12.20 %	
Between 4 - 7 hours	51.10%	22.20%	36.70 %	
Between 8 - 11 hours	31.10%	33.30%	32.20	

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[2]samuelgarriba@yahoo.com

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			%	
			13.30	
Between 12 - 15 hours	6.70%	20.00%	%	
Between 16 - 19 hours	2.20%	4.40%	3.30%	
Between 20 hours & above		4.40%	2.20%	
			100.00	
Total	100.00%	100.00%	%	
Is Driver Tired/Stressed Up After a Day's Work?				0.570
Yes	95.6%	97.7%	96.6%	
No	4.4%	2.3%	3.4%	
Total	100.0%	100.0%	100.0	
			%	
Does Driver Take Energy Drink and or Pain Killer?				0.280
Yes	66.7%	55.6%	61.1%	
No	33.3%	44.4%	38.9%	
Total	100.0%	100.0%	100.0	
			%	
Does Driver Know the Side Effects of Energy Drink and or Pain Killer?				0.673
Yes	51.1%	55.6%	53.3%	
No	48.9%	44.4%	46.7%	
Total	100.0%	100.0%	100.0	
			%	
Is Driver Satisfied on the State of His Rear Brake?				0.047*
Yes	97.7%	88.9%	93.3%	
No	0.0%	11.1%	5.6%	
Don't Know	2.3%	0.0%	1.1%	
Total	100.0%	100.0%	100.0	
			%	
Is Driver Willing to Test and or Inspect the Vehicle's Rear Brakes?				0.523
Yes	92.7%	88.6%	90.6%	
No	7.3%	11.4%	9.4%	
Total	100.0%	100.0%	100.0	

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

			%	
Inspection and Testing of Rear Brakes				
				0.008**
	Excellent	39.5%	10.0%	24.4%
	Good	50.0%	55.0%	52.6%
	Fairly Good	10.5%	20.0%	15.4%
	Spoilt Brakes	0.0%	2.5%	1.3%
	Spoilt Brake Light	0.0%	12.5%	6.4%
	Total	100.0%	100.0%	100.0 %

The differences in the lifestyles and attitudes toward maintenance for Long and Short Journey Commercial Drivers were tested using a Pearson's Chi-square Test at 95% Confidence level (2-tailed) in SPSS-version 17.0 Software.

*Significant at 95% confidence interval

**Significant at 99% confidence interval

Inasmuch as road accident prevention is the pertinent issue for stake holders, one cannot overrule the behavioral and attitudinal dynamics of the driver, who is at the center of ensuring road safety improvement. The few results presented in Table 3 on driver's attitude towards vehicle repair and maintenance culture, in terms of willingness to repair rear brakes, have revealed significant differences between the two driver groups. Smaller numbers, representing 10.5% of long-journey commercial drivers had minor problems on their rear brakes whilst great numbers, representing 35% of their counterpart short-journey commercial drivers had serious unfitted problems such as spoilt rear brakes (2.5%), spoilt rear brake light (12.5%) and minor brake problems (20.0%). This scenario did reflect in the satisfaction levels of drivers in a brake inspection and stopping distance test. 11.1% of short-journey commercial drivers knew of the bad state of their vehicles' brakes but were just unwilling to repair them whilst 2.3% of short-journey commercial drivers were not sure of the state of their rear brakes. These aberrant behaviours of drivers seem to reaffirm that driver attitudinal and behavioural factor is one area that needs attention in vehicle and road accident dynamics (Rudin-Brown & Jamson, 2013).

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

Influence of Speed Ramps on Transport Business

In another paradigm, one cannot discount the socioeconomic problems associated with speed ramps in the transport industry, especially when converging revelations on its repercussions on social and economic lives of road users are so severe. From Table 4, it is deduced that the unproductive hours lost by drivers per trip is so huge and this has a lot of psychological dynamics on the driver as far as meeting daily sales target of vehicle owner is concerned. With the exception of 9.3% of drivers, who felt their drive time per trip were not affected by the presence of speed ramps on road, the others registered their displeasure by way of quantifying the extra drive time per trip that they bear. Similar sentiments were expressed by both driver groups in the following pattern. It cost 29.1% of drivers one-quarter normal drive time to complete a single trip followed by one-half normal drive time (25.6%), three-quarters of normal drive time (12.8%), one full normal drive time (12.8%) and 10.5% for drivers who could not quantify the extent of delays they encounter. Some drivers were quick to opine that "We are in a state of limbo-as to whether to stick to road safety regulations, delay on the road and not meet the vehicle owners' sales targets and be sacked or over-speed on sections of roads with pot holes, bounce into them, meet sales targets and retain our job". These unfortunate comments made by some drivers attempt to allude to the fact that delays woefully affect the number of trips they make in a day.

Moreover, when some 80.2% of drivers, who used the same car or similar car of close age during the times before and after the erection of speed ramps, were probe on fuel consumption, a similar pattern was obtained. Apart from 21.4% of them who did not experienced any difference in fuel consumption levels, the remaining 78.6% of drivers did

Table 4: Replacement of Vehicle Parts, Fuel Consumption and Delays per Trip by Drivers

Variable	Type of Driver			Significance
	Long Journey Commercial (%)	Short Journey Commercial (%)	Total (%)	
Type of Transmissions				0.502
Manual	86.7%	91.1%	88.9%	
Automatic	13.3%	8.9%	11.1%	
Total	100.0%	100.0%	100.0 %	
Were you Driving before Erection of Ramp?				0.292
Yes	93.3%	86.7%	90.0%	
No	6.7%	13.3%	10.0%	

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[2]samuelgarriba@yahoo.com

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Total	100.0%	100.0%	100.0%	
Drive Time Delays per Trip				0.256
No Difference	7.0%	11.6%	9.3%	
Quarter of Normal Drive Time	37.2%	20.9%	29.1%	
Half of Normal Drive Time	25.6%	25.6%	25.6%	
Three-Quarters of Normal Drive Time	16.3%	9.3%	12.8%	
One-Fold Normal Drive Time	7.0%	18.6%	12.8%	
Don't Know	7.0%	14.0%	10.5%	
Total	100.0%	100.0%	100.0%	
Is Driver Using Same/Similar Type of Car of Close Age?				0.144
Yes	86.4%	73.8%	80.2%	
No	13.6%	26.2%	19.8%	
Total	100.0%	100.0%	100.0%	
Comparative Rate of Fuel(gallons)Consumption per Day's Work				0.301
No difference	21.1%	21.9%	21.4%	
Quarter of previous gallons	26.3%	50.0%	37.1%	
Half of previous gallons	23.7%	15.6%	20.0%	
Three-Quarters of previous gallons	18.4%	9.4%	14.3%	
One-fold of previous gallons	5.3%	3.1%	4.3%	
Don't Know	5.3%		2.9%	
Total	100.0%	100.0%	100.0%	
Comparative Rate of Replacement of Suspension Components				0.275
Same as previous	13.2%	25.0%	18.6%	

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

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replacement				
Twice as previous replacement	42.1%	40.6%	41.4%	
Trice replacement & above	36.8%	34.4%	35.7%	
Don't Know	7.9%	0.0%	4.3%	
Total	100.0%	100.0%	100.0 %	
Comparative Rate of Replacement of Brake Bands				0.011*
Same as previous replacement	2.6%	25.0%	12.9%	
Twice as previous replacement	52.6%	31.3%	42.9%	
Trice replacement & above	44.7%	37.5%	41.4%	
Don't Know	0.0%	6.3%	2.9%	
Total	100.0%	100.0%	100.0 %	
Comparative Rate of Replacement of Clutch Discs				0.537
Same as previous replacement	37.1%	27.3%	32.4%	
Twice as previous replacement	34.3%	48.5%	41.2%	
Trice replacement & above	25.7%	18.2%	22.1%	
Don't Know	2.9%	6.1%	4.4%	
Total	100.0%	100.0%	100.0 %	

The differences between the replacement trend, fuel consumption and delays for driver groups were tested using a Pearson's Chi-square Test at 95% Confidence level (2-tailed) in SPSS-version 17.0 Software.

*Significant at 98% confidence interval

experienced differentiated forms of fuel consumption levels. The various consumption rates for drivers were; quarter of previous gallons (37.1%), half of previous gallons (20.0%). Three-quarters of previous gallons (14.3%), one-fold of previous gallons (4.3%) and 2.9% of

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[2]samuelgarriba@yahoo.com

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drivers could not tell in actual terms, the extent of such consumption levels. The trend of cost incurred is no different for the rate of replacement of suspension components and clutch discs for both driver groups.

However, there existed significant difference among the two drivers groups on the replacement rates of brake bands. In Figure 3, it is apparent that more long-journey commercial drivers recorded higher replacement rates than their counterpart short-journey commercial drivers. After the erection of speed ramps, more long-journey commercial drivers (52.6%) do replace their brake bands twice as previous times when there were no speed ramps on access routes than their counterpart short-journey commercial drivers (31.3%) do. More so, 44.7% of long-journey commercial drivers recorded trice replacement rates as against 37.5% for short-journey commercial drivers.

The differences in the replacement rates of brake bands for the two driver groups as depicted in Figure 6 is in consonance with wear rate theories that suggest that wearing of two parts in contact is a function of the sliding velocity between the two parts, and volume wear rate is proportional to frictional power (Howell & Ball, 1995; Stromberg et al, 1996). During periods of sharp deceleration, the brake frictional power for vehicles moving at higher speeds would rise and cause the brake bands to wear at faster rates than those moving at a slower pace. Since long-journey commercial drivers are expected to drive at a speed limit of 80 km/h on highways and 100 km/h on motorways whilst short-journey drivers are to remain within the 50 km/h speed limit in towns (Damsere-Derry et al, 2008), deceleration rates are high for the long-journey commercial driver than short-journey commercial driver and hence the replacement trend in Figure 3.

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

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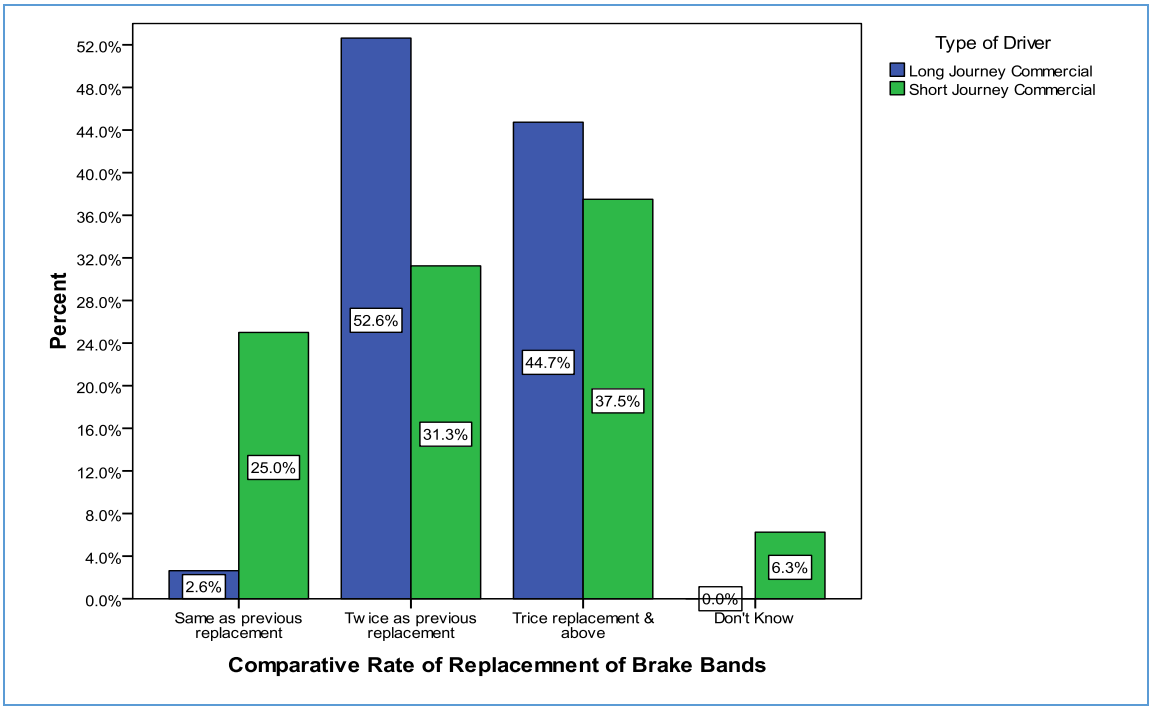


Figure 3: Brake Band/Disc Replacement for Long and Short Journey Commercial Drivers

In the mist of all these aforementioned direct and indirect financial burdens in the transport industry, the onus is on the driver to fulfill the sales target set by vehicle owner, pay transport union dues and make ends meet for himself and his conductor in some instance. As social beings, some drivers are bound to be obsessed (Dorn & Matthews, 1992; Hennessy & Wiesenthal 1999) about these aforementioned responsibilities in the work they do and are more likely to bend road safety rules in exchange for job retention.

CONCLUSION AND RECOMMENDATION

The descriptive assessment on speed ramps in the transport industry has suggested that speed ramps are not antidote to road accidents. Interestingly, the combined effect of accidents caused by pot holes and poorly designed speed ramps, without surface markings, signage and speed limits, is higher than that for over-speeding. Even though, some handful of drivers have bad attitude towards maintenance culture that might lead to the occurrence of some preventable accidents on road, the socioeconomic and psychological effect on drivers and vehicle owners in respect of the speed ramp policy is unpalatable.

It is recommended that Ghana Highway Authority should rather concentrate on patching up the pot holes on roads and build self-explaining roads imbued with all the requisite roads signs and over head crossings for pedestrians. Meanwhile, the National Road Safety Commission should evaluate all speed ramps based on the standards set by Ghana Highway

[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

Authority and accordingly demolish those that fall outside its own standards as stipulated in the speed ramp implementation policy.

Moreover, the National Road Safety Commission should begin to cast it stiff neck on more results oriented and consequential strategic policies that could pragmatically curb the ever increasing road accident menace. The National Road Safety Commission could design and adopt a 'drive-time estimator chart' to be enforced by a joint team of the commission and transport unions. The 'drive-time estimator chart' would be used to determine the approximate drive time for all access routes in Ghana and this should form the basis for setting and reviewing sales target for commercial drivers. And the transport unions and vehicle owners are encouraged to use the proposed chart to decide on the daily sales target for commercial drivers.

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[1]ericakowuah15@gmail.com,
[2]samuelgarriba@yahoo.com

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FAIR VALUE MEASUREMENT, USEFULNESS AND IMPLEMENTATION OBSTACLES - THE VIEW OF PROFESSIONAL ACCOUNTANTS IN GHANA

Amanamah, R.[1] and Owusu, E.O.[2] Amanamah, R.[1] and Owusu, E.O.[2]
Department of Accounting Studies Education, University of Education Winneba, Kumasi Campus, Ghana
Department of Accounting Studies Education, University of Education Winneba, Kumasi Campus, Ghana.

ABSTRACT
The mandatory adoption of the International Financial Reporting Standards (IFRS), in Ghana, is a real challenge for preparers of the financial statement, given the standards' emphasis on fair value as measures to improve the true and fair presentation of the financial statements. This study solicited the views of professional accountants on the usefulness and implementation obstacles of fair value accounting in Ghana. The study used 200 sampled respondents using convenience sampling methods from accounting professionals in different sectors of Ghana's economy who use IFRS. Data was collected from respondents using a well-structured questionnaire. Data was analysed using descriptive statistics with the help of SPSS software. The findings indicated that, 72% of Ghanaian accounting professionals approved fair value over historical cost because it provides useful and accurate information for economic decision making. Though, many respondents were of the view that measuring methods available were not accurate. 60% claims that majority of the assets do not have an active market making it difficult to accurately determine their fair value while 21% were neutral. Furthermore, 52% assert there is lack of skilled and qualified valuers while 60% said there is no strong regulatory body to carry out the valuation and manage the measurement methods. 47% of the respondents indicated that Ghanaian stock markets is young and not efficient therefore the cost of shares in most listed companies might not represent the true and fair value of the company's shares. Our results suggest that simply requiring fair value as the reported measure for financial instruments may not improve the quality of information unless appropriate estimation methods or guidance for financial instruments that are not traded in active markets can be established. We recommend that standard setters must factor the inefficient market of developing market to enhance the efficient application of fair value measurement hence comparability

***Keywords**: Accountants, Fair, Value, Measurement, Ghana*

richaman2@gmail.com
owusuekofi@gmail.com

Amanamah, R.[1] and Owusu, E.O.[2] Amanamah, R.[1] and Owusu, E.O.[2] (2016) Fair Value Measurement, Usefulness And Implementation Obstacles - The View Of Professional Accountants In Ghana In: Mojekwu,J.N., Nani G., Atepor, L., Oppong, R.A.., Adetunji,M.O., Ogunsumi, L., Tetteh, U.S., Awere E., Ocran, S.P., and Bamfo-Agyei, E. (Eds) Procs 5th Applied Research Conference in Africa. (ARCA) Conference, 25-27 August 2016, Cape Coast, Ghana. 421-434

INTRODUCTION

Ghana has adopted International Financial Reporting Standards (IFRS) since 2007. The adoption of the IFRS increases the use of fair value as a measurement basis for financial reporting. The fair value concept is applied in several International Accounting Standards (IAS), such as IAS 16 Property, Plant and Equipment; IAS 37 Provisions, Contingent Liabilities and Contingent Assets; IAS 38 Impairment of Assets; IAS 39 Financial Instruments; IAS 40 Investment Properties; IAS 41 Agriculture; IFRS 2 Share-based Payment; and IFRS 3 Business Combinations. While many argue that fair value is the most relevant measurement basis for financial reporting, others express concerns about the reliability and usefulness, of fair value measurements. The challenge is that many of the items might not be measured accurately to enable investors adequately assess the firm's financial position and earnings potential. This is because in the absence of active markets for a particular asset, management must estimate its fair value, which can be subject to discretion or manipulation. Given the magnitude of the complications of applying fair value accounting this study contribute to knowledge on this issue by studying the views of the implementors of the IFRS in Ghana which has a smaller economy and a much less efficient financial market, where the consequences of such an application would be relatively higher. This paper, therefore, solicits the views of professional accountants on the challenge and benefit of the implementation of fair value measurement in Ghana.

FAIR VALUE REQUIREMENT

IAS 39 Requires financial instrument to be estimated under fair value, which is easy to find fair prices since the fair prices are available in active market. The challenge is with IAS 16 where Property, Plant and Equipment are required to be estimated under fair value where there is no active or similar items traded fairly in active market. In such cases, the company has to use external appraisals to determine the fair prices for revaluated items. IAS 16 Property, Plant and Equipment requires that property, plant and equipment, be initially measured at its cost and subsequently measured either using a cost or revaluation model. Under the revaluation model, revaluations should be carried out regularly, so that the carrying amount of an asset does not differ materially from its fair value at the balance sheet date. The Standard specifies that cost comprises: Purchase price, including import duties, non-refundable purchase taxes, less trade discounts and rebates; Costs directly attributable to bringing the asset to the location and condition necessary for it to be used in a manner intended by the entity; Initial estimates of dismantling, removing, and site restoration if the entity has an obligation that it incurs on acquisition of the asset or as a result of using the asset other than to produce inventories. (IASplus, 2015).

richaman2@gmail.com
owusuekofi@gmail.com

Fair Value

international financial reporting standards (IFRS) defines fair value as the amount for which an asset could be exchanged, a liability settled, or an equity instrument granted could be exchanged, between knowledgeable, willing parties in an arm's length transaction" (IASB 2011). Ament (2010) refers to fair value as "exit values". IFRS 13(2011) defines Fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. To increase consistency and comparability in fair value measurements IFRS 13 (2011) has established the following 'fair value hierarchy':

Level 1 inputs: quoted prices in active markets for identical assets or liabilities that the entity can access at the measurement date. [IFRS 13:80]

Level 2 inputs: inputs other than quoted market prices included within Level 1 that are observable for the asset or liability, either directly or indirectly. Level 2 inputs include: quoted prices for similar assets or liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, inputs other than quoted prices that are observable for the asset or liability, for example interest rates and yield curves observable at commonly quoted intervals, implied volatilities, credit spreads and inputs that are derived principally from or corroborated by observable market data by correlation or other means ('market-corroborated inputs'). [IFRS 13:81]

Level 3 inputs: are unobservable inputs for the asset or liability. Unobservable inputs are used to measure fair value to the extent that relevant observable inputs are not available, thereby allowing for situations in which there is little, if any, market activity for the asset or liability at the measurement date. An entity develops unobservable inputs using the best information available in the circumstances, which might include the entity's own data, taking into account all information about market participant assumptions that is reasonably available. [IFRS 13:86-89]

Fair Value measurement

Fair Value measurement is a way to measure assets and liabilities that appear on a company's balance sheet. It is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date Luez (2009).

The objective of a fair value measurement is to estimate the price at which an orderly transaction to sell the asset or to transfer the liability would take place between market participants at the measurement date under current market conditions. A fair value measurement requires an entity to determine all of the following: [IFRS 13:B2]

richaman2@gmail.com
owusuekofi@gmail.com

- the particular asset or liability that is the subject of the measurement (consistently with its unit of account)
- for a non-financial asset, the valuation premise that is appropriate for the measurement (consistently with its highest and best use)
- the principal (or most advantageous) market for the asset or liability
- the valuation technique(s) appropriate for the measurement, considering the availability of data with which to develop inputs that represent the assumptions that market participants would use when pricing the asset or liability and the level of the fair value hierarchy within which the inputs are categorised.

Valuation techniques

IFRS 13(2011) gives different approaches which are the:

- Market approach – uses prices and other relevant information generated by market transactions involving identical or comparable (similar) assets, liabilities, or a group of assets and liabilities.
- Cost approach – reflects the amount that would be required currently to replace the service capacity of an asset (current replacement cost)
- Income approach – converts future amounts (cash flows or income and expenses) to a single current (discounted) amount, reflecting current market expectations about those future amounts.

An entity is required to use a valuation techniques appropriate in the circumstances and for which sufficient data are available to measure fair value, maximising the use of relevant observable inputs and minimising the use of unobservable inputs. [IFRS 13:61, IFRS 13:67]

IFRS 13 defines Active market as market in which transactions for the asset or liability take place with sufficient frequency and volume to provide pricing information on an ongoing basis; Exit price as the price that would be received to sell an asset or paid to transfer a liability; Highest and best use as the use of a non-financial asset by market participants that would maximise the value of the asset or the group of assets and liabilities (e.g. a business) within which the asset would be used; Most advantageous market as the market that maximises the amount that would be received to sell the asset or minimises the amount that would be paid to transfer the liability, after taking into account transaction costs and transport costs and Principal market as the market with the greatest volume and level of activity for the asset or liability. [IFRS 13: Appendix A]

Challenges and benefits of Fair Value Measurement

Procházka (2011) points out that elements of financial statements can be measured by various attributes, but the relevance and reliability of the attribute measured are the key points of

richaman2@gmail.com
owusuekofi@gmail.com

measuring assets, liabilities, equity and other elements. American Bankers Association (2009) asserts that fair value measurement is one of the key factors which can contribute to the problems that exist in the financial market. On the other hand Song etal. (2010) asserts that fair value measurements are relevant to investors and reliable enough to be reflected in share prices. This is because financial instrument measured at fair value lead to market discipline. Landsman (2007), is of the view that fair value measurements creates information asymmetry. He observed that if fair value accounting is generally applied for financial statement recognition, accounting standard-setters and securities regulators face the challenge of determining how much latitude to give managers when they estimate fair values. According Mwape (2010) companies have major challenge implementing IFRS due to lack of active markets. Lefebvre etal (2009) noted that active markets may not always exist in order to identify a market price for the specific asset or liability. Pacter (2007), outlined some of the major concerns associated with the application of fair value accounting in developing countries as inactive market, cost, skills shortage, government controlled markets, related parties, weak regulatory environment, and lack of valuation standard and guidance. Laux and Leuz (2010) state that fair value played a major role in the severity of the financial crisis during 2008. They claim that fair value accounting estimated some assets at zero or fire-sales, which caused some companies to fail. Also, Chevis (2009) maintains that the only way to prevent another financial crisis is to be released from fair value accounting. Magnan (2009) assert that there is no absolute evidence about the role of fair value accounting during the 2008 financial crisis. However, researchers such as Herrmann, Saudagaran and Thomas, (2005), and Landsman (2006) argue otherwise by saying that the benefits of applying fair value accounting exceed the disadvantages it possesses.

Historical cost and Fair Value

Historical cost measures an asset at the cost of acquiring it. This provides a reliable basis for measurement, but the problem is that, as price changes subsequent to acquisition, the relevance of historical cost declines if the objective of measurement is to reflect the current economic benefit represented by the asset. Fair values measurement measures a current rather than an historical attribute of the asset and looks to the market rather than the specific transaction. This involves a degree of estimation because the measure may not be based on actual transactions but on transactions that might take place in markets that are far from perfect and, in the extreme, may not even exist. Therefore the values of the elements of the financial statement may include gains or losses in value that are unrealized. Laux and Leuz (2009) posit that fair value measurement open door for management to manipulate the values. As fair value incorporate current information about current market conditions and expectations, they are expected to provide a superior basis for prediction than outdated cost figures can since these outdated cost figures reflect an outdated

richaman2@gmail.com
owusuekofi@gmail.com

market conditions and expectations (Poon, 2004). According to Christensen and Nikolaev (2012) the choice between fair value and historical cost accounting has since time immemorial been a subject of controversy among accounting academics and regulators. They claimed that despite the advantages, fair value is unlikely to become the primary valuation method for illiquid nonfinancial assets. It was also argued that fair value accounting measures, as compared to historical cost accounting, provides better international accounting harmonization Barlevand Haddad (2007)

Reliability and Measurements

According to the conceptual framework of the IASB and the FASB, the primary objective of the financial statement is to provide relevant information so that users can make an informed decision. The framework refers to reliability as information that is free from material error and bias and can be depended on by users to represent faithfully that which it either purports to represent or could reasonably be expected to represent. Related to the concept of reliability is prudence, whereby preparers of financial statements should include a degree of caution in exercising judgments needed in making estimates, such that assets or income are not overstated and liabilities or expenses are not understated.

Fair value as an estimate under normal market condition has no challenge; the challenge arises when there are no active markets. Bies (2005) stated that if markets were liquid and transparent for all assets and liabilities, fair value accounting clearly would be reliable information useful in the decision-making process. However, because many assets and liabilities do not have an active market, the inputs and methods for estimating their fair value are more subjective and, therefore, the valuations less reliable. Power (2010) argued on the fictional and imaginary nature of fair value and bemoaned their subjectivity and potential for manipulation and bias. Ryan et al. (2015) argued that selecting an appropriate measurement basis for financial reporting is a fundamental and contentious accounting policy issue. They added while many argue that fair value is the most relevant measurement basis for financial reporting, other observers express concerns about the reliability (or "faithful representation"), and thus the usefulness, of fair value measurements. Benston (2008) argues that although the concept of using market values of assets and liabilities is theoretically sound, its implementation has been seriously flawed, such as in the case of excluding held-to-maturity securities from revaluation, or in the case of treating derivatives with fair values that may in many cases be calculated with substantial leeway by managers. Benston(2005) also argues that extending the use of fair value accounting to the level of revaluation for all assets would allow managers to record income in advance of reliable evidence that it has been earned. This carries the risk of being misleading due to being based on expectations that may turn out to be false (Rayman, 2007).

richaman2@gmail.com
owusuekofi@gmail.com

Conceptual framework

This study tries to solicit the views of professional accountants in Ghana on the usefulness and implementation obstacles fair value measurement. The conceptual framework for this study covers the variable that influence Fair Value Measurement such as absence of Active Market, lack of Skilled Qualified Valuers, Regulatory Bodies in relations to asset valuation and efficiency level of the Ghana stock exchange. Fig 1 gives a pictorial view.

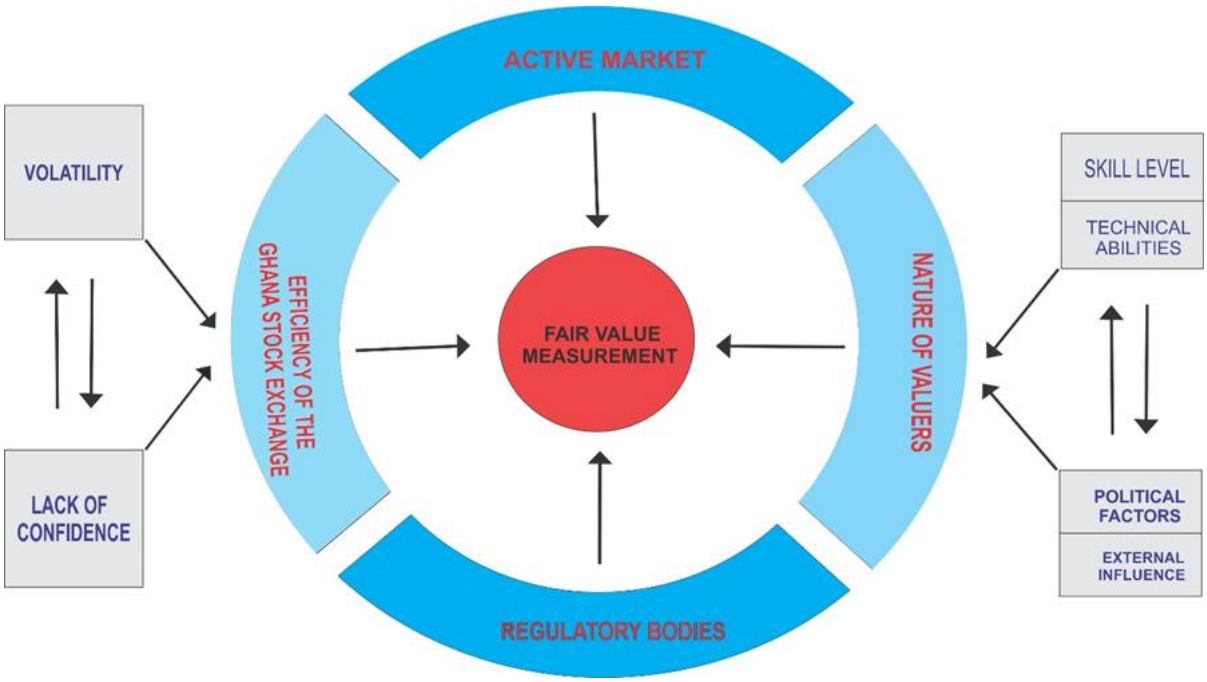


Fig 1: Model Framework on Variables That Impact on Fair Value Measurement

RESEARCH METHOD

Population and sampling

The total sample size for the study was 200 professional accountants who are members of the Institute of Chartered Accountants Ghana (ICAG) and Association of Certified Chartered Accountants (ACCA). Convenient sampling was used to sample the 200. Out of the 200 questionnaire administered, 185 were obtained from respondents for analysis. This represents a response rate of 92.5%.Data was collected from respondents using a well-structured questionnaire containing both closed and opened ended questions. A self-administered, structured questionnaire was used to collect data from respondents. The questionnaire also used the Likert scale to sample responses from the sampled respondents to enable the ranking of the response for easy assessment and analysis. The questionnaire was pre- tested, refined to suit the research context and finally administered to the target sample through personal contact by researchers. Data were analysed using SPSS.

richaman2@gmail.com
owusuekofi@gmail.com

RESULTS AND DISCUSSION

Characteristics of respondents

Data collection was primarily focused on Professionals in all aspects of the business environment in Ghana, totalling 185 respondents. A male dominated population of 148 and 37 females representing 80 and 20 percent respectively provided their opinion on the usefulness and implementation obstacles of fair value measurement. A total of 62 respondents representing 33.2% aged between 20 to 30 years. A little under 2.7 % made up for those above 60 years with the middle aged sampled workforce (31 to 50 years) summing their respective proportions to represent a 54% majority.

Table 4.1.1: Gender Analysis

Sex	**Sampled Population**	**Percentage**
Male	148	80.0%
Female	37	20.0%
Total	**185**	**100.0%**

8% of the professional accountants are also Doctorate and Higher National Diploma degree holders while 48% and 32% of the professional accountants holds masters and bachelor's degree respectively.

Table 4.1.2: Educational level of respondents

Educational Level of Respondents	**Number of Respondents**	**Percentage**
SHS/O-level/A-level	0	0.0%
HND	16	8.6%
Bachelor's Degree	60	32.4%
Masters	90	48.6%
Doctorate	15	8.1%
Other	4	2.2%
Total	185	100.0%

Out of the 185 respondents, 106 representing 58% were members of ICAG and the rest members of different professional bodies.

Table 4.1.3: Professional Qualification of respondents

Professional Affiliation of Respondent	**Number of Respondents**	**Percentage**
Member ICAG	106	57.9%
Member ACCA	15	8.1%

richaman2@gmail.com
owusuekofi@gmail.com

Student member ICAG	26	14.2%
Student member ACCA	28	15.3%
Other	3	1.6%
None	7	3.8%
Total	185	100.0%

Auditors and Accountants formed the core of the professionals who relayed their impressions on the usefulness and implementation obstacles of fair value measurement per this study. They represented 71% of respondents with percentages of 37.4 and 34.2 respectively. Other positions held by respondents included Senior Partners and Partners of auditing firms, General Managers and Managers. .

4.1.4 Role/Position of Respondent

Role/Position of Respondent	**Number of Respondents**	**Percent %**
Auditor	70	37.84%
Accountant	64	34.59%
Senior Partner	5	2.7%
Partner	5	2.7%
General manager	9	4.86%
Manager	8	4.3%
Other	23	12.43%
Total	184	99.42%
Missing System	1	0.58%
Total	185	100.0%

Over 72% of the respondents work in the private sector as opposed to 20% of the Public with the remaining fractions being Non-Governmental Agencies and other institutions.

Table 4.1.6 Respondents firm of practice

	Frequency	Valid Percent	Cumulative Percent
Private Company	132	72.1%	72.1
Public Organization	37	20.2%	92.3
Non-Profit	2	1.1%	93.4
Other	14	6.6%	100.0
Total	185	100.0%	

richaman2@gmail.com
owusuekofi@gmail.com

Usefulness and implementation obstacles of faur value

The survey was to solicit the views of professional accountants on the usefulness and implementation obstacles of fair value measurement. A series of 8 statements were used to solicit their views this is showed in table 4.2.2.

On the issue of whether investment property should be measured at fair value, 49.7% and 22.8% of the professional accountants with a mean of 3.76 and standard deviation of 1.0 agreed and strongly agreed respectively that investment property should be measured at fair value.Accountants, making up to 74% of the respondents with a mean value of 3.92 were of the view that fair value measurement in investment property provides useful and accurate information for economic decision making. The views of the professional accountants support the assertion by Song etal. (2010) that fair value measurements are relevant to investors and reliable enough to be reflected in share prices. This is because financial instrument measured at fair value lead to market discipline.

On the issue of availability of an active markets, 59.5% of the sampled professional accountants with a mean of 3.5 and standard deviation of 0.9 are of the opinion thatmajority of the assets to be measured at fair value do not have an active market making it difficult to determine their fair value. This opinion of the accountants in Ghana buttress Mwape (2010) and Lefebvre et al., (2009) assertion that companies have major challenge implementing IFRS due to lack of active markets because markets may not always exist in order to identify a market price for the specific asset or liability.

Furthermore over 50% respondents are of the view that there is the lack of skilled and qualified valuers to carry out valuations as well as a strong regulatory body to carry out valuations and manage these measurement methods. While 24.5% remain neutral, 47.6% of Ghanaian accountants, auditors and business professionals perceive that the Ghana stock market is young and not efficient. This phenomenon will cause the misrepresentation of fair value of local company shares.

richaman2@gmail.com
owusuekofi@gmail.com

Table 4.2.2 Factors influencing fair value measurement

Statements	Mean	Mode	Std. Deviation	Total Respondents	1_SD	%	2_D	%	3_N	%	4_A	%	5_SA	%	T
1. Investment property should be measured by fair value method	3.76	4	1.056	145	6	4.1%	16	11.0%	18	12.4%	72	49.7%	33	22.8%	**145**
2. Investment property should be measured by historical cost method	2.47	2	1.128	144	27	18.8%	63	43.8%	20	13.9%	28	19.4%	6	4.2%	**144**
3. Fair value measurement in investment property provides useful and accurate information for economic decision making	3.92	4	.964	142	2	1.4%	13	9.2%	21	14.8%	65	45.8%	41	28.9%	**142**
4. Majority of the assets do not have an active market and it is difficult to determine fair value	3.52	4	.999	143	3	2.1%	24	16.8%	31	21.7%	65	45.5%	20	14.0%	**143**
5. Lack of skilled and qualified values to carry out the valuation	3.32	4	1.140	142	9	6.3%	30	21.1%	28	19.7%	56	39.4%	19	13.4%	**142**
6. Lack of strong regulatory body to carry out the valuation and manage the measurement methods	3.45	4	1.142	145	10	6.9%	24	16.6%	24	16.6%	65	44.8%	22	15.2%	**145**
7. Ghana stock market is young and not efficient will misrepresent fair value of the companies' shares	3.26	4	1.197	143	13	9.1%	27	18.9%	35	24.5%	46	32.2%	22	15.4%	**143**

richaman2@gmail.com
owusuekofi@gmail.com

Conclusion and Recommendation

The study found that the professional accountants in Ghana are of the view that although fair value measurement is useful in relation to financial reporting, there are no active market for certain assets in Ghana posing a lot of challenge in its implementation. Again there are not enough skilled and qualified valuers as well as regulatory body to assist in the valuation of certain assets. Furthermore the Ghana Stock market is not efficient to accurately support fair measurement.

Implications

This paper has provided empirical evidence of the usefulness and implementation obstacles of fair value measurement in Ghana. It has contributed to the literature by supporting assertions that fair value measurement in developing countries poses a lot of implementation challenge. Also, this paper has extended our understanding of the various factors influencing fair value measurement implementation in developing countries such as Ghana. In particular, it has demonstrated that lack of active market for certain assets, lack of skilled and professional valuers as well as regulators are major factors influencing fair value measurement in a developing country. Again, this study has important implications for standard setters. Since one of the major objectives of IASB is to ensure objectivity and reduce biasness in the financial statements, standard setters should take into consideration the peculiar challenges of developing countries when setting standards.

Limitations

The main limitation of this study was that the method of sampling was not done randomly and these may lead to biasness in the findings. Again accountants from other sectors may not have been considered. Furthermore there may be other factors other than the ones considered in this study which influence fair value measurement. Future research should explore other factors that may influence fair value implementation in developing countries especially in other African countries.

The survey revealed that professional accountants in Ghana are of the view that fair value measurement is a reliable information for users of the financial statement. However lack of active market and appropriate valuing procedures may impact on the information in the financial statement because the inputs and methods for estimating their fair value may be subjective and, therefore, the valuations less reliable.

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richaman2@gmail.com
owusuekofi@gmail.com

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richaman2@gmail.com
owusuekofi@gmail.com

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richaman2@gmail.com
owusuekofi@gmail.com

ASSESSING THE NEXUS BETWEEN GRADUATE UNEMPLOYMENT, ENTREPRENEURSHIP EDUCATION AND ENTREPRENEURIAL ECOSYSTEM IN GHANA

Pardie, S. P., and [2]Akoto, O.

[1]*Department t of Fashion Design and Textiles Studies Cape Coast Polytechnic, Ghana*
[2]*Academic Affairs Office, Cape Coast Polytechnic, Ghana*

ABSTRACT
There is an ever increasing recognition that entrepreneurship education can be a vehicle for economic development by many countries and especially as a tool for reducing unemployment among the youth in developing countries. Consequently, a number of developing countries (Ghana included) have made entrepreneurship education programmes mandatory in the Polytechnics. This research work, which is conceptual in nature and depends on secondary sources of literature, explores the connection which should exist between entrepreneurship education and the prevailing entrepreneurial ecosystem in Ghana in order to foster employment among graduates.

Keywords: *Graduate; Unemployment, Entrepreneurship; Education, Ecosystem*

INTRODUCTION
Entrepreneurship has emerged as a dominant economic force in the world (Kuratko, 2005). It is increasingly being recognized that entrepreneurial activities enhance job creation (Barringer & Ireland, 2008). In developing countries, one of the reasons advanced for the promotion of entrepreneurship is the firm belief that entrepreneurship development can help in curbing youth unemployment especially graduates from tertiary institutions (Owusu-Ansah & Poku, 2012). In Africa, Kabongo and Okpara (2010) identified 106 institutions in 36 countries where entrepreneurship is either taught as a full degree or diploma course or have at least a course in entrepreneurship. It is now mandatory for all Higher National Diploma (HND) students in Ghanaian Polytechnics to take an entrepreneurship course (Azilla-Gbettor& Harrison, 2013).

Unemployment
Youth unemployment remains one of the most formidable socio-economic problems in Sub-Sahara Africa. The fact that a sizeable number of the unemployed youth in Sub-Sahara Africa are graduates of tertiary institutions gives the issue a sense of urgency.

sophty2006@yahoo.com
oseiakoto64@gmail.com

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The International Labour Organization (ILO, 1982) broadly spelt out that a person can be called Unemployed if he/she is:
Without work. That means he/she was not in paid employment or self-employment during the period under reference;
Currently available for work. This means he\she was ready for paid employment or self-employment during the reference period, and
Seeking work. That means the person had taken specific steps, in a specified recent period of time to seek paid employment or self-employment. Per the above definition by ILO, the term does not refer to people who are not seeking work because of age, ill-health or any handicap.

Graduate Unemployment

By ILO (1982) criteria for determining Unemployment, graduate unemployment may be described as the number of diploma and/or degree holders (graduate and post-graduate students) in a given economy, at a specified period of time, who are capable and willing to work, but are unable to find jobs.

Graduate Unemployment in Ghana

Unfortunately, there are no official statistics on the graduate unemployment situation in Ghana. The Unemployed Graduates Association of Ghana (UGAG), the body which was formed to tackle unemployment among university and polytechnic graduates in Ghana, believes that the unemployment rate for graduates from the polytechnics, universities and other tertiary institutions is high (UGAG, 2012). Aryeetey (2011) as cited by Owusu-Ansah and Poku (2012) estimated that about 50% of graduates of Ghanaian universities and polytechnics will not find jobs for two years upon completion of their national service and 20% of them will not find jobs for three years. The most pertinent question to ask is: "What are the causes of graduate unemployment in Ghana?

Cause(s) of Graduate Unemployment in Ghana

In the Ghanaian context, a number of factors are collectively responsible for the alarming graduate unemployment situation. Fallows and Steven (2000) have observed that over the past decades the educational sector in many developing countries (the Ghanaian Education Sector included) has experienced a remarkable growth in the number of private tertiary institutions. Simultaneously governments in developing countries in their attempts to re-structure their economies have carried out a number of Structural Adjustment Programmes (SAPs) which have culminated in the sale or down-sizing of a number of State Owned Enterprises (SOEs). These restructure programmes have greatly limited the capacities of these State Enterprises to absorb labour. The combined effect of graduate glut on chances of

sophty2006@yahoo.com
oseiakoto64@gmail.com

entry into existing enterprises has had a catastrophic impact on graduates from tertiary institutions in search of employment.

Poku-Buansi and Afrane (2011) in their contribution to the causes of graduate unemployment in Ghana have observed that there is a gap between the academic training received by Ghanaian graduates and industry requirements. The Ghanaian educational system continues to produce graduates whose training does not match the requirements of modern industry. Similar argument has been put forward by Afenyadu, King, Mc Grath, Oketch, Rogerson and Visser (2001). The argument here is that tertiary institutions are producing unemployed graduates not necessarily as a consequence of non-availability of jobs, but essentially because the available jobs do not match their acquired skills.

Owusu-Ansah and Poku (2012) assert that products of Ghanaian tertiary institutions are poorly equipped with the requisite entrepreneurial knowledge and skills which are necessary in venture creation or self-employment. This sentiment is shared by Ogege (2011) who makes a similar observation with regard to the unemployment situation in Nigeria, where he believes that entrepreneurship education would make it possible for graduates to be self-employed instead of relying upon an over-burdened government to create jobs for them. The lack of entrepreneurial skills among graduates as pointed by Owusu-Ansah and Poku (2012) as well as Ogege (2011) as being partly responsible for the graduate unemployment crisis, is further worsened by the notion of paid employment which is dominant in the Ghanaian society and endemic among graduates (Mensah, 2012). As pointed out by Mensah (2012, p. 108) self-employment is "not the preferred destination of most graduates".

Consequence(s) of Graduate Unemployment

As poignantly pointed out by Broecke (2012), perhaps the most dangerous and catastrophic consequence of graduate unemployment in Ghana and in most developing countries is the potential for political uprisings and upheavals. As indicated by Broecke (2012), the Arab spring which started in Tunisia and swept through the Middle East in 2011 had a lot to do with graduate unemployment in particular and youth unemployment in general. Any country with a significant number of unemployed youth sits on a powder keg.

Entrepreneurship Education

In Ghana, as well as many developing countries, it is envisaged that the active promotion of Entrepreneurship Education Programmes (EEPs) in the curricula of tertiary institutions could be a solution to the graduate unemployment crisis (Owusu-Ansah & Poku, 2012; Maina, 2013). This growing interest in entrepreneurship education as a panacea for youth employment is reflected in the growing number of entrepreneurship education programmes in African universities and other tertiary institutions (Kabongo & Okpara, 2010).

sophty2006@yahoo.com
oseiakoto64@gmail.com

Teaching Entrepreneurship

The concept of entrepreneurship education presupposes that entrepreneurship can be taught. Some scholars have argued that it is not possible to teach entrepreneurship because it deals with talent and passion (Marques & Albuquerque, 2012), while scholars like Drucker (1985) firmly believed that it could be taught. The emerging consensus in academia is that entrepreneurship, or at least certain aspects of the discipline can be taught or be encouraged through Entrepreneurship Education (Garavan & O'Cenneide, 1994).

Definition of Entrepreneurship Education

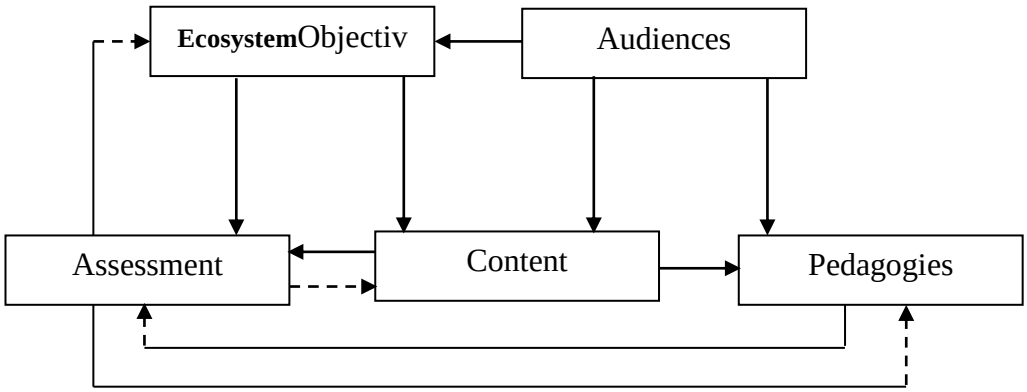
Bechard and Toulouse (1998, p. 320) defined entrepreneurship education as "a collection of formalized teachings that informs, trains and educates anyone interested in participating in socio-economic development through a project to promote entrepreneurship awareness, business creation, or small business development".

Kirby (2004, p. 53) opines that "entrepreneurship education refers to activities aimed at developing enterprising or entrepreneurial people and increasing their understanding and knowledge about entrepreneurship and enterprise". Alberti, Sciascia and Poli (2004) on their part see entrepreneurship education as a structured formal delivery of entrepreneurial competencies. This refers to the concepts, skills and mental awareness used by individuals during the process of starting or developing their growth oriented ventures.

Despite the divergence of opinion on what constitutes entrepreneurship education, it is widely acknowledged that the success of any entrepreneurship education programme is inextricably linked to the programme's objective(s), content(s), audience, pedagogy and its mode of assessment (Azim & Al-kahtani, 2014). The linkages between the components of an entrepreneurship programme are illustrated by a model provided by Alberti, Sciascia and Poli (2004) which appears below:

sophty2006@yahoo.com
oseiakoto64@gmail.com

Figure 1 Components of Entrepreneurship Education Programme framework



Source: Adapted from Alberti et al. (2004)

In Alberti et al. (2004) model for entrepreneurship education programme, there are five components with eight relationships, some of which are reciprocal in nature. For example, the objectives of any entrepreneurship education programme is determined by its audience. Similarly the audience(s) determine(s) the content(s) and pedagogies to be employed in the teaching of the programme. Likewise the objective(s) of the programme should relate to its mode of assessment. For any entrepreneurship education programme to be effective these five cardinal elements, namely the programme's Objective(s), Audience, Content(s) Pedagogies and Mode of assessment should be clearly spelt out.

Impact of Entrepreneurship Education Programmes

A number of students have shown that entrepreneurship education has a positive impact on students. Owusu-Ansah (2004) observed that entrepreneurship education had a positive impact on the entrepreneurship intention of selected students of University of Ghana and University of Cape Coast (Ghana).

Similarly, studies have also shown that entrepreneurship education has a positive impact on students' views about entrepreneurship, entrepreneurs and self-employment. A study conducted by Waldman (1977) and cited by Cheung (2012) affirmed that entrepreneurship education at the high school level has a great impact on students who seriously considered starting business sometime after graduation. Peterman and Kennedy (2003) observed a positive impact of entrepreneurship education in participating students in Australia by observing the perceptions of a sample of secondary school students enrolled in the Young Achievement Australia (Y.A.A.) enterprise programme. The researchers observed

sophty2006@yahoo.com
oseiakoto64@gmail.com

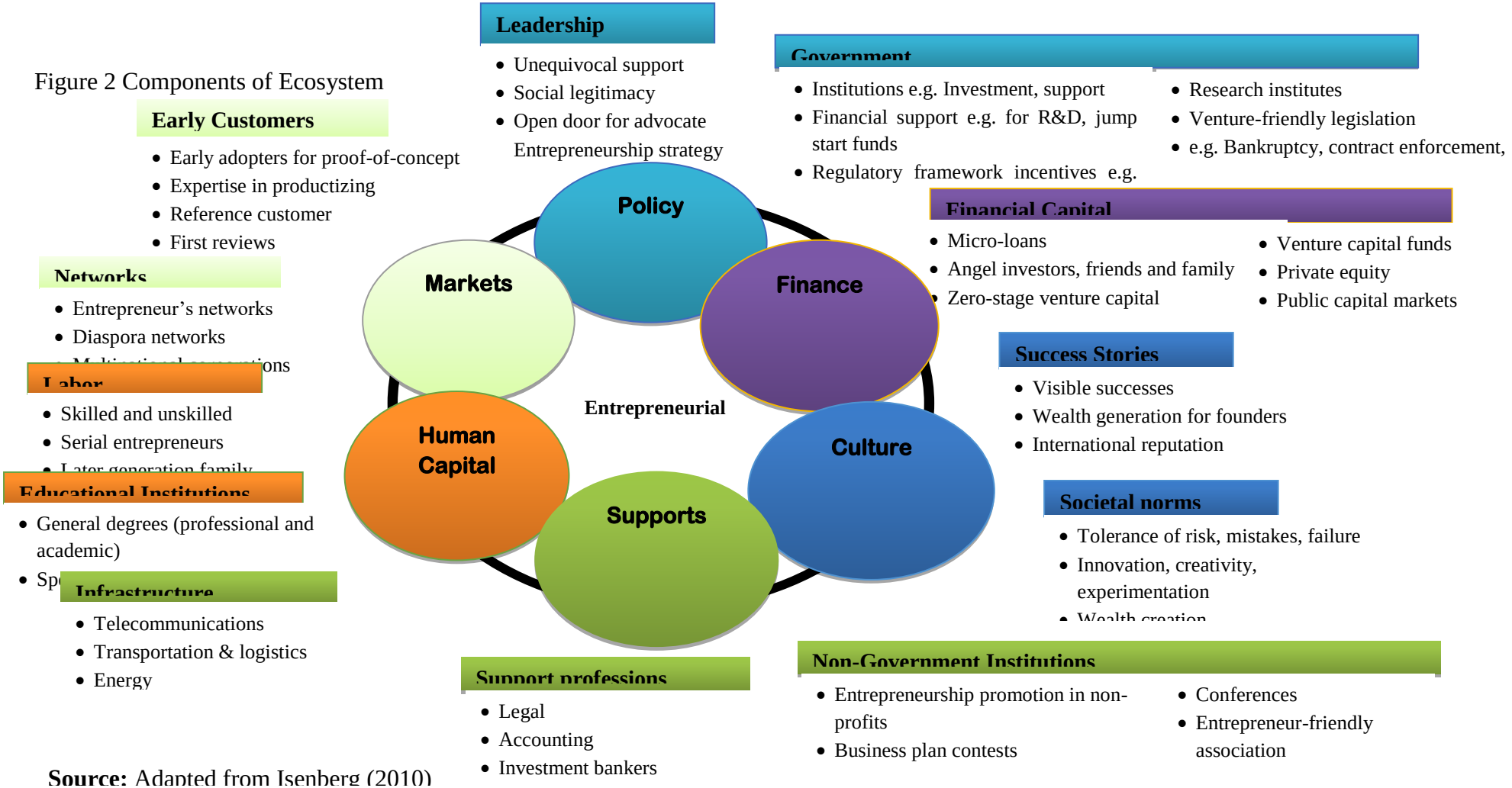
significantly higher perceptions of both desirability and feasibility. These cited cases establish a strong impact of entrepreneurship education.

Entrepreneurial Ecosystem

The ability to recognise business opportunities per se does not ensure its evaluation and subsequent exploitation. There ought to be contextual factors which can influence an individual's drive to create a venture. Put in other words, entrepreneurship thrives within certain environments. These environments perceived by Isenberg (2010) as **entrepreneurial ecosystem(s)** are environment which nurture and sustain entrepreneurship. It is the interaction which takes place between a range of institutional and individual stakeholders within this ecosystem which engenders entrepreneurship. This is illustrated by Figure 2

sophty2006@yahoo.com
oseiakoto64@gmail.com

Figure 2 Components of Ecosystem



Source: Adapted from Isenberg (2010)

sophty2006@yahoo.com
oseiakoto64@gmail.com

Figure 2 depicts the components of an entrepreneurial ecosystem according to (Isenberg, 2010). It is made up of six domains namely: (1) **Policy**, which includes leadership and government, (2) **Finances**, (3) **Culture**, including entrepreneurial success stories and social norms, (4) **Support**, infrastructure, professional and non-public (5) **Human Capital**, including education and personnel, and (6) **Markets**, consisting of networks and early customers. These domains in turn consist of further elements.

Isenberg (2011) maintains that for any healthy entrepreneurial ecosystem to exist, each of the six domains should exist and be entrepreneurship friendly. It should also be pointed out that there is, and should be an inextricable nexus between each of the six domains of the entrepreneurial ecosystem. For example, the creation of an entrepreneurial friendly ecosystem will be difficult if there is no explicit political support of and no high social and / or political premium on entrepreneurship. Similarly, there cannot be any vibrant entrepreneurial ecosystem without the requisite support systems to back available human capital.

Nexus between Graduate Unemployment, Entrepreneurship Education and Entrepreneurial Ecosystems

The ever increasing attention being paid to entrepreneurship Education, in tertiary educational institutions in developing countries has arisen out of the perceived role of entrepreneurship education in job creation among the youth (Maina, 2013). It is envisaged that entrepreneurship education programmes will contribute towards making graduates of tertiary institutions be in a position to create jobs for themselves instead of relying on the government (Ogege, 2011).

However, since the ability to recognise, evaluate and subsequently exploit business opportunities which entrepreneurship education equips the students with depends upon existing entrepreneurial ecosystem, it becomes very imperative that attention is paid to an entrepreneurship friendly ecosystem to develop and sustain such entrepreneurial talents.

The Ghanaian Ecosystem.

Here the Ghanaian ecosystem is discussed along the key domain framework of Isenberg (2011), namely: Policy, Finance, Culture, Markets, Human Capital and Support System.

Government Policy

Over the past decades the Ghanaian government has embarked upon a number of Structural Reform Programmes (SRPs) to stimulate and strengthen the economy. Ghana's Vision 2020 together with other initiatives like the Savannah Accelerated Development Programme are aimed at youth entrepreneurship, but results are yet to be seen. Local and foreign businessmen complain of long processing time to open a business, as well as long and

cumbersome judicial processes in the event of dispute resolution. Even though the government has emphasised its belief that the private sector is the engine of growth of the Ghanaian economy, many entrepreneurs think that there is much to be done.

Finance

Through its Structural Adjustment Programmes, Ghana has sought to establish a relatively strong financial system by privatizing State Owned Banks (SOBs) and passing laws to permit the establishment of a number of both foreign and locally owned banks, thereby making the banking sector more competitive. There exists a national Venture Capital Fund to assist entrepreneurs who qualify for assistance. However, finance continues to be a formidable problem facing entrepreneurs in the Ghanaian economy. High interest rates, coupled with poor financial records keeping by a significant number of Small and Medium scale Enterprises (SMEs), makes loans from financial institutions extremely difficult. This void is gradually being filled by a number of Microfinance institutions springing up across the country.

Culture

Cultural attitudes towards entrepreneurship and wealth creation have undergone some profound changes as a result of the romance given to entrepreneurs in the print and electronic media. Ghana is gradually producing its own home-grown entrepreneurs who in the near future can be mentors and role models for aspiring entrepreneurs. However, the fear of risk taking, making mistakes in an unstable economy as the Ghanaian one is predominant. This might explain why a number of graduates prefer to be employees than being employers (Mensah, 2012).

Support

Entrepreneurial support systems in terms of infrastructure, and professional support in Ghana appears to be minimal and in some instances weak. Few Entrepreneurship Development Zones exist (EDZs), apart from the Ghana Free Zones at Tema. Energy supply is capricious, with few incubation centres. Ghana is yet to develop a significant number of experts and advisors on business related issues, even though the M.B.A (Entrepreneurship) programme currently being run by the University of Cape Coast envisages such objectives.

Human Capital

Ghanaian universities and polytechnics are beginning to build platforms to support entrepreneurship, research and development. Currently, three public universities; namely the University of Cape Coast, University of Ghana and Kwame Nkrumah University of Science and Technology offer post graduate courses in entrepreneurship. University of Cape Coast and the Kwame Nkrumah University of Science and Technology have business incubation

centres. All the public polytechnics run courses in entrepreneurship. However, the objectives, content(s) and methods of teaching the programme ought to be reviewed (Omane & Nyarko, 2012). Being a developing country labour is predominantly unskilled in Ghana.

Markets

The government of Ghana in collaboration with other countries in the West Africa Sub-region is fervently working towards making the Economic Community of West Africa a reality. This would afford entrepreneurs in the sub-region access to a wider market. However, the concept of modern marketing is relatively new to quite a number of SMEs in Ghana; awareness of distribution channels, packaging and customer retention techniques are yet to be fully developed. From the assessment of the Ghanaian entrepreneurial ecosystem along the model of Isenberg (2011) it could be seen that the Ghanaian entrepreneurial ecosystem is weak, (as in many developing countries) and needs to be improved upon.

Recommendation(s)

The ideal of being a job creator instead of a job seeker which falls in line with the Objectives of Entrepreneurship Education Programmes in developing countries should be seen and developed as a component unit of the elements which should be part of the overall entrepreneurship ecosystem of the country. This includes, but not limited to:

i. Government policies which can reduce bureaucracy, creating access to credit and tax incentives, and providing business and technology training for entrepreneurs.
ii. Entrepreneurs require the society's support. This requires a profound cultural change in the Ghanaian community that promotes risk tolerance.
iii. Universities and other tertiary institutions. Ghanaian universities and other tertiary institutions should assume a more active role in promoting entrepreneurship and fostering industry – academia co-operation. There is also the increasing need for the creation of platforms that emphasise entrepreneurship as a career choice.

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A LABOUR OUPUT MODEL FOR BLOCK WORK USING ACTIVITY SAMPLING TECHNIQUES IN GHANA

Bamfo-Agyei, E.[1] and Aigbavboa, C.O.[2] and Thwala D.W.[3]

[1,2&3] *Department of Construction Management and Quantity Surveying, University of Johannesburg, South Africa.*

ABSTRACT

Labour output is an issue of a particular importance to some of the camping's in Ghana as it is considered a newly developed area and because of the huge amount of projects planned to be carried out in the near future. The purpose of this research is to determined labour output in the construction industry in Ghana. The main objectives of this study were to establish the labour output constants for block work; to find the factors affecting labour output in blockwork; and to compare the research findings to the labour output at the site for block work. Data will be collected using the Delphi and field questionnaire survey. The Structural Equation Modelling (SEM) and Nvivo will be used to analyse data from the field questionnaire survey and Delphi respectively.

Keywords: *Labour; Ouput; Model; Blockwork; Ghana*

INTRODUCTION

Background

As construction work becomes simpler in recent times, due to the increasing levels of technology and techniques that has introduced in to the industry, the general public continues to complain that the cost of putting up building or house is still high, which is believed depends principally on the cost of material and labour. According to (Bamfo-Agyei and Kotey, 2009) the cost of 'labour are normally be obtained from standard labour constants or from work study were time taken by operative to carry out a task is recorded.

Several construction companies are constantly searching for ways to improve labour output constants in the construction industry. This is because labour is one of the greatest risks in the building construction industry. This must be controlled and continuously improved. Because it is believed those constructions have a process of continuous improvement at site and it is necessary to evaluate this performance. Doing this only in terms of profits, which is the most common way, is not sufficient. Other ways of evaluating site performance is by studying labour output constants using scientific study.

[1]kwaminabamfoagyei@gmail.com
[2]caigbavboa@uj.ac.za
[3]didibhukut@uj.ac.za

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Although the construction industry is faced with a number of problems, several techniques can be put in place to improved labour output constant. Hence this study which is to present action for implementing a work sampling study on selecting job site to enhance work output on a building construction site. From Harris and McCaffer (2001); Since the primary task of construction is bringing favorable condition for management, workforce and resources to effectively and efficiently combine towards raising output constant and quality by achieving a given level of output with fewer inputs, while providing high rewards for those involved. Measuring productivity in the construction site is inherently difficulty due to the labour intensive divers' nature of the industry.

There is no doubt that construction industry is the key in any economic. Due to the increasing level of constructing a building the general public continues to complain that the average cost of designing and building a house is of high cost. Most Building construction companies are trying to generate ways which might improve labour output constants in the industry. It is because labour is one of the greatest risks in the construction sector or industry, which must be controlled and continues improvement of sites and it is necessary to determine this performance. But doing this only in terms of profits which the most common way is not sufficient. Labour costs depend on the squared make up is the numbers of craftsman and labourer's.

According to Harris and MacCaffer (2001) since the primary task of continuation is bringing favorable condition for Management, work force and the resource to effectively and efficiently combine towards raising output constant and quality by achieving a given levels of output with fewer inputs while providing high rewards for those involved. Measuring productivity: In its construction site is inherently difficulty due to its labour intensive, diverse nature of the industry.

RESEARCH MOTIVATION

There is no study on Labour output satisfaction on block work in the construction industry in Ghana, the study hopes to fill this gap in this area. The motivation behind this research is to determine the labour output in block work in Ghana. The research will evaluate the influence of the labour output of block work in predicting the completion time of projects. The factors affecting labour output on site will be considered.

There is a gap that exists in literature on the factors that affect labour output of block work in the construction industry in developing countries. This study therefore contributes in existing knowledge by establishing the factors that establish the labour output of block work activity using sampling techniques and determining the impact on completion time of the construction

[1]kwaminabamfoagyei@gmail.com
[2]caigbavboa@uj.ac.za
[3]didibhukut@uj.ac.za

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projects. Instead using existing models as conceptualized for developed countries using instrument such as SERVQUAL factors of labour output satisfaction which have not been considered in previous study will be evaluated as outcome variables. The study will use Structural Equation modeling to analyse and model the labour output in block work activity. Consequently, the study will add new knowledge on the factors that determine labour output of block work activity in the construction industry in Ghana. The innovative method and the outcome of the variable measures that will be used in the study will contribute to existing body of knowledge.

PROBLEM STATEMENT

In recent years the rate of delays in the construction 'industry has raised a general concern by the general public to find out what actually is happening considering the basic resources available to construction firms .There is no standard method for determining the financial value of workers daily output. This levels contractors and building owners with the choices of paying huge sums of money or sometimes under paying workers for services rendered. This study is to set the stage for clients, contractors and other professionals in the building construction industry by providing them with labour output constants in the building industry. Amoah-Mensah in 1995 published the data for the output for both skill and unskilled labourers, which is over 20 years due to the span in years this output might not be realistic in the current situation.

Contractor's construction time and cost depend on the output of the labour but delays in the construction industry have raised a general concern by the public in other to determine actually what is happing. Considering the basic resources that were available to construction industry productivity remains an interesting subject and a dominant issue in construction sector, promising efficient usage of resources and cost saving and ultimately affecting the bottom line of every effort in the construction sector**.** This study is to set the for client, contractors and other professionals in the building industry. (Olomolaiye et al, 1998)

Aim of the study and Objectives

This research is to establish the labour output for block work using activity sampling techniques.

The objectives of the study are:

- (RO1) To identify the factors that determines the labour satisfaction on the construction of block work.
- (RO2) To investigate the current theories and literature that has been published on labour satisfaction and identifies the gaps.

[1]kwaminabamfoagyei@gmail.com
[2]caigbavboa@uj.ac.za
[3]didibhukut@uj.ac.za

- (RO3) To identify the critical factors that conveys about labour satisfaction and to examine if the factors that determine satisfaction in other cultural contexts, in the same in Ghana.
- (RO4) To evaluate the critical factors that affects labour output of block work in Ghana
- (RO5) To develop a holistically labour output model for block work.
- (RO6) To determine the validity of the conceptualized labour output model for block work.

THEORETICAL VIEWS ON LABOUR OUTPUT SATISFACTION

Labour output is one of the most important issues in both developed and developing countries.

Developed countries are aware that productivity is very important for economical growth and social welfare. Developing countries which face unemployment problems, inflation, and resource scarcity and growth rate decline try to utilize its resources in such a way that achieve economical growth and improve citizen's life. Yi and Chan (2014) summarized three main measurements of construction labor productivity at activity, project and industry levels; the major differences between these measurements are the source of data, the level of aggregation, the definition of the production process and the completeness. Hanna et al., (2005) noted that Labor productivity is reflected by the ratio between total product output and total input resource from an economic perspective).Productivity is one of the key measures of utilization of human and financial resources because it is a strong indicator of efficient use of available resources (Hanna et al., 2005). While the economic performance of construction becomes the focus of interest, the gross value or the value added of the production per employee over a certain time period is used to reflect the labor productivity, where the key economic indicators within the construction industry are collected in order to compute the productivity of the referenced region and time period (Li and Liu, 2010; Chia et al., 2012).

Work measurement

Work measurement is the application of techniques designed to establish the time for an average worker to carry out a specified manufacturing task at a defined level of performance. It is concerned with the length of time it takes to complete a work task assigned to a specific job.

Revealing existing causes of ineffective time through study, important though it is, is perhaps less important in the long term than the setting of sound time standards, since these will continue to apply as long as the work to which they refer continues to be done. They will also show up any ineffective time or additional work which may occur once they have been established.

[1]kwaminabamfoagyei@gmail.com
[2]caigbavboa@uj.ac.za
[3]didibhukut@uj.ac.za

At the activity level, labor productivity is widely reflected by hourly outputs, where a labor hour and physical quantity of work completed are used as input unit and output, respectively (Hanna et al.,2008). Ma et al., (2016) noted that external factors can barely control the actual physical quantity and working hours, the hourly output measurement of productivity can provide an accurate proxy for construction activity efficiency. At the project level, the aggregation is composed of a series of construction activities with different units of measurements. Therefore, the efficiency of the whole construction process is reflected by the ratio between expected productivity and actual productivity, which is determined by the work days and quantities installed under consideration and practice, respectively Ma et al., (2016).

To provide information on which the planning and scheduling of production can be based, including the plant and labour requirements for carrying out the programmed of work and the utilization of available capacity. To provide information on which estimates for tenders, selling prices and delivery promises can be based. To set standards of machine utilization and labour performance this can be used for any of the above purposes and as a basis for incentive schemes. To provide information for labour-cost control and to enable standard costs to be fixed and maintained. It is thus clear that work measurement provides the basic information necessary for all the activities of organizing and controlling the work of an enterprise in which the time element plays a part. Its uses in connection with these activities will be more clearly seen when we have shown how the standard time is obtained. Cornwell & Cornwell (2006) assert that, "You can't manage what you can't measure". Measurement is crucial before a management activity is executed. However, it should be noted that an incorrect measurement of labour performance can lead to incorrect and warped decisions by the management team. Therefore, the importance of measuring the right thing at the right time to reflect the true conditions of a company cannot be over emphasized. The measurements should offer the management an opportunity to make effective and accurate decisions. The various techniques available to supply information need to be explored so as to identify the right measurement technique for prevalent conditions. These techniques include: time studies, work sampling, subjective evaluations and) personal recording of activities (Przemeck & Grund, 2008). Many of these techniques have involved over time. Use of technological advances makes it easier to efficiently acquire accurate results.

Time study

Time study is a method used to determine the actual time required to complete a task. It takes into account time allowances and delays. Time studies enable the management to make effective decisions aimed at improving the efficiency of the entities operating within the system. It is important to realize that accurate time studies yield positive results and inaccurate time studies can create many problems (Freivalds, 2009) as mentioned earlier.

[1]kwaminabamfoagyei@gmail.com
[2]caigbavboa@uj.ac.za
[3]didibhukut@uj.ac.za

Work sampling

On the other hand, work sampling was developed for the first time in 1935 .(Fitzgerald, 2009). Work sampling is the activity of taking randomly distributed observations of activities; these activities can include both humans and machines, with the objective of determining their utilization (Fitzgerald, 2009). The fundamental principle of work sampling is that it is based on the laws of probability (Freivalds, 2009). Work sampling only takes samples rather than continuous observation of the object being studied. This allows for the acquisition of reasonably accurate representations of the work under study, without the drawbacks of continuous monitoring. Work sampling is also observed as a low cost alternative method for determining of workforce utilization (Fitzgerald, 2009). In work sampling, the accuracy of the results is linked to the number of samples taken in the study (Sitting, 2000), as well as the time period during which the analysis is performed. It is, therefore, important that the analyst understands the operations of the company so as to identify an appropriate time frame for the study. The analyst needs to select a sample size that represents the true conditions of the system accurately, while also understanding the capabilities of the observer. Some standards have been developed to aid in making selections about the number of samples in a study. One such guideline is not to exceed 8 observations per hour (Sitting, 2000). With the understanding that statistical methods form the basis of work sampling, the input data needs to be randomly collected and unbiased (Fitzgerald, 2009). If these conditions are not met the data will not deliver reasonable results. These inaccuracies can include continuity errors (in which small changes in input data represent small changes in the output data), and consistency errors (in which similar runs will not reflect similar results), (Bakker, 2010). Traditionally work sampling does not determine the effectiveness of workers but rather whether they are working or not. It does this by recording the amount of time workers spend on certain activities (Fitzgerald, 2009). Thorough planning needs to be done prior to the start of the work sampling study. The following procedure covers the work sampling process from the objective identification step through to the analysis of the results (Freivalds, 2009).

Activity sampling

Activity sampling is a technique through which information can be obtained not only quickly and economically but also to predetermine levels of accuracy. It is a method that measures the time labor spent in various categories of activities (Thomas, 1991).

A sequence of project-based studies were carried out to investigate the factors influencing construction labor productivity, with the purpose of maintaining construction development (Goodrum and Haas, 2002; Jarkas and Bitar, 2012; Loosemore, 2014). Based on a collection of substantial cross-sectional data, detailed insights into construction labor productivity were

[1]kwaminabamfoagyei@gmail.com
[2]caigbavboa@uj.ac.za
[3]didibhukut@uj.ac.za

provided at the project level. The productivity ratio can reflect performance efficiency, where differences between various construction activities can be diminished.

Activity sampling can be defined as a technique in which a large number of instantaneous Observations are made over a period of time of workers, machines, or processes. Each Observation records what is happening at that instant and the percentage of observations recorded for a particular activity or delay is a measure of the percentage of time during which that activity or delay occurs Activity sampling study provides the necessary information to help determine how time is being employed by the workforce, identify the problem area that cause the work delay, and set up a base line measure for productivity improvement. The main advantage of using activity sampling is that it allows a larger number of machines or men to be studied at one time that can be managed using a continuous time study. This leads to a broader picture of the efficiency of a particular operation than that obtained from a more concentrated but continuous study on a smaller group. Oglesby, (2002) suggested that there are general rules for activity sampling that need to be observed and these are :

a) The observer must be able quickly to identify the individuals to be included in and excluded from the sampling;
b) There should be an equal likelihood of observing every worker;
c) Observation must have no sequential relationship;
d) The basic characteristics of the work situation must remain the same while the Observations are being made.

Activity sampling theory

Activity sampling concepts based on two facts, first fact is a working day can be subdivided into three major parts: productive, contributory, and unproductive time (Oglesby, 2002).

Productive time: time spent in elements directly involved in the actual process of putting together or adding to a unit being constructed.

Contributory time: time spent in elements not directly added to but essential to finish the unit;

Unproductive time: idle time or time spent in not useful or all other elements. Second fact on which activity sampling based is small number of chance occurrences tends to form the same distribution pattern as the whole operation. Thus it is a mathematical technique closely associated with statistics and the theory of probability (Olomolaiye, 1998).

Activity sampling being based on a sample of observations must adhere to certain statistical principles and rules to obtain a proper representation of the studied operation. Any sampling carried out should be large enough to be statistically valid – can be used to predict the characteristics of studied operation with a desirable degree of accuracy.

The following formula can be used to calculate the required sample size and achieve the specified confidence level and accuracy criteria

[1]kwaminabamfoagyei@gmail.com
[2]caigbavboa@uj.ac.za
[3]didibhukut@uj.ac.za

$$N = \frac{Z2 \times P \times (1 - P)}{L2}$$

Where:
N = number of observations required;
P = proportion of the total operation being observed;
L = limit (in percentage) of accuracy required; and
Z = standard normal variable depending on the level of confidence.

In construction work, it is generally accepted that 95 percent confidence limits with limit of error of ±5 percent give satisfactory results that can assist in making a real contribution to increase effectiveness. The value of proportion of the total operation being observed, for construction work usually falls within the limits of 0.40 to 0.6. For construction work, 384 observations are normally accepted as a minimum satisfactory number of observations which allow statistically significant results to be obtained (Oglesby, 2002).

RESEARCH METHODOLOGY

On-site productivity study will be conducted on block work activity to determine the time spent in carrying out an activity. Site observations and structured questionnaire will be used in this research. Daily visit method of observation of labour productivity will be adopted throughout the study. This involved personal observation of labour activities on the selected work on projects. The strategy here was to visit the site daily and interact with the foreman and workers in order to record the dates, number of workers, starting time, closing time and measurement of length/breadth of work done (quantities) of each worker.

The studied population will include 200 contractors who have valid registration from the ministry of works and housing in Ghana.
In all a total number of 320 respondents on site 80 of them will be masons; 160 will also be laboueres; 40 contractors and 40 site engineers at the construction site in the ten regions of Ghana will be considered.

The study used convenience sampling techniques in data collection; a random sampling technique was adopted to select respondents. The sample was selected randomly from each level of contractor's categories. The contractor's union list is ordered by the company number, one lists of contractors were prepared to represent for only one category. The randomly selection among the lists was done by the researcher using non-replacement random selection.

[1]kwaminabamfoagyei@gmail.com
[2]caigbavboa@uj.ac.za
[3]didibhukut@uj.ac.za

With this type of research instruments of data collection, first-hand information will be gathered from the study area of the project. The methods the researcher that will be use under the primary methods are; interviews; structured questionnaires and observations

The analysis will be carried out through structural equation modeling which will be used in the development of the labour output model.

Delimitations of the Study

The scope of this thesis focused on labour output of block work on construction sites in Ghana. The study focus on the factors that influence labour output of block work activity of the construction process. The study was restricted in 40 construction sites each in the 10 regions of Ghana and focused on block work activities.

Ethical Consideration

Ethical issues will be considered in carrying out the study. Respondents will not be forced to participate in the research. The privacy of the respondents will be respected by ensuring confidentiality in not making available identifying information to anyone was not directly involved in the study. The respondents will be anonymous throughout the study.

Overview of study

This study focused on the background of the study and the problem statement. The aim and objectives will be considered. Research questions will be presented and the research methodology will be stated. The ethical consideration will be clearly stated.

The theoretical and conceptual views of literature on labour output satisfaction evaluated a survey of related literatures from books, journal articles and conference papers from relevant sources.

The gaps observed in labour output satisfaction on block work activity which was not evaluated holistically taking consideration of developing countries like Ghana in previous model will be considered. These gaps forms the additional new constructs in the current study's of conceptual framework. The gaps that will be identified are the needs and expectations of the workforce and their impacts on the block work activity.

Studies conducted in other Africa countries including Ghana, Nigeria South Africa, Zambia, Kenya, Tanzania and Egypt will be considered in relation to the labour output on blockwork. This will assist to identify other factors that affect their labour output on block work.

[1]kwaminabamfoagyei@gmail.com
[2]caigbavboa@uj.ac.za
[3]didibhukut@uj.ac.za

The development of labour output on block work in South Africa and the suitable model that is used in the country will be focused. The factors that affect the labour satisfaction will be considered and its impact on the construction process.

The methodology that will be used to collect the data of the study will be stated. It will give the sampling technique in selecting the sample size and research instrument used in gathering information from the respondents. Findings from review of literature on existing models on labour output will be discussed. This forms a basis of conceptual labour output model's theory. The hypothesised labour output model will be stated. The findings will be stated based on the said objectives from the questionnaire survey. The analysis and interpretation of result obtained from the questionnaire and discussion on the model will be covered. The conclusion and recommendations of this study will be considered and recommendation for future work will be stated.

CONCLUSION AND THE WAY FORWARD

The long-run trend of the growth in construction productivity at an industry level was explored, suggesting that exogenous technological progress and the existence of capital are the most important factors influencing construction labor productivity changes (Mills 2016). This research has giving insight to other research works on labour output in the construction industry in other countries and the study looked at the Panel error correction models (ECMs) implemented to to the data for the Australian construction industry.
The long-run equilibrium and dynamics of construction labor productivity across the Australian states and territories have been revealed. The developed models have been further used to simulate regional construction productivity in order to discover the regional clusters for Australian construction labor productivity.

The study will help in developing a model that will focusing in forecasting the labour output in Ghana. At the site management level, a daily progress report must include the required information necessary to obtain the baseline productivity. It is strongly recommended to develop a benchmarking standard for each construction firm in Ghana, which may lead to an improvement in the national construction productivity.

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[1]kwaminabamfoagyei@gmail.com
[2]caigbavboa@uj.ac.za
[3]didibhukut@uj.ac.za

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[1]kwaminabamfoagyei@gmail.com
[2]caigbavboa@uj.ac.za
[3]didibhukut@uj.ac.za

MOTIVATION AND IMPROVEMENT IN EMPLOYEE PERFORMANCE IN THE RESTAURANT INDUSTRY IN GHANA

Owusu-Mintah, S. B.[1] and Kissi, M.[2]

[1&2]*Tourism Department, Cape Coast Polytechnic, Cape Coast, Ghana*

ABSTRACT

This study examined the impact of motivation on the performance of restaurant employees within the Cape Coast Metropolis of the Central Region of Ghana. The study sought to identify motivational strategies used by the selected restaurants and determine their effectiveness in influencing employee performance. Adopting an ex-post facto research survey, primary data were collected from 4 restaurant managers and 56 of their employees using simple random sampling to elicit data on motivational strategies enjoyed by the staff. The findings showed that motivational strategies used included the payment of bonuses, free communication, monetary rewards, provision of free meals, recognition and rewards. Most of the employees were however dissatisfied with the motivational packages resulting in the low performance of the respondents as obtained from performance indicators on profitability, customer satisfaction and increased customer base, showing the ineffectiveness of the motivational strategies employed. Lack of effective implementation of some of the motivational strategies and inconsistency in strategic decisions were the major constraints affecting employees' performance. It was thus recommended that more motivational incentives such as supported study leave should be planned for the employees in order to help reduce absenteeism and the high labour turnover in the restaurant industry in Ghana.

Keywords*: Motivational strategies, employee turnover, hospitality industry, hierarchy of needs*

INTRODUCTION

Background to the Study

The restaurant industry is a significant part of the hospitality industry worldwide and its employees play a key role in delivering the service products to the guests. Quality service delivered by the employees creates lasting positive experiences for the guests (Owusu-Mintah, 2013). The individual motivational construct of the restaurant employees, play important and perceivably significant role in achieving high satisfaction for the guests. Motivation of employees whether professional, skilled or unskilled is a major issue in all service organizations. For the restaurant industry, motivation is a major issue and a challenge for management in their bid to retain employees for them to offer efficient services expected by their guests (Owusu, 2010).

If employees are not satisfied they will not perform as expected. Workplace dissatisfaction and poor performance usually lead to high employee turnover in the restaurant industry. According to a Hotel and Catering Training Company in the United Kingdom, turnover in the United Kingdom was estimated to have cost the hotel and the catering industry 430 million pounds a year, and turnover was higher among men than women (Lucas, 2010). In Ghana the Restaurants Association found in its 2010-2011 Annual Survey that 41.26 percent of the employees in 63 restaurants changed jobs or resigned. Amoah (2009) reported that in order to reduce such high labour turnover and retain productive employees, management has to improve working conditions and keep the employees properly motivated. To remain in this competitive business environment, restaurant businesses need to increase their employees' motivation, so as to enjoy continuous development of their business facilities (Aksu, 2000). One of the most important variables known to affect the performance of restaurant staff is that of their motivation. Employees' performance and efficiency are among the factors that are known to affect the success of these businesses. Employees showing high performance rate and efficiency, relate to their satisfaction of their jobs (Torkunu, 2007). Especially in the service sector, employees' motivation is very crucial in terms of ensuring continuous of quality service delivery (Hays & Hill, 1999).

The hospitality industry had grown in numbers with a lot of multi-nationals opening more branches in Ghana. With the emergence of the oil find, the hospitality industry in Ghana had both increased in numbers and capital base, which has therefore engendered fierce competition in the sector. According to McKenna (2000) free entry and exit of new firms into a competitive market comes with its associated opportunities and treats. Therefore the influx of the restaurant businesses in Ghana comes with its opportunities and treats to existing ones. The level of motivation to determine whether employees are satisfied to stay on the job or are leaving and joining the new ones is of greater concern, not only to investors, but also to researchers. Due to the high turnover and absenteeism within the restaurant business, managers now realize the importance of employee motivation to retain quality staff. When employees maintain a high level of motivation, quality service delivery will result (Holley, Jennings, & Wolters, 2005).

Purpose of the Study

Over the years, employee turnover has drawn a lot of attention to human resource professionals (Mullins, 2007). Worldwide, researchers have suggested that employee turnover is among the highest in the hospitality industry. Studies have shown that the average turnover level among non-management restaurant employees in the US is about 50%, and about 25% for management staff (Mullins, 2007). In Ghana, it has been observed that a lot of hospitality staffs have been leaving the industry as a result of unfavourable working conditions, low salaries and delay in promotion as well as lack of opportunity for career development. This study was undertaken to examine the extent to which motivation can lead to improved employee performance and retention. With this in mind, the purpose of the paper

was therefore to determine specific motivational packages available to employees of the restaurants studied and also assess the effects of motivational packages on employee performance in the restaurant business.

Literature Review

By the restaurant businesses, it is meant individual restaurants and not those attached to hotels that serve mostly, in-house guests. Considerable research has been conducted regarding the definition of motivation. According to Dessler (1980) motivation is one of the simplest, but most complex of management jobs. It is simple because people are basically motivated or driven to behave in a way that they feel leads to rewards. So motivating someone should be easy; just find out what the employee wants and hold it out as a possible reward. Daschler and Ninemeier (1984) noted that motivation is a state or force within an individual that makes the employee act in a way designed to achieve some goal. Taking this broad definition and putting it into the context of supervision in the restaurant operation, we might say that motivation is what the supervisor does to encourage and influence other people to take necessary action. According to them Motivation is in fact an internally generated force or drive within the individual which provides an incentive for the employee to act. Ray and Wieland (1985) had stated that motivation is the force within a person that makes him/her act in a certain way to achieve some goal.

According to Kelly (1974), motivation has to do with the forces that maintain and alter the direction, quality and intensity of behaviour. Hoy and Miskel (1987) contend that employee motivation is the complex forces, drives, needs, tension states, or other mechanisms that start and maintain voluntary activity directed towards the achievement of personal goals. In short, Simon (2001) defined motivation as the intensity of a person's desire to engage in some activity. From the above definitions some issues are brought to mind that deal with what starts and energizes human behaviour, how those forces are directed and sustained as well as the outcomes they bring about. There is a relationship between motivation and job satisfaction. However, the concepts of motivation and job satisfaction are often confused with one another. While motivation is primarily concerned with goal-directed behaviour, job satisfaction refers to the fulfillment acquired by experiencing various job activities and rewards. It is possible that an employee may display low motivation from the organization's perspective yet enjoy every aspect of the job. This state represents high job satisfaction. Peretomode (1991) also argued that a highly motivated employee might also be dissatisfied with every aspect of his or her job.

Motivation is a human psychological characteristic that contributes to a person's degree of commitment (Stoke, 1999). It includes the factors that cause, channel and sustain human behaviour in a particular committed direction. Stoke, goes on to say that there are basic assumptions of motivation practices by managers which must be understood. First, that motivation is commonly assumed to be a good thing. One cannot feel very good about

oneself if one is not motivated. Second, motivation is one of several factors that go into a person's performance. Factors such as ability, resources and conditions under which one performs are also important. Third, managers and researchers alike assume that motivation is in short supply and in need of periodic replenishment. Fourth, motivation is a tool with which managers can use in organizations. If managers know what drives the people working for them, they can tailor job assignments and rewards to what makes these people more effective.

Types of Motivation

There are various types of motivation. It could be extrinsic, involving tangible rewards, or intrinsic, such as intangible but one that provides inner satisfaction. Motivation could be short, which needs a shorter period for achieving the result and long term, as well as self-motivation. Other studies also have found that students with high levels of intrinsic motivation and career self efficacy are likely to attain strong results educationally (Evans & Burck, 1992) and have better school-to-work transition experiences (Pinquart, Juang, & Silbereisen, 2003). Once at work, these individuals seem generally more satisfied with their work and perform significantly better than others (Judge & Bono, 2001). According to Cavelzani (2012), individual self-motivation should undergird the promotion of cooperation among front desk personnel, waiters and housekeeping staff to create a feeling of intrinsically-felt hospitality. According to Petcharak (2002), one of the functions of the human resource manager is related to ensuring employees workplace motivation. The human resource manager's function should be to assist the general manager in keeping the employees satisfied with their jobs. The employee work morale, such as supervisors, peers, organization, and work environment can be defined in a sense that the employee has the feeling and be conscious about all aspects of the job. The performance is poor if the employee is not satisfied and happy. Workplace dissatisfaction often leads to poor employees and organizational performance.

Maslow's (1943) need-based theory of motivation is the most widely recognized theory of motivation and perhaps the most referenced of the content theories. According to Maslow, five basic constructs form the human hierarchy of needs, which are physiological, security, affection, esteem and self-actualization needs. Maslow's conceptualization of needs is represented by a triangle with five levels which he called the Hierarchy of Needs. According to Anyim (2012) physiological or basic needs are the basic need of a person taken care of by the hospitality industry. It is seen as a driving force or a felt need. This need causes physiological tension which can be shown by anybody's behaviour. This can be reduced by eating something. Chintalloo and Mahadeo (2013) also explain physiological needs, seen to satisfy the basic need of humans. Physiological needs or basic needs also called biological needs. Maslow said when a person fulfills the basic, physiological or biological needs he moves up the next level of security, achieved with a very good job.

The Theoretical Framework

Maslow's hierarchy of needs theory was found to be more relevant to this study as the theory is applicable to organizational performance and employee motivation (Greenberg & Baron, 2003). They further argue that the theory is able to suggest how managers can lead their employees or subordinates to self-actualization. The idea implies the dual role of the theory first to organizations and second to employees on the basis that both the organization and the employees must decide on the performance of their organization. When employees put in their best in the service of the organization, the human resource practice should also ensure that the employees' level of needs is reflected in values the organization holds with high esteem (Greenberg & Baron, 2003).

The cultural framework of the organization should reflect the fact that employees' physiological and security needs are paramount; therefore, when such needs became critically focused, performance will be improved tremendously in that organization (Maslow, 1943). This argument implies a reversed effect that if the need is not critically focused on, the performance standard will not be met. As employees yearn for social needs, it is the role of organizational culture to create the values and norms that human resource practice will focus on when planning for the smooth running of the organization, with employee relationship being one of the key areas that human resource must strengthen (Storey, 1992). Moreover, the physiological needs of guests, including food and drinks (refreshment) are provided by restaurant, while hotel go ahead to provide the security needs of their guests. Human resource management practice should help employees attain their self-esteem and self-actualization needs. When employees discover that their organization cares so much about their developmental status, employees will offer their best to the service of the organization.

METHODOLOGY

In this section, the methods including the sample size and sampling techniques used for collection of the data are presented.

The Research Design

An ex-post facto survey design was adopted for this study (Ardichvili, et al, 2003). It was used because it allowed the study to objectively sample opinions from employees in the hospitality industry in the Cape Coast Metropolis in May 2014 on factors that affect their motivation and performance. According to Cohen and Manion (1980) and Babbie (1986), this survey design uncovers data, interprets, synthesizes and establishes the relationship among variables. It is also used to study people's attitudes, feelings and opinions, enabling the study to get the true feeling of workers on motivation incentives that affect their performance. The study also opted for the design because it involves the collection of data and accurate description of existing phenomena.

The Population and Sample Size

The target population for the study consisted of all restaurants in the Cape Coast Metropolis of the Central Region of Ghana. There were fifteen notable restaurants in Cape Coast, most of which are located along the Takoradi–Accra Highway. Five of the restaurants selected for the study were Goil Rest Stop, African Pot, Sizzler Spot, Solace and Shell Elmina Highway Rest Stop Restaurants. The total number of people forming the population of employees in the restaurants was about one hundred and twenty (120) including the managers. Based on Krejcie and Morgan's (1970) table for determining sample size for a given population, a sample size of sixty 50% (60) respondents; consisting of four (5) managers and fifty-six (55) employees from the restaurants was deemed enough for the study. Quota sampling was used in selecting the respondents from the five restaurants as shown in Table 1. From Table 1, Goil Rest Stop had the highest sample of 16 (27%), while Sizzler Spot had the smallest sample of 9 (15%). Almost all the restaurants also operated as night clubs, explaining their apparently large number of employees. Out of the 60 respondents, 24 representing 40% were males and 36 representing 60% were females.

Table 1: Population and Sample for the Study

S/No	Restaurant	Population	Sample	Percentage
1	Goil Rest Stop	32	16	27
2	Shell Elmina Highway Rest Stop	26	13	21
3	Solace	24	12	20
4	Sizzler Spot	20	10	17
5	African Pot	18	9	15
	Total	**120**	**60**	**100**

The main instrument used to collect data for this study was a questionnaire, which was self developed, based on the literature review and a previous study conducted by Afful-Broni and Tah (2014). The questionnaire had three sections and twenty items. The first section was about the respondents' demographic data including gender, age, employment position, employment status and period of work in hospitality organization. The second section gathered the views of the respondents on motivation for their jobs. The questions included their reasons for working in the restaurant and their most desired motivational factors. The questions demanded opinions on their wages or salaries, fringe benefits, job security, working environment, opportunity for advancement, training and involvement in decision making. Section C asked respondents to choose the appropriate answers as to how they rated some motivational factors on a five-point Likert scale with items ranging from 5: strongly agree (SA), 4 for agree (A), 3 for undecided (U), 2for disagree (D), and 1for strongly disagree (SD). On the other hand, items that showed dislike were ranked from 1 to 5, with 1 for strongly disagree (SD), 2 for disagree (D) 3 for neutral (N), 4 for agree (A) and 5 for strongly agree (SA). In all fifty (60) questionnaires were developed and administered to both the employees and managers or owners of the restaurants.

To maximize the reliability and validity of the questionnaire, a pilot study was conducted on two restaurants outside the sample area to pre test the instruments. The participants were asked to respond to the initial surveys based on their understanding of motivation factors. Answering the questionnaire took about ten minutes each. The questionnaire was modified based on the pilot study and the final version of the questionnaire was completed after the review. The data collected were processed using the SPSS version 17.0. The results of the fieldwork were shown using frequency tables with descriptive analysis. Both qualitative and quantitative methods of data analysis were used for the study. The variables of interest were motivation and employee's job performance and these were analyzed with the demographic characteristics of the respondents and predictor variables such as wages and salaries, promotion, benefits and recognition, environmental factors and fringe benefits.

RESULTS AND DISCUSSION

This section covers a presentation, analysis and discussion of the results.

Profile of the Respondents

Socio-demographic attributes like gender, education, and age are known to affect significantly motivation of employees at the workplace (Perry, 2000). So these variables were considered in the analysis of the data for the study. The profile of the respondents involved in the study showed that there were 40% males and 60% females. This was no wonder as females are known to dominate employment if the hospitality industry, whether in developed or developing countries (King et al., 2003; Li & Leung, 2001; Mill & Morrison, 1998; Owusu-Mintah, 2012). As shown on Table 2, most of the respondents were aged between 18 and 24, indicating the youthful nature of employees in the hospitality sector. Further, the data on Table 2 show that most of the respondents (66.7%) had received secondary school education. However only 13.3% of them had received tertiary education, where they might have received professional training for working efficiently in the hospitality industry.

Table 2: Age and Educational Background of the Respondents

Age Group in Years	**Frequency**	**Percentage**
18 -24	30	50
25 –34	15	25
35 -44	8	13.3
45 -54	4	6.7
55 and above	3	5
Level of Education		
Basic education	12	20
Secondary education	40	66.7
Tertiary education	8	13.3
Total	**60**	**100**

Hence majority of the workers did not have specific training for the hospitality industry. When the respondents were asked to indicate the length of service on their present jobs, the data obtained are shown on Table 3. The data presented on Table 3, indicate that most of the respondents (43%) had spent less than one year on their present jobs. This attests to the fact that employee turnover tends to be very high in the hospitality industry in the country.

Table 3: Length of Service at Current Restaurant

Years	Frequency	Percentage
Less Than 1 Year	26	43.3
1-3 Years	8	13.3
4-6 Years	16	26.7
More than 6 years	10	16.7
Total	**60**	**100**

Motivational Factors

Regarding the importance of training as a motivating factor, the data as to whether or not training and development are effective in improving employees motivation showed that almost all the respondents either agreed or strongly agreed that employee training is an important motivational factor. This assertion is supported by Powers and Barrows (1999), who contended that training provides on-the-job experience that helps employees become more proficient or qualified at a task at their current jobs. According to Mill (1998) training provides on-the-job experiences and also helps employees become more proficient on their jobs. He noted further that a well trained group of employees should result in a reduction of costs, stress, turnover, and absenteeism and a corresponding increase in efficiency and customer satisfaction. When a company wants to encourage productivity among its employees, one option available is an employee incentive program. Employee incentives describe a system of rewarding success and effort in the workplace. The researchers sought to find out the kind of motivational packages available for employees of the selected restaurants and the responses gathered are shown in Figure 1.

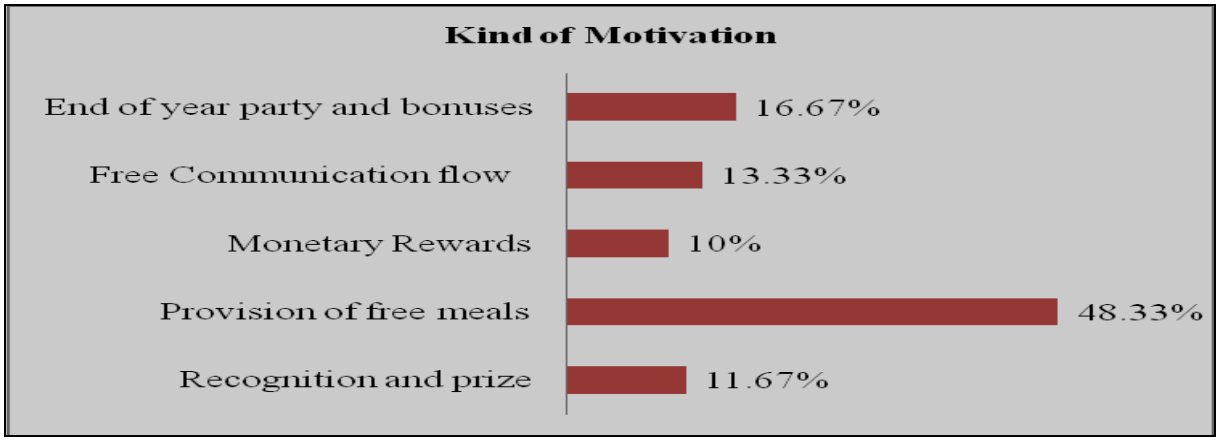


Figure 1: Types of Incentives Given to Employees

As shown in Figure 1, majority of the respondents (48.33%) indicated that free meals offered to them by management, provided them high motivation for work than monetary rewards that recorded only 10% of the respondents. However 16.7% of the respondents indicated that end of year party and bonuses were also an important motivation for to them. The best employee motivation efforts focus on what employees deem to be acceptable. Employee motivation as a status simply describes the degree to which management succeeds and employees become satisfied and willing to put in their maximum effort. The study also sought to ascertain the level of satisfaction of employee's motivation packages offered by management of the selected restaurants. The responses gathered showed that while 36.7% of the respondents were satisfied, about 70% of them indicated that they were dissatisfied with motivational packages offered by management of the restaurants. Tsang and Wong (1997) were of the view that if hotel managers knew what motivates their staff, they would stand a better chance of satisfying and ultimately retaining their employees longer. According to Awuni (1991), lack of employees' motivation in a restaurant business will cause a higher turnover, absenteeism, lower service, higher operating costs for recruitment, selection, and training.

In answering the question about which motivation packages affect the performance of restaurant employees, the next section sought to examine the motivational packages that affect the performance of restaurant employees. No matter the size of an organization, having a team of motivated, hard-working employees is crucial to business success. When people lose their motivation, however, their job performance suffers; they become less productive, less creative and also less of an asset to the business. The researchers sought to find out from the respondents whether or not extrinsic motivational factors like relationship with supervisors, working conditions, relationship with peers and job security are effective in improving employee's motivation. As to whether or not relationship with supervisors are effective in improving employee's motivation (Figure 2), majority of the respondents (x=33) strongly agreed that relationship with supervisors are effective in improving employee's

motivation. eighteen respondents agreed that relationship with supervisors are effective in improving employee's motivation, four respondents disagreed, while, three respondents strongly disagreed that relationship with supervisors are effective in improving employee's motivation. Only two respondents were undecided as to whether or not relationship with supervisors was effective in improving employee's motivation.

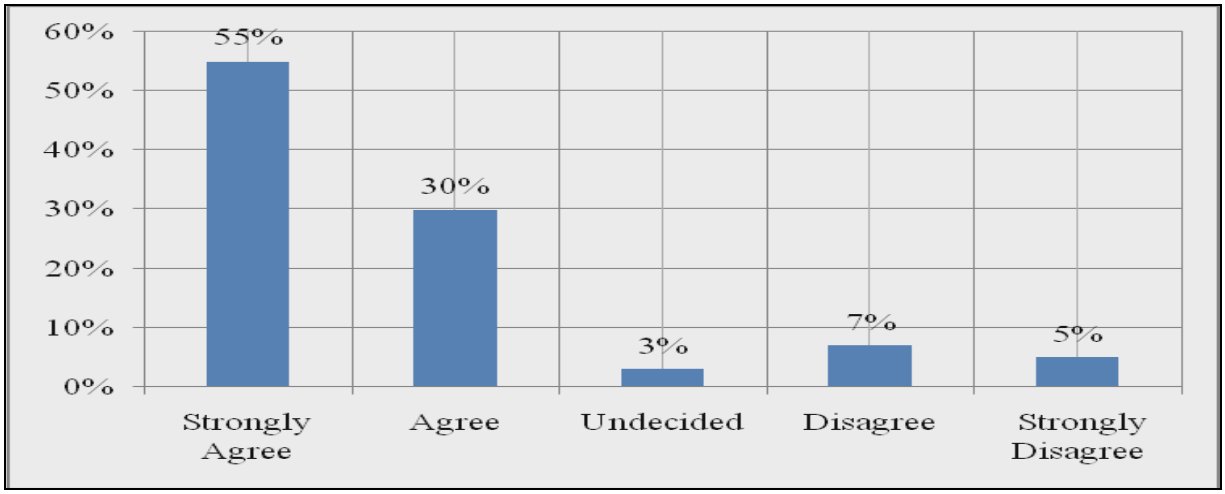


Figure 2: Relationship with Supervisors as a Factor of Motivation

The results from Figure 2 show that most of the respondents supported the view that good relationship with supervisors was likely to enhance employee's motivation at the work place. The implication is that if cordial relationship exists between subordinates and supervisors, subordinates will become contended and therefore put in their maximum effort at the work place. According to McGregor (1960) an organization that offers participative decision-making processes, informal relationships and group collaboration could maximize the employees' motivation level the work place. As to whether or not job security is effective in improving employee's motivation, the data on Figure 3 show that as much as 76% of the respondents either disagreed or strongly disagreed with the proposition.

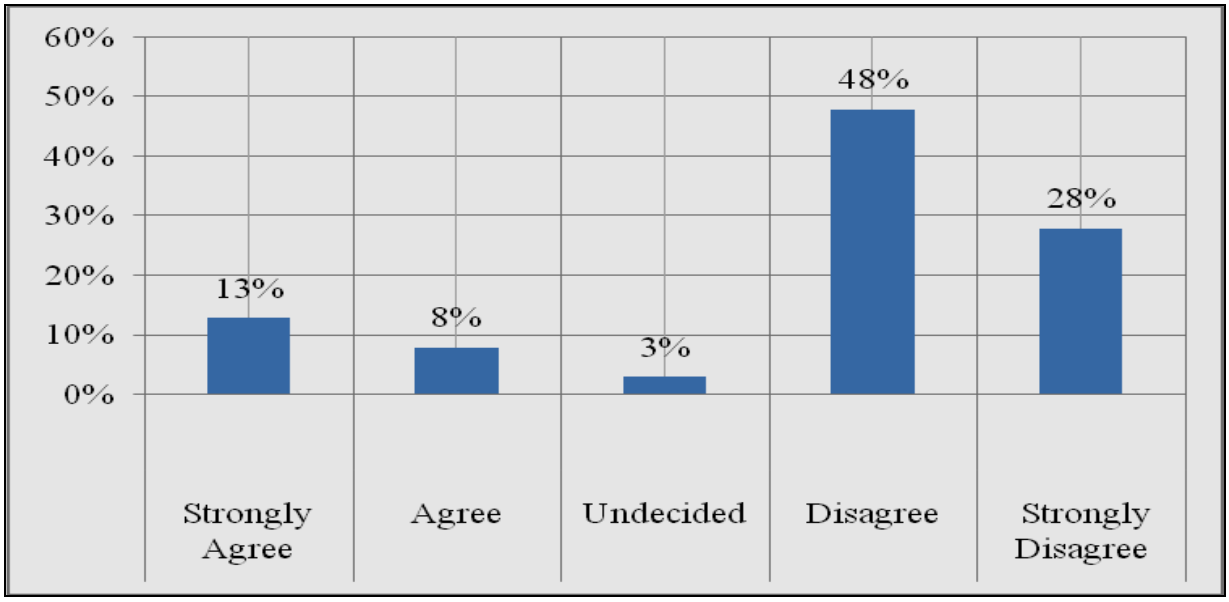


Figure 3: Job Security Factor for Improving Motivation

This shows that most of the respondents disagreed that job security improves employee's motivation at the work place. The implication is that employees in the selected restaurants did to consider their job security as a motivational factor. According to Maslow's (1943) theory of needs, the security needs include the need for safety, fair treatment, protection against threats and job security. He indicated that when employee's physiological needs are satisfied they strive to secure their job security so as to remain in employment. When the respondents were further asked to indicate whether or not intrinsic motivational factors like training and development, challenging work environment, and higher responsibility are effective in improving employee's motivation, responses gathered showed that several factors are known to affect productivity of labour, which cannot be achieved without maintaining and enhancing the skills of labour and human resource strategies. To achieve higher service quality and employee productivity organizations must develop and encourage work environment where employee's contribution to productivity would be increased towards the attainment of organizational goals. By motivating employees, restaurant operators can enhance their employee's productivity resulting in improved services and product to satisfy customer's needs. Table 4 shows the effects of motivational packages on profitability, customer satisfaction, staff retention and increased customer base.

On the effects of motivational packages on employees performance, it could be noted from Table 4 that fifteen respondents indicated that the effect of employee motivational package on profitability was high, thirty five respondents indicated average profitability returns, and eight respondents indicated low profitability on effect of employee motivational package while two respondents could not provide any response as to whether or not employee's motivation could have an effect on profitability.

Table 4: Effects of Motivational Packages on Performance

Effects of motivational packages	High (4)	Average (3)	Low (2)	Cannot tell (1)	Total	Mean Score
Profitability	15	35	8	2	183	3.05
Customer satisfaction	11	40	5	4	178	2.97
Staff retention	7	10	43	0	144	2.40
Increased customer base	9	44	4	3	179	2.98

The results show that most of the respondents believed employees' motivation increases the profitability of the business. It can be concluded from the table that the mean score of 3.05 out of 4 for profitability was critical as compared with other effects though increased customer base and customer satisfaction where equally important. On the degree of importance of motivational packages available to employees of the restaurants in the study, the results are presented on Table 5.

Table 5: Degree of Importance of Motivational Packages

Motivational Packages	Most Important (3)	Important (2)	Least Important (1)	Total	Mean score
Wages and salaries	45	13	2	162	2.70
Fringe benefits	32	23	5	147	2.45
Job security	9	20	31	98	1.63
Working conditions	20	34	6	134	2.23
Training and development	11	34	15	116	1.93
Opportunity for advancement	36	21	3	153	2.55

The data on Table 5 show that forty-five respondents indicated that wages and salaries was the most important motivational factor, thirteen respondents rated wages and salaries as the next important motivational factor while two respondents rated wages and salaries at as the least important motivational factor that inspire employees to perform better on their job. Based on this wages and salaries, opportunity for advancement and fringe benefits had high mean score of 2.70; 2.55, and 2.45 respectively. The analysis confirm a study done by Bohlander, Snell and Sherman, (2001) that well paid employees are normally committed to their jobs and hardly indulge in fraud as against leanly paid employees. The choice of enhanced salary by employees raises some basic concerns of their needs. According to Bohlander et al., (ibid) enhanced salary is necessary for them to meet their physiological needs which are fundamental to man as identified by Maslow in his hierarchy of needs model. It was necessary to find out from the respondents whether or not motivational packages given to them were adequate enough to induce them to give out their best effort at the workplace.

On the issue of whether the motivational packages available were sufficient enough to enhance their performance, majority of the respondents (66%) said no to justify that the packages were not enough while 29% indicated that the motivational packages were sufficient enough to enhance performance. However, 5% of them were not certain as to whether motivational packages available were sufficient for them. Analyses on whether motivational packages available were sufficient to enhance their performance or not revealed that despite the above mentioned motivations that is, opportunity for advancement, monetary incentives, job security and fringe benefits, motivation given to them are woefully inadequate to enhance their performance. This might have contributed to frequent absenteeism and labour turnover in the hospitality industry. The study further revealed that the following motivational packages were available to employees of the restaurant business: monetary incentives, end of year parties and bonuses, provision of free meals, recognition and rewards. Generally, assessing the extent of satisfaction with the motivational packages among the staff, it was discovered that the employees were not satisfied with the motivational packages in place. The results of the study showed that most of the respondents supported the view that good relationship with supervisors, good working conditions, relationship with peers, training and development and challenging work environment were all factors that enhance employee's motivation at the work place. Monetary rewards in terms of allowances and salary increment as part of the main factors of motivation for restaurant staff was skewed towards disagreeing to the notion. This was evidenced by the 60% aggregate affirmation, even though 22% registered neutrality and 18% collectively agreed to the notion. However, majority of the respondents (76%) disagreed that job security improves employee's motivation at the work place.

Finally, the results showed that most of the respondents believed employee's motivation increased the profitability of the business. An aggregate of 85% of the respondents agreed to the notion that employee's motivation improves Customer satisfaction. However, 43% of the respondents disagreed with the notion that employee's motivation increased staff retention. Further, job security and good working conditions were somehow strong factors that affected respondents approach to work. They also thought that pay and fringe benefits were strong factors that influenced them to work. However, 60% of the respondents said recognition and rewards were not strong enough to influence them to work. Despite the availability of some motivational packages such as opportunity for advancement, monetary incentives, job security and fringe benefits for the respondents they were woefully inadequate to enhance their performance. This might have contributed to frequent absenteeism and labour turnover in the hospitality industry.

RECOMMENDATIONS AND CONCLUSION

This final section of the paper, presents the recommendations made, conclusions drawn from the findings of the study and directions for further research..

Recommendations

Based on the findings of the study, the following recommendations are made.

- More motivational incentives should be planned by management for employees of restaurants so as to help reduce absenteeism and increased labour turnover in the industry since most of them were not satisfied with the motivational packages offered them.
- It was discovered that job security was not a factor that affects the employees approach to work. Restaurant employees should therefore be sensitized to see the need to ensure their job security. This will go long way to increase their loyalty to their organisations.
- It is believed that since the factors that motivate people to perform best are distinct and different, learning about what workers want from their jobs, or what is more important for them, may generate essential information for effective human-resource management. This can guarantee the long-term profitability and survival of their organisations. Furthermore, such learning may help organizations to find answers to questions such as; why do some people invest greater effort in their jobs and why some people are more efficacious in their jobs than others?
- Also, as the employees expressed dissatisfaction with the incentives provided by their organizations and as majority of them did not agree with incentives meant to motivate them, management of the organisations must deem it necessary to put up appropriate measures which will concretely meet the demands of their employees to strengthen their motivation, satisfaction, and commitment to the restaurants.

Conclusion

In conclusion, it is explicitly clear that the following motivational packages are available to employees of the restaurant business: monetary incentives, end of party and bonuses, provision of free meals, recognition and rewards. Also, it can be concluded that majority of restaurant staff agreed that monetary incentives and good working conditions are somehow strong factors that affect their output, most of the respondents were of the opinion that recognition and rewards are not strong factors that can affect their output as employees. Furthermore, profitability of the restaurant business, customer satisfaction and increased customer base were all indications of effective motivational packages enjoyed by restaurant employees. The results of this study indicate that there is the need to determine other factors that the employees may care about as these factors are likely to have an effect on their performances. Finally, the results show a positive relationship between motivational factors and the performance of restaurant employees. This means that whenever employees are highly motivated they can achieve higher productivity for their businesses.

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ASSESSMENT OF COST CONTROL IN KEBBI STATE BUILDING CONSTRUCTION SITES

Nagande,U.[1], Marafa M.[2] and Jackson, E.N.[3]

[1 &2] Department Of Building Technology, Waziri Umaru Federal Polytechnic, Birnin Kebbi, Kebbi State, Nigeria
[3]Department Of Building Technology, Cape Coast Polytechnic, Ghana

ABSTRACT
Building construction is a dynamic industry faced with many uncertainties which make the management of cost difficult and consequently causes cost overrun. This may result in wastage of resources and project abandonment. The aim of this paper is to investigate the main causes of cost increase in building construction project, (public building). The paper was carried out in Kebbi of the Federal Republic of Nigeria, adopting a quantitative structured questionnaire survey and using stratified random sampling techniques. Data were collected from different professionals in the field i.e., Quantity Surveyors, Architects, and, Builders. 15 construction industries were studied in the state. The data collected were, analyzed using Relatives Importance Index (RII) (descriptive statistical method).. . The result showed that out of a total of 15 factors, the top influencing factors causing cost overrun as arranged in descending order of importance are: Lack of proper planning and control techniques, fluctuation in the price of material resource used, government policies & Political Interference, The analysis of data on the effect of cost control revealed that; provision of imformations for management decisions, prevention of resources waste on site and abandonments of building projects as the major effects of cost control. Therefore, , the paper recommended that consideration should be given to proper cost planning and work's programming**,** establishment of price control measures, interest on delay payment provisions within construction contracts, finally training and development of site personnel should be improved.

Keyword: cost control, cost over-run, cost escalation, cost increase

INTRODUCTION
Good project management in construction must vigorously pursue efficient utilization of cost, which should be a major and continual concern of those who are responsible for cost control of constructed facilities. It is also a common knowledge that the implementation of construction project in the industry is usually accompanied with a problem of time delay and cost increase as well as owner dissatisfaction (Hafez, 2001). In general, most construction

[1]umarnagande.un@gmail.com
[2]mohammedmarafa70@yahoo.com

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projects experience time delays and cost overruns during their implementation phase (Koushki and Kartam, 2004).

Numerous researchers, both in the developed and under-developed nations have also examined and identified the causes of time and cost overrun in the construction industry. The aim of this paper is to investigate the main causes of cost increase in building construction project, (public building) and the objectives are to identify the causes of cost escalation on building construction projects and to analyze the effects of cost control in building construction projects. In Nigeria, many construction Projects development have failed owing to the various technical and financial pressures of cost limit, quality and value optimization. Jagboro and Banalola (2005), wrote that, the interim report of the Presidential panel on contracts at the wake of the present democratic government in Nigeria, confirmed a staggering amount of over four hundred and fifty billion naira (N450, 000,000,000.00) project which can be classified as failed contracts, spanning from 1979 to1998. The main reason for this is due to outright abuse of tendering procedure, non adherence to the rate of each building item in Bill Of Quantity, lack of comprehensive programme of work to aid in effective cost control management. It requires three main resources to complete a project: manpower, materials and equipment. When they are left out controlled, the cost associated with utilization of these resources will definitely escalate..

The concept of this paper is cost control of materials and manpower resources in public building construction project. (i.e. Federal & State Intervention Project) The context of this research work is within Kebbi State of Nigeria

LITERATURE REVIEW

In the construction industry, the aim of project control is to ensure that projects finish on time, within budget and achieving other project objectives. It is a complex task undertaken by project managers, which involves constantly measuring progress; evaluating plans, and taking corrective actions when required (Kerzner, 2003).

In general, cost overruns (increases) are among the most common phenomena in the construction industry – from simple to complex projects. Morris and Hugh (1980) examined the records of more than 4000 construction projects are found that, they were rarely finished on time, or within the allocated budget. Arditi (1985) also observed that time and cost overruns were common place in the construction industry worldwide. During the last few decades, numerous project control methods, such as Gantt Bar Chart, Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM), have been developed (Nicholas 2001, Lester 2000). A variety of software packages have become available to support the application of these project control methods, for example Microsoft Project, Asta

[1]umarnagande.un@gmail.com

[2]mohammedmarafa70@yahoo.com

Power Project, Primavera, etc. Despite the wide use of these methods and software packages in practice, many construction projects still lack control over cost. (Mensah, 2002).
Seeley;(1979) defined cost control as a process employed by the building economist to make sure that building cost does not rise above cost limit of such building, which include adopting an alternative technique and cost reduction. Ibironke (2001) is of the opinion that, cost control aims at ensuring the available & limited resources are used to the best advantage.

Cost overrun is defined as excess of actual cost over budget. Cost overrun is also called cost escalation, cost increase, or budget overrun. Choudhry (2004) defined the cost overruns as the difference between the original cost estimate of project and actual construction cost on completion of work of a commercial sector construction projects. In a study of infrastructure projects in Nigeria by Omoregie and Radford (2006), it was found that the major factors of cost overruns were fluctuations in prices, financing and payments made for completed works, inefficient contract management, delays in schedule, changes in site condition, inaccurate estimate, shortages of materials, delay in imported materials, additional works, changes in design, subcontractors and nominated suppliers, adverse conditions like weather, non-adherence to contract conditions, mistakes and disagreements in contract condition and fraudulent practices Similarly, Frimpong (2003) found that the top 5 significant factors causing cost overruns in large construction projects are Inadequate site management and supervision, lack of project management support, owner's financial difficulties, contractor's financial difficulties and changes in design. Omoregie and Radford (2006) conducted a study in Gaza and identified 10 major factors causing cost overruns. The factors include increment of materials prices due to continuous border closures, delay in construction, raw materials supply and equipment by contractors, instabilities in the cost of building materials, problems of the local currency in relation to dollar value, project materials control by some suppliers, constraints in resources, funds and associated auxiliaries not complete, lack of cost planning/monitoring during pre-and post-contract stages, improvements to standard drawing during construction stages, design changes and inaccurate quantity take-off. Literature review helped to identify most of the common factors that often lead to project cost overruns.

RESEARCH METHOD

This paper intends to assess cost control in building construction project. The paper is based on research design stages to ensure the achievement of the stated research aims and objectives. The main source of quantitative data used for this paper was from the questionnaire sent out to the building construction site and .Secondary data was obtained through the review of various relevant literatures. Generally, the scales of the variable were nominal and ordinal scales.

[1]umarnagande.un@gmail.com
[2]mohammedmarafa70@yahoo.com

The population of this paper was the professionals and experts in both clients and contractors side. There are 60 building construction projects in Kebbi State at the time of writing this paper. The projects was supervised by either state/fed. Ministry of work & housing, as Client. 40 projects were chosen to be used for this paper, made up of three different professionals i.e. Quantity Surveyors, Builders and Architects, The sample is obtained using sample size survey formula: **sample size (n) = N/1 +N (e)** ^{2} Yamaniyaro (1964) Where n= sample size, N=population, e=error limit= (5%), therefore, if N=120, e= $(0.05)^2$ n= $N/1+N(e)^2$= **120. T**herefore, sample size for this study was **120 respondents**, made up at least 3 professionals each from 40 construction projects. in Kebbi state. For analyzing data for this research, the relatives' importance index (RII) of the factors was adopted as confirmed by (Enshassi, 2007). They were computed using the following equation.

$$\textbf{RELATIVE Important index (RII)} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5(n_5 + n_4 + n_3 + n_2 + n_1)}$$

RESULTS AND DISCUSSION OF FINDINGS

A total of 120 questionnaires were administered and out of these, 100 questionnaires were received. This represent approximately 83% response rate,

Table 1: Analysis of The Respondents

PROFESSIONAL	NO. OF SITE	NO. OF RESPONDENTS	PERCENTAGE %
BUILDERS(ENGR)	40	45	37.5
QUANTITY SURV.	40	55	41.6
ARCHITECH	40	5	4.1
TOTAL	**120**	**100**	**83.2**

Source: Field Survey, 2016

This shows that, all the project sites have the three Professional such as Builders (Engineers), Quantity Surveyor and Architect with 37.5%, 41.6% and 4.1% respectively.
The analysis of the factors which causes cost increase from the Professional perspective. The causes were identified and ranked based on their relative importance indexes.

[1]umarnagande.un@gmail.com

[2]mohammedmarafa70@yahoo.com

Table 2: Analysis of Factors Causes Cost Increase

FACTORS CAUSES COST INCREASE		1	2	3	4	5	RII	RANK
1	Lack of proper cost planning & control techniques of work	0	0	0	5	95	0.990	1ST
2	Fluctuation in the price of resources use	1	3	1	5	90	0.940	2ND
3	Government policies /political interference	1	3	1	5	90	0.940	2ND
4	Lack of clear understanding of cost control procedure by site personnel	2	7	1	5	85	0.932	3RD
5	Lack of understanding of contract document	2	7	1	5	85	0.932	3RD
6	Inefficient use of materials on site.	2	8	5	5	80	0.906	4TH
7	Delay in payment	2	8	5	5	80	0.906	4TH
8	Inadequate availability of material to be use	2	8	5	5	80	0.906	4TH
9	Duration in contract time (period)	2	8	5	5	80	0.906	4TH
10	Lack of proper supervision	9	3	3	7	75	0.866	5TH
11	Improper allocation of labour to the various work items	5	10	5	20	60	0.840	6TH
12	Lack of Check resources level & re schedule materials and labour	5	10	5	20	60	0.840	6TH
13	Lack of accurate and timely record on the progress of work	10	5	10	20	55	0.810	7TH
14	Inefficient feedback mechanism on cost performance to mgt	10	12	10	13	55	0.782	8TH
15	Lack of instituting good incentive scheme	13	23	4	55	5	0.720	9TH

Source: Field Survey, 2016

Based on Table .2, Lack of proper planning and control techniques of works is the first ranked factor that causes cost increase in building construction project**.** with a relative importance index of (0.990) This confirms the studies done by Iyer and Jha (2005), Assaf et al(1995), Arditi et al (1985), Frimpong et al(2003). Poor planning is one of the most important factors that cause increase in cost of construction. The client and Contractors must

[1]umarnagande.un@gmail.com

[2]mohammedmarafa70@yahoo.com

be aware of all resources needed for any project, and also their utilization in an efficient manner. Proper scheduling is the key to utilizing project resources, if not, the project cost will increase.

Furthermore, fluctuation in the prices of materials resource used and government policies/ political interference were ranked second with a relative importance index of (0.940). This also confirm the literature byAibinu and Jagboro (2002), Omoregie and Radfort (2005) Government deregulation policies aimed at liberalizing the economy since 1986 are responsible for the instability in prices of building materials, it is therefore not surprising that fluctuation claims during these periods contribute significantly to additional cost. Also lack of clear understanding of contract document fall as third causes of cost increase with a relative importance index of (0.932)It also confirms the literature by Koushki et al (2005),
The fourth factors are inadequate availability of materials to be use, inefficient use of material on site,Delay in payment and Duration of contract periodwith a relative importance index of (0.906). This also confirms the literature by Ogunlana, (1996) and Mansfield et al (1994).The fifth factor that causes cost increase is Lack of proper supervission, with a relative importance index of (0.866).It also confirms the literature by Arditi (1985), Kartam et al (2000).

Subsequently**,** Improper allocation of labour to the various work items and Lack of Check resources level and re-schedule materials and labour, fall as six factors that causes cost increase in building construction site with a relative importance index of (0.840). Finally, Lack of accurate and timely record on the progress of work, Inefficient feedback mechanism on cost performance to management, and lack of instituting good incentive scheme falls as seven, Eight and Nine Factors that causes cost escalation in building construction project. with a relative importance index of (0.812), (0.780), (0.734), Respectively.

[1]umarnagande.un@gmail.com

[2]mohammedmarafa70@yahoo.com

Table 3: Analysis of The Effects Of Cost Control

THE EFFECT OF COST CONTROL		1	2	3	4	5	RII	RANK
1.	It provides imformations for management decisions	0	0	0	9	91	0.982	1ST
2.	In the absence of Cost control management the result may be waste of resources	0	2	1	31	66	0.922	2ND
3.	It may also lead to abundoment of resources	0	2	1	31	66	0.922	2ND
4.	With Cost control system client have value for his money	3	6	2	28	61	0.904	3RD
5.	Cost control help to identify economic/ uneconomic construction activities	0	8	3	28	61	0.882	4TH
6.	It provide feedback to the estimator for future estimation	0	14	5	23	58	0.850	5TH
7.	It Serves As Guide For Project Planning & Control	1	13	10	16	60	0.842	6TH
8.	It help in construction stage	13	4	3	29	51	0.802	7TH

Source: Field Survey, 2016

The following are the results of the analysis on the effects of Cost Control, from the Professional perspective. The effects were analysed based on their Relative Importance Indices. Provision of informations for management decisions is found the most important effect of **Cost Control** with a relative importance index of (0.982). This confirms the studies; by Ayodele (2014) that Provision of informations for management decisions means that, cost control technique help the management of project site with the information needed as regard financial aspect and budgetary control.

The second effect of cost control is, It Prevents waste of resources on site and abandonments of projects with a relative importance index of (0.922). Again, Cost control help in identification of economic/ uneconomic construction activities with a relative importance index of (0.882). provision of feedback to the estimator for future estimation ranked the fifth effect with relative importance index of (0.850). The next effect of cost control is It Serves

[1]umarnagande.un@gmail.com

[2]mohammedmarafa70@yahoo.com

As Guide For Project Planning & Control with a relative importance index of (0.842). Lastly cost control help in construction stage is the least effect identified with a weighted mean of (0.802).

CONCLUSION & RECOMMENDATION

Fifteen factors that contribute to the cost overrun were identified, Out of these factors, the ten most important factors ranked in descending order were found to be; Lack of proper planning and control techniques, Fluctuation in the price of Materials resource use, Government policies/Political Interference. Inadequate availability of materials to be use, inefficient use of material on site, Delay in payment, Duration of contract period, Lack of proper supervission, Improper allocation of labour to the various work items, Lack of Check resources level & re schedule materials and labour.

It was further revealed that; Provision of imformations for management decisions, Prevention of resources waste on site and abandonments of building projects as the major effects of cost control

From the findings and conclusions drawn, the study recommends that:

1. Consideration should be given to Proper cost planning and work's programming**.** Basically, Planning is a management functions, and it was found to be the major causes of escalation on sites. It is therefore compulsory on management to identify and adopt such techniques as will serve the best needs of the project. So that effective cost monitoring, and Good Control Documentation can be achieved.
2. Establishment of price control measures, so the cost of material and Man power resources can be maintained.
3. Interest on delay payment provisions within construction contracts must always be activated by contractors and their interest recovered in full to deter clients from persistent default
4. Use of Computer applications, The increasing capital-intensive nature of construction projects demand, that a more efficient system is sought to process cost data to produce useful information early enough for management use. Training and development of site personnel should be improved.

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[1]umarnagande.un@gmail.com

[2]mohammedmarafa70@yahoo.com

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[1]umarnagande.un@gmail.com

[2]mohammedmarafa70@yahoo.com

THE IMPACT OF EMPLOYEE TURNOVER IN THE CONSTRUCTION INDUSTRY: A COMPARATIVE STUDY OF EMPLOYER AND EMPLOYEE PERSPECTIVE IN KEBBI STATE NIGERIA.

Marafa, M.[1], Nagande, U.[2], and Hagan D. E.[2]

[1&2]*Department of Building Technology, Waziri Umaru Federal Polytechnic, Birnin Kebbi, Nigeria*
[3] *Department of Building Technology, Cape Coast Polytechnic, Ghana.*

ABSTRACT
The paper gives an insight into the impact of employee turnover in the construction industry. In the study, the main factors responsible for employee turnover, the effect of employee turnover and suggestions that will help to minimize the problem of turnover were considered. A total of 140 questionnaires were distributed and 129 of the administered questionnaires were responded to and returned. The data obtained were analysed with descriptive statistics such as frequencies, percentages, means and standard deviations. Also, Man Whitney U test and factors analysis were used to perform inferential analyses and to draw conclusions on the research objectives. Pie charts, bar chart, and tables were used in presenting results. The result shows that better job option, absence of advancement and promotion opportunities and job satisfaction are the main causes of turnover. The study observed that employee turnover has effect in the construction industry such as Project overtime, additional workload on remaining workers and reduction of project performance. The study also shows that the problem of employee turnover can be minimized by paying competitive compensation and benefit packages, fair treatment of workers and reward for dedicated workers as some of the best ways of reducing turnover, while fairness, equal opportunity and conducive workplace are also ways of reducing turnover. The study also identified that promoting committed workers and training of employees can be used to reduce the effect of employee turnover. Based on the findings in the work, appropriate recommendations were made to help tackle the challenges of employee turnover in the construction industry.

Key words: *Employee Turnover, Construction Industry in Kebbi state, Employer/Employee perspectives.*

[1]mohammedmarafa70@yahoo.com
[2]umarnagande.un@gmail.com
[3]dandehag101@yahoo.com

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INTRODUCTION

The construction industry is so unique that the approach towards the management of its resources is very dynamic and complex. "employee turnover" is an important metric that is often central to organizations' workforce planning and strategy. The reasons why employees leave their current jobs and positions; not just the fact that their leave have crucial implications for future retention rates among current staff, job satisfaction and employee engagement and an organization's ability to attract talented people for job vacancies. The impact of turnover has received considerable attention by senior management, human resources professionals and industrial psychologists. It has proven to be one of the most costly and seemingly intractable human resource challenges confronting several organizations globally. With the effect of globalization, it has been touted that every construction company will have to manage their employee turnover methodically. Every company wishes to have high productivity, fewer turnovers and to be profitable. Managing turnover successfully is a must to achieve the above goals. Studies have also been carried out by various scholars regionally and globally to explore and to study the relationship between various variable(s) with employee turnover. These studied variables include occupational content, leadership styles and job satisfaction.

Beam, (2009) explains employee turnover as a ratio of comparison of the number of employees a company must replace in a given time period to the average number of total employees. A huge concern to most companies, employee turnover is a costly expense especially in lower paying job roles, for which the employee turnover rate is highest. Many factors play a role in the employee turnover rate of any company, and these can stem from both the employer and the employees. Wages, company benefits, employee attendance, and job performance are all factors that play a significant role in employee turnover. Companies take a deep interest in their employee turnover rate because it is a costly part of doing business.

Yankelov, (2008) also defines employee turnover as a situation whereby employees exit the organization voluntarily for various reasons and thereby affecting the company negatively in terms of cost and the capacity to deliver the minimum required service.

Previous research findings indicate that some causes of employee turnover are job related factors that are somewhat within the direct control of the employer. Example of such factors would be dissatisfaction with working condition, supervising conflicts, scheduling conflicts or salary discrepancies. Understanding the causes of job-related turnover is crucial in being able to identify problems within a company that might be controlled by the employer.

[1]mohammedmarafa70@yahoo.com
[2]umarnagande.un@gmail.com
[3]dandehag101@yahoo.com

Corrective steps taken in this area included training programs for supervisors, clarification of the employee's purpose or role and identifying scheduling solutions.
In contrast, non-job related causes of employee turnover are generally out of the employer's control. Non job-related causes of employee turnover are those things in the employee's personal life that impact their performance at the workplace.
Solomon et al. (2012) added that the loss of an employee triggers additional work stress and lowers motivation of employees who stay behind. In other words, it is negatively impacting employees' group morale and organizational membership.

THEORITICAL FRAMEWORK OF EMPLOYEE TURNOVER

Employee turnover has become an important area of research from both a theoretical and practical standpoint. It is important from a theoretical perspective, in understanding how the underlying causes of turnover can provide insights into how to control the phenomenon. However, from a practical standpoint, learning how to minimize the turnover of skilled employees is crucial in reducing employee replacement costs (Keaveney, 1992).Due to high work stress and an unstable working environment, the turnover of construction workers is an important issue from a practical viewpoint. Also, decreasing employee turnover keeps knowledgeable and experienced employees working in the organization.

Turnover Defined

Employee turnover has been one of the most studied subjects in organizational behavior literature (Schwab, 1991), yet continues to elude any concrete conclusions. To better understand the implications of turnover, one must understand how turnover is defined.
According to Beam, (2009), employee turnover is a ratio comparison of the number of employees a company must replace in a given time period to the average number of total employees.

Abassi & Hollman (2000), refer to employee turnover as the rotation of workers around the labor market, between firms, jobs and occupations, and between the states of employment and unemployment. Employee turnover is defined as the individual movement of employees across the membership boundary of organizations (Price, 2000). This definition refers to employees moving into or out of an organization. Harkins (1998) defines employee turnover as the entrance of new employees from the organization and the departure of existing employees from the organization. Employee turnover is further defined as the rate at which new recruitments are hired to replace resigned employees. By these definitions, turnover occurs only when a replacement is successfully hired. A similar definition is provided by Mondy, (2010) who state that turnover means voluntary cessation of membership of an

[1]mohammedmarafa70@yahoo.com
[2]umarnagande.un@gmail.com
[3]dandehag101@yahoo.com

organization by an employee of that organization. In an organizational context, turnover can be defined as the termination of an employee's intra organizational career trajectory, which is composed of a sequence of job changes from job entry to job exit (National skills development cooperation) NSDC, (2010).

Types of Employee Turnover

Turnover can be classified as voluntary (to include withdrawals out of volition) or involuntary (to include layoffs and dismissals) There are a few generally accepted models of employee turnover. The first model suggests that turnover is either voluntary or involuntary. Suggesting that an employee has chosen to leave the organization (voluntary) or they have been forced to leave (involuntary).

Voluntary Turnover:

When employees leave an organization at their own discretion, it is referred to as voluntary turnover (Noe, 2006). It is initiated by the choice of the employee. A similar definition is given by (Egan, 2004), stating that "An instance of voluntary turnover, or a quit, reflects an employee's decision to leave an organization, whereas an instance of involuntary turnover, or a discharge, reflects an employer's decision to terminate the employment relationship".

Involuntary Turnover:

Mathis, (2004) define involuntary turnover as "... an instance of involuntary turnover, or a discharge" that "reflects an employer's decision to in terms of costs and the capacity to deliver the minimum terminate the employment relationship". According to (Allen, 2003), involuntary turnover includes retirement, death and dismissal. (Boxall, 2003) further state that turnover initiated by the employee such as resigning to take care of a terminally ill family member or accompanying a spouse to another area should also be considered as involuntary as it includes reasons over which the employee has no control.

RESEARCH METHODOLOGY

.Data for the study was collected by the use of a structured questionnaire designed to assess the views of respondent on employee turnover in the construction industry with particular emphasis on the factors responsible for employee turnover, the effects of employee turnover and suggestions that will help tackle the challenges of employee turnover in the construction industry. The study was targeted for employers and employees in the construction industry. The study was carried out in Kebbi state, questionnaires were administered to employers and employees in their respective companies and employers considered in the study were Architects, Builders, Quantity surveyors, Engineers and Project managers. While on the part

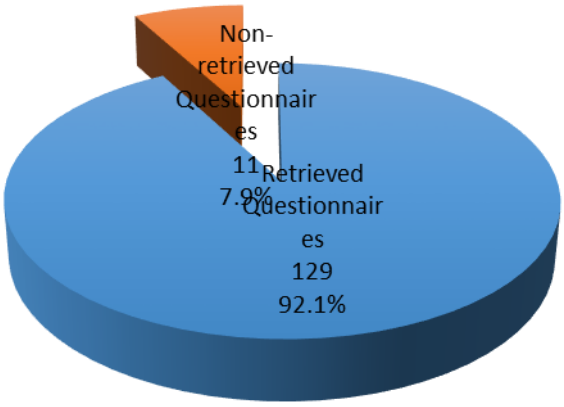
[1]mohammedmarafa70@yahoo.com
[2]umarnagande.un@gmail.com
[3]dandehag101@yahoo.com

of the employees; Masons, Carpenters, Steel benders, Plumbers, Electricians, Plant operators, Foremen, Painters and Tillers.

. A total of one hundred and forty questionnaires (140) were administered to employers and employees of construction companies within the study area out which one hundred and twenty nine (129) were retrieved and analyzed. The same respondents were asked to rate their level of agreement on a number of factors generated from literature review on employee turnover on a four point Likert scale of 1= not significant 2= fairly significant 3= significant and 4 = very significant, and 1= not important 2= fairly important 3= important 4= very important, these was used to ascertain their responses on the list of causes, effects and factors responsible for employee turnover. Results were obtained and analyzed with descriptive statistics such as frequencies, percentages, means and standard deviations. Also, Man Whitney U test and factors analysis were used to perform inferential analyses and to draw conclusions on the research objectives.

RESULTS AND DISCUSSIONS

A total of one hundred and forty questionnaires (140) were administered to employers and employees of construction companies within the study area out which one hundred and twenty nine (129) were retrieved and analyzed. The figure below shows the distribution and percentages of the respondents which indicate that a total of 129 questionnaires were retrieved for analysis representing ninety two percent (92.14%) of the total population.



Working experience of the respondents

Table 1 expresses the years of working experience of the respondents for both the employers and the employees. From the table, it is obvious that the working experience of both the employees and the employers is high at 11-20years with a percentage of 51.4% and 60% respectively. This makes a total percentage of 52.7% for both the categories at that level.

Table 1: Years of working Experience of Respondents

[1]mohammedmarafa70@yahoo.com
[2]umarnagande.un@gmail.com
[3]dandehag101@yahoo.com

Years	Employee		Employer		Total	
	Freq.	%	Freq.	%	Freq.	%
1-10 years	29	26.6	3	15.0	32	24.8
11-20 years	56	51.4	12	60.0	68	52.7
21-30 years	24	22.0	5	25.0	29	22.5
31 and above years	0	0.0	0	0.0	0	0.0
Total	109	100.0	20	100.0	129	100.0

Causes of employee turnover

Findings from the research present the ranking of the causes of employee turnover in the construction industry as ranked by the respondents. It shows that better job option was ranked the first with a mean of 5.54 from the employee perspective and a mean of 2.65 from the employer perspective with a total mean of 3.40 for both the two categories, this agreed with Anantha (2013), research on A qualitative study on causes and effect of employee turnover in the private sector in Malaysia. This is followed by absence of advancement and promotion opportunities which has a mean of 3.17 and 3.10 from employees and employers perspective respectively and was ranked the second with total mean of 3.16 for the two categories. Job satisfaction was also ranked the second with a mean of 3.17 and 2.85 from employee and employer perspective with a total mean of 3.12. These indicate that those three factors were very significant on the causes of employee turnover in the construction industry. Furthermore job security and irregular payment of salary were ranked third and fourth respectively with a mean of 3.08 and 2.60 for employee and employer on job security and that of irregular payment of salary has a mean of 2.86 and 2.90 for the two categories respectively. The respondents also gave their views on poor salary and benefits which was ranked the fifth with a mean of 2.61and 2.75 for employee and employer perspective. Poor working tools and equipment with a mean of 2.48 and 2.80 then poor health and safety benefits mean 2.39 and 2.80 were ranked sixth seventh from employee and employer point of view respectively. Factor that were ranked eighth and ninth position by the employee and employers are poor working environment and poor relationship with management with their means as 2.19, 2.45 and 2.17, 2.75. Inconvenient working schedule was ranked the tenth with a mean of 2.16 and 2.35 lastly job location with a mean of 1.85 and 2.30 was ranked the eleventh which was the least.

[1]mohammedmarafa70@yahoo.com
[2]umarnagande.un@gmail.com
[3]dandehag101@yahoo.com

Effect of employee turnover

The responses in the second section of the questionnaire depict the stakeholders' perspective on the effects of employee turnover in the construction industry; it combines the responses from employees and employers in the study area. The table indicates that the employees ranked reduced project performance as the first effect with a mean of 3.50 followed by reduction in quality of work which was ranked second with a mean of 3.24. The employees further ranked difficulty in replacing old experienced workers and high cost of hiring and training new workers to be the third and fourth with a mean of 3.23 and 2.85 respectively. Decreased employee morale was ranked the fifth with a mean of 2.84 while additional workload on remaining workers has a mean of 2.49 and was ranked the sixth; the seventh in ranking was bad reputation to organization which has a mean of 2.39. Project overtime was ranked the least with a mean of 1.94.

On the other hand, the employers ranked reduction in quality of work and difficulty in replacing old experienced workers as the first with a mean of 3.00 and 3.00. then decrease in employee morale was ranked the second with a mean of 2.95; high cost of hiring and training new workers was ranked the third with a mean of 2.90; they further ranked additional workload on remaining staff to be the fourth with a mean of 2.70; reduced project performance was ranked the fifth from the employer perspective; the sixth on ranking was project overtime with a mean of 2.60 then bad reputation to organization was ranked the least with a mean of 2.50.

Factors Affecting Minimization of Employee Turnover

The stakeholder's perspective on the factor that will help in minimizing employee turnover in the construction industry was identified through their response on the questionnaires; a combine response of both employees and employers was shown. The employee responded that reward for dedicated workers has a mean of 3.65 and was ranked the first factor. Then creating advancement and promotion opportunities was ranked the second with a mean of 3.06 the third in ranking was proper treatment of workers by supervisors which has a mean of 2.79, hiring competent staff and dedicated workers was ranked the fourth with a mean of 2.78 the fifth was paying competitive compensation and benefit packages with a mean of 2.76the sixth and seventh on ranking are review of compensation/benefit packages annually and provision of working tools and equipment with their means as 2.69 and 2.65 respectively. paying attention to personal needs of workers was ranked the eighth and has a mean of 2.44 the ninth in ranking was provision of positive work environment with a mean of 2.31 regular communication with workers has a mean of 2.19 and was ranked the tenth, while social interaction with workers and review of company policy were ranked eleventh and twelfth

[1]mohammedmarafa70@yahoo.com
[2]umarnagande.un@gmail.com
[3]dandehag101@yahoo.com

with their means as 2.11 and 2.06. Reduced working hour was ranked the least from the employee perspective with regards to factors that help in minimizing employee turnover. Meanwhile the employers' response in this regard ranked reward for dedicated workers as the first and hiring competent and dedicated workers to be the second with a mean of 3.65 and 3.10 respectively. The third and fourth has a mean of 2.85 and 2.80 which are referred to paying attention to personal needs of workers and paying competitive compensation/ benefit packages, proper treatment of workers by supervisors was ranked the fifth with a mean of 2.75 then review of compensation and benefit packages annually was ranked the sixth and has a mean of 2.70,the seventh in ranking were provision of working tools and equipment, creating advancement and promotion opportunities and review of company policies with a mean of 2.65, provision of positive work environment was ranked the eighth with a mean of 2.55, reduced working hour is ranked the ninth with a mean of 2.50 and social interaction with workers which has a mean of 2.25 was ranked the tenth and the least ranking.

The statistical analyses from the research on the causes of employee turnover in the construction industry indicates that better job, absence of advancement and promotion opportunities and job satisfaction are the most effective causes of employee turnover in the construction industry. The results had also shown to us that reduced project performance, reduction in quality of work and difficulty in replacing old experienced workers are the key effects of employee turnover in the construction industry. Furthermore the leading factors that help in minimizing employee turnover according to the findings were and indicated as follows; Reward for dedicated workers, creating advancement and promotion opportunities and hiring competent and dedicated workers.

CONCLUSION

The research work studied employee turnover in the construction industry. Findings show that better job option, that is alternative employment opportunity also known as perceived ease of movement (perception of availability of job alternatives is the most significant factor that causes employee turnover, other serious factors to be put into consideration according to the research are absence of advancement and promotion opportunity and job satisfaction. The study also identifies the major effects of employee turnover in the construction industry in Kebbi state, the effect ranked first was reduced project performance followed by reduction in quality of work and difficulty in replacing old experienced workers. The research however identifies the main ways by which employee turnover in construction companies of Kebbi state can be minimized to the nearest minimum, the main factors as identified during the study are; reward for dedicated workers, creating advancement and promotion opportunities, hiring competent and dedicated workers.

[1]mohammedmarafa70@yahoo.com
[2]umarnagande.un@gmail.com
[3]dandehag101@yahoo.com

The factors that causes employee turnover in the construction industry were highlighted under some factors which include financial factors, management factors, organizational factors and personality factors. If continually ignored, employee turnover rate will be on the increase and job performance will be affected

Recommendations

It is important for construction companies to have an understanding of why employees would leave the organization and it is equally important to those factors that attract people to the organization. This research presents valuable possible ways that will help to minimize employee turnover in the construction industries of Kebbi state. It is expected that the under listed recommendations are made to enhance the minimization of employee turnover in the construction industries.

i. Employees who are hard working with the companies should be identified and rewarded for their hard work.
ii. Construction firms should create opportunities for advancement and promotion to the employees by giving them additional training and also allowing them to go for further studies.
iii. Construction companies should learn to recruit competent and dedicated workers and also train employees within the firm (internal recruitment)
iv. Employees should be given a proper treatment by their supervisors and positive working environment to be provided for the betterment of their work.

However, the study was able to assess the causes of employee turnover its effect and measures by which it can be minimized.

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[1]mohammedmarafa70@yahoo.com
[2]umarnagande.un@gmail.com
[3]dandehag101@yahoo.com

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[1]mohammedmarafa70@yahoo.com
[2]umarnagande.un@gmail.com
[3]dandehag101@yahoo.com

QUALITY CONTROL COMPLIANCE IN NIGERIAN BUILDING CONSTRUCTION INDUSTRY

Mansur, Y.I.[1] Abdulladhif, A. J.[2] and Ankomah, B. B.[3]

[1] *Department of Building Technology, Waziri Umaru Federal Polytechnic, Birnin Kebbi, Kebbi State, Nigeria*
[2] *Department of Quantity Surveying Waziri Umaru Federal Polytechnic, Birnin Kebbi, Kebbi State, Nigeria*
[3]*Department of Building Technology Cape Coast Polytechnic Ghana.*

ABSTRACT

Quality is regarded as the fulfillment of the expectations of the project participants, the two most important aspect of quality management are quality assurance and quality control. Quality control will tell whether the requirements are achieved or not, the primary function of quality control is to ensure that requirements are meet for each service or product. The cases of building collapse and building failure has indicated poor quality management practice within the study area. This research is aimed at establishing contractor's level of compliance with quality control provisions in Nigeria with the objectives of assessing the compliance and to identify the reason for non-compliance. The method used in collecting the data include the use of checklist prepared in form of questionnaires in Likert scale which were distributed to professionals i.e. project managers, site supervisor and site engineers of the construction firms within the study area and review of literature, while descriptive statistical analysis were adopted in the analysis of the data. The study established the level of quality control compliance to be 54.68%, which is slightly above half of the total compliance required, there is deficit of 45.32% to achieve the required expectation, the study also revealed that the reasons for non- compliance are; lack of established quality control performance record, lack of laboratories and testing equipment, inadequate time provided for quality control during construction and so on. Professionals, artisans and authorities are needed to ensure full compliance with quality control measures for client to get full value of their investment, quality product and safety for users. It helps to save lives, property, time and money.

INTRODUCTION

Quality is one of the critical success factors in or otherwise of construction project which is regarded as the fulfillment of expectation of project participants (Asokkumar, 2014). The most important aspects of quality are quality assurance and quality control. Quality assurance is a planned and systematic activity implemented within quality system and demonstrated as needed to provide adequate confidence that an entity will fulfill requirement for quality

[1]mansurgiris@gmail.com
[3]bengisaih@yahoo.com

Mansur, Y.I.[1] Abdulladhif, A. J.[2] and Ankomah, B. B.[3] (2016) Quality Control Compliance In Nigerian Building Construction Industry In: Mojekwu,J.N., Nani G., Atepor, L., Oppong, R.A.., Adetunji,M.O., Ogunsumi, L., Tetteh, U.S., Awere E., Ocran, S.P., and Bamfo-Agyei, E. (Eds) Procs 5th Applied Research Conference in Africa. (ARCA) Conference, 25-27 August 2016, Cape Coast, Ghana. 495-504

standard (Okereke, 2001). In recent years there have been several building collapses and different building failures of varying degrees in Nigeria; as a result many people lost their lives and properties. These things happened because contractors failed to go by quality standards. Building construction projects contribute significantly to the economy; standard of living and welfare of the citizens are therefore regarded as an issue of national interest. These incidences lead to the enactment of National Building Code in 2006, which is enforced by Nigerian Institute of Building (NIOB) and Council of registered Builders (CORBON) to ensure that all buildings comply with its provisions for quality building production. Quality control is an effective system for coordinating quality maintenance and quality improvements effort of the various groups in an organisation so as to enable production at the most economical level to allow for full customer satisfaction (Feigenbaum, 2004). Quality control is based on the inspection of services or work product.

The Nigerian construction industry has been struggling with quality issues for many years, even though a significant amount of budget is spent each year on infrastructure and other development projects (Abdulkareem, 2006).The building code is widely incorporated into contract documents for efficient project delivery, but the major problem is the compliance with the quality provisions of the code when it comes to actual building production. London survey for quality control has found that design and poor workmanship in construction processes combine to form 90% of the total failure events (Ashokkumar, 2014). Technical professional bodies and government agencies have not really focus on the quality of engineering or construction projects in such a way as to have statistical base on the state or status of their quality control implementation (Lawal, 2000).

This research is aimed at establishing contractor's level of compliance with quality control provisions in Nigeria with the objectives of assessing the compliance and to identify the reason for non-compliance. The research will establish the level of quality control compliance in construction projects within the study area to provide statistical base on the quality control implementation and it will also help participants to change their attitude on quality culture to invest the required time, cost and skills for successful implementation of quality control in building projects.

NIGERIAN CONSTRUCTION INDUSTRY

All over the world, the construction industry is continually growing. This industry is mostly concerned with development of civil engineering works and heavy infrastructural provisions (roads, bridges, railways, etc.), residential and commercial real estate and their maintenance therein. Thus, the continual growth can be explained by the dynamisms of development and the need to accommodate social and demographic changes that happen over time. Factors

[1]mansurgiris@gmail.com
[3]bengisaih@yahoo.com

such as migration and urbanization, a rising middle class with their demands for better living conditions (better houses, road networks) and societal needs for social infrastructure all combine to give the sector the fuel for growth (Sanni and Windapo, 2008). The construction sector has grown over the years, as a result of demands for real estate and housing and the provision of infrastructure to support an increasing population size, the need to open up communities to foster inter-state and inter-regional trade and movement.

The real GDP for the year 2010 was N54,612,264.18 in which the construction sector's share of 2.88% was N1,570,973.47. The construction sector grew by 21.30% to reach N1,905,574.90 in 2011. A slowdown in growth rate of the construction sector by 14.86% resulted in the sector closing at N2,188,718.59 in 2012, hence the share of construction to GDP that same year stood at 3.05%. Part of the reason for the increase in the contribution of the construction sector to GDP is the better capturing of all the economic activities in the construction sector. Prior to rebasing, construction data was mainly sourced from construction of buildings and construction of roads and railways activities. Now, construction activity has been broken down into 11 different activities, bringing the total for the construction sector to 13 (NBS, 2015).

Quality

Quality has become of the essential elements in recent years due to conceptual changes in construction industry. In any industry the product should be manufactured according to required standard which provide worth of money and satisfaction to the customers. Quality is nothing but the satisfaction of the customers with the performance, appearance and reliability of the project for the valuable cost range.

The international organisation for standardization (ISO DIS 9000:2000), formally defines quality as the degree to which a set of inherent characteristics fulfills the requirement. In a project scenario, quality can be defined as meeting the legal, aesthetic and functional requirement of a project (Berawi, 2006). In term of quality in the construction industry, Arditi and Gunaydin (1999) argue that a high quality building project should include a design that is easily understandable and applicable, with a high conformity of design with specifications, economy of construction, ease of operation, ease of maintenance and energy efficiency. Abdurrahman and Berawi (2002) argue that expectation of quality of construction projects would continue to grow rapidly as the number of effluents; educated and quality conscious customers are increasing, with globalisation of the economy, construction firms worldwide are actively engaged in achieving internationally acceptable quality levels to ensure their position in the emerging international market, especially those in developing economy. Thus

[1]mansurgiris@gmail.com
[3]bengisaih@yahoo.com

need to have proper system that ensures quality control is critical, coupled with high level of attention paid to quality management in the construction industry (Hiyasat, 2000).

Nigerian National Building Code 2006

National Building Code NBC is a body of laws, regulations, signals, symbols and statutes for the initiated (professionals) in the Construction Industry in Nigeria (Ogunbiyi, 2014).Until 2006, Nigeria was without uniform regulations, guidelines and standard for the design, construction and operation/maintenance of buildings. This manifested in a range of deplorable state of affairs in the building construction industry and built environment.(Mbamali and Okotie, 2012).

According to the National Building code NBC (2006), the need for a building code is premised on the following reasons:

1. The absence of planning of our towns and cities,
2. Incessant collapse of buildings, fire infernos, built environment abuse and other disasters,
3. Dearth of referenced design standards for professionals,
4. Use of untested products and materials,
5. Lack of adequate regulations and sanctions against offenders.

There have been raging questions among professionals on the issue of whether the code as approved, is a law or until it is promulgated by the National Assembly of the Federation before it becomes a law. Referring to the earlier meaning given in this paper to a code, the fact that the code has been signed by both the National Council of States and the National Executive Council (the highest executive arm of government in the land), it can, therefore, be deduced that, the National Building Code (NBC, 2006) is a body of laws that need no further signing by the National Assembly to be enforced, and binding in Nigeria.

Quality Management.

Quality is one of the aims of standardization. The quality of a product or a complete building or other constructions is the totality of its attributes that enable it to perform a stated task or to fulfill a given need satisfactorily for an acceptable period of time. For a building and civil engineering work, a satisfactory product, although essential in itself, is not on its own sufficient. It must be incorporated in the design and construction in a correct manner. In buildings, more defects and failures arise from inadequacies in the treatment of products in design and construction than from shortcomings in the products themselves (Atkinson, 2005). In their work, Harris, McCaffer and Edum-Fotwe, (2006) stated that Quality Management has seen a transition from reacting to the outcome of site production activities to becoming a strategic business function accounting for the raison d'être of construction companies. Unless

[1]mansurgiris@gmail.com
[3]bengisaih@yahoo.com

a construction company can guarantee its clients a quality product, it cannot compete effectively in the modern construction market.

Quality Control

Quality control involves the examination of a product, service, or process for certain minimum levels of quality (Feignbaum, 2008).

Quality Control (QC) in construction is the process of verifying that the project is built to plan, that the tolerances allowable by industry standard and engineering practices have been met or bettered, and that the finished project (and all phases to get there) meet with the quality standards of the architect, engineer, owner, and general contractor (Standen, 1995).In order to achieve this purpose, processes are monitored and performance problem are solved. Thus quality control is a system for verifying and maintaining a desired level of quality in an existing product or service, by careful planning, used of proper equipment continued inspection and corrective action as required. The inspector, engineer, contractor, funding agency, permit agency, and system personnel must work together to inspect, document, and correct deficiencies (Chung Hu, 1999). The major aim of this inspectoral system of quality control is to identify the mistakes after the product has been produce. (MCPD, 2014).

Setting and management of process quality control points

The principle of setting quality control points includes: (MCPD, 2014)

1 The important and key construction process and parts.
2 The construction process and parts without assured quality.
3 The construction position and parts with hard condition and technological difficulty
4 The construction projects and contents with strict requirements of quality standards or precision.
5 The construction process and parts influencing the quality or safety of subsequent construction.

RESEARCH METHOD

A survey of expert opinion on QC compliance was conducted. A well-structured questionnaire was designed and administered to project managers, site supervisors and site engineers in construction firms in Kebbi State, Nigeria. A total of one hundred and seven (107) questionnaires were distributed out of which eighty six (86) representing 80% were properly completed and returned. The questionnaire was designed into two major parts; the part one (1) is QC checklist on construction of foundation in building and part two: reasons for non-compliance with QC provisions. A comprehensive QC checklist for construction of foundation was extracted from the Nigerian National Building Code 2006, in form of questionnaire rated on five point Likert scale. This scale provides a range of responses to a

[1]mansurgiris@gmail.com
[3]bengisaih@yahoo.com

given question and was set out as 1 = No compliance; 2=Very low compliance; 3 = Low compliance; 4 = Medium compliance; 5 = High compliance. The basis for doing this was to identify the level of compliance with each QC measure in the checklist by the respondents. Section two (2) required respondents to answer by ticking a "yes or no" for a number of reasons for non-compliance QC standard obtained from literature.

Population

The population for this research was made up of Project managers, Site supervisors and Site engineers in building construction firms within the Kebbi state who are registered with KSTB. According to KSTB (2016) there are 38 construction companies duly registered and are currently working in the State. In the course of this research, 36 Project managers, 54 Site engineers and 24 Site supervisors were identified making total of 114 respondents.

Sample Size

The sample size was calculated mathematically to give a more precise sample for the research. The risk level selected by a sample will not show the true value of the population even if the sample is reduced for confidence levels of 99% and increased for a lower confidence level of 90% or lower (Babbie, 2007). Therefore, a level of 95% was thus chosen for the survey. With a confidence level of 95%, the sample, n was calculated using Israel and Glenn (2009) formula as follows:

$$n = \frac{N}{1+N(e)^2}$$

Given that N = 114 and e = 0.05 for a confidence level of 95%
n= 114 / 1 + (114) $(0.05)^2$ = 114 / 1.285 = 88.79, approximated to 89.

Adding 20% to compensate for non-responses and non-returns, i.e. 20% of 89 = 17.8 approximates to 18 questionnaires added for non-responses. Adding 18 to 89 gives 107, therefore the researcher distributed a total of 107 questionnaires of which 86 were returned filled. This constitutes a return rate of 80% of the questionnaires that were distributed.

Method of Data Analysis

The data analysis tool used was the Statistical Package for the Social Sciences (SPSS version 1.6).In this research, the ordinal scale of data (Likert-Scale) was weighted where No compliance = 0, Very low compliance = 1, Low compliance = 2, Medium compliance = 3,High compliance = 4. Section two is "yes" or "no" as for the reasons for non-compliance.

Descriptive statistics such as frequencies, percentages, means and standard deviations were used to analyze the data. Also non-parametric test in ANOVA using Kruskal Wallis P-value

[1]mansurgiris@gmail.com
[3]bengisaih@yahoo.com

to test the statistical relationship between the responses of the three categories of data obtained in the questionnaire survey, for using Likert scale to obtained numerical data.

ANALYSIS OF THE LEVEL OF COMPLIANCE WITH QUALITY CONTROL MEASURES.

Table 1: Overall Level of Quality Control Compliance
Source: Field survey, 2016.

Designation of the respondent.	Number	Mean	Std. Deviation	Level of compliance (%)	P-Value
Project manager	27	2.50	0.75	62.54	0.000
Site engineer	39	2.00	0.31	50.02	
Site supervisor	20	2.13	0.27	53.15	
Total	86	2.19	0.53	54.68	

Table 4.1 presents the level of compliance of each category of respondents. Project managers had a mean compliance of 2.50 out of 4.00, with standard deviation of 0.75 and percentage compliance of 62.54% which is the highest level of compliance among the three categories of the respondents. This was followed by site supervisors with a mean compliance of 2.13 out of 4.00, and a standard deviation of 0.27 and percentage compliance of 53.15%. The mean compliance of site engineers was 2.00 out of 4.00, with a standard deviation of 0.31 and percentage compliance of 50.02 %. This was the least among the three categories of the respondents. The P-test value of 0.000 which is less than 0.05 shows statistically that there is higher significant difference between the responses of these three categories of the respondents. The overall mean compliance for all categories was 2.19 out of 4.00, with a mean standard deviation of 0.53. The overall level of quality control compliance is 54.68 % which is slightly above half or 50% of the requirement or expectation of 100%.

The level of compliance of various sub-sections were identified which enabled the researcher to examine the areas of different levels of compliance i.e. below or above the average. It can be deduced that quality control compliance in materials testing has the highest percentage of overall compliance of 89.49%, followed by block work with the overall percentage compliance of 55.16% which is slightly above 50% of the required or expected compliance.

[1]mansurgiris@gmail.com
[3]bengisaih@yahoo.com

The other five sub-sections i.e. setting-out and trenches, concrete production process, reinforcement works, hardcore filling and services were all below 50% with services having the least overall quality control compliance of 38.37% which is far below average.

Reasons for non- compliance to quality control measures.

Among the reasons for non-compliance in the questionnaire accepted by the majority of the respondents with higher percentage agreements are;

- Lack of established quality performance record of previous projects.
- Lack of laboratories and testing equipment.
- Poor communication among the professionals.
- Inadequate time provided for quality control during the construction.
- Lack of awareness on of quality control.
- Poor project coordination.
- Misinterpretation of drawings and specifications.

Other factors like absence of quality control enforcement, poor planning by both clients and contractors, delay in payments by the clients and limitation to construction methodology majority of the respondent believed that they are not among the reasons for non-compliance with the quality control measures by the majority of the respondents with high percentage of disagreement ranges from 51.2% to 69.8%.

CONCLUSION

The study established the level of quality control to be 55 % based on the subjective judgment of the professionals who are responsible for the implementation of quality control during construction. Material testing and specification was found to be more compliant with the highest percentage of 89.49. Quality compliance for services had the least compliance of 38.37%.

It was revealed that the major reasons for non-compliance with quality control measures are: Lack of established quality performance record for previous projects, lack of laboratories testing equipment, poor communication among the professionals, inadequate time provided for quality control during construction, lack of awareness on quality control, poor coordination of projects, misinterpretation of drawing and specification, lack of effective supervision and verification on site.

In the view of the above findings; the professionals in the construction industry should establish record of the quality performance of all building projects within the study area. If there is established data for quality performance it will help to improve quality control compliance. All professionals the in the building industry should ensure 100% quality control compliance in their respective profession; Architects should ensure quality control

[1]mansurgiris@gmail.com
[3]bengisaih@yahoo.com

compliance in all architectural drawings, structural engineer should ensure full quality control compliance in structural designs, the project manager though site engineer, clerk of works and foremen should ensure 100% quality control compliance in every aspect of building project, these will obviously improve quality control compliance in construction industry. Government should establish adequate laboratories for testing and verification during construction process and ensure enforcement of quality control compliance in the industry and private building, to ensure adequate protection and safety of users. Due effort has to be made to verify every aspect of work process and through practical checks, audits, inspections and witnessing. The authorities concerned and other quality regulatory bodies in the construction industry should be more involved in the quality control programme, monitoring, evaluation and enforcement to improve on the level of quality control compliance. The checklist, which could be generic or project specific, has to define the format for the inspection as well as indicate the type and the scope of items to be covered and suggest the out-come expected, these will help in full quality control compliance during the construction.

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[1]mansurgiris@gmail.com

[3]bengisaih@yahoo.com

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[1]mansurgiris@gmail.com

[3]bengisaih@yahoo.com

BARRIERS TO WOMEN AS PROFESSIONALS IN THE NIGERIAN CONSTRUCTION INDUSTRY: A CASE STUDY OF SOKOTO STATE

Idris, M.Y.[1], and Bamfo-Agyei, E.[2]

[1]*Department of Building Technology, The Polytechnic of Sokoto, Sokoto State, Nigeria*
[2]*Department of Building Technology, Cape Coast Polytechnic, Cape Coast, Ghana.*

ABSTRACT
Despite the fact that women possess the required knowledge, skills, competencies, training and experiences to perform effectively and efficiently in construction industry, they experience entry and career advancement barriers. The study found that women have a role to play in the construction industry and that they can build successful careers within the sector. This research is for Barrier of women as professionals in construction industry (Sokoto State, Nigeria). Data were obtained through structured questionnaire distributed to workers of selected construction companies and some students from polytechnic. The research adopted the use of a questionnaire. A total of 155 questionnaires were distributed, and 135 (87.1%) were returned and used in the analysis. Data was encoded into SPSS and analysed using Descriptive statistical analysis. The findings reveal that some of the barriers mentioned in the literature against women career advancement in construction are prevalent in Nigeria, except the existence of equality in respect of male and female in terms of employment and career development opportunity. Also, low women participation in Nigerian construction industry begins in choosing course, education and continues throughout recruitment process. The aim is to encourage women's participation in construction industry and employers to tackle the industry's environmental issues by introducing flexible work hour, reducing workload and making the works less tedious and stressful. Also, use of foul languages, harassment of women should be eradicated and continuous supports to balance and family responsibilities should be given.

Keywords: *Barriers, Women, Professional, Nigerian, and Construction*

INTRODUCTION
Construction industry is considered the world's largest industrial employer of employees. This means that construction is a vital contributor to global development through the proviso of jobs Confederation of International Constructor's Association (CICA, 2002). The Nigerian building industry is typically a male dominated and present a major challenge for equal opportunities for women. The Nigerian building industry sector has a particularly low

[1]ykbidirs8390@gmail.com
[2]kwamenabamfoagyei@gmail.com

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participation rate for women, both in industry and academia. This means constructions is found difficult in joining for women and are confronted by a significant numbers of barriers in the field of constructions.
Thus the lack of women in building industry has been a concern for many years now. The studies in these areas have been invaluable in pinpointing the factors militating against the participation of more women in the construction workplace and in particular, the recruitment into the building professions, there are many studies discussing the reason why female workers shy away from the building as whole and the craft in particular (Wangle, 2009; Whittock, 2002; Fielden et al, 2002).

Women in Nigeria lag behind men in most indicators of socio-economic development. They comprise the largest share of the poor, unemployed, and marginalized. The enrolment in primary education overall is 58% girls and 64% boys. For secondary education it is 22% girls and 29% boys. In the Northern Nigeria, only 4% of females who complete secondary school manage to receive tertiary education. The disparity in gender equality is more pronounced in the North, where over half of all women are married by age 16 and are expected to have a child within the 1st year of marriage. Girls have limited access to the types of vocational training and skills acquisition that could improve their access to economic assets and overall financial security. (National Bureau of Statistics, 2010).

This study investigated the barriers faced by women in professional practice in the Nigerian construction industry. Responsibility to the family from objective one, Creating the sense of being inferior in the industry from objective two and to challenge the perception that construction is for Men is third objective.

THE BARRIER TO WOMEN IN CONSTRUCTION INDUSTRY

Women account for 49% of the Nigerian population (National Bureau of Statistics, 2010). Kolawole and Boison (1999) Adeyemi et al. (2006) have observed that it is a cause for concern that this large human resource is not being fully utilized, in particular by the construction industry. They observed that the construction industry is very important because it makes a significant contribution to the socioeconomic development process through its significant contribution to the Gross Domestic Product. They concluded that there is a need to encourage more women to pursue construction by encouraging girls in secondary school to take science subjects and by introducing initiatives where female students are exposed to the benefits of working in the construction industry.
Ghana government's current policies on education promote equal educational opportunities in non-traditional women's programmes like Building Technology and Architecture, available information indicates that universities in Ghana still display higher numbers of enrolment for

[1]ykbidirs8390@gmail.com
[2]kwamenabamfoagyei@gmail.com

men than women in most disciplines (Anamuah, 2007 & Obu, 1997). This discrepancy in the education of men and women in Ghana was inherited from colonialism (Baryeh, et al 2009). Also a study was conducted on Gender Parity index (GP1) in terms of the ratio of males to females' enrolled in the engineering disciplines over the last ten years at Cape Coast Polytechnic to determine the proportion of females enrolled in engineering education over the last ten years at the School or Engineering of Cape Coast Polytechnic, and identify the challenges of female enrolment into the programmes. Gender disparities become more prevalent at higher levels of education, with greater variances among female students in the School of Engineering; most employers perceived women's reproductive role and responsibilities in the family as a constraint on productivity and an influential factor in deciding the employment of women in the construction industry; socio-cultural practices, norms and societal attitude that tend to discourage women from engaging in wage employment and some occupation such as construction, welding, auto-mechanics (Bamfo-Agyei and Atepor, 2015). The above situation, which is similar to what pertains in other construction related departments in tertiary institutions in Ghana, contributes to the reason why women remain seriously under-represented in the construction industry which has been regarded traditionally as stereotypically 'male' occupations. Mutandwa (2008) observed that whilst women may be entering the workforce in increasing numbers, female workers remain concentrated in certain occupational sectors such as education, health and service sectors, notably banking, insurance and the retail trade. Data from Ghana Statistical Service (2010) indicated that the ratio of female to male employees in the construction industry is 1:25, indicating low female entry and retention.The generally accepted and popular image of construction is that of a male-dominated industry requiring brute strength and tolerance for outdoor conditions, inclement weather and bad language (Fielden et al., 1999). Women, therefore, have three choices, namely to be successful by behaving like men, fail to adapt to the culture and leave, or by not acting like men to remain in unimportant positions (Bennett, et al. 1996; Sachs, et al. 1992). According to Agapiou (2002), the image and perception of an industry were significant factors in determining career choice in their study. Furthermore the construction industry is perceived as being the epitome of crisis, conflict and masculinity manifesting in the unsociable, confrontational behavior that discourages women and ethnic minorities from considering construction as a meaningful career. The industry had an industry-wide problem with 'image', which made both men and women reluctant or uninterested in the industry (Gale, 1994). Haupt and Smallwood, (2005) in their study found South African students had very limited knowledge and understanding of the construction industry.

[1]ykbidirs8390@gmail.com
[2]kwamenabamfoagyei@gmail.com

RESEARCH METHOD

The researcher employed a survey research method which involved the use of only questionnaire in collecting quantitative data. The Questionnaires is of two category, the first is for Professional in the Building construction industry and the second one is for the students that is undergoing a programme on Environmental Studies in the State Polytechnic.

The study used purposive sampling and random sampling approach. Purposive sampling was used to select the key professional. This was to ensure that the right respondents with the relevant knowledge, experience and in-depth appreciation of barrier to women as professionals in the building industry. However a total number of 235 professional from the construction firms and 25 currents female students from Polytechnic which are undergoing various Environmental studies programme. The Professionals comprises, Quantity Surveyors, Architects, Builders and Engineers.

A sample is a subset selected from the population to obtain a fair representation. Ghyoot (1994) gives a useful guide lines in which gives recommended sample sizes for general research activities, applicable to any defined population. In the table, "N" denotes the size of the population to be sampled, while, "S" denotes the recommended sample size. From the table, the recommended sample size for a population (universe) of 100 is 80, for 1000 it is 278, for 10,000 it is 370 and for 1,000,000 it is 384. The rule of thumb that one obtains diminishing returns when sample size increases beyond about 300 appears to apply.

According to the Extract from Ghyoot (1994) Table, the population of **260** has a sample of **155** which is the sample of this research.

RESULTS AND DISCUSSION

Level of Barriers for low participation of women in Building Industry by Profession

Barriers	Builder			Architect			Quantity Surveyor			Engineer		
	Mean	SD	Rank	Mean	SD	Rank	Mean	SD	Rank	Mean	SD	Rank
Inadequate job security in the private sector compare to Government job	2.06	0.24	**9th**	2.06	0.50	**10th**	2.26	0.55	**7th**	2.25	0.96	**1st**
Work/Fatigue	1.88	0.60	**11th**	2.19	0.47	**8th**	2.35	0.52	**5th**	1.50	1.00	**2nd**
Inadequate payment	2.29	0.77	**4th**	2.28	0.68	**7th**	2.21	0.77	**9th**	2.25	0.96	**1st**

[1]ykbidirs8390@gmail.com
[2]kwamenabamfoagyei@gmail.com

Male dominance of the industry	2.35	0.70	**3rd**	2.38	0.49	**4th**	2.37	0.56	**4th**	2.25	0.96	**1st**
Challenging work environment	2.24	0.44	**5th**	2.31	0.47	**6th**	2.39	0.53	**3rd**	1.50	1.00	**2nd**
Responsibility to family	2.53	0.51	**1st**	2.47	0.51	**2nd**	2.46	0.54	**1st**	2.25	0.96	**1**
The masculine and unattractive image of the building industry	1.94	0.83	**10th**	2.03	0.65	**11th**	1.95	0.77	**12th**	1.50	1.00	**2nd**
Unsecure working environment	2.24	0.75	**6th**	2.34	0.65	**5th**	2.30	0.50	**6th**	1.50	1.00	**2nd**
Inflexible working hours	2.47	0.72	**2th**	2.38	0.55	**4th**	2.40	0.56	**2nd**	2.25	1.50	**1st**
Sexual harassment	2.18	0.95	**7th**	2.28	0.52	**7th**	2.07	0.62	**11th**	1.25	1.26	**3rd**
The dangerous working nature of the working place	2.12	0.99	**8th**	2.28	0.63	**7th**	2.19	0.69	**10th**	1.00	0.82	**4th**
Poor safety and Risk	1.59	0.94	**12th**	2.00	0.76	**12th**	1.95	0.67	**12th**	1.00	0.82	**4th**
Lack of understanding of career opportunity in construction	2.06	1.03	**9th**	2.50	0.51	**1st**	2.35	0.58	**5th**	2.25	0.96	**1st**
Bad societal perception	2.53	0.62	**1st**	2.41	0.50	**3rd**	2.23	0.57	**8th**	0.75	0.96	**5th**
Stressful and demanding nature of work	2.18	0.53	**7th**	2.38	0.55	**4th**	2.21	0.56	**9th**	1.50	1.00	**4th**

Source: (Field survey, 2016)

[1]ykbidirs8390@gmail.com
[2]kwamenabamfoagyei@gmail.com

Factors that influence career choice of women in the building industry

Variables	N Agreement	% Agreement	Mean	Standard Deviation	Rank
Opportunity in the industry	22	88.0	3.04	0.62	**7th**
Peer group influence	23	92.0	3.13	0.45	**5th**
Fascinated by beauty of building	24	96.0	3.16	0.62	**4th**
Increase female role model	23	92.0	3.08	0.58	**6th**
Giving career guidance	23	92.0	3.04	0.61	**7th**
To challenge the perception that construction is for male	25	100.0	3.28	0.46	**1st**
Successful women in building industry	21	84.0	3.00	0.51	**8th**
Increasing access to construction higher education	18	72.0	2.88	0.67	**9th**
Proper image and culture of the industry	24	96.0	3.29	0.46	**2nd**
Practical assistance such as career break scheme and after school care	1	4.0	1.79	0.51	**12th**
Paid the same rates of pay (wages and salary) as males	23	92.0	3.17	0.48	**3rd**
Equal advancement and promotion opportunities	3	12.0	2.04	0.61	**10th**
Same right, benefits and opportunities as males	24	96.0	3.16	0.47	**4th**
Separate Toilet and Office facilities provided	0	0.0	1.75	0.44	**13th**
Provision of gender-based educational material	0	0.0	1.83	0.38	**11th**

Source: (Field survey, 2016)

Factors that lead to low participation of women in Building Industry

Table 1 also focuses on the challenges on low participation of women into the building industry according to responses of some professional in the building industry e.g. Architect, Builder, Quantity Surveyor and Engineer. It was shown in table 2 that, characteristic of the respondents on profession are that of Quantity Surveyors is having highest percentage of 51.8% and it was equally reflected in the table 1. The QS has the highest opinion on responsibility to the family with Means and SD of 2.46 and 0.54 respectively are most challenging factors for women participation in building industry and this is supported by

[1]ykbidirs8390@gmail.com
[2]kwamenabamfoagyei@gmail.com

(Fielden et al 2000) that construction industry fails to appreciate some of the issues associated with work and family commitments and organisations tend to treat family and work completely separate. Builders and Engineers are in the same opinion with Quantity Surveyors that Responsibility to family is most challenging factor. The next challenging factors is Bad societal perception having the Means of 2.23 and SD of 0.57 which indicated by Builders as most challenging nature of low participation of women in the building industry. It is evidently proved that Women may seek out only social acceptable employment they may stay away from the job that they think may result in negative feedback and harassment from the family members. (Moccio, 2006). The next or the least challenging factor in this table is poor safety and risk which is on the Means of 1.00 and SD of 0.82 are all agreed by all profession in the table to be the least factor.

Factors that influence career choice of women in the building industry.

Table 2 has fifteen variables that talk about Factors that influence career choice of women into building industry which you either agree with the statements or not agree and it has been rank according to statistical tools analysis.

To challenge the perception that construction is for Men is the highest variable with 3.28 Means and 0.46 SD in the table. Despite the fact that admission to Nigerian higher institutions to study project/construction management related courses (such as civil engineering, building technology, quantity surveying, architecture, land surveying, project management, estate management) is not gender bias but practically, the core courses and training provided by institutions, training organizations and employers create a whole host of problems for women arising from the male-dominated environment and masculine culture.(Gale, 1994).

Increases female role model is another factor that influences career choice into the building industry. It has been rank in the Means of 3.16 and 0.62 SD in the table. This has been confirmed that, it is widely acknowledged that the lack of visible women role models in the skilled trades perpetuates gender stereotypes related to the place of women in construction. To recruit more women to the skilled trades, that the female role models be increased in schools by hiring women in industrial arts programs, and creating opportunities for women in the trades to be part of the school environment. Trades Certification Commission (2007).

Peer group influence is another factor which respondents identify as one of the key factor that influence female chooses building construction as profession. This factor has the Means of 3.13 with Standard Deviation of 0.45 in the table. 'A' level students and undergraduates, with regard to professional activities such as engineering and architecture, the status of the industry as a career opportunity does not compare favorably with other options. This is

[1]ykbidirs8390@gmail.com
[2]kwamenabamfoagyei@gmail.com

mainly because the girls' career choices, and in particular their encouragement to enter non-traditional occupations, is strongly influenced by their family, friends and teachers (Agapiou, 2002).

Summary of Finding

To gain a complete and more balanced view of the barriers women face, this study investigated the barriers faced by women in professional practice in the Nigerian construction industry. Responsibility to the family from objective one, Creating the sense of being inferior in the industry from objective two and to challenge the perception that construction is for Men is third objective. The findings suggest that the barriers that women face in the construction industry are globally similar. The uniqueness of the traditional and patriarchal system, which exists in Africa, exacerbates these barriers. Additionally, the cultural and religious dimensions also introduce a challenge that does not exist in some part of Nigeria. The women emphasized on the need to learn to balance work and family responsibilities, noting that this is more difficult in the early stages of career development and that it becomes easier to manage over time. It is also important for women to participate in professional bodies, develop further in areas of specialisation and seek mentors/role models who can educate them on the best career options available for them in the industry.

CONCLUSION

This research found that some of the barriers evidence in the literature against women career advancement in construction is prevalent in the developing economy of Nigeria. However, the existence of equality in the respect of male and female in terms of employment requirements and career development opportunity seen to be exception. The barriers against women participation in construction industry have their roots in choice of course of education and blossom throughout recruitment and career progression. Based on the findings, to encourage women participation in construction, the male-only image of the industry should be de-emphasized and equal gender image should be focus so as to attract and retain talented women. The gender bias education, training and recruitment exercise should be improved by genuine provision of adequate career guidance toward construction related occupation and seeking women job opportunities. Also, the industry should improve the environmental factors by introducing flexible work hours, reducing work load and making the work less tedious and stressful. The construction companies should have policies that respect the dignity of women by discouraging the use of foul languages and harassment and continually support them to balance work and family responsibilities.

Recommendation

1. It is recommended that the female members of professional bodies organise seminars

[1]ykbidirs8390@gmail.com
[2]kwamenabamfoagyei@gmail.com

and workshops to be delivered yearly at all institutions addressing construction related disciplines.

2. Dressing: There is a need to provide dress which is in line with the Religion and culture of the environment as appropriately for such functions as site visits.
3. There is need to address adverse effects on careers of women as professional in the building industry so that they do not abandon their careers because of motherhood and to preserve family values, construction employers should consider the establishment of child day care centers close to the works sites.

4. Postgraduate scholarships scheme should be made available to women building graduates for furtherance of their education.

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[1]ykbidirs8390@gmail.com

[2]kwamenabamfoagyei@gmail.com

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[1]ykbidirs8390@gmail.com
[2]kwamenabamfoagyei@gmail.com

AN INTEGRATED FRAMEWORK FOR THE IMPLEMENTATION OF SUSTAINABLE ROAD INFRASTRUCTURE PROJECTS IN DEVELOPING COUNTRIES

Ametepey, S. A.[1] and Aigbavboa, C.O.[2]

[1]*PhD Candidate, Department of Civil Engineering, University of Johannesburg, Doornfontein Campus, Johannesburg, South Africa*
[2]*Associate Professor, Department of Construction Management & Quantity Surveying, University of Johannesburg, Doornfontein Campus, Johannesburg, South Africa*

ABSTRACT

With recent unprecedented environmental deterioration becoming more adverse worldwide, discussions by the international community for establishing an appropriate response policy against this menace has become more urgent. This has led the world to focus on a new sustainable development agenda tagged – Sustainable Development Goals (SDGs). A significant section of the SDGs focuses on sustainable infrastructure development. Therefore, the road infrastructure sector cannot be left out of the sustainability agenda since it forms a significant part of infrastructure development. Though there are a few sustainability interventions in road infrastructure development, they are limited and unclear. Therefore, the purpose of this research is to develop an integrated framework to guide the implementation of sustainable road infrastructure projects in developing countries. The study will adopt a mixed method approach. Face-to-face interviews on selected representatives of key stakeholders will be carried out to select and classify, confirm and prioritize a list of sustainability performance targets that will be identified through literature and past research. A Delphi technique through questionnaire survey will be used to explore the extent to which the sustainability criteria and indicators impact or influence on Sustainable road infrastructure project implementation in developing countries. Through the identification and integration of different perceptions and priority needs of the stakeholders, as well as key sustainability indicators and solutions for critical issues, a set of decision-making guidelines will be developed to promote and drive consistent sustainability deliverables in road infrastructure projects. The study is expected to provide an innovative and practical framework which will aid road infrastructure development stakeholders in the implementation of Sustainable Road Infrastructure projects.

Keywords: *Developing Countries; Infrastructure Development; Road Infrastructure; Sustainable Development;*

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

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INTRODUCTION

With recent unprecedented environmental deterioration becoming more adverse worldwide, discussions by the international community for establishing an appropriate response policy against this menace has become more urgent. This has led the world to focus on a new sustainable development (SD) agenda tagged – Sustainable Development Goals (SDGs). Following the UN conference on Sustainable Development (Rio + 20), in June 2012, UN member states have been working to create the SDGs. These goals were launched finally at the UN summit in New York in September, 2015. The purpose of the SDGs is to form the blueprint for development policy and funding for the next 15 years. The SDGs are made up of 17 goals that seek to address the most pressing sustainability challenges facing the world by 2030. Seven (7) out of the 17 newly developed SDGs focuses directly and indirectly on sustainable infrastructure development.

The developing world contributes less in terms of the total world's environmental destruction. For example, carbon emissions seems very low, especially compared to advanced nations like China and the USA who contributes 20.2% and 19.1%, respectively (Baer et al, 2007). However, developing countries are still developing and striving to soothe its domestic poverty with almost half of their population still under the official poverty line. The released UN publication: "Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication" and the SDGs elaborates on the participation of developing countries in contributing to these mitigation options. The UN documents on SD above takes note of the greater responsibility of industrialized countries to that of developing countries in protecting the environment, as they are putting much larger strain on natural resources and the environment.

High income countries consist of one sixth of the world population, but is responsible for two thirds of the world's GHG (Green House Gas) emissions into the atmosphere, but it is developing countries that will suffer the most from the effects of weather extremes (World Bank, 2010). These indicators question developing countries responsibility with regard to SD. Because of this, the crux of SD is questioned - which should come first, growth or green development? However, recent studies raise critical questions about the mutual exclusivity of ecological sustainability and poverty alleviation. The aforementioned issues and further work of Burgess et al (1997), also highlights this point by addressing social consequences and poverty eradication within the framework of sustainability. Extensive international literature elaborates on the need and importance of sustainability, but as reported by Swilling (2006), various social movements within the developed countries are also evident and contribute to the current greening of national policies. The further pressure received from international stakeholders also promotes this issue.

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

On the above-mentioned issues, the question of whether SD is applicable should not be asked, but if the industry is equipped to implement SD. Within this questioning framework it is highlighted that, globally, the transportation sector is estimated to contribute to about 25% of carbon dioxide (CO2) emissions while as part of this sector, road transport contributes 80% (World Resources Institute, 2007).

Because of the said reasons and the new agenda for SD, every engineering discipline and sectors of society have to play a role to achieve the global position of being sustainable (Jarmin, 2008). Therefore, it becomes evident that within the sphere of civil engineering projects, regardless of their size, their design, build, operation, maintenance, and removal consider sustainability throughout its whole life cycle equally to be compliant to the said agenda. Indeed, it is foreseeable policies such as sustainable procurement, sustainability monitoring, and sustainability reporting using relevant criteria become increasingly stipulated by clients and key stakeholders (or may become mandatory within the near future) for the respective industries to win work and/or remain competitive (Oltean-Dumbrava, Watts, & Miah, 2014).

Dependable and safe road transport systems are central for sustainable economic development, which assists in poverty reduction, shared prosperity and a desirable quality of life in developing countries (Montgomery, Schirmer, & Hirsch, 2014). A significant section of the SDGs focuses on sustainable infrastructure development (SID). One of the targets of the SDGs is that by 2030, all countries should provide access to safe, affordable, accessible and sustainable transport systems including infrastructure for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons. Therefore, the road infrastructure sector cannot be left out of the sustainability agenda since it forms a significant part of infrastructure development. Besides, the various professionals in the transportation sector such as planners, engineers and environmental scientists worldwide recognize that roadway systems need to be more sustainable in light of finite natural resources, sensitive environmental conditions and limited economic resources (Montgomery, Schirmer, & Hirsch, 2014). Sustainability is not just environmental considerations associated with energy conservation and alternative energy generation; it is the inseparable integration of the environmental, community/society, economic and other attributes that need to be managed at the project level to be effective and successful.

There are significant benefits associated with sustainable road infrastructure projects (SRIP) including improved cost effectiveness, reduced material consumption, improved community quality of life, increased protection of finite environmental resources and improved

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

consideration of a life cycle approach (Greenroads, 2011). Other potential related benefits can be enhanced innovation and improved knowledge transfer and capacity building. These, in turn, provide results to support an entity (e.g., transport agency) by developing or demonstrating implementation of its sustainability goals and policy/programs. One approach to help promote SRIP has been an effort to develop comprehensive sustainability rating systems for transportation infrastructure systems (e.g., Envision, CEEQUAL, INVEST, Green Roads, GreenLITES, etc.). However, embedding sustainability principles and best practices into road infrastructure projects in the developing world has been a challenge due to many unique aspects including changing or varying degrees of commitment and limited financial resources (Montgomery, Schirmer, & Hirsch, 2014). In addition, there is often a lack of understanding about sustainability concepts, how to address them given the regional specific characteristics or the lack of availability of more sustainable based products and technologies in these countries.

To implement SRIPs successfully, there is the need to identify the suitable criteria and indicators. According to Lim (2009), to measure sustainability of road infrastructure projects, criteria and indicators that can represent the sustainability of a development process are required. The sustainability criteria and indicators are also useful for monitoring and measuring the state of the environment by considering a manageable number of variables or characteristics (McLaren &Simonovic, 1999).

With the launch of the SDGs, it is incumbent on all sectors especially the built environment to play a critical role to achieve the global position of being sustainable. Therefore, the main motivation for this research stems for the need to achieve SID as targeted by the SDGs. Besides, since research on SRIP implementation in developing countries is rare, the study hopes to fill the gap in this area. Therefore, the inspiration behind this research is to determine how SRIPs could be implemented in developing countries.

This paper presents a proposed PhD research to develop an integrated framework for the implementation of sustainable road infrastructure projects in developing countries. The problem and the gap the research seek to address is discussed as well as the significance of the study. The varied conceptual interpretation of sustainable road infrastructure development as well as the various frameworks, criteria and indicators are also presented. The proposed methodology to conduct the research as well as its envisaged outcome is also discussed.

Problem Statement

Stakeholders (both private and public sectors), are under pressure to look for economically feasible, socially viable and environmentally accountable project outcomes or processes that

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

will bring about sustainable road infrastructure development (SRID). This will require not only the adoption of sustainability principles during project conception, design and planning, and innovative use of technologies and products during construction, but also to evaluate results and to consider accountability during project delivery.

Even though, in an ideal sense, the principles of sustainability should drive infrastructure development, many stakeholders are involved in the process and this seems to complicate the matter. At any given road infrastructure development project, stakeholders have their own concerns, priorities and interests, resulting in different expectations in the project delivery. The professionals similarly face the task of understanding and deciphering strategic sustainability objectives into real action at project-specific levels (Ugwu & Haupt, 2007). This is extra hampered by different vested interests of project stakeholders and the multi-dimensional outlooks of sustainability, combined with a lack of well-thought-out decision-making method and information at various categorized levels in road infrastructure project development.

In addition, there is a lack of integrated research where different parties in the road infrastructure industry address each issue individually and independently of other issues to which it is linked (CIB and United Nations Environment Programme - International Environmental Technology Centre, 2002). Many of the efforts of past research and development, often seen as the vision provider for the industry, contemplated technical innovation on isolated issues that were applicable only within certain localities and concerned with immediate outcomes (Yang et al., 2005). This has resulted in gaps in SRID such as the gap caused by a failure to identify common priorities.

Decision-making for SRID, therefore, requires new approaches that can integrate and synthesise all the dimensions and different point of views, in an all-inclusive manner (Deakin et al., 2001; Mitchell, 1999). This process requires the application of a suitable operational framework, and an evaluation method or approach that can guide stakeholders through the decision-making processes for SRID. However, at the moment, such a structure for organizing the information required in decision-making is not yet available, or at least not agreed on by the different disciplines and fields of activities in the road infrastructure sector in Developing Countries. This lack of an agreed structure that will assist stakeholders achieve greater sustainability in road infrastructure development (RID) is a major concern (Brandon &Lombardi, 2005).

Thus far, much of the attention on sustainability has concentrated on buildings within the built environment (Huang & Yeh, 2008). Little has been done on infrastructure systems, such as transportation and utilities, which may extend over large geographic spaces, with much

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

broader and more wide-ranging potential impacts (Dasgupta & Tam, 2005). This is mainly surprising, given the fact that road infrastructure constitute a large portion of built assets undertaken in the built environment (Lim, 2009).Specifically, RID, which often leads other types of infrastructure development, merits due attention. This is critical because road systems produce a mixture of impacts on the environment and nearby communities (Surahyo and El-Diraby, 2009). Road infrastructure projects often involve large land use, high-energy input and enormous resource consumption – all elements which may cause serious impacts to the environment and social dislocation. So, it is imperative to balance the constraints and develop a SRIP implementation framework that will mitigate the impact of road construction activities.

Literature in the field shows there do exist research initiatives attempting to develop infrastructure sustainability assessment indicators and tools (eg. CEEQUAL, 2008; Ugwu and Haupts, 2007; Ugwu et al., 2006; Mirza, 2006; Daguspta and Tam, 2005; Sahely et al., 2005; Brent and Labuschange, 2004; FIDIC, 2004; MOD, 2003), but they do not focus on a particular type of infrastructure such as roads. Even though there are existing Sustainable Roads Assessment Tools such as one developed by Australia's Victorian State Road Agency (VicRoads) in 2007, GREENROADS, Envision among others, the adoption of these tools is rather limited, new and unclear. Though focusing on assessing the end results, the assessment tools did not probe into identifying and addressing precise issues that impact on the gap between sustainability efforts and their real deliverables during project delivery – which are the crux of every sustainability initiative. This is also coupled with the fact that these tools are many with varied criteria and indicators.

In light of the above discussions, two research needs can be identified, in relation to the practice of SRIP development within the road infrastructure sector. First, given the lack of a uniform understanding, there is a need to explore how SRID is interpreted within the industry. Second, there is a need to explore how these interpretations can be synthesized and transformed into practice through project level implementation. This research therefore, tackles these two issues of interpretation and implementation of SRIP. As a result, the research is unique in scrutinising the above issues through both the strategic level and road infrastructure project level perspectives.

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

Aim of the Study

The purpose of this research is to develop an integrated framework to guide the implementation of sustainable road infrastructure projects in developing countries. The study will examine suitable sustainability criteria and indicators which are the essential variables that have been measured in the majority of previous studies to develop SRIP implementation frameworks. The research seeks to ascertain and incorporate the different perceptions and priority needs of the stakeholders, and address the grave issues that impact on the gap between sustainability motivations and their actual realization at project level, in order to develop an integrated framework for the implementation of SRIPs. Precisely, the anticipated final outcome of this research aim to function as a management tool to encourage more methodical and combined approaches to decision-making in the implementation of sustainability strategies to accomplish deliverable goals during the course of the development and delivery process of road infrastructure projects.

Research Questions

Based on the research problem and aim of the study, a few research questions emerged as stated below:

RQ1 What is the extent of influence of sustainability criteria in road infrastructure projects?

RQ2 What is the extent to which the sustainable road infrastructure project implementation framework be developed to guide road projects in developing countries?

RQ3 What are the perceptions and motivations of various stakeholders about 'sustainability' in infrastructure development?

RO4 What critical factors and issues affect the implementation of sustainable road infrastructure projects?

RQ5 What are the existing sustainability assessment methods for infrastructure projects?

RQ6 What are the primary criteria and indicators used to assess sustainability in road infrastructure projects?

Research Objectives

To provide answers to the research questions and achieve the aim of the research, the following objectives are set to:

RO1 Find out current theories and literature on sustainable road infrastructure development and to identify the gaps that need consideration;

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

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RO2 Evaluate existing sustainability assessment methods for road infrastructure projects;

RO3 Identify theperceptionsandmotivationsofvariousstakeholdersabout‘sustainability’in road infrastructure development;

RO4 Identify the critical factors and issues that affect the implementation of sustainable road infrastructure projects;

RO5 Identify the primary road sustainability criteria and indicators used to assess road infrastructure projects;

RO6 Develop an integrated framework for implementing sustainable road infrastructure projects; and

RO7 Determine the validity of the conceptualized integrated framework for sustainable road infrastructure projects

Significance of the Study

As road infrastructure projects involve large resources and mechanisms, achieving sustainability not only on economic scales, but also through environmental and social responsibility becomes a critical issue. Conversely, present efforts are often hampered by diverse interpretation of the sustainability agenda by the stakeholders involved. For that reason, sustainability deliverables at the project level are regularly not as transparent and measurable as promised in project briefs and designs (Lim, 2009).

Specifically, the expected outcome of this research will function as a management tool to encourage more systematic and combined approaches to decision-making in the implementation of sustainability strategies to accomplish deliverable goals during the development and delivery process of road infrastructure projects. It is also anticipated the proposed framework will promote consultation, collaboration and communication among all decision-makers involved in road infrastructure project delivery to accomplish dependable decision-making steps during the development life span, and thereby increase sustainability outcomes in a harmonious way.

This study also seeks to add to the existing body of knowledge about sustainable development for road infrastructure development. The data to be collected will be an asset to knowledge on issues pertaining to sustainable infrastructure projects, in particular roads and highways. The results will serve to encourage associated stakeholders involved in RID to consider sustainable principles, and to establish ways to turn these principles into “win-win” situations for all actors.

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

Additionally, the potential economic and intangible long term benefits to the project stakeholders because of the sustainability initiatives are underscored. It will also contribute to developing a sustainable community in general.

Sustainable Road Infrastructure Development Concept and Constructs (Criteria)

Although research has been conducted in SRID implementation, no universally accepted SRID concepts and constructs presently exist. Actually, researchers have different ideas about SRID concept. The concept is still a subject of debate (Brandon, 2000), still a hazy and ambiguous concept (Ametepey & Aigbavboa, 2015; Brandon, 2000; Dovers & Handmer, 1993). So far, sustainability in infrastructure development has come to mean different things to different people ((Brandon, 2000; Pearce et al., 1989).

As with sustainable development, the term sustainable infrastructure development is a crosscutting matter and means different things to different people. The review of related works suggests multiple definitions exist (for example, Kibert 1994; Wyatt, 1994; DETR, 2000; Langston & Ding, 2001) and there is inconsistency in scope and context. For simplicity, sustainable infrastructure development is best described as the subdivision of sustainable development and its application to infrastructure development. Infrastructure development involves all planning, developing, producing, designing, modifying or maintaining the built environment and includes manufacturers and suppliers of materials, clients, contractors, consultants and end users of facilities (CRISP, 2000). Therefore, sustainable infrastructure development could be best described as a subset of sustainable development, which encircles matters such as tendering, site planning and organization, material selection, recycling, and waste minimization.

In most literature, a common definition of sustainable infrastructure development, ‘the creation and responsible management of a healthy built environment based on prudent use of resources and ecological principles’ (Kibert 1994) and a myriad of other definitions (e.g. Roodman & Lenssen, 1994, 1995) focused more on the environmental aspect of sustainability. Others, for example Wyatt (1994) stated that ‘sustainable infrastructure development philosophy requires a 'cradle to grave’ appraisal of project, which involves managing the serviceability of project during its life- time and eventual deconstruction’ focus on the economic aspect of sustainability. Ceres (2012) defines Sustainable infrastructure development as designing, building, and operating of these structural elements in ways that do not lessen the social, economic and ecological processes required to maintain human equity, diversity, and the functionality of natural systems. The American Society of Civil Engineers (ASCE) also defines Sustainable infrastructure as a structure that provides

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

environmental, economic and societal well-being, now and for the future. According to United States Environmental Protection Agency (USEPA) sustainable infrastructure consists of an array of products, technologies and practices that use natural systems (or engineered systems that mimic natural processes) to improve overall environmental quality and provide utility services. Sustainable infrastructure considers policies, approaches and investments that consistently provide effective systems over the long term with adequate operations, maintenance and replacement (USEPA).

Only a few of the existing definitions are comprehensive and capture the holism of the concept. A good example of this is, 'sustainable infrastructure development comprises several processes through which a profitable and competitive industry delivers built assets to improve quality of life and stakeholder satisfaction' (DETR, 2000).
The key issues that could be drawn from these numerous definitions in the existing work have been summarized below.

- Most concentrated on either the environmental or economic aspect of sustainability while a few recommend integrating the three dimensions of sustainability: environmental, social and economic.
- Embedded in those definitions that capture a holistic approach to the concept is the idea of economic profitability based on environmental integrity and social responsibility.
- Sustainable infrastructure development involves all phases of the construction activities, which are: (i) Pre-construction - planning, option and tender appraisal, design stage etc.; (ii) Construction - construction impact, supply chain management etc.; and (iii) Post construction - operation and maintenance to the eventual deconstruction and recycling of resources, to reduce the waste stream usually associated with demolition.
- Sustainable infrastructure development encapsulates issues such as whole life cycle, procurement, site planning, material selection and the use of recycling, and waste and energy minimization and so on.

Therefore, the SID concept covers a wider scope and considers different dimensions. In this study, Sustainable road infrastructure development could therefore be defined as follows:
Designing, building, operating, maintaining and deconstructing road structural elements in ways that balances the social, economic and ecological processes required to uphold human equity, diversity, and the functionality of natural systems.

Various authors have divergent views on SID and its basic elements or variables. Lim (2009) agreed that although sustainability is applicable in the infrastructure sector, there is a lack of

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

agreement on the implementation process and lack of understanding of the criteria and indicators as well. Conversely, it should be noted that much research has been carried out in SID and its implementation. The literature review conducted revealed there has been extensive research (Assah Amiril et al., 2014; Montgomery et al., 2014; Krishna & Jun, 2011; Lim, 2009; CEEQUAL, 2008; Ugwu and Haupts, 2007; Ugwu et al., 2006; Mirza, 2006; Daguspta and Tam, 2005; FIDIC, 2004) on sustainability criteria and indicators (constructs) and are used to measure SID implementation. However, there are disagreement among the various identified criteria and indicators by individual researchers and institutions.

A study by Montgomery et al. (2014) in their research sought to develop a sustainability rating system for roads in developing countries. The study provided an extensive set of environmental road sustainability criteria. The authors grouped the sustainability criteria into 5 categories: quality of life; Project leadership; Natural world; Natural resource management and; resilience and greenhouse gas emissions. Literature also reveals that different frameworks have adopted similar criteria for sustainability under different title. Hence, for a successful implementation of SRIP, it is pressing that stakeholders integrate and build consensus on the right criteria and indicators and understand its implementation.
After careful study of previous studies, it has been found that various sustainability gurus in the infrastructure sector have different views about SRID, although some similarities can be found. It is established also in the literature there are frameworks and models for assessing and rating sustainability of infrastructure projects. These frameworks and models provide insights into the application of sustainability to infrastructure projects and give the researcher a better understanding of SRID and its constructs. Nonetheless, it was obvious there are disparities in the various sustainability frameworks and models. Besides, the frameworks have also failed to capture some factors affecting its implementation in developing countries.

Even though, the frameworks identified from literature are the most comprehensive and robust in nature but important constructs such as public participation and governance, climate change response, and stakeholder management were missing. A much more comprehensive and robust integrated framework for implementing Sustainable Road Infrastructure Projects will be developed by considering public participation and governance, climate change response, and stakeholder management. Using the existing frameworks reviewed, it becomes clear that most of the models were based on the three pillars of sustainale development (Economic, Social, and Environmental).

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

Table 1: Sustainable Infrastructure Development framework comparison

No.	Framework	Criteria
1.	Proposed Framework for this study	Social and Cultural Sustainability; Economic Sustainability; Environmental Sustainability; Institutional Sustainability; Health & Safety; Project Management; Resource Utilisation and Management; Engineering Performance; Climate Change Response; Public participation and Governance; and Stakeholder management
2.	CEEQUAL – Civil Engineering and Environmental Quality Assessment and Award Scheme	Project Management; Land Use; Landscape; Ecology & Biodiversity; The Historic Environment; Energy and Carbon; Material Use; Waste Management; Transport; Effects on Neighbours; Relations with the Local Community and other Stakeholders
3.	FIDIC's Project Sustainability Management(PSM)Guidelines	Equity; Health; Human rights; Education; Housing; Security; Population; Culture; Integrity; Atmosphere; Land; Oceans, Seas & Coast; Fresh Water; Biodiversity; Economic Structure; Consumption& Product Patterns; Institutional Framework
4.	BE^{2}ST-In-Highways	Social Carbon saving; Life Cycle Cost; Traffic Noise; Hazardous waste; Water Consumption; waste reduction (including in-situ materials); waste reduction (including ex-situ materials); Energy Use; Greenhouse gas emissions
5.	**Envision^{TM}**	Climate; Natural World; Resource Allocation; Leadership; Quality of Life
6.	**Green Guide for Roads**	Mobility for All; Transportation Planning; Environmental Impact; Energy and Atmosphere; Materials and Resources; Community Impact; Innovation and Design
7.	GreenLITES	Innovation/Unlisted; Materials and Resources; Energy and Atmosphere; Water Quality; Sustainable Sites
8.	**GreenPave**	Pavement Technologies; Energy and Atmosphere; Materials and Resources; Innovation and Design
9.	Greenroads	Pavement Technologies; Materials and Resources;

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

		Energy and Atmosphere; Construction Activities; Access and Equity; Environment and Water
10.	I – LAST	Materials; Lighting; Transportation; Water Quality; Environmental; Design; Planning
11.	INVEST	Operations and Maintenance; Project Development; Systems Planning
12.	Montgomery, Schirmer and Hirsch (2014)	Quality of life category; Project leadership; Natural world; Natural resource management; Resilience and greenhouse gas emissions
13.	Lim (2009)	Environmental; Economic; Social, Engineering; Community engagement; Relationship management; Project management; Institutional sustainability; Health and safety; Resource utilization and management
14.	Transport for New South Wales (2012)	Environmental category (GHG emissions, water, pollution control, noise management, resource management, waste management, material consumption and biodiversity); Social category; (stakeholders' relationship, communities/public acceptance and heritage conservation); Economic category (corporate sustainability).
15.	Assah Amiril et al (2014)	Environment; Economic; Social; Engineering/resource utilization; Project administration
16.	Ugwu & Haupt (2007)	Economy; Environment; Society; Resource Utilization; Health and Safety; Project Management/Administration
17.	Huang & Yeh (2008)	Ecology; Landscaping; Material; Waste Reduction; Water Conservation; Energy Conservation

Thus, the Sustainable road infrastructure project implementation framework in this study will consist of eleven (11) constructs.

Research Methodology

Different methods of investigation will be used in the research, which is a mix of quantitative and qualitative research designs usually referred to as mixed method design. These approaches will be used to answer research questions and meet the research objectives, as well as develop an integrated Sustainable road infrastructure Project implementation

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

framework. The qualitative method will make use of structured (using an interview guide) interview. The findings from this section will help to refine the survey tool (structured questionnaire) for the study. Delphi technique will be used in this method. The Delphi technique will be used to resolve conflicting issues on Sustainable road infrastructure Project implementation in the study areas through consensus. In the Delphi study, data on the ratings on the impact of the factors that determine the sustainability of road infrastructure projects will be obtained from the panel of experts. Experts will be asked to complete the questionnaire and reach consensus on the rated likelihoods and severity of various Sustainable road infrastructure project implementation factors and management issues. The process will involve a three round iterative process with the main aim of getting experts to reach consensus on the questions that will be raised in the questionnaire. Experts will be encouraged to give reasons for their dissenting views. The Delphi technique will be used to explore the extent to which the main attribute, sub- attributes, sub-factors impact or influence on Sustainable road infrastructure project implementation in developing countries. A face-to-face administered questionnaire survey will be conducted among stakeholders in the road infrastructure development sector. Data from the questionnaire survey will be obtained from key actors in the road infrastructure sector such as the road agencies, contractors, consultants and professionals such as engineers, designers, environmentalists, planners etc.

Data obtained from the Delphi Study will be analysed using Microsoft Excel, and spreadsheet software. The output from the analysis will be mainly descriptive statistics such as means, medians, standard deviations and derivatives of these statistics. Data gathered by means of the questionnaire survey will be analyzed using Structural Equation Modeling (SEM) software Version 6.2, which will be used to assess the factor structure of the constructs. The conceptual variables will be tested as a prior using SEM of the questionnaire survey results. The SEM process will be undertaken as Exploratory Factor Analysis (EFA), and further Confirmatory Factor Analysis (CFA) of the prior framework for an integrated Sustainable road infrastructure Project implementation for Developing Countries.

The research objectives will be achieved through the following methods:
Research objectives RO1 and RO2 will be achieved through conducting a literature review on the subject in question. It is principally a theoretical understanding of the discussion on sustainable road infrastructure development and general sustainability theories. The objectives RO3, RO4 and RO5 will be achieved by conducting a Delphi Study and a questionnaire survey. Research objective RO6 will be achieved by drawing on the conclusions from the extensive literature review and the findings from the Delphi Study and questionnaire survey. The final objective RO7 will be achieved through conducting a field

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

questionnaire survey and modeling of the results, using a structural equation model software known as EQations Software (EQS).

Delimitation of the Study

It should be distinguished at the outset of this research that sustainable transport and sustainable road infrastructure development are two different areas of studies, even though they could be related or possess similar sustainability objectives (such as minimizing environmental impacts). While sustainable transport looks for sustainable modes of mobility such as public transport systems (Hensher, 2007; Chamber, 2002), sustainable road infrastructure development mainly focuses on sustainable construction solutions at the project-level. Although sustainable modes of transport are the key to addressing major traffic problems, improving the efficiency and effectiveness of any system depends on both infrastructure and modes (Sohail et al., 2006). In this case, the focus of this research is on developing sustainable road infrastructure project implementation framework, without undermining the parallel importance of sustainable transport development. This study is delimited to the project execution phase of road infrastructure development in developing countries.

The research aim and objectives will be explored within key actors in the road infrastructure sector in Ghana. The key actors in this context refers to stakeholders such as Government Institutions mandated to manage the road infrastructure sector, Consultants, Contractors, Financiers, Academics, sustainability experts who play active role in the road infrastructure sector.

Envisage Outcomes/ Relevance to Knowledge

It is expected the study will contribute to the road infrastructure sector in developing countries. Several work has been done and continues to be done worldwide on SD practices and policies, even in the road infrastructure sector. This proposal is in response to a call on the road construction sector to develop measures to improve their sustainability practices, that is, curbing the impacts of road construction activities on the environment. The focus of the thesis is on developing an integrated framework for implementing sustainable road infrastructure projects. It is expected the framework will thus fill a theoretical gap in sustainable infrastructure literature on the road infrastructure sector to achieve its sustainability goal. It is also envisaged the research will contribute to existing literature on sustainable road infrastructure. Besides, the research is also expected to identify and propose areas in sustainable road construction which can be further investigated to additionally enhance to achieve the sustainability goal by the road infrastructure sector in developing countries and indeed globally.

[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

The research is also envisaged to make some practical contributions to industry. It is expected to provide an innovative and practical framework which will aid road infrastructure development professionals in implementing SRIP. The study is also expected to contribute to the industry by educating the various respondents who will take part in the study on SRIP.

Conclusion

Roads and road infrastructure will be faced with many challenges over the coming decades. These include the considerable number of rapidly expanding economies around the world, significant changes to weather patterns and extreme weather events, depleting natural resources and predicted increases in energy and resource prices. Leading efforts around the world are now showing how such challenges can now be met with creativity and innovation across many aspects of roads. The dominant message emerging from these efforts is the opportunity exists to transform the way road infrastructure is conceived and built, to aid society to respond to climate change and reduce a range of environmental pressures. Hence, this research seeks to develop an integrated framework for implementing sustainable road infrastructure projects in developing countries. It is expected the framework will therefore fill a theoretical gap in sustainable construction literature with respect to the road infrastructure sector to achieve its sustainability goal. In addition, the research is also expected to identify and propose areas in sustainable road construction which can be further investigated to additionally enhance achieving the sustainability goal by the road construction sector.

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[1]oforipmp@gmail.com

[2]caigbavboa@uj.ac.za

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[1]oforipmp@gmail.com

[2]caigbavboa@uj.ac.za

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[1]oforipmp@gmail.com

[2]caigbavboa@uj.ac.za

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[1]oforipmp@gmail.com
[2]caigbavboa@uj.ac.za

BUILT- OPERATE- TRANSFER (BOT) MODEL FOR PUBLIC UNIVERSITIES IN GHANA FOR ACCELERATING INFRASTRUCTURAL DEVELOPMENT.

Owusu, K.[1], Aigbavboa, C. O.[2] and Thwala D.W.[3]

[1,2&3]*Department of Construction Management and Quantity Surveying, University of Johannesburg, South Africa*

ABSTRACT

At independence, many countries look to reform education to accelerate economic and social development. Ghana is no exception, and after independence government saw in education the keys to social and economic development. Quality and availability of school infrastructure is one of the numerous problems confronting Ghana's education delivery. The purpose of this research is to find out infrastructure delivered by the private sector in our state Universities. The main objectives of this study were to assess the effectiveness of public private partnership in infrastructure development at the state public universities in Ghana, and also find out the number of infrastructure undertaken by the private sector; and to find out which of the PPP model is appropriate for the development of infrastructure in the state public universities. Data will be collected using the Delphi and field questionnaire survey. The Structural Equation Modeling (SEM) and Nvivo will be used to analyze data from the field questionnaire survey and Delphi respectively. This is a preliminary survey study on an ongoing Ph.D. study.

Keywords: Infrastructure; Public Private Partnership; Public Universities; Model; Ghana

1.0 INTRODUCTION

1.1 Background

Appreciation of the critical role of relevant and quality education in national development has never been lost on Ghana since its days of pre-independence, as captured in one of the addresses delivered by its first president Dr. Kwame Nkrumah to the Legislative Assembly two days before the declaration of Ghana's independence: "....only with a population so educated can we hope to face the tremendous problems which confront any country attempting to raise the standard of life in a tropical zone"(McWilliam and Kwamena-Poh, 1975, p.94).Education is the key to accelerate social and economic development of a country. Ghana is one country which has taken this purpose very serious since independence. Since

[1]kwacus@yahoo.com,
[2]caigbavboa@uj.ac.za,
[3]didibhukut@uj.ac.za

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independence till now Ghana has established thirteen public universities. These universities have over the years found it difficult to admit all qualify applicants. This problem is largely due to the lack of infrastructure development on various university campuses. There is a mounting demand for the acceleration of infrastructure development in the Country's State Universities in order to meet the growing needs of its population.

Basically, school infrastructure refers to the totality of physical facilities that create the learning environment of a school (Daniel, 2014). It has been observed that delivery of quality education is greatly hampered by poor and inadequate school infrastructure (Obonyo, 2011).

The early years of Ghana's independence experienced massive school infrastructural development; the setting up of the Ghana Education Trust (GET) supported the rapid expansion of school infrastructure (Kadingdi, 2006). The Accelerated Development Plans (ADP) for education and the 1961 Education Act facilitated rapid and steady growth of schools both numerically and qualitatively; and Ghana's education system shortly after independence gained the enviable reputation of being one of the best and most respected in Africa (World Bank, 2004; Ghana Human Development Report, 1998). The economic decline experienced by Ghana in the 1970's and early 1980s saw a sharp decline in Ghana's educational system; this was evidenced in the myriads of problems experienced by the sector such as: inadequate and poor school infrastructure (Akyeampong et al. 2007; Kadingdi, 2006).

The 1987 educational reform introduced an aspect of community participation in the provision of school infrastructure, for instance community labour was very instrumental in the J.S.S. school building programme (Little, 2010). To reduce cost and improve accessibility to secondary school education, community day secondary schools were introduced as part of the 1987 educational reform (Akyeampong, 2010).

At the root of school infrastructural problem in public schools in Ghana is funding and resource constraints. Government is not able to mobilise enough resources to provide all infrastructural needs of public schools in every community, and this resource constraint is a universal problem; with the developed countries not being exceptions to resource constraints. Addressing the infrastructural challenges of schools in Ghana requires doing things out of the ordinary, thinking outside the box, and in fact been innovative (Daniel, 2014).

For the country to continue solving her infrastructure problem; the government in recent years has introduced another way of solving infrastructure problems in the country's schools. This system is referred to us Ghana Education Trust Fund (GETFund).

[1]kwacus@yahoo.com,
[2]caigbavboa@uj.ac.za,
[3]didibhukut@uj.ac.za

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The Ghana Education Trust Fund (GETFund) is a public trust set up by an Act of Parliament in the year 2000. Its core mandate is to provide funding to supplement government effort for the provision of educational infrastructure and facilities within the public sector from the pre-tertiary to the tertiary level. One of the objectives of the GETfund is to provide financial support to the agencies and institutions under the Ministry of Education, through the Ministry, for the development and maintenance of essential academic facilities and infrastructure in public educational institutions, particularly, in tertiary institutions (The Ghana Education Trust Fund Act 2000 Act 581, 2000)

It is quite obvious that adequate and sound school infrastructure at every level of education is critical to the realisation of the mission and vision of Ghana's Education Ministry. It has been proven that inadequate and poor school infrastructure has negative effect on school enrolment, effective teaching and learning, academic performance of students, wellbeing of students, motivation of students and teachers, and accessibility to education (Obonyo, 2012; Cuyvers et al., 2011; Crampton and Thompson, 2008; Akyeampong, 2010). Therefore, the need to address infrastructural challenges in schools cannot be over empasized.

RESEARCH MOTIVATION

Little has been done on assessing the effectiveness of public private partnership in infrastructural development in the state public Universities of the Republic of Ghana. The study hopes to add on to knowledge in this area. The motivation behind this research is to assess the effectiveness of public private partnership in infrastructure development in the state public universities in Ghana. The research will determine the number of infrastructure undertaken by the private sector in the state universities. The PPP model appropriate for the development of infrastructure in the state public universities will be considered.

SIGNIFICANCE OF STUDY

There is a gap that exists in literature on the PPP model appropriate for the development of infrastructure in the state public universities in the republic of Ghana. This study therefore contributes to the existing knowledge by establishing the PPP model appropriate for the development of infrastructure in the state public universities in Ghana. Instead of using existing models such as Service contract, Management contract, Lease, Concession and Divestiture; built operate and transfer which has not been largely considered in most of Ghana's privatization concept will be put under perspective. Consequently the study will add new knowledge on establishing the PPP model appropriate for the development of infrastructure in the state public universities in Ghana.

[1]kwacus@yahoo.com,
[2]caigbavboa@uj.ac.za,
[3]didibhukut@uj.ac.za

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PROBLEM STATEMENT

Though the GETfund was established to solve educational infrastructure and the others, the fund has not been able to provide the numerous needed infrastructures at the state universities. For instance almost all the 19,904 students of University of Development Studies spread across the four campuses of the university are reportedly stranded without hostel accommodation (Edmond, 2010). The economic decline experienced by Ghana in the 1970's and early 1980s saw a sharp decline in Ghana's educational system; this was evidenced in the myriads of problems experienced by the sector such as: inadequate and poor school infrastructure, lack of basic teaching and learning materials, shortage of teachers, low enrolment levels and high drop-out rates (Akyeampong et al. 2007; Kadingdi, 2006). It has been proven that inadequate and poor school infrastructure has negative effect on school enrolment, effective teaching and learning, academic performance of students, wellbeing of students, motivation of students and teachers, and accessibility to education (Obonyo, 2012; Cuyvers et al., 2011; Crampton and Thompson, 2008; Akyeampong, 2010).

The inability of the state to provide the needed infrastructure development in State Universities call for the Public Private Partnership to improve the needed infrastructure that the country's Universities require. The problem of the country's economy which causes lack of fund for so many developmental projects, further worsen the infrastructure problem at the country's universities. This infrastructure difficulty has forced some of the state universities authorities to stretch their hand to the PPP for help.

RESEARCH QUESTION

(RQ1) Is the PPP model used to provide infrastructural development in the state universities?
(RQ2) Is the PPP model in infrastructural development within the public universities in Ghana effective?
(RQ3) Do the private sectors develop any infrastructure at the state public universities?

AIM OF THE STUDY

This research is to establish the best PPP model for the infrastructural development at the state universities in Ghana.

RESEARCH OBJECTIVES

(RO1) To assess the effectiveness of public private partnership in infrastructure development at the state public universities in Ghana

[1]kwacus@yahoo.com,
[2]caigbavboa@uj.ac.za,
[3]didibhukut@uj.ac.za

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(RO2) To find out the number of infrastructure undertaken by the private sector at the state universities in Ghana

(RO3) To find out which of the PPP model is appropriate for the development of infrastructure in the state public universities

LITERATURE REVIEW - THEORETICAL AND CONCEPTUAL VIEWS ON EDUCATION AND ITS INFRASTRUCTURE DEVELOPMENT

Introduction

Education is a concept that may be defined differently, therefore, may defy precise definition. However, education could be explained as a systematic or organised means which are designed to bring about learning formally or informally. Nonetheless, basically, it aims at socialising the child by the adult to acquire the culturally desirable and appropriate behaviours, goals, motives and skills for his or her future role in the society (Hetherington, 1979; Davidoff, 1980; Aboagye, 1997). Higher education is critical to economic success and long-term development of Ghana, a country facing several challenges of growth and development on many fronts. Higher education provides economic and social benefits, both to the individual and the public, produces qualified human capital, adapts and generates knowledge, promotes international cooperation and improves competitiveness in the global knowledge based economy.

Despite the substantial progress that has been made over the years in providing access to education, the nation continues to grapple with serious challenges in terms of infrastructure within the High Education Sub Sector (Duwiejua& Newman, 2014).

School Infrastructure

Crampton and Thompson (2008) define school infrastructure to include deferred maintenance; new construction; renovation; retrofitting; additions to existing facilities; and major improvements.

It has been observed that delivery of quality education is greatly hampered by poor and inadequate school infrastructure. Conversely it has been proven that students' academic performance has improved, school attendance increased, and staff motivation enhanced by improvement in school infrastructure (Obonyo, 2011). A study by Cuyvers et al.(2011) suggests the following: i) differences in students' well-being can be attributed to the quality of their school's infrastructure; ii) there are differences in well-being between students who study in schools that have good infrastructure and students who study in schools with poor infrastructure; and iii) school infrastructure has the same impact on all students; whether in rural or urban settings. These findings clearly show the critical role played by quality of

[1]kwacus@yahoo.com,
[2]caigbavboa@uj.ac.za,
[3]didibhukut@uj.ac.za

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school infrastructure in the scheme of educational delivery, and the big problem created when these facilities are lacking.

Some Approaches Adopted by Ghana to Address School Infrastructural Problems

School infrastructural problem in Ghana include: non-availability, inadequate supply, and poor quality of school facilities such as classrooms; laboratories and laboratory equipment; dormitories/halls of residence/student hostels; office space; sports, recreational and entertainment facilities; computer and ICT facilities; dining halls/canteens; water and sanitation facilities; furniture (classroom, office and residential); and other such facilities which create the physical environment in which teaching and learning is delivered.

Over the years, Ghana's approach to addressing school infrastructural challenges has been multi-faceted and this includes: building and provision of new facilities; private sector participation; community participation; shift system; and distance education and e-learning.

- **Community Participation**

The 1987 educational reform introduced an aspect of community participation in the provision of school infrastructure, for instance community labour was very instrumental in the J.S.S. school building programme (Little, 2010).

- **Private Sector**

Private sector participation in education delivery in Ghana has been significant and progressive over the years. Between 2006 and 2009, private sector participation in education is estimated to have grown by 26% (International Finance Corporation, 2010). In Ghana, private schools represent 33% of total number of basic schools in the country (IDP Foundation Inc., 2012).

- **The Shift System**

The shift system of education, whereby pupils attend classes either in the mornings or afternoons in alternatives for a specified duration of usually two weeks, has been a feature of some basic schools since the 1960s (Bervell, Cobbina Sam, and Boadu, 2013). This system was introduced to address problems of overcrowding when school enrolment increased; because government was unable to increase school infrastructure and other facilities to meet increasing demands; short supply of teachers exist; and the opportunity cost of schooling is high (MacWilliam, 1964) cited in (Bervell, Cobbina Sam, and Boadu, 2013). Though the shift system has been used over the years as a means of containing the problem of inadequate supply of school infrastructure, the system has been criticised for being a major setback to the nation's educational system and also one of the major causes of poor academic performance of pupils at the basic school level (Bentil, 2009). The government in 2009 announced the

[1]kwacus@yahoo.com,
[2]caigbavboa@uj.ac.za,
[3]didibhukut@uj.ac.za

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intention to abolish the shift school system with the aim of halting poor academic performance (Ghana News Agency, 2010).

- **Distance Education and E-learning**

Distance education has been defined by Perraton and Creed (2000) as any educational process in which a significant proportion of instruction is conducted by someone removed from the learner in space and/or time. Nsiah (2011) identifies distance education as an effective solution for addressing the problems of inadequate school infrastructure; rural urban divide; logistical and material constrains; and the shortage of qualified and competent teachers in the delivery of quality education in Ghana This mode of education delivery became imperative due to the growing demand for higher education by qualified applicants coupled with the limited space available for admission; limited infrastructural and other resources prevented the state universities from admitting more than half of qualified applicants (Lawoe, 2005).

Some Innovative Ways of Addressing the Problem of School Infrastructure in Ghana

At the root of school infrastructural problem in public schools in Ghana is funding and resource constraints. Government is not able to mobilise enough resources to provide all infrastructural needs of public schools in every community, and this resource constraint is a universal problem; the developed countries not exceptions. Addressing the infrastructural challenges of schools in Ghana requires doing things out of the ordinary, thinking outside the box, and in fact been innovative. It requires smart deployment of information and communication technology (ICT); innovative ways of engaging the private sector, and adopting a proactive method of maintaining existing facilities. The following are some of the proposed innovative means of addressing school infrastructure problems in Ghana:

- **Making judicious use of Public Private Partnerships (PPPs)**

Internationally, PPPs have been found to contribute to addressing both physical infrastructure and quality education issues (Mehta, Bhatia and Chatterjee, 2010). The government of Ghana stands to gain immensely by partnering with the private sector in partnerships such as: build-operate -transfer (BOT); build- own -operate (BOO); build -own -operate -transfer (BOOT); and operation and maintenance, to build better infrastructure faster, to maintain infrastructure more effectively, to better manage schools, to provide better budget certainty to government, to deliver better quality education, and to attain universal primary enrollment (MDG 2) (Oyewole, 2009).

[1]kwacus@yahoo.com,
[2]caigbavboa@uj.ac.za,
[3]didibhukut@uj.ac.za

RESEARCH METHODOLOGY

Research methodology involved the processes used for the collection and analyses ofthe data using various techniques and tools to find answers to the questions.Is a procedural plan that is adopted by the researcher to answer questions validly, objectively, accurately, and economcally.

Research Design

The research adopted a mixed approach in the process of collecting and analyzing data. The mixed approach in this research consists of two methods of data collection and analysis: survey questionnaires, semi structured interview. This is due to the fact that different approaches leading to greater validity and reliability than a single methodological approach according to Denzin (1970), Dixon et al. (1988) and Yin (1994). The questionnaires were designed to find out a lot about the quasi BOT arrangement for infrastructural projects by higher education institutions and also the internal and external factor that influence readiness of both the institutions and the private sector. The semi-structured face-to-faceinterview was designed to qualitatively analyze respondents free format comments on the main subject.

Research Population

The study zero in on the ten (10) traditional universities spread across the length and breadth of Ghana. This is because these institutions had tried one or more quasi BOT before the PPP Policy was formulated. Again, in terms of activities, they seem to have the potential to initiate PPP projects. In all two (2) top officials, two (2) Prospective private sector players and a student representing the student body for each of the selected institutions were targeted, making a total of 50 officials.

Sample Size

In all a total of fifty (50) officials from 10 traditional universities will be involved in the exercise.

Sample Technique

The study used purposive sampling for all the top officials in both the institutions and the private sector, since the information required was technical in nature and could be provided by a population with some specialties/expertise and board room information. Most of the private sector selected had old relationship with the institutions and most especially companies with BOT relationship.

[1]kwacus@yahoo.com,
[2]caigbavboa@uj.ac.za,
[3]didibhukut@uj.ac.za

Data Analysis

Data collected will be analysed using structural equation modeling (SEM) to develop an appropriate BOT Model for higher education institutions in Ghana. Other part of the data analysis was done using SPSS for other findings. Data were presented in the form of bar charts and pie charts.

Delimitation of the Study

The scope of this thesis focuses on developing an appropriate BOT for higher education institutions in Ghana and factors influencing readiness of both the private sector and the institutions. The study was restricted to the 10 traditional Universities in Ghana.

Ethical Consideration of the Study

Ethical issues will be considered in carrying out the study. Respondents will not be forced to participate in the research. The privacy of respondents by ensuring confidentiality in terms of information gathered and also ensuring anonymity of respondents throughout the study. Permission to carry out the study was sought from all relevant authorities. The main objective of the study was explained to all the participants in the study and their consent sought prior to interview.

OVERVIEW OF CHAPTERS

Chapter 1 Introduction

This chapter will focus on the background of the study and the problem statement. The aim and the objectives will be considered. Research questions be will presented and the research methodology stated. The ethical consideration will be clearly stated in the chapter.

Chapter 2- Theoretical and Conceptual views on PPP

The chapter will focus on theoretical and conceptual views of literature on PPP that will be important in this study. The chapter will evaluate a survey of related literatures from books, journal articles and conference papers from relevant sources.

Chapter 3- Gaps in PPP

This chapter will deal with the gaps observed in PPP which was not evaluated holistically taking consideration of developing countries like Ghana in previous model. These gaps form the additional new constructs in the current studies of conceptual framework. The gaps that will be identified are the needs and expectations of the institutions and private partners on the PPP.

[1]kwacus@yahoo.com,
[2]caigbavboa@uj.ac.za,
[3]didibhukut@uj.ac.za

Chapter 4- PPP Delivery within Higher Education Institutions- African Experience
This chapter will look at studies conducted in other Africa countries including Ghana, Nigeria, South Africa, Zambia, Kenya, Tanzania and Egypt will be considered in relation to PPP. This will assist to identify other factors that affect PPP.

Chapter 5- PPP Delivery within Higher Education Institutions South Africa
This chapter will focus on the development of PPP Model in South Africa and the suitable model that is used in the country. The factors that affect PPP will be considered and its impact on the infrastructure delivery within Higher Institutions.

Chapter 6- Research Methodology
This chapter will focus on the methodology that will be used to collect the data of the study. It will give the sampling technique in selecting the sample size and research instrument used in gathering information from the respondents.

Chapter 7- Conceptual PPP model
In this chapter findings from review of literature on existing models on PPP will be discussed. This forms a basis of conceptual PPP model's theory. The hypothesized PPP model will be stated.

Chapter 8- Results
The findings will be stated based on the said objectives from the questionnaire survey.

Chapter 9- Discussion of Results
This chapter will stress on the analysis and interpretation of result obtained from the questionnaire. Discussion on the model will be covered.

Chapter 10- Conclusion and Recommendations
The conclusion and recommendations of this study will be considered in this chapter. Recommendation for future work will be stated in the chapter.

[1]kwacus@yahoo.com,
[2]caigbavboa@uj.ac.za,
[3]didibhukut@uj.ac.za

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[1]kwacus@yahoo.com,

[2]caigbavboa@uj.ac.za,

[3]didibhukut@uj.ac.za

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[1]kwacus@yahoo.com,

[2]caigbavboa@uj.ac.za,

[3]didibhukut@uj.ac.za

CHALLENGES INVOLVED IN THE IMPLEMENTATION OF BUILDING CONTROL REGULATIONS: A CASE OF KPESHIE SUB – METRO DISTRICT ASSEMBLY IN GHANA.

Arthur-Aidoo B. M.[1] Ansary, N.[2] and Aigbavboa C. O.[3]

[1,2&3]*Department of Construction Management and Quantity Surveying, Faculty of Engineering and Built Environment, University, of Johannesburg, Johannesburg South Africa*

ABSTRACT

This study was embarked in order to discover challenges involved in the implementation of building regulations at the district assembly level precisely the Kpeshie sub – metro district assembly in Ghana. Review of relevant and available literature on the subject matter was made to gain better insight into the topic in obtaining the needed information, the method used were field survey and was supported by the distribution of questionnaires to the district assembly. In all, thirty-five questionnaires were administered to personnel who work with three zonal capital towns and three sub-towns of the district assemblies via random sampling. The analysis of the data collected from the District Assembly revealed that 66.7% remarked they lack have enough personnel to see to the proper implementation of the Building Regulation. 100% responds from Town and Country Planning shown the various challenges they encounter including; lack of ownership (title to land) of developers, Poor compliance to design standards, Poor site description and Poor presentation of design proposals. The study recommends the following among other things that the District Assembly must institute and organize educational programmes such as symposia, community seminars regarding Building Regulations and other relevant themes to broaden the knowledge of both their personnel and the community. Also, the monitoring team of the District Assembly must ensure and approved buildings drawings are in compliant with the building regulations during the construction stage of the project.

Keywords: *Assessing, building regulations, implementation construction industry*

INTRODUCTION

The interrelationship of the various elements of the built environment in the majority of town and cities is a result of historical development on the basis of economics and convenience. However, the recent attention to Town and Country Planning has brought the various relationships under examination, and new towns are now designed on a more selective basis with consideration being to the interrelationship of man's several activities (Grundy, 1992)

[1]bernardmartins@hotmail.com

[2]nansary@uj.ac.z

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Building regulation is the statutory instrument which sets out the minimum performance standards for the design and construction of the building is paramount to Ghana's economy. According to municipal council ordinance by the ministry of works and housing (1953), No building shall be erected or any work carried out without the approval of the town engineer or health officer who may enforce full complainant with the regulation in the case of building materials and construction. The fact that the regulation has been in existence and controlled by Town and Country Planning Department of the District assembly, the majority of building and structures constructed are not in compliant with the building regulations.
The effort to meet the increasing population on the issue of unauthorised structures in Accra metropolis has not been adequate.

The Kpeshie Sub-metro District Assembly is one of the six sub-districts under the Accra Metropolitan Assembly, which came created in 1988 by the Provisional National Defence Council National Democratic Congress (P.N.D.C/NDC) Government. A lot of residents who live around the Kpeshie Sub-metro District Assembly have not realised the importance of the building control regulations. This is because of how they have ignored the regulations and have built haphazardly without conforming to their approved drawings. Observations of the unauthorised location of structures that have sprung-up across selected areas in the sub-metro show that only a few structures are in conformity with the originally approved designs. Despite all the strenuous efforts by the Town and Country Planners and the District Assembly engineers in checking structures without documentations, the structural problems and encroachment of service reserve areas for markets, schools among others, still building construction goes on without complying the proper the proper control measure and by-laws. Also, unauthorised and unapproved locations of structures at space to create access during fire outbreak have as well being occupied. This study, therefore, seek to ascertain the challenges involved in the implementation of building control regulations at the district assembly level precisely the Kpeshie sub – metro district assembly in Ghana.

AIM OF THE STUDY

The aim of the study is to assess the challenges involved in the implementation the building control regulations.

METHODOLOGY

The study adopted a mixed method of both qualitative and quantitative technique. The qualitative technique made use of review of relevant literature on building control regulation via existing government gazettes and publication supported by other published resources. The quantitative method on the other hand adopted the use of questionnaire survey. In all, thirty-five questionnaires were administered to the targeted population who work with three zonal

[1]bernardmartins@hotmail.com
[2]nansary@uj.ac.z

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capital towns and three sub-towns of the district assemblies via random sampling technique. The main respondents of the questionnaires were building professionals, real estate managers, building owners. The entire administered questionnaires were however retrieved. The questionnaires were of the semi-structured format that allowed the inclusion of respondent opinion.

FINDINGS OF RESULTS

The validity of the questionnaire and its responses established the following results.

The analysis of the data collected from the District Assembly revealed that 66.7% of the respondent remarked they lack have enough personnel to see to the proper implementation of the Building Regulation. 100% responds from Town and Country Planning shown the various challenges they encounter including; lack of ownership (title to land) of developers, Poor compliance to design standards, Poor site description and Poor presentation of design proposals.

100% of the respondents stressed that the problems associated with the citing of unauthorized structures at unapproved locations can be solved in the communities when the Legislative instrument (LI) 1639 (1996) of the building regulations is adhered to strictly. Also, 33% of the respondents expressed the sentiments that the District Assembly must enforce a penalty fee for encroachers and defaulters or demolish the structure. On the issues of problems building owners encounter during application process for their development permits, 95% of the respondents indicated following as some of the challenges they encounter during the acquisition of the building permits: Lack of ownership (title to land) of developers, Poor compliance to design standards, Poor site description and demarcation and Poor presentation of design proposals. Findings on issues regarding the bylaws within the scope of the national building regulations in the district two respondents representing 66.75 pointed they have the bylaws. While one respondent representing 33.3% indicated, he has no knowledge of the laws. Also, 100% respondents indicated that the processes involved in the acquisition of the building permit are too long and as a result, it compiles building owners to ignore the lengthy process and construct their buildings without regard to the regulations. This implies that work such as structures, drainage, and sanitation; streets and sign boarding among others will be poorly constructed.

Table A: Classification of study population

Professionals	Total number
Real estate Managers	12
Site engineers	5
Town and country planners	5
Building owners	31
Total (N)	53

[1]bernardmartins@hotmail.com

[2]nansary@uj.ac.z

The sample size for the study was the proportion of the selected professionals. This is because it was impossible to distribute the questionnaires to all professionals. There was the need to obtain a representative sample size for all the respondents. The formula recommended by Kish Leslie (1965) was used to obtain the representative sample. These include using a census for a small population, limiting a sample size of similar studied using formulas to calculate a sample size.
For critical sampling, however, the Kish Formula was used to compute the number of questionnaires to be given to the workers sampled under the simple random sampling.

The computation is done as follows: $n = \frac{n}{(1+\frac{n}{N})}$

And $n = \frac{S^2}{V^2}$

Where

n= Sample Size

N= Total population

=Max standard development of population element (using max variability of p=0.5 at confidence level of 95%)

V =the desired level of precision ±5% =(0.5)

P = the proportion of population element that belong to the define class.

S^2=P (1-P)

=0.5(1-0.5)

=0.25

$n' = \frac{S^2}{V^2}$

[1]bernardmartins@hotmail.com
[2]nansary@uj.ac.z

$0.25/0.05^2$

=100

$$n = \frac{n}{(1 + \frac{n}{N})}$$

$$n = \frac{100}{(1 + \frac{100}{53})}$$

=34.6

n= 35

Therefore, thirty five (35) questionnaires were distributed randomly among respondents.

Response Rate of Respondents

Professional	Questionnaires issued	Responses	Percentage
Real estate Managers	8	4	50%
Site engineers	3	3	100%
Town and country planners	2	2	100%
Building owners	22	22	100%
Total	35	31	89%

CONCLUSION

This studies into the challenges involved in the implementation of building control regulations at the Kpeshie Sub Metro District Assembly concludes on the following:

x. The proper implementation of the Building Regulation by the sub-Metro District is not being achieved.
xi. The composition of the District Planning Authority has an excellent task on them.
xii. The District Assembly lacks qualify expertise because they fail to attract Planning Professionals.
xiii. There is a fair amount of confusion as to whether or not LI 1630 is playing the role of Building Regulation or Town Planning Regulation.
xiv. The District Planning Authority for the impact on the Regulations has not fulfilled education for the general public within the communities.

[1]bernardmartins@hotmail.com
[2]nansary@uj.ac.z

xv. The haphazard positioning of building in the communities usually accompanied by flooding, the fire which causes loss of properties, the District has not demolished such unauthorized structures.

xvi. The haphazard positioning of building in the communities often accompanied by flooding, the fire which causes loss of properties, the District has not demolish such unauthorized structures.

xvii. Issuance of development and Building permit do not conform to the physical structure on the ground after being approved.

xviii. Custodians of lands in the District Assembly ignore expert advice before developing their lands leading to misuse of the land.

RECOMMENDATIONS

The following recommendations are drawn to enhance effective planning and development of the district with the aim of instituting proper implementation into the community development.

x. The Sub Metro District Assembly should see to the proper implementation of the Building Regulation by enforcing the law on the community developers from day one.

xi. The greater task on the compositions of the District Planning Authority is to help in fighting against unauthorized developers by bringing all the ideas of the technicality from the various departments, i.e. the Town and Country planning, Metro Works, Roads, Survey department, Housing and water Company.

xii. The building inspectors have a great task for carrying out their duties properly to ensure that buildings under construction conform to specifications as prescribe by permit, to stop unauthorized development and to examine building materials properly to ensure that buildings under construction conform to specifications as prescribe by permit, to stop unauthorized development and to examine building materials properly.

xiii. There should be qualified expertise in the District Assembly to exhibit human resources of building the discipline of integrity high reputation to oversee the total planning development.

xiv. The confusion whether or not LI 1630 is playing the role of building Regulation, or Town and Country Planning both laws are operating side by side. It is hereby recommended that a building Regulation law should be promulgated to see the standard in a proper building code.

xv. Due to inefficient by the District Assemblies to educate the community members either by using the media, patrolling the communities with information van and by a demolishing exercise, most of the opinion leaders has also not felt the impact and the development plan the authorities has set up for the communities.

[1]bernardmartins@hotmail.com
[2]nansary@uj.ac.z

xvi. District Assembly must institute and organize educational programmes such as symposia, community seminars regarding Building Regulations and other relevant themes to broaden the knowledge of both their personnel and the community.

xvii. The Assembly should embark on a demolishing exercise to put a stop to the haphazard positioning of buildings in the communities. The assembly should enforce that the approved building permit conforms to what is pertaining structure.

xviii. Custodians of lands in the district should constantly be advice through by the District Planning Authority before developing their lands in order not to lead to misuse of the land.

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[1]bernardmartins@hotmail.com

[2]nansary@uj.ac.z

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[1]bernardmartins@hotmail.com

[2]nansary@uj.ac.z

AN INTEGRATED FRAMEWORK FOR MAINTENANCE OF PUBLIC BUILDINGS IN GHANA

Tengan, C.[1] and Aigbavboa, C. O.[2]

[1]*Building Technology Department, Cape Coast Polytechnic, Ghana*
[2]*Faculty of Engineering and Built Environment, University of Johannesburg, South Africa*

ABSTRACT

Maintenance works is an important function in organizations with significant investment in physical assets. This aids to prolong the life of these assets and plays an important role in achieving organizational goals. Acknowledging the need of a systematic maintenance for public buildings, this research therefore is seen as the vital approach to highlight and to assist the improvement on the maintenance for public buildings. This research intents to integrate two key elements, namely, the importance and the needs of the maintenance, with the aim of developing an integrated framework for a systematic maintenance programme for public buildings in Ghana. The study is a social research which is focused on obtaining perceptions or opinions of the caretakers, maintenance experts and other stakeholders who are key in the implementation of maintenance programmes for public buildings. The nature of this investigation will be undertaken through a cross sectional survey design and will make use of a mix of qualitative and quantitative research strategies. This study will be conducted in government owned universities in Ghana. The research will be limited to respondents who are involved in maintenance of these public universities. The respondents will represent government departments, budget officers, maintenance officers, community consultants, contractors, designers, engineers, project managers, town planners and cultural heritage preservation experts. The involvement of multiple project stakeholders in this study will provide in-depth views and aid validate the research findings. The study will employ both probabilistic and non-probabilistic sampling techniques. Purposive sampling will be use to narrow the sample frame to only universities owned by the government and used in selecting the experts and other key stakeholders while systematic sampling will be used to select the actual buildings from various universities to be analyzed. Data collection instruments will include questionnaires, observation list, Delphi methods, and a variety of other techniques. Primary and secondary methods of data collection will be used. Secondary data will be collected from analysis of related and relevant literature in books, articles in accredited journals, published and unpublished works such as dissertations. Records from the maintenance departments and web-based publications on the specified field of study will also be used for the study. For the primary data, questionnaire survey, observational survey and

callyclarke@gmail.com
caigbavboa@uj.ac.za

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Delphi method will be used to collect data. The study is envisaged to establish the critical success factors in the maintenance management process that contribute to maintenance of public building and develop an integrated framework for maintenance management system of public buildings in Ghana.

Keywords: *maintenance, public buildings, integrated framework, maintenance management system*

BACKGROUND OF THE STUDY

The success and progress of human society depends on physical infrastructure for distributing resources and essential services to the public. The quality and efficiency of this infrastructure affects the quality of life, the health of the social system, and the continuity of economic and business activity. A nation's economic strength is reflected in its infrastructure assets. Preserving public buildings is important because they represent significant investments of tax payers' money. Many Ghanaian public structures are often inadequately maintained and windows and doors and other building elements and facilities frequently show evidence of lack of maintenance and repair. Some residential and office buildings of public institutions have not seen any significant maintenance or show little signs of maintenance since they were constructed, some dating back to the colonial era. This has resulted in such buildings being in a dilapidated state with some being abandoned. This lack of maintenance by the authorities and occupants of these facilities often leads to reduced lifespan of these buildings (Melvin, 1992), which invariably defeat the purpose for which they are put up i.e. to ensure that the nation's stock of buildings, both as a factor of production and accommodation, was used effectively as possible.

Building maintenance is traditionally, a labour intensive activity and its operation processes are not noticeable and not attractive (Jones and Collis 1996; Wood 1999). However, as times change, top management including organizations' leaders as well as senior managers are now more concerned because building maintenance serves as a supporting activity for the core business (Mak 1997; Chan et al. 2001; Tranfield and Denyer 2004; Osgood 2004). Top management at the strategic level always challenges operation process efficiency from the planning stage to implementation. On the other hand, maintenance personnel at the operational level are faced with the challenge of insufficient maintenance resources and lack of support from top management (Lee and Scot, 2008). These misalignments do not help the effectiveness of maintenance and operation of public building. The application of maintenance policy and strategy influences the building maintenance operation processes.

callyclarke@gmail.com
caigbavboa@uj.ac.za

The main components of maintenance policy (i.e. maintenance strategy, maintenance standards and maintenance resources) are developed from the principle of understanding the length of time for which the building requires maintaining for the present use, the life requirements of the buildings and their fittings and services, the standard to which the buildings and its services are to be maintained. The reaction time is defined as time between a defect occurring and the legal and statutory requirements (RICS, 1990; Seeley, 1987; Lee, 1987; Barrett, 1995; Chanter and Swallow, 1996). The maintenance policy is to integrate different maintenance strategies including corrective, preventive and condition based maintenance since recent maintenance strategies are developed from the corrective, preventive and condition based (Horner et al., 1997; Chan et al., 2001).

Maintenance strategy depends on various factors such as standard, resources and the objectives of the organizations. While these factors influence adopting appropriate maintenance strategy, some studies suggest that preventive maintenance pose more challenges among other maintenance strategy (Wood, 1999, 2003a; Horner et al., 1997; Spedding, 1987). Loosemore and Hsin (2001) argued that the understanding of the relationship of planned preventive maintenance to a building and the core business objectives is inadequate. On the contrary, there are some suggestions for the better use of planned preventive maintenance (Shen and Lo, 1999; Tse, 2002; Chan et al. 2001). To this, Coetzee (1999) suggests that planned preventive maintenance could be of better use if it is based on the detail design of the maintenance cycle processes for the specific organization.

Some studies (Then 1996; Zavadskas et al. 1998; Wood 2003a) suggest that maintenance standard depends on the maintenance resources available, the degree of maintenance standard and business objectives. Then (1996) argues that the maintenance standard is essential to the maintenance process, which is limited by health, safety and use. Zavadskas et al. (1998) suggests understanding more about the organization's objectives and management may raise the maintenance standard. A balanced approach between top management at the strategic level and maintenance personnel at the operational level is required. Top management is interesting in focusing on the maintenance resources to see if there is any ways to minimize the building maintenance cost. Maintenance at the operational level argues that the maintenance budget is always below the maintenance needs (Tse 2002; Lo et al. 2000; Lam 2000; Shen and Lo 1999, Pitt 1997) while the top management at the strategic level criticizes the inefficiency of the maintenance, which contributes to the wastage and makes it difficult to get more resources.

Acknowledging the need of a systematic maintenance for public buildings, this research therefore is seen as the vital approach to highlight and to assist the improvement on the

callyclarke@gmail.com
caigbavboa@uj.ac.za

maintenance for public buildings within the local context. This research intents to integrate two key elements, namely, the importance and the needs of the maintenance, with the main purpose of developing a framework for a systematic maintenance programme for public buildings in Ghana. The study focuses on developing an integrated framework for building maintenance activities of public building. The study will extensively examine the practice of preventive maintenance and establish obstacles limiting local governments' ability to perform preventive maintenance of public buildings within their jurisdiction.

PROBLEM STATEMENT

All buildings should meet certain safety and health regulations. These regulations ensure that built facilities are well maintained to ensure that they are structurally safe in order to provide a safe environment to live in and ensure that they are not a danger to the health of occupants. Equally the facilities must be in a condition that ensures that they are functionally sound and meet the expectations of users. According to Choka (2012) to achieve this, maintenance works must be effectively and efficiently managed. Maintenance management is crucial especially in current times where maintenance budgets are constrained. Maintenance management is an area that has been given very little attention in public institutions in Ghana resulting in deteriorating of buildings. The current state of buildings or built facilities in some public universities is a symptom of an inherent problem with the management of maintenance works in these public institutions.

The current condition of some public universities buildings and the backlog of deferred maintenance is, in part, a product of the poor maintenance practices used by these institutions. Buildings are assets whose life may span over several decades; in fact, records have indicated that some buildings have existed for over centuries. The lifespan of a building to a large extent depends on the level of maintenance it is subjected to. Maintenance work will be inevitable, as it is in the nature of materials to deteriorate over time with usage and exposure to the elements of climate. All things being equal, a properly maintained building will last longer than a scantily maintained building. Physical development is one of the sectors that swallow the greater part of governments' revenue. It is therefore imperative that these developments which include public buildings are well maintained so that they can serve adequately the functions which they were put up for.

Regardless of the heavy investment in physical infrastructure including public buildings, most public institutions allow their buildings to care for themselves without any sustainable maintenance plan to retain them. Maintenance should be a part of the usual cost of operating a building, according to experts, but it is more likely to be short-changed relative to other operating costs and there is a persistent problem of underfunding of maintenance and repair.

callyclarke@gmail.com
caigbavboa@uj.ac.za

Public institution managers are faced with the constant challenge of balancing competing public priorities and limited fiscal resources and often find it stress-free to neglect the maintenance and repair of public buildings. The neglect of maintenance has a cumulative effect with rapidly increasing deterioration of the fabric and finishes of a building accompanied by harmful effects on the occupants and contents of the building. Some residential and office buildings of public institutions have not seen any considerable maintenance since they were constructed and this has resulted in most of them suffering from dilapidation with others being completely abandoned. The lack of maintenance of public buildings often leads to reduced lifespan of the buildings and invariably affects the uses of these buildings. The occupants are mostly driven by the way of thinking that public property is nobody's property and therefore make no conscious effort to maintain them. Lack of maintenance of buildings has become a national tormentor and is a serious hindrance to the development of the nation.

Some studies have described the problem of maintenance of public buildings in developing countries as running down of important national capital assets beyond economic repair (Choka, 2012). Most public institutions in Ghana have in the last decade faced challenges to maintain their buildings due to lack of funds resulting from backlog of deferred maintenance. Maintenance is an area where public universities would probably cut down on expenditure. Maintenance management therefore plays a very important role by ensuring limited resources are managed to obtain the best possible outcome for these universities. The ad hoc approach to maintenance may seem attractive but is unlikely to obtain value for money or an efficient maintenance system (Seeley, 1987). It is important for managers in public universities to embrace modern maintenance management systems to ensure that with the little resources available, the built asset portfolio owned by the universities is in good maintenance condition. In as much as maintenance services do not form a core function, their contribution to the universities core functions of teaching and research should not be underestimated. The deterioration of buildings due to lack of maintenance can lead to future financial burdens, pose legal and other issues that will affect the delivery of teaching and research. By engaging in strategic approach to maintenance public universities are bound to benefit from the increase and enhance effective use of the universities' physical assets.

In Ghana, maintenance of public buildings is being executed ineffectively in a haphazard manner and without adequate budgetary support. According to Idrus et al (2009), effective building maintenance is necessary to maximize service life of buildings by delaying deterioration, decay and failure thereby enhancing service delivery. The haphazard and ineffective systems currently being applied coupled with low budgetary allocations imply that maintenance targets cannot be met resulting to serious defects build up. The consequences for

callyclarke@gmail.com
caigbavboa@uj.ac.za

ever increasing defects build up include disruption of delivery of services through equipment breakdowns or building element/component failures. It is against this background that this study has been crafted to investigate the existing maintenance framework with a view to developing an appropriate maintenance model framework for maintaining public buildings.

AIM OF THE STUDY

The study is aimed at developing an integrated framework for building maintenance activities of public buildings in Ghana. The study will extensively examine the practice of preventive maintenance and establish obstacles limiting local governments' ability to perform preventive maintenance of public buildings within their jurisdiction.

OBJECTIVES OF THE STUDY

The specific objectives of the study are:

1. to critically examine the maintenance management systems of public buildings and highlight the shortcomings and inadequacies in the system
2. to identify and examine the challenges faced in implementing a maintenance management system
3. to establish the critical success factors in the maintenance management process that contribute to maintenance of public building
4. to critically evaluate maintenance strategies and determine the extent to which models/frameworks can be applied to building maintenance
5. to develop and validate a framework for maintenance management system of public buildings

RESEARCH QUESTION

The research seeks to answer the following questions

1. To what extent do maintenance management systems contribute to effective management of public buildings?
2. What are the shortcomings and inadequacies in the maintenance management system?
3. What are the challenges faced in implementing a maintenance management system?
4. What are the critical success factors in maintenance management process that contribute to maintenance of public building?
5. To what extent do the critical success factors influence maintenance of public buildings?
6. What maintenance strategies and practices contribute to effective maintenance management?
7. To which extent can models/frameworks be applied to public building maintenance?

callyclarke@gmail.com
caigbavboa@uj.ac.za

8. Which framework can possibly improve the maintenance management system of public buildings?

SIGNIFICANCE OF THE STUDY

Whereas the importance of maintenance to public office buildings cannot be understated, there is no effective framework within which to execute maintenance works leading to uncoordinated, costly maintenance systems. The study therefore endeavors to investigate the existing maintenance framework with a view to making it more effective and efficient. Besides adding to existing body of knowledge the field of study, the findings are intended to offer an effective maintenance management framework for adoption by institutions as well as government towards stimulating maintenance systems for public buildings. The outcome of this research is also expected to function as a decision-making tool to encourage more methodical approaches to decision-making in maintenance of public buildings. It is also anticipated that the proposed framework will aid consultation, collaboration and communication among all stakeholders involved in the process of maintenance of public buildings.

SCOPE OF THE STUDY

The study will focus on maintenance of built facilities that contribute directly to the core functions of the public universities in Ghana; teaching and research because of limited time and resources. This will focus mainly on administration blocks, lecture halls, libraries and laboratories. The research will cover the maintenance of selected facilities at the six public universities; University of Ghana, Kwame Nkrumah University of Science and Technology, University of Cape Coast, University of Education, University for Development Studies and the University of Mines and Technology. These Universities were selected as the case study given that they are fully fledged universities own by the government. This implies that the tax payers' monies are used to a large extent for provision of infrastructure and other developments in these universities. These universities also have arguably the largest built asset portfolio than other private owned universities in Ghana. Some of the buildings in some of these institutions are as old as have the respective university had been in existence. The large built asset portfolio and ageing building poses unique maintenance challenges for maintenance managers. The universities also have a relatively better developed maintenance departments and as such are expected to have a better developed maintenance management systems. These universities would probably then serve as a benchmark for best practice on maintenance management system in Ghanaian public universities.

callyclarke@gmail.com
caigbavboa@uj.ac.za

RESEARCH METHODOLOGY

Research Approach and Design

The study is a social research which is focused on obtaining perceptions or opinions of the caretakers, maintenance experts and other stakeholders who are key in the implementation of maintenance programmes for public buildings. The nature of this investigation is best undertaken through a cross sectional survey design (Bryman 2008, Mugenda and Mugenda 2003). The study will make use of different methods of investigation. In this study, a mix of qualitative and quantitative research strategies will be adopted. This approach will be used in order to answer the research questions and as well meet the objectives of the study; thus developing an integrated framework for maintenance of public buildings in Ghana and other developing countries. The qualitative strategy will primarily be employed to identify the different expectations and perceptions of various stakeholders, and their motivations with regard to maintenance activities in the public sector; and to identify possible solutions to critical maintenance issues relating to public buildings. On the other hand, the quantitative strategy will be applied to determine used maintenance criteria and indicators and the critical success factors that impact on the gap between maintenance expectations and actual deliverables after maintenance activities are completed.

Research Area and Targeted Respondents

This study will be conducted in government owned universities in Ghana. The research will be limited to respondents who are involved in maintenance of these public universities. People who have extensive experience and possess decision-making roles in their respective organizations, and have some exposure to sustainable development concepts will be used for the study. They will represent government departments, budget officers, maintenance officers, community consultants, contractors, designers, engineers, project managers, town planners and cultural heritage experts. The involvement of multiple project stakeholders in this study will provide in-depth views and aid validate the research findings.

Sample and Data Collection

According to Babbie (1990), sampling is necessary in research because of the constraints of time and cost attending all element of the population especially when the population is large. The sample size of an empirical study is an important characteristic of the study especially where the target is to make deductions about a population from a sample. The study will employ both probabilistic and non-probabilistic sampling techniques. Purposive sampling will be use to narrow the sample frame to only universities owned by the government and used in selecting the experts and other key stakeholders while systematic sampling will be used to select the actual buildings to be analyzed.

callyclarke@gmail.com
caigbavboa@uj.ac.za

Considering the types of data needed, this study requires a combination of data collection methods. In their view, Fellow and Lui (1997) posit that for the body of knowledge for construction to be established and move forward with confidence then appropriate methodologies and methods of research should be applied with rigor in related studies. In view of this, methods of data collection will be given careful attention. Data collection methods will include Delphi, questionnaires, observations, and a variety of other motivational techniques (Robson, 2002).
To fulfill the intended objectives of the study, primary and secondary methods of data collection will be used. Secondary data will be collected from analysis of related and relevant literature in books, articles in accredited journals, published and unpublished works such as dissertations. Records from the maintenance departments and web-based publications on the specified field of study will also be used for the study. For the primary data, three methods will be used to collect the data. These methods will be the questionnaire survey method, observational survey and Delphi method.

The proposed use of questionnaires which will be self- administered to respondents will considerably reduce the time and cost involved. The questionnaire will be constructed to cover the objectives of the study and other variables to be identified in literature relating to the main study so that data collected conforms to these objectives and assists in a better understanding the research problem. The observational survey will mainly focus on the condition assessment of the sampled buildings. The researcher will have predetermined aspects of maintenance condition which will form the basis of the observation schedule to be used. The purpose of observation schedule is to record the status of the buildings as they are in their natural setting. The researcher will therefore be a non participant observer; simply observing and recording the phenomena of concern to the study. Delphi method will be used to identify the primary maintenance criteria and indicators and the critical success factors that impact on the gap between maintenance expectations and actual deliverables after maintenance activities are completed. Data from the Delphi method will be obtained from experts in institutions that have a role to play in maintenance of public buildings in Ghana.

CONCLUSION

This study is a PhD research at its proposal stage. The study seeks to focus on developing an integrated framework for building maintenance activities of public building. The study however intends to highlight the establishment of maintenance management, the responses on the importance of maintenance works to be undertaken for public buildings, factors governing the effectiveness of maintenance works on public buildings and maintenance approaches, inclusive of maintenance programmed undertaken on the structural, non-

callyclarke@gmail.com
caigbavboa@uj.ac.za

structural elements as well as the services systems. Five objectives and eight research questions have been developed to help achieve the aim of the study

As indicated in the background of the study, a nation's economic strength is reflected in its infrastructure assets hence preserving public buildings is important because they represent significant investments of tax payers' money. Many Ghanaian public structures are often inadequately maintained with some building elements and facilities frequently showing evidence of lack of maintenance and repair. Some residential and office buildings of public institutions have not seen any significant maintenance or show little signs of maintenance since they were constructed, some dating back to the colonial era. This has resulted in such buildings being in a dilapidated state with some being abandoned. In view of this, the study focuses on developing an integrated framework for building maintenance activities of public building. The study will extensively examine the practice of preventive maintenance and establish obstacles limiting local governments' ability to perform preventive maintenance of public buildings within their jurisdiction. On completion, the study seeks to function as a decision-making tool to promote systematic and combined approaches to decision-making in the implementation of maintenance strategies in the course of maintenance of public buildings.

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callyclarke@gmail.com

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callyclarke@gmail.com
caigbavboa@uj.ac.za

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callyclarke@gmail.com
caigbavboa@uj.ac.za

DESIGN AND MANUFACTURE KEROSENE POWERED INCUBATOR FOR THE POULTRY FARMER

Atsu, A. M. and Adam, B. Y.

Agricultural Engineering Department, Tamale Polytechnic, Box 3E/R, Tamale, N/R, Ghana, W/A.

ABSTRACT

Poultry production is an old business in the rural areas. Due to lack of electricity, farmers still rely on the hen to lay and hatch eggs which has limitations in terms of quantity of eggs hatched. To address this challenge, this study was carried to design and manufacture Kerosene incubator. The objectives of the study was to improved and increase poultry production in rural communities, designed and manufacture affordable incubator for the rural communities, eliminate loses in local poultry production, help to minimize unemployment in rural communities and to help farmers to improve their hatching method. The manufactured incubator has a cabinet which is insulated with plywood to prevent heat loss. The fuel used in heating the system was kerosene which was connected to galvanize pipe through the cabinet which contain the water. After the construction of the incubator, hatching trials was conducted and the efficiency of the machine was determined to be 70%. Data collected from the hatching trials was discussed and cause of low hatchability and infertility were identified as a problem of selection of eggs. The only short-coming of the machine was even distribution of the heat. It is recommended that NGO's sponsor the manufacturing of the incubator for rural farmers.

INTRODUCTION

Poultry farming is the raising of domesticated birds such as Turkeys, Doves, Ducks, Chickens, Guinea fowls, Geese, and ostriches purposely for meat, eggs and feathers. Poultry is classified into different type or varieties, Broilers purposely breed for meat production, layers for laying eggs and breeders. Poultry is becoming the most popularly consumed meal in the world as awhole. In India, Asia, Africa, and Europe poultry was raised purposely for cockfighting and later an attention was giving to eggs and meat production. Before 1820s poultry production was only in Asia, Europe, and India and later chicken raisers stress eggs and meat where commercial hatcheries became more important after 1920s. From 1920s poultry rearing became more popular and different varieties were introduced into the system such as Plymouth rock, the Wyandotte, the Rhode island red, the New Hampshire, and Red Malay game fowls etc. Years later crossbreeding of these birds has been introduced and this different variety of poultry lead to the improvement of poultry production in the world. (Soul, 2013)

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Ghanaians depend on local bird which is small with a little meat on it while the hen lays only a few eggs of about10 to 20 eggs per annum. It has the natural habit of broody that is after laying its eggs, it sit on the eggs to hatch. To improve on these situations the Minister of Agriculture first introduced a foreign breed to the country in the 1930s for the farmers to cross the local hens and obtain cross –breeds. These breed had better performance than the local birds by producing larger size chickens and more eggs.(Karbo and, 2006)

The New State-owned company supply both layers and broilers day old chicks and also produced poultry feed. In 1962, the state farms corporation came into being and it set up its own poultry complex to supply day-old chicks and to its farms and sold the surplus to interested farmers.
Poultry keeping started to become popular. A scheme was therefore mounted by the Food and Agriculture Organization of the United Nation (FAO, 1999) to promote and sustain the industry.

The FAO undertook the project, to provide housing and day old chicks free of charge, but the cost of the feed was made the responsibility of the individual involved, the scheme opened the way for the expansion of the poultry industries in the country to backyard poultry farmers. In 1970s a shortage created in the supply of day-old chicks and feed due to more of this requirement being imported. As a result, a number of hatcheries and feed mills sprang up in the country .Among this were Darko Farms, Tama Food Complex, Agri-care and Glamour Farms as well as poultry equip farms and Acme Farms. Therefore the construction of an incubator that is easily affordable and easy to operate by the local farmer will help to increase poultry production and eradicate poverty in the rural areas. An incubator is a machine used for hatching eggs of domestic birds such as hen eggs. This is very important because there is the need to undertake this project to help reduce local method of poultry production in the rural area. This will go a long way to increase poultry production which will also increase their income levels.

PROBLEM STATEMENT

Local farmers still depend on the old crude method of poultry production thus the poultry sitting on eggs to hatch less than 20 eggs for 21 days, which is coupled with insecurity of the eggs from rain, and snakes which leads to losses. In view of this farmers continue to depend on low production. In order to increased poultry production in rural areas, there is the need to provide them with simple technology to be able to hatch more eggs. This calls for the design and manufacture of a simple incubator that will suit the rural setting. Most of the rural areas do not have electricity and for that matter cannot employ the existing incubators that use electricity as source of heat during incubation. Also it will encourage the youth to enter into poultry farming rather than going into the cities for illegal mining called “Galamsey” leading to the pre-mature death of some youth and teenage pregnancy and a lot more.

OBJECTIVES

The aim of this project is to design and manufacture a simple incubator which will use kerosene or gas as its source of heating to help the rural farmers to increase their poultry production. The objectives of the study are as follows:

- To eliminate loses in local poultry production
- To improved and increase poultry production in rural communities.
- To help farmers to programme their hatching.

MATERIALS AND METHODS

According to Samuel A. A. and Gideon A. D. (2001), in research of locally available materials such as wood, lantern, kerosene, galvanize plate and thermometer were used in the design and construction of the incubator.

The materials selected and used for this project were based on certain consideration and advantages over other materials.

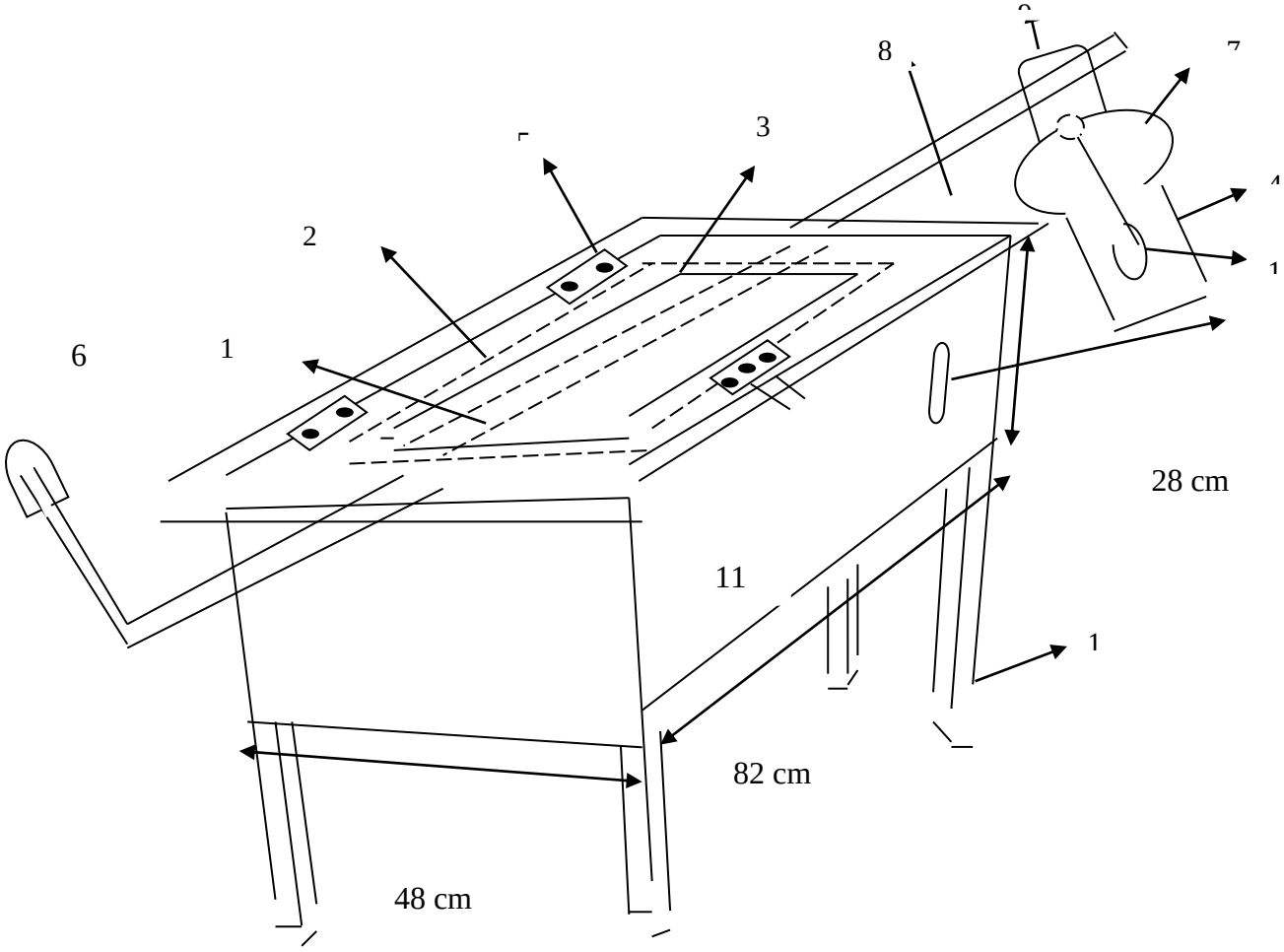
These advantages include operational, production, economical and availability.

- Operational advantages are based on its ability to perform its desired function such as ability to withstand stress and easy movability and disease disinfection.
- Production advantage include, ease of cutting, welding, and machining.
- Economical advantage has to do with cost reduction and availability.

Materials advantage is base on readily affordable and locally available materials. Some of these properties considered were mechanical and physical properties. The reservoir of the lantern is filled with kerosene oil which burns to provide the temperature needed for the heat generation. The lantern is fixed to logged galvanize pipe which transfer or conducts the heat into a vacuum where the eggs are set on the stray.

The eggs tray provides the setting of the eggs. The flame of the lantern is regulated so as to achieved the required temperature in the vacuum which is controlled at 37to39^{o}c for the period of 19 -22 days for hatching to be completed or achieved. The thermometer and hydrometer are used to measure the temperature and humidity respectively in the incubator.

FIGURE 1 INCUBATOR SHOWING VARIOUS PARTS
ALL DIMENSION IN CM



MATERIALS AND THEIR USES

1. **Galvanize pipe:** is used for transmitting heat into the incubator. It is also essential to use a galvanize pipe because it is anticorrosion material.
2. **1/2 inch plywood:** is use because it is a poor heat conductor and it is more affordable for the rural farmer which is used to hold the eggs.
3. **Plain glass:** is used in the incubator for easy viewing of eggs during hatchery without opening the incubator itself because opening the incubator always will allow heat to escape during incubation.
4. A **jam bottle:** is to contain the kerosene and for easy reading of the level of kerosene, and easy top-up to prevent quenching.
5. **Bolts and Nut**: They are used for easy assembling and disassembling of parts
6. **Thermometer** for reading temperature to assist in regulating the system.
7. **Flame hood**: For heat conservation and to prevent heat from escaping.

8. **Silver paint**: prevent the plywood and galvanize plate from rusting, corroding and rotting and also not to warp and preserved heat.
9. **Kerosene lamp (lantern)** for the lighting system during incubation and easy regulating of heat.
10. **Wick**; used for burning
11. **1×1 angle iron** used for the frame of the incubator.

CONSTRUCTION DESIGN

A galvanize plate was cut in to six(6) pieces, two (2) of the same dimensions for the length of 82cm per each and another two (2) pieces of the same dimensions for the width of 48cm per each and another two (2) pieces for the bottom and top panels which is 82 by 48cm. Also the height of the incubator was 28cm and the stand was provided with a height of 52 cm. inside the incubator, was a plywood box which is fixed to help to withhold heat in the incubator and for the holding or keeping of eggs during incubation. The top panel was cut fixed by a plain glass for easy identification and reading of temperature. Two wooding boxes were place inside the plywood box with equal sizes where some holes are created for the holding or keeping eggs and to prevent eggs from breakages. It also creates easy circulation of air between the eggs for proper incubation.
(Soul and Alexander, 2013).

INSULATION

The inside of the cabinet was with a white plywood sheet to prevent heat loss in the cabinet.One bolt and nuts was used on the plywood for easy assembling and disassembling. The disaffection of pest in the incubator, silver paint is used to prevent corrosion and rotting of wood.

VENTILATION

The life embryo inside every egg needs oxygen (o2) to survive as it is needed during incubation, so there are some vacuum created in the incubator to allow oxygen to enter for normal incubation temperature or the regulation of the temperature. There is water tray mounted inside the incubator to regulate and control the internal humidity. Eggs should be turned manually during incubation at least every two (2) hours.A glass is fixed on top of the incubator for easy visibility of the eggs and reading of temperature during incubation.

HEATING SYSTEM

A kerosene heating system is mounted outside the incubator, the heat is transferred from the lantern by the galvanize pipe into the incubation chamber. Heat is been stored inside the flame hood for transition and also excess heat will evaporate through a hole that is created on top of it in order to distribute the heat uniformly during incubation, a clinical thermometer is used to read the temperature.

RESULT AND DISCUSSION

RESULTS

The incubator capacity is to take 100eggs but only 10eggs were tried to test its efficiency, these were the results that were obtained, including un-hatched eggs, infertile eggs and eggs that were dead-in-shells during incubation. This is shown in numbers and percentages in table one below.

TABLE1: HATCHING RESULT IN PERCENTAGE

RESULT	NUMBER OF EGGS	NUMBER OF EGGS IN (%)
Hatched eggs	7	70%
Infertile eggs	1	10%
Dead-in-shells	2	20%
Total number of eggs	**10**	**100%**

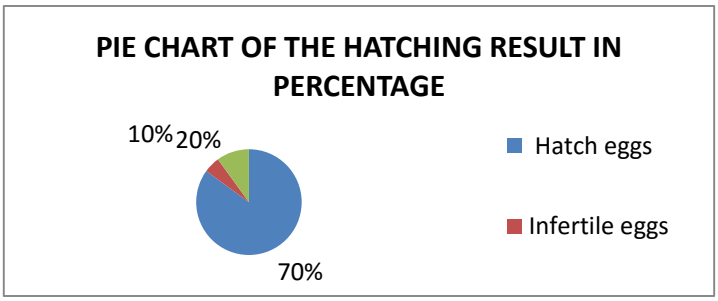


FIGURE 1: Pie chart of results of incubation

DISCUSSION

Ten (10) eggs ware used for the trial of the locally made incubator on 15 /07/ 15 to 6/08/15, and seven (7) out of these were able to hatch properly which represent 70%, two (2) eggs were infertile this represent 20% while one(1) of the eggs was dead-in-shell which represent 10% during incubation. The results show a good output. The possible cause of the problem of the un-hatched eggs was due to the small size of jam bottle which did not give enough heat and temperature regulation during incubation, some eggs were also stored for more than ten (10) days before used which lead to the infertility of eggs, this was intentional to see whether storage can affect hatching, which was achieved. Poor eggs turning, incorrect hatching temperature, fowl diseases among others could also lead to poor incubation. It is good to set the eggs of old fowl's between one to two years or eggs of old fowl for good outcome.

On the 15/07/15 the incubator was tested with ten (10) eggs. Figure 2 below shows the eggs arranged in the incubator.



FIGURE 2: Eggs placed in incubator. (Source: Authors)

The incubator was opened every three days to turn eggs and also check the temperature during incubation. After 20-21 days of testing, it was found that seven (7) out of ten (10) eggs were able to hatch while three were not able to hatch. See figure three (3) below.



FIGURE 3: Hatched eggs. (Source: Authors)

SPECIFICATION AND REQUIREMENT

1. Keep the incubator in a cool and dry place and allow technical know-how person to operate it.
2. Do not turn eggs when your hands are oily or dirty.
3. Clean the machine before setting eggs inside for incubation to prevent pest infection.
4. Ensure the temperature requirement for the incubation is well set.
5. Select only disease free fowl eggs and mutual fowl eggs for the incubation.
6. Make sure the eggs selected for incubation are not breaking and kept long in the house before using for hatching.
7. Eggs turning should be done regularly and gently for the first eighteen (18) days
8. Ensure that there is a normal temperature of 37-39℃ in the cabinet during incubation.
9. Eggs selected for incubation should not have rough shells and should be round.

LIMITATION OF THE INCUBATOR

- Inability to detect and control humidity level in the cabinet
- Temperature control during the first three days and during the night

CONCLUSION AND RECOMMENDATION

The kerosene incubator for eggs hatchers was designed, constructed and tested and found to be satisfactory. The hatching result of the project under results and discussions shows that, the efficiency of the kerosene incubator was70%. This was calculated based on 7 eggs out of 10 eggs at the temperature of 37-39c within 20-21 days. The machine is very usefully and the materials are locally available for both rural and urban area poultry farmers. Also the cost involved is low, because they do not involve the use of expensive materials hence can be easily afforded. These will also minimize the rate of depending on the hen itself to hatch few eggs with its accompanying risks. Also this will improve the condition of poor class people to hatch many eggs and sell them to make money.

It is recommended that Non-Governmental Organizations (NGOs) sponsor the manufacturing of the incubator for rural farmers.
To increase the number eggs to hatch, the size of the incubator should be increased.

TABLE 5: COST ESTIMATION OF MATERIAL

MATERIALS	QUANTITY	UNIT COST GH¢	TOTAL COST GH¢
Galvanize pipe	1	15	15
1/2inch plywood	1	7	7
Plain glass	1	6	6
Kerosene /lantern	1	35	35

Jam bottle	1	1	1
Silver paint	1 milo tin	15	15
Bolt and nut	1 dozen	10	10
Thermometer	1	20	20
Wick	5	2	10
Flame hood	1	3.5	3.5
Galvanize plate	1	50	50
Square pipe	1	35	35
Hinges	2	3	3
Workmanship		50	50
Miscellaneous		20	20
TOTAL COST			**249**

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AN INTEGRATED FRAMEWORK FOR THE ADOPTION OF LEAN CONSTRUCTION PRINCIPLES FOR THE REAL ESTATE INDUSTRY IN GHANA

Salifu Osumanu, I.[1] and Aigbavboa, C.O.[2] and Thwala D.W.[3]

Department of Construction Management and Quantity Surveying, University of Johannesburg, South Africa.

ABSTRACT

In general, a very high level of waste exists in construction; according to Koskela (2012). Although it is difficult to systematically measure all wastes in construction. Various studies from various countries have confirmed that waste represents a relatively large percentage of production costs. The main objective of this research among others is aimed at developing an integrated framework for the adoption of lean construction principles as a tool to revolutionize Real estate industry in Ghana. The researcher purposively selected a sample size of forty (40) out of the total population of four hundred (400) registered Real estate Development companies of GREDA (Ghana Real Estates Development Association) as multiple case studies to respond to the research questions.

Keywords: *Adoption; Lean; Construction; Real Estate; Ghana*

INTRODUCTION

In recent times, the manufacturing industry has seen great performance improvement in productivity by the implementation of Lean production principles. This manufacturing principles seek to remove various stages of waste by continues improvement of operations.
Waste reduction has become an important issue to improve the performance of the Real estate industry in terms of economics, quality and sustainability. One way of achieving this target is by reducing the waste at all stages of the construction process in Real estate development using lean construction principles. A study by Garas (2001), explains that contractors have the perception that waste whenever found, is not considered valueless as long as the contractor can sell it to waste dealers at any cost, not one comparable with the cost, at the end of the project. Material loss is seen as an inevitable by-product of estate development.

An unacceptable level of material waste creates growing tension for local authorities in many countries. Although the waste problem is well known, it does not seem to be given the recognition it deserves because of the trend to underestimate waste levels. According to

caigbavboa@uj.ac.za
didibhukut@uj.ac.za

McGrath and Anderson (2000), wastage within the United Kingdom (UK) construction industry is as high as 17%.

Construction wastage is estimated around 70 million tonnes per annum. Research has shown that the Brazilian construction industry has a waste rate of 20–30% if compared to the weight of materials on site. The Netherlands site waste averages 9% (by weight) of the purchased construction materials. In addition, construction waste has become a burden to clients, as they eventually have to bear the costs of waste. The same is also a major problem to contractors, as it leads to loss of profits and potential bankruptcy (Skoyles & Skoyles, 1987, Ekanayake & Ofori, 2000). As a result, minimization of construction waste has become a sensitive topic among professionals in the construction industry (Poon, Yu, Wong & Cheung, 2004)

In the Real estate's development industry, waste is a loss of profit. Building materials are far too expensive to waste, but in spite of this, money is being wasted because of breakages and losses during development. This waste also results in higher building costs to the end user (Skoyles & Skoyles, 1987).
Waste, according to Skoyles and Skoyles (1987), can occur in many ways. Materials may be lost in the ground or be damaged by lying around and have to be discarded, or they may be rejected as unsuitable for the purpose for which they were purchased, thereby becoming surplus to the site. Additional materials may be needed to renew damaged work or to replace articles missing through lack of materials control.

Motivation for the Study

The main motivation for this research stems for the need to apply lean principles in the reduction of waste in real estate development in Ghana. Besides, there is no any known integrated frame work for the adoption of lean construction principles for the real estate industry in Ghana.
The study hopes to fill the gap in the area of real estate construction projects and could be implemented in other developing countries.

Significance of the Study

The generation of material waste in Real estate's development site leads to a decrease in profitability and increase in cost, increase resource dissipation culminating in low productivity and an increase in pollution.

caigbavboa@uj.ac.za
didibhukut@uj.ac.za

Problem Statement

The cost of materials being used on site contributes between 55 – 60% of the total construction cost of the building (Illesanmi, 1986). Material left after an operation is just dumped anywhere and not used again.

Construction waste is not just about environment and health issues, but also related to contractor's profit. (Trignunarsyah 2006). According to Trignunarsyah (2006) in the developed countries such as the US, the volume of construction waste produce contributes up to 23% of the total volume of solid waste. This leads to the need for the construction industry to reduce the amount of waste produced by construction projects.

Studies show that the waste rate in the Brazilian construction industry is 20 to 30% of the weight of total materials on site. On the other hand, work in the Netherlands found that the amount of waste for each building material lies between 1% and 10% of the amount purchased, depending on type of material. (Ekanayake & Ofori, 2000)

Further, it was concluded that an average 9% (by weight) of the purchased construction materials end up as site waste in the Netherlands. Moreover, whereas the waste problem is well known, it seems not to be given the recognition it deserves. One reason may be to underestimate waste levels. Past studies have found that, most of the time, actual percentages of site waste generation have been much higher than the initial recommended waste norms for the project the projects. (Ekanayake & Ofori, 2000)

In the UK, the BRE studied the waste levels for specific materials on 230 different building sites and found that the actual waste levels is consistently higher than the estimated level for all materials studied. New purchases to replace wasted materials cause heavy financial losses to the contractor.

Research Questions

Based on the research problem, a few research questions emerged as stated below;

RQ1. What are the major sources and causes of waste in estates development activities?

RQ2. What are the views of professionals on materials waste minimization?

RQ3. What are the views of estate developers on materials wastage and minimization?

RQ4. What are the views of estates developers on the concept of lean construction?

RQ5. What are the perceptions of construction professionals on the concept of lean construction principles?

QR6. What are the potential barriers that hinder the implementation of lean construction principles in the Ghanaian estate development industry?

caigbavboa@uj.ac.za
didibhukut@uj.ac.za

Research Objectives

In order to provide answers to the research questions and achieve the aim of the research, the following objectives are set to:

RQ1. To establish current theories and literature in real estate construction projects and identify gabs that is worth considering.

RQ2. To come out with ways of minimizing material wastes on estate development sites and to make necessary recommendations on effective waste management through the use of lean construction principles on construction sites to maximize profit.

RQ3. Develop an integrated frame for the adoption of lean construction principles in the real estate industry.

RQ4. Serve as a tool for the estate developer to design projects with lean principle in mind and the economic use of materials resulting for greater profitability, resource conservation and pollution prevention.

Purpose Of The Study

The purpose of this research is to develop an integrated framework to guide the adoption of lean construction principles in the Real Estate Industry. The study will examine suitable criteria and variables as benchmark in previous studies to aid the implementation of lean construction framework.

The research is also aimed at advancing knowledge in the application of lean construction principles as a tool to revolutionize Real estate development industry in Ghana.

Value Of The Study

This research will contribute to body of knowledge, reveal various losses arising from material wastage and to propose measures that will enhance judicious use of developers' money coupled with an overall effect on cost savings on Real estate projects, as well as leading to increase profit and time saving on the construction period of Real estate housing projects.

The implementation of lean construction would help to remove waste at design and construction stage through to the selling point thereby reducing the cost of production and increasing productivity.

This study will create the awareness of the benefits of minimizing material waste on estate development sites.

caigbavboa@uj.ac.za
didibhukut@uj.ac.za

It will also serve as a guide to potential real estate developer and existing ones in the Real estate development and construction industry.

LEAN CONSTRUCTION FRAMEWORK

This will represent the review of related literatures on the topic. It will indicate clearly what has already been written on the topic in terms of theories, concept and empirical evidence on the topic; examining the concept of waste, theory of waste management and waste in the Real Estate and construction industry.

The concept of waste

Waste is the unnecessary depletion of the natural resources, unnecessary costs and environmental damage which can be avoided through improved waste ethics. The Waste Framework Directive (European Directive 2006/12/EC) has defined waste as "any substance or object the holder discards, intend to discard or required to discard".

Theory of waste management

In industrialized nations the waste management practices evolved with the 1970's focusing on reducing environmental impacts (Tanskanen 2000). This was done by creating controlled landfill sites- starting from 1970 – today (Environment to resource recovery).

Classification of waste

Rama Rao (2009) classified waste on the basis of: Waste resources, Origin of waste, Property of waste and Recoverability. Taiichiohno (1988) classified waste into Defect, Overproduction, inventory, Unnecessary processing, Transportation, Motion, Waiting

Waste in construction Industry

According to koskela (1992) defined waste as "any inefficiency that results in the use of equipment material, labour or capital in larger quantities than those considered as necessary in the production of building

Productivity theories in relation to waste management

Several productivity enhancement techniques and theories have emerged over the last five decades with the clear objective of minimizing waste e.g. JIT, TQM, TPM, Concurrent Engineering , Value Management, Continuous Improvement, Re- engineering

caigbavboa@uj.ac.za
didibhukut@uj.ac.za

PROPOSED METHODOLOGY

In this study the researcher will collect information from reference books and journal articles to introduce some theories regarding to lean production principles, lean construction materials and other materials relating to waste elimination.

Moreover, internet sources are also a part of the research methodology for the researcher to get the latest updated information of Real estate development and construction waste issues. In order for the researcher to get some practical information from the estate and construction industry, the data collection can be collected by using survey questionnaire.

The method and detail on this data collection, location, and analysis will be explained in more detail manner when this proposal is approved.

RESEARCH AREA AND TARGETTED RESPONSE

The study will be conducted in the Ghanaian real estate industry. The research will limit the types of respondents who are involved in real estate construction projects. People who have extensive experience and possess decision-making. They will represent Ghana Real Estate Developers Association, environmentalists, environmental protection agencies, construction consultants, contractors, designers, engineers, project managers, town planners and architects.

SAMPLE AND DATA COLLECTION

The data collection for the study will comprise of primary and secondary data.

In conducting a research, it is often impossible, impracticable or too expensive to collect data from all the potential units of analysis (population). Hence a smaller number of units (sample) are often chosen to represent the whole population.

The respondents will be selected through purposive sampling based on their experience on the culture of Realty estate business and the work performance. A purposive sample is a sample selected in a deliberative and non-random fashion to achieve a certain goal (Children's mercy, 2012). The researcher chose the sample based on who the researcher thinks would be appropriate for the study. According to Kumar (2005), the primary consideration in purposive sampling is the judgment of the researcher as to who can provide the best information to achieve the objectives of the study. The researcher only goes to those people who in his/her own opinion are likely to have the required information and be willing to share it. The researcher uses his discretion in selecting samples for his research.

Forty (40) respondents will be conveniently selected from the entire population of four hundred (400) registered members of GREDA (Ghana Real Estate Developers Association) as multiple case studies for the research.

caigbavboa@uj.ac.za
didibhukut@uj.ac.za

This forms 10% of the total population of Real Estate Developers in Ghana. These are companies that are doing well in the industry.

LIMITATION AND DELIMITATIONS OF THE STUDY

In such a research there is bound to be several constraints to be encountered.

Firstly, there are several Real Estate firms in the country hence the study will not be necessarily representative of all the overall population.

Secondly, the study will also be constrained in terms of time. The researcher will be constrained by the limitedness of time in which this thesis is supposed to be presented. This may not allow the researcher to critically assess large numbers of the Real estates work force. Cost is another issue that will limit how widespread the researcher's data can be collected, as more data can be necessary to have a better assessment of clients.

Nevertheless, in the face of all of these limitations, it is believed that the core objective of seeking to develop an integrated framework for the adoption of lean construction principles as a tool to revolutionized Real estate development in Ghana can be achieved with high confidence.

The limitation is being considered in relation to the natural explanation to which the searcher has limited the study and the active choices to limit the study area that is material wastage as a determinant of Estate development.

By considering the material wastage aspect of Estate development relating to existing theories and models, the researcher intends to mark a demarcation for the study. The researcher considered limitation in line with the research objectives believing that, with the changing nature of the work force the selected companies, recent trends in development, information and technology, the issue of material wastage will become consent on one of the most essential assets in Real Estate organizations.

This research will consider the inside work forces as a starting point. Ideally, a study of all the explanatory objectives will be considered appropriately in order to capture the interactive influences of other objectives and thus be able to come up with holistic and generally more acceptable results of material wastage in Estate development.

ENVISAGE FINDINGS

It is expected that the study will contribute to the development of the Real Estate Industry in Ghana. A lot of work has been done by way of practice and policies worldwide. This proposal is in response to a call in the Real Estate Industry in Ghana to develop measures to enhance their sustainability in business.

caigbavboa@uj.ac.za
didibhukut@uj.ac.za

The major objective of the thesis is to develop an integrated framework for the adoption of lean construction principles in the Real Estate Industry. It is expected that the framework will therefore fill a theoretical gap in lean construction in Real Estate business literature with respect to the Real estate construction sector to achieve its sustainability and profitability goal.

Furthermore, the research is also expected to identify and propose areas in lean construction which can be further investigated to additionally enhance the sustainability and profitability goal of the Real Estate Industry in developing countries such as Ghana and beyond.

The research is also envisaged to make some practical contributions to the Real Estate industry; it is expected to provide an innovative and practical framework which will help Real Estate professionals in the discharge of their duties. The study is also expected to educate the various respondents who will take part in the study.

The study will reveal several disturbing issues in the industry and if the findings of this research are to be extrapolated to the entire industry there will be the need to be awakened.

ETHICAL STATEMENT

Ethical consideration issues are vital in this study. This requires people to participate in the study voluntarily. It will not coheres nor compel participants into partaking of the study.

The researcher will seek the consent of Participants before they are involved in the study. The privacy of the participants will be heavily protected and kept anonymous throughout the study.

OVERVIEW OF THE CHAPTERS

The thesis will be organized as follows;

Chapter one will focus on the introduction to the study, problem statement, research objectives, research questions, research relevance, the scope and limitations of the study.

Chapter two will focus on the literature review that has been written on the topic to provide a background and the context for understanding the problem at stake.

Chapter three will outline the research methods used to generate information to answer the research objectives and research questions. Specifically, it includes the research design, population of interest, sampling size & techniques & procedures, instrumentation, methods of data collection and data handling procedures.

Chapter four is concerned with the data analysis and discussion.

Chapter five draws the curtains by providing conclusions and recommendations in relation to the key issues of the research problem and objectives.

caigbavboa@uj.ac.za
didibhukut@uj.ac.za

BUDGET AND TIMELINES

These thesis is expected to be completed in two (2) years running starting January 1, 2016 – January 1, 2018. Below is Gantt chart showing details of work to be done in months.

Item	Activities	1	6	12	16	24	Amount($)
1	Introduction the topic under study; An Integrated Framework for the adoption of lean construction principles						$ 200
2	Literature review on the various concept of waste etc						$ 800
3	Research methodology						$ 120
4	Questionnaire based on the objective of the study						$ 2,800
5	Data analysis						$ 350
6	Conclusion& Recommend						$ 80
7	Abstract writing						$ 50
8	Submission of draft						
9	Submission final report						$ 1000
	Total duration in 24 months						**$ 5,400**

CONCLUSION

Conclusion will be made on the main findings as well as possible recommendations for further research. It will also focus on proposing practical steps for the implementation of lean construction principles as a tool to eliminate waste in the processes leading to production of housing and to enhance the profitability of the developer thereby making cost of housing cheaper for the average Ghanaian worker.

caigbavboa@uj.ac.za
didibhukut@uj.ac.za

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caigbavboa@uj.ac.za

didibhukut@uj.ac.za

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caigbavboa@uj.ac.za
didibhukut@uj.ac.za

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caigbavboa@uj.ac.za
didibhukut@uj.ac.za

MARKETING MANAGEMENT AS A POTENTIAL PREREQUISITE FOR SUCCESS OF THE CONSTRUCTION INDUSTRY DEVELOPMENT AGENDA

[1,2,&3]Department of Construction Management and Quantity Surveying, University of Johannesburg, Johannesburg, South Africa
[1]Department of Building Technology, Cape Coast Polytechnic, Cape Coast, Ghana

ABSTRACT
The Ghana's Construction Industry Develop Agenda (CIDA) is plagued with many challenges. The objectives of this paper are: to identify the root cause of the challenges and examine the right corporate strategy for overcoming it. The paper adopts a descriptive study design and uses literature review as a method to summarize and examine relevant extant literature on the subject and to show why marketing is indispensable for the development of the construction industry in Ghana. Findings reveal that the challenges confronting the construction industry development agenda are unique to developing nations and largely emanates from competition. The need exist for adoption of marketing by construction businesses as a means to enhance their competitive advantage which are necessary for overcoming the construction industry development challenges. The CIDA may remain a mirage unless the effort to develop the construction industry is underpinned by construction business development through effective marketing management of construction business enterprises, to overcome the effects of competition.

Keywords: competition, construction, marketing,

INTRODUCTION
There is a strong link between construction and economic activity (Anaman and Osei-Amponsah, 2007) and the projected economic growth in Ghana. In Ghana for instance, the construction industry's contribution to GDP has shown an increasing trend from 8.5% to 11.8% from 2010 to 2013 respectively (GSS, 2014); a sign of its growing importance in the development of nations. Not only do these provisions of infrastructure contribute to GDP growth of a nation, they also provide a means by which the construction industry obtains the necessary resources in terms of financial gains needed for its development. Infrastructure delivery can therefore have a twin benefit: it can be used as a means to develop the construction industry of nations' especially in developing nation, where infrastructural needs are comparatively much greater and it can also to be used for the provision of social and economic development needs of nations. This explains why the Construction Industry Development Agenda has become a topical issue of both national and international interest.

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Ghana as a developing economy has a great need for physical infrastructures, which are built through construction activities. Such infrastructure includes schools, hospitals, airports, highways, roads, hospitals, power plants, dams, housing, maintenance on existing infrastructure, and seaports, bridges, roads, houses among others that contribute to the socio-economic development of the country (Ofori, 2012; United Nations Human Development Report/Index, 2008; Jaselskis and Talukhaba 1998: 185). The relationship between infrastructural delivery and the construction industry suggest that the greater the infrastructure needs of a nation, the greater the gains to the construction companies that deliver it. These gains which occur in terms of financial benefits are vital resources needed for the construction industry development. Although these financial gains are highly desirable, it has become hardly feasible for domestic construction companies to obtain them. This is due to the challenges that come along with situations where a nation has great need for infrastructures (Ofori, 2012).

The rest of the paper begins by contextualizing construction industry development and examines the construction industry development challenges and their causes. It further explores marketing as the right corporate strategy for overcoming the challenges hindering the construction industry development agenda.

CONSTRUCTION INDUSTRY DEVELOPMENT

In the view of Ofori (1993: 48-49) construction industry development "refers to the pursuit of the improvement of the industry as an objective in itself … the approach is direct and continuous … [it] would incorporate appropriate strategies, and integrated plans and programmes under specific implementing agencies". This definition suggests that appropriate strategies coupled with integrated plans and programmes implemented and supervised by specific agencies are critical factors for success.

This leads to improvement in the industry itself and the resultant effects are used to achieve social and economic benefits by nations. Although, the various dimensions highlighted in the definition are explored, it appears the aspect that has to do with strategies lack some measure of appropriateness, giving our peculiar characteristics as a nation.

A more concise and yet detailed definition of construction industry development is:

"a deliberate and managed process to improve the capacity and effectiveness of the construction industry to meet the national economic demand for building and civil engineering products, and to support sustained national economic and social development objectives" (Task Group 29). The definition highlights 'to improve the capacity'. This means that construction industry development must first improve the capacity of the industry to meet the demand for building and civil products before the benefit of 'supporting sustained national economic and social development' can be realized. Improving the capacity is a factor

that requires the use of the right cooperate strategy. When the capacity improvement is done, the benefits are enormous.

Ofori (2012:8) notes that the development of the construction industry wills among others things promote:

1. Increased value for money to industry clients as well as environmental responsibility in the delivery process
2. The viability and competitiveness of domestic construction enterprises
3. Optimisation of the role of all participants and stakeholders through process, technological, institutional enhancement and through appropriate human resource development.

From the foregoing, it is obvious that construction industry development is deemed to have the following components in order to achieve the benefits: human resource development; materials development; technology development; corporate development; development of documentation, procedures and operating environment; institution building; and develop. Developments in these areas are necessary for overcoming the inherent challenges that confronts most countries in the construction industry development agenda.

CONSTRUCTION INDUSTRY DEVELOPMENT CHALLENGES

The Ghana construction industry faces more of these problems in addition to many other several constraints. In a report by the Government of the Republic of Ghana (2000) Highway Network Master Plan, 2001-2020, (P. 144–145) the following problems were further highlighted as follows:

"national road contractors face the following problems "regardless of their financial class"

Inability to secure adequate working capital
Inadequate management
Insufficient engineering capacity
Poor workmanship.

The problems of consultants include:

inadequate operating cash flow
inadequate flow of jobs
low level of fees, hinders the development of their technical support system
low productivity
poor quality of work
lack of means and opportunities for providing training."

Several other researchers have also identified other challenges of the construction industry. In the work of Fugar et al. (2013), the seven key challenges identified include;

1. absence of a principal development regulatory body,
2. Inadequate financial resources,
3. Lack of investment in human resource development,
4. Inability to embrace change,
5. Low technology in the industry,
6. Lack of appreciation for workforce in the industry and
7. High level of employee mobility

All these factors can be traced back, directly or indirectly to the fact that domestic construction firms that constitute a greater part of the construction firms that makes the construction industry have not had the chance to participate fully in the infrastructural delivery of Ghana. As a result the firms are denied of the numerous benefits that can result from undertaken infrastructural projects. Principal amongst such benefits are financial gains (Eyiah and Cook, 2003), which is the single most important factor needed to overcome most of the challenges highlighted earlier. Firms with sufficient financial resources can successfully deal with issues with employee mobility since employees mostly move to other firms due better financial gains they hope to receive. In a similar vein, firms with adequate financial resources can also adopt high technologies since such technologies come along with the use of some plants and equipments which require huge capital investment for their acquisition.

The study of Eyiah and Cook (2003) was carried out with the aim to identify the financing needs and constraints of contractors in Ghana; determine the extent to which their characteristics influence financing needs and constraints; examine factors contributing to these constraints and the effect on different groups of contractors; and develop guidelines for policy-makers. In conclusion, Eyiah and Cook (2003) advocated for more but effective financing schemes for local contractors. Eyiah and Cook (2003) also cited contractor inability to service equipment loans; disparity between Ghanaian currency and foreign currency in which cost of equipment was to be repaid among others.

ROOT CAUSE OF THE CONSTRUCTION INDUSTRY DEVELOPMENT CHALLENGES

What is remarkable in other works that highlights challenges confronting the construction industry is that all the authors converge at this one factor: absence of a central agency to regulate and ensure the continuous development of the construction industry. That makes this single factor appear as pivotal challenge amongst all other known challenges confronting the construction industry of Ghana. This factor has been associated with the construction industry development of Ghana as the major stumbling block (Ofori, 2012).

Although, this is an important factor, it may not be entirely the overall problem. Highlighting on the challenges facing individual construction companies towards the construction industry development, Ofori (2012) argues that the:

> local construction consultants, contractors and individual practitioners will face greater competition from their foreign counterparts which are likely to have greater experience and resources. Another challenge will be for the local construction industry to exploit the opportunities offered by the Economic Community of West African States, and address its possible negative impact such as an influx into Ghana of firms from the other member countries.
>
> (P. 16-17)

The enormity of infrastructure needs of many developing countries explains why many multinational firms have moved to developing countries where a lot of markets are emerging to do business (Wooldridge, 2010). Because such countries are mainly developing countries, there are lots of demands for all types of construction work (Jaselskis and Talukhaba, 1998) and that demand presents work opportunities for construction companies. Also, the existence of huge infrastructural deficit in such countries impedes the nation's economic and social growth. In an attempt to accelerate the 'bridging of infrastructure gaps' to overcome existing deficits in infrastructure, many developing countries have instituted incentive packages designed to attract foreign investment and foreign firms including tax reliefs. In Ghana for example, the Free Zones Act, 1995 was passed inter alia to provide incentives such as tax concessions to firms granted licences under the Act (Laryea 2010).

In most countries, especially developing nations, the enormity of such needs attracts construction firms both within and outside which also makes the country ripe for competition. Also, in this era of globalization, which means collapse of boundaries, all nations has become competing nations in an attempt position themselves to attract foreign investment (Ofori, 2012). The opportunity offered by ECOWAS and globalization further increases the intensity of the competition. The Ghanaian construction industry's ability to take maximum advantage of the opportunities for its own growth is the biggest question today because competition remains the biggest challenge of the industry.

High competition and high risk have been considered as the construction industry's major challenge (Schaufelberger 2009). Mochtar and Arditi (2001) contend that, the construction industry is typically characterized by extreme competitiveness, high uncertainty and risks, and generally low profit margins when compared to other industries. In Ghana, these constraints are exacerbated by globalization, which has manifested in an inflow of investment into Ghana from other countries. Although, it creates work opportunities however, domestic construction consultants, contractors and individual practitioners face greater competition from their non domestic (foreign) counterparts that are likely to have greater experience and resources (Ofori, 2012). Similarly, the opportunities offered by the Economic Community of

West African States, has also lead to an influx into Ghana of firms from the other member countries that further escalates the intensity of competition prevailing in the industry.

It is therefore not surprising that market for major projects in developing countries tends to be dominated by foreign contractors (Laryea, 2010). In a study on contractor development in Nigeria, Adams (1997) found that major projects in most developing countries are carried out by foreign contractors because of deficiencies in indigenous construction capacity. A similar finding was reported by Aniekwu (1995) in the study of business environment of contractors in Nigeria. Of the 344 respondents, 266 were indigenous contractors (wholly Nigerian-owned) and 78 foreign contractors (either Nigerian branch of a foreign company or Nigerian/foreign joint venture). Although 78% of contractors were indigenous firms, their total share of annual construction work was likely to be significantly lower than the total annual volume of work done by the 22% foreign firms. These findings are indicative of the major takeover of construction related jobs by foreign firms in developing countries. The stack reality is summed up in the account of an interview with Ghanaian contractors reported by Laryea (2010):

> One contractor said that a Ghanaian contractor who wants to increase and build their capacity should approach foreign firms who might like to sublet some of their work. This would help the local contractor in developing capacity and learning and transferring knowledge
>
> (P. 225)

The above situation is an indication of the extent to which the domestic construction companies are denied of the opportunity to participate in the infrastructure delivery of their own counties. It also shows the extent to which local construction companies are struggling for construction and construction related works that are at the disposal of the non domestic construction companies. Domestic contractors can at best wish for sublet works (not main works) from non domestic construction companies and at worst not get the work at all. Even their desire for subcontracting works from the non domestic construction companies is merely a wishful thinking that has no guarantee.

These indications suggest that domestic construction firms are not able to secure adequate share of the infrastructure projects. This is due to the intensity of competition in the construction industry of many developing nations due to the greater needs of infrastructures. The problem arises where the non-domestic firms wins greater share of projects due their greater resources and experience that gives them competitive advantage over their domestic counterparts. That indicates that the challenges of the CIDA are repercussions of competition in the construction industry of nations especially in developing nations, such as Ghana.

MARKETING AS THE RIGHT CORPORATE STRATEGY

Marketing and competition

Marketing as a management function is now widely adopted by manufacturing, distribution and many more service industries. Although marketing has a wide application in many industries, it has not yet been applied to any great extent by contractors in the construction industry, except those engaged in speculative house building where its benefits are comparatively understood. With intense competition that threatens survival of domestic contractors, marketing is expected to arouse the interest of construction contractors.

To survive competition and to grow, construction companies need to constantly seek ways to outbid their competitors and explore new and/or less crowded areas of construction that may provide more jobs and higher profits. To this end, marketing which has been referred to as "an investment for creating a competitive edge–an empowerment for competitive advantage" (Arditi et al, 2008, P. 255) is recognized as one of the more important functions for helping the construction companies to meet the unprecedented challenges faced by them (Kotler and Conner, 1977). In this context, marketing may help construction companies to differentiate themselves from their competitors, cultivate and/or keep clients, and thereby create competitive advantage needed to effectively compete with non domestic construction companies (Arditi et al. 2008; Chen and Mohamed 2008).

Marketing therefore become the fundamental component for the growth and survival of construction companies by enhancing their knowledge to ensure continuous relevance and to enable them move quickly into new areas of service as opportunities arise. Kotler and Conner (1977) noted that a successful competition of a firm that leads to survival on the market requires the achievement of three major objectives i.e. a sufficient demand a sustained growth and profitable volume. This according to Jaafar et al., (2008) justifies the important role of marketing practices in the management of construction companies.

The need for marketing in the operations of business enterprise is enormous. Notable amongst them are the challenges that came along with the beginning of the 21st century.

Kotler and Keller (2012:3), notes that:

> "The first decade of the 21st century challenged firms to prosper financially and even survive in the face of an unforgiving economic environment. Marketing is playing a key role in addressing those challenges.

This assertion underscores the role of marketing function in the operations of a business enterprise: to prosper financially and survive in the business environment. This is a top priority for every business. This explains why marketing has aroused the attention of many industries including construction.

Naranjo et al. (2011) notes that:

> 'Construction enterprises are aware of the importance of involving marketing in their management functions as a way to adapt themselves not only to the continuous changes in the industry, but also to satisfy their clients' demands, while being competitive and improving their business strategy' (Naranjo et al., 2011:245).

The indispensability of marketing for every business industry is summarized by Kotler and Keller (2012:3). The authors concur that:

> Finance, operations, accounting, and other business functions won't really matter without sufficient demand for products and services so the firm can make a profit. In other words, there must be a top line for there to be a bottom line. Thus financial success often depends on marketing ability"

This marketing ability of business enterprises is especially useful for businesses that are operating in intensely competitive business environments such as construction. This underscore the need for marketing in the operations of a business enterprise particularly in developing nations where competition is intense and the competing firms turns to make greater competitive advantage that the local construction businesses. By focusing its marketing activities, a firm can protect its existing customer base and win new client business. This can be achieved through the proper understanding and management of the client base, and in enabling the tailoring of corporate messages, this would improve the chance of winning work and the profitability of that work (Smith, 2001).

Marketing and the construction industry

However, construction enterprise management practices according to Cicmil and Nickolson (1998:96),

> "suffers from a "cast in concrete", inwards-oriented management paradigm which forms a barrier to the implementation of some contemporary managerial techniques and philosophies, now widely recognised and adopted in other industrial sectors".

Marketing is among the managerial techniques which are now widely recognized in many industries. However, the inward-oriented management paradigm prevents it utilization in the construction businesses.

Cicmil and Nickolson (1998), further states that:

> "Construction business practices suffer from parochial attitudes to ownership of projects, technically biased operations, and conservative, efficiency-based approach to management. Novice propositions, such as the acceptance of customer-oriented policies through partnering, synergy, professional concurrence and organisational

systems conducive to learning, have been a topic of major academic and professional debates on culture change in the construction industry" (p. 96)

The authors further argue that:

"Management practices in the construction industry are dominated by the engineers paradigm (Seymour and Rooke, 1995) which leaves a rather limited scope for implementation of contemporary business theories, management processes and behavioural change, such as marketing driven strategic management or total quality management (TQM)". (p. 97)

Many other researchers such as Betts and Wood-Harper, (1994); Cicmil and Egan, (1996); Seymour et al., (1997) and other have made similar observations. Typical management structure of construction business enterprise is illustrated in figure 1. It is obvious that the addition of marketing to the business functions appears to be a wishful thinking. Morgan and Morgan (1991) states that marketing within the construction profession is considered at worst as an alien concept, and at best as a new development that is viewed with scepticism. Similarly, Pheng (1991) observed that marketing has attracted only little attention among construction professionals. Morgan and Morgan (1990) also stated that marketing is less developed in the professional industry and often performed in most firms in an ad hoc basis. This augments the assertion that marketing is not seen as a source of competitive advantage by most construction business companies.

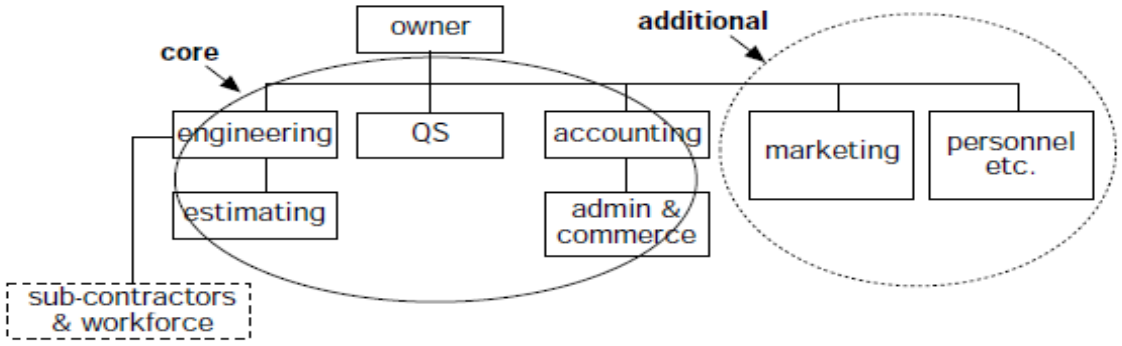


Figure 1: An outline of a typical organisational structure development in a small/medium construction contracting company

Source: Adopted from Cicmil and Nickolson (1998)

MANAGERIALS IMPLICATIONS AND DIRECTIONS FOR FUTURE RESEARCH

The paper demonstrates that active participation in infrastructural delivery by domestic construction companies may be used to address many of the challenges facing the construction industry in Ghana. This will in turn enhance the effort towards developing the construction industry of Ghana. However, this is hindered by competition.

The paper has further shown that the establishment of a central regulatory agency may not be the only sure way towards success of construction industry development agenda, as has been indicated by many researchers in this field of research. This is because the construction industry environment is now experiencing a new wave of challenge: competition which has arisen out of globalization and other changes occurring in the construction industry. Due to that, what is equally important is marketing as a management function in the operations of a construction business enterprise. This is essential for competitive advantage which is needed for construction businesses to survive competition, to grow and to be profitable. When these prerequisites are met, the CIDA can be achieved.

Managerial Implications

Management of construction business enterprises must embrace marketing in their management functions. They must acquire necessary marketing skills and manpower, and allocate adequate funds for marketing activities.

Directions for Future Research

Future research must focus on the role of marketing in the operations of a construction business enterprise in face of competition. Especially important are empirical research that will result in integrated models and frameworks for marketing construction business enterprises that will serve to guide construction businesses on the application of marketing to ensure overall effectiveness.

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A FRAMEWORK FOR HIGHER EDUCATION AND INDUSTRY LINKAGE IN THE GHANAIAN BUILT ENVIRONMENT

Alhassan, M.[1], Aigbavboa, C. O.[2] and Atepor, L.[3]

[1&2] *Department of Construction Management and Quantity Surveying, University of Johannesburg, Johannesburg, South Africa*
[3]*Mechanical Engineering Department, Cape Coast Polytechnic, Ghana*

ABSTRACT
One of the challenges we face as a nation is the absence of relevance or responsiveness of the polytechnic training efforts to the changing needs of industry and society. The overall purpose of this study is to explore the effectiveness of industrial attachment collaboration between higher institutions and the industry. The objectives are to identify the relevance of the polytechnic curricula to industry and the world of work. To find how Polytechnics are actively involved in the monitoring and assessment of students' industrial attachment. To determine the capacity of the polytechnics in the delivery of both theory and practical lessons. To identify major constraints faced by polytechnics and the Industry during attachment. To find out how mutual benefits between polytechnics and Industry are likely to strengthen collaborations. Existing research works were conducted in the research area. The industrial attachment is expected to give students the requisite practical skill and for that matter the needed manpower necessary for national development.

Keywords*: Industry; Linkage; Education; Construction; Ghana*

INTRODUCTION

Generally speaking, all past and present governments of Ghana ranked Technical Education high on their policy agenda including polytechnic education. Notably, government in 2004 renewed its pledge to continue supporting polytechnics in their drive to produce technically trained graduates for national development (Iddrisu, et al, 2014). Government will continue to equip the polytechnics to make them offer tertiary education in their own right; to emphasise practical skills that are needed to run the productive economy and build a nation. Achio (2012) stated that the linkage between Polytechnic education and industry was very crucial to its identity and development as the industry provides placement for their students as well as helps to set the standards through which the students are trained. He stated that they have recognized the acute need to equip their graduates with key employable knowledge and skills, and as such had reached agreements to co-operate in skills training, teaching and research with a number of firms. In Zimbabwe because of a growing number of universities producing graduates each year and dwindling employment opportunities employers have raised the stake by looking for those graduates who are self starters and who have gone through the working environment (Matamande, et al, 2013). Not all aspects a of profession

munkhas@yahoo.com

can be learned in a classroom, but must necessarily be learned in the environment where the profession is practiced (Barbeau and stull,1990).

Ideally there should be a linkage between educational institutions and the world of work. According to Agyefi-Mensah (2014) the quality of the Polytechnic curriculum is a concern for Ghanaians. He emphasized that the curriculum is intended to reflect the demands and expectations of the larger society–local and global. There should be constant review of national curricula in general and those in our Polytechnics in particular are important. Mensah, A. (2002) in educational review report noted that one of the challenges we face as a nation is the lack of relevance or responsiveness of our national curricula to the changing needs of society and other external factors. Yawson (2014) in a three day conference highlighted the need for polytechnics and Industry linkages, and to ensure that solutions are found to challenges facing industry and polytechnics in terms of hands down training for students. He further explained that the gap between the two sectors could be bridged when technical staff from industry were engaged in part-time teaching to impart practical knowledge whiles officials from the school also visit industries to be abreast with current methodology and equipment (Agyefi-Mensah, 2014).

RATIONALE / MOTIVATION FOR THE STUDY

One of the major functions of polytechnics is to develop a curriculum which is in consonance with what pertains in industry and obviously industrial attachment is a major component of the curriculum. Ideally, there should be networking and collaboration between polytechnics and the world of work. One of the challenges we face as a nation is the absence of relevance or responsiveness of the polytechnic training efforts to the changing needs of industry and society. Students on attachment seem not to be doing well after graduation. It is against this background that the researcher conducts a survey to examine the circumstances surrounding polytechnic-industry linkages, especially Students' Industrial Attachment (SIA)

Significance of The Study

The findings may influence institutional policies on training students in the Technical Universities, making industrial attachment more effective and efficient; consequently this may enhance the job prospects of graduates. The research study could provide information on types of linkages with industry and models of theories. The new framework will help improve the capacity of the polytechnics. The findings shall also contribute to knowledge by which all stake holders can take advantage of. Additionally, implementation of the findings can also go a long way to address the national unemployment problem and hence foster national development.

Problem Statement

Polytechnics are expected to give educational offerings that are career oriented, linking it with industry. However this has not been the case; there are great lapses between the needs of industry and the caliber of graduates produced to serve in those industries. Adjei et al, (2014) in their works indicated that Competency-based training and industrial attachment have been introduced and instituted in the polytechnics as a significant step and conduit of enhancing technical knowledge and productive skills of students. One raises quizzical eye brows as to whether the industrial attachment is not well designed or implemented? Or there is no close collaboration between polytechnics and industries? Or lack of funding or capacity is the major problem? This study seeks to investigate the lapses that exist between polytechnics and industries, and possible measures that are likely to link up polytechnics with industries for effective industrial attachment.

Research Questions

The research questions posed in this study are as follows:

- To what extent are polytechnic curricula relevant to industry and the world of work?
- What roles do Institutions and Firms play in monitoring and assessment of students' industrial attachment
- Do Polytechnics have the requisite capacity in the delivery of both theory and practical lessons?
- What are the constraints faced by the Institutions and firms during industrial attachment?
- How does apparent mutual benefit between Universities and Industry strengthen collaborations
- What other collaborations generally contribute to effective partnership of University-Industry.

Purpose of The Study

The overall purpose of this study is to explore the effectiveness of industrial attachment collaboration between higher institutions and the industry, including the major constraints of industry in terms of giving the right skills to interns. It will assess the factors that will improve the capacity of polytechnics as well as the capacity of industry to provide relevant practical training to students during industrial attachment.

Objectives of The Study

The study is designed to achieving the following specific objectives:

- To assess the relevance of the polytechnic curricula to industry and the world of work.
- To look at how Polytechnics are actively involved in the monitoring and assessment of students' industrial attachment.

munkhas@yahoo.com

- To investigate the capacity of the polytechnics in the delivery of both theory and practical lessons.
- To look at major constraints faced by polytechnics and the Industry during attachment.
- To find out how mutual benefits between polytechnics and Industry are likely to strengthen collaborations
- What other collaborations generally contribute to effective polytechnic-Industry partnership.

Value of The Study

This is to identify the constraints and challenges confronting industrial attachment of students and nature of networking that is currently in operation, and to design a conceptual frame wok for a more effective networking and collaboration between polytechnics and industry.

Literature Review

Polytechnics are comprehensive universities offering professional and career-focused programs in the arts, social and related behavioral sciences, engineering, education and natural sciences and technology that engage students in active, applied learning, theory and research essential to the future of society, business and industry. According to (Lauber, et al 2004)Industrial attachment is a practical skill training enterprise prepared to narrow the gap between the theoretical world of academic enterprise and the world of work of professional practice.

Importance of higher education and Industry Linkages

In realising the aims and objectives of polytechnic education in human capital development, it is quite essential for students and senior members to acquire both theoretical and practical knowledge including technical skills (Adjei et al, 2014). This effort can be achieved through institutional support and collaboration as well as polytechnic-industry linkage. With regard to institutional support and collaboration, a number of key institutions including the Ministry of Education (MoE), National Council for Tertiary Education (NCTE), National Accreditation Board (NAB), National Board for Professional and Technician Examinations (NABPTEX), and Council for Technical Vocational Education and Training (COTVET) have been set up to coordinate the activities of technical institutions including the polytechnics (Adjei N.K. et al, 2014). Adequate funding for the converted polytechnics (Afeti, et al, 2014) is a critical challenge that must be addressed by the Government, policy implementers, and leaders of the polytechnics currently; the Government of Ghana spends less than GH₵ 3,000 on a student in a polytechnic per year. The huge gap between the current and optimal funding levels will have to be bridged if the quality of training in the converted polytechnics is to be comparable to international standards (Afeti, et al, 2014).This collaboration is to ensure quality of programmes and good governance, also to ensure the award of degrees and diploma

munkhas@yahoo.com

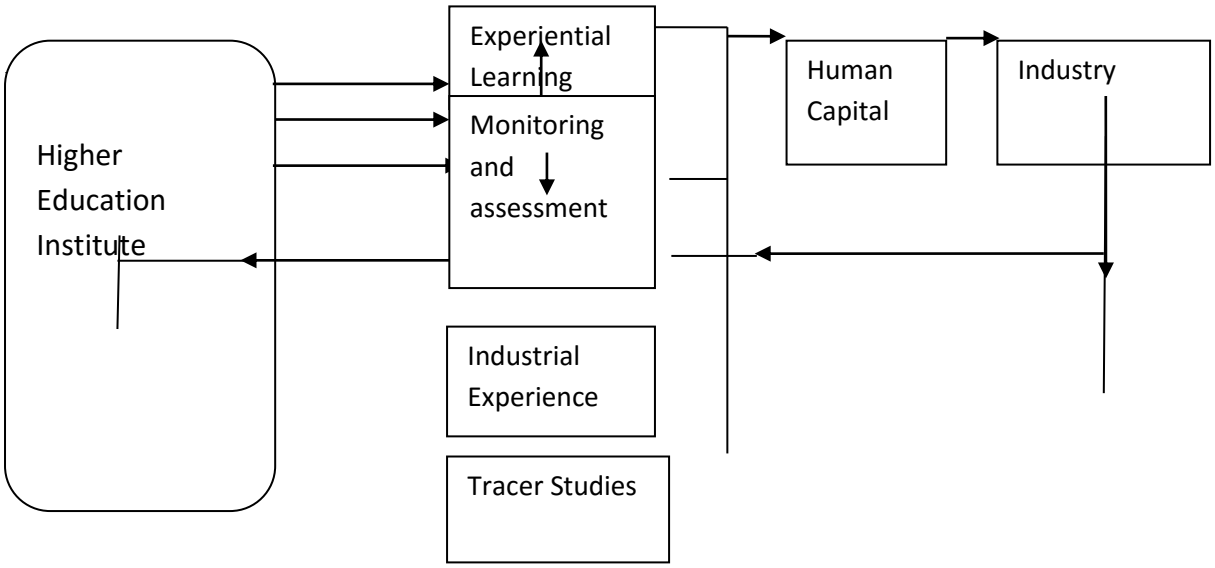
certificates to students. Competency-based training and industrial attachment have been introduced and instituted in the polytechnics as a significant step and conduit of enhancing technical knowledge, productive skills of students (Adjei et al, 2014). Instead of the methodology being student centered it is rather teacher centered approach with skeletal practical training. Unfortunately this curriculum, since its inception, had not been revised. University-industry linkages (Ssebuwufu, et al.2012) require pro-activity on the part of both sides, the emphasis on the need for internal capacity-building (skill development, strategic planning, leadership, etc.) rather than on non-conducive external conditions (lack of national policies, industry weaknesses, etc.), they therefore challenge universities to take responsibility and action for strengthening their own internal capacity to work with the productive sector. (Barry and Sawyerr, 2008) noted that the strength of University-industry linkages is basically measured in terms of how closely institutions work with high-tech industries and other key players in the formal sector. They further noted that African economies differ significantly from those economies that are more industrialised. For effective and successful university-Industry relation (West, 2008) enumerated three major points as the mission of each partner and must be supported in the collaboration, institutional practices and national resources should focus on promoting appropriate long term partnerships between HEI,s and industry. HEIs and industries should focus on the benefits to each party that will result from the collaborations and ensure timely conduct of the research and development of the research findings. Relating the case of universities to that of polytechnics (Pauw et al, 2008) stated that there is a growing perception concerning the knowledge and skills acquired by students in African universities; they do not meet the requirements of industry and the wider economy. This mismatch results from under-training in the critical skills of problem-solving, analytical thinking and communication. This accounts for the emerging high graduate unemployment and under-employment in many parts of Africa.

Institutions of higher learning are expected to constantly interact with their environments. In fact, they need to structure themselves to deal with forces in the world around them (Scott, 2008). On the contrary, a closed-system theory views Institutions of higher learning as sufficiently independent to solve most of their problems through their internal forces, without taking into account forces in the external environment. Afeti (2003) clearly indicated that the curriculum of the polytechnics in Ghana was designed without taking cognizance of the needs of local industries, and therefore not practical-oriented. Industrial attachment cannot be effective without educational institution partnering with industry for certain collaborations.
Experiential Learning couple with student industrial attachment will definitely lay a solid foundation leading to human capital development that is needed for nation building. Jarvis(1995) noted that industrial work experience, following a prior theoretical learning in the lecture hall, reinforces the lesson learnt and therefore produces skilled and knowledgeable students who possess productive and employable skills required for the world of work

Theoretical Perspective

The two main theories found to be relevant to this study are the Experiential Learning Theory and Human Capital Theory. In this context, industrial attachment is the collaborative effort between educational institutions and the industry. Clearly speaking, industrial attachment is an integral part of the Polytechnic curriculum and is expected to address this issue. However, Ford (2007) stressed the fact that Polytechnic curricula are alien to the manpower needs of the country and should therefore be tailored to reflect the developmental needs of the country.

UNIVERSITY-INDUSTRY TRAINING FRAMEWORK



Human Capital Theory

This can be defined as knowledge, skills, attitudes, aptitudes, and other acquired traits contributing to production (Goode, 1959). It implies that this model takes into account a synergy of theoretical and practical learning in the overall human capital development of the student undergoing training. Human capital is operational on the assumption that formal education is necessary and highly instrumental in improving the production capacity of a population. It stresses on the fact that education increases the productivity and efficiency of workers by increasing the level of cognitive stock of economically productive human capability. (Psacharopoulos & Woodhall, 1997).

Experiential Learning

This is a situation where **student has direct encounter with the phenomenon being studied instead of merely conceiving and thinking about it (Brookfield, 1983: Smith, 2005).** The key proponents who laid groundwork of learning through experience or learning by doing were John Dewy (1859-1952), Carl Rogers (1902-1987), and David Colb (1939). John Dewy discouraged rote learning and learning by memorization but rather laid emphasis

on the concept of experiential learning thus, learning by doing which focuses on problem solving and critical thinking. Davis (2011) indicated that what is so essential about experiential learning is that, it is learning by doing, reflecting and applying. These processes make it quite distinct from other models such as "learn by doing" or "hands on learning". A number of steps are evident in experiential learning Haynes (2007): Experiencing (doing), reflecting (what happen), analyzing (what is important) and generalizing (so what). In experiential learning the instructor guides rather than direct the learning process where student develops a keen interest and enthusiasm for learning. Houle (1980) describe experiential learning in twofold: A learning situation where students are given the chance to acquire and apply knowledge, skills and feelings in an immediate and relevant setting.

Conceptual Framework for the study

It is worth noting that experiential learning rather restricts academic and practical experience to the educational set up, neglecting collaborations with industry where students could be attached to improve upon deficiencies and learn new skills relevant to the word of work. Houle (1980) rather referred to the experiential environment as "immediate and relevant setting" which could be construed to mean both institution and industry. This study could further be built on the concept of GMU, 2011 and Lorette, 2011 who listed a number of experiential learning opportunities in higher education, and it includes Apprenticeship experience, internship experience, practicum experience, etc, where these concepts have something to do with industry.

The open system is the main approach to connect the institution and the industry for effective collaboration. The open system model shall be blended with human capital theory and the experiential learning theory as a training strategy. The open system model is expected to constantly interact with the environment in which the polytechnic is situated. The open system needs to structure itself to deal with forces in the world around them (Scott, 2008). It implies that allowing a system to be open ultimately sustains growth and serves its parent environment.

Strictly based on the understanding of environment, this study will certainly construe the idea of environment to mean industry with close monitoring and assessment.

Integrated (Enhanced) Industrial Experience

Integrated Industrial Experience in this context is the learner's translation of theoretical learning into practical application during student industrial attachment with close bilateral monitoring and assessment from the firm and the Institution. It encompasses strengthening institutional capacity in terms of qualified staff and provision of requisite machinery and equipment. It is also expedient to support startup companies or existing and emerging productive sectors of the economy with technical expertise and Research & Development

(Afeti et al, 2014). The theoretical content must also be reduced, making more room for practical and skill training. It is wasteful to teach people things they would never use. John franklin Bobbitt (1912), his primary goal of curriculum design is the elimination of waste. Graduate career tracking should also be given due attention in order to assure quality.

Keywords: industrial attachment, practical acquisition, reflective learning, bilateral supervision and assessment, building institutional capacity, nation building.

Assumptions Underlying the Framework

This framework is operational on the assumption that theoretical content coupled with enhanced industrial experience will give a graduate the much needed skills relevant to industry for both wage and self-employment, and for that matter give the country the requisite human capital for nation building. Enhanced industrial experience in this context implies close monitoring in terms of assessment during attachment. The following variables shall be put together in order to operationalise the concept. They however include reduction of theoretical content, increase duration of attachment, evidence of mutual benefits, relevance of acquired skills, bilateral assessment and supervision, engagement of all students for attachment and well structured tracer studies.

CONTRIBUTION TO KNOWLEDGE

The study will deepen the partnership between the polytechnics and the industry, improving communication between them and bilateral relation during attachment. Consequently, making student industrial attachment more effective. The industrial attachment is expected to give students the requisite practical skill and for that matter the needed manpower necessary for national development.

CONCLUSION

In conclusion, the study seeks to examine the linkage between polytechnics and industries, and the cooperation between the two institutions, including the benefits accruing to both sides. A mixed methodology shall be used, comprising both quantitative and qualitative approaches. Obviously the case study approach shall be used to survey the lapses between needs of industries and products of polytechnics. The purposive method of the non-probability method shall be use d to select the sample. A sample size of 300 shall be considered and the descriptive method shall be used to answer the research questions. Questionnaire consisting of close and open ended items together with interview sessions shall be administered to respondents. In analysing the data appropriate statistical model. Finally the study shall be developed on a conceptual frame work which shall serve as a blue print and a guide for a smooth sail.

munkhas@yahoo.com

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EXPLORING THE INTEGRATED COST CONTROL MODELS USEDIN THE CONSTRUCTION INDUSTRY

Adjei, K. O.[1], Aigbavboa, C. O.[2], Thwala, W. D.[3]

[1]*Department of Building Technology, Faculty of Built & Natural Environment, Kumasi Polytechnic, P. O. Box 854, Kumasi - Ghana*
[1,2,3] *Department of Construction Management and Quantity Surveying, University of Johannesburg, Johannesburg, South Africa*

ABSTRACT
Project cost control models bring about all the techniques used in developing construction cost, cash flow forecasting and cost control. The construction industry has been unfamiliar with its characteristics and properties.This study therefore exploresthe existing integrated cost control models used in the construction industry.The study was conducted through a literatureresearch. Three different integrated cost control models used for the construction industry were selected between the years 2001 and 2013. The data used in the report is mainly qualitative and it was based on content analysis.The findings show that all the models had cost control systems. The inputs of the models were bills of quantities, resources list, activities programme, work breakdown structure and estimates. The processes of the models were managing all the resources; materials, labour, equipment and overhead costs, monitoring, controlling, reporting, decision making, corrective actions, forecasting and deadlines. Lastly the outputs of the models were project loss or profit, post evaluation and historical data kept for future use.

Keywords: *cost control, model, construction industry, forecasting, systems*

1.0 INTRODUCTION
Cost controlpractice should be seen as an important management tool that is crucial to the survival of every construction company in Africa and beyond.Project cost control models bring about all the techniques used in developing construction cost, cash flow forecasting and cost control. The construction industry has been unfamiliar with its characteristics and properties.An understanding of the various types of cost control modelsare vital to enable managers to effectively prepare their cost control and the development of future forecasting techniques for effective project delivery (Skitmore and Marston, 2005).According to Cleland and Ireland (2002) cost control is the process of monitoring; evaluating and comparing planned result with actual results to determine the status of the project cost, schedule and technical performance objectives.

kofiwusugh@yahoo.com

When construction begins the budget which is a conversion from the estimate, isfixed and acts as the baseline for the contractor to control costs (Bahaudin, et al, 2012, Adjei et al, 2015). The responsibility of the contractor to the client isto carry out the works according to the specifications, cost and schedule. The contractor at this stage is faced with one of the most difficult task in construction management as this is the phase that potentially has thegreatest ability to increase the planned budgeted costs (Halpinand Woodhead, 1998). With maximum profit inmind, because the goals of any business cannot be achieved without profit, the contractor will have to turn to cost control for assistance.

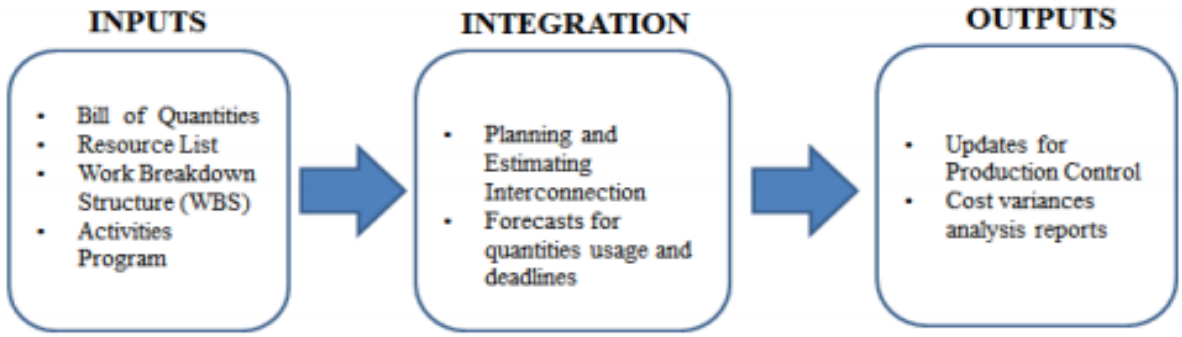
The cost control mechanismis intended to provide an early warning system, alerting of possible budget problems in good time for remedial action to be taken. The Quantity Surveyor or Cost Engineer may berequired to use the cost control process to develop a range of options for the design team toconsider and select one option within the prescribed budget limit (Dikko, 2002).

The objectives of the study were to compare and contrast the existing construction cost control models used in the construction industry.

PREVIOUS COST CONTROL MODELS

Figure 1: Cost Control Model

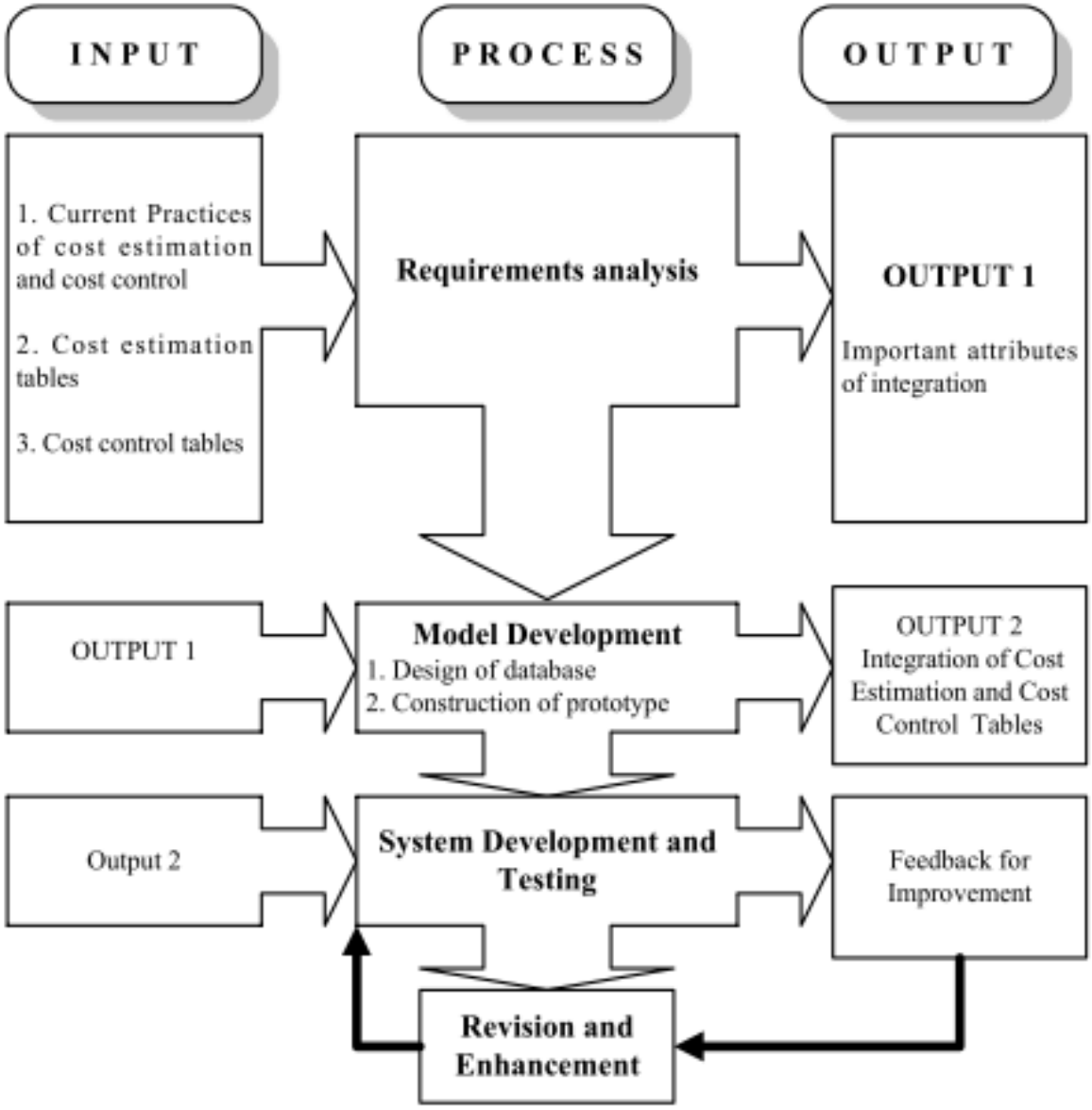
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Source: (Amaral Lopes, 2013)

By implementing the aboveIntegrated System in figure 1, it is possible to obtain data regarding the current state of the project as well as its future, reliably, securely and quickly. Thus, any change in the resource cost or in its consumption to in any bill item, will be reflected dynamically in all of the reports and the documents that are available in the software package, and this information, if used correctly, will allow the project managers to make informed decisions whenever to improve the Project's final cost and completion date. This is true both when establishing the base forecast and at any stage during the execution phase of the Project (Amaral Lopes, 2013).

Figure 2: Cost Control Model 2

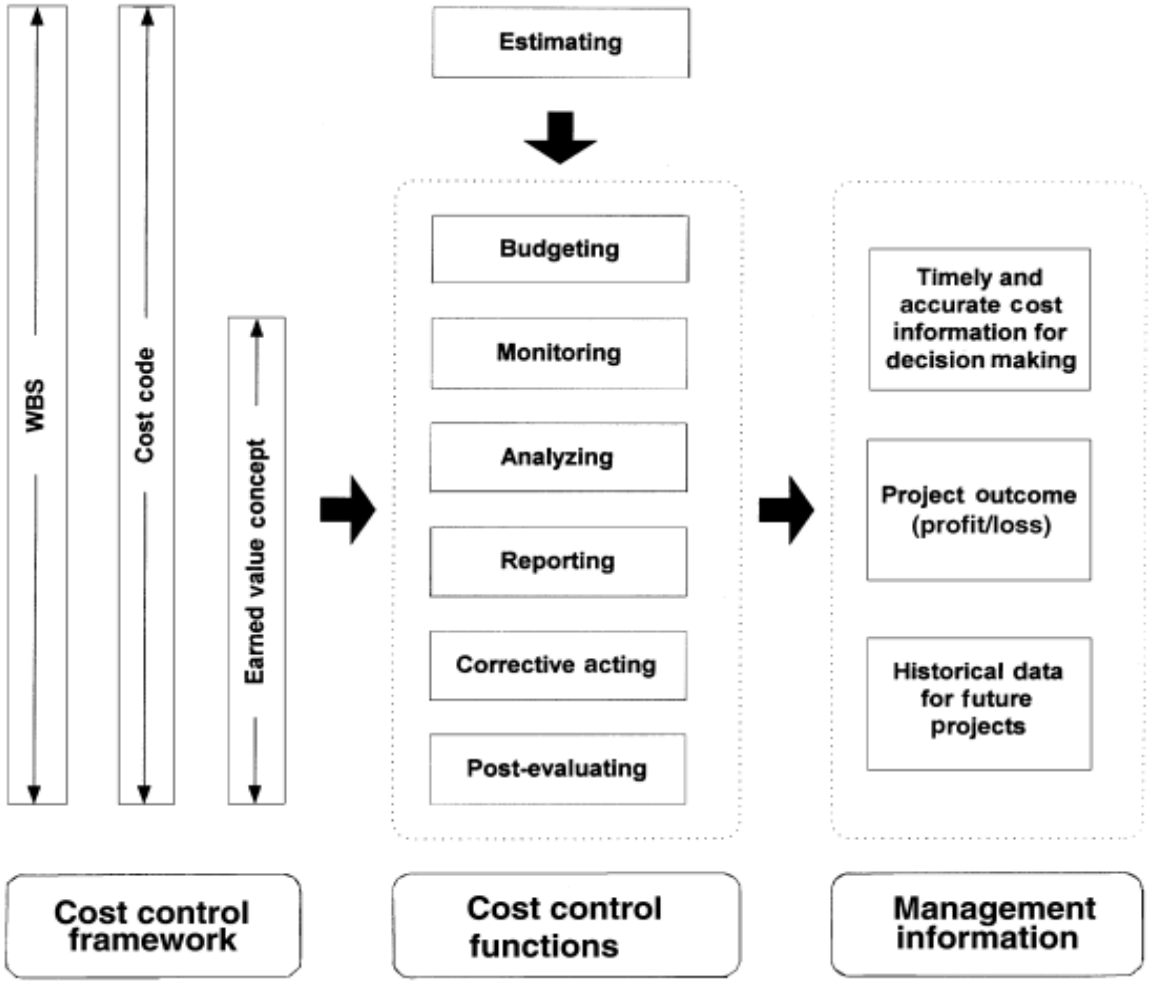


Source: (Azhar et al. 2003)

Cost engineering consists of cost estimation and cost control. Estimation is a methodology for forecasting and predicting cost and expenditures of a future project and to produce a budget (Azhar et al. 2003). His cost control model is based on the earned value concept, consisting of three elements: actual cost of work performed (ACWP), budgeted cost of work performed (BCWP) and budgeted cost of work scheduled (BCWS). ACWP for material = total amount paid for materials in a work package ACWP for labor = total amount paid to labor for a work package. ACWP for equipment = total amount paid for equipment assigned to a work package. BCWP for material, labor or equipment = percent work

progress multiplied by total cost of labor or equipment or material in a work package. BCWS for material, labor or equipment = total estimated cost for labor, equipment, or material at the control time. On the basis of these parameters, cost variances and schedule variances are calculated todetermine work productivity which is used to measure the rate of work progress.

Figure 3: Cost control system: anintegrated view.



Source: (Charoenngam and Sriprasert, 2001)

Theframework, the cost control system above defined as a kind of information system that aims to provide management with timely and accurate cost information so that timely proper corrective actions can be taken. In addition, management information can be stored in a historical database and, in turn, serves as a feedback for future estimation. The system consists of three main parts, namely, cost control framework, cost control functions and management information(Charoenngam and Sriprasert, 2001).

Cost control framework

This part consists of three substantial factors, namely Work Breakdown Structure (WBS), Cost Code and Earned Value Concept. The essence of these factors has been widely discussed by many researchers (Rasdorfand budayyeh, 1991; Abu-Hijleh and Ibbs, 1993; Fleming andKoppelman, 1994; Giammalvo, 1994). It is well accepted that these factors must be appropriately employed as a critical frame for cost control system. With well-established framework, management can systematically manage the project in small manageable fashion and will not be overwhelmed by information explosion during construction phase. A pattern of proper cost control framework is illustrated in Fig. 4. Work breakdown structure: A task-oriented family tree of activities widely known as WBS is indispensable for project cost control. Unemployment or improper design of this structure can cause a chain of deficiencies in all cost control functions. Commencing with estimating and budgeting, work items may be duplicated, overlooked, or shelter inadequate details. This ineffective control reference, therefore, cannot be served as a guideline for systematic monitoring as well as comprehensive analysing. Finally, an evaluation of project outcome and establishment of historical cost data can also be ineffective. The following are two major criteria for assessment of WBS: Systematic structure The project must be partitioned into manageable elements of work for which budgets and expenditures can be systematically controlled. Formation of the WBS must begin by subdividing, or partitioning the project objective into successively smaller work elements until the lowest level to be reported on or controlled is reached(Charoenngam and Sriprasert, 2001).

Level of detail of WBS: The WBS should be sufficiently broken down into various types of level components including functional system (i.e. major work, activity, resource), and span of control (i.e. area, floor). If the WBS is brokendown into more than three levels and each work element has a value not exceeding 1 000 000 Baht (25 000 $US), the level of detail can be considered as ‘adequate’(Charoenngam and Sriprasert, 2001).

Cost code: The success of cost control system depends to a large extent on an ability to develop a sound system of identification coding for the basic cost data (Pilcher, 1994). Primarily, this cost coding system must be designed based upon a systematic cost item framework, so-called cost breakdown structure (CBS). Main essentialities for having the proper cost coding system were classically concluded. First, as a data-handling facility, vast amount of cost data can be organized, collected, manipulated and presented in a useful form (Ahuja, 1980). Economy of storage and rapidity in data retrieval can also be provided by computer (Pilcher, 1994). Secondly, as a common language, a standard set of cost codes should be publicized not only to the estimators, field supervisors and engineers, but also to the book-keepers and the management. These people who feed data and receive information relating to cost control have different backgrounds; left to themselves they will develop their own naming systems for work items, which will lead to complete chaos instead of cost

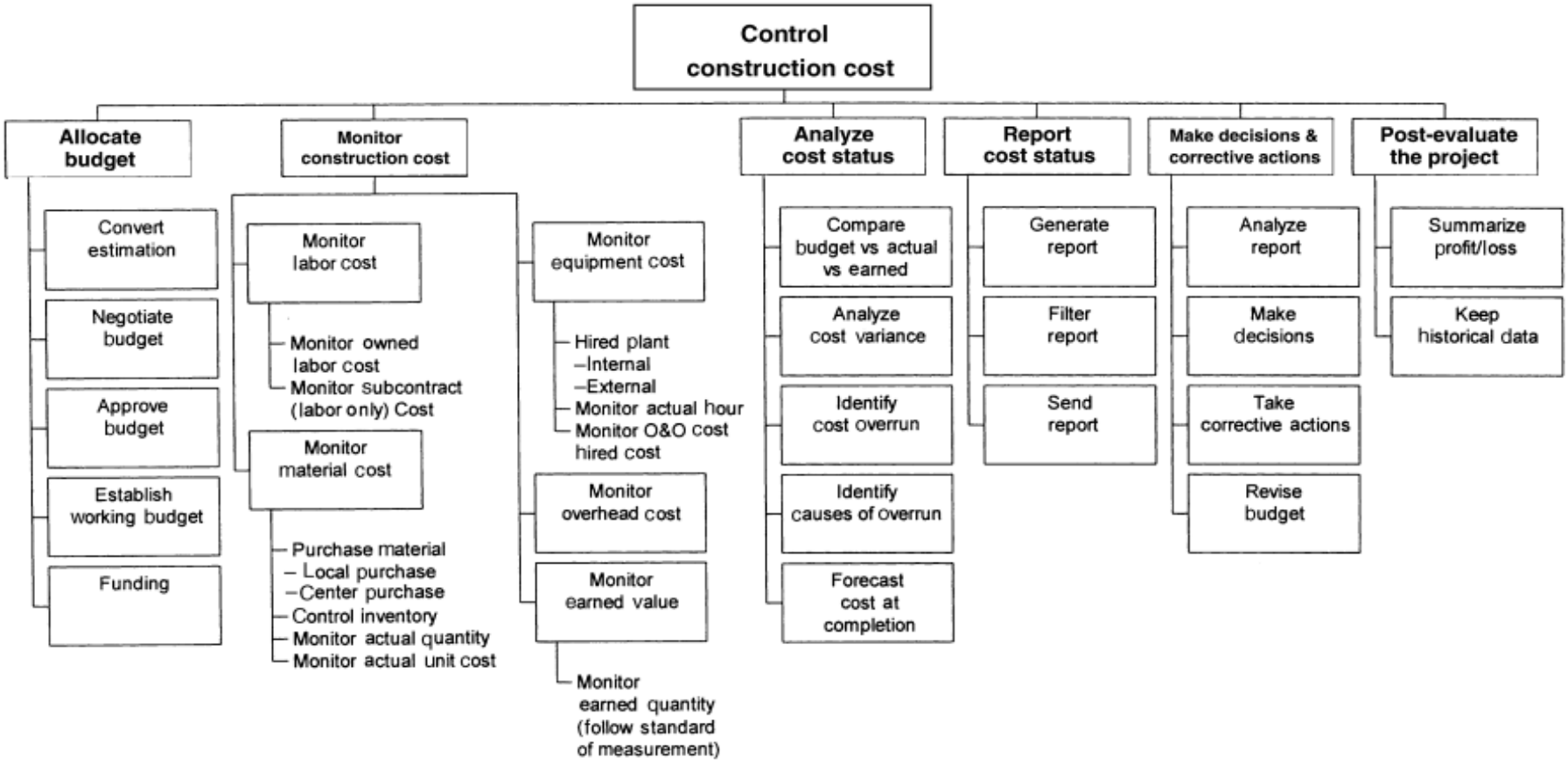
control. In addition, cross-referencing of data files, drawings, bills of materials, requisitions, purchase orders and specifications can also be simplified (Ahuja, 1980). Being able to achieve all advantages summarized above, the code must be properly designed. The following are four major criteria for assessment of cost code.

Flexibility: The structure of cost code should have the ability to cope with future expanding items. Utilizing of one numerical-digit code can represent 10 items, i.e. 0, 1, 2,. . ., 9 while two numerical-digit code can represent up to a 100 items, i.e. 00, 01,. . ., 99. Apart from thenumerical code, an alphabetical code is another option. One alphabetical-digit code can represent up to 26 items, i.e. A, B, C,. . ., Z and each alphabet can be designed as a meaningful symbol, i.e. S-Structural work. When cost codes among the sampled cases are taken into account, three levels of the degree of flexibility can be labelled as (1) 'High' if the code at each level of CBS has two or more digits; (2) 'Medium' if the code has one digit in some levels and two digits in some levels; (3) 'Low' if the code at each level has only one digit(Charoenngam and Sriprasert, 2001).

Level of detail of CBS: Similar to the WBS, the CBS should be sufficiently broken down into various types of level components including functional system (i.e. major work, activity, resource), and span of control (i.e. area, floor). If the CBS is broken down into not less than three levels and each cost item has value not exceeding 1 000 000 Baht (25 000 $US), the level of detail can be considered as 'adequate'. Compliance with WBS: According to Rasdorf&Abudayyeh (1991), cost coding should be designed based on WBS. With one control frame, it facilitates data collection and enables identification of cost status in terms of activity progress(Charoenngam and Sriprasert, 2001).

Compliance with accounting code: When an accounting system is integrated within the cost control system, not only data processing can be substantially speeded up but also many frauds can be avoided. For instance, the account payable checking system can directly verify whether invoices of each work item are still under-budget and should be paid or not. Furthermore, account reports generated at head office and job cost reports generated at site can be cross-checked for ensuring accuracy(Charoenngam and Sriprasert, 2001).
The assessment of the control framework probably enables the author tosummarize effectiveness as well as deficiencies of eachaudited system. However, to acquire more confidence and a richer picture, assessment of each control function and management information has to betaken into account. Subjected to research constraints,efforts spent in this section did not try to cope with allexcessive detail in real practices, yet it valuably coversall critical aspects.
This part broke down into seven sub-sections consisting of one supported function – estimating – and sixfunctions for cost control – budgeting, monitoring,analysing, reporting, corrective action, and post-evaluating(Charoenngam and Sriprasert, 2001).

Figure 4: Cost control function breakdown structure.



Source: (Charoenngam and Sriprasert, 2001).

RESEARCH METHODS

The study was conducted through a literatureresearch. Three different integrated cost control models used for the construction industry were selected between the years 2001 and 2013. The papers were thenreviewed in line with the purpose of the study. The research method was divided into three stages:

1. Previous approach and initial search
2. Literature search
3. Summarizing the major contributions and in-depth study of the areas relating to cost control.

The data used in the report is mainly qualitative and it was based on content analysis.

FINDINGS AND DISCUSSION

All the three different integrated cost control models from Charoenngam and Sriprasert, (2001), Azhar et al., (2003) andAmaral Lopes (2013) had the basic techniques of construction cost control. All the models had a budget or cost prepared from the bills of quantities through estimation. Estimation is a methodology for forecasting and predicting cost and expenditures of a future project and to produce a budget (Azhar et al. 2003).Charoenngam and Sriprasert, (2001), added that the estimates must be finally established as a working budget. The work breakdown from the activities of the work can then be prepared. The WBS should be sufficiently broken down into various types of level components including functional system (i.e. major work, activity, resource), and span of control (i.e. area, floor)Charoenngam and Sriprasert, (2001).Formation of the WBS must begin by subdividing, or partitioning the project objective into successively smaller work elements until the lowest level to be reported on or controlled is reached(Charoenngam and Sriprasert, 2001).

The budget cost will then be compared to actual cost at site. It is normally based on the earned value concept, consisting of three elements: actual cost of work performed (ACWP), budgeted cost of work performed (BCWP) and budgeted cost of work scheduled (BCWS). ACWP for material = total amount paid for materials in a work package ACWP for labor = total amount paid to labor for a work package. ACWP for equipment = total amount paid for equipment assigned to a work package. BCWP for material, labor or equipment = percent work progress multiplied by total cost of labor or equipment or material in a work package. BCWS for material, labor or equipment = total estimated cost for labor, equipment, or material at the control time. On the basis of these parameters, cost variances and schedule variances are calculated to determine work productivity which is used to measure the rate of work progress (Azhar et al. 2003).

It agrees with Charoenngam and Sriprasert, (2001) where the model has sixfunctions of cost control – budgeting, monitoring,analysing, reporting, corrective action, and post-evaluating(Charoenngam and Sriprasert, 2001). Reports and documents are available in the

kofiwusugh@yahoo.com

software package, and this information, if used correctly, will allow the project managers to make informed decisions whenever to improve the Project's final cost and completion date (Amaral Lopes, 2013).Corrective measures are then taken and effective decision made to improve feedback of the cost control process. Post evaluation of the process is done to serve as a prototype for future similar projects.

CONCLUSIONS

All the three different integrated cost control models by Charoenngam and Sriprasert, (2001), Azhar et al., (2003) and Amaral Lopes (2013) had the basic techniques of construction cost control.

In summary, all the models have cost control systems. The inputs are bills of quantities, resources list, activities programme, workbreakdown structure and estimates. The process are managing all the resources – materials, labour, equipment and overhead costs, monitoring, controlling, reporting, decision making, corrective actions, forecasting and deadlines. The outputs are project loss or profit, post evaluation and historical data kept for future use.

It is however recommended that addition of management structures that would help effective cost control to the models.

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kofiwusugh@yahoo.com

A REVIEW OF INDIGENOUS FIRM'S COMPETITIVENESS IN THE CONSTRUCTION INDUSTRIES OF DEVELOPING COUNTRIES

Somiah, M.K.[1] and Aigbavboa, C.O.[2]

[1]&[2]Faculty of Engineering and Built Environment, University of Johannesburg, South Africa
[1]School of Engineering, Takoradi Polytechnic, Ghana
brokwaw@yahoo.com

ABSTRACT

There is extant of literature showing the wide application of the concept of competitiveness at nation, industry and firm levelsof most developed countries but little is known about that of developing countries. In the evolution of the concept of competitiveness, there is consensus in literature that the concept has been misunderstood. It ismultifaceted, relative,its definition depends on the values of stakeholders in the industry under investigation and there is a dearth of studies that develops models to aid indigenous construction firms to understand and achievecompetitiveness in the construction industries of developing countries. As a result, this research gives adesk survey on firm's competitiveness highlighting contemporary trends in relation to the concept of firm's competitiveness in the construction industries of developing countries, the importance of firm's competitiveness, determinants of firm's competitiveness as well asgaps in literature that needs to be filled. The implication of this study is that,it providescomprehensiveaccount on firm's competitiveness in the construction industry and forms the basis for subsequent studies in relation toindigenous construction firm's competitivenessin the construction industries of developing countriesthat the researchers seek to address.

INTRODUCTION

Competitiveness of firms is largely associated with firms achieving competitive advantage or edge. Thus, a competitive firm should possess certain key factors that give it a competitive advantage over its rivals in an industry(Porter, 1990;Oyewobi, et al., 2014). However, throughout literature on competitiveness, there is no one universal definition for competitiveness(Flanagan, et al., 2007). As a result, several authors and researchers have defined competitiveness based on their understanding of the concept (Ambastha & Momaya, 2004;Flanagan, et al., 2005;Lu, 2006;Oyewobi, et al., 2014). The concept has been widely applied across various industries and the construction industry is of no (Flanagan, et al., 2007). As a result, this research gives a desk survey on firm's competitiveness highlighting contemporary trends in relation to the concept of firm's competitiveness in the construction industries of developing countries, the importance of firm's competitiveness, determinants of firm's competitiveness as well as gaps in literature that needs to be filled. The study is

organized under the sections: review of firm's competitiveness and conclusion and recommendations.

REVIEW OF FIRM'S COMPETITIVENESS

Competitiveness is one term that has gained wide popularity in usage and attention across academia, governments and industry; this may be attributed to its close relation with the success of an entity (Bhawsar & Chattopadhyay, 2015). According to the International Institute of Management Development (IMD) (2004), achieving competitiveness inspires sustainable growth and ensures capability for long term development. According to Flanagan et al.(2005) and IMD (2014) achieving competitiveness brings about enormous benefit which include prosperity, high and rising standard of living in the lives of the populace of a nation or increasing returns on investment to owners of firms as well as employees. Similarly, Porter (2004) in his study attributed the importance of competitiveness to include wealth creation and having large influence on the standard of living in a particular nation. However, regardless of its widespread and acceptance of its importance, competitiveness has remained a concept that is not well understood and well measured chiefly in the construction sector(Flanagan, et al., 2005).Competitiveness is a multifaceted and relative concept(Ambastha & Momaya, 2004); its understanding comes from, management, economics, politics, culture and even history(Waheeduzzaman & Ryans Jr, 1996). Its meaning and definition depends on the values of the stakeholders of the unit under investigation(Momaya, 2004). In the World Competitiveness Yearbook (WCY), competitiveness is perceived as a combination of assets (competitiveness potentials), management processes and competitiveness performance (economic result).The assets are inherent and created whereas the management process transfers the assets into competitiveness performance(World Competitiveness Year Book, 2009).

It has become synonymous with productivity, economic strength and performance of firms, industries and nations in literature (Porter,2004; Flanagan, et al., 2005;Srivastava, et al., 2006;Flanagan, et al., 2007). The existence, survival and success of every firm, industry or nation greatly depend on its competitiveness(Ambastha & Momaya, 2004).This is supported by the argument of Porter (2004) that competitiveness is a zero-sum game; because at the national ,industry or firm level as one country, industry or a firm captures a greater market share of a product, it is at the expense of another country, industry or firm losing it share(s) in the market and risks being marginalized. As a result, some nations and unions in the world have set up competitiveness councils, among other things, to foresee that competitiveness is consistently achieved and sustained over a long period. Examples of such bodies are the World Economic Forum (WEF) and the International Institute of Management Development (IMD) which have been periodically evaluating competitiveness at the national level (Flanagan, et al., 2005); theCompetiveness Advisory Group, Ciampi Group by the European Union (EU) and the Special Commission for Competitiveness by the United States(US).More

so, there are several white papers which are periodically released by some countries and unions in the developed world on competitiveness. Examples of such countries are the United Kingdom (UK), the United States US and the European Union(EU) (Lu, 2006).In Turkey, there is a strong collaboration between industry and academia to help improve competitiveness of its firms in the international market by conducting and supporting studies on competitiveness(Cetindamar & Kilitcioglu, 2013).All these give an indication as to the importance some nations and unions attach to competitiveness.

Currently, there are phenomena that are trending in the globalized markets. This include the rise in economic relations and interdependence among businesses and countries across the globe due to the falling political, trade, and socio-economic barriers; making businesses able to enter markets more readily and rapidly than they otherwise would have done(Krueger, 2006).Legally, there are even enactments that have given room for free trade or trade liberalization among some member states for their mutual benefits. For example, article 3(2)(d) of the Economic Community of West African States (ECOWAS) revised treaty which came into force in 1975 created the legal framework that created a common market among member states; it also promoted trade liberation or free trade and granted right to establish businesses among /in member states respectively(ECOWAS, 1975).The adoption of Most Favoured Nation (MFN) clauses in trade treaties among some nations has similarly given some level of preference and tariffs exemptions to sister nations for mutual benefits(Krueger, 2006).In Ghana, the passage into law of-the Companies Code, 1963 (Act 179); the Partnership Act, 192 (Act 152) and the Business Name Act, 1962 (Act 151), has given entrepreneurs, without prejudice to any nationality, the liberty to set up business enterprise(s) in Ghana(Ghana Embassy, 2015).Furthermore, the construction industry is gradually moving from being traditionally labor-intensive industry to technology intensive industry and firms lagging behind are less competitive. More so, complicated project functions and the ever changing need of clients require that contractors enhance their competitiveness to achieve competitive advantage(Lu, 2006).These trends have heightened competition among firms in the global market; and survival and sustainable growth of firms depend on the competitive edge or advantage the firm has over its rivals(Porter, 1990). This has called for an increasing focus of researches towards construction firms achieving competitiveness in a globalized business environment and defines the contemporary factors influencing construction firm's competitiveness in construction industries.

Several works on competitiveness from different perspectives have been published over the past decades. But competitiveness is still an elusive concept and its relevance and determinants keep changing with time (Bhawsar & Chattopadhyay, 2015).According to Ioncica, et al.(2006) and Roy (2011), the concept of competitiveness is best studied under two main sub-concepts, namely: the concepts of comparative advantage and the concept of competitive advantage. The comparative advantage theories focuses largely on the relative

influence of the abundance of cheap or low-cost labour or resources in a national economy on its industry (Porter,2004; Roy, 2011); whereas theories on competitive advantage focuses on dynamics and micro-economic approaches firms must adopt to remain in business in a competitive environment both at national and international levels. It also touches on building capacity of firms to achieve competitiveness (Roy, 2011).Contributing to issues of firm's survival and growth(Ambastha & Momaya, 2004).More so,theories on competitive advantages emphasis on the uniqueness of the product a firm produces and the processes of achieving competitiveness (Buckley, et al., 1998;Porter, 2004).Thus, Porter (2004) argued that there is the need to shift from competiting on comparative advantage to competitive advantage if economic development,sustainable growth,productive and competitive edge is espoused by firms.Thus,the need to identify contemporary factors influencing firm's competitiveness in the constructio industries of developing countries.This gap would be subsequently addressed by the researchers in subsequent studies.

More so, there is a consensus in existing literatures on competitiveness which suggest that, competitiveness could be studied at three main distinct levels, namely: nation, industry or firm with each level being appreciably different and espousing different philosophy (Ambastha & Momaya, 2004; Cetindamar & Kilitcioglu, 2013).Largely, extant studies on competitiveness focuses on either of the three main levels, one at a time, even in contemporary studies. They are not lumped together (Porter,1980;Ambastha & Momaya, 2004; Flanagan, et al., 2005;Lu, 2006;Oyewobi, et al., 2014). This is attributable to the heterogeneous nature of the factors that defines competitiveness at each of the levels; the uniqueness of the philosophical thinking underpinning each of them and the significantly different analytical context each is viewed (Flanagan, et al., 2005;Lu,2006). Very often, competitiveness at the industry level is adopted as an analytical context rather than an entity for investigating competitiveness. It lies between the nation level (macro perspective) and the firm level (micro perspective) (Flanagan, et al., 2007).However, an observing trend over the years with respect to studies on competitiveness is that, much of the debate on competitiveness has focused on the macro level(nation and/or industry) (Porter,2004;Cetindamar & Kilitcioglu, 2013); and constructs such as efficient and trusted legal systems, sound monetary and fiscal policies ,political stability, among others, have been identified to have significantly contributed to competitiveness at the macro level resulting in wealth creation in a nation. However, they quickly added and clarified that the actual act of wealth creation is totally rooted at the micro level, precisely it is the result of the competitiveness of the firms' operational practices(competitive processes), superiority of firms' strategies (competitive strategies) and in the quality of the microeconomic business market(competitiveness of the industry) within which firms compete(Porter, 2004).However, little is known about competitiveness at the firm level; and even in contemporary studies on competitiveness, Cetindamar & Kilitcioglu (2013)argued that firm level competitiveness appears to have been totally neglected. Thus there is a gap in literature in relation to the

constructs that defines firm's competitiveness in the construction industries of developing countries.

In addition, Garelli (2012) explains the link between nations and firms by emphasizing that it is the firms that are responsible for creating economic value, whereas nations create the environment to encourage or discourage firms to achieve that economic value. Furthermore, Moon & Peery(1995) and Bhawsar & Chattopadhyay(2015) posited that it is firms that compete and not nations. Similarly, according to the World Competitiveness Year Book(2009), no economy in the world can be competitive unless firms operating in them are competitive. Thus, the competitiveness of every nation is partly dependent upon the synergistic inputs of its constituent firms (Flanagan, et al., 2007). Hence there is the need to understand firm level competitiveness in the construction industries of developing countries.

Competitiveness of firms is largely associated with firms achieving competitive advantage or edge. In general sense, competitiveness comes into play when a consumer has to choose a good amongst several goods which are competing for the consumer's money(Papadakis, 1994).Similarly, in the construction industry, spanning from the general concept of competitiveness posited by Papadakis (1994), competitiveness come into play when a client has to choose amongst several contractors or construction firms which are in competition for the client's proposed project; and it is the firm with competitive edge over its competitors that wins the project. This is what Lu (2006) meant by bidding successfully, when he developed a system for assessing and communicating the competitiveness of Chinese contractors (Lu, 2006). Thus, a competitive firm should possess certain key factors that give it a competitive advantage over its rivals. However, throughout literature on competitiveness, there is no one universal definition for competitiveness (Flanagan, et al., 2007). As a result, several authors and researchers have defined competitiveness based on their understanding of the concept (Ambastha & Momaya, 2004;Flanagan, et al., 2005;Lu, 2006;Oyewobi, et al., 2014). The plethoric definition of competitiveness gives an indication of how widely applicable, inclusive and complex its concept is (Flanagan, et al., 2007). But one thought that runs through most of the definitions in various sectors is: competitive advantage or edge over competitors, competitive strategy and achieving sustainable superiority in performance over the long term.

Deducing from the various studies in relation to the concept of competitiveness, it could be inferred that: there is no generic determinants of competitiveness as determinants vary with the various posited definitions of competitiveness (Buckley, et al., 1998; Lall, 2001).Similarly, the meaning of competitiveness is dependent on the expectations of the stakeholders of the industry under investigation (Momaya and Selby, 1998; Flanagan, et al., 2005).The concept of competitiveness is relative and relational;as a result,competitiveness is best studied in relation to or in comparism with some set objectives,ideal levels or some peers in a paticular sector (Buckley, et al., 1998;Lall, 2001). The dynamics or variables that influence competitiveness change with context and time; for example, as a national economy

optimistically transforms from a less developed to a more developed stage so shall the factors that influence competitiveness of firms change (Cho & Moon, 2000;Ambastha & Momaya, 2004).Competitiveness involves processes, assets and performance. It is the processes that turn assets into performance (Buckley, et al., 1998; Flanagan, et al., 2005).Thus, in this research, competitiveness of construction firms is defined as the ability of the construction firm to win contracts or project(s)and execute the project to client's satisfaction as specified: within time and cost, of distinguished quality, and meets health and safety requirement in a globalized market; in the light of competitiveness-centered interventions and supports by the government; thus achieving sustainable superiority in performance in the long run.

More so, there are instances where firms exercise varying degree of competitiveness though they all exist in the same macro environment. Hence competitiveness cannot be fully achieved if firm level competitiveness (microeconomics) is neglected (Cetindamar & Kilitcioglu, 2013).Thus, the need to focus contemporary studies on firm level competitiveness which has influence on the output of competitiveness at industry and the nation levels.

Again, the relatively few studies that focused on firm level competitiveness considered firms in general business environment whereas few focused on construction firms in a particular construction industry (Fellows, et al., 1983; Male & Stocks, 1991; Betts & Ofori, 1992; Venegas & Alarcon, 1997; Haan, et al., 2002; Kale, 2002; Oyewobi, et al., 2014).Furthermore, relatively large number of existing researches on firm's competitiveness largely focused on assessing the competitiveness of firms; measuring firm's competitiveness; the role of management in competition and firm's strategies for global operations (Oral, 1993;Offstein, et al., 2007;Cetindamar & Kilitcioglu, 2013);with few studies developping models that aid firms in achieving competitivenes and determine the relative level of influence of the factors influencing competitiveness of firms in a givene industry.In addition, Langford & Male (2001) and Lu (2006) informed that the few studies on construction firm's competitiveness focuses largely on strategic management approaches of the firm, whereas it marginalizes the tactical approaches of the firms; loosing focus of the sight that strategicdecisions primarily addresses the issues of what the firm should do or 'what shall we do?', whereas tactical decisions approaches incorporate the issues of "how should we do it?'. Hence, Martins & Kato (2010) advanced for the need to focus contemporary researches on how competitiveness could be achieved (gained) and sustained (held).

Cetindamar & Kilitcioglu (2013) observed a trend in the various models for measuring or assessing firm's competitiveness and posited that, they are only efficient in indicating amongs other things level of sales,profit and growth. However, these measures are outcomes, which was as a result of the unique resources the firm had and the way these resources were utilized to meet those measurement criterions. Thus, the need to look at how firm's achieved

competitiveness; what factors really influence their competitiveness or what actually aided them in achieving competitiveness in an industry. Thus, there is a gap in knowledge holistically defining the factors influencing firm's competitiveness, integrating the fragmented literatures on firm's competitiveness. More so, Flanagan, et al.(2007) argued that a significant number of both classical and contemporary researches has largely tired down competitiveness to productitivity.This is evidenced in the study by Porter in 1990 when he argued productivity is the only source of competitive advantage (Porter, 1990; Oyewobi, et al., 2014);thus there is a need to develop models that give broader spectrum in determining competitiveness instead of largely limiting competitiveness to productivity(Cattell, et al., 2004).Furthermore,Nonaka, et al.(2000) underscored the limitations of traditional theories and called for the need to develop new theories that address the competitiveness dynamics of this era. Thus, there is the need to focus researches and develop models that captures the dynamics of the current globalized business markets that will aid firms in achieving competitiveness.

According to Metaxas & Economou (2012) largely a number of studies on firm' competitiveness in various disciplines, have measured or modeled firm's competitiveness using statistical, econometric and/or correlation analysis; for instance (Henderson & Cockburn , 1994;Kumar & Chadee, 2002; Flanagan, et al., 2005;Lu,2006;Bayyurt & Dozu, 2008; Parida,2008;Barge-Gil &Modrego, 2011;Oyewobi, et al., 2014).Little is known of the use structural equation model in modeling firm's competitiveness.

Again, largely all the studies that have developed theories or applied theories of competitiveness of firms in the construction sector largely used descriptive approach (Kale & Arditi , 2002). This has led to lack of rigorous empirical data and inconsistencies in the finding of researches that investigated competitiveness at the firm level (Flanagan, et al., 2007).Thus there is the need to address the inherent weakness of the descriptive approach to research by adopting the mixed method approach to study the concept of competitiveness of construction firms. Moreover, existing literatures suggest that largely all the studies relating to firm's competitiveness in the construction industry has been done in developed countries with little or no evidence indicating that such studies have been conducted in developing countries. Lu's study (2006) is a typical one that focused on the construction industry; however, it has been largely criticized to be only valid for gauging competitiveness of Chinese general contractors that are operating in the chines indigenous construction industry (Flanagan, et al., 2007);similarly, the study of Momaya & Selby (1998) has also been criticized for being limited to only canadian firms and comparing the competitiveness of canadian firms with that of Japan and the United States of America.In the same vein,Flanagan, et al., (2005) measured contractor's competitiveness in some selected countries using Porter's diamond model; however, their model is only capable of being used to analyze contractor's competitiveness in some specific construction market, namely,

Finland, Sweden and the United Kingdom (UK); it has also been widely criticized for its non-inclusion of sub-factors relating to macro level; and like other previous studies on competitiveness in the construction sector, it considered countries that were developed, thus has limited its wider adoption and generalization. Even the study by Oyewobi, et al. (2014) which focused on South Africa only identified some strategies firms could adopt to be competitive; however, firm's competitive strategy is just an integral aspect of the extant literature of firm's competitiveness. Thus, it worth re-echoing that little is known about researches that holistically looked at firm's competitiveness in the construction industry of developing countries(Lu, 2006)by integrating the fragmented literature on firm's competitiveness. Again, none of such studies have also been conducted that is related to the construction industry of Ghana. In addition, largely all the studies that identified factors influencing firm's competitiveness in the construction industry were limited because they were not able to define the extent to which the determinants influence firms in achieving competitiveness(Shen, et al., 2006). Furthermore, little is known about the usage and application of frameworks and models in developing countries (Ambastha & Momaya, 2004).In recognition of the heterogeneous nature of firms and the fact that firms may vary even in terms of their resources or capabilities or endowments(Martins & Kato, 2010);it will be of great dis-service to adopt models of competitiveness that captured the dynamics of developed countries in developing countries.

CONCLUSION AND RECOMMENDATIONS

In view of the above discussions, there is a gap in literature over the contextual meaning of competitiveness of construction firms in developing countries. Similarly, a gap exists in literature as to the factors that constitute the determinants of competitiveness of construction firms operating in the construction industry of developing countries and the extent to which the determinants of firm's competitiveness influence firms in achieving competitiveness in an industry. There is also a gap in literature about the determinants of competitiveness of firms in the construction industry of Ghana. Again, there is a dearth of research that develops competitiveness achievement model for indigenous construction firms operating in the construction industry of developing. The study also concludes that the concept of firm's competitiveness is dynamic, multifaceted and it definition depends upon the values of stakeholders and competitiveness in contemporary studies is driven by the firm's competitive edge or advantage in the construction industry. Thus, the need to develop a competitiveness achievement model that integrate all the fragmented constructs of firm's competitiveness and would aid indigenous firms in the construction industries of developing countries in achieving competitiveness in order to survive in business.

The implication of this study is that, it has provided a comprehensive account on firm's competitiveness in the construction industry and giving the basis for subsequent studies in

relation to indigenous construction firm's competitiveness in the construction industries of developing countries.

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A MODEL FOR THE MANAGEMENT OF HEALTH AND SAFETY PRACTICES ON GHANAIAN SITES.

Okae Adow,A.A. M.[1] and Aigbavboa, C.O.[2] and Thwala D.W.[3]

[1,2,&3]*Department of Construction Management and Quantity Surveying, University of*
[1]*mickeyadow@yahoo.com*

ABSTRACT

Construction Health and Safety management is an issue of great concern to the Ghanaian economy. In spite of its contribution to the economy, the Ghanaian construction industry has poor safety record. The research aims at establishing a model for the management of Health and Safety practices on Ghanaian construction sites. The main objectives of the study is to establish the status of health and safety management in the construction industry, the role of clients, designers and the top management of contractors in H&S management, to establish the current trends in H&S management, to establish the role and impact of construction clients and their potential construction and influence on project H & S management, to develop a model for H & S management improvement in the Ghanaian Construction industry and to validate the conceptualized model for H&S management improvement by comparing the new model with existing models. Data will be collected using Delphi and field questionnaire survey. Structural equation modeling and Nvivo will be used to analyse the field questionnaire and Delphi surveys respectively. The study is ongoing Phd study and so no findings are available at this stage.

Keywords : Health; Safety; Model ; Management ; Ghana.

INTRODUCTION

Construction health and Safety (H & S) has been a major problem and concern to the Construction Industry stakeholders ((Ragendran and Gambatese 2009, Lingard and Rawlinson 2005) primarily because Construction projects are generally complex and hazards. Lingard & Rawlinson (2005), attributed the complex nature of construction projects to the extensive use of sophisticated plant, equipment, modern methods of construction, and multidisciplinary aspects of the project team.Construction projects are hazardous because of the high incidence of accidents and fatalities (Bakri et al, 2006). The Construction industry has always been blamed for the high rates of accidents and fatalities despite its contributions to economic growth. The Construction industry has been placed among the industries with unreasonable rates of accidents, permanent and non-permanent disabilities and even fatalities (Abdul Hamid et al, 2003), Haupt (2001), stated that construction workers were two to three

[1]mickeyadow@yahoo.com
[3]didibhukut@uj.ac.za

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times more likely to die on the job than workers in other industries, while the risk of injury was also three times higher. The International Labour Organization (ILO, 2005) further affirmed that 24 to 40 per cent of fatalities in the industrialized world's workplace occur in Construction.
The indirect rate for fatal accidents in the Construction industry is high in most countries of the world (Ling et al, 2009, Abudayyeh et al, 2006).

The poor H& S performance of the industry and in associated problems must therefore be the concern of all in the industry (Butler, 1982). Construction health and safety (H & S) performance improvement therefore has in recent years become priority and therefore has gained industry-wide attention (Cheung, |Cheung & Suen, 2004: 159; Hamalaien, Saarele & Takala, 2009 : 125). Improving H & S performance in the Construction industry has proved to be somewhat challenging partly due to the industry's Complex nature. Despite the complexity of the construction industry, H & S performance improvement remains a crucial issue and its importance or need has been demonstrated in numerous studies (Smallman & John, 2001; ILO, 2003; Hoonakker et al, 2005; Lee, Halpin & Chang, 2006). Harris & McCaffer (2001), stated that Safety should be seriously treated by all parties in the project.
Accidents make construction expensive worldwide and Ghana is not exempted. This fact was affirmed by Li, Wah and Man (2015). This research aims at establishing a model for the management of Health and Safety practices on Ghanaian Construction Sites and to offer recommendations.

Motivation

Kheni et al (2008), Ghanaian construction industry accounts for the highest rate of occupational deaths compared with other industrial sectors. According to the Labour Department (2000), out of a total of 902 occupational accidents that occurred in construction in the year 2000, 56 were fatal, a fatality rate of 77.6 per 100,000 workers. The research aims at establishing a model for the management of Health and Safety practices on Ghanaian construction sites. The research findings will be made available to major stakeholders in the Ghanaian Construction Industry.

Problem Statement

Poor Health and Safety performance in the form of accidents, incidents, injuries, illnesses and fatalities continues to occur on construction sites in Ghana. These challenges or problems persists despite the H & S regulatory standards in the Ghanaian construction industry. Unfortunately, no vigorous study has been conducted to develop a model for the management of Health and Safety practices on Ghanaian Construction sites. This study aims at establishing a model for the management of Health and Safety practices on Ghanaian construction sites.

[1]mickeyadow@yahoo.com
[3]didibhukut@uj.ac.za

Research Questions

1. (RQ1) Is there any model for the management of health and safety practices on Ghanaian Construction Site?
2. (RQ2) What are the factors which lead to challenges or problems with the existing model for the management of Health & Safety Practices on Ghanaian Construction Sites?
3. (RQ3) What are the critical success factors required to achieve significant improvement in the current model for the management of health & safety practices on Ghanaian Construction site?
4. (RQ4) What measures should the various stakeholders focus on if significant improvements in the Health and safety management on Ghanaian Construction Sites can be attained?

Aim Of The Studies

The study aims at developing a model for the management of Health & Safety practices on Ghanaian Construction sites.

Research Objectives

1. (RO1) To establish the status of Health and Safety Management in the Construction Industry, the role of clients, designers and the top management of contractors in H&S management.
2. (RO 2) To examine current trends in H&S management in the construction industry to establish gaps.
3. (RO 3) To establish the role and impact of construction clients and their influence on project H& S management.
4. (RO 4) To develop a model for H&S management improvement in the Ghanaian construction industry.
5. (RO 5) To validate the conceptualized model for H&S management improvement by comparing the new model with existing model(s).

THEORITICAL AND CONCEPTUAL VIEWS ON CONSTRUCTION HEALTH &SAFETY MANAGEMENT.

ILO (1983: 1491),defined health as the wellness of workers relative to their occupation or place of work. Health also is the occupational health.

ILO (1983: 1491), further defined safety as the prevention of risk to health worker, and visitors to a workplace and to property. H&S is a combination of two expressions namely, health and Safety.

[1]mickeyadow@yahoo.com
[3]didibhukut@uj.ac.za

Workers H&S is regularly in danger either due to conditions within and outside of their workplace or their inability to recognize and handle the risks. The Construction Industry is inclusive of these risks.

Suraji et al (2001) reported that construction workers are more at risk of an injury or even a fatality at their workplace than manufacturing based industries.

Teo et al (2005) and Kines et al (2007) affirmed that generally construction sites are still one of the most dangerous workplaces because of high incidence of accidents.

Sawacha et al (1999), further asserted that in the construction industry, the risk of a fatality is said to be more at least five times more likely than in other manufacturing industries. Abdelhamed & Everett (2005), said that the Construction Industry is considered to be hazardous and is among the most hazardous. In terms of work related mortality rate, injury rates and worker's compensation packages construction industry is very hazardous (Mc Donald, 2009),

Bomel (2001), affirmed that the construction industry is described as being a hazardous environment where workers are expected directly to power, forces and height. DOETE (2006) further revealed the Irish Government's assessment, statistics maintained by the H&S Authority, reveals that the construction industry has a consistency poor record on worker H&S relative to other industries. Gambatese et al (1997), said that the Construction industry still continues to lag behind many industries in H &S performance.

RESEARCH METHODOLOGY

The conduction of research will involve the following:

Reviewing of literature, field surveys, interviewing of professionals in the construction industry, interviewing of Contractors and Subcontractors, workers and administrators, and managers. Interviews and literature will form the primary source of information for this study. The literature review will be done by reviewing past theses, textbooks, field surveys, webpages and journals to get the information on health and safety practices on constructions sites. The information gathered will be analyzed and conclusion drawn.

Research area and Targeted Respondents.

The research area will be selected sites in Ghana and the targeted respondents will be thirty Contractors from all the four Classes of Contractors, (DIKI, D2K2, D3K3, D4K4) and ten Consultants.

Sample area and Targeted Respondents.

The research area will be some selected sites in Ghana and the respondents will be made up of ten D1K1 Contractors, ten D2K2 Contractors, eight D3K3, D4K4 Contractors and ten Consultants. This will be 40 respondents.

[1]mickeyadow@yahoo.com
[3]didibhukut@uj.ac.za

Sample and Data Collection

Structured questionnaires will be given to the targeted respondents. The questions will be opened ended. A total of eighty questionnaires will be administered. Information obtained from the questionnaires will be analysed and conclusions drawn.

STRUCTURE OF THE WORK

This work is organized as follows:

Introduction (Chapter 1)

This chapter presents information on the background to the study, a definition of terms and key concepts that have been used as well as the main research problem, the aim and objectives of the study. The chapter also presents a description of methods that were used to conduct this study.

Literature Review (Chapter 2 To 4)

These chapters present the review of literature that informed this study. The literature relating to the management of H&S in Construction, the Concept of H&S performance management, current trends on H&S performance management, the nature of the Ghanaian Construction Industry and the Global Construction Industry and the Concept of H&S culture in general. The roles of various stakeholders in the construction industry are also discussed.

Research Methods (Chapter 5)

This chapter contains the detailed description of the methods and the tools used to collect data for this study. In addition, this chapter describes the participants to this study as well as detailed description of the results, analysis of the results and how results are presented in the findings section. The research design is also described in this chapter.

This chapter also presents finds regarding the nature of the projects that were reported on by the respondents in the questionnaire survey as well as the profile of respondents to the questionnaire survey.

Conceptual Model For H&S Management (Chapter 6)

Chapter six is a discussion from the review of literature and other existing models. This discussion forms the basis of the conceptual model's theory. The model for the management of health and safety is presented in this chapter. Variables of the model as well as the inter-relationships between all the variables of the model are also described.

Findings From The Questionnaire Survey (Chapter 7)

Chapter Seven contains findings from the questionnaire survey. Finds from this survey are discussed relative of each questionnaire survey objective.

[1]mickeyadow@yahoo.com
[3]didibhukut@uj.ac.za

Discussion Of Questionnaire Results (Chapter 8)

This Chapter covers discussion, analysis and interpretation from the results obtained from the questionnaire. Discussions on the goodness of the proposed model for health and Safety management are presented in this chapter.

Conclusions And Recommendations (Chapter 9)

This Chapter concludes the study and contains recommendations based on the conclusions drawn from the study. Recommendations for future research are also made in this chapter.

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[1]mickeyadow@yahoo.com

[3]didibhukut@uj.ac.za

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[1]mickeyadow@yahoo.com
[3]didibhukut@uj.ac.za

CHALLENGES INVOLVED IN THE IMPLEMENTATION OF BUILDING REGULATIONS: A CASE OF KPESHIE SUB – METRO DISTRICT ASSEMBLY IN GHANA.

Arthur-Aidoo, B.M.[1], Ansary, N.[2]and Aigbavboa, C.O.[2]

[1,2&3]*Department of Construction Management and Quantity Surveying, University of Johannesburg South Africa.*

ABSTRACT

This study was embarked upon in order to discover challenges involved in the implementation of building regulations at the district assembly level, precisely at the Kpeshie Sub–Metro District Assembly in Ghana. Review of relevant and available literature on the subject matter was made to gain better insight into the topic in obtaining the needed information. The method used was field survey and was supported by the distribution of questionnaires to the district assembly. In all, thirty-five structured questionnaires were administered to the built environment personnel who work with three zonal capital towns and three sub-towns of the district assemblies via random sampling. The analysis of the data collected from the District Assembly revealed that 66.7% remarked they lack enough personnel to see to the proper implementation of the Building Regulation. 100% responds from Town and Country Planning showed the various challenges they encounter including: lack of ownership (title to land) of developers, poor compliance to design standards, poor site description and poor presentation of design proposals. The study recommends the following among other things that the District Assembly must institute and organize educational programmes such as symposia, community seminars regarding building regulations and other relevant themes to broaden the knowledge of both their personnel and the community. Also, the monitoring team of the District Assembly must ensure that approved building drawings are in compliance with the building regulations during the construction stage of the project.

Keywords: *Assessing; Building Regulations; Implementation; Construction; Industry*

INTRODUCTION

The interrelationship of the various elements of the built environment in majority of town and cities is a result of historical development on the basis of economics and convenience. However, the recent attention to Town and Country Planning has brought the various relationships under examination, and new towns are now designed on a more selective basis

[1]bernardmartins@hotmail.com
[2]nansary@uj.ac.za
[3]caigbavboa@uj.ac.za

Arthur-Aidoo, B.M.[1], Ansary, N.[2]and Aigbavboa, C.O.[2] (2016) Challenges Involved In The Implementation Of Building Regulations: A Case Of Kpeshie Sub – Metro District Assembly In Ghana In: Mojekwu,J.N., Nani G., Atepor, L., Oppong, R.A.., Adetunji,M.O., Ogunsumi, L., Tetteh, U.S., Awere E., Ocran, S.P., and Bamfo-Agyei, E. (Eds) Procs 5th Applied Research Conference in Africa. (ARCA) Conference, 25-27 August 2016, Cape Coast, Ghana. 640-647

with consideration being given to the interrelationship of man's several activities. Building regulation is the statutory instrument which sets out the minimum performance standards for the design and construction of the building is paramount to Ghana's economy. According to the Municipal Council Ordinance by the Ministry of Works and Housing (1953), no building shall be erected or any work carried out without the approval of the town engineer or health officer who may enforce full compliance with the regulation in the case of building materials and construction. The fact that the regulation has been in existence and controlled by Town and Country Planning Department of the District assembly, the majority of building and structures constructed are not in compliance with the building regulations. The effort to meet the increasing population on the issue of unauthorised structures in Accra metropolis has not been adequate. The Kpeshie Sub-metro District Assembly is one of the six sub-districts under the Accra Metropolitan Assembly, which was created in 1988 by the Provisional National Defence Council National Democratic Congress (P.N.D.C/NDC) Government. A lot of residents who live around the Kpeshie Sub-metro District Assembly have not realised the importance of the building control regulations. This is because of how they have ignored the regulations and have built haphazardly without conforming to their approved drawings. Observations of the unauthorised location of structures that have sprang up across selected areas in the sub-metro show that only a few structures are in conformity with the originally approved designs. Despite all the strenuous efforts by the Town and Country Planners and the District Assembly engineers in checking structures without documentations, the structural problems and encroachment of service reserve areas for markets, schools among others, building construction still goes on without complying with the proper control measures and by-laws. Also, unauthorised and unapproved locations of structures at spaces meant for creating access during fire outbreaks have all been occupied. This study, therefore, seeks to ascertain the challenges involved in the implementation of building control regulations at the district assembly level, precisely at the Kpeshie Sub–Metro District Assembly in Ghana.

Aim of the Study

The aim of the study is to assess the challenges involved in the implementation the building regulations.

Objectives of the Study

The primary objectives of the study include:

iii. to establish why unauthorised buildings are built at unapproved locations
iv. to find out what causes delays in the approval of building permits.

[1]bernardmartins@hotmail.com
[2]nansary@uj.ac.za
[3]caigbavboa@uj.ac.za

Arthur-Aidoo, B.M.[1], Ansary, N.[2]and Aigbavboa, C.O.[2] (2016) Challenges Involved In The Implementation Of Building Regulations: A Case Of Kpeshie Sub – Metro District Assembly In Ghana In: Mojekwu,J.N., Nani G., Atepor, L., Oppong, R.A.., Adetunji,M.O., Ogunsumi, L., Tetteh, U.S., Awere E., Ocran, S.P., and Bamfo-Agyei, E. (Eds) Procs 5th Applied Research Conference in Africa. (ARCA) Conference, 25-27 August 2016, Cape Coast, Ghana. 640-647

RESEARCH METHODOLOGY

The study adopted a mixed method of both qualitative and quantitative techniques. The qualitative technique made use of review of relevant literature on building control regulations via existing government gazettes and publications supported by other published resources. The quantitative method, on the other hand, adopted the use of questionnaire survey. In all, thirty-five semi-structured questionnaires were administered to the targeted population who work with three zonal capital towns and three sub-towns of the district assemblies via random sampling technique. The main respondents of the questionnaires were the built environment professionals including, 10 Real Estate managers, 10 building owners, 7 site engineers, 5 town planners, 13 Building inspectors and 5 Architects who were randomly selected. The entire administered questionnaires were, however, retrieved. The questionnaires were of the semi-structured format that allowed the inclusion of respondents' opinion.

Table 1. Response Rate of Respondents

Professional	**Questionnaires issued**	**Responses**	**Percentage**
Real estate Managers	8	4	50%
Site engineers	3	3	100%
Town and country planners	2	2	100%
Building owners	7	7	100%
Building Inspectors	10	10	100%
Architects	5	5	100%
Total	35	31	89%

Table 2: Classification of study population

Professionals	**Total number**
Real estate Managers	10
Site engineers	7
Town and country planners	5
Building owners	10
Building Inspectors	13
Architects	8
Total (N)	53

[1]bernardmartins@hotmail.com
[2]nansary@uj.ac.za
[3]caigbavboa@uj.ac.za

The sample size for the study was the proportion of the selected professionals. This is because it was impossible to distribute the questionnaires to all professionals. There was the need to obtain a representative sample size for all the respondents. The formula recommended by Kish (1965) was used to obtain the representative sample. These include using a census for a small population, limiting a sample size of similar studies using formulas to calculate a sample size.

For critical sampling, however, the Kish Formula was used to compute the number of questionnaires to be given to the workers sampled under the simple random sampling.

The computation is done as follows:

$$n = \frac{n}{(1 + \frac{n}{N})}$$

And $n = \frac{S^2}{V^2}$

Where

n= Sample Size

N= Total population

S^2=Max standard development of population element (using max variability of p=0.5 at confidence level of 95%)

V =the desired level of precision ±5% =(0.5)

P = the proportion of population element that belong to the define class.

S^2=P (1-P)

=0.5(1-0.5)

=0.25

$$n' = \frac{S^2}{V^2}$$

[1]bernardmartins@hotmail.com
[2]nansary@uj.ac.za
[3]caigbavboa@uj.ac.za

$0.25/0.05^2$

=100

$$n = \frac{n}{(1 + \frac{n}{N})}$$

$$n = \frac{100}{(1 + \frac{100}{53})}$$

=34.6

n= 35

Therefore, thirty five (35) questionnaires were distributed randomly among respondents.

FINDINGS OF RESULTS

The validity of the questionnaire supported by the responses established the following results. The analysis of the data collected from the District Assembly revealed that 66.7% of the respondents remarked they lack enough personnel to see to the proper implementation of the Building Regulation. 100% of the response from Town and Country Planning showed the various challenges they encounter including: lack of ownership (title to land) of developers, Poor compliance to design standards, Poor site description and Poor presentation of design proposals.

100% of the respondents stressed that the problems associated with the citing of unauthorized structures at unapproved locations can be solved in the communities where the Legislative instrument (LI) 1639 (1996) of the building regulations is adhered to, strictly. Also, 33% of the respondents expressed their sentiments that the District Assembly must enforce a penalty fee for encroachers and defaulters or demolish the structure. On the issues of problems building owners encounter during the application process for their development permits, 95% of the respondents indicated the following as some of the challenges they encounter during the acquisition of the building permits: Lack of ownership (title to land) of developers, Poor compliance to design standards, Poor site description and demarcation and Poor presentation of design proposals. On the findings on issues regarding the by-laws within the scope of the national building regulations in the district, two respondents representing 66.75 pointed out that they have the by-laws, while one respondent representing 33.3% indicated he has no

[1]bernardmartins@hotmail.com
[2]nansary@uj.ac.za
[3]caigbavboa@uj.ac.za

knowledge of the laws. Also, 100% of the respondents indicated that the processes involved in the acquisition of the building permit are too long and as a result, it compels building owners to ignore the lengthy process and construct their buildings without regard to the regulations. This implies that works such as structures, drainage, and sanitation; streets and sign boarding among others will be poorly constructed.

CONCLUSION

This study into the challenges involved in the implementation of building control regulations at the Kpeshie Sub Metro concludes on the following:

xix. The proper implementation of the Building Regulation by the sub-Metro District is not being achieved.

xx. The composition of the District Planning Authority has an excellent task on them.

xxi. The Sub-metro lacks qualified expertise because they fail to attract Planning Professionals.

xxii. There is a fair amount of confusion as to whether or not LI 1630 is playing the role of Building Regulation.

xxiii. The role of the District Planning Authority to enforce the Regulations has not been felt by way of educating the general public within the communities.

xxiv. The haphazard positioning of buildings in the communities has resulted in flooding, fire outbreaks which cause loss of properties; and still, the District has not demolished such unauthorized structures.

xxv. Issuance of development and Building permits do not conform to the physical structure on the ground after being approved.

xxvi. Custodians of lands in the District Assembly ignore expert advice before developing their lands leading to misuse of the land.

Recommendations

The following recommendations are being suggested by this study to enhance effective planning and development of the district with the aim of instituting proper implementation into the development of the communities:

xix. The Sub Metro District Assembly should see to the proper implementation of the Building Regulation by enforcing the law on the community developers from day one.

xx. The greater task on the compositions of the District Planning Authority is to help in fighting against unauthorized developers by bringing all the ideas of the technicality from the various departments, i.e. the Town and Country planning, Metro Works, Roads, Survey department, Housing and water Company.

[1]bernardmartins@hotmail.com
[2]nansary@uj.ac.za
[3]caigbavboa@uj.ac.za

xxi. The building inspectors have a great task of carrying out their duties properly to ensure that buildings under construction conform with specifications as prescribed by permit, to stop unauthorized development and to examine building materials properly to ensure that buildings under construction conform with specifications prescribed by permit; and to stop unauthorized developments; and to examine building materials properly.

xxii. There should be qualified expertise in the District Assembly:
   a. to enhance human resource capacity
   b. to ensure the existence of the discipline of integrity and high reputation
   c. to oversee the total planning and development of the communities.

xxiii. The confusion of whether or not LI 1630 is playing the role of building Regulation, or Town and Country Planning will be solved. Both laws are operating side by side. It is hereby recommended that a building regulation regime should be promulgated to see to maintaining proper standards following a proper building code.

xxiv. The District Assemblies should educate the community members either by using the media, patrolling the communities with information van and by using demolishing exercise so that most of the opinion leaders will feel the impact of the development plans the authorities have set up for the communities.

xxv. The District Assembly must institute and organize educational programmes such as symposia, community seminars regarding Building Regulations and other relevant themes to broaden the knowledge of both their personnel and the community.

xxvi. The Assembly should embark on a demolishing exercise to put a stop to the haphazard positioning of buildings in the communities. The assembly should ensure that the approved building permits conform to what is permitted.

xxvii. Custodians of lands in the district should constantly be advised by the District Planning Authority before developing their lands in order not to lead to misuse of the land.

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[1]bernardmartins@hotmail.com

[2]nansary@uj.ac.za

[3]caigbavboa@uj.ac.za

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[1]bernardmartins@hotmail.com

[2]nansary@uj.ac.za

[3]caigbavboa@uj.ac.za

THE IMPACT OF AUDITING IN AN ORGANISATION

Aliyu, S.

Department of Accountancy, Federal Polytechnic Kaura Namoda
Zamfara State, Nigeria

ABSTRACT
Auditing is an essential ingredient achieving accountability and transparency in an organization in the light of this fact, the topic "Impact of auditing in an organization. The objectives of the study is to ensure that the auditing bring so many impact to organization. The methodology adopted for this paper is documentary research. The study uses only the secondary data by critical review of relevant literature to the topic from textbooks, journals, seminar papers, workshop, internet and also financial statement of Gusau Hotel in order to know the impact of auditing in an organization. Finding reveal that auditing has reduced tremendously the rate of fraud, error, misappropriation, irregularities and has reinforce people confidence and ability to invest their money in the organization and also to subscribe for their shares. Recommendation reveal that auditing make a great impact in every organization should be encourage in any governmental and nongovernmental organization for accountability and more creditability of financial report.

Keywords*: impact; auditing; organisation; accountability; creditability*

INTRODUCTION

The word audit was derived from a Latin word 'Audire" means to hear. Land owner engage tenant farmer to work on the land in which themselves did not take part in active work of the land instead oversees were appointed to safeguard their interest by ensuring that the account rendered were in the best interest of their master at that early time audit took the form of public hearing, in fact the account were read in public a loud. The impetus of European industrial revolution soon after the 1st world war brought about considerable expansion in exploration in an international trade in which adventure depend on merchant for funding. The need to protect the interest of investors or merchant against wasteful deviation of fund, desist fraud and reckless spending became necessary, the emergency of joint fraud company to mobilized funds from general public for industries and commerce contribution to the need for Auditing, sequent account i.e. those entrusted to manage resources of other were expected from time to time to produces and present financial report or statement to the owners as to how well their resources were manage. Babatunde (1986).

Stewardship Accounting has been introduced into our law, under the farm organization. The shareholder as a body delegated the management of the enterprises to a Board of directors and periodically, the board, submitted the financial position and profit and loss of the undertaking, thus around the 19th Century, were greatly arouse a need for some means by the

aliyushehu84@yahoo.com
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shareholder as a body might be satisfied that the account presented to them by the board of director actually show a true and fair view of financial position and earning of the company, it then become necessary to appoint both internal and external auditors, whose duty it was verify on behalf of the shareholder; however, it was not until the turn of the 20th century that mandatory requirement for the audit of limited company account and for the presentation of an audit report to members was finally embodied in the company Act's.
In Nigeria. It was in 1986 that anything like realistic accounting and safeguard were incorporation into law. The Nigeria company act of 1968 is being reviewed from time to time, we now have the Nigeria Companies and Allied Matter Act of 1991 guiding the conduct of auditing in Nigeria. Millichamp (2002).

The Need for an Auditing

The problem which has existed when directors or management of an organization make report (in case of private equity business concerns) is how to secure the owners believe and acceptances. This is because the report may contain errors, not disclose fraud be inadvertently misleading, be deliberately misleading, fail to disclose relevant information or fail to conform to regulations.
The solution to the problem of credibility in report account lies on the appointing an independent person called an auditor to investigate the report and report on his findings to owners or stakeholders as the situation may demand.
Modern organization can be very large with multi – national activities. The preparation of the account in such organization is a very complex operation involving sometimes the bringing together and summarizing of account of many subsidiaries with different convention, legal system accounting and control system. The examination of such account by independent expert (Auditor) trained in the assessment of financial information is of benefit to those who control and operate such organization as well as owners and outsiders.
Financial statement must conform to statutory or other requirement. The most notable is that all companies accounts have to conform to the requirement of the companies allied matters act 2004 and international financial reporting standard.

The following are the need for audit in an Organization

1. Reviewing the reliability and integrity of financial and operating information and the means used to identify, measure, classify, and report such information.
2. Reviewing the systems established to ensure compliance with those policies, plans, procedures, laws and regulations that could have a significant impact on operations and reports, and determining whether the organization is in compliance.
3. Reviewing the means of safeguarding assets and, as appropriate, verifying the existence of such assets.
4. Appraising the economy and efficiency with which resources are employed.
5. Reviewing operations or programs to ascertain whether results are consistent with established objectives and goals and whether the operations or programs are being carried out as planned.

2.0 CONCEPTUAL FRAMEWORK OF AUDITING

According to Aquasua (2004) define auditing as an independent checking and investigation of the books of account and vouchers of the business with a view to enabling the auditor to report whether the balance sheet and profit and loss account are properly drawn up to so as to show a true and fair view of the state of the organization.

According to Babatunde (1999) define auditing as a systematic process of objectivity obtaining and evaluating evidence regarding and ascertain about economic action and establish criteria and communicating the result to interested users.

According to Alvin and James (1976) said that auditing is the process by which a competent independent person accumulate and evaluate to a specific economic entity for the purpose of determining and reporting on the degree of correspondence between the quantifiable information and establish criteria.

According to Emile (1986) said is a process (Carried out by suitable qualified auditor) whereby the account of business entities including limited companies, charities, trust and professional firms are subjected to suiting in such details as will enable the auditor to form an opinion as to their accuracy of true and fair.

From all indication in the definitions above, it show clearly that an audit is means to improve the entire system of the organization and its principally serve as a watch dog in an organization and some of the objectives it aims at attaining include:

1. To report whether adequate and proper book of account were kept by the personnel or management of the organization
2. To safeguard the asset of the organization
3. Help in checking the accuracy reliability of the account data
4. To promote operational efficiency and encourage adherence to the prescribed management policies
5. To prevent loss of destruction of records falsification of entries and facilitate detection and correction of inaccuracies in the records.

2.1 Who is an Auditor?

The popular Maxin that say all auditors are accountant but not all accountant are auditors, clearly indicates that an auditor is a distinct accountant especially trained to perform expert assignment and recognized by statute.

The companies allied matters act 1990 in section 358 define an auditor as a person shall not be qualified for appointment as an auditor of a company for the purpose of this act, unless he is a member of a professional body of accountant in Nigeria established from time to time by an Act e.g. ICAN and ANAN.

2.3 Advantages of Auditing:

Okazie (2008) enumerated the advantages of audit include:

- It helps to agree tax assessment with the internal revenue service.
- It facilitates any claim for loss of profit from an insurance company. Including consequential loss.
- It helps to reduce fraud and errors, through internal control system
- It enables the client to obtain general and sound financial advice
- It helps to attest to the truth and fairness of financial statement of companies.

aliyushehu84@yahoo.com

2.4 Disadvantages of Audit

Uwota (2012) Stressed that as useful as audit is to an organization, certain side effects are known with the process of audit, they include:

- It is a very costly exercise
- It is time consuming
- It sometimes leads to stop of work, especially during cash or stock count.

2.5 Types of Auditor:

Several types of audit exist in modern day practice these, Deloritte (2012) gave as:

a. Statutory Audit
b. Private Audit
c. Interim Audit
d. Management Audit
e. Internal Audit
f. External Audit

a. **Statutory Audit**: Statutory Audit is that type of audit imposed by statute, which is carried out because the law requires it. The duties of an auditor under this type are spelt out in the enabling statute (Like the Companies and Allied Matter Act 2004) and cannot be limited in any way by the client (Although the scope could be increased by mutual agreement between the client and the auditors) e.g. annual audit of companies and government departments and corporations by external auditors.

b. **The Private Audit**: Is an audit not imposed by law. The duties of external auditors is/ are stated by the engagement letter. A private audit is therefore a special audit where the duties and functions of auditors are specified by the engagement letter and not statute.

c. **Interim Audit**: Is the term used to describe the audit conducted before the end of the financial year. This is where the external auditor reviews the records of an organization before the year end and may be so required by management of companies of their financers e.g. banks, investors, supplies etc.

d. **Management Audit**: A management audit can be defined as an audit which analyzes the effectiveness of the management team of a company. The purpose of this is seven-fold understand current practices, relate these to company financials, suggest new procedures which will improve the efficiency of managers, present a financial gain related to these new procedures and create benchmarks and projections of the future.

e. **Internal Audit**: Is an independent, objective assurance and consulting activity designed to add value and improve organization's operation. It helps an organization accomplish its objectives by bringing a systematic, discipline approach to evaluate and improve the effectiveness of risk management, control and governance processes.

f. **External Audit**: A report is made to a person external to the audited entity and its management. External audit is carried out by a professional who has the authority of the law to vouch the financial statement and record of an entity.

2.6 Role of Auditing in Current Economic Trend

Auditing is a substantial factor for organization development, in the current economy trend of the world auditing remain the only key factor for economic growth. Auditing serve as a yard stick for the shareholder to appraise and evaluate the performance of the management of an organization also auditing create shareholders confidence in the ability of the management of an organization.

In the last eight (8) years during the economic crises of the world auditors play vital role to sustained organization to remain immune to the economic meltdown.

2.7 Qualities Required of an Auditors

1. **Independence**: An auditor cannot give an unbiased opinion unless he is reasonably independent of all parties involve.

2. **Competence:** An auditor must be thoroughly trained and prove his competence before he can sign an audit report and also ability to carry out professional duty with great knowledge and skills.

3. **Integrity**: True and qualified accountants are renowned for their honesty, discretion and lawfulness and also confidential information obtained in the course of the audit is disclosed only when required in the public interest or by operation of law.

3.0 Organization:

Is a group of people coming together for the purpose of achieving a certain goal or achieving a profit.

There are three (3) major Legal form of organizational Development

1. ***Sole Proprietorship***: Is a business owned and operated by one person, usually, the proprietor (The owner) personally supervises its operation.
2. ***Partnership***: Is form of business organization is a mutual outgrowth of the sole proprietorship. In a partnership, two or more individual (The partners) agree to own and operate a business together. Usually they took their financial resources and business skills. Consequently, they share the risks and profit or loss.
3. ***Corporation***: Is a legal creation that acquire resources, own asset, produce and sell product, incur debts, extend credit, sue and be sued, and perform the function of any other type of enterprise. A corporation is distinct and separate from the individual stockholder.

4.0 RESEARCH METHODOLOGY

The methodology adopted for this paper is documentary research. The study uses only the secondary data by critical review of relevant literature to the topic from textbooks, journals, seminar papers, workshop, internet and also financial statement of Gusau Hotel in order to know the impact of auditing in an organization.

5.0 Discussion

Contemporary organizations are increasingly information dependent and knowledge intensive, and engage in extremely specialized operations across industries and sectors globally. The development of new organizational forms in the information age, with the forging of strategic alliances and the emergence of virtual organizations, has dramatically altered the purpose and functioning of organizations as well as the attendant needs for

aliyushehu84@yahoo.com

exercising control. The controls landscape within organizations today is quite different from those existing in the industrial – era traditional organizations for most of the 20th century. In this radically changed business environment, the audit function has become a major support function for management, the audit committee, the board of directors, the external auditors, as well as key stakeholders. Properly conceived and implemented, the audit function can play a critical role in the promoting and supporting effective organizational governance.
As multinational enterprises have recognized an increasing array of risks facing the organization, it is no surprise that the demand for risk management professionals has risen dramatically (cf Berstein, 1996). Any disciplined approach to growth and value creation assumes that the organization is managing all manner of significant and likely risk effectively. Risk can be considered both at the macro or portfolio level (Enterprise – wide risk management) as well as the micro or departmental level. Risk management is frequently an area in which audit can contribute greatly by furnishing analyses and providing wise counsel to top management and the board of directors. The audit function also performs micro level risk assessment for its own purposes to identify those areas which demand the greatest efforts on the part of the audit functions and for achieving appropriate audit coverage of the audit universe over defined periods of time (Ramamoorti & Traver, 1998). Auditors can play a significant 'partnering' role with management in establishing and monitoring business processes for the assessment, measurement and reporting of risks in general and in implementing enterprise risk management initiatives. Modern approaches to risk – based auditing allow for the assessment of risks and linking them to business objectives systematically (McNamee and Selim, 1998) walker, Shinkir, and Barton 2002; Deloach, 2000). Indeed, the audit function can facilitate the processes by which business units can develop high quality risk assessments, and this can in turn be very useful to the audit function in planning its own work, primarily by enhancing the quality of decision – relevant information and minimizing duplication of effort (Walker et al 2002).

One of the key premises today in any organization is that the presence of a strong audit function can go a long way in supporting and promoting effective organizational governance. Much of organizational governance has to do with effective monitoring and oversight of risk management, and auditors, if perceived as 'risk management expert' can expect to play an immensely significant and high-profile role within organizations in the coming decades. With the recent New York Stock Exchange requirement for listed companies to have audit function, the profile of the audit function has been raised considerably. By being given a seat at the table where high – level discussions of organizational governance occur, the horizons for the profession have been considerably expanded and its opportunities to add value have growth exponentially.

However, the challenge remains for audit professional to develop a keen understanding of the value proposition they offer and manage their perception and image both within and without organizations. Once the audit function gains the trust and confidence of those charged with governance, it proceed to deliver outstanding performance and value using the combined wealth of knowledge and experience possessed by its personnel in control best practices, risk monitoring and management, and governance structures and process. Specifically, with all of the Big four professional services firms demonstrating a strong interest in developing their audit co-sourcing practices, the audit activities and the attendant recognition of the value added by the audit function are indeed welcome trends.

In conclusion, the 21st century presents much promise and unprecedented growth opportunities for the auditing profession. However, developments in practice must be carefully studied by interested academics so that a body of knowledge is systematically built up and transmitted to future generations of auditing professionals. The extant body of knowledge should not only be critiqued and constantly refined to reflect the current state of the art, but should also encourage and stimulate, through research, leading edge thinking that so often produces innovations in practice. We believe that this report constitutes an excellent sources to start the journey that will yield important insights into auditing research, practice, and education.

5.0 CONCLUSION

As at today auditing organization financial statement remains the only weapon that bring sanity into the general mode of operation in an organization and also serve as a yardstick for the shareholder to appraise and evaluate the performance of the management of the organization so far and see how they can assist to improve on their performance. Auditing also create shareholder confidence in the ability of the management of the organization to perform as well as third parties to invest and transact business with the organization.

Finally, auditing has reduced tremendously the rate of fraud, error, misappropriation, irregularities and has reinforce people confidence and ability to invest their money in the organization and also to subscribe for their shares.

5.2 Recommendation

1. Audit make a great impact in every organization should be encourage in any government and non-governmental organization for accountability and more creditability of financial report.
2. Government and professional bodies should formulate law that will reduce the liabilities of auditors to the minimal level in order to encourage them and gear them up to discharge their duties diligently, skillfully and with sense of due care.
3. Auditing should be seen as an essential part of the accountability process and a significant restriction on the freedom of action of those who control resources.
4. Government should introduce legislation allowing auditors to report reasonable suspicion or a certain categories of fraud to government authorities without breaching the role of clients confidentially, so that the benefits of auditing can be achieved in practice and enjoyed by the general public in the society.
5. Potential benefits of auditing should be realized by strengthening auditor's independence. This is attainable by revising and strengthening the professional guidelines and giving legal backing on them.

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ANALYSIS OF FOOD INSECURITY STATUS AMONG FARMING HOUSEHOLDS IN NORTH CENTRAL NIGERIA

Amao, J.O.[1] and Ayantoye, K.[2]

[1 & 2] *Department of Agricultural Economics, Ladoke Akintola University of Technology, P.M.B 4000. Ogbomoso, Nigeria.*

ABSTRACT

Food insecurity has been attributed to many interconnected factors, hence this study intends to analyse food insecurity status among farming households. The objectives of the study are to analyse the food insecurity status by socioeconomic characteristics as well as its determinants in the study area. Panel data survey method was used to collect relevant information from 283 farming households in North Central, Nigeria from September to December 2013 during food crops harvesting season (HS) and from April to June 2014, during food crops planting season (PS). Data were collected with well-structured questionnaire and were analysed using Foster Greer and Thobekcke (FGT) 1984 Food insecurity index and Probit regression model. Based on the recommended daily energy level (L) of 2250 kcal, the food insecurity line (Z) was estimated at ₦1652.38 per month per adult equivalent during the harvesting season, while the food insecurity line (Z) during the planting season was ₦1795.80 per month per adult equivalent, 42 and 78 percent of the households were food insecured during the harvesting and planting seasons respectively. Probit Regression analysis revealed that household size, educational status, age, asset ownership, remittances, occupational status, access to credit and access to extension services are factors that significantly determine food insecurity status. The study therefore concludes that there is high level of food insecurity during planting season in the study area.

Keywords: *Food insecurity, harvesting season, planting season, adult equivalent, dependency ratio*

1.0**INTRODUCTION**

The UN General Assembly decided that the Report of the Open Working Group on Sustainable Development Goals would be the main basis for integrating the SDGs into the post 2015 development agenda. The second of the seventeen proposed SDGs is "End hunger, achieve food security and improved nutrition, and promote sustainable agriculture". The following suggested targets and indicators are associated with the goal: by 2030 end hunger and ensure access by all people, in particular the poor and people in vulnerable situations including infants, to safe, nutritious and sufficient food all year round, by 2030 end all forms of malnutrition, including achieving and by 2025 the internationally agreed targets on stunting and wasting in children under five years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons (Sustainable Development Goals, 2014).More than 150 world leaders gathered at United Nations Headquarters in New York to adopt an ambitious new sustainable development agenda at a 3-day summit that commenced Friday 25 September.

yojobamoo@yahoo.com

2015 presents a historic and unprecedented opportunity to bring the countries and citizens of the world together to decide and embark on new paths to improve the lives of people everywhere. These decisions will determine the global course of action to end poverty, promote prosperity and well-being for all, protect the environment and address climate change. Agreed by the 193 Member States of the UN, the new agenda, Transforming Our World: 2030 Agenda for Sustainable Development, consists of a Declaration, 17 Sustainable Development Goals and 169 targets (Sustainable Development Summit, 2015).
In 1996, World leaders met in Rome for the second World Food Summit (WFS) to discuss ways to end hunger and to challenge the global community to cut in half by the year 2015, the number of undernourished people worldwide (800 million), of whom 250 million are severely malnourished children. This goal was reiterated in the United Nations Millennium Declaration in September 2000. To achieve the goal, the number of undernourished people was to be reduced by at least 20 million every year between 1996 and 2015. However, the trend of the decline in the number of the undernourished (an average of 8 million each year), as observed by Food and Agriculture Organization (FAO, 2008), is grossly inadequate to meet the 1996 World Food Summit target (Okuneye, 2002).
Food availability for the farm household means ensuring sufficient food is available for them through own production. The seasonal trends in food prices and wage rates have important implications on the food security status of Nigerian poor household, who according to the findings from the National Living Standard Survey (NLSS) in 2004 spent up to 90 percent of their income on food (World Bank, 2005). Statistics from the National Bureau of Statistics (NBS, 2007) indicated that poverty incidence in Nigeria rose from 28.1 percent in 1980 to 54.4 percent in 2004.With the estimated population figure of 140 million, this translates to 74 million Nigerians were living below poverty line. While 63 percent of this figure lives in the rural areas, 43 percent of the total population of the south west, Nigeria, is poor (NBS, 2007). Similarly, Okunmadewa (2001) revealed that one major characteristic of the farming populace of Nigeria is food insecurity. The basic minimum requirement figure has been found to be 65 grammes of protein and 2500 kcal of energy per capita intake of which if consumed otherwise, leads to a state of malnutrition (Omonona and Agoi, 2007). The problem of food insecurity especially during the hungry period among rural households in Nigeria is long standing (Obamiro, 2005). Most times, they rely on market purchases since they do not have enough to subsist on the year round. This leads to inconsistent food availability thus contributing to food insecurity during the period (Adepoju and Adejare, 2013).

Food insecurity has been attributed to the following interconnected factors: Income insecurity making an individual or household unable to purchase sufficient food or food with adequate nutrient content to assure food security; spatial factors such as living in a neighborhood without an affordable grocery store, markets or other outlets; disproportionate income allocation to other areas, such as rent, leaving an insufficient budget for food; and isolation, loss of autonomy or a lack of a social network (Olagunju et al, 2012). In addition, Adebayo (2010) noted that the factors that constrain food supply and food demand invariably affect food security. Studies (World Bank, 2001; Ribar and Hamrick, 2003) have revealed that rural people face a high risk of food insecurity due to poverty, income inadequacies, limited access to resources, underemployment, and unemployment, and many barriers to self-sufficiency, which create family frailty and crisis (Ayantoye et al, 2011). The main focus has shifted from global and national to household and individual food insecurity and from food

yojobamoo@yahoo.com

availability to food accessibility and the security of access (Maxwell and Smith 1996). The study sets out to analyse the food insecurity statusamong farming households in North central Nigeria. The objectives of the study are to analyse the food insecurity status by socioeconomic characteristics as well as its determinants in the study area.

2. RESEACH METHODOLOGY

This study was carried out in the North central, Nigeria. The zone is one of the six geo political zones that the country is divided into. It comprises Nasarawa, Plateau, Benue, Kogi, Niger and Kwara states. Kwara and Kogi states were purposively selected for the study.Primary data were collected in two periods, during the harvesting season of 2013 and the planting season of 2014. A Multi-stage random sampling method was adopted in the selection of respondents.The proportionality factor used in the selection of the villages is stated as:

$X_i = {}^{n}/N*15$……... (2.1)

Where X_i = number of villages to be sampled, n = number of villages in the particular Local Government Area, N= total number of villages in all the Local Government Areas. The proportionality factor is stated as follows: $x_j = {}^{p}/p*150$…….(2.2)

Where x_j = the number of households to be sampled from each village, ^{p} = the number of households in each village, **P** = the sum of the number of households in the 16 villages selected This led to 15 villages being proportionately selected in each of Kwara and Kogi States respectively based on the number of villages in the study area. And 150 respondents (these sample sizes were successfully drawn and the responses were satisfactory) each for the two states to give a total of 300 sample size. However 283 households were tracked in the second phase of data collection and were used for the study.

Data Analysis

Food Insecurity Status and Profile

Detail methods adopted in the computation of the food insecurity line, profiling of food insecurity status and probit regression model used in projecting the long run equilibrium state are well outlined. Specifically, the food insecurity line is gotten in the following steps:

(a) The Value of Food (F_j) consumed by the j^{th} household: $F_j = G^*_j + C^*_j$..... (2.3). The value of purchased food consumed G^*_j by j^{th} household: $G^*_j = \sum D_{ij}P_{ij}$..... (2.4). The value of own output or donated food C^*_j consumed by the j^{th} household: $C^*_j = \sum M_{ij}P_{ij}$ …… (2.5)

(b) Total value of food consumed per adult equivalent:

$F^*_j = \underline{F}_j$..... (2.6)

H_j

(c) The different types and quantities of foods consumed by the different households were converted to calories (Cj) (d) A regression model was then fitted into equation (2.7) to estimate parameters (a) and (b) to be used in determining food insecurity threshold (line).

$\ln F^*_j = a + bCj$……(2.7) (e) The food insecurity line, Z, which is the estimated cost of acquiring the calorie recommended daily allowance (RDA) was estimated

yojobamoo@yahoo.com

asZ=$e^{(a+bR)}$……(2.8) (f) The decomposition of food insecurity status was based on several socio-economic characteristics of households using: $P_\alpha = \frac{I}{N}\sum_{I=1}^{q}\left(\frac{Z-Yi}{Z}\right)^{\alpha}$ ……(2.9)

THE FGT 1984 measure for the group or population was obtained using: $F\alpha = \sum_{i=1}^{m} F\alpha_i \, {}^{n_i}\!/_{n}$ …… (2.10)The contribution (c_i) of each subgroup's weighted food insecurity measure to the whole group's weighted food insecurity measure was determined by using: $C_i = n_i F\alpha_i / nF\alpha_i$ …… (2.11)

Determinants of Food Insecurity Status

Estimation of factors influencing food security transitions are best captured by using Probit model (Baulch and mcculloch, 1998). This study used Probit model for data analysis in determining factors that affect food insecurity status and then picked the model that best fitted and interpreted the data collected.

$Y_{IJ} = B_O + B_I X_I + E_I$…… …… (2.12)

WHERE: Y_{IJ} = THE DEPENDENT VARIABLE FOR THE FOOD INSECURITY STATUS

i=1….. 283, j=1 or 0 for food insecurity status, Y = f(X_1, X8…….X_{15}), Y=1 if food secure 0 if otherwise, b_o= constant term, X_i = the independent variables. The Independent Variables, which are the socio economic and Demographic variables, are captured as: X_1 = Household size, X_2 = Primary Education Dummy (D=1 If households head has primary education, 0 If otherwise), X_3 = Secondary Education Dummy (D=1 If households head has Secondary education, 0 If otherwise) X_4 = Tertiary Education Dummy (D=1 If households head has Tertiary education, 0 If otherwise) X_5 = Age of Household head (year), X_6 = Marital Status of the Household Head (D = 1 If Married, 0 If otherwise), X_7 = Gender of the Household head (D = 1 If Male, 0 If otherwise), X_8 = Years of farming experience (Years), X_9 = Dependency Ratio, X_{10} = Farm Size (Ha), X_{11} = Access to Extension Services (1 If yes, 0 If otherwise) X_{12} = Access to credit facilities (1 if yes, 0 if otherwise), X_{13} = Occupation status of the head (D =1 If household head is into farming as primary occupation, 0 if otherwise), X_{14} = Access to Remittance (D = 1 if household has access to remittance, 0 if otherwise) and X_{15} = Land ownership (D =1 if household own land, 0 if otherwise)

3 RESULTS AND DISCUSSION

3.1 Food Insecurity by Dependency Ratio, Years of Farming experience, Educational Status and Farm Size of household heads in the study area

In Table 1 households with dependency ratio less than one had lower food insecurity indices while households with dependency ratio greater than one have higher food insecurity indices. Specifically, the food insecurity incidence increases with dependency ratio from 12 percent to 50 percent for households with dependency ratio zero and > 1.0 respectively during HS while similar movement was also recorded among the four groups of dependency but at high degree during PS. The subgroup contribution to the whole group weighted food insecurity measure revealed a similar pattern as with the food insecurity incidence, depth and severity (Table 1). Overall, food insecurity increases with increase in dependency ratio; this is probably because more mouths were needed to be fed. This result is in tune with the findings of Riber and Hamrick (2003), London and Scott (2005) that households with higher number

yojobamoo@yahoo.com

of children under the age of 18 years or higher number of dependants in their households were more likely to be food insecured.

Two subgroups of households farming experience were used to profile food insecurity among farming households. These were households whose heads had farming experience below 10years and those whose heads had farming experience of 10years and above as shown in Table 1. The analysis revealed that 42 percent of the households headed by persons having less than 10years and, 10years and above farming experience were food insecured during HS. Similar pattern of equality was shown by the sub-groups for both the food insecurity depth and severity. But in PS, the food insecurity incidences among the households headed by persons of below 10years and, 10years and above rose to 74 and 80 percent respectively. It is important to equally mention here that food insecurity incidence for the two sub-groups in PS were very high when compared with HS figure. However, there were no appreciable changes in the sub-groups contribution to the whole weighted measure of food insecurity incidence, depth and severity for both periods (Table 1). This is probably has to do with the increase in age of farmers as observed by London and Scott (2005). This is in agreement with the findings of Obamiro (2005). The high food insecurity incidence experience in both groups in PS could also be attributed to the period which coincides with the period of food scarcity.

Table 1 revealed that for the two seasons of study, food insecurity indices were higher among those farming households whose heads had no formal education and lowest among those family whose heads have attained one level of education or the other. The food insecurity incidence almost doubled the HS figures in PS. The food security depth and severity followed similar pattern among the various sub-groups of educational status of household heads for the two years of study. Similar pattern of decrease in subgroups contributions to the whole weighted food insecurity depth and severity as the level of education increases were observed during the two years of study (Table 1). However, the PS indices were higher than HS. Higher education increases the likelihood of getting other paid jobs other than farming and equally regulates indiscriminate child birth that would have led to an increase in the dependency ratio of such a household (Omonona, 2001). Table 1 showed that 43 percent of the households whose farm sizes were not more than 5 hectares were food insecured while 41 percent of households whose farm sizes were more than 5 hectares were food insecured in HS. The food insecurity incidence in PS almost doubled the HS figure for the two sub-groups. The food insecurity depth and severity experienced by these two subgroups in HS and PS followed similar pattern as the food insecurity incidence. The contributions of the subgroup to the whole group food insecurity depth and severity for the two periods followed similar pattern with the food insecurity incidence. The result indicated that food insecurity decreases with increase in farm size. This result is in agreement with the findings of Obamiro (2005).

Table 1: Food insecurity by Dependency Ratio, Years of Farming experience, Educational Status and Farm Size of household heads in the study area

	Harvesting Season(HS)			**Planting Season(PS)**		
	P_0	**P_1**	**P_2**	**P_0**	**P_1**	**P_2**
Dependency Ratio						
Zero	0.12 (0.03)	0.04 (0.02)	0.01 (0.02)	0.38 (0.04)	0.11 (0.03)	0.06 (0.01)
0.01 -0.999	0.16 (0.02)	0.06 (0.03)	0.02 (0.02)	0.79 (0.07)	0.28 (0.04)	0.15 (0.04)
1.0	0.36 (0.14)	0.11 (0.12)	0.05 (0.11)	0.74 (0.15)	0.37 (0.15)	0.24 (0.14)
> 1.0	0.50 (0.81)	0.18 (0.83)	0.09 (0.85)	0.84 (0.74)	0.47 (0.78)	0.38 (0.81)
Total	0.44	0.17	0.09	0.73	0.38	0.25
Years of Farming Experience						
< 10years	0.42 (0.44)	0.15 (0.44)	0.07 (0.42)	0.74 (0.42)	0.41 (0.44)	0.27 (0.46)
≥ 10years	0.42 (0.56)	0.15 (0.56)	0.08 (0.58)	0.80 (0.58)	0.41 (0.56)	0.28 (0.54)
Total	0.44	0.17	0.09	0.73	0.38	0.25
Educational Status						
No Formal Education	0.48 (0.59)	0.17 (0.59)	0.12 (0.58)	0.87 (0.55)	0.59 (0.57)	0.43 (0.57)
Primary School	0.37 (0.20)	0.18 (0.20)	0.09 (0.20)	0.72 (0.22)	0.47 (0.17)	0.31 (0.16)
Secondary School	0.35 (0.12)	0.11 (0.11)	0.04 (0.15)	0.68 (0.14)	0.39 (0.13)	0.26 (0.13)
Tertiary School	0.32 (0.09)	0.11 (0.10)	0.04 (0.07)	0.60 (0.09)	0.25 (0.13)	0.15 (0.14)
Total	0.44	0.17	0.09	0.73	0.38	0.25
Farm Size						
≤5 (ha)	0.43 (0.57)	0.15 (0.59)	0.08 (0.57)	0.82 (0.61)	0.43 (0.60)	0.28 (0.60)
Above 5 (ha)	0.41 (0.43)	0.15 (0.41)	0.07 (0.43)	0.72 (0.39)	0.39 (0.40)	0.26 (0.40)
Total	0.44	0.17	0.09	0.73	0.38	0.25

Source: Field Surveys, 2014

yojobamoo@yahoo.com

3.2 Food Insecurity by Access to Extension Services, Access to Credit, Occupational Status, Access to Remittances and land ownership of household heads in the study area

Farming households were categorised into those without access to extension services and those households whose heads had access to extension services (Table 2). The result of the analysis revealed that 46 and 37 percent respectively had no access to extension services and farming households whose heads had access to extension services were food insecured in HS. The incidence of food insecurity increased to 78 and 76 percent respectively, for households whose heads had no access to extension services and households whose heads had access to extension services in PS. Similar pattern were also recorded for food insecurity depth and severity for the two years period. The contribution of the subgroups to the whole group food insecurity incidence, depth and severity for the two years followed similar pattern. This result is in agreement with Obamiro(2005). In summary, food insecurity among rural households in the study area is higher when households' heads had no access to extension services than when the head had access to extension services. Also the food insecurity measures are very high in PS than in HS.

Farming households were also categorised into those without access and those with access to credit (Table 2). Also 43 percent of households whose heads had no access to credit facilities were food insecured in HS while the incidence increased to 78 percent in PS. Among the households whose heads had access to credit, 40 percent of them were food insecured in HS, but increased to 76 percent in PS. The food insecurity depth and severity for the two years of study followed similar pattern. The contributions of the subgroups to the whole weighted food insecurity indices in both HS and PS showed a similar pattern with the food insecurity incidence. This result is in agreement with Obamiro(2005).

In HS, the food insecurity incidence is 34 percent among the households whose heads takes into farming as primary occupation, while it is 58 percent among households whose heads engaged in farming as secondary occupation. (Table2). In PS, food insecurity incidence rose to 84 and 66 percent respectively for the households whose heads engaged in farming as primary occupation, and those households whose heads engaged in farming as secondary occupation. Similar pattern of higher food insecurity depth and severity among the households whose heads engaged in farming as primary occupation were observed in the two years of study. Generally, households whose heads engaged in farming as primary occupation are more vulnerable to food insecurity. This is because they had limited source of meeting their food needs during the planting season due to poor storage facilities and the pressure to sell off their excess food crops to meet other financial obligation (Jimoh 2004). Table 2 showed that households with no access to remittances were more food insecured than those with access to remittances. The food insecurity incidence increases from 27 percent in HS to 40 percent in PS among households who had access to remittances, while the food insecurity incidence among households who had no access to remittances increases from 46 percent in HS to 93 percent in PS. This indicated that households who had no access to remittances were more vulnerable to food insecurity than the households who had access to remittances. This result is in agreement with a priori expectation that access to remittance decreases food insecurity (Agbola et al 2005).

The result of the analysis as shown in Table 2 revealed that in HS food insecurity incidence among households who own no land were 46 percent while it was 34 percent among land

owning households. Their food insecurity depth and severity follow similar pattern. The respective contributions of sub group food insecurity to the whole group food insecurity measures follow similar pattern. Also, during PS, food insecurity incidence among households who own no land rose to 87 percent, while it rose to 63 percent among land owning households. Food insecurity depth, severity and their contributions followed similar pattern (Table 2).

Table 2: Food insecurity by access to extension services, Access to Credit, Occupational Status, Access to Remittances and land ownership of household heads in the study area

	Harvesting Season(HS)			**Planting Season(PS)**		
	P_0	**P_1**	**P_2**	**P_0**	**P_1**	**P_2**
Access to Extension Services						
No Access	0.46 (0.61)	0.18 (0.57)	0.08 (0.56)	0.78 (0.59)	0.42 (0.59)	0.27 (0.60)
Access	0.37 (0.39)	0.15 (0.43)	0.07 (0.44)	0.76 (0.41)	0.41 (0.41)	0.27 (0.40)
Total	0.44	0.17	0.09	0.73	0.38	0.25
Access to Credit Facilities						
No Access	0.43 (0.61)	0.16 (0.59)	0.08 (0.56)	0.78 (0.59)	0.41 (0.59)	0.28 (0.60)
Access	0.40 (0.39)	0.14 (0.43)	0.07 (0.41)	0.76 (0.41)	0.41 (0.41)	0.26 (0.40)
Total	0.44	0.17	0.09	0.73	0.38	0.25
Occupational Status						
Farming as primary occupation	0.34 (0.59)	0.44 (0.60)	0.27 (0.58)	0.84 (0.70)	0.62 (0.52)	0.33 (0.52)
Farming as secondary Occupation	0.58 (0.41)	0.26 (0.40)	0.14 (0.42)	0.66 (0.30)	0.34 (0.48)	0.19 (0.48)
Total	0.44	0.17	0.09	0.73	0.38	0.25
Access to Remittances						
No	0.46 (0.61)	0.32 (0.75)	0.22 (0.82)	0.93 (0.55)	0.59 (0.58)	0.41 (0.62)
Yes	0.27 (0.52)	0.26 (0.20)	0.18 (0.70)	0.40 (0.33)	0.51 (0.36)	0.40 (0.35)
Total	0.44	0.17	0.09	0.73	0.38	0.25
Land Ownership						
No	0.46 (0.58)	0.22 (0.90)	0.11 (0.94)	0.87 (0.63)	0.49 (0.62)	0.31 (0.65)
Yes	0.34 (0.42)	0.15 (0.10)	0.07 (0.60)	0.63 (0.37)	0.40 (0.38)	0.29 (0.35)
Total	0.44	0.17	0.09	0.73	0.38	0.25

Source: Field Surveys, 2014

yojobamoo@yahoo.com

3.3 Determinants of Household Food Insecurity status among households in the study area

It should be noted that a positive sign of a coefficient indicated that an increase in the variable tend to increase the likelihood of the household moving into food insecurity .Similarly, a negative sign of a coefficient decreases the likelihood of the household moving into food insecurity. Out of the 15 variables, 8 significantly determined the probability of household's food insecurity status in the area of study. These were household size (X_1), the three educational status categories (X_2, X_3, X_4), Age of the household head (X_5), access to credit (X_{12}), farming as primary occupation (X_{13}) and ownership of land (X_{15}). Large household size had the likelihood increasing food insecurity by 12.4 percent at $p<0.01$. This agrees with Riber and Harmrick (2003) that the larger the household size the higher the probability of moving into food insecurity. This could be as a result of the fact that increased household size is synonymous with higher dependency that hardly contributed to the income of household. Also, the negative and significant coefficients 0.2635($p<0.1$), 0.0205($p<0.05$) and 0.1481($p<0.1$) respectively for primary, secondary and tertiary levels of educational attainment of the households heads indicated that households' heads attainment of any of the levels decrease the probability of moving into food insecurity by 26, 2 and 15 percent respectively for primary, secondary and tertiary educational attainment. This is in agreement with Ribar and Hamrick (2003) that the odd of moving into food insecurity decreases with increase in educational attainment of household head. An increase in the age of household head increases the probability of such a household into food insecurity by 1.5 percent at $p<0.1$. This is in agreement with Ribar and Hamrick (2003), that household headed by older person is more likely to move into food insecurity. This could be attributed to the fact that the ability to do hard and difficult work associated with rural livelihood activities of which farming is one decreases with increase in age. Access to credit had a coefficient of -0.0330. This indicated that access to credit reduces the probability of the household moving into food insecurity by 3 percent at $p<0.01$. This is so because loanable funds can be used to expand production through the purchase and use of modern improved inputs and consequently improve the food security of such households. Households whose heads engaged in farming as primary occupation had the likelihood of moving into food insecurity by 5 percent at $p<0.1$. Land ownership reduces the probability of household moving into food insecurity by 0.8 percent at $p<0.01$.

Table 3: Maximum Likelihood Estimate of the Probit Regression of Household Food Insecurity status among farming households in North Central, Nigeria.

Variable	Coefficient	Standard Error
Constant	-0.0654	0.2455
Household Size (X_1)	0.1238	0.0426 * **
Primary Education (X_2)	-0.2635	0.1580 *
Secondary Education (X_3)	-0.0205	0.0109 **
Tertiary Education (X_4)	-0.1481	0.0874 *
Age (X_5)	0.0150	0.0078*

Marital Status (X_6)	-0.0607	0.0821
Gender (X_7)	0.0734	0.0591
Farming Experience (X_8)	-0.0081	0.0164
Dependency Ratio (X_9)	0.0019	0.0250
Farm Size (X_{10})	-0.0010	0.0015
Access to Extension. (X_{11})	-0.1745	0.2247
Access to Credit (X_{12})	-0.0330	0.0111***
Occupational Status (X_{13})	0.0529	0.0303*
Access to Remittance (X_{14})	0.1347	0.7460
Land Ownership (X_{15})	-0.0084	0.0031***
Chisqure=59648.692	DF=453	P=0.00

Source: 2014 Computer Print outof Probit Regression
***-denotes significance at 1%, ** at 5% and * at 10%

CONCLUSION

Based on the empirical evidence emanating from this study, it was concluded that there was high level of food insecurity in the study area particularly during the PS. Food insecurity was influenced by household size, educational status, age, dependency ratio and occupational status of the household head. The findings further revealed that food insecurity status was influenced by household size, educational status, age, marital status, farming experience, farm size, dependency ratio, access to extension services, access to credit facilities and occupational status of the household head. The households with large size and high dependency ratio were worst hit by food insecurity. The very few that had fairly small household sizes were food secure. The food insecure households were more among households whose heads had no access to credit facilities. The following recommendations are made in order to ensure food security among rural households in the study area. The identified chronically food insecured households should be specifically targeted by the government for safety net such as provision of subsidized food crops, distribution of food crops as relief materials and special nutrition programme involving the provision of free meal for malnourished households. Since most of the rural households who engaged in farming as primary occupation are worst hit by food insecurity, special training to enable them acquire skills fully is being advocated. This will guarantee them more income to meet food needs during the planting period. This study suggests that efforts should be made to sensitize and encourage households to have children they can really cater for. It is also recommended that formation of cooperative societies should be encouraged and institutionalized among rural households. In addition, government should encourage farmers to borrow money at regular basis from micro finance banks through favorable lending terms. To ease access to credit, the

difficulties and bureaucracies (like suitable collateral and education of applicant) involved in formal lending procedures must be removed.

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DEVELOPMENT OF SMALL HYDRO POWER STATION: A CASE STUDY OF JIBIA DAM, KATSINA STATE NIGERIA.

Ibrahim, W.

Department Of Mechanical Engineering Technology, Federal Polytechnic Kaura Namoda, Zamfara State, Nigeria.

ABSTRACT

Electrical energy is one of the commodities on which the provision of goods and services depend. Its availability and consumption rate serve as the economic index to measure the development of any community or nation. In Nigeria, there is a limitation to power supply from the National grid which has adversely affected the economic and social development of the populace. This really necessitates the use of other energy sources as a viable alternative to which small hydro power plant (SHP) readily fits in. Major rivers and dams in Nigeria have high rate of hydro power potential, but lack of SHP feasibility studies was opined as one of the barriers for its development. In this study therefore, the features of Jibia dam and the dam site were over- viewed in respect to its suitability to sustain hydropower and it was found viable for hydro electric development. In addition, detailed analysis of technical and financial assessments have been examined, and revealed that the dam can potentially generate about 2MW and could as well be used for irrigation activities. The financial analysis however, reveals that the estimated cost for developing Jibia SHP to produce about 2MW of electricity is ₦1,150,000,000.00 and consequently could generate a revenue of ₦330,625,567.00 per annum. The mode of approach and the result of this study may however be used as a guide in similar situations.

Keywords: Small Hydropower, Technical analysis, Financial analysis

1.0 INTRODUCTION

Electrical power is a critical infrastructure for economic development and for improving the quality of life. However, in Nigeria only about 40% of the nation's 140 million population or more has access to grid electricity. The end users of electricity like households, farmers, commercial establishments and industries are confronted with frequent power cuts, both scheduled and unscheduled. Power cuts, erratic voltage, and low or high supply frequency have added to the 'power woes' of the consumer. These problems emanate from: Inadequate power generation capacity; Lack of optimum utilization of the existing generation capacity; Inadequate inter–regional transmission links; Inadequate and ageing sub–transmission and distribution network leading to power cuts and local faults; Slow pace of rural electrification; Large scale theft and skewed tariff structure and Militancy in the Niger Delta region.

wadaasy@gmail.com

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For some years, interest in hydropower went down drastically due to a number of factors: fast growth in electricity demand globally; progress of other technologies, success of large generation schemes and large grids in bringing down cost; mass production of small diesel sets that are both portable and easily installed and easy access to affordable diesel fuel. In the more recent past, the energy crisis, climate change, energy poverty in developing countries, high price in dollar exchange rate, significant increased in power generation and commitments for achieving the Millennium Development Goals (MDGs) have led to a rethink. Planners and policy makers are being urged to review all available energy options, especially those decentralized sources that could play a role supplying poor and isolated communities with energy for development. These sources include hydro power schemes as well as solar photovoltaic systems, biomass energy and wind generators. While attending to the task of improving the country's generation capacity, high priority is to be given to reduce the cost of power to enable different segments of the population and the economy to effectively utilize power as an input. As a result, adoption of best practice and choosing least cost options in capacity addition will be encouraged and therefore, small hydro power could be the best option.

The development of energy from small, mini and micro hydropower projects are being encouraged and supported worldwide because of its relative advantage of being a safe and clean renewable source of energy that can be developed and managed by local communities (Zarma, 2006, and Inversin, 1995). The frameworks for sustainable development and utilization of SHP across the globe that are well documented in different literatures present some information that are useful as guidelines and adaptation for implementing this SHP project at Jibia dam. Although SHP is still experiencing slow growth in its development in Nigeria, yet recent reviews have shown that Nigeria is blessed with huge hydropower potentials (Manohar and Adeyanju 2009) .With the difficulty of starting new small hydropower scheme from the scratch, this study desires to look into the feasibility of incorporating hydropower schemes in existing dams with other supplementary functions.

The inclusion of hydropower schemes into any technically viable existing dams is without doubt a welcoming solution to the critical power crises in most rural communities living within the vicinities of these water infrastructures. It is in view of the above mentioned reasons that this study have selected Jibia dam in Katsina state, Nigeria, with the intention of undertaking feasibility for the development of small hydropower station that can meet the electricity demand of its neighboring communities as well as fulfilling its other primary use and purpose. It is expected that the outcome of this study would help to address the issue of the lack of SHP feasibility studies that was opined by as one of the major barriers for SHP sector development in Nigeria (Uhunmwangho and Okedu, 2009).

1.1 The Study Area

Jibia Dam is located in Jibia local Government Area, about 43km west of Katsina town, the capital of Katsina State. It is within latitude of 13.07167^0N and longitude 7.25167^0E. The construction works of the project started on 1st December, 1981, completed and commissioned in 1992. It is designed to irrigate about 3,500 hectares of land and to supply

raw water to a nearby treatment plant operated by the state Government for Jibia town and 15 villages as well as to Niger Republic (Paul, 2008).

2.0 SMALL HYDROPOWER

Small hydropower represents the highest density resources in Nigeria and stands in the first place in electricity generation from renewable sources throughout the world among all the non- conventional renewable energy sources. There is no census in the world on the classification of hydropower plants and its classification is based only on a country's level of hydropower development. The table below summarized the classification as follows:

Table 1: Classification of various Hydro schemes

Scale of hydro scheme	Capacity Range (MW)
Large	100
Medium	> 50 – 100
Intermediate	10 50
Small	1 – 10
Mini	0.5 – 1
Micro	< 0.5

Source: (Aribisala, 2011).

2.1 Major Components of Small Hydropower Plants

Hydropower plants consist basically of a dam to store water in a fore bay, a penstock to deliver the falling water to the turbine and hydraulic turbine to convert the hydraulic energy released to mechanical energy and alternating generator (alternator) to convert the mechanical energy to electrical energy. These are the main parts of the hydropower installations, all other components are accessory equipment necessary to control the power flow, voltage and frequency and to also provide the protection needed (McGraw Hill,1982). In the hydropower generator, water pressure from falling water pushes the turbine blades which are connected to a generator shaft and therefore causing the armature to spin in the magnetic field and by this electricity is generated (Encarta Concise Encyclopedia,2005).

2.2 Factors to be considered in selecting a Hydro site

The factors to be considered in selecting a hydro site are:

1) Topographical Maps (2) Site Hydrology (3) Type of Turbine (4) Water Quality Studies

(5) Water Head (6) Connectivity to the Transmission System (Jahidul et al., 2012).

2.3 Turbine Selection

The type of turbine for a hydropower system differs from one project to another, there are many factors to be considered in its selection, and they are: specific speed, the head, discharge and the power output. Therefore, using these factors as criteria, the type of a turbine for a particular hydropower system can be determined.

Table 2: Classification of hydro turbines according to head, flow and power

Classification	Turbine Name	Head (m)	Flow (m^3/s)	Power output (Kw)
Impulse	Pelton	50-1000	0.2- 3	50- 15000
	Turgo	30 – 200	0.2 -5	20 – 5000
	Cross flow	2 -50	0.01 – 2	0.1 – 600
Reaction	Kaplan & propeller	3 – 40	3 -20	50 -500
	Francis radial flow	40 – 200	1 – 20	500 – 15000
	Francis mixed flow	10 – 40	0.7 – 10	100 – 5000

Source (Inversin, 1995).

3.0 GENERAL PROCEDURE OF JIBIA SHP DEVELOPMENT

The scheme aims to utilize surface water abstraction for the development of small hydropower project for Jibia town and its environs. The key components of small-hydro development are: site selection and plan development, Power estimation and turbine selection, costs of financing, grid interconnection, energy sales, environmental impacts assessments, beneficiaries and their electric power demand.

3.1 Site Selection and Plan Development: A preliminary survey of the Jibia dam reveals that the basic requirements for the sitting of a small hydroelectric power station exist, for example the stream flows all year round and is located in a hilly terrain. The table summarized some important features of the dam that makes it suitable for hydropower development.

Table: 3: The principal dimensions of Jibia dam.

S/NO.	ITEM	DETAILS
1	Hydraulic head	10m
2	Embankment height	19.5m
3	Discharge (valve chamber)	2 pipes of 1,400mm discharge $10.6m^3/s$
4	Surface area	2,600Ha
5	Catchment area	$3,700km^2$
6	Average Rainfall	700mm
7	Full storage capacity	$142,000,000m^3$
8	Active storage capacity	$121,000,000m^3$
9	Dead storage capacity	$21,000,000m^3$
10	Free board	5m
11	Net Irrigation area	3,000Ha
12	Water supply capacity	$600m^3$
13	Type of dam	Earth dam
14	Spill way type	Free flow

(SRRBDA JIBIA, 2015).

3.2 Power Estimation and Selection of Turbine: The estimated power to be generated from the proposed hydropower plant can be determined from the relation (ESHA, 2004):

$$P = \rho g Q H \eta \quad \text{- - - - - - - - - (1)}$$

Where P = Power (W), ρ = density of water = 1000 kg/m, ^{3}g = acceleration due to gravity = 9.81 m/s^{2,}

Q = Discharge = (m^3 /s), H= hydraulic head (m) and η= Hydraulic efficiency (%).

For this study, the dam has a flow rate (Q) of 21.2m^3 /s which flows all year round and a Hydraulic head of 10m [10]. η = 92% [3], Therefore, from Equation 1 above, the estimated power at this site is:

$$P = 1000 \times 9.81 \times 21.2 \times 10 \times 0.92 \quad = 1.9133\text{MW}$$

For the selection of appropriate type of Turbine that will actualize the estimated power, table 2.2 clearly outlined selection criteria. Based on these criteria, Francis turbine is selected. Therefore, the use of two Francis turbines of 1MW capacity each can actualize the estimated power.

3.3 Cost of Financing: It is estimated that the average cost of building a hydroelectric power station of about 125kW to 32MW is $2,000.00 per kW (Uhunmwangho and Okedu 2009), since the Jibia SHP falls within this range; the value can be used as a rough guide. This means that for a 1.9133MW plant, the total capital cost of construction could be estimated as: $2,000.00 x 1,913.3 = $3,826,600.00 or N1,147,980,000.00 at the rate of ₦300.00 to $1.00.

However, developing a small hydro project can be an expensive undertaking, the total project costs should be estimated early in the project to provide a good understanding of the total investment required. Planning of project expenditures allows for the development of a financial plan, identifying how much money is needed at each stage of the project. This information is required when approaching potential project sponsor. The above estimated cost will be used to carry out the following: Water level variation study; Design of hydrological features; Engineering geological conditions; Base structure study; Design and Instrumentation of hydraulic equipment; Electric generator, governor, turbine; Valve, auxiliary equipment systems; Electric equipments; Architectural Design and Quantity Survey; Dredging of water discharge; Civil works; Flow measurement equipment, Computer facilities (Laptop, desktop) and materials for hydropower library; Operation, maintenance and surveillance ; Miscellaneous.

3.4 Grid Interconnection and Energy Sales:

In relation to grid interconnection, it is technically possible to connect the proposed plant with national grid or to be developed as monolithic power plant, but, since we are moving from a monopoly on power generation toward a competitive market in which customers will have the opportunity to choose among power suppliers a monolithic power plant is preferred. The risk of power loss, initial cost as well as vandalization of power facilities will be greatly reduced if stand-alone hydropower system is selected, since it does not require long distance transmission.

For the energy sales, the 1,913.34kW to be generated from this unit will supply enough power to the community and its surrounding settlements, this power could be sold to the

consumers at ₦20/kwh. For a 1,913.34kW plant, this will yield 1,913.34 x 20x 24 = ₦ 918,384.000 per day or ₦ 330,625,567.00 per annum. This revenue can be used to provide operations and maintenance service for the plant, as well as contribute to offset the cost of replacing the unit after the expiration of its useful life. The average useful life of a hydroelectric power plant is 20years, given adequate maintenance. Hence, after the initial expenditure on the project, further investments in the project becomes unnecessary as the project would begin to generate enough revenue to take care of itself and even replace itself when it's useful life has expired.

3.5 Environmental Impact Assessment

The environmental impact of developing Jibia dam as hydropower plant may be positive or negative.

- **Positive Environmental Impacts of Developing Jibia Hydropower plant**

(a) Cleaner Source of Renewable Energy: Developing Jibia dam hydropower scheme will reduce the current level of green house emissions from alternative energy sources used in these communities around Jibia, i.e. the use of fossil fuel for generators will reduce drastically.

(b) Reduced risk of flooding and other environmental degradation: It is expected that the improved controlled releases from the proposed hydropower scheme will moderate the effects of the usual flooding and environmental degradation experienced at the downstream of the dam.

(c) Improved sources of livelihood and Industrialization: Developing Jibia SHP will create more and diversified job opportunities as neighborhood communities will get electricity supply and more rural industries take advantage of this renewable energy source.

(d) Recreation and tourism: The high volume stored water in Jibia dam may encourage the use of the watercourse for fishing, canoeing etc.

(e) Optimizing Available water: Regular water releases through the tail water of the proposed Jibia hydropower scheme will always keep water in the main channel that can be optimized for irrigation throughout the year. (Sokoto Rima River Basin Development Authority, 2005)

- **Negative Environmental Impacts of Developing Jibia Hydropower plant**

(a) Inundation of some arable lands and roads: Some arable lands for crop and animal farming will be inundated if the dam spills.

(b) Biological diversity: During construction stage of this proposed project, it is expected that some fauna and flora around will be displaced or destroyed.

(c) Conflicts: Several conflicts may arise. They include conflicts due to land ownership, settlements and compensations etc.

(d) High Investment Cost: Without doubt, there is a cost implication in implementing the proposed Jibia hydropower plant. This will include cost of paying compensations, settling conflicts, constructing the required SHP equipments and provision of other facilities at the dam site.

(e) Noise and Water Pollution: High noise and turbid water level that may arise during the construction stage, this may cause problems to the neighboring communities. (Sokoto Rima River Basin Development Authority,2005)

3.5 Beneficiary

The beneficiaries are in two fold, local or national: The energy generated can be utilized locally within the Jibia community as monolithic power plant and it can also be sold to Power Holding Company of Nigeria (PHCN) as an input to the national grid supply.

3.6 Electricity power demand of the community

Based on basic electric power demand data collected from Power Holding Company of Nigeria and focal group discussions with some members of the communities at Jibia, Magama, Kwari, Tudun Wulli and Kukar Nabaushe, the total maximum electrical power demand for Jibia and its neighboring communities around the dam was estimated as 2.5MVA equivalent to 2MW.

4.0 CHALLENGES IN HYDRO POWER DEVELOPMENT IN NIGERIA

Nigeria is a country with vast hydropower potentials dispersed here and there, unfortunately there are some problems militating against its development, some of them are briefly discussed.

4.1 Huge Financial Investments

Considering the very expensive equipment or overhead cost in undertaking hydropower scheme especially on dam construction, turbine and generator amongst others and in line with economic level in the country and any other developing countries in the world, this is really serving as a great challenge in the development of hydropower stations.

4.2 Poor Revenue Collection

Kesharwani(2006) noted that based on the fact that majority of Nigerians are in the rural areas which account about 70% of the country's population, and also in view of the fact that electricity in Nigeria is regarded as essential commodities like road and water, it is always hard to get people paying their tariff regularly, though this is coupled with the interrupted nature of power supply in the country, this results to poor revenue collection. It will therefore take very long time for the investors to realize the invested capital talk less of the profit.

4.3 Significant Environmental Damage

Major problems in this case are desertification, deforestation, erosion, massive water impoundment and poaching, and settlements within the potential areas. This really contributes to a very significant environmental damage in the country.

4.4 Lack of Skills and Manpower Technology

There are limited skills and manpower in planning, development, design and manufacture of hydropower equipment in Nigeria.

5.0 CONCLUSION

Jibia Dam has the viability of being used for small hydro power generation as well as irrigation activities and water supply which are primary purposes for which it was constructed. The technical analysis shows that the dam has the capacity to generate about 2MW of electricity which is almost equivalent to the demand of Jibia and its environs, two Francis turbine of capacity 1MW each could be used to actualize the estimated power. The economic analysis reveals that it is possible to earn very high returns on investment and hence, the investment opportunities in the dam are motivating for any investor whether local or foreign.

Although the power that could be generated from monolithic small hydropower may appear to be very small, its contribution to solving Nigerian's perennial power problems cannot be overlooked, because if, small villages, industries, communities, single family and so on that could be served by PHCN are excluded from the national grid. If the national grid only focused on the large communities, load centers and densely populated areas, the problem of power supply in Nigeria will be reduced.

Finally, having concluded the research, Katsina State Government is hereby advised to make the proposed Jibia Small hydropower plant highlighted in this research and many other similar Dams a reality by embarking on the project (work). This will in no doubt, eliminate the frequent failure and lack of reliability associated with the grid power supply in meeting the electricity demand of the state.

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wadaasy@gmail.com

AN ASSESSMENT OF VALUE ADDED TAX (VAT) AS A SOURCE OF NON- OIL REVENUE IN NIGERIA

Nakazalle, I. S.

Department of Accountancy, Federal Polytechnic Kaura Namoda, Zamfara State, Nigeria.

ABSTRACT

The continued decline in the oil revenue experienced in the late 80s and in 90s made military government in Nigeria to think of other possible sources of non-oil revenue. On the advice of the World Bank and the International Monetary Fund (IMF), on the alternative sources of non-oil revenue for the development of Nigeria economy, Nigerian government adopted Value Added Tax (VAT) in 1994. The objective of the study is to assess the relevant of value added tax as a source of non-oil revenue in Nigeria. To realize this, the paper largely utilized secondary data which were completed by the researcher's personal observation and analysis of Annual Report and Statement of accounts of the Central Bank of Nigeria (CBN), as well as the CBN statistical bulletin, Federal Inland Revenue Service, Annual Reports, Chartered Institute of Taxation of Nigeria Journal. The major finding of the study was that Value Added Tax (VAT) as a fiscal policy was the first of its kind to achieve its objective right from the first year of its inception; that is from 1994 up to 2015, increase in the generated amount is ever recorded. To this end, the paper recommends that adequate planning, staff training and welfare as well as computerization of the VAT system should be given more attention in order to boost the VAT collection.

Keywords: *Vat; Non- Oil; Revenue; Assessment; Nigeria*

INTRODUCTION

One of the recurrent problems of the three tier structure of the government in Nigeria is dwindling revenue generation as characterized by yearly budget deficit and insufficient funds for economic growth and development or economic crises, especially from 2013 to date and the resultant decline in public revenue and foreign exchange earnings for most developing countries have increased their financial problems. This economic reasoning emphasis the revenue need of government and indicates that, apart from strengthening the existing sources of revenue (Onaolapo 2013). It is also necessary for government to diversify its revenue base in order to meet its constitutional responsibility.

According to Myles (2000) states that financial capacity of any government depends among other things, on its revenue base, the fiscal resources available to it and the way these resources are generated and utilized. It is therefore, the duty of the government to adequately mobilized potentials revenue across the country to prevent economic stagnation.

Ibrahimshehu09@yahoo.com

Nigeria today is seen as monocultural economy which depends largely on the oil sector for its income, but oil is a phenomenon which is exhaustible, which probably cannot be forever. Besides the present process of oil in the international market have been fluctuating, which is believed to have adverse effect on the economy. It becomes necessary, therefore, for countries like Nigeria whose economic activities depends solely on revenue from oil, to find positive alternative sources of non – oil revenue to cope with global economic crises (Hannatu 2005). Due to this circumstance was arises, influence the Nigerian government to made provision for economic forum which is headed by the Vice president and members which included the state governors. The forum agreed in March 2016 to find at least two sources of revenue after crude oil.

The Value Added Tax (VAT) was introduced in Nigeria in 1993 by the Federal military government. since then, the value added tax decree, had been amended more than half of a dozen times the latest being Value Added Tax (Amendment) Act of 2007. This was meant to replace the existing sales tax. The replacement was necessitated by the numerous laws and short comings inherent in the sale tax administration and collection.

However, in general perspective N2.17tr drop in revenue analysis of official data obtained from FIRS website shows that the agency generated N4.72 trillion from taxes for the Federal Government in 2014. But the revenue dropped to N2.54 trillion in 2015. A quarterly analysis of the data shows that the revenue generation dropped by N2.17 trillion. The biggest drop occurred in the third quarter which was when Fowler resumed at the FIRS.

The data shows that in 2014 N1.06 trillion was generated in the first quarter, N1.46 trillion from the second quarter, N1.19 trillion for the third quarter and N1.00 trillion for the last quarter. But the figures slipped in 2015, where the agency generated N756.7 billion for the first quarter, N746.7 billion for the second quarter, N250.2 billion for the third quarter and N790.7 billion for the fourth quarter. It may get worse in 2016 experts former president of Chartered Institute of Taxation of Nigeria (CITN), Mark Anthony Dike blamed the economy for the drop in revenue. Therefore, it is realization of the relevance of Value Added Tax (VAT) in Nigeria that the paper sets out to conduct a critical study of VAT as alternative source of non – oil revenue in Nigeria. The paper is divided into five parts. The first part is the introduction, which is part under discussion. The second part is the literature review. The third part is about the methodology used in the study. The fourth part is about the discussion and the fifth part, which is the last part is about the conclusion and recommendations.

2.0 Conceptual Framework and Literature Review

2.1 The Concept of Taxation

Taxation is reviewed as a powerful policy instrument to serve dual role of securing resources transfer to the public sector for application planned was and inducing the private sector to operate in conforming to plan objectives. Hannatu (2005). However, according to Jhingan (2005) taxation is an important and useful fiscal instrument for reducing private consumption, and transferring idle resources for capital formation by the government. Furthermore, taxation is a compulsory payment on all taxable individuals and corporations within the country. In Nigeria this is one of the major sources of government revenue, Nuraddeen (2009).

In a similar fashion, Burgess and Stern (1992), the main purpose of taxation should be raised resources to finance government expenditure rather than the dual role of securing resources and including private sector. In other words the role should be narrowed down to focus on

revenue. Similarly in the view of Mackenzie et al (1997), the main objective of tax policy is to design a system that raises enough revenue to meet a government revenue target while minimizing the level associated distortions. Generally, taxation is believed to be a well – known an widely used system of withdrawing resources from the private sector of the economy for public sector use. This means that taxes are statutorily imposed, compulsory payment to government. therefore in the opinion of Akinlo (2002)..

2.2 The Concept of Value Added Tax (VAT)

Value Added Tax (VAT) is defined as a consumption tax on economic operation, including imports which is this context means goods and services brought from abroad into Nigeria. Hannatu (2005). Like Adesola (2000) describe Value Added Tax as a consumer tax and is charge before selling the goods. He said, value added tax is often defined as the sum of wages and profit. Vat has become a veritable source of revenue in introduced in several countries in sub-sahara Africa, it has been introduced in several countries (Whenkroff, 2003).

Similarly, Bird (2005) defined Value Added Tax as a multi stage tax imposed on the value added tax to goods and services as they proceed through various stages of production and distribution and to services as they are rendered' which is eventually borne by the final consumer but collected at each stage of production and contribution chain. This definition brings out the three characteristics of value added tax which are: VAT is consumer tax, VAT incidence is on the final consumer and vat is a multi – stage tax (Onaolapo 2010). In the other vain jones (2003) also describes VAT as a tax levied at each stage which supplies changes hands. In the case of manufacture items, this could be at the primary producer, manufacturer, wholesaler and retailer stages. It is ultimately borne by the consumer who being register for VAT purpose is unable to reclaim it. The above definitions of VAT by jones suggest that there are intermediaries through which goods must pass before they reach the final consumer. However, Naiyeju (2009) that the purpose of introducing Value Added Tax as one of the methods of taxation in Nigeria is economy has not yet known. Furthermore FIRS (1999) states that value added tax (VAT) is a tax on spending which borne by the final consumer of goods and services because it is included in the price paid. This is so since the tax is included in the prices that consumers pay.

2.3 VAT in Nigeria: Background

In 1991 the Federal Government set up a study group to review the entire tax system, it was the outcome of the study group that led the idea of introducing VAT in Nigeria. A Modified Value Added Tax (MVAT) committee was set up, under the chairmanship of Mr. Emmanuel Ifewere to carry out the feasibility studies on implementation. This committee was a result of the recommendations of the Dr. Silvester Ugor panel on the workings of Nigerian indirect tax system, 1991 initially, the tax was billed to take effect early 1993 in line with the ideas of MVAT committee, 123 member panel that prescribed modalities for operating VAT in the country. This was later shifted to 1st September, 1993 by which time the relevant legislature had been done and proper ground work done.

VAT is a replacement of the existing sales tax which introduced via decree No. 7 of 1986 and replaced by VAT Decree 102 of 1993, which unifies as well as centralizes the sales tax which initially collected by individuals status separately. This uniform tax system at least has the similar advantages of retrieving the foreign investors of the problem of studying different states edict to know what their tax obligations are.

The then head of state, General Sani Abacha announced in the 1994 budget the commencement of VAT in the country. He declared that the short term fiscal goal of the tax was to realize ₦6 billion revenue in the first year of operation. The budget pronouncement and the entire idea of launching VAT as a time of inflation did not go down well with many fiscal economists, government functionaries and members of the organized private sector. For instance Kuewemi (1995) states that because the sales tax which VAT replaced had realized less than ₦2 billion between 1986 and 1993, many observers felt to estimated ₦6 billion VAT revenue was unrealistic. That the imposition of VAT would amount to over burdening the economy with taxation; and that Nigerian tax administration were probably ill – prepared to run a modern and intricate tax such as VAT.

Similarly on the assumptions that the policy was over – ambitious were strengthened by the international Monetary Fund (IMF) which estimated that VAT could realize only about ₦4.5 billion in 1994. The IMF and the World Bank complained that the 5% was too low a rate especially when compared with other African countries who operate the policy. On this ground, the Nigerian tax administrators agree that at a low flate rate of 5% would be neither regressive nor inequitable. "The Nigerian VAT rate of five percent" observed by Federal Inland Revenue Service Chairman. Mr. I.K Naiyaju at many occasion is one of the lowest in the world. However, the president Olusegun Obasanjo has increased the rate of VAT from 5 percent to 10 percent at the end of his second tenure. But the late president Ummaru Musa Yar'adua tried to come down to percentage to 5 percent in 23 June, 2007. Indeed except in Mauritius where VAT is levied also to 5% on wholesales, the Nigeria rate is the lowest among the 19 VAT operators in Africa. The average rate is 11% in Coted'vore, 30% in Kenya, 14% in Togo, 17% in Tunusia and Niger, 13% in Guinea, 18% in Benin, 14% in South Africa, 15% of Madagascar and at graduated rates of 7, 13, 20 and 21% in Algeria, 10, 35 and 85% in Malawi, 19% in Morocco, Zambia and Ghana introduced VAT in 1995, over a year of its introduction in Nigeria and launched the tax at 20% and 17.5% respectively.

In order to achieve the objective of the new fiscal policy in the country, the Nigerian tax administrators continued to engaged the public in VAT discourse and enlightenment campaigns'. Besides the use of the advertisements in both the broadcast and the print media, a number of seminars and workshops were held in the administration zones to sensitize tax payers and tax collectors for the operations of the VAT.

In all these government lunged its campaign for VAT on the prospect of a successful administration of the tax. In the first year of its inception, VAT did not only meet its 1994 budget objectives of ₦ 6 billions, it overshot the target by over 30% or ₦ 2.1 billion total yield. "VAT has proved a remarkable success" (Abacha, 1995).

2.4 **VAT Administration**

"The success or failure of any tax depend largely on the extent of how it is properly managed. The extent of how the law is interpreted and implemented, as well as the publicity brought into it, will determine how a particular tax is able to meet its objectives" (Naiyeju, 1996:45). Similarly, in the area of VAT administration Onaja (2002:208) states that "the due administration of VAT occupies a unique position tax system. Just as good law is important to the system, a good administration is a well a pre-requisite to the attainment of the overall goal of the system."

2.5 VAT Registration (FIRS: 1999:5)

The VAT Decree requires all vatable person i.e. manufacturers, wholesalers, distributors, importers and exporters of vatable goods and services as well as contract awarding organizations to register with the VAT office to them as "registered agents" for the administration of VAT. All vatable persons are required to register within six months of the commencement of business for the purpose of tax (Hannatu. 2005).

Furthermore, failure to register attract a penalty of ₦ 10,000 for the first month in which the failure occurs, and ₦ 5,000 for each subsequent month (Abiola 2012), since a period of six months has elapsed after the promulgation of the Act. It presupposes that every taxable person is now obliged register as soon as it commence business.

Registered persons are required to obtained and complete VAT registration form, i.e. VAT form 001 from the nearest VAT local office where a payment VAT registration certificate which must be conspicuously displaced in the place of business is issued to the registered person as evidence of registration. This certificate confers on the owner the right to charge VAT on his sales.

All registered persons are required to calculate, charge and account for the tax payable and remit the net tax due for each period by the due date to the local VAT office nearest to them. A registered person is entitled to a refund when his input tax exceeds his output tax. A refund is also available on VAT paid on zero rated supplies. To make a claim or refund, a registered person must fill the VAT return on VAT form 002 duly completed to indicate the computation of the refund claims and attached all the necessary voices.

2.6 Rate:

Nigeria adopts the single rate of 5 percent of the Value of all taxable goods and services which is the world lowest VAT rate. A recent attempt by the National Assembly to increase the rate of VAT to 10% was unsuccessful. Despite the avowed policy of the Federal Government to increase the VAT. British Journal of Arts and Social Science ISSN: 2046 – 9578: 192 (P – 11 – 12).

2.7 Vatable Goods and Services

The VAT Decree 102 of 1993 lists as vatable. 17 goods and 24 services. Examples of vatable goods include; all goods manufactured or assembled in Nigeria, all goods imported into Nigeria, all second hand goods, household furniture and equipments, jewels and jewelries; petroleum products; textile; clothing; carpets and rugs, bears and wines, spirits, soft drinks and bottled water etc.

Examples of vatable services include: all services rendered by financial institutionsto their customers, accounting services; legal services, computer services, advertisement, public relations, service rendered by architectures etc.

2.8 Offences and Penalties

There are various offences with staff penalties under the VAT system. All these are explained in part IV of the Value Added Tax Decree No. 102 of 1993. The law is even more strict in dealings with offences of the board. Any officer of the board who is aids or abet the commission of any of the offences under VAT law will be liable of a fine of ₦ 50,000 and/or imprisonment for five years.

2.9 VAT Tribunal and Right of Appeal

The FIRS (2000), in its publication, the Nation builder highlighted that with promulgation of Decree 18 of 1998, government constituted the VAT tribunal which are located in eight (8) zonal offices of the FIRS i.e. Lagos, Abuja, Ibadan, Enugu, Port-Harcourt, Jos, Maiduguri, and Kaduna. This will afford aggrieved VAT payers the channel to seek redress and facilitates prompt prosecution of VAT defaulters.

Idris (2002:17) explain that "If an importer disagrees with an assessment of VAT payable on an imported consignment and other goods and services, he/she has a right of appeal to the Local VAT office (LVO), the zonal office of the VAT Directorate in Abuja". Any aggrieved vatable person also be has the same right.

3.0 Methodology

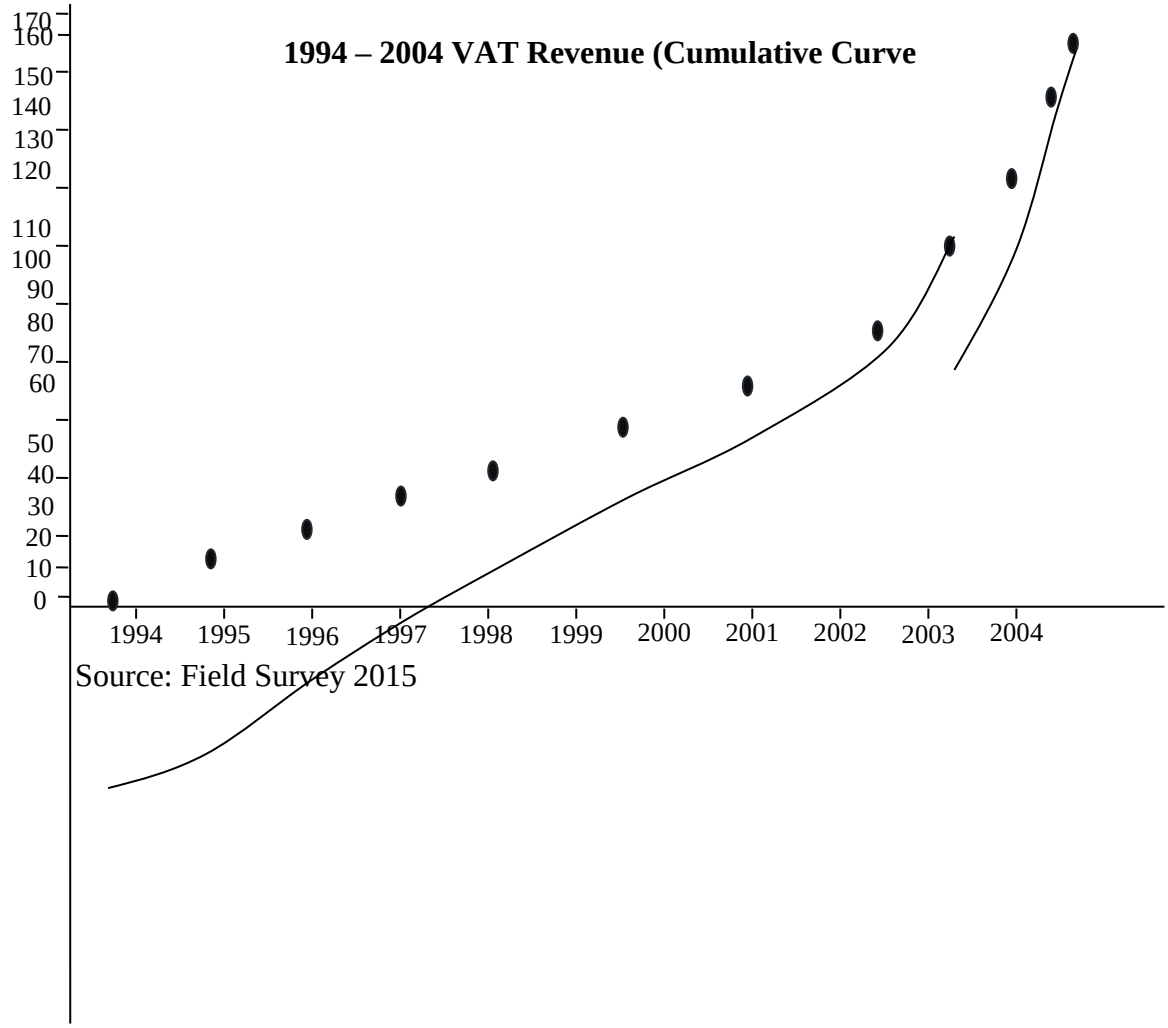
The methodology adopted for this paper is explanatory research. The study uses mainly secondary data through critical review of relevant literature to the topic from textbooks, journals, seminars and workshop papers, CBN statistical bulletins and annual reports and statements of accounts of Central Bank of Nigeria. The researchers personal observation obtained through analysis of statements of accounts of the Central Bank of Nigeria and also used to complement the secondary data charts and tables were used to explain the level of effected of Value Added Tax receipts on the revenue of the country. However, a flash back was made on the collected revenue for the year 1999 to 1994 in order to further confirm the relevance of value added tax on the federally collected revenue for those periods.

4.0 Discussion

The introduction of VAT in Nigeria by the government was bold and desperate measure in order to increase the revenue of the government so as to fulfill its obligation to the citizens. The most significant index to the effectiveness of Value Added Tax (VAT) effort is financial returns. In January 1994, the first month of administering the tax, realized a total of about ₦122 million. As a result of massive enlightment and mobilization efforts, the revenue aggravated by over 400% to about ₦568 million in 1994. By the end of the first quarter, VAT yield had surpassed a billion naira mark by realizing ₦ 1.4 billion (Kvewemi 1995).

The second quarter yield hit a ₦ 2 billion mark by the end of June 1994. However, the VAT yield shrank and fell below expectation in the third quarter of its inception i.e. from July to late August, 1994. The collection in July was ₦ 546.9 million and further diminished to ₦ 492.3 million in the period is attributable to the political crisis that paralyzed the economy from June to the late August 1994. The period was characterized by work stoppages, riots, closure of business and etc. the rest of the period in 1994, VAT realized as much as ₦ 1 billion on a monthly basis.

Successfully, VAT did not meet its 1994 budget objective of ₦ 6 billion, it overshot the budget by 20% said the then hand of state, late General Sani Abacha in the 1995 budget statement, ₮AT has proved a remarkable success.



Source: Field Survey 2015

From the curve above, we can see that colossal sum of money has been generated and is still being generated through VAT, for instance, the first year of its inception, a total sum of ₦ 7,260.8 billion was generated, in 1995 the amount rose to 20,761 billion and the amount went up to ₦ 31 billion in 1996. In 1997, the amount realized to ₦ 34 billion in 1999 and ₦ 58,469.6 billion shot off to ₦ 91,757.9 billion in 2001. There was also increase in the generated amount in 2002 to a total of ₦108,601 billion. The generated amount in 2003 was ₦ 136, 411.2 billion, while the generated went up to ₦ 159.5 billion in the year 2004.

Federation Account: Composition of Revenue (N' Billion)

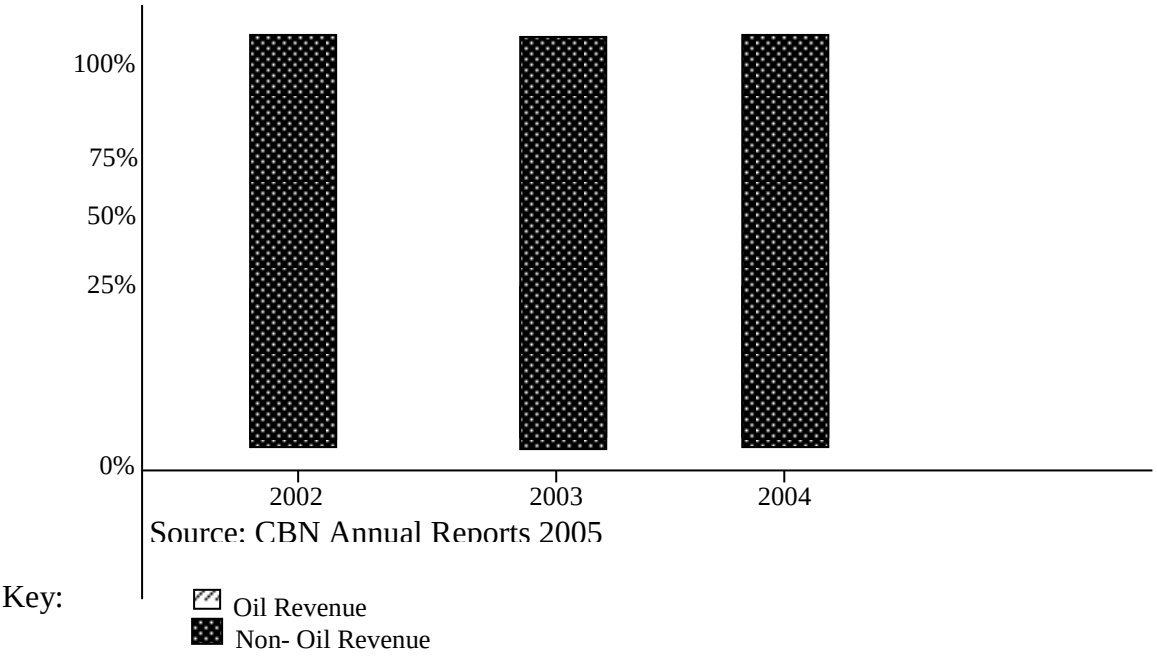


Chart II is about the federation account. It shows the composition of revenue from oil and non – oil for 2002, 2003, and 2014. Revenue from non – oil sources increased by 9.1% amounting to ₦ 546.6 billion in 2004. All the components of non – oil revenue except the federal government independent revenue increased relatively in 2003. Companies income Tax (CIT), Custom and Exercise Duties and Value Added Tax (VAT) increased by 13.3,110 and 16.9 percent respectively over their levels in the preceding year, while the federal government independent revenue fall by 26.4 percent, i.e. ₦ 39.9 billion

5.0 Conclusion and Recommendation

5.1 Conclusions

In spite of its shortcomings, VAT has taken so many people by surprise including IMF and the world bank, both in terms of its success in generating a lot of revenue for the country and as a potent weapon for achieving fiscal stability in the country. Economic history, the world over, reveal that taxation is an important weapon for effective performance of government. apart from being a means of generating revenue taxation is about the achieving the fiscal goods of the government by way of influencing the direction of the flow of investment and taming the production and consumption of certain goods and services.

We have seen from the data collected that, colossal amount of money were generated over the years from value added tax (VAT), since its inception in 1994, VAT has been a major contributor of the non – oil revenue in Nigeria. Therefore, the performance of VAT in terms

of financial contributions has enhanced the economic and social development of the three ties of government including the Federal capital territory (FCT) Abuja.
Conclusively, the overall objectives of VAT in Nigeria have been achieved and it is believed that, with effectives supervision and monitoring, more will be achieved.

5.2 **Recommendations**

The operation of VAT in Nigeria could be improved so as to enhance its role in generating more revenue for the country. The following recommendations have therefore been preferred by the paper to the policy makers with a view to achieving the overall objectives of fiscal policy.

1. Adequate Planning: Even though, the Nigeria VAT has to a large extent achieved its objectives, going by its success over the years, it still requires that the implementation of VAT should be premised on adequate planning, as the popular saying goes that anybody who does not plan is certainly planning to fail. Therefore the need for adequate planning should not be over looked.
2. Effective Communication: This is necessary in order to communicate and publicize VAT activities to the relevant authorities and the general public on a regular basis. Effective communication can be inform of workshops, seminars, interview on VAT with experts on radio and television channels, advertisements (Using press, bill board, audio – visuals) news media, routine correspondence, or direct mail of VAT brochure and manuals should be issued to the tax agents and the general public.
3. Staff Training and Welfare: The effectiveness of tax legislation depends on the quality and efficiency of tax collectors. Therefore for VAT to continue to register maximum yield. Government needs to improve the condition of service of tax workers. The means, staff should be tied to work performance and knowledge of fiscal developments globally. This can be achieved through training and development causes, as well as furtherance of education in both home and aboard.
4. Computerization: A computerize VAT collection and audit department is likely to be more efficient in the realization of the broad objective of the fiscal policy. Therefore there is the need for modern technology for easy compilation of data, information matching, VAT auditing and provision of other tax services.

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BUILDING MATERIALS AND THEIR ENERGY DEMAND: A CASE IN GHANA

Gyimah, K. A.[1] and Oppong, R. A.[2]

[1&2] Department of Architecture, Kwame Nkrumah University of Science and Technology – Kumasi, Ghana.

ABSTRACT

Building design and construction have evolved from a lot of theories and styles. The first cities were created when human kind decided to take on farming on a more regular basis. To facilitate their farming, there was the need to settle down to raise permanent homes, shrines, temples and palaces. The development of these cities resulted in the birth of architecture as man needed to settle and improve their new cities. Even though energy conservation was not in the know until the 1950s, the early theories dwelt on the use of locally available materials. The advent of industrialization brought in a lot of materials which gave birth to architecture movements including modernism and post modernism. Currently there is the flexibility of material taste and use in the world and the energy use of a building has become a great concern. The world seeks to reduce energy use in buildings due to the fact that energy related CO_2 pollution is a contributory factor to climate change. This study therefore looks at various construction and material uses in a benchmark building for less energy demand. Autodesk simulation tool Ecotect is used on a case study in Ghana. The benchmark (hypothetical) building in Accra - Ghana is oriented to an optimum position and materials and construction methods are changed for results. The results of this study reveals that concrete roofing tiles is the most optimum for less energy use whiles block work with cladding is the best for walls and slab with wooden finish is the most appropriate floor construction. However with some modifications in construction systems, brick is the best option for wall construction in Ghana.

Keywords: *Architecture, Building materials, Methods, Energy, Climate change, Ghana.*

INTRODUCTION

Architecture has advanced for over decades and different improvements over these decades are required when discussing it. Architecture can be described as unpreventable, widespread, perpetual, consistent and rudimentary because it encompasses the crudest types of settlement in caves from the ancient times to the most complex sort of modern environments. In any case, whatever the scale and unpredictability, architecture means shelter which is an essential need of every man (Glancey, 2000). Developmental stages have always been affected by the materials available to the builders. The need for building came into existence as man sought to modify the macro climate into a suitable micro climate. This made it possible for man to

live everywhere on the surface of the earth (Hooda et al, 2013). However, these early structures were not durable and lasted sometimes days or weeks. Man engaged mostly in hunting and gathering and was always on the move from one place to another. Thus structures lasting for a few days suited their way of life. Caves that were man's means of abode, have survived to date due to their durable nature. (Swenson and Chang, 2008).

During the Neolithic era man begun farming and settled at places for a longer time. This initiated the demand for much more durable buildings. Their farming activities and domestication also brought in the need for storage spaces in their buildings. Functionality became necessary in the spaces provided as well as construction materials to help achieve the various needs (Glancey, 2000). There was a gradual development of building materials and styles to exhibit grandness and prestige during the Roman and Greek eras. This saw the introduction of aesthetics into the built environment. These developments continued until the World War II which came with a lot of destruction. After the war there was a housing boom and people sort to settle in their own homes (Stoloff, 2004). This brought about a lot of demand on oil for heating these homes. Automobile which had also developed at the time added to the demand for oil. With demand hike, the cost of oil also became high and thus heating cost went up. This led to the development of energy conservation techniques such as trombe wall and solar in the 1950s (Brohl, 2001).

Buildings utilize nearly 40% of the world's energy, 16% of the fresh water and 25% of the wood timber, while it is in charge of just about 70% of transmitted sulphur oxides and half of the carbon dioxide (CO_2) (Santamouris, 2010). However in Ghana, residential and industrial demand for power has for quite some time been moderately low, albeit expanding. The population in Ghana has increased throughout the years and monetary development rates have likewise increased consistently yet the energy supply base has not got pace with the development. From the Volta River Authority of Ghana and other public sources, the overall installed capacity and effectual capacity of electricity in Ghana as at December 2013 remained at 2,814 and 2,492 megawatts (MW) correspondingly. Majority of this supply originates from hydro-based sources which are the Akosombo and Bui hydro dams (Acheampong and Ankrah, 2014). In 2006, the energy demand in Ghana totalled to 9,518 GWh as against energy generation of 1760 MW. It has been anticipated that Ghana will require more than 7 times its 2006 electricity capacity by 2020 in the event that it ought to succeed in forming its economy into a middle income one (Ofosu-Ahenkorah, 2007). This means there is the need to reduce the energy load on the national grid for sustainability. Thus the building and construction industry need to play a key in reducing energy demand as they contribute greatly to energy use in the country.

To Hooda et al, (2013) these processes of research and development is an ongoing process. There is always evolution of new materials and techniques to suit our needs. Due to this need, there has been a lot of developments and research into construction materials. *U* values which show a materials thermal conductivity are known all over the world. Li et al., (2015) show that even though the standard UK wall *U* value has been used for energy certification, it is not appropriate. The study revealed a reduction in space heating demand of 16% when the standard UK wall properties were changed. These developments have also advanced into the construction of composite or complex building envelopes. Phase Change Material (PCM) is amongst the new discoveries and has the potential of reducing thermal influx into buildings as well as improves energy efficiency (Silva et al., 2015; Han and Taylor, 2016). A composite material is a material produced using two or more constituent materials with fundamentally distinctive physical or substance properties that, when consolidated, produce a material with qualities not the same as the individual parts.

Composite structures makes thickness of materials increase, thus even though a particular material might not be good thermally, it performance in a composite structure will be different. For instance, a study by Nematchoua and Orosa (2016) shows that the application of marble over the surface of a wall helped to improve the indoor ambience. The introduction or development of complex materials such as PCM and composite combination of different materials as one unit brings to bear a big question; thus how appropriate can *U* values of such materials be used to conclude on their energy demand implications?

Producers of construction materials will not objectively tell that their product can cost you money on energy use to be comfortable because this will put them out of market. The study seeks to contribute to the body of knowledge of the energy efficiency of building materials in construction industry.

RESEARCH METHODOLOGY

This research is mainly quantitative and adopts both the experimental and case study approach. Case study approach is flexible and combines very well with other approaches (Descombe, 2007). Thus its choice makes it possible to add the experimental approach as well. The experiment is done with a benchmark building as the case and within the climate of Accra, Ghana. Only one building was chosen for this study because the most optimum orientation for the climate of Ghana was chosen for the benchmark building. This optimum orientation takes into consideration achieving the best for of natural ventilation and less solar radiation into building to reduce heating in spaces. Thus any other orientation with the same building materials and opening sizes would yield worse results. Data on the benchmark

building can be found in appendix 1. Optimum orientation was derived from analysis of weather data in Ecotect and this can be seen in Figure 1.

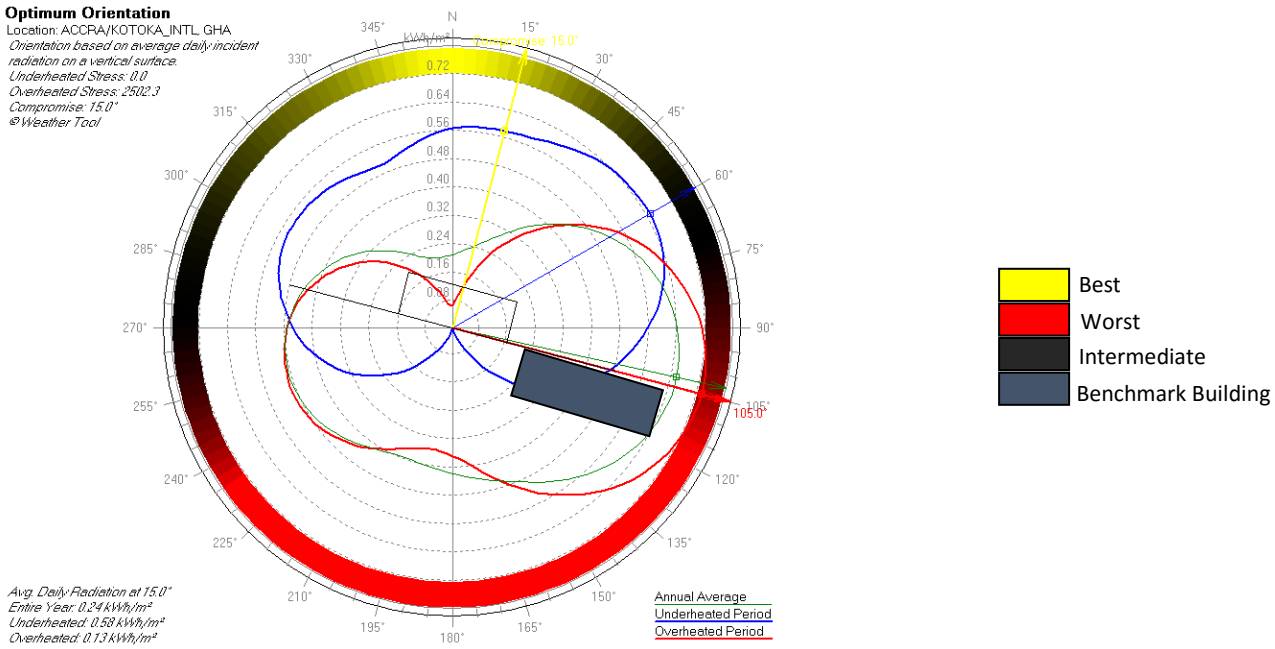


Figure 1. Optimum orientation for Accra, Ghana weather.

Figure 1 depicts a 15^{o} compromise from the north. This means that even though some schools of thought are for a north-south orientation in the tropical regions, analysis of weather data specific to Ghana changes a little. This orientation was applied to the benchmark and then other modifications followed.

This study seeks to identify some key construction systems in Ghana and investigate their impact on the energy demand on a benchmark building. To achieve this data, selected construction systems were composed into Autodesk Ecotect software for analysis. The results are then interpreted in terms of energy requirement for comfort in such spaces.

Building elements such as roof, wall, window, door and floor are the main variables for the study. One variable is taken and manipulated for results whiles the other variables remain constant. The changes applied are current construction systems existing in the country for various building elements. The results are then analysed and discussed for the best performing construction system in terms of less energy demand for comfort in the benchmark building. Table 1 below show the various construction systems applied to the various building elements.

Table 1. Construction Systems – Authors Construct

Building Element	Benchmark Material Specification	Modification Option 1	Modification Option 2	Modification Option 3	Modification Option 4
Roof s	Gable roof with aluminium roofing sheets	Gable roof with aluzinc roofing sheets	Gable roof with concrete roofing tiles	Gable roof with stone coating on aluzinc roofing sheets	Gable roof with shingles
Walls	150mm solid block work 10mm sandcrete plaster	150mm hollow block work 10mm sandcrete plaster	150mm solid block work 5mm metal cladding	150mm solid block work With wall tiles	100mm brick work
Floors	150mm floor slab with screed only	150mm floor slab with terrazzo finish	150mm floor slab with wooden finish	150mm floor slab with tile finish	150mm floor slab with carpet finish

These materials were inputted into the building simulation software Ecotect for results. Results are exported into a Spreadsheet and graphs generated for discussions.

RESULTS AND DISCUSSION

With the study having a focus of identifying some key construction systems in Ghana and investigate their impact on energy demand, key construction systems identified can be seen in Table 1. These construction systems are not the only systems in the country but rather the most widely used in the country. Based on the methodology used varying *U*-values were realised from the various construction systems (Table 2).

Table 2. U values of the various construction systems.

Building Element	Benchmark Material U-value	Modification Option 1 U-value	Modification Option 2 U-value	Modification Option 3 U-value	Modification Option 4 U-value
Roof s	2.520	2.700	2.290	2.630	2.170
Walls	2.770	1.830	1.210	2.880	2.810

Floors	2.490	2.400	1.920	2.400	1.310

Table 2 reveals that option 4 (shingles) of roofs has the lowest *U*-value and thus the best for the climate of Ghana. Option 1 (hollow block) for the walls was the best and option 4 (floor with carpet) for the floors. These *U*-values however was not the only factor for the simulated results. Other material properties such as reflectivity and emissivity were considered. Table 3 gives details of the various materials and such properties.

Table 3. Other properties of the various construction systems.

Roof	**Benchmark Material**	**Modification Option 1**	**Modification Option 2**	**Modification Option 3**	**Modification Option 4**
Reflectivity	0.837	0.624	0.351	0.571	0.492
Emissivity	0.870	0.890	0.753	0.831	0.852
Walls	**Benchmark Material**	**Modification Option 1**	**Modification Option 2**	**Modification Option 3**	**Modification Option 4**
Reflectivity	0.549	0.679	0.735	0.801	0.590
Emissivity	0.900	0.900	0.681	0.852	0.783

The above emissivity values affected the simulation results. However, the value of the floors was not included due to the fact that they are not exposed to the external environment. Even though the *U* values presented shingles as the best material, emissivity and reflectivity differs. This is because the higher the reflectivity, the lower the heat influx and the lower the emissivity, the lower the heat influx. Thus the most appropriate for less energy to cool spaces is high reflectivity and low emissivity. With this argument, the benchmark material (aluminium sheets) is best in terms of reflectivity and concrete tiles the best for emissivity. This disparity led to a total simulation of all variables to determine the best material for less energy use.

Roofing

With aluminium being the benchmark roofing material, the other roofing construction systems were applied to see the energy needed for comfort. From the generated results, only cooling loads were needed. This means the climate of Ghana does not require heating.

Tabulated figures plotted into bar graphs can be seen in Figure 2.

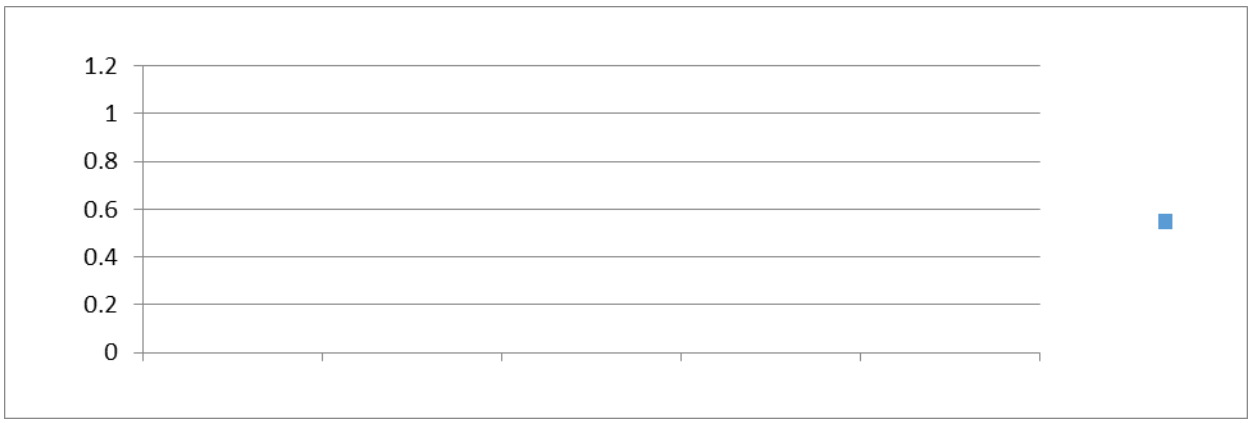


Figure 2. Cooling Energy needed for the various roofing systems.

The cooling loads show that one will need more energy for cooling with shingles than any other roofing construction system. Cement tiles had the lowest with 537.3kWh of energy per annum. Aluminium performed better than both Aluzinc and Aluzinc with chippings. But the energy needed for cooling reduced when stone chippings were added to the Aluzinc. Thus it means shingles are not very good for a climate such as Ghana. The worst performing roofing systems in relation to energy are the most current types such as shingles, aluzinc and aluzinc with chippings.

Walls

The benchmark wall which is 150mm solid block simulated against the other construction systems and the result is shown in Figure 3. The solid block has a mixture ratio of 1:8 that is 1 part of cement to 8 parts of sand.



Figure 3. Cooling Energy needed for the various wall systems.

Figure 3 shows that solid block work with metal cladding is the best performing construction system whiles brick is the worst of them all. This means brick walling system of 100mm is not good for a climate such as Ghana. However, the results present a reflection of the thickness of construction systems with the thicker walls having low cooling energy required.

Block work with metal cladding with a thickness of 215mm needs cooling energy of 288.4 kWh and brick with a thickness of 100mm needs 794.3 kWh. In view of this all construction systems had their total thickness increased to 215mm to tally with that of the block work with metal cladding (See Table 4).

Table 4. Wall construction systems with equal thickness

Wall Construction	**Initial Thickness**	**New Thickness**
Solid Block	Outside plastering 10mm, Block 150mm and Inside Plastering 10mm ***Total = 170mm***	Outside plastering 10mm, Block 195mm and Inside Plastering 10mm ***Total = 215mm***
Hollow Block	Outside plastering 10mm, Block 150mm and Inside Plastering 10mm ***Total = 170mm***	Outside plastering 10mm, Block 195mm and Inside Plastering 10mm ***Total = 215mm***
Block with tile finish	Tile 5mm, Block 150mm and Inside Plastering 10mm ***Total = 165mm***	Tile 5mm, Block 200mm and Inside Plastering 10mm ***Total = 215mm***
Brick	Brick 100mm and Inside Plastering 10mm ***Total = 110mm***	Brick 205mm and Inside Plastering 10mm ***Total = 215mm***
Block work with metal cladding	Metal cladding 5mm, Air Gap 50mm, Block 150mm and Inside Plastering 10mm ***Total = 215mm***	Metal cladding 5mm, Air Gap 50mm, Block 150mm and Inside Plastering 10mm ***Total = 215mm***

Table 4 details out the wall construction systems having their thicknesses increased to 215mm. The main material components were increased whiles the surface finish remained the same size. The simulation results can be seen in Figure 4.

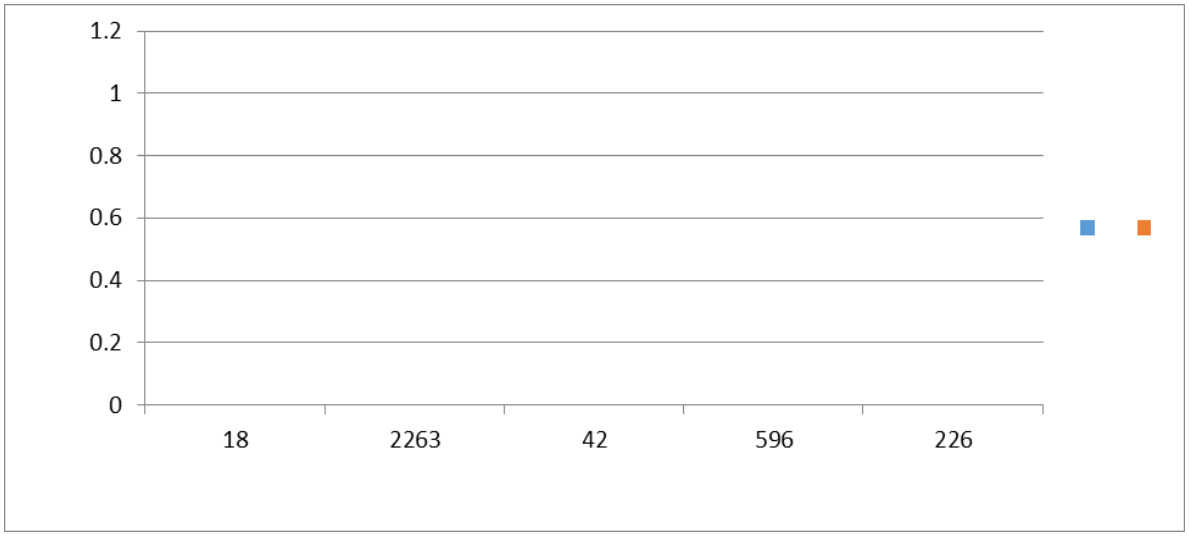


Figure 4. Cooling Energy needed for the various wall systems of equal thickness.

From Figure 4, it is observed that all systems had their energy demand reduced when the thickness is increased. However, the best construction wall system that demands less energy is the solid block work. Such block thickness is rarely used in the Ghanaian construction industry and thus needs attention. Bricks and block work with tile finish are not close to the block work with metal cladding. A further simulation was done to check if the air gaps in the block work with metal cladding construction system contributes to the performance of the wall. Air gaps were then added to the other construction wall systems and simulated for results. The wall construction system of block work with metal cladding is maintained for comparison. Table 5 shows the various modifications of materials with air gaps.

Table 5. Material modifications with air gaps

Wall Construction	**Initial Construction**	**With Cavity**
Solid Block	Outside plastering 10mm, Block 150mm and Inside Plastering 10mm ***Total = 170mm***	Outside plastering 10mm, Block 75mm, Cavity 45mm, Block 75mm and Inside Plastering 10mm ***Total = 215mm***
Hollow Block	Outside plastering 10mm, Block 150mm and Inside Plastering 10mm ***Total = 170mm***	Outside plastering 10mm, Block 75mm, Cavity 45mm, Block 75mm and Inside Plastering 10mm ***Total = 215mm***
Block with tile finish	Tile 5mm, Block 150mm and Inside Plastering 10mm	Tile 5mm, Block 75mm, Cavity 50mm, Block 75mm and Inside Plastering 10mm

	Total = 165mm	***Total = 215mm***
Brick	Brick 100mm and Inside Plastering 10mm ***Total = 110mm***	Brick 75mm, Cavity 55mm, Brick 75mm and Inside Plastering 10mm ***Total = 215mm***
Block work with metal cladding	Metal cladding 5mm, Air Gap 50mm, Block 150mm and Inside Plastering 10mm ***Total = 215mm***	Metal cladding 5mm, Air Gap 50mm, Block 150mm and Inside Plastering 10mm ***Total = 215mm***

Table 5 shows the introduction of air cavity into all wall construction systems. However, the total thickness of each wall construction system was still maintained at 215mm. Thus the cavity thickness ranges from 45mm to 55mm. The simulated results can be seen in Figure 5.

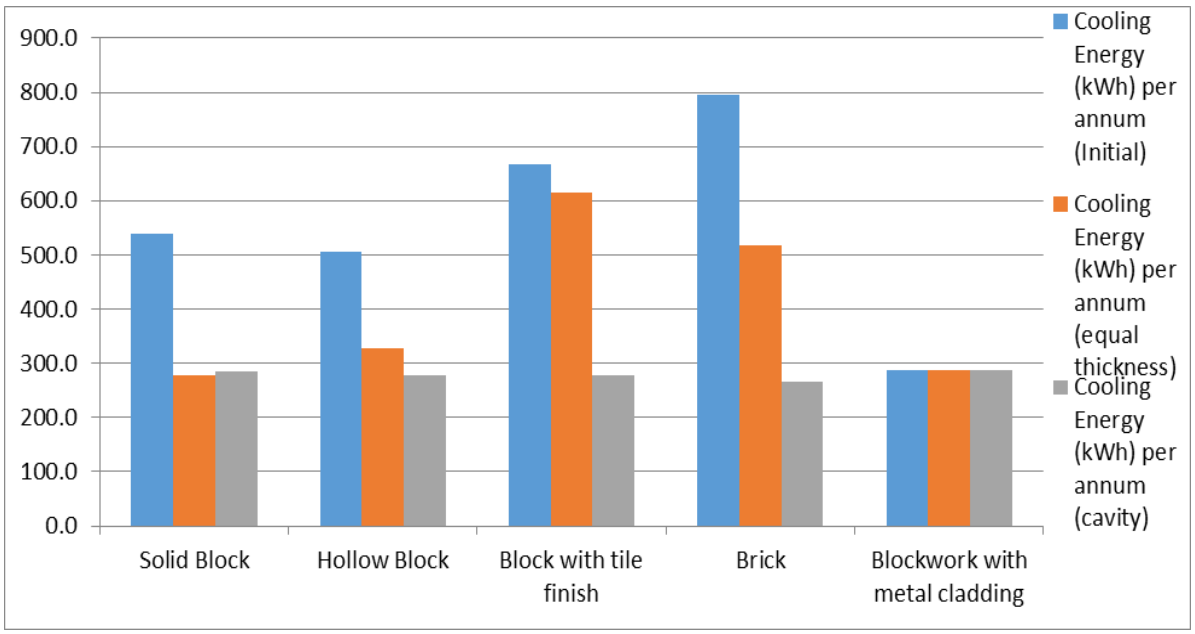


Figure 5. Cooling Energy needed for the various wall systems with cavity of equal thickness.

Even though there were no changes in the block work with metal cladding because materials were not changed, all the other had significant changes. Brick recorded the highest with a decrement in cooling energy from 794.3kWh to 265.4kWh. This shows that brick performs better when used in cavity wall constructions. This explains why cavity brick construction is dominant in the temperate regions. Generally, all wall construction systems have lower cooling energy needed for the building with the exception of the solid block. Solid block with cavity when compared with its initial benchmark block had energy loads reduced but it is better when mass thickness of 215mm.

Floors

The various ground floor slab construction systems as outlined in Table 1 after simulation presented the results in Figure 6.

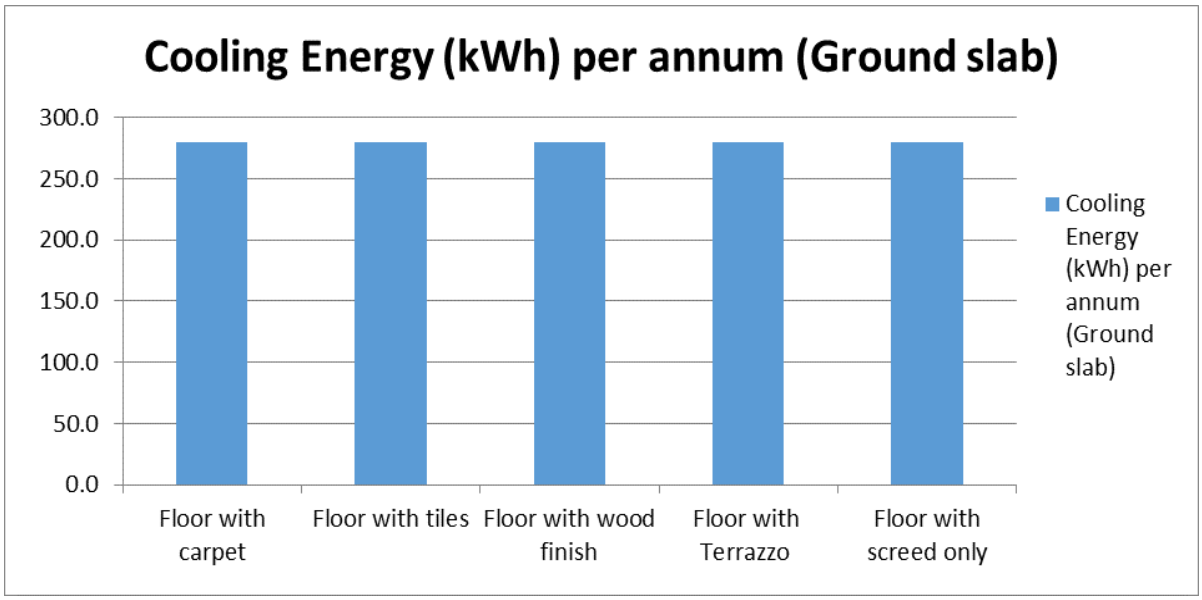


Figure 6. Cooling Energy needed for the various floor systems on ground

The cooling loads needed to cool the various floor constructions systems were found to be equal. This means that the type of floor construction system chosen for a building does not necessarily matter when it is a ground floor slab. All ground floor slabs have hard core filling of 1500mm and thus this has been considered as part of the simulation. The equivalence in cooling loads can be attributed to this thickness of both hard core filling and slab which runs through all simulations. The floors above are looked from a suspended floor angle where there is no hardcore filling. The results can be seen in Figure 7.



Figure 7. Cooling Energy needed for the various floor systems - suspended floors

CONCLUSION

The building fabric and construction systems keep changing and thus there is the need for continuous research and development into the best and most appropriate building material for every peculiar weather or climatic condition. In the temperate regions, producers of building materials normally provide *U* values of the materials and professionals in the industry are tempted to conclude on the materials performance based on the *U* values only. The Ghanaian market also thrives on the thickness of the construction system to market materials resistance to heat influx. However, this research has revealed that reflectivity and emissivity of the material need to be considered to know the actual energy performance of the material. Thus, there is the need to continuously analysis materials and construction systems for effective energy use in buildings. Based on the simulation of materials done with the climate of Accra Ghana, the following recommendations have been arrived at.

Recommendations

The apparent roofing material that should be used in Ghana to reduce the amount of energy needed for cooling is cement tiles. This is a plus for cement tiles and therefore research and development should be done to resolve any issue that discourages end users from patronising this roofing system. Traditional aluminium roofing system on the other hand is the next likely choice after cement tiles. It seems better than both aluzinc and that with chippings. Thus the challenge of this roofing system rusting can be dealt with by coating its surfaces with anti rust. Shingles seems the worst performing roofing system and should not be encouraged in Ghana.

Block work with metal cladding seems superlative over all other walls with the lowest energy need for cooling. However, further research should be done in relation to its cost. Hollow block is the next appropriate wall construction system whiles brick is the worst. With thickness of 215mm, solid block rather is the most appropriate wall system. Thus thermal mass wall constructions should be done with solid blocks. When air gaps are introduced into the wall systems, brick cavity wall is the most suitable wall system in Ghana for less energy consumption. This study therefore recommends cavity brick wall construction for residential buildings and block work with metal work cladding for commercial buildings. The issue of cost can be argued here but the cost reduction in relation to energy use of the building should be duly considered. Thus Life Cycle Analysis (LCA) is needed to ascertain this.

Ground floor slabs do not have much of an effect on the cooling energy needed for spaces. But the most appropriate floor construction system is a floor slab with wooden finish. The worst performing floor system amongst the lot is a floor slab with terrazzo finish. Thus the usage of terrazzo finish floor slabs should be discouraged.

Even though these findings and recommendations are very viable, there is the need for a further research on LCA. Apart from cost related issues, some materials reflectivity and emissivity can change after years of usage. This can affect their performance and thus there is a need for further research into these areas.

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Appendix 1

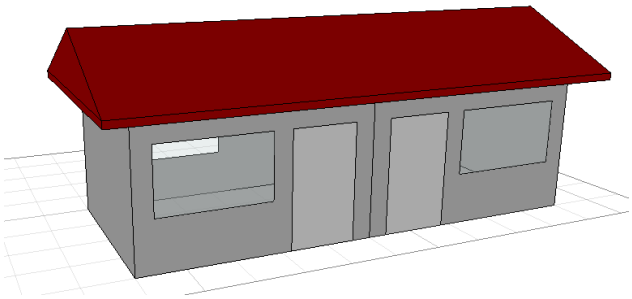


Table 1 Dimensions of the building

Building Dimensions
Rooms are 5 x 4m each on plan with a floor to ceiling height of 3m
Windows are all 1.2m high and 2.4m wide
Doors are all 2.1m high and 1.0m wide
There are no windows in the east and west walls

Table 2 Properties of the building

Building Element	**Material Specification**
Roof	Gable roof with aluminium roofing sheets
Walls	150mm block work 10mm sandcrete plaster
Floor	150mm solid concrete slab supported on the ground
Windows	Single pane, 6mm glass
Doors	50mm solid wood door
Ventilation	Fixed at 1ach (this represents the combination of ventilation and infiltration)

Table 3 Internal occupancy and gains

Gain	**Occurrence/schedule**
Occupants (assume sedentary)	1 occupant in each room (zone), present 24h a day
Lighting (assume a total lighting gain of 30W in each zone)	Lights switched on from 6pm until 6am every day

Appendix 2 Thermal Properties of Materials (Szokolay, 2004)

	Conductivity (W/m K)	Density (kg/m^3)	Specific heat (J/kg K)
Wall materials			
Adobe blocks	1.250	2050	1000
Brickwork, outer leaf	0.840	1700	800
Brickwork, inner leaf	0.620	1700	800
Brick, sand-lime	1.080	1840	840
Brick, silica	0.890	2240	840
Concrete			
cast, dense	1.400	2100	840
lightweight	0.380	1200	1000
Concrete block, heavy	1.630	2300	1000
Concrete block, medium	0.510	1400	1000
Concrete block, light	0.190	600	1000
Fibreboard (softboard)	0.060	300	1000
Fibrous cement sheet	0.360	700	1050
Fibrous cement decking	0.580	1500	1050
Glass	1.100	2500	840
Plywood	0.138	620	1300
Sand (dry)	0.300	1500	800
Stone			
marble	2.000	2500	900
sandstone	1.300	2000	800
granite	2.300	2600	820
slate	1.530	2950	750
Tile hanging	0.840	1900	800
Plasterboard	0.160	950	840
Timber			
softwood	0.130	610	1420
hardwood	0.150	680	1200
Wood chipboard	0.108	660	1300
Surfacing			
External rendering	0.500	1300	1000
Plastering			
dense	0.500	1300	1000
lightweight	0.160	600	1000
Roof & floor materials			
Asphalt, bitum. felt	0.500	1700	1000
Concrete slab, dense	1.130	2000	1000
Concrete slab, aerated	0.160	500	840
Metal deck	50.000	7800	480
Sand/cement screed	0.410	1200	840
Stone chippings	0.960	1800	1000
Tiles	0.840	1900	800
Thatch (straw)	0.070	240	1420
Timber boarding	0.140	640	1200

	Conductivity (W/m K)	Density (kg/m^3)	Specific heat (J/kg K)
Insulating materials			
Cork	0.038	144	1800
EPS (exp. polystyrene)	0.035	25	1400
Glass fibre			
quilt	0.040	12	840
batt	0.035	25	1000
Mineral fibre			
slab	0.035	35	1000
same, denser	0.044	150	920
Phenolic foam	0.040	30	1400
Polyurethane board	0.025	30	1400
Strawboard	0.037	250	1050
Same compr, paper faced	0.081	320	1450
Wood wool slab	0.100	500	1000
Loose fills			
Perlite fill, loose	0.046	65	
Cellulose fibre			
fireproofed	0.039	42	
same, denser	0.047	83	
Vermiculite, exfoliated	0.069	128	
Metals			
Aluminium	236	2700	877
Copper	384	8900	380
Zinc	112	7200	390
Iron	78	7900	437
Steel, mild	47	7800	480
Stainless steel	24	7900	510
Lead	37	11300	126

Note that the above are ‘declared’ conductivity values based on laboratory tests. Before they could be used for calculating U-values, they should be corrected by κ factors

IMPACT OF HUMAN CAPITAL ON CHANGE IN POVERTY STATUS OF RURAL HOUSEHOLDS IN NIGERIA

[1,2]Abdulaziz Shehu & [2]Kabiru Hannafi

[1]Economics Unit, Department of General Studies, Sokoto State Polytechnic,Nigeria
[2]Department of Economics, Federal University Birnin-Kebbi, Nigeria

ABSTRACT

Poverty has remained a serious challenge in Nigeria, especially among those residing in its rural areas. Hence, human capital has been identified as one of the notable factors that reduced poverty. However, little is known about its effect on the poverty status of households in Nigeria. This paper accessed the impact of human capital on change in the poverty status of rural households in Nigeria, using the nationally representative survey data of its rural households conducted by the Nigerian Bureau of Statistics in collaboration with the World Bank in 2010/2011 and 2012/2013. Multinomial Logit model was employed in assessing the impact of human capital on change in the poverty status of the households. The result revealed that human, physical, financial and social capital endowments of the households are having a significant and positive effect on change in their poverty status. However, human capital was the most important endowment that explained welfare changes over time. Based on this findings, the study suggest that the government need to initiate programs that would facilitate access of the poor households to formal education, formal credit, social capital and non-farm diversification opportunities towards eradicating rural poverty in the country.

Keywords: *Human Capital; Poverty; Household; Multinomial Logit Model; Nigeria*

INTRODUCTION

Poverty reduction has been part of the worldwide agenda since September, 2000 when the countries of the world signed the Millennium Declaration and set their commitment towards reducing poverty in the entire world by half by the end of the year 2015. However, the year has ended but yet poverty has been a major challenge facing predominance of the people living in the Sub-Saharan Africa, especially those residing in rural areas. Nigeria has been placed as one of the country in the region with the high rate of poverty with nearly 60% of its working population living below the poverty line of US $1.25 per day despite its abundant resources and oil wealth (World Bank, 2010). The poverty situation in the country is often worsened among its rural households whom majority of them are subsistence farmers with low level of human capital.

Numerous factors have been identified as the possible determinants of poverty and notable among them is human capital. The development of human capital have been widely recognized as a long-term solution to poverty as it helps in increasing productivity and income of the existing and potential labor force in the household, which helps in alleviating poverty (Glewwe, 1991; Grootaert et al., 1997; Ellis 1998). Human capital also determine the economic activities of the household and its ability to take advantage of investment opportunities in certain income- generating activities, which serves as a path of determining household welfare. Thus, it is expected that a household with an adequate human capital investment would be able to generate substantial income from other sources apart from farming, which may play a vital role in improving the household welfare. Ellis and Freeman (2004) maintain that the current understanding of poverty should place considerable attention on ownership of assets because they are the building blocks that the poor can easily convert to productive use to make their own routes out of poverty.

Problem Statement

Despite the potential role of human capital in reducing poverty, there are few empirical studies that examined its impact on poverty reduction in rural Nigeria (Olaniyan, 2002; Awotide et al., 2011, Sekumade and Osundare, 2014). Moreover, none of the past studies have examined the impact of human capital on changes in the poverty status of the households. This is dictated by the lack of panel data on household survey in the country, until the current one collected in 2011 and 2013. The paucity of panel data in the country makes it impossible to track changes in the poverty status of the households over time. Hence, without adequate knowledge of the impact of human capital on poverty it would be difficult to identify the possible factors that should be considered in reducing poverty among the households.

It is against this background that this paper studied the role of human capital in changing the poverty status of rural households in Nigeria. Hence, the findings of the study would help in suggesting sound appropriate policies that could enhance the endowments of the poor households so as to complement their own resources needed to improve their wellbeing

Aim and Objectives

This paper aimed at examining the impact of human capital on change in the poverty status of rural households in Nigeria, using a nationally representative household panel survey data of rural households from Nigeria for the period of 2010/20011 and 2012/2013.

The specific objectives of this paper are:

To describe the socio economic characteristics as well as human, social and physical capital endowments of the households.

To assess the impact of human capital on change in the poverty status of rural households.

RELATED LITERATURE

Several empirical studies have documented the role of human capital in reducing poverty amongst rural households in developing countries (Grootaert et al., 1997; Canagarajah et al., 2001; Ellis and Freeman, 2004; Winters et al., 2007; Awotide et al., 2011). Hence, education have been identified as the most important component of human capital that have a positive significance on poverty reduction. In a study of rice farm households in Nigeria conducted by Awotide et al., 2011, it was found that households headed by educated heads are less likely to be poor compared to those that are headed by illiterate heads. The review of the existing studies indicated that in nearly all developing countries for which empirical research has been conducted on determinants of poverty, education is having a significant positive impact on the economic wellbeing of the households irrespective of their location and poverty status.

In the same vein, Lucas, 1998 revealed that households with higher educational level have higher chances of getting better employment opportunities and well-salaried employment than less educated ones. The level of education tends to increase level of household productivity in all the sectors of the economy and boosted mobility in the labor market. Also Riggs (2006) maintains that the best means of promoting growth in less developed countries is through endowing households with adequate skills to be obtained through increase investment in education. Using the data of Fiji national living standard household survey, Xing and Gounder (2012) reveal that the educational attainment of household members plays a vital role in improving the overall welfare of the rural households by increasing their wage earning, which increases their per capita annual consumption expenditure. Similarly, Vijaya, et al, (2014) using nationally representative household level data from India reported that the educational attainment of the household has a significant positive impact on the welfare of both the rural and urban households in the country.

Household size and its composition is another components of human capital that affects poverty status of households in rural areas of developing countries. Bogale, (2002) in their study of rural households in Ethiopia reported that there is a significant negative relationship between household welfare and household size. Similarly, Awotide et al., (2011) reported that the larger the household size the higher the likelihood of rice farm households falling into poverty in the rural parts of Nigeria. However, the actual effect of household size on household welfare depends on the percentage of adult and dependents in the household. The recent study by Alem, et al., (2014) using 15 years' panel data of Ethiopia reveal that households with high proportion of children are more likely to be poor than households with less proportion number of children. They also found that households with high percentage of adult employed members are more likely to sustain their livelihood above the poverty line because the members contribute actively to household consumption expenditure. Similarly, Mukherjee and Benson (2003) reported that the coefficient of proportion of children is having negative significant impact on household consumption, while that of adults is having significant positive effect on household consumption.

The review of the aforementioned studies portrayed that little is known about the impact of human capital on poverty reduction in Nigeria. Moreover, none of the past studies from the country have examined the effect of household endowments on changes in the poverty status of the households which may be dictated by the lack of panel data on household survey in the country, until the current one collected in 2011 and 2013.

RESEARCH METHODOLOGY

Source of Data

The data for this study were collected from the first and second wave of General Household Survey (GHS) of the nationally representative sample of rural households in Nigeria conducted by the Nigerian Bureau of Statistics in collaboration with the World Bank in 2010/2011 and 2012/2013. Over the period, the coverage and methodology of the data collection used in the surveys were held constant so that results are comparable over time. The survey collected detail information on household endowments, employment, consumption and non-consumption expenditure, demographic characteristics of the household member, community infrastructures and other issues related to household wellbeing. The projected sample size was 3380 rural households, but the study used only the sample of rural households that were interviewed in both 2010/2011 and 2012/2013 accounted to 3257 respondents.

Theoretical Framework

The paper used human capital theory as its framework to capture the effect of human capital on likelihood of household to escape from poverty. Human capital theory provides a conceptual basis for relating human capital endowments of the household with poverty reduction. The theory is largely credited to the work of Becker (1964) and is often used in the literature to establish a linkage between human capital and household poverty status. The theory emphasized on the role of human capital formation in improving the poverty status of individual households. Human capital theory asserts that education is the basis of creating human capital as it inculcates skills and knowledge to an individual person, which facilitate higher level of productivity, which in turns improves household economic wellbeing.

The theory was used to capture the likelihood of household to escape from poverty given the level of his human capital. In line with the theory, households that are endowed with enough human capital have higher chances of engaging in high return productive investment which results in higher income and consequently improve the status of the household above the poverty level. The theory maintains that households without a minimum level of human, capital investment are confined to perpetual life in poverty. The insights of this theory provide a basis of empirical assessment of the impact of capital endowment on change of poverty status of rural households in Nigeria.

Empirical Model

The study used multinomial logit model to assess the effects of human capital on the likelihood of a given household to escape from poverty or fall into poverty. Thus, the multinomial regression model can be specified as

$$P_{i[,1,2,3]} = \beta_0 + \boldsymbol{\beta_1 HN_{it-1}} + \boldsymbol{\beta_2 K_{it-1}} + \beta_3 M_{it-1} + \beta_4 A_{it-1} + u_{it} \quad (1)$$

Where $P_{i[1,2,3]}$represents the likelihood that the household would be in one of the three exclusive groups. Group one are those households whose poverty status remains remained unchanged over the two periods (2010/211 and 2012/1013), which serve as a reference group. Group two are those households that were not poor in 2010/2011 but fall into poverty between 2012/2013. Group three encompasses households that were poor in 2010/2011 but escaped poverty in 2012/2013.

The study used the world absolute poverty line of $1.25 dollar per day deflated by 2010 consumer's price index to come up with the poverty line of $457 dollars per annum, which is equivalent to NGN 71,292 as at the time of the survey. Thus, households having less than NGN 71,292 as their per capita annual consumption expenditure are classified to be poor, while those having more than the threshold value are considered as non-poor ones.

Among the right hand side variables$\boldsymbol{HN_{it-1}}$represents a vector of human capital endowments at the initial period; this comprises of head age, head gender, years of education of adult household members and the composition of adults and dependents in the household. $\boldsymbol{K_{it-1}}$represents set of physical capital endowments owned by the household in 2010, which comprises of farm size and non-farm enterprises owned by the household.. M_{it-1} denotesfinancial capital, which is measured by the share of household members that have access to formal capital. A_{it-1}denotes social capital, and is measured by the share of household members that are registered with various forms of associations. The study used initial endowments because changes in consumption in the short run is very much a function of the level of endowments prior to the changes (Grootert et al., 1997).

Definition and Measurement of Variables

The conceptual definition and measurement of the variables used in this study were presented in Table 1. The variables are classified under three headings, namely Dependent variable, Human Capital Measures, Physical Capital Measures, Financial Capital Measures and Social Capital Measures

Table1Measurement and Definition of Variables

Variable	Measurement and Definition
Dependent Variable:	
Poverty Status Measure Per capita Consumption Expenditure	Annual household consumption expenditure divide by the household size
Independent Variables:	
Human Capital Measures	
Male Adults	Proportion of males that are between 18 to 65 years in the household
Female Adults	Proportion of females that are between 18 to 65 years in the household
Dependents	Proportion of household members that are less than 18 years and those more than 65 years
Education	Average years of education of adult members of the household
Head Age	Years of the head of the household
Head Age Square	Square of years of the head of the household
Physical Capital Measures	
Farm Size	Hectares of farm owned by the household.
Nonfarm Enterprises	Share of household members employed in the non-farm enterprises
Financial Capital Measure	
Formal Credit	Share of household members that have access to formal credit
Social Capital Measure	
Association Membership	Share of household members that have access to various associations.

RESULTS AND DISCUSSION

Descriptive Statistics

The descriptive statistics presented in Table 1 disaggregated the sample into poor and non-poor households. Those that their per capita annual consumption expenditure is below the poverty line of NGN 71,292 per annum are classified as poor while those above it are termed as non-poor households. The per annum poverty line was constructed on the basis of the minimum requirement of consumption expenditure of $1.25 per day declared by the World Bank in 2010 deflated by the Nigerian consumer price index for the period.

The descriptive results indicate that the per capita annual household consumption expenditure for the full sample increases by 11.26% from 2010 to 2013. However, the result of the disaggregated sample revealed the mean of per adult consumption expenditure of the non-poor households increases by 17% while that of the poor households decreases by 11%. This depicts the high level of income inequality that exist between the poor and non-poor households in rural Nigeria.

In the case of human capital, the descriptive statistics indicate that in spite of low level of education in rural Nigeria, which on average accounts for 3 and 1/2 years, the average years of adult education of the non-poor household is higher than that of the poor ones. This shows that the influence of wealth on educational attainment of the household members. It also indicates the importance of human capital development to improvement in the household welfare.

Table 2 Descriptive Statistics

Variable Description	**Unit**	**All Households**		**Non-poor Households (35%)**		**Poor Households (65%)**		**T-test** (Means Difference)
		Mean	SD	Mean	SD	Mean	SD	
Poverty Status Measure								
Per capita household consumption expenditure		77182	81088	138898	97198	34620	29742	42562**
Human Capital								
Male Adults (%)	Years	0.61	0.33	0.49	0.38	0.53	0.27	-0.04
Female Adults (%)	Years	0.39	0.18	0.51	0.23	0.47	0.29	0.04
Dependents %	Years							
Education (Adults)	Years	3.40	3.72	5.10	4.43	2.47	2.87	2.63***
Head Age	Years	49.87	15.25	49.52	15.65	50.06	15.02	-0.54
Head Age Square	Years	2119	1634	2698	1661	2731	1619	-33.00
Physical Capital								
Farm Size	Hectares	1.65	1.18	1.58	1.16	1.25	1.15	-0.33
Nonfarm	Count	0.23	0.28	0.31	0.33	0.18	0.23	0.13***

Enterprises								
Financial Capital								
Formal Credit	Count	0.08	0.18	0.13	0.26	0.05	0.13	0.08***
Social Capital								
Association Membership	Count	0.05	0.16	0.09	0.22	0.03	0.10	0.06***

Note: Households are desegregated into poor and non-poor households on the basis of international World absolute poverty line measurement of USD 1.25 per day deflated by 2010 Consumer's Price Index. Household consumption expenditure is in Naira (NGN). Exchange Rate NGN156 per USD1 as at the time of the survey 2013; *, **, *** denote 10%, 5% and 1% significance levels.

With respect to physical capital, the result shows that the share of non-farm enterprises among the non- poor households is higher than of the poor ones. This indicates that the existence of barriers to participation of the poor farm households in high return non-farm enterprise activities. Likewise, the proportion of non-poor households with access to social as well as financial capital, outweighs that of poor households. This signifies the importance of formal credit and social networking to investment opportunities in the rural areas.

4.3 Impact of Human Capital on Change in Poverty Status of Rural Household

The results of multinomial logit model presented in Table 3 revealed that all the capital endowments of the households are having a significant effect on the change in the poverty status of the households. An increase in the share of both male and female adults in the household decreases the probability of the household to move into poverty. However, the result suggests that the coefficient of share of male adults escapes only the non-poor households out of out of poverty. This may be attributed to the cultural gender bias against female participation in certain income generating activities among the poor households in rural areas of Nigeria, specifically formal employment.

Regarding the estimates of years of adult education and share of dependents, the result revealed that while increase in the years of adult education increases household welfare, the increases in the share of dependents reduces household welfare drastically. This may be associated with the high lucrative labor opportunities that the educated households are having in the formal sector of the economy compared to uneducated ones. The outcome of this study corroborates with the findings of Grootaert et al., (1997) and Vijaya et al, (2014) who conducts studies on the effects of capital endowments on welfare gain in Cotedevoire and India respectively.

As expected, Table 4 revealed that an increase in the share of dependents in the household increases the probability of falling into poverty and decreases the likelihood of escaping out of poverty. This suggests that the dependents solely depend on the adult members of the household for their consumption expenditure. The result also suggests that the educational attainment of the adult household members has no significant effect on probability of falling into poverty, but it has a positive significant influence on the probability of escaping out of poverty. This may imply that education is more welfare enhancing for the poor households than the non-poor ones. The possible reason for this discrepancy is that the non-poor households have other forms of alternative investment opportunities that haves little to do with their educational attainment

Table 2 Multinomial Results of the effect of Capital Endowment on Poverty Status of the Households Dependent Variable: Change in the Poverty Status of the Household

Independent Variables	**Moved into Poverty** Coefficient	**Escaped Out of Poverty** Coefficient
Human Capital		
Male Adults	-0.42*	0.69**
	(0.23)	(0.29)
Female Adults	-0.08***	0.06
	(0.02)	(0.03)
Dependents	0.12***	-0.22***
	(0.04)	(0.06)
Education	-0.45	0.33**
	(0.73)	(0.06)
Head Age	-0.03***	0.01
	(0.01)	(0.01)
Head Age Square	0.03***	-0.01
	(0.01)	(0.01)
Physical Capital		
Farm Size	-0.03**	0.04**
	(0.01)	(0.02)
Non-farm Enterprises	-0.09**	0.08
	(0.04)	(0.15)
Financial Capital		
Formal Credit	-0.26	0.19***
	(0.30)	(0.03)
Social Capital		
Association's Membership	-0.03	0.09***
	(0.02)	(0.03)
Observation	3257	3257
Wald-Test	184***	251***
Pseudo R^2	0.13	0.18

Notes: Households are desegregated into poor and non-poor households on the basis of international

World Absolute Poverty line measurement of USD 1.25 per day deflated by 2010 Consumer's Price
Index *, ** and *** denotes 10%, 5% and 1% levels of significance respectively.
Values in Parenthesis represent Robust Standard Error.

Predictably, the age of household head has a nonlinear effect on the probability of falling into poverty. The coefficient of age decreases the likelihood of falling into poverty. However, after reaching an old age, it increases the likelihood of the falling into poverty due to diminishing return to human productivity. The coefficients of formal credit and association's membership which measures financial and social capital respectively have no significant influence on the probability of falling into poverty, but they have a positive significant influence on probability of escaping out of poverty. This portrays the importance of formal credit and social networking in improving the wellbeing of the households.

CONCLUSION

The study used the nationally representative survey data of rural households from Nigeria to empirically examine the effect of household human capital on the change in their poverty status. The outcome of the study revealed that the initial human, physical, financial and social capital endowments of the households play a significant role in improving their welfare as well as changing their poverty status. Households who were more successful at improving their welfare were those who are well educated, with a high proportion of male adults, few children, and having access to financial and social capital with a large farm size and investment in the non-farm sector.

Human capital was found to be the most important endowment that explains the welfare changes over time. Households with high share of male adults and well educated members experienced a significant improvement in their welfare compared to those households with a high proportion of children and elderly members. With respect to physical capital, the study found that farm size is having negligible impact on the improvement in the wellbeing of both the poor and non- poor households. Similarly, non-farm enterprises as one of the important physical capital endowment increases per capita annual consumption expenditure of the households irrespective of their poverty status. The result also revealed that the coefficients of formal credit and the association's membership which measures financial and social capital are having a positive significant influence on the improvement in the poverty status of households. This portrays the importance of formal credit and social networking in improving the wellbeing of the households.

As regards to the effects of capital endowments on change in the poverty status of the households, the result suggests that the poverty situation in the country is a temporary condition, which is hopeful information for poverty alleviation in the country. An increase in the share of male adults, educated adult members, farm size, and share of household members

with access to financial and social capital increases the probability of the poor household to escape out of poverty. In contrast, high share of dependents and ageing heads increases the likelihood of household to fall into poverty.

The finding of this study is hopeful news for poverty alleviation policies in the country and it implies that the human capital can effectively change the poverty status of rural household. Therefore,the policy makers need to target funds and design appropriate programs which facilitate the development of desirable forms of human, physical, financial and social capital of the rural households. Suggested targeted programs include basic and adult education; rural banking and micro finance with simple collateral; and non-farm diversification initiative scheme.

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HOUSING DEVELOPMENT FOR SUSTAINABLE BUILT ENVIRONMENT IN NIGERIA

Usman, N. D.[1]; Adebitan, E. O.[2] Ma'ori, J. K.[3] and Gyang, J. B. [4\]

[1]*Department of Civil Engineering Technology, Federal Polytechnic, Bauchi, Nigeria*
[2] *Department of Hospitality Management, Federal Polytechnic, Bauchi, Nigeria*
[3] *Ministry of Works and Housing, Gombe, Nigeria*
[4]*Department of Building, Federal Polytechnic, Nasarawa, Nigeria*

ABSTRACT
Housing is a basic need for sustainable development as it provides shelter and employment to people. Housing development is enhanced by cost, time and quality standards, unfortunately in Nigeria is yet to attain its optimum in the built environment. Housing demand is on the increase as a result of population growth. However, non-sustainability of housing policy led to abandonment and uncompleted housing projects remain a challenge. This has resulted to ineffective and inefficient project monitoring and supervision. This study therefore seeks to assess housing development challenges for sustainable built environment in Nigeria. The objectives: to examine the policy framework for sustainable built environment and to evaluate effective planning for sustainable housing delivery in Abuja.The study adopts both qualitative and quantitative survey. Stratified random sampling technique was used to select 400 respondents from the entire population for the purpose of data analysis. The study found out that there are ineffective and inefficient monitoring mechanisms to enhance sustainable built environment. It is recommended that project and evaluation should be strictly adhered and procurement due process should be maintained.

Keywords*: Challenges, Development, Housing, Sustainable Built Environment*

INTRODUCTION
Housing is a basic need for sustainable development as it provides shelter and employment to people especially youths (Usman *et al*, 2014). Housing development promotes socio-economic status of a nation. The socio-economic growth of a nation can be determined by its gross domestic product (GDP). For instance, in 2013 Nigerian GDP rose from US $262.6 Billion to US &510 billion (Mailafiya 2015). Nigeria in the last decade has the faster growth economy in Africa with a GDP average rate of 6% annually (Mailafya, 2015).
Despite the increase in GDP, Nigeria has acute shortage of houses. A house is a shelter with comfortable accommodation portable water, electricity and conducive environment for livelihood. According to UNICEF(2014) Housing requirement including portable water, comfortable accommodation, good disposal system , adequate ventilation, available energy

napodanusman@yahoo.com

and power, good health facilities, to mention but a few. Nigeria has experience tremendous growth in the last two decades. According to the NBS (2014), reported that Nigeria population is 170 million. This growth in population was as a result of people migrating from rural to urban areas for greater pasture and for basic social amenities so as to improve their livelihood.

The migration of people from rural to urban cities create serious housing challenges such as overcrowding, inadequate dwelling, inadequate portable water, limited disposable system, inadequate planning, abandonment and collapse of building projects (Usman, 2014).These are contending issues and Nigeria is yet to attain its optimum on sustainable housing in the built the environment.

Studies have shown that more than one billion of the world residents live in slums and squatter settlement especially in developing countries (UNICEF, 2014). It is estimated that 20-40 million households are homeless. A sizeable number of those housed, do not have basic facilities and so cannot be regarded as living in adequate housing. Global urban shelter reported that 125 million units (18%) of urban housing units are rented and 175 million units (25%) do not conform to building regulation. Studies have shown that most cities in developing countries like Nigeria, Ghana, and Kenya, Botswana and Asia and Pacific regions have deficit of housing unit (Usman, 2014).

In pre-colonial period, most developing countries build houses through communal efforts (Amao & Ilesanmi, 2013). The Government of Nigeria intervened in housing delivery system from 1928-1929 (FGN, 2014). Lagos Executive Development Board was mandated to plan and develop Lagos city (Amao & Ilesanmi, 2013). After the World War II, Colonial Government provided housing opportunities to both public and private sectors. This system failed because the Nigerian Building Society was dependent on Government for funding (Kabir *et al*, 2009).

From 1951-1962, there was massive construction of housing estates to replace the slum areas. This was done but the creation of three regions namely, Northern, Eastern and Western has adversely affected the program. The regions provided Mortgage Housing Corporation in 1964. This mortgages program was not sustained and within the two national developing plans 1962-1968 and 1970-1975, housing scheme was not attractable due to low rating. Though not patronized but government pumped in money to this sector. There were illustrations and misconception by inventors (Amoa & Ilesami, 2013) and loan was accessed by few. The scheme was poorly managed.

In 1976-1985, Government reorganized NBS to Federal Mortgage Bank of Nigeria charged with the responsibility for housing loans. This housing organ was under Decree No 54 of 1979. The Decree stated that every employer should provide housing for its employee. The Government directed commercial banks to reserve 5% - 6% of its total income to housing loan. In the same vein, the Federal Government established National Housing policy in 1991. This policy was geared towards providing affordable housing to all Nigerians. This also failed. In addition, Government set up a presidential committee on house and urban Development to restructure FMBN and create real Estate Developers Association of Nigeria

(REDAN) as well, Building Materials Producers Association (BUMPA). These reforms were aimed at empowering private finance housing estates and to enable Nigerians to access loans from financial institutions to own a house (Kabri *et al*, 2009: Amao & Ilesanmi, 2013).
In 2003, the Federal Ministry of Housing and Urban Development was created to provide decent and affordable housing. Despite, various housing delivery programs Nigeria is still deficient on sustainable housing. Sustainability is the bedrock of socio – economic development in the build environment (Kuhtz, 2007; Standing & Jackson, 2007). Therefore, this research is geared toward examining housing development for sustainable built environment. This can be achieved through the following objectives: to examine policy framework for sustainable housing delivery and to evaluate effective planning for sustainable built environment in Abuja, Nigeria.

1.2 Research for Sustainable Housing Development

The growth and development of sustainable housing depends on the quality of research (Usman, 2015; Nebo, 2006). Nations with less research activities lag behind in labour force competitiveness. In fact, as labour force drives development, such countries lag behind in sustainable housing development. Therefore, researchers should be able to monitor global, technological needs, assess their relevance to national growth and contribute to the technological capacity for socio-economic growth of their nation.
Studies have shown that most nations that have achieved a stable economic growth relied on research to drive their growth (Nebo, 2006; Eze, 2013 & Aimiuwu, 2010). For instance, the respect china bestowed as a player in the process of globalization was attributed by its development in sciences through research. In 2003, china had the second highest number of researchers in the world (862,000) behind USA (1.3 million in 1999) ahead of Japan (675,000) and Russia (487,000) (Chukwuemeka, 2014). Amongst the Organization for Economic Co-operation and Development (OESD) regimes, Japan had the highest number of researchers relative to employment (10.4 per thousand), followed by USA (9.3) and the European Union (5.8) (OECD Scientific Technology and Industry Score Board, 2005).
In Nigeria our limitation to research deter sustainable housing development and has increased the level of poverty (Usman, 2015). Poverty rate has worsened from about 45% in 1970 to nearly 70% in 2009. This shows that nearly 70% of our people live below $1 a day.According to the 2010 Global Monitoring Report of the United Nations Educational, Scientific and Cultural Organisation (UNESCO), about 92% of Nigerians survive on less than $2 daily while about 71% survive on less than $1 a day. This means that two Nigerians' income is equal to the daily feeding of a cow in Europe (Chukwuemeka, 2014).
The rate of unemployment has worsened in the last 10 years from about 15% in 2003 to at least 20% in 2009 in the total population reaching 40% among the youth. Life expectancy has deteriorated from 54 years in 1980 to 47 years in 2008. A country that produces two million barrels of oil a day, has the seventh-largest natural gas reserves of any country in the world, and recently the first in Africa but according to the United Nations, the poverty rate in

napodanusman@yahoo.com

Nigeria has gone up from 46 percent to 76 percent over the last 13 years. The most immediate source of the vacuum between Nigeria's wealth and its poverty is a failure of governance at the three -tier levels (Oloyede, 2010).

RESEARCH METHODOLOGY

The study area is Abuja, the Federal capital Territory of Nigeria. Abuja is chosen for the study because of the increased in population due to development in socio-economic activities. It is also the fastest growing city in Africa. The research used interview and questionnaire to obtain data for analysis. The strata for data collection were consultants (Architect, Builder, Engineers, Urban and regional planners), Ministry of Housing and Environment officials and clients. Stratified simple random sampling was used to select 400 respondents for the study.
Yamane formula was applied based on sample size guidelines (Leady & Ormond, 2005; Olatunji, 2010). This comprises of 15% consultants, 35% staff of Ministry of Housing and Environment and 50% clients. Simple regression was used find the relationship between sustainable built environment and housing development in Nigeria. Hence, the hypothesis – There is no policy framework for sustainable housing in the built environment and; there is no planning for sustainable housing in Abuja, Nigeria.

RESULT AND DISCUSSION

3.1 Impact of Policy and Procedural Framework on Project Delivery

Result indicate that there is a significant relationship between policy framework and sustainable housing in the built environment ($F= 108.283$; $P< 0.05$).Results from ANOVA test shows that the p - value is less that the alpha value which means it is statistically significant. It means that the Null hypothesis was rejected because there is policy framework for sustainable housing in the built environment in Abuja. The study established that there are policies for sustainable housing but there is poor implementation. This is due to non-compliance, poor communication and lack of proper monitoring and supervision as well as the use of non - professionals in the built environment. (Ofori, 2014; Jambol, 2012).
Data analysis and interpretation revealed the following major findings regarding the policy and procedural framework in the building industry in Abuja. Though there are policy measures and procedural frameworks within the building industry, there is minimum compliance. Procedural approvals of building plans, mobilization fee, mobilization to site, safety and health provisions, standardization and other ethical provisions as stipulated in the National Building Code (NBC) (FRN, 2006) were rarely observed. This is because 60% were not constructed based on the National Building Code (Jambol, 2012).

Jambol (2012) advocates that the NBC clearly spelt out contract documentation for building production as provided at section 2.3 to 13.5 (actual production, control of building works, workmanship and supervision). While sections 6, 13.6 to 13.19 of NBC set up requirement for quality and tests of materials, building construction, post construction and components requirements as well as architectural, civil and engineering design requirements.

napodanusman@yahoo.com

NBC also provides requirements for building condition survey report, and environmental and general building requirements. In addition, it provides for working drawings; general building limitations. Others include health and safety and quality management plans (FRN, 2006). Jambol (2012) added that the building industry is guided by law throughout its operations from project start to finish.

The findings indicate that there are policies/procedural frameworks but there is poor or no implementation. This was due to non-compliance and bureaucratic hurdles, poor communication, lack of proper monitoring and supervision, the use of quacks in construction. These are serious challenges that lead to project failures, collapsed buildings and abandonment. These findings are similar with other research findings that in Nigeria building regulations are not adhered to; and policies are poorly implemented especially in the building industry (Jambol, 2012; Ike, 2012, Idoro, 2014; Ofori, 2014; Usman *et al*, 2010)

3.2 The Impact of Planning Phase Principles on Project Delivery

Results show that there is significant relationship between planning and sustainable Housing delivery in the built environment ($F = 112.166$, $P<0.05$), it is on the reverse. ANOVA test revealed that the p – value is less than the alpha value and this suggest the rejection of Null hypothesis that there is no planning for sustainable housing in Abuja, Nigeria. It was revealed that sustainable housing depends on proper planning. Non - compliance to planning principles cause overcrowding, inadequate housing facilities and abandonment.

Planning phase principles are central to the overall project performance; any failure in its adoption adversely affects project performance for example, the project might face litigation charges from Environmentalists or it might turn out to be a health hazard. The planning phase principles include, project goal, project activities, design/specification, choosing a strategy, breaking projects to sub-units, determining performance standards, determining proper sequence, designing the project and estimating costs, determining personnel, determining time/schedules, mobilizing funds, and obtaining approvals.

This study indicates that planning phase principles are not fully adopted within the building industry in Abuja. This could be due to poor design, discrepancies in contract documents, project variation, and shortage of materials, inadequate work plans, and poor service delivery. It was established that the National Building Code specifies that drawings and specifications, which are prepared by architects in the Urban Development Planning Unit, are supposed to be approved within three months once the required standards are met (FRN, 2006).

The findings indicate that planning phase principles form a significant aspect of project performance. It must therefore be taken into account to improve project performance and service delivery. In the same way, Idoro (2010); Nwanchukwu (2008); Nwanchukwu & Fedelis (2011); Usman, Inuwa & Iro (2012) in their studies found similar challenges.

Past studies show that the application of modern techniques, project management techniques, planning, scheduling and controlling, are bedrock to successful project delivery (Aniekwu & Audu, 2010; Kedzner, 2000; Gollenbeck, 2008). Krishnamurthy and Ravindra (2010) added that adequate planning must precede the execution of all other managerial functions. Planning facilitates project performance; and when the project is highly complex, it must be well planned (Bailey *et al*, 2008; Bamisile, 2008).

In Nigeria, lack of sustainable housing is traced back to inability to plan adequately (Usman *et al*, 2012). It does not satisfy housing requirement for a sustainable housing in the built environment. The built environment as sector of the economy contributes immense to growth domestic product (Usman, 2015).

CONCLUSION

In conclusion, the study found out that most houses does not meet the housing standards because they lack basic facilities. This resulted to migration of people from rural to urban cities. It was also discovered that lack of proper planning and policy compliance led to sub-standard facilities. In addition, monitoring and supervision was not frequently maintained. Besides, poverty and lack of employment contributed to lack of sustainable housing provision in the built environment in Nigeria.

Recommendation

Based on the findings, the study recommends the following:

There should be high level of compliance for sustainable housing in the built environment

Monitoring mechanisms should be enforced by the government and professional bodies

The government and private investors should create employment opportunities to limit the level of poverty and improve livelihood.

Policies and programs should be maintained by successive administration, this will minimized uncompleted and abandonment of buildings

napodanusman@yahoo.com

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napodanusman@yahoo.com

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CHALLENGES FACING WOMEN ENTREPRENEURSHIP IN SOUTH AFRICA CONSTRUCTION INDUSTRY SOUTH AFRICA

Balogun, O.A.[1],Ansary, N. [2] and Mogodi, K.E.M. [3]

[1,2&3] Department of Construction Management and Quantity Surveying, Faculty of Engineering and the Built Environment, University of Johannesburg, Johannesburg, South Africa

ABSTRACT

The study sought to identify the challenges facing women entrepreneurship in the construction industry in South Africa and initiatives put in place to counter the challenges. The small and micro enterprises (SMEs) play an important role in the South African Economy such as creating jobs however they face serious challenges such as lack of finance, discrimination, multiple duties, poor access to justice, and lack of education, among others. The study established that many stakeholders from both public and private sector should help empower women entrepreneurs in South Africa: such as formation of women enterprise fund, formal and informal financial support, and donor initiatives among others should put in place. The study recommends that women in entrepreneurship need to be accepted and supported financially, legally and more capacity building should be made available. Further research is recommended in this area.

Keywords: *Women; Entrepreneurship; Challenges; Small and Medium Enterprise; South Africa.*

INTRODUCTION

Entrepreneurial activity is widely seen as an engine of economic growth. It can contribute to the creation of wealth and jobs, may foster innovation and provide autonomy and a sense of personal accomplishment to the individual needs and support women entrepreneurship because they may fail to take into account the different motivations and obstacles of female and male entrepreneurs (Ahmad et, al 2011). Specific support systems or organisations that take into account the needs, challenges and unique situation of women are essential to promote women entrepreneurship, as these may assist women entrepreneurs to avoid failure. Amyx (2005) found that countries providing more incentives and support systems specifically designed for women entrepreneurs have higher rates of female entrepreneurship. The failure to adopt such specific support services means lower levels of women entrepreneurship.

Athanne 2011 and Bindra (2006) stated that the low level of entrepreneurial activity in South Africa is of concern, because entrepreneurs are involved in the establishment and growth of

balogununlimited@gmail.com

new and existing enterprises of varying sizes, including small businesses. The cross-national data of the Global Entrepreneurship Monitor (GEM) indicate that South Africa's Total (early stage) Entrepreneurial Activity (TEA) performance, in terms of relative position, has consistently been below the median since 2001 (Bowen and Morara, 2009).

De Bruin et al., (2007) pointed out that entrepreneurial activity is a prerequisite for the success of economic growth and development, social well-being and social development. According to Gakure (2003), innovation is a specific instrument of entrepreneurs, the means by which they exploit change as an opportunity for a different business or a different service. Successful innovation procedures can be learned and practiced. Thus entrepreneurs need to understand and apply the principles of successful innovation because there are plenty of entrepreneurial opportunities within the areas of change (Gakure, 2003). Entrepreneurs develop new products and services for a market niche, or confront established firms with better quality, additional features or lower prices. Entrepreneurship should include participation from all groups in society, including women, a range of age groups and education levels and disadvantaged populations (Gary *et al*., 1998).

Green and Cohen (2010) defined Total Early-Stage Entrepreneurship Activity (TEA) as the prevalence rate of individuals in the working-age population who are actively involved in business start-ups, either in the phase preceding the birth of the firm (nascent entrepreneurs), or the phase spanning 3½ years after the birth of the firm (owner managers of new firms). The cut-off point of 3½ years has been made on a combination of theoretical and operational ground.

Hisrich *and Brush* (2009) stated in the Global Entrepreneurship Monitor South African Report that given the failure of the formal and public sector to absorb the growing number of job seekers in South Africa, increasing attention has focused on entrepreneurship and new firm creation and its potential for contributing to economic growth and job creation. According to Hisrich and Brush, in 2009 South Africa ranked 23rd out of 43 countries, with a Total Early-Stage Entrepreneurial Activity (TEA) below the average rate (10.6%) of all participating countries. The TEA is a primary measure of entrepreneurship used by GEM. South Africa's TEA rate of 7.8 percent is significantly lower than the average for all efficiency-driven economies (developed countries) which have 11.4% as well as the average for all middle to low income countries, where South Africa belongs which have 13.2%. A country at South Africa's stage of economic development would be expected to have a TEA rate in the order of 13%, almost double South Africa's TEA rate of 7.8%. In addition, South Africa suffers from high unemployment with an official estimate of 25.0% of the economically active population unemployed (Statistics South Africa, Quarterly Labour Force Survey, 2011).

Southern Africa is a developing region with high unemployment rates, low levels of formal and higher education, the migration of individuals from rural areas to cities, corporate restructuring and government policies, and regulations that enforces the restructuring of

larger organisations. The region has an urgent need for entrepreneurs in the Small, Micro and Medium enterprises (SMMEs) which can act as a tool to combat unemployment and crime and to stimulate the economy as a whole (Maas & Herrington, 2006: 59).

Kenneth et al., (1996) mentioned that the Women in Construction (WIC) initiative was originally founded in 1997. WIC later developed into the South African Women in Construction (SAWIC) with some of its objectives to protect women entrepreneurs in construction against discrimination. The Construction Industry Development Board (CIDB) - a Schedule 3A public entity – was established by Act of Parliament (Act 38 of 2000) to promote a regulatory and developmental framework that builds: The construction delivery capability for South Africa‘s social and economic growth. A proudly South African construction industry that delivers to globally competitive standards.

According to the Construction Industry Development Board (the CIDB) register of contractors, the majority of the 47% women owned enterprises on the register are in grades 1 to 4, with very few moving into the higher grades 5 to 8. (cidb) (www.cidb.org.za: Date access: 11-05-2016).

According to Kenneth and Kimathi (1998), construction has traditionally been a male dominated industry in South Africa. Men have dominated the representative structures such as the Association of General Contractors (AGC), the Building Industries Federation of South Africa (BIFSA), the South African Federation of Civil Engineering Contractors (SAFCEC) and the Black Construction Council (BCC). The South African Women in Construction (SAWIC) association is the product of a programme of the Development Bank of Southern Africa (DBSA), promoting sustainable development and job creation through empowering women and facilitating support for their construction enterprises.

The emerging and the established bodies have come together under the Construction Industry Council. Public and private sector initiatives such as the establishment of the Construction Industry Development Board and the Construction Education and Training Authority will no doubt provide a more enabling environment for Construction SMME‘s in South Africa. Noticeable changes in the management structures in these bodies have taken place and now include women in decision making roles.

According to Kinyanjui (2006) maintained that entrepreneurship needs both dynamism and stability. Dynamism occurs through the creation of new businesses and the exit of non-viable ones. Stability comes from providing new businesses with the best chance to test and reach their potential. Entrepreneurship in a society should contain a variety of business phases and types, led by different types of entrepreneurs, including women and underrepresented age groups. Initiatives aimed toward improving entrepreneurship should consider the development level of the economy.

With a strong set of basic requirements in place, efforts can turn toward reinforcing efficiency enhancers, and then building entrepreneurship framework conditions. An entrepreneurial mind-set is not just for entrepreneurs. It must include a variety of stakeholders that are willing to support and cooperate with these dynamic efforts. In addition, non-entrepreneurs with entrepreneurial mind-sets may indirectly stimulate others to start businesses. This indicates the value of broader societal acceptance of entrepreneurship. Total Early-Stage Entrepreneurial Activity (TEA) includes individuals in the process of starting a business and those running new businesses less than 3 ½ years old.

1.1 Problems Statement

Contribution of women in the economy is very important for the growth of the private sector, which offers a substantial share of employment opportunities. Mainstreaming women in industrial activities of the private sector can substantially contribute towards economic growth and their empowerment. However, there are some silent areas in the research on women's entrepreneurship, mostly concerned with how the social world is constructed and how it affects entrepreneurship (Ahmad, 2011, Langowitz and Minniti (2007) highlighted that women may have to accept that entrepreneurship comes with certain ―lifestyle by products‖ for example women who started their business single remained single because the business absorbed so much of their time and emotions they had no time to concentrate on their life outside of the business. Women entrepreneurs in construction are not optimising the opportunities in that sector. There is a perception that construction is for men and that women can only explore soft skills in the entrepreneurial sector. The focus of the research is to investigate the challenges women entrepreneurs face to grow and develop their business in the construction industry. The research will also reveal reasons for slow growth and development of women owned businesses.The reasons for slow growth and development may differ from individuals such as the following:

- Difficulties in accessing credit facilities from financial institutions
- Lack of relevant skills in the construction industry
- Perception regarding the issue that women cannot be good in construction industry.
- Lack of good partnership to share the skills and resources.

Women in construction face many challenges. According the studies done by kimathi (2009) emphasize that small businesses are held back by tough local condition some of them are unable huge collaterals demanded by banks as a condition to access credit facilities. This has created an impression that they are too big for microfinance institutions but too small for conventional banks. Could this be the greatest challenge faced by women in construction in South Africa? This study seeks to explore more.

1.2 Research Objectives

- To establish whether women in construction have relevant skills required in the construction industry in Randfontein Municipality?

- To investigate reasons for the shortage of women entrepreneurs in the construction and engineering fields within Randfontein Municipality?

2.0 Methodology

The literature review of scholarly work spanned the period September 1995 to 2015 and was based on a systematic keyword combination search in the following databases: UJDigispace/Multidisciplinary, Sabinet/Multidisciplinary, ProQuest MTD, Emerald on Business studies and Entrepreneurship, Economics Engineering and Technology, OECDilibray, Oxford journals online and Socio-logical Abstracts.

3.0 LITERATURE REVIEW

3.1 Definition Small and Medium Enterprises

According to the South Africa National Small Business Act of 1996, as amended in 2003 SMEs are defined as separate and distinct business entities in any sector of the economy managed by one owner or more. These include cooperative enterprises and non-governmental organizations, as well as branches or subsidiaries if any (Agumba et al., (2005). However, the South African government has defined the SME sector according to various factors namely, ownership, employment size and formality with various classifications. The most widely used framework in South Africa is the definition of the National Small Business amended Act 2003, which defines five categories of businesses in South Africa. The definition uses the number of employees (the most common mode of definition) per enterprise size category combined with the annual turnover categories, the gross assets excluding fixed property. The definitions for the various enterprise categories are given as follows (Republic of South Africa - White paper on national strategy for the development and promotion of small business in South Africa, 1995) and the National Small Business Act (amended 2003).

Survivalist enterprise: The income generated is less than the minimum income standard or the poverty line. This category is considered pre-entrepreneurial, and includes hawkers, vendors and subsistence farmers. (In practice, survivalist enterprises are often categorised as part of the micro-enterprise sector). **Micro enterprise**: The turnover is less than the Value Added Tax registration limit (that is, R150 000 per year). These enterprises usually lack formality in terms of registration. They include, for example, spaza shops, minibus taxis and household industries. They employ no more than 5 people. **Very small enterprise**: These are enterprises employing fewer than 10 paid employees, except mining, electricity, manufacturing and construction sectors, in which the figure is 20 employees. These enterprises operate in the formal market and have access to technology. **Small enterprise**: The upper limit is 50 employees lower limit and Small enterprises are generally more established than very small enterprises and exhibit more complex business practices. **Medium enterprise**: The maximum number of employees is 100, or 200 for the mining,

electricity, manufacturing and construction sectors. These enterprises are often characterised by the decentralisation of power to an additional management layer.

Entrepreneurship as a concept centres mainly on personal conviction of individuals who intends to establish their own start-up businesses (MC Kay, 2001). Similarly from a cognitive perspective, Mugwara (2000) assumed that the concept of entrepreneurship is not only about distinctive ways of thinking but also the entrepreneur must display better and exceptional behaviour standards. However, the concepts of entrepreneurship and the entrepreneur are further defined in a more practical context by successful entrepreneurs. For instance, recently a South African technology entrepreneur, Oketch (2000), described entrepreneurship as *"the ability to create a new meritocratic enterprise that can participate in an open market opportunity"*. Though the concept of entrepreneurship shares similar personality traits and characteristics as well as different qualities with intrapreneurship, it is still interesting to note that other environmental factors differ (Ongori, and Migiro 2011). Entrepreneurship in most instances is grounded as an innovative process. A study done by Peter et al.,(2005) opined that entrepreneurial intent is crucial for the development of efficient interactive models which defined entrepreneurial behaviour as a function of both personal and environmental conditions. Another approach defined entrepreneurship based specifically on the research outcome by Agumba 2005 which account for a holistic picture of entrepreneurship. According to the above authors, the definition of entrepreneurship should focus more on the entrepreneurial process and not only on a single segment namely individual behaviour, or the identification of opportunity.

According to Ahmad et al., (2011) defines women in construction as a women who have initiated a business, is actively involved in managing it, and owns at least 55% of the firm and have been in operation one year or more. This definition identifies an entrepreneur by their behaviour rather than the specific occupation they are involved in. That willingness to take calculated risks, determination, insight, total involvement, independence, need for achievement, leadership ability and among others. Green (1995)

3.1.1 Factors affecting small and medium Enterprises (Women in Construction) in South Africa.

Shekari *et al.,* (2011) conducted a study on the main obstacles faced by several South African entrepreneurs, the results of which indicated that the most recurrent weakness is lack of education and training among entrepreneurs. It is therefore imperative to focus on the training of entrepreneurs, particularly the development of previously-disadvantaged individuals, specifically women entrepreneurs Siwadi and Mhangami (2011). Individuals starting businesses typically dominated by white males may potentially face difficulties in obtaining a client base. This is likely to be a very real problem because, the most rapid growth in women-owned firms lies in non-traditional industries such as construction, wholesale trade, transportation, communications, agriculture, and manufacturing. Customers may choose not to turn to women and minorities for their products and services due to a perceived lack of fit

between business owner and industry characteristics. Customers who have the option of employing a male owned versus a female-owned construction firm may, for example, select the male owned firm simply because men are more commonly associated with and are believed to be more knowledgeable about the construction business. If this is the case, then women and minorities have an uphill battle in combating the scepticism of potential clients, and may wind up with less than they deserve in terms of market share (Smith 1997)

3.2.1Access to credit is of one of the major problems that studies highlight is the business women's perception that banks discriminate against them and that this creates difficulty in their ability to gain external business finance. A large proportion of small businesses utilise their own financial resources but the most common source of external capital is banks (Stevenson and St-Onge 2005)

Siwadi and Mhangami (2010) quoted Ronge (2002) stated that one of the inhibitors to becoming an entrepreneur is an inability to secure start-up capital and the high cost of start-up capital. Other factors which affect the accessibility of financing for SMEs include business size (with micro-businesses typically having less access to financing than larger SMEs) and geographic location.

3.2.2 Education and women entrepreneurship. Training is the essential component for producing an able corps of entrepreneurs who not only survive but thrive and contribute to the local, and ultimately, the global economy. Skill-based training, technical training, technology training, and delivery of management skills are necessary to strengthen not only entrepreneurs, but also associations. Technical assistance, in other words, is especially valuable in developing and transitional economies where business and managerial skills are often completely lacking (Temecko, and Dondo, 1992).

4.0 CHALLENGEFACING WOMEN- OWNED BUSINESS IN SOUTH AFRICA.

Stereotype-derived expectations that the woman or minority entrepreneur is not very competent also are apt to create problems in obtaining financial backing. Providing money and resources to such an individual is very likely to be viewed as more risky than providing money and resources to others (Walsh and Likinski, 2009).

4.1 Socio-cultural environment. According to Zororo (2004), equality legislative policies, laws and regulations that promote gender equality can be negated by prevailing cultural or traditional norms and practise. Some of the most pervasive factors which can encourage and enable, or discourage and disable, women's enterprise development are those things which are most difficult to observe and measure. These are also factors which concern women's position in society. They also affect what societies, communities and families perceive as acceptable (or not) for women to be and to do. This in turn adversely impacts on the components of the enhanced SL-MAIR framework relating to women's entrepreneurial skills,

motivations and level of confidence. Cultural and social traditions play a large role in determining who within a society becomes an entrepreneur. For example, social conditions in some societies inhibit women from starting their own businesses. For a female business owner, the process of starting and operating a new enterprise can be difficult because often they lack the skills, education, and support systems that can expedite their business pursuits (Ahmad, et al., 2011).

Access to economic resources and appropriate technology remain major obstacles to the survival of women-owned enterprises. Also an access to international markets has not necessarily been improved for women (Green, and Cohen 1995). Government or customary law bar women from inheriting ancestral land, which is traditionally passed down through male descendants. Registration provides titles in the name of the ―head of the family‖ but once a man dies, his widow's continued access to the land may be threatened by his relative who may want the land. Widow inheritance rights do not exist in principle and land in the hands of widows tends to pass to a male heir of the next generation (Hisrich& Brush 2009).

4.2 Access to business support. Lack of sufficient capital tends to affect SMEs'ability to develop new products and services or to grow so as to meet demand Ahmed (2011) posited that 90% of business start-ups that failed did so because of the lack of management skills of the owners. Access to the right types and amounts of capital, at the right times, directly relates to the successful operation of a business. It is commonly believed that entrepreneurs seek and receive a majority of their initial capital as equity from venture capitalists, angel investors or friends and family (Bindra 2006).

4.3 Inequality of access to credit. It is harder to access funding for earlier stages of SME development e.g., seed money, start-up capital) than for later stages e.g. working capital or expansion funds (Gray et al.,, 1998). Capital may be acquired via debt or equity financing and may take the form of any number of financial instruments. Debt instruments used by SMEs may include bank term or demand loans, private loans, operating lines of credit, credit cards, leases, supplier credit contracts, and government-backed loan programs. Equity investments in SMEs are typically reflected through ownership of one or more classes of shares in the venture. These investments may include personal investment by the entrepreneur, private investment by friends and family (love money), angel investments, venture capital investment and in cases of publicly traded companies, public market equity. In the case of established companies, retained earnings may also be re-invested in the venture (Gray et. al.1998).

4.4 Lack of timely business information. According to the department of Trade and Industry (the dti, 2009) there are number of factors affecting women entrepreneurs such as access to capital, labour issues, inadequate education and training as well as discrimination as major constraints affecting the establishment as well as the expansion of women's entrepreneurial activities. Women normally rely on personal income to provide the initial finance for their enterprises.

4.5 Obstacles in starting up the new venture. Bowen *et al*., (2009) argued that although education is not mandatory for new venture creation, it provides the skills, contacts and opportunities vital to most successful businesses. According to Hisrich, and Brush (2009), for many start-up businesses, some form of mentoring is needed in varying degrees to grow business skills. One to one mentoring is effective but expensive and unless economies of scale can be achieved, providing these support services to small enterprises is difficult to sustain. Jaiyeoba, (2010) conducted a study on the main obstacles faced by several South African entrepreneurs, the results of which indicated that the most recurrent weakness is lack of education and training among entrepreneurs.

4.6 Lack of female role models. For some entrepreneurs, role models and mentors played a key role in carving out paths for them to follow. Mentors include business men and women, family members, women with a high public profile, and an occasional consultant. Mentors often view mentoring as a responsibility, a way of ensuring entry for the next generation of women. Within women‘s business associations, business management, economic empowerment, and advocacy techniques combine with the more humanistic skills of fostering mutual respect, improving ethical standards, and improving health in order to equip female entrepreneurs to succeed in a competitive business environment (Jaiyeoba 2010).

4.7 Lack of business management skills. Hisrich and Brush (2009) are of the opinion that ―a mentor–protégé relationship is an excellent avenue of securing needed professional advice, as well as providing an additional source of moral support. Stevenson (2005) defined mentoring as ―a protected relationship in which learning and experimentation can occur potential skills can be developed and in which results can be measured in terms of competencies gained, rather than curricular territory covered‖. General business training includes basic business skills such as costing, marketing, accounting and negotiation, and is usually a central element of an integrated service package. However, training in skills is often not enough for women, and successful training programmes for women entrepreneurs therefore also include confidence building, entrepreneurship development training, fostering the attitudes important to starting and managing one‘s own business.

4.8 Lack of confidence. Langowitz and Minniti (2007) quoted that another barrier that was apparent amongst women was a lack of self-confidence. This was related to a lack of business knowledge and low self-esteem (Peter et. al. 2005). Nowadays most of the women are suffering from one major problem of lack of self-confidence, determination, physically powerful outlook, hopefulness etc. They always panic from committing mistakes while doing their piece of work, more over there is limited initiative of taking risk and bearing uncertainty in them. Thus all these psychological factors often obstruct their path of achieving success in the area of enterprise (De Bruin, et al. 2007).

5.0 EFFORTS BEIN MADE TO EMPOWER WOMEN IN CONSTRUCTION IN SOUTH AFRICA.

South African Government has established its funding organisations providing financial assistance to the small business sector, these are the Industrial Development Corporation and the Umsobomvu Youth Fund (UYF) which was tasked with promoting entrepreneurship, job creation and skills development among young people (now absorbed into the newly established National Youth Development Fund). There are also sector-specific frameworks such as the mining industry's Social and Labour Plan (SLP) that compels mining and production companies to develop strategies and programmes that create economic opportunities for low skilled and under-employed communities in their operating areas (DTI, 2000). Gender also plays a role in business performance, insofar as it influences the self-perception of women entrepreneurs and their abilities to realise business growth given the desirability society attaches to business success (Bindra 2006).

5.1 Entrepreneurship for economic growth. Growth within existing companies, not just new small businesses, also generates job increases and contributes to a robust economy (Berlin *et al.*,2010). Setting up microenterprises, small and medium-sized enterprises in both formal and informal economic sectors is now being proposed as a way to achieve sustainable socioeconomic development and eliminate poverty (Jaiyeoba, 2010).

5.2 Women entrepreneurs in construction in general. Hisrich and Brush (2009) found that women entrepreneurs tend to be more motivated by the need for achievement. Wickham (2001) described an opportunity as a gap in a market where the potential exists to do something better, enhance effectiveness and create value. The South African construction industry has been described as the most untransformed industrial sector, because the industry is still dominated by white male management (kinyanjui, 2006). The construction industry defines a large sector of the economy. The size and markets of a construction firm may strongly influence the level of professionalism and working practices. Women are under-represented in management, particularly in the traditional project-based industries of construction and engineering. The experiences of women in both the traditional and non-traditional project environment offers an opportunity to investigate the importance and nature of gender relations and the "gendering" of organisations and project organisations (Green & Cohen, 1995).

5.3 Growth strategies for women in construction industries. Women's entrepreneurship development strategy document, it is intended to place a particular emphasis on women entrepreneurs whose businesses have growth potential as a more strategic way to create sustainable jobs and decent work. Enabling more women to pursue enterprise growth through a more favourable support environment generates employment, empowers women and brings social and economic benefits to women and to society at large.

6.0 RECOMMENDATIONS

1). Married women should be given support by spouse in respect of finances, motivational encouragement, advice and actual involvement in the running of business.

2). Access to credit facilities by women in construction at the level of small and medium enterprises, should be facilitated through innovative programs and financing arrangements that go beyond the conventional approaches; which require collateral and capital among other conditional ties.

3).The public sector and formal financial organizations should be sensitized on the value of gender-balanced participation in the informal sector enterprises. A major should be to promote the social and economic empowerment of women, as they constitute a vulnerable social category that is critical in sustainable development endeavours.

4).Micro finance institutions should portray a non-gender based environment in order to stimulate women entrepreneurs in South-Africa to do business with them.

5).The registration officers should be more friendly and available for service to all; particularly the city council officials should refrain from harassing women in business.

6). Women entrepreneurs in South-Africa should be taught on the value of being independent. This will stimulate them to do things on their own like acquiring property.

7). Strategies should be put in place with different instruments to address finance issues for women, like mentoring them, helping them prepare proposals for bank funding and even providing a guarantee for them.

8). Support Research and Development on SMEs and market information systems.

6.0 Further Research

Based on the findings, further research is recommended in this area especially on the accessibility of credit for women in construction in South Africa.

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ASSESSMENT OF OCCUPATIONAL HAZARDS IN THE DRESSMAKING INDUSTRY IN CAPE COAST METROPOLIS

Pardie, S. P. [1] and Akuffo, E. N.[2]

[1&2]Department of Fashion Design & Textile Studies, Cape Coast Polytechnic, Cape Coast, Ghana.

ABSTRACT

An in-depth study of the lifestyles of dressmakers in Cape Coast reveals that they retire on the job at a very early stage due to ill-health and the slightest opportunity of a new venture. The aim of the study is to investigate the presence of occupational hazards in the industry. The objectives are to identify the occupational hazards in the workshops, to assess the extent to which the dressmakers are aware of the occupational hazards involved in dressmaking and to determine the relationship between the variables of the occupational hazards in dressmaking in the Cape Coast Metropolis. The survey was conducted among one hundred and ninety-six (196 dressmakers) in the Cape Coast Municipality who were randomly selected. A questionnaire was used for data collection and the data was analyzed. The study concluded that the main occupational hazard in the workshops is uncomfortable working position and physical and electrical hazards, the dressmakers in the Cape Coast Metropolis are very aware of the occupational hazards in their profession and also the five variables used had positive relationship with each other. The study recommended that dressmakers take a critical look at the height of their tables in relation to their chairs or stools vis-à-vis their own height so that they will not have to bend all the time when cutting and sewing, use chairs with back rest and finally, turn off the pressing iron after use.

Keywords: *Occupational; Hazards; Dressmakers; Awareness; Height*

INTRODUCTION

Industrial development has been recognized as one of the surest means of ensuring higher and sustained growth rates. Hence, African countries including Ghana pursued import substitution industrialization in the 1960s and 1970s. Ghana's industrial strategy was meant to reduce economic dependence; hence, manufacturing industries were established to produce items that were previously imported. Consequently, industries making textiles, soap, wood works, aluminum, metal, to mention a few were established. For over two decades, the textile sub-sector dominated the manufacturing sector and contributed significantly to livelihood. It employed about 25,000 of the labour force, accounted for 27% of total manufacturing employment and operated at about 60% of plant capacity Turlings (2002). The textile sector has also been an important source of foreign exchange in Ghana. Ghana's textile industries are mainly concerned with the production of fabrics for use by the garment industry and also for the export market.

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

The development of fashion in Ghana is believed to have started during the colonial period with the introduction of wax prints and dresses by the colonial masters (Turlings, 2002). Today, Ghanaian Fashion has undergone a complete overhaul because of globalization. Even though fashion change is intrinsic, today's fashion is being shaped by globalization. Jarnow and Dickson (1997) assert that, globalization process is having tremendous impact on the fashion industry; the effect is that, where and how fashion is produced and marketed has changed. Jones (1998) describes globalization as a growing integration of the world's economy. To Walters (2002), social and cultural arrangements recede and people become increasingly aware that they are receding.

While developed countries like China, India and Hong Kong are earning valuable foreign exchange and building their wealth from exportation of Fashion products, Ghana's income generated from fashion production is very low. Attempts have been made by Ghana's consecutive governments of the fourth republic to develop and improve the industrial sector of the country. Fashion education has also been improved; it is now being studied at the tertiary level of Ghana's educational institutions, where graduates are expected to acquire quality demand-driven employable and marketable skills that will make them take their roles in the industrial sector, work and be economically productive (Amankwah, 2007). Despite this trend, the fashion businesses in Ghana are still dominated by ubiquitous roadside dressmakers whose market value is very low. Their main production is based on "custom-made" items. The main Ghanaian fashion export destinations comprising of European countries, United States of America (USA) and some parts of the Economic Community of West Africa State (ECOWAS) have declined due to competition with other African countries and poor finishing of products which make products not able to conform to standards required (Quartey, 2006).

Statement of the problem

The dressmaking profession is plagued with frequent injuries. The most obvious injuries are those caused by sharp tools, such as needles and cutting tools. In addition to puncture wounds, dressmakers are at risk of slicing wounds (from scissors and rotary cutters) and burns from pressing irons. This study seeks to fill the research void on the dressmaking industry in Ghana by examining the occupational hazards for dressmakers in the Cape Coast Metropolis which are exposed to and subsequently proffer precautionary measures to mitigate these occupational dangers involved in dressmaking.

Aim and Objectives

The aim of the study is to investigate the presence of occupational hazards in the dressmaking industry. The specific objectives are:

- To identify the various hazards which are prevailing in the Cape Coast Metropolis dressmaking industry.
- To assess the extent to which the dressmakers are aware of the occupational hazards involve in dressmaking. To determine the relationship between the variables of the occupational hazards in dressmaking in the Cape Coast Metropolis.

LITERATURE REVIEW

In Ghana, the dressmaking industry falls within the Micro Small and Medium Enterprises sector (MSMEs). This sector is recognized by various researchers as the engine of economic

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

growth in developing countries (Abor & Quartey, 2010) and (Aremu & Adeyemi, 2011). According to Muritala, Awolaja and Bako (2012), MSMEs utilized labour intensive technologies thereby reducing unemployment particularly in developing countries. Also, MSMEs have traditionally championed job creation, stimulating innovations and creating new products and services in developed countries.
Dressmakers generally alter and repair tailored or handmade clothing, they produce made-to-measure clothing such as suits, overcoats and dresses from textile fabrics, light leather, fur and other material according to customer's and clothing manufacturer's specifications. Dressmaking methods involve measurements, producing trial garments usually referred to "muslin or toile" and several fittings. Dressmakers are prone to some occupational hazards in the working environment during production.

Occupational hazards are dangers or risks inherent in employment or workplaces. They are working conditions that can lead to illness or death at the workplace.

Types of Occupational Hazards
The list of occupational hazards may vary depending on the occupation. However, workers may be exposed to five types of hazards, depending on the type of occupation. These hazards are; physical, chemical biological, mechanical and psychosocial hazards.

Physical hazard
Physical hazard is an environmental factor which threatens an individual's physical safety without the individual touching it. According to Casio (1996), the direct effects of heat are burns, heat exhaustion, heat stroke and heat cramps; the indirect effects are decreased efficiency, increased fatigue enhanced accident rates. Physical work under bad conditions is very stressful and impairs the health and efficiency of the workers. Also, workers may be exposed to the risk of poor illumination or excessive brightness. The acute effects of poor illumination are eye strain, headache, eye pain, congestion around the cornea and eye fatigue. Exposure to excessive brightness or "glare" is associated with discomfort, annoyance and visual fatigue. Intense direct glare may also result in blurring of vision and lead to accidents. There should be sufficient and suitable lighting, natural or artificial, wherever persons are working. Inhaling of fabric linters can also caused respiratory problems in the dressmaking industry.

Chemical hazards
In the view of Pike (2000), there is hardly any industry which does not make use of chemicals. The chemical hazards are on the increase with the introduction of newer and complex chemicals. Chemical agents act in three ways: local, inhalation and ingestion. The ill-effects produced depend on the duration of exposure, the quantum of exposure and individual susceptibility. Some chemicals cause dermatitis, eczema, ulcers and even cancer by primary irritant action; some cause dermatitis by an allergic action. Furthermore, dusts are finely released into the atmosphere during crushing, grinding, abrading, loading and unloading operations. Dusts are produced in a number of industries mines, foundry quarry, pottery, textile, wood or stone working industries. Dust particles larger than 10 microns settle down from the air rapidly, while the smaller ones remain suspended indefinitely. The particles that are smaller than 5 microns are directly inhaled into the lungs and are retained

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

there. This fraction of the dust is called "respiratory dust" and is mainly responsible for pneumoconiosis.

Biological Hazards

Workers may be exposed to infective and parasitic agents at the place of work. Pike (2000) asserted the occupational diseases in this category as brucellosis, leptospirosis, anthrax, hydatidosis, psittacosis, tetanus, fungal infection and a host of others. Persons working among animal products (e.g. hair, wool, hides) and agricultural workers are specially exposed to biological hazards.

Psychosocial Hazards

Casio (1996) indicated that the psychosocial hazards arise from the workers' failure to adapt to an alien psychosocial environment. Frustration, lack of job satisfaction, insecurity, poor human relationships, and emotional tension are some of the psychosocial factors which may undermine both physical and mental health of the workers. The capacity to adapt to different working environments is influenced by many factors such as education, cultural background, family life, social habits and what the worker expects from employment.

Occupational Health and Safety in Ghana

In the developed countries, particularly in America, there is the Occupation Health and Safety Act 1970, which is supplemented by the National Institute for Occupational Health and Safety (Schuler and Huber, 1993). However, in African countries health risks and safety programmes in business and work places are not often measured. It is therefore important to ensure employees are always free from any health and safety hazards because employees who work in a good working environment are more productive. Many international and no-governmental organizations often ask why majority of African countries are struggling to foster an effective occupational health and safety workplace. One perspective to the above concern is that majority of African countries have poor health and safety culture (Regional Committee for Africa Report, 2004). Occupational Health and Safety (OHS) remain neglected in developing countries in Africa because of competing national and sector issues and challenges (Nuwayhid, 2004). For instance, the Regional Committee for Africa Report (2004) stipulated that due to endemic poverty and poor performance of African economies, the African region is faced with a number of OHS challenges. According to this report, Africa's challenge is how to ensure that workers in both the informal sector have adequate health and safety education and are able to actively use this information to better their health and safety practices. Perhaps, ignorance might be the reason for the neglect of OHS practices and investment in African countries.

In Ghana, like many African countries, Ghana cannot boast of any comprehensive national OHS policy. This challenge was observed by Ghana Health Service (2007) which reported that, Ghana's challenge of mainstreaming OHS practices in tits national developmental agenda is certainly mitigated by lack of national OHS policy. The issue of policy framework is commonly regarded as African countries most difficult challenge in the sense that policies do not work. For example, Clark (2005) indicated that, majority of Ghana's legal provisions on OHS is limited in scope as vast majority industries, including agriculture and most of the informal sectors are not specifically covered. However, few statutes inform the implementation of occupational health and safety. These are the factories, offices and shops

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

Act 1970, Act 328 and the mining regulations 1970 LI 665 which have driven OHS implementation in the manufacturing, shipping and mining sectors. Other statues that have a bearing on OHS are the Workmen's Compensation Law 1987, Environmental Protection Agency Act 490, 1994, and the Ghana Health Service and Teaching Hospitals Act 526, 1999. But these few legal require huge modification to meet international requirements and standards.

Occupational Hazards in Dressmaking

Dressmaking is a fun and relaxing way to express your creativity. It is also an activity that involves a lot of sharp, pointy objects that can be dangerous if not handled with care. The machines commonly used in making dresses are the sewing machines. Sewing machines make quick work out of piles of mending, but many people take for granted that sewing machines are potentially harmful equipment. Each year, people accidentally harm themselves at home or work while sewing on a machine. The following are health related hazards in the dressmaking industries.

Dangers of sharp and pointy objects in dressmaking

The best fabric scissors and sewing shears are razor sharp. But the sharp the object is, the more dangerous it can be. It is much too easy to get into the habit of dropping scissors indiscriminately. But, do this often enough, and it is just a matter of time before a harm caused. Also, pins and needles end up on the floor or stuck in the most surprising places. When pins and needles and needles are picked with the bare feet, it can cause a 2-inch puncture wound.

An uncomfortable work position

Dressmaking may force people to hold their body in the same position for long periods. If so, pain and injury can result. Dressmaking entails repeated or forceful motions such as reaching, stitching, pinching and pulling. These are done hundreds of times a day and can cause small injuries to make muscles and joints. Dressmakers are likely to suffer Occupational Overuse Syndrome (OOS). Occupational Overuse Syndrome (OOS) is a type of injury common to fingers, hands, wrists and elbow. It is caused by repetitive movement or awkward postures. Symptoms include swelling, pain and weakness in the affected joints. Vulnerable tendons can be overworked and inflamed by repetitions manual tasks such as working on dressmaking, working on the keyboard or even playing musical instrument. Rest is usually the best cure. Sometimes poor workplace design or work practices contribute to OOS. Making minor changes can alleviate or prevent the condition.

Electrical problems

Dressmaking in recent time depends mostly on electricity to facilitate and make sewing easier. Technology advancement has enabled the development of dressmaking tools and equipment to be powered by electricity. The electrical addition to dressmaking exposes dressmaker to electricity-related problems particularly, electrical shocks. People are injured or even killed by electricity. The reasons are almost always carelessness, a faulty appliance or tool, or a lack of knowledge about how electricity works. Dressmaking equipment that are unplugged or have frayed cords are prone to electricity shock unsuspecting dressmakers.

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

Research Method

The descriptive research design was used for this study since prevailing conditions, practices, opinions and attitude were considered (Bryman & Bell, 2003). The study was carried out in the Cape Coast Metropolis, the capital town of Central Region. The Dressmakers Association in the Cape Coast Metropolis has 400 members. The sample size of 196 dressmakers was used for this study based on simple random sampling using the formula developed by Krejcie & Morgan, (1970). The data was obtained through survey design, specifically, self administered questionnaire was employed.

The occupational hazards in dressmaking measured on an awareness scale of 1 to 5 with I indicating strongly unaware while 5 indicates strongly aware. The Likert-scale was used to measure attitude of people by combing scores on variety of items into single index, Likert (1932). Scaling is achieved by ensuring that high-scoring and low-scoring individuals differ in the responses on each of the items selected for inclusion in the index, and the distance is assumed to be the same between categories.

Data collected from the survey design were analyzed quantitatively using both inferential statistics. The data collected were first edited to remove errors and the coded accordingly. The data obtained were analyzed using the Statistical Product and Service Solutions (SPSS 17.0). Regarding the extent to which the dressmakers are aware of the occupational hazards in dressmaking. The variables in occupational hazards in dressmaking had their mean put on scale 0-5. They were classified to be low and high awareness if the scale was 0-2.9 and 3-5 respectively as posited.

RESULTS AND DISCUSSION

The results were analyzed using frequencies, percentages, means and standard deviations. Descriptive statistics were used to measure the extent to which the dressmakers were aware to the occupational hazards in dressmaking. Regression analysis was used to determine the relationship between the variables of the occupational hazards in dressmaking in the Cape Coast Metropolis.

Determining the extent to which the dressmakers are aware of the Occupational Hazards

This section is to determine the extent to which the dressmakers are aware of the occupational hazards involve in dressmaking. The awareness level of each variable; physical hazards, dangers of sharp and pointy objects, uncomfortable work position, dangers of ironing and electrical problems were independently examined. A mean scale of 0-5 was used. With 0-2.9 indicating low awareness whiles 3-5 indicates high awareness.

Table 1: Physical Hazards Awareness

Forms of Physical Hazards	Frequency	%	Mean	Standard Deviation
Heat cause decreased efficiency	3.77	15.33	3.51	0.186
Poor illumination causes eye pain	3.68	14.96	3.47	0.171

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

Exposure to excessive brightness is associated with blurring vision	3.66	14.92	3.43	0.163
Heat cause increased fatigue	3.60	14.64	3.37	0.145
Poor illumination causes headache	3.47	14.11	3.29	0.114
Heat enhanced accident rate	3.29	13.37	3.21	0.071
Inhalation of fabric linters causes respiratory problems	3.12	12.67	3.12	0.000
Total	**24.59**	**100**	**23.4**	**0.850**

Source: Field data, 2014

The findings from Table 1 indicate that the dressmakers are highly aware of the physical hazards involved in dressmaking. This is so because the highest score was 15.33% with a mean of 3.51 and a standard deviation of 0.186 representing a high awareness level. Specifically, the awareness that heat causes decreased efficiency (15.33%) was the highest recognized physical hazard. Inhalation of fabric linters was the least physical hazard that the dressmakers were aware of. These results imply the dressmakers are fully aware of the physical hazards involved in their profession.

Dangers of sharp and pointy objects

This section looks at the extent to which dressmakers are aware of the dangers involved in using sharp and pointy objects in sewing.

Table 2: Dangers of Sharp and Pointy Objects Awareness

Forms of Sharp and Pointy Objects	Frequency	%	Mean	Standard Deviation
Scissors can be harmful	3.40	36.24	3.13	0.293
Needles can be harmful	3.28	34.97	2.99	0.278
Razor objects can be harmful	2.70	28.78	2.70	0.000
Total	**9.38**	**100**	**8.82**	**0.571**

Source: Field data, 2014

In Table 2, the results indicate the dressmakers are highly aware of the dangers in using sharp and pointy objects during sewing. The recorded percentage score was 36.24% with a mean of 3.13 and a standard deviation of 0.293 positing high awareness levels. The harmful effect of using scissors was widely recognized, followed by the dangers of sewing with needles. However, razor harmful effects recorded low awareness level. This outcome could mean that

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

the dressmakers do not frequently use razor in their sewing or had other alternative equipment.

An Uncomfortable Work Position

This discusses the extent to which the dressmakers are aware of the harmful effects of sitting in an uncomfortable work position during sewing.

Table 3: Uncomfortable Work Position Awareness

Effects of Uncomfortable Work Position	Frequency	%	Mean	Standard Deviation
If the edges of your chair, work table or table legs press into your body for long periods, it can damage nerves or soft body parts.	3.05	28.40	2.86	0.216
Sitting at the same position for hours can cause pain and injury	2.80	26.07	2.56	0.275
The repeated or forceful motions such as reaching, stitching, pinching and pulling can cause small injuries to muscles and joints	2.73	25.42	2.45	0.273
Dressmaking may force you to hold your body in the same position for long periods	2.16	20.11	2.16	0.000
Total	**10.74**	**100**	**10.03**	**0.764**

Source: Field data, 2014

The responses from the dressmakers revealed that they were not aware that sitting in an uncomfortable work position during sewing can be hazardous to their health. This is true because the overall percentage recorded a low aware of 20.11% with a mean of 2.16 and a standard deviation of 0.000. However, the dressmakers were highly aware of the adverse effect of pressing their body against hard edges of tables and chairs. Surprisingly, the dressmakers did not know that sitting down for long hours can cause body pains and also,

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

repeated motion can cause small to muscles and joints. The outcome of the findings is rather shocking because it is a basic knowledge that sitting in uncomfortable work position for long hour causes severe body pains. Dressmakers are commonly noted to sit for very long hours during sewing especially if deadlines are to be met.

Dangers of Ironing

This section discusses the dangers involved in ironing and the extent to which the dressmakers are aware of such dangers.

Table 4: Dangers of Ironing Awareness

Dangers of ironing	Frequency	%	Mean	Standard Deviation
It is easy to burn your fingers trying to hold open a seam whiles ironing	3.23	50.31	3.21	0.019
An iron accidentally left on is a hazard and dangerous	3.19	49.69	3.19	0.000
Total	**6.42**	**100**	**3.40**	**0.019**

Source: Field data, 2014

As depicted in Table 4, dressmakers are fully aware of the dangers of ironing. In fact, the overall table confirms this position with a high percentage of 50.31% i.e. a mean of 3.21 and a standard deviation of 0.019. Also, the dressmakers are highly aware of leaving an iron on after use and the possibility of burning your fingers trying to hold open a seam whilst ironing. The conclusion from these findings is the dressmakers are very careful when ironing because of inherent dangers involved.

Electrical Problems

This section discusses the extent of awareness level in the dangers associated with electrical problems in the dressmaking industry.

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

Table 5: Electrical Problems Awareness

Effects of Electrical Problems	Frequency	%	Mean	Standard Deviation
The electrical addition to dressmaking exposes dressmaker to electricity-related problem particularly, electrical shocks.	3.42	51.51	3.32	0.096
People are injured or killed by electricity due to carelessness, a faulty appliance or tool, or lack of knowledge about how electricity works	3.22	48.49	3.19	0.000
Total	**6.64**	**100**	**6.54**	**0.096**

Source: Field data, 2014

The findings from Table 5 indicate that the dressmakers are highly aware of the dangers of electrical problems involved in dressmaking. This is so because the percentage score was 51.51% with a mean of 3.32 and a standard deviation of 0.096 representing a high awareness level. The dressmakers were very aware of possible shocks that electrical problems can create and also they are fully aware electrical faults can result in people losing their lives. It could be dangers of not repairing electrical faults and per their responses will quickly solve electrical faults before preventable electrical havocs are caused.

Table 6: Occupational hazard in dressmaking

This concluding section discusses the extent to which the dressmakers are aware of the various Occupational Hazards involved in their profession. The percentage of the variables of occupational hazards was combined to achieve this purpose.

Variables	Frequency	%	Mean	Standard Deviation
Electrical problems	3.32	21.53	3.22	0.120
Dangers of ironing	3.21	20.82	3.14	0.122
Dangers of sharp and pointy objects	3.13	20.30	2.96	0.187
Physical hazards	3.07	19.91	2.88	0.182
Uncomfortable work position	2.69	17.44	2.69	0.000
Total	**15.42**	**100**	**14.89**	**0.611**

Source: Field data, 2014

Table 6 shows the occupational hazard that the majority of dressmakers were aware was electrical problems **(21.53%)**with a mean of 3.22 followed by dangers of ironing **(20.82%)** witha mean of 3.14 and dangers of sharp and pointy objects **(20.30%)**with a mean of 2.96**.** Physical hazards recorded **(19.91%)** with mean of 2.88 whilst, uncomfortable work position was least recognized hazard **(17.44%)** with a mean of 2.69**.**

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

The conclusion drawn from these results is that the dressmakers in the Cape Coast Metropolis are highly aware of the dangers involved in their profession. Particularly, these dressmakers are fully aware of the dangers posed by electrical faults. This could be due to the fact that most of the modern sewing equipment are powered by electricity and ignorance of the inherent dangers could be very disastrous.

Determining the relationship between the variables of occupational hazards

The Pearson moment correlation co-efficient and corresponding p-value to examine the intensity of the relationship among the dimensions was used to determine the relationship between the variables of the occupational hazards in dressmaking in the Cape Coast Metropolis.

Table 7: The Relationship among the variables of occupation hazards in dressmaking

Dimensions	Correlation co-efficient(r)	p-value
Physical hazard & Dangers of sharp and pointy objects	.652	.000
Physical hazard & Uncomfortable work position	.723	.000
Physical hazard & Dangers of ironing	.748	.000
Physical hazard & Dangers of electrical problems	.677	.000
Dangers of sharp and pointy objects & work position	.916	.000
Dangers of sharp and pointy objects & Dangers of ironing	.832	.000
Dangers of sharp and pointy objects & Electrical problems	.762	.000
Uncomfortable work position & Dangers of ironing	.975	.000
Uncomfortable work position & Electrical problems	.950	.000
Dangers of ironing & Electrical problems	.987	.000

Source: Field data, 2014 **p<0.05 *p<0.05

From Table 7, the results show how each one of the five variables of occupational hazard had a positive and significant relationship with each other **(p<0.01 & p<0.05).** The relationship was significantly positive dangers of ironing and electrical problem **(r=.987** & p=.000)** whiles, the least significant positive relationship was recorded between physical hazard and, dangers of sharp and pointy objects **(r=.652 & p=.000)**

This outcome implies that the adverse effect of each occupational hazard influences the other variables and as such each of the occupational hazard variables are significantly important to the well-being of the profession. The dressmakers in the Cape Coast Metropolis must as a

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

matter of occupational management principle avoid or mitigate these occupational hazards involved in their profession.

CONCLUSION

The dressmakers in the Cape Coast Metropolis demonstrated a high awareness of level of occupational hazards in dressmaking with dangers in electrical problems recording the highest whilst; uncomfortable work position was the least recognized hazard. Additionally, the five variables of occupational hazard had a positive and significantly positive between dangers of ironing and electrical problem. The least significant positive relationship was recorded between physical hazard and, dangers of sharp and pointy objects. In a nut-shell, the dressmakers in the Cape Coast Metropolis are very aware of the occupational hazards in their profession and also the five variables used had positive relationship with each other. This implies the five variables can influence the occurrence of the other.

RECOMMENDATIONS

Based on the findings and conclusions, the following recommendations are made:

- It is easy for the dressmakers to lose track of pins and needles. For that reasons, it is safer to wear shoes in the sewing rooms. Also the dressmakers must keep magnet in their sewing kit to attract the elusive pins and needles.
- The dressmakers must keep a shallow box on the right side of the sewing machines for pair of scissors, rotary cutters, marking pens, pins and needles. It helps to reduce the chances of these items getting brushed onto the floor.
- The dressmakers must turn off iron after use. It easy to burn fingers trying to hold or open a seam while ironing. A silicone oven mitt is a useful protector. Cool fingers can also be worn by slipping it over the fingers to protect it from heat.
- The dressmaker must sit all the way back in the chair with the back against the chair back. Do not sit on the edge of the seat. Sitting improperly can cause myriad health problems ranging from poor blood circulation to upper back, neck, shoulder and hand pain.
- The height of the cutting table is as important as the sewing surface because of the many hours spent during cutting and markingof fabrics prior to sewing. Bending over a cutting table, may cause the risk of straining and injuring the lower back. It is therefore advisable to go in for perfect height of tables that will best give suitable position. The dressmaker must be able to stand with elbows bent at right angles, the drop hands very slightly so the arms are in comfortable position.

[1]sophty2006@yahoo.com
[2]sharplooks2@gmail.com

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[1]sophty2006@yahoo.com

[2]sharplooks2@gmail.com

PHYSICO-CHEMICAL AND BACTERIAL ANALYSES OF HAND DUG WELL WATER AND RIVERS IN AROGBO AREA OF ONDO STATE, NIGERIA

Kenni A, M[1].; Falemu F. A[2].; Adaramodu A.**A.[3] and Owoeye P. E.O [4].**

[1&3]Department of Chemistry, Ekiti State College of Education, Ikere Ekiti, Ekiti State, Nigeria
[3&4]Department of Biology, Ekiti State College of Education, Ikere Ekiti, Ekiti State, Nigeria

ABSTRACT

Water samples from selected hand dug wells and rivers in Arogbo in Ese Odo local Government of Ondo State were collected, physic – chemical and bacterial analyses were done using standard analytical procedures. The results of the physico – chemical analyses were obtained in the following range: PH (6.74 – 7.30) in hand dug wells while that of rivers ranged from (7.13 – 8.25), temperature (23 – 26^0C) in hand dug wells and (25 – 28^0C) in rivers, chloride (8.20 – 135.00 mg/l) in hand dug wells and (152.0 – 182.00 mg/l) in rivers, sulphate (58.10 – 74.30 mg/l) in hand dug wells and (72.10 – 94.00mg/l) in rivers, total hardness(128 – 160 mg/l) in hand dug wells and (128 – 283 mg/l) in wells and (128 – 283 mg/l) in rivers, alkanility (0.90 – 1.65mg/l) in hand dug wells and (1.68 – 2.52mg/l) in rivers, conductivity (510 – 920μΩ) in hand dug wells and (930 – 1440μΩ) in rivers and total dissolved solid (0.02 – 0.04 %) and (0.02 – 0.08) respectively. The results indicate that rivers water have the highest physic – chemical values. In addition, all samples examined contain bacterial and coliform which renders the water sampled unsafe if consumed raw. Total bacteria count ranged from (22 – 111) in hand dug wells and (52 – 383) in river samples while that of total coliform count range between (20 – 28) and (34 – 116) in hand dug wells and rivers respectively. The bacteria and coliform present in the samples can be removed by boiling and chlorination before consumption. It is hereby recommended that the inhabitants of the study area should be educated about the hazard effects of contaminating rivers through dumping of waste, faecal, washing in rivers among others and provision of bore holes of good quality and adequate quantity by the government.

Keywords: *Arogbo; River; Physic; Chemical; Bacterial; Coliform*

INTRODUCTION

A well refers to man – made hole that is dug or drilled deep enough to intersect the water table. However, if the well is dug beneath the water table, water will fill the open space to the level of the water table and can be drawn out by a bucket or by pumping (Odeyemi, Akinjogunla and Ojo, 2011). Ground water derives its origin from rain or snowmelt infiltrates

kenniamoke68@yahoo.com

through soils into subsurface aquifers is apparently purer than surface water because of the natural purification process which it undergoes while percolating through piles of soils (Aturamu, 2012).

Ground water is usually assumed to be a very good source of potable water due to purification property of soil (Odeyemi et al., 2011). The two main criteria on which drinking water standards were based are the presence of objectionable tastes, odor and color and the presence of substances with adverse physiological effects (Aturamu, 2012), Ground water may be subjected to pollution and may not be as safe as is generally assumed (Odeyemi et al, 2011). Natural water contains some types of impurities whose nature and amount vary with source of water (Adefemi and Awokunmi, 2010).

Human activities such as increased use of metal-based fertilizer in agriculture, production and disposal of industrial wastes, discharge of sewage, progressing urbanization and faecal pollution alter and contaminate the natural pure state of ground water (Aturamu, 2012; Odeyemi et al., 2011, Adeyemi and Awokunmi, 2010). Contaminated ground water could be a source of water borne diseases. Water-related diseases include those due to micro-organisms and chemicals in water people drink; diseases like cholera, dysentery, schistosomiasis which have their life cycle in water diseases like malaria with water –related vectors, drowning and some injuries including legionellosis carried by aerosols containing certain microorganisms (Aturamu, 2012).

In addition, some of these microorganisms are pathogenic bacteria which is detrimental to underground water through the soil and thus may become the source of various diseases. Bacteria such as pseudomonas or aeromonas may constitute a threat to human health due to their ability to multiply in drinking water (Odeyemi et al., 2011).

Problem Statement

World Health Organization (WHO) 2008 revealed that over 385000 children die annually of various diseases due to drinking contaminated water. Isolated cases of cholera outbreak are reported periodically in the national dailies in Nigeria. Contaminated water is dangerous to health and has led to the death of millions of people in cities and villages. Studies have been carried out on water quality assessment , heavy water pollution on water sources, physico-chemical parameters and heavy metals in water samples in Itaogbolu (Ondo State), Ado and Ikere in Ekiti State (Odeyemi et.al., 2011, Adefemi and Awokunmi, 2010) and study on biomagnifications factors of some heavy and essential metals in sediments, fish and crayfish from Ondo State coastal region have been documented (Asaolu and Olaofe, 2004). There is rare evidence that the groundwater wells in Arogbo township and it's environ have been assessed scientifically. This study therefore investigate physico-chemical and bacteria analyses of hand dug wells and rivers in Arogbo township to determine the portability of the water. The results of the analyses would be compared with the World Health Organization Standards for potable water.

Arogbo town is located within Ese Odo local Government area of Ondo State, South Western Nigeria.

kenniamoke68@yahoo.com

MATERIALS AND METHODS

Sampling and Sample Analyses

Ten water samples (five wells and five rivers) were taken from different locations in Arogbo township. The wells are selected from five out of nine major quarters in the town (Agobiri, Erubiri, Egbesubiri, Opuerubiri, Kapabiri, Tubugbini,Perebiri,Epuidumu, and Ofoniege) while the rivers are located in their farm settlements. Water samples were collected same day and stored in sterilized polythene bottles and were preserved by the addition of few drops of concentrated HNO_3 to prevent loss of metals, bacteria and fungal growth. Temperature and PH of water samples were also measured at the time of collection and labeled using a simple thermometer calibrated in ^0C and PH metre respectively. Electrical conductivity measured with a CDM 83 conductivity metre. While alkanility, chloride, sulphate and total hardness concentrations in the samples were determined using a Buck Scientific model 200/AB. Atomic Absorption Spectrophotometer (AAS). Total dissolved solids were determined by evaporation. Also, total bacteria count and coliform colonies were determined using culturing in incubators at 37^0C for 24 hours.

Statistical analysis

Data generated were analyzed statistically by calculating standard deviation, mean and coefficient of variation. The method was adopted from Adefemi and Awokunmi (2010).

RESULTS AND DISCUSSION

Physicio- Chemical Analyses

The results of physico-chemical parameters of the water samples from both hand dug well and rivers was shown in table 1 ranged as follow: PH (6.74 – 7.20 and 7.13 – 8.25). These results were similar to the results of Adefemi and Awokunmi, (2010) and also in conformity with WHO's maximum standards 2008. The hand dug wells which are deep have relatively uniform temperature ranged from 23 – 26^0c while the river samples had higher temperature ranged from 25 – 28^0c. This could be due to increase in the rate of chemical reaction and nature of biological activities since temperature is one of the factors governing the assimilative capacity of the aquatic system Forstner and Withiman, (1979). However, the temperature is in line with the maximum allowable standard by WHO for drinking water. Likewise, the values of chloride, sulphate, total hardness, alkalinity, conductivity and total dissolved solid are: 84.20 – 140.35 mg/l and 152.20 – 182.00 mg/l, 58.10 - 74.30 mg/l and 72.10 – 9400 mg/l, 128 – 160mg/l and 128 -283 mg/l, 0.90 – 165mg/l and 1.68 – 2.52 mg/l, 510 – 920μΩ and 930 -1440μΩ and 0.02 – 0.04 % and 0.02 0.08 % for both hand dug wells and river water respectively.

A cursory look at the results revealed the values of these physico-chemical parameters are higher in rivers in Arogbo and it's environ than those obtained from wells. The concentration of waste in different levels of a natural aquatic habitat is reflected by the degree of hardness, alkanility, dissolved oxygen and other physico – chemical parameters Adefemi and Awofemi, (2010). The major occupation of Arogbo people is fishing, the higher values of all these physico – chemical parameters are higher in Rivers than wells, this could be as a result of oil spillage, waste, dump, chemicals used in fishing and domestic activities in the River

kenniamoke68@yahoo.com

Table1: The physico – chemical parameters of water samples from Hand dug Wells and Rivers in Arogbo

Sample	PH Location	Temperature ^{0}C	Chloride Mg/I	Sulphate Mg/I	Total Hardness Mg/I	Alkalinity Mg/I	Conductivity μΩ	TDS %	
HDW1	7.30	24	108.40	64.20	130	1.60	761	0.02	
HDW2	6.88	26	89.40	58.10	128	1.40	510	0.04	
HDW3	7.20	23	140.25	74.30	140	1.58	870	0.03	
HDW4	6.97	26	84.20	69.30	160	1.65	920	0.04	
HDW5	6.74	23	135	70.00	145	0.90	840	0.02	
$\bar{X}$	7.02	24.4	111.45	67.18	140.6	1.43	780.2	0.03	
SD	0.23	1.52	25.60	6.21	12.92	0.31	161.68	0.01	
CV	3.28%	6.23	22.97	9.24	9.19	21.60	20.72	33.33%	
AR1	7.42	25	164.10	80.00	196	1.68	930	0.04	
AR2	7.62	25.4	152.20	78.20	154	1.82	1000	0.05	

kenniamoke68@yahoo.com

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AR3	8.25	26.8	172.00	82.10	182	1.95	1260	0.06	
AR4	7.13	28	160.30	72.10	128	1.60	960	0.02	
AR5	7.60	26	182.00	94.00	283	2.52	1440	0.08	
$\bar{X}$	7.60	25.04	166.12	81.28	188.6	1.91	1118	0.05	
SD	0.41	1.19	11.4	8.03	58.91	0.36	222.53	0.02	
CV	5.54	4.77	6.86	9.88	31.23	19.07	19.90	44.72	

Key: HDW Hand dug well
TDS- Total Dissolved solid
Mg/I – Milligram Per Litre
AR – Arogbo Rivers

kenniamoke68@yahoo.com

Bacteriological Analyses

Table 2 shows the average data of the bacteria counts for each well samples after analyses. Total bacteria counts ranges from 34 – 20 and while the count for total coliform counts vary from 20 – 30 . On the other hand , the total bacteria count in Rivers ranges from 52 -383 while that of total coliform counts ranged from 34 -116 respectively .The result of the bacteriochemical analysis revealed lower bacterial counts in the hand dug well samples while water samples from rivers have higher bacterial counts. This could be due to unhygienic and poor sanitary condition ranging from defeacating, urinating, washing cloths and dishes, swimming, dumping refuges in the river. The data obtained are in agreement with studies of Odeyemi et al. (2011), and Akinyanju (1987). The results obtained from the study also revealed that microbiological organisms that can be injurious to human health if drinked or used domestically without scientific purication are present. According to Geldreich, (1981) water derived from deep wells are generally of good bacteriological quality.

kenniamoke68@yahoo.com

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Table 2: Microbiological Data for Hand dug well and Rivers in Arogbo

Sample	Bacterial Count	Total Coliform Count
HDW1	47	20
HDW2	52	28
HDW3	89	24
HDW4	111	30
HDW5	22	20
$\overline{X}$	64.2	24.4
SD	35.46	4.56
CV	55.24	18.69
AR1	52	79
AR2	94	34
AR3	164	92

AR4	256	116
AR5	383	88
$\overline{X}$	189.8	81.8
SD	132.80	30.10
CV	69.97	36.70

CONCLUSION

The results of the physico – chemical and bacterial analyses conducted on hand dug wells and rivers in Arogbo township and its environ revealed that it is safe for human consumption. However, the river water contains high values of bacteria than well water which render it unsafe to be drunk raw. The study suggests a possible link between activities or behavioral patterns of rural resident and high content of bacteria in river water. It is important to educate the inhabitant about the contamination of river water from domestic waste and other municipal waste that can lead to adverse health implication. In the light of the findings of this study, it is hereby recommended that good bore holes both in quantity and quality should be provided for the inhabitants of the study area.

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kenniamoke68@yahoo.com

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SUSTAINABILITY OF BAMBOO AS A BUILDING MATERIAL FOR THE CONSTRUCTION INDUSTRIES OF GHANA

Akwada,D.R.[1], and Atepor, L.[2]

[1&2]Department of Mechanical Engineering, Cape Coast Polytechnic, Ghana

ABSTRACT

Bamboo as a natural plant has long been used as a traditional building material and is achieving increasing popularity in recent years due to its potential for environmental sustainability. As a construction material, bamboo has similar properties as that of timber and often uses related techniques of structural framing, though the suitability of bamboo for construction is largely dependent on the species. The use of bamboo in the construction industries in recent times has attracted increasing interest for its promising applications in sustainable green environment building purposes. Its superior mechanical properties arising from the unique functionally-graded structures have also made it an excellent substitute for infrastructure development in Ghana. In spite of its impressive mechanical characteristics, its sustainability has not been critically assessed. This work seeks to examine the sustainability of bamboo species in Ghana for the construction industry**.** This work outlines the potentials for bamboo and its products sustainability, its application as a raw material for the construction industry. This work seeks to examine the major constraints facing the bamboo sector in Ghana as well as adaptation of an efficient technique in the growing of bamboo, growing of hybrid species, appropriate management practice, harvesting techniques, processing and preservation techniques analysed for its effective development and sustenance in construction industry as a raw material. The application of appropriate techniques, well management skills and with the required treatment processes through its life cycle, can be a major supply of wood and its produce to the construction industries of Ghana.This work gives insights to bamboo growers, entrepreneurs, researchers, scientist and industrialists that use bamboo as raw materials especially building engineers in their construction works.The adoption of a suitable technology from it's planting to its final usage will ensure its sustainability in the construction industry, since it is promising, renewable and eco-friendly material.

Keyword: Bamboo, Constraints, Hybrid, Preservation, Sustainability.

rich.akwada@gmail.com
ccprector@gmail.com

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INTRODUCTION

1.1 Sustainability of bamboo and its products

Sustainability of bamboo and its products for industrial applications in designs and architecture works, construction of buildings, bridges, tricycles, bicycle, etc. is very needful as there is a rising awareness of it's sustainable development internationally (Schau *et al.,* 2012; 2008; Swarr *et al.,* 2011 and Benoît *et al.,* 2009).Sustainability has become an ultimate goal for worldwide industries to pursue in recent years (Finkbeiner *et al.* 2010 and Klöpffer *et al.* 2009). It is in view of this that there is the need for sustainable development of the bamboo and its products in the country(Schau *et al.,* 2012).In recent years, the consumption patterns/demand for bamboo as a raw material and its products has been on the increase due to technological advancement to its treatment(Schau *et al.*, 2012).

Bamboo is a fast growing sustainable plant and a renewable material, the demand for its raw products for food, medicine, textiles, weapon, other tools, building and other industrial produce is more demanding than what currently is being cultivated globally of which Ghana is no exception. The sustainability of bamboo and its products is an important subject which needs to be critically looked at. Sustainability includes not only the environmental pillar but also the economic and social pillars. Bamboo sustainability is very important as we look at its life cycle stages. It is as a versatile plant with a short growth cycle that can be harvested in 3 to 5 years, as opposed to 10 to 50 years for most soft and hard woods.

It grows in almost any climate, and it can replace itself very quickly. Bamboo has been used for thousands of years, and has not suffered from deforestation, however, the introduction of modern and advance methods in the application to needs to be critically looked at in order to sustain its growth and dependability in future(Schau *et al.,* 2012;Yu *et al.,* 2011; Van der Lugt *et al*.,2009 and Benoît *et al.,* 2009). Bamboo provides safer environmental conditions and sustainable options than other modern industrial materials like corrugated metal, artificial plastics, and chemically treated wood and bricks (Van der Lugt *et al*., 2009).

1.2. The Prospective of Bamboo for Construction

1.2.1. Bamboo: Economic and Sustainable Alternative?

Bamboo is abundantly found in diverse climates, from cold mountains to hot tropical regions and primarily grows on sandy topsoil to loamy mud soils. They can be found mostly across Asia, Africa, America (Gratani *et al.* 2008*).* It belongs to the Gramineae/Procea family, and therefore it is not classified as a tree, but as a grass according to (Arce 1993). According to Ahmad *et al.* (2005) bamboo is an anisotropic material with mechanical properties in the three (3) principal directions that vary in the longitudinal, radial and transverse directions. Bamboo is considered to be a sustainable material due to its environmental properties. However, until recently, this had never quantitatively been proven. In contrast, the number of building materials assessed by environmental Life Cycle Analysis (LCA) based methods is increasing fast. Therefore, the first research objective of this study presented (van den Dobbelsteen 2002) was to gain more insight in the environmental performance of bamboo

rich.akwada@gmail.com
ccprector@gmail.com

(products) compared to the conventional building materials more commonly used in Ghana. In the study presented, an LCA based assessment was conducted for bamboo from its planting stage through harvesting and processing till its disposal stage in the life cycle. The bamboo plant absorbs a large amount of CO_2 out of the atmosphere by providing oxygen in return (Van den Dobbelsten 2002 and Vogtländer *et al.*, 2014). Bamboo cultivation has not been given attention in Ghana as compare to countries in Asia. Ghana depends largely on its forest for the supply of bamboo culm with less than 0.15 percent from farmlands for constructional applications.

In Ghana, bamboo usage has been limited to the poor in the farming communities and for this reason, there is little knowledge about its economic viability as a building material. Therefore, the second research objective of the study as presented, was to gain more insight into building and maintenance costs of the previously described bamboo applications, again compared to more common building materials, such as steel, timber and concrete (Van den Dobbelsten 2002).

1.2.2. Application of Bamboo in Ghana

In Ghana, bamboo buildings are mostly associated with the poor and mostly used in the villages as the main structural elements in the buildings. It requires minimal processing before its use, and it leaves no environmental footprint afterward as it is affordability and ease of access (Yu *et al.*, 2011 and Van der Lugt *et al*. 2009). Bamboo is a multi-functional material which is used in production of varieties of products ranging from household to industrial uses (Janssen, 2000).According to Janssen (2000); Naxium (2001); Waite (2009) and Wooldridge (2012), bamboo can be used to construct houses, bridges, furniture, scaffolds, flooring as electrical insulators in manufacturing automobile parts, as laminated ply bamboo and as reinforcement in matrix composites. The influence of working with bamboo needed to be analysed. Therefore, the third objective of the study presented was to gain more insight into critical factors of failure and success of the application of bamboo in the Ghanaian building industry, and to find ways of preventing the negative consequences of their usage.

2. METHOD AND MATERIAL

2.1. Selection of Bamboo Species.

The main focus of this study is to use the Life Cycle Assessment (LCA) as a tool to evaluate the sustainability of bamboo as a raw material for construction from its nursing, planting stage through harvesting, processing, and preservation as well to its final disposal in the Ghanaian construction industry. This study was carried on 3 years Bambusa Vulgaris species, planted in Abrafo, harvested, processed and used for a building project in the central region. The assessment of the bamboo and its industrial product application (i.e., a wall panel) and its comparison with more common alternatives were studied.

rich.akwada@gmail.com
ccprector@gmail.com

2.2 Planting bamboo in the plantation/farmland

Before planting bamboos in the plantation, the land was first cleared and all weeds burn and seedling which were nursed were transfer to the farmland. There are numerous factors that needed to be taken into consideration before transporting the seedlings from the nursery bed to the farm for planting. In order to have a very high productive plantation, the following factors were taken into considered:

i. Selecting the plantation site, by checking the soil quality. Bamboo grows very well on most soil, but deep porous fertile soil with high moisture content and a pH of 5.5 is preferable.

ii. Good soil drainage is very important for bamboo growth and habitat. Before planting the seedlings, the land or soil was tested to know if is not prone to flooding. Bamboo does not perform well in waterlogged soils. It is, therefore, preferable for a plantation to be situated on moderate slopes.

iii. The farmland was cleared of all weeds and other plants on the vegetation.

iv. A well-planned layout with suitable distances was left in between the seedlings to provide an optimal distribution of sunlight to the plants and also to give a high yield of culms.

v. The plantation was carried during the raining season and manure was applied to the soil for strong and thick culms.

vi. The seedlings are planted vertically in an erect position and the hole covered well and mulching is also done.



Figure 1: Sections of matured Bamboo in the plantation at Abrafo- Ghana (Author's Field Work: March, 2015)

2.3 Replanting of dead plants

The newly transplanted nursery seedlings that did not survive in their new environment were replaced immediately and constant watering was essential for their survival. Hence, it is very important to keep closed eyes on the survival of the plants.

rich.akwada@gmail.com
ccprector@gmail.com

2.3.1 Maintenance of plantation

The maintenance culture of the plantation was taken into very serious consideration. This was done during the first two (2) years after planting in order to protect the young plants from competing with the vegetation, pests and rodents. After the first two (2) years, maintenance activities are mainly concentrated on clumps maintenance.

2.3.2 Maintenance of soil

The need to improve the soil aeration around the plants was very important and it helped to loosen the soil during the first year. Hence, this practice was done for about a year for each plant to enhance their growth. In the process of loosening the soil around the plant, care was taken not to disturb the rhizome system of the bamboo plant.

2.3.3 Weeding

In order to check competition of weeds with the bamboo plantation, weedicides were sprayed to kill all potential weeds that could hamper their growth. This is to say weeds compete with bamboo plants in terms of nutrients, sunlight and water. They have rhizomes which sprout again if not removed. It is very important to control and arrest the growth of weeds around each bamboo clump. When this is not done, then invariably it will result in poor root and stem development in the young bamboos plant. Weeds were removed thoroughly, systematically and regularly. Each bamboo plant was clear of weeds and vegetation for about a radius of 0.6 m around. Weeds were removed when soil is moist and also properly disposed by burning.

2.3.4 Harvesting and handling

An effective management involves systematic, but a selective cutting of mature culms assures continuous production of young shoots, which is an index of annual yield or increment. The implementation of plantation management strategies can help sustain the regenerative characteristics of bamboo and thereby provide an enduring supply of raw material for industries.

The bamboo plantation will be managed effectively if the exploitation is regulated on a sustainable yield basis. The cutting off of the mature culms also helps in maintaining the vitality of the plant and allows for the continuous generation of new shoots. In other words, the clump should never be over-harvested or clear cut. New culms, as well as 1 to 2 years old culms, should not be harvested. A few 3 years old culms should also be left standing so that the clump remains robust so that harvesting can be performed annually. By applying this method, culms are left standing on the clump until they mature, after which, they may be harvested. As the mature culm ages, it deteriorates and eventually dies and rots. However, the life of the bamboo clump can be sustained when the rhizome system which annually generates new shoots grow into culms.

The cutting cycles and methods of extraction of culms from a clump should be implemented as an integral part of the management system of the entire bamboo plantation as well as

rich.akwada@gmail.com
ccprector@gmail.com

natural stands. Achieving sustainability in terms of culm production will, therefore, depend on how effectively culms are selected for harvesting, and on how the extraction from the clump is carried out.

Harvesting is a labour intensive operation and it is necessary to make good arrangements with plantation workers so that harvesting operations are meticulously.

The following basic rules apply to harvesting of bamboo culms.

i. Harvesting of mature culms may begin from 5 to 6 years after planting the first time.
ii. Harvesting of mature bamboo culms is more appropriate during the dry season. This is so because the starch content of bamboo is lower during the dry season. Lower starch content in the culms will make them less susceptible to attack by borers.
iii. Harvesting should be selective: only mature culms which are 3 to 4 years old should be harvested.
iv. In a clump, new culms are normally produced outwards - towards the periphery of the clump, and the older culms stand towards the centre. Harvesting of culms, therefore, should be from the centre and not at the periphery of the clump. This makes it necessary to maintain clumps in the shape of a horseshoe, keeping the apex towards the side where the new culms are emerging. The open end of the horseshoe facilitates entry inside the clump for extracting mature culms.
v. Plan the cutting operation to avoid harming young culms. New culms that attain an average height within the first few months are soft and may collapse unless supported by mature erect culms. A few older culms should be left in the clump after cutting, seeing to it however that congestion is under control.
vi. Use very sharp tools. It is highly advisable to disinfect harvesting tools using bleach. This lowers the risk of infecting the plants.
vii. Do not cut young culms unless the congestion in the clump prevents the cutting of mature culms.
viii. Cut each culm between 0.15 m to 0.3 m from the ground or just above the first node from the ground level. This is necessary so that water does not accumulate in the protruding internode. The accumulation of water may result in rotting and invites insects to lay their eggs.
ix. Never clear-cut an entire clump unless it has been verified to be seriously infected by a disease.
x. Never harvest culms during the rainy season.
xi. Mulch each clump after harvesting using branches and leaves of harvested culms. These should be neatly piled around the clump to provide organic material to enrich the soil around the clump.

If the plantation is situated near a river, the culms may be allowed to soak in water for a few weeks to aid in the removal of starch and protect them from beetle attack. Otherwise, they should be hauled to an area where they are sorted and air-dried. Good practices to enable drying will help minimize losses due to bio-degradation of the culms. The large bamboo

rich.akwada@gmail.com
ccprector@gmail.com

culms should be stacked horizontally on parapets where there is good air circulation whilst smaller bamboo culms may be piled horizontally at a 60° angle to form a "tepee shape" allowing air to circulate around them to aid the drying process.

2.3.5 Post-harvesting treatment

Bamboo culms are vulnerable to decay and attack by fungi or insects, especially powder post beetles. Such attacks reduce the natural durability of bamboo and diminish its value and utility. Post-harvest treatments can help to reduce the risk of decay and attack by pests and thereby increase the useful life and value of bamboo culms. Depending on the end use of the bamboo culm, several methods of preservation may be applied to the bamboo culms prior to their sale or industrial utilization and is discussed below.

2.3.5 Treatment of Bamboo

Bamboo culms were harvested and air-dried to a moisture content of about 8-12%. The bamboo was first soak into a flowing stream of water to help reduce the sugar content in the stem/culm. They were air-dried for one month under a well ventilated temperature. After attaining the required moisture of 8-12%. They were then soak into a mixture of Gasoline and Dursband solution which gets soaked by the bamboo culm. They are well dry again to help preserves the culm which is the industrial partfor construction from fungi and insects attack.

2.4. Environmental Assessment of Bamboo

2.4.1. The Environmental Impact on the Sustainability of Bamboo

The environmental impact of a product depends on all the life cycle stages of the product. Intuitively one expects that the environmental impact of a material has the most influence on the production phase of a product caused by raw material provision and production effects from the factory. However, the choice for a specific material in a product also has a strong and direct impact on other aspects of the product in other stages of the life cycle, such as the processing stage (e.g. energy impact and efficiency of production technology), use phase (e.g. durability during life span) and the end-of-life phase (e.g. possibility of recycling, biodegradation, or generation of electricity at the end of the life span). This shows that materials are intrinsically linked to every stage of the life cycle of a product. If we look at the three main environmental problems, the important role of materials on the environment also becomes evident:

2.4.2. Bamboo: Life Cycle Analysis (LCA)

Life cycle analysis, or life cycle assessment (LCA), is the commonly acknowledged basis for environmental assessment of products. Principally, in an LCA, all environmental effects occurring during the life cycle of bamboo and its product are analysed, from cultivation through the extraction of resources until the end phase of recycling. The standard LCA includes environmental effects that can be quantified. Some effects (e.g.,deterioration of eco-

rich.akwada@gmail.com
ccprector@gmail.com

systems) are ignored until a generally accepted assessment method has been developed.The study finding by using the LCA test analysis on the bamboo from cultivation to the end of its disposal systematically shows that the environmental impact of bamboo products is sustainable and it improves the atmospheric conditions of our societies. Principally, in an LCA, all environmental effects relating to the three main environmental problems occurring during the life cycle of its product are analyzed, from the extraction of resources until the end phase of demolition or recycling. The LCA-methodology used was conducted in accordance to the internationally standardized in the ISO 14040 series. The three main environmental problems are:

Depletion of Resources: The use of materials contributes to the depletion of resources. It becomes clear that resource depletion is becoming an urgent problem for society. The raw material consumption of industrialized per capita is high according to (Dorsthorst and Kowalczyk 2000)

Ecosystem Deterioration: The next to resource depletion is the high raw material requirements of industrialized countries also impact ecosystems, since these raw materials need to be extracted (e.g. landscape deterioration, erosion), processed and transported (e.g. emissions of greenhouse gases causing climate change), and ultimately disposed of as waste (e.g. toxification, acidification). Depending on the material in question the influence of the extraction and manufacturing of materials on ecosystem deterioration will differ. For example, heavy metals may have a stronger environmental impact during the use and end-of-life phase due to their toxicity and the lack of biological degradability of these materials as stated by (Dorsthorst and Kowalczyk 2000)

Deterioration of Human Health: According to Dorsthorst and Kowalczyk (2000) some materials, such as the earlier mentioned heavy metals, can be harmful to human health. Some materials such as timber can be harmful to human health, when they are impregnated with poisonous preservatives (e.g. arsenic, copper, chrome) for a longer life span of the timber. Directly or indirectly, materials have a large influence on the environmental impact of products, now and in the future.

A basic LCA provides an outcome of different effect scores; a weighing method is not included, and an overall judgment of the environmental impact of bamboo products is therefore not possible. The models to arrive at a single indicator are always subject to discussion, mainly about the weighing method applied in damage based models, but also about the environmental effects included/excluded as well as allocation issues (van den Dobbelsteen 2002).

2.4.3. The functional unit

Before an environmental assessment can be executed, a general basis for the alternatives compared needs to be defined. This basis is called the functional unit (van den Dobbelsteen 2002). It is of vital importance for a correct comparison: measurements of the alternatives are determined by their technical and functional requirements (e.g., strength and stiffness). As

a consequence, weaker alternatives require more material, and alternatives with a shorter life span need to be maintained or replaced more often (both leading to higher annual environmental costs). For the bamboo culm, the functional unit chosen was column, beam and rail, as used in the in the buildings in Jukwa and Abrafo, each element with its original technical requirements. Bamboo was compared with the building materials most commonly used in this application: steel, sustainably produced from soft and hardwood and concrete. Concrete was only taken into account for the function of column because it is not normally used as a line element in the other functions.

2.4.3.1 The process

In order to obtain the environmental score of bamboo, all steps in the production process and life span of the bamboo culm needed to be defined and analysed. For instance, for the bamboo culm this meant analysing the amount of boron used in preservation (Boucherie method), the amount of gasoline for the chainsaws, the number of kilometres of transport, etc. These data were retrieved through interviews with experts and literature study. Data of the alternatives were already available in LCA databases. After this, the environmental costs of 1 kg bamboo culm over the production process could be analysed.

2.5. Financial Assessment of Bamboo

2.5.1. Life Cycle Costing (LCC)

In order to make a complete cost comparison, the method of life cycle costing (LCC) was used, taking into account all costs occurring during the whole life span of a product. Besides purchasing the material, costs for the building product assembly, maintenance, disassembly, and other various costs or profits in the end phase of the product (e.g., disposal of waste, yield of recycling material) are also included. To make a fair comparison between alternatives, the costs of each alternative were also compared over the same reference period (annual costs).

2.5.1.1 The process

For the cost comparison, the same functions (column, transversal and longitudinal beam and rail) and materials (steel, wood and concrete) were taken into account as with the environmental assessment. Following LCC, financial aspects of all steps in the life cycle of the bamboo culm needed to be analysed. Data for the costs of bamboo were obtained from the bamboo building project undertaken in Abrafo and Jukwa respectively. Costs of alternatives were determined through literature study and the field experience with the building project. Alternatives are compared on the level of the elements itself (column, beam and rail).

rich.akwada@gmail.com
ccprector@gmail.com

3. BAMBOO FOR CONSTRUCTION

In the constructional industry, bamboo is used as a building material for decoration and as a structural member of a house. Bamboo utilization for housing has been for ages back, being used as poles, trusses, rafter, flooring, ceiling, roof, window and door frames, foot bridges, fence posts and, wall as shown in figure 2 to figure 4 below. They are additionally used in now a day as scaffolds to support slabs while constructing. Bamboo production is now common to the world and has been developed in China, India, Vietnam and Thailand where bamboo mat boards are manufactured. In Asian countries bamboo can be a valuable sustainable natural resource.



Figure 2: Traditional bahareque Houses



Figure 3: Bamboo wall (Anon, 2015).



Figure 4: Modern prefabricated House

The use of bamboo in recent times as a raw material in structural works is due to its environmental friendly attributes and readily availability (Yu *et al.* 2011).

Bamboo based panels are products made from raw bamboo through a series of mechanical and chemical procedures, such as spraying glue, laying up, and hot pressing. According to Naxium *(*2001*)*, the bamboo-based panels have the advantages of large size, high strength, stabilization in shape and size, and its parallel and perpendicular strength and property that

rich.akwada@gmail.com
ccprector@gmail.com

can be adjusted according to different demands. Bamboo based panels are relatively ideal engineering materials. The panels are manufactured under high temperature and pressure with the aid of adhesives. Ply bamboo is used in truck floors as weight of steel materials is too high. In addition, ply bamboo has a high friction coefficient and it does not rust. The bamboo species in Ghana at present can be developed into bamboo based panels which can be used in the structural application fields in a form of Mat Ply bamboo, Curtain Ply bamboo, Laminated Bamboo of Strips, Ply bamboo, Bamboo Particleboard, and Bamboo Composite Board. Bamboo-based composite may also be the suitable alternative as the materials of prefabrication in terms of the various advantages they contain. Development of panel products based on bamboo strips and fibre polymer is gaining importance as these panel products reassemble wood when used in a particular fashion as in parallel laminates and as reinforcement in other matrices. These products will have superior physical, mechanical properties and are suitable for structural and specialized application. Moreover, the requirement of resin adhesives is expected to be lower compared to bamboo mat based composites and therefore making the products cost effective which are considered to be ideal for alternates to wood and plywood for several end user applications. Bamboo laminates and fibre polymers could replace timber in many applications such as house building, doors, windows, ceiling, furniture, and several other structural applications. Bamboo laminate chair is shown in figures 5 and 6.



Figure 5: Bamboo laminate Chair (Anon, 2015).



Figure 6: Multiple products of bamboo (www.mordernghana.com and http://www.guaduabamboo.com), accessed 10th July, 2015)

A light and durable material, bamboo's dimensions make it ready for use in construction with minimal sawing, splitting or cutting. Since bamboo can be quickly and easily cultivated as well as harvested and treated without complicated techniques or tools, it is a good fit in communities where skills' training is available.

4. RECOMMENDATIONS

In order to improve the environmental sustainability of bamboo cultivation, processing and preservation of its products for structural applications, we recommend the following to industrial bamboo material producers:

i. cultivate high yielding giant bamboo species suitable for the production of fibres and materials for structural application to increase the establishment of plantations.

ii. execute environmental impact assessments used by the LCA method in order to better understand which steps in the production process are most harmful to the environment and should therefore receive priority if the environmental impact of the materials is to be reduced.

iii. develop take-back procedures, and recycling processes in which the materials at the end of their lifetime are 100% reusable in the same function (Cradle to Cradle strategy).

iv. further increase the efficiency of the transformation process of the bamboo resource in semi-finished materials, including the search for more high end and durable materials and applications in which bi-products of bamboo can be used to produce other wood panels.

v. further develops new industrial bamboo materials, like corrugated bamboo mat boards, in which the competitive advantages and specific differences of bamboo compared to wood are utilized. For example, if the bamboo micro fibre is chosen in natural fibre based composites because of its mechanical performance, it might be worthwhile to do research into processes to extract bamboo fibres in an efficient and environmentally friendly way from the stem, including space efficient ways of transportation to the composite material production site (e.g. compressed bags through vacuum suction).

5. CONCLUSION

In conclusion, it can be said that an environmental impact assessment based on LCA is often lacking specific data and only provides an overview of the environmental impact (in terms of emissions and materials depletion) of a product or material as in the case of bamboo sustainability in Ghana. However, by taking a critical assessment on the bamboo sectors, it can be said that bamboo is a renewable, eco-friendly, fast growing and a readily available raw material which when used does not leave any environmental effects during its life cycle. Bamboo usage in the construction industry is sustainable and therefore its propagation and constructional usage should be promoted on commercial basis in Ghana.

rich.akwada@gmail.com
ccprector@gmail.com

Furthermore, bamboo possess excellent mechanical properties such as high strength and stiffness, less energy cost of processing, less transportation cost, multifunctional characteristics makes it a suitable material for the construction. Adoption of an advance methods of cultivation using high yielding species, an advance harvesting techniques, treatment processes and the appropriate methods of construction etc.

Though bamboo is a fast renewable material for production of wood products, if sustainable measures are not taken in Ghana as a result of the high rate of harvesting from available forests in Ghana as in the case of hard and softwood, this renewable resource will deplete from the forest since current rate of harvesting is increasing.

The work seeks to urge government of Ghana, the ministry of agriculture, forestry department, non-governmental organisations, private entrepreneurs and farmers to go into providing high yielding seedling and capital for its growing commercially as well as for researchers, scientist and industrialists to research into the potentials of this resourceful material a raw material for the design engineers and the construction industry.

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rich.akwada@gmail.com
ccprector@gmail.com

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rich.akwada@gmail.com
ccprector@gmail.com

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