Sustainability of the surveying profession and national development in the 21st Century

21st – 23rd April 2016
Abuja – Nigeria

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CASLE Declaration
All the papers in this proceeding have been through a peer review process involving screening of abstracts, review of papers, reporting of review comments to authors, amendments of papers by authors, and re-evaluation of the amended papers to ensure the quality of the papers.
FOREWORD

Foreword by the CASLE Secretary-General, Mrs. Susan Spedding

CASLE was founded in 1969 as a federation of independent professional societies involved in surveying and land economy in Commonwealth countries, and currently, CASLE has member societies in over 30 Commonwealth countries and correspondents in many other countries.

The three surveying professional bodies of Nigeria, NIS, NIQS and NIESV, have all been members of CASLE for some years, and have made a welcome contribution to CASLE. These activities include a conference which was held in Abuja in 2002 to coincide with the Commonwealth Heads of Government Meeting (CHOGM).

The formation of CASLE was inspired by the Commonwealth Foundation, with a promise of financial support to aid the development of skills in surveying and land economy, specifically to foster the development of the profession in all Commonwealth countries. This includes appropriate facilities and standards of education, the development of professional techniques and practices, technology transfer, and dialogue between member societies and national governments.

Unfortunately, in 2012 The Commonwealth Foundation withdrew core and activity grants from Commonwealth Societies like CASLE, and we have had to find other sources of income in order to implement our programmes of activities. Currently, CASLE derives income from the subscriptions of its members and sponsorship, whilst all of its officers serve in an honorary capacity.

CASLE has achieved accredited ‘Special Consultative Status’ with the Economic and Social Council of the United Nations (ECOSOC) and is closely involved in many aspects of implementation of the Habitat Agenda. CASLE also works closely with other Commonwealth associations in cognate fields, participates in UN-Habitat meetings and is a partner of the Global Land Tool Network (GLTN). CASLE has established its own Land Administration Group, and also takes part in pre-CHOGM events.

In implementing the Habitat Agenda, the issues of particular relevance to us are:
(a) access to land and legal security of tenure
(b) pro-poor housing and livelihoods
(c) improvement of the enabling framework
(d) sustainable development goals
(e) promotion of partnerships focused on resources, relief of poverty and securing finance for sustainable development.
The application of all of these is central to the management of natural resources, and the ever-demanding challenge of climate change - the three pillars on which sustainability must be built and which form the theme of this regional and international conference.

I wish to thank the following:

- Members of NIS, NIQS, NIESV
- Mr Olumide Adewebi and the Local Organising Committee
- Members of the CASLE Conference Scientific Committee
- Professor Paul Olomolaiye and UWE for sponsoring the Dean’s UWE-CASLE Scholarship 2016 and also for their support and assistance.

Professor Dr Alan Spedding and I are very sorry that we are unable to participate in the conference but we send our best wishes to all participants for a most successful and rewarding conference.

_Susan M Spedding (Mrs)_

_CASLE Secretary-General_
It is just a year since I was elected President of CASLE at the 13th General Assembly in Takoradi, Ghana, in March 2015. Prior to the General Assembly, CASLE in collaboration with the Ghana Institution of Surveyors (GhIS) held a very successful conference attended by over 450 delegates.

My close involvement with CASLE strengthened in 1998 when I attended the Commonwealth Heads of Government Meeting (CHOGM) in Edinburgh, UK. I have since participated in many conferences and nearly all General Assemblies.

During my first year of office as President, I was invited to attend a reception at St James’s Palace in London where I had the honour to meet Her Majesty The Queen.

In November 2015, I represented CASLE at the Commonwealth Heads of Government Meeting in Malta where I was accredited to the Commonwealth Business Forum.

This conference in Abuja is a follow-up event to the conference in Takoradi, Ghana, and I am very pleased that Mr James Dadson, Past President of GhIS and CASLE Africa President, Surv Akhigbe, CASLE Vice President for West Africa and Mr Matthew Ngulube, CASLE Vice President for Southern Africa will also be representing CASLE.

The conference is therefore an affirmation of the CASLE Management Board’s interest in ensuring that member bodies and its members are afforded the opportunity of benefitting from the expertise and knowledge warehoused by CASLE for their professional development aside from the added value of networking that is derivable from the conference. We will continue to pursue this programme in all Commonwealth regional groupings throughout the tenure of this leadership.

It gives me great pleasure to welcome everyone to the conference and I wish you all a very enjoyable and rewarding experience.

Mr Joseph Olusegun Ajanlekoko
CASLE President
ACKNOWLEDGEMENTS

The CASLE Secretary General and President would like to express their gratitude for the contribution of the following individuals, organisations and committees:

- Nigerian Institution of Surveyors (NIS)
- Nigerian Institute of Quantity Surveyors (NIQS)
- Nigerian Institution of Estates Surveyors and Valuers (NIESV)
- Thomson Reuters
- Members of staff of the University of the West of England including Professor Paul Olomolaiye, Mr Jimi Ogunussi, Mr Chris Wade, Mr Morris Williams and Helen Johnson.
- Royal Institution of Chartered Surveyors
- The conference local organising committee
- The conference scientific committee
- Keynote speakers and presenters
- The CASLE Management Board and members of the Task Force.
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PROPERTY
A RESILIENT CITIES NETWORK FOR NIGERIA

Adamu Ahmed\textsuperscript{1}, Michael Mutter\textsuperscript{2}, Tony Lloyd-Jones\textsuperscript{3}, Simon Gusah\textsuperscript{4}, Samuel Adenekan\textsuperscript{5}, and Nick Leffler\textsuperscript{6}

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Relating to the extensive Commonwealth position on Urban Development, such as the Com-Habitat publication on the State of Cities in the Commonwealth, and further work of the Commonwealth Consultative Group on Human Settlements, and the Built Environment Profession in the Commonwealth, which includes CASLE, this paper describes the establishment of a Nigeria Resilient Cities Network. Currently the cities of Nigeria work in isolation, under the control of their respective State Governors. The opportunity is to create the Nigeria Resilient Cities Network to be hosted by Ahmadu Bello University, Zaria (ABU) at the Centre for Spatial and Information Systems (CSIS), on the following basis: The NRCN would aim to work with the lead cities of the nation, with their respective State Governors, and ABU to establish the Nigeria Resilient Cities Network (NRCN) at ABU–CSIS and thus operate a knowledge-resources sharing system along the lines of the Rockefeller Foundation’s 100 Resilient Cities format, as a means of introducing the concept of cities working with their communities towards more ‘Resilient Cities’. The NRCN would develop model bases for city level administrations – City Development Authorities together with their associated City Development Strategies (CDSs) methodologies along the lines of that being established for Metropolitan Kaduna, including recognizing and establishing the Geo-Spatial Data Infrastructure (GDI) methodology for city-specific databases, together with their City Mapping Centres. The NRCN would develop the concept of publicly accessible ‘cloud-based’ and ‘app-based’ Resilient City Forums for citizens and investors to see where they may relate to making cities better able to recover from and prosper following shock and stress events.

Keywords: Resilience, Cities, Nigeria, Networks, Commonwealth

INTRODUCTION

The City Resilience Framework that has been researched and developed by the global consultancy ARUP for the Rockefeller Foundation (ARUP 2015) has shown how ‘systemising’ the greater citizen participation brings the objectives for resilience to life, in concert with the city authorities. This also applies to the concepts for rural-urban linkages, and the ways in which the surrounding communities of the City

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Region interact (Lloyd-Jones and Rakodi 2002). In the last two years, the Nigeria Infrastructure Advisory Facility (NIAF) has pushed an interest in re-creating the path to sustainable urban development in Nigeria through its Effective Cities Programme that has a core principle in promoting resilience (Mutter 2015a and 2015b).

This effort has already led an application process to the Rockefeller Foundation’s Global 100 Resilient Cities programme by five Nigerian State Governors (Lagos, Kaduna, Kano, Katsina and Enugu) on behalf of their capital cities, for which Enugu was successful in the 2014 round. Enugu is now part of the 100 Resilient Cities Network and for that is receiving Rockefeller Foundation support for its City Resilient Officer and technical support over a two-year period. The limited possibilities left for Nigerian cities to join the network have given credence to the idea of a National Resilience Network using the existing conceptual basis of the Rockefeller Foundations Resilient Cities Programme that allows Nigeria to remain within the fold of the global movement but on a local platform of local resources and strategies.

The paper outlines the basis of the Nigeria Resilient Cities Network being hosted by Ahmadu Bello University (ABU), Zaria at the Centre for Spatial and Information Sciences (CSIS) (see also content outlined by Ahmed 2016, 2009), and how it can enable Nigerian cities to best work collectively on behalf of their citizens in bringing together a common source of information and advice for a people-centred planning approach. This Network approach would aim to work with the lead cities of the nation, together with their respective State Governors and ABU to operate a knowledge-resources sharing system along the lines of the Rockefeller Foundation’s 100 Resilient Cities format, as a means of introducing the concept of cities working with their communities and investors towards more ‘Resilient Cities’.

THE CONCERNS AND POLICY DYNAMICS WITHIN THE RESILIENCE CITIES MOVEMENT

The concerns for resilience have shifted between economic, environmental and social issues but more specifically on the need to strengthen survival mechanisms of society for sustainable development. So how do people feel about being part of the city and their capacities to resist adversities, downturns and shocks? Much has already been written about the negative effects of rapid urbanisation, but what is amazing is how positive slum dwellers feel about their opportunity to be part of the dynamics of the city and the ability to withstand adversities. It suggests that the positive returns from living in slums far outweighs the negative impacts- the primary reason why people would not select an alternative that makes them go ‘back to the village’(see for example Mutter’s experiences from running the global Slum Upgrading Facility for five years – Mutter Ed. 2006). However, support for slum dwellers is still required. Most notably this has been recognised as the remit of UN-Habitat, and this is where the Slum Upgrading Facility has been established.

Similarly, people are expecting employment and enterprise opportunities when considering a life in the city (either as a move to the city, or now more commonly as a move to remain in the city, having been born there), but it has been observed that they are also willing to pay the price for such a position in the city (see for example, Mutter 2001, 2002, 2006, 2008 and 2009, and World Bank 2015c). In our explorations on “The 21st Century Urban Scenario” with Professor Amartya Sen in the build-up to the Global Habitat Day celebrations in Brussels earlier in 2002 (Mutter 2002), the economic dimension of the then Millennium Development Goals Target 11 in
addressing urban poverty aiming for a significant improvement in the lives of at least 100 million slum dwellers by 2020 has been highlighted (Mutter 2001, 2002). The scenario contended that Target 11 could only be met if the spatial dimension of poverty and the barriers faced by slum dwellers are better understood and acknowledged by policy makers.

We proposed that encouraging the development of “freedoms” for citizens can enhance their potential as natural agents of change towards reducing poverty, while also proposing for the drafting of an “Urban Freedom” policy framework to facilitate the implementation of coordinated actions supportive of the ingenuity of the poor in forging solutions for themselves.

Such idea was further concluded by Jane Samuels and Romi Khosla in their book (2005) “Removing Unfreedoms – Citizens as Agents of Change in Urban Development” where, in the introduction, the processes for localising development opportunity - processes that have the acknowledged support from international development cooperation agencies such as DFID were highlighted (see also the fundamental work of “Development as Freedom” Sen 1999).

In 2002 DFID had instigated the innovative City-Community Challenge Fund (C3) to wide acclaim from Jo Beal and others; and in conjunction with the then recently developed Cities Alliance (in 2000, with DFID funding support), had promoted the Community-Led Infrastructure Finance Facility (CLIFF) which brought these funding mechanisms for local initiatives to a wider set of actors including organised community groups (based on savings schemes), banks and other financing organisations particularly in India, and Kenya.

CLIFF generally had been borne out of a significant piece of research into the ways in which the urban poor have access to development finance – “Bridging the Finance Gap” funded by the ‘urban development’ research window in the DFID EngKaRs programme (Com-Habitat 2009, and CHEC/CCGHS 1999). The subsequent DFID-led CLIFF programme (which was initially developed within DFID and now operating with multiple donors) seeks to bring initial finance to establish community groups, so that over the course of time they can develop their own plans and demonstrate their capacity to lead a local development process in conjunction with their local governments and the local private sector finance institutions on a credit guarantee basis. The programme has continued successfully to today.

Has this concept been further developed over the course of time? Well, eventually this became the basic concept of the Slum Upgrading Facility (SUF) (Mutter 2006) as promoted by DFID, together with the governments of Sweden and Norway, basing the global operations within UN-Habitat in Nairobi. Significant progress was made in Sri Lanka, Indonesia, Ghana and Tanzania showing how the local banking institutions would be willing to adjust their commercial interest rates for schemes developed by slum dwellers themselves. The programme works in concert with the Local Financing Facility acting with base capital to provide a modest private sector guarantee mechanism that recognises the abilities of slum dwellers to effectively manage their own upgrading schemes.

So how can we now further capture these dynamics within the current Resilient Cities concepts? The Resilient City Frameworks builds on the capabilities of citizens to promote sustainable development in conjunction with the city authorities. This is demonstrated in the earlier City Development Strategies (CDS) as the bedrock of the
Cities Alliance approach. These concepts are alive and well, for example in the case of Cape Town in South Africa where the CDS has achieved its own long-term momentum. It stands as an example to others, particularly in Africa in showing the way towards resilient mechanisms.

The City Development Strategy generally is not a one-off exercise, rather a strategy for the continuous assessment of aspirations for the city, amongst the players that will ensure that the aspirations can be achieved in a timely fashion. Being aspirational, this relies heavily on the political support required for realisation (see also the role of the community in the process, as in Theis 2006, and UN-Habitat 1996 and 2012, and as portrayed in the UN-Habitat flagship reports 2006, 2008, 2010).

NEED FOR A NIGERIAN RESILIENT CITIES NETWORK - WHAT WOULD IT ACHIEVE?

Better urban management is a national priority as Nigeria continues to urbanise rapidly. Currently the cities of Nigeria work in isolation under the control of their respective State Governors. Peer learning therefore is limited and the ability to adopt and maintain a common and complementary strategy for urban development management is non-existent. Other than the purpose of networking for knowledge sharing, the concern for building capacity to withstand shocks has created the basis for developing methodologies and strategies to make cities resilient. Simply put, a Resilient Cities approach would demonstrate each city’s ability to withstand the shocks of modern life, climate change, the global oil price, and global interdependency.

Resilience can come into play effectively with cities banding together, recognising each other’s strengths, and thus forming the basis of a cities-led national urban development strategy (Hague and Mutter 2012). In a Federal system, this is a challenge, although with States and their Governors now recognising the value of a resilience approach, it now has every chance of success. The Federal Government would be taking a pro-active coordination role that can be achieved through the National Council on Lands, Housing and Urban Development. This is already intrinsically a platform for interaction between States, and with the Federal Government.

A Resilience Network would be the platform for interaction of ideas and processes that help a city develop more effectively in the Nigerian context; and it would be a place where the most comprehensive knowledge for city development and users experience in the country can be most easily accessed and shared. Such a Network would require a long-term base, such as within a University, where it can exist over time and also where it can build a relationship with the research agenda for cities generally for the nation. It would need to be a network where city authorities want to be a part of the ‘systems-type’ approach.

The Network also would develop model bases for city level administrations – City Development Authorities together with their associated City Development Strategies (CDSs) methodologies along the lines of that being established for Metropolitan Kaduna, including recognizing and establishing the Geo-Spatial Data Infrastructure (GDI) methodology for city-specific databases, and City Mapping Centres. Additionally, the Network will develop the concept of publicly accessible ‘cloud-based’ and ‘apps-based’ Resilient City Forums for their citizens and investors to see
where they may relate in making those cities better able to plan ahead as well as being able to recover from and prosper following shocks and stress events.

The Framework fundamentally promotes processes for listening to the people of the city, much as the earlier City Development Strategy (CDS) concepts worked in the Cities Alliance Framework. Although not new, this process can be further developed with recent technology. For example, using cloud-based interactive websites (as seen in the proposal for Metropolitan Kaduna as part of its City Development Authority concept), citizens are allowed to participate in the continuous processes of determining upgrades to the city’s development – processes that never stop, but require constant refinement. In this way both government and associated investors can know the situation on the ground. Putting all the known factors (the data and knowledge guidance) in the public domain means that innovation from the community can develop and be shared. They are the best placed people to ‘self-enumerate’ their community, taking account of the rising population, even when official records are typically out-of-date.

Related to this is the criteria for ‘Housing’ the urban citizens (as in John Turner’s earlier use of the word ‘housing’ as a verb) adopted by the Max Lock consultants in the surveys of Kaduna (as in Lock 1967, and the same methodology in the Revised Kaduna Mater Plan in Max Lock Consultants Nigeria 2015), Maiduguri and Katsina to name but a few cities in Nigeria. In this way, the cultural identity of the citizens was maintained and built upon. See for example, Mutter (1994) “Traditional housing and future urban planning strategy in Katsina, Nigeria” in Hamish Main (1994), and in FIG 2009, and recently in the World Bank 2015c “Stocktaking of Housing in Africa”, which outline how people are the general drivers of where they want to live, and pay for the privilege. Advising cities on their best options for city development, the planning for future needs, efficiency and effectiveness is critical. The ‘Knowledge Base, and ‘Logistics’ for movements and including the long term finance show Resilience in practice, with the mixed use incentivising financing mechanisms demonstrating the methodologies for stimulating more organised and thus resilient future growth (as in Mutter Ed. 2003, Mutter 2002, and Mutter 2001).

A city’s ability to withstand shocks, such as flooding, desertification and even de-industrialisation, which results in riots with other ethnic dimensions as in the case of Kaduna in 2000/2001 – and similarly in Jos - is highly dependent on integrating resilience into citizen-led planning.

WORKING TOWARDS ESTABLISHMENT OF A RESILIENT CITIES NETWORK IN NIGERIA

As shown earlier, the concept of Resilient Cities, as promoted by the Rockefeller Foundation’s global 100 Resilient Cities programme, has caught the imagination of State governors, keen to ensure that their cities are developing robust approaches to the spectre of shocks to society, their economies and the environment. Five cities have already used the Resilient Cities Framework to cast their aspirations towards this process and made applications to the Foundation for acceptance into the programme. The City of Enugu has led the way, being successful in 2014. Now Kaduna, Kano, Katsina and Lagos are following suit in 2015. As argued, since all cannot be successful, the idea of a National Network thus gains credence using the Framework concept.
The Centre for Spatial Information Sciences (CSIS) at Ahmadu Bello University, Zaria has made an offer to base a National Resilient Cities Network within its Urban and Regional Department home. The Nigeria Infrastructure Advisory Facility is supporting its development and will view the Centre and its Network as the residual place for the knowledge element of its 10-year programme of experience in developing infrastructure across the country and its implications for cities in particular. An assessment of the quality of city infrastructure is being developed as a comparative index in order to provide some measure of achievement. With cities taking on complementary roles in the national cities hierarchy, this can be seen as constructive, given a common framework.

The processes of bringing the four city applicants and Enugu together as pioneer members of the Network is being developed through a memorandum that set out frameworks of activities and responsibilities, and modalities by which learning, knowledge sharing and skills transfer can be promoted. The Spatial Data Infrastructure portal already created allows for the capture of remotely sensed data for monitoring developments and change, for creating open source maps and for modelling potential outcomes of various socioeconomic and spatial decisions. A focus also exists on developing tools to empower local communities with the basic skills to identify, generate, share, analyse and use information regarding their localities towards building resilience, and to respond to adversities. This directly relates to the democratization of urban geo-spatial information using Citizens as sensors - Participatory Geographical Information Systems; and promoting the widespread use of Open-source Geo-spatial software and location-aware Apps to support communities build capacities to anticipate and respond to shocks and stresses (see also Venebles 2015, and World Bank 2013, 2015c and 2015b).

CONCLUSIONS

We believe that cities can lead the way forward for the national economy, as has been demonstrated in so many countries that are advancing rapidly. However, the cities need to work together within a national framework for the concerted development. This requires three things – firstly, working with an agreed national strategy for the inter-relationship of a nation’s cities, understanding where resources for their development can be most efficiently accessed; secondly, by working with an understanding and guidance on the ways in which planned growth for the future is paramount; and lastly by working within a network whereby they can observe their individual roles within a national framework, and work with a ‘resilience’ approach such that they can be adaptable to the external change factors that will undoubtedly be thrust upon their well-being and strategies for the future.

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USING SOCIAL HOUSING AS A MEANS OF DEVELOPMENT IN THE DEVELOPING NATION

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It is universally acknowledged that Shelter is one of the most basic human needs along food and healthcare, with profound impact on life style, clothing, happiness as well as the productivity of the individual. Developments have overtaken the idea of shelter by now and moved towards the provision of Housing. This paper analyses the housing problems in the Developing economy, how such problems affect the socio-economy of these nations using Nigeria as case study. It further analyses housing itself as an institution that encompasses all ancillary services and community facilities, which are necessary to human well-being. That it is in fact a package of services, land, utilities and access to employment and special amenities as well as the structure of shelter itself. It also x-rays the problems of housing and how social housing could be used as a means of development in the Developing Nation. It analyses various socioeconomic problems facing the developing nations and how the housing development, if it is well explored, will solve most of the socioeconomic problems facing the developing nations. This problem is basically the uneven development. This is the ultimate aim of this paper.

Keywords: Development, Housing, Rural, Unemployment, Urban.

INTRODUCTION
There are 195 sovereign nations, 72 dependent areas and disputed territories which are grouped into four by the United Nations based on their level of economic and social development. The groups are:

1. More developed regions comprise Europe, Northern America, Australia/New Zealand and Japan.
2. Less developed regions comprise all regions of Africa, Asia (excluding Japan), Latin America and the Caribbean plus Melanesia, Micronesia and Polynesia.
3. The least developed countries are 48 countries, 33 in Africa, 9 in Asia, 5 in Oceania plus one in Latin America and the Caribbean.
4. Other less developed countries comprise the less developed regions excluding the least developed countries.

The first and the last groups will be excluded by this paper, which includes only the second and third groups.

The Developing Nations have a problem of "Rural-Urban Migration". This is due to uneven development they experience. To a large extent, the development in these nations is only based on the capital towns and the city centres. A typical example of this is Nigeria, a large nation of about 182million inhabitants.

From the Population Reference Bureau (PRB's World Population Data sheet 2015) Nigeria is the most populous Country in Africa and ranked seventh in the world and

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has the geographical area of 923,768Km² to rank 32nd in the world. The population density is about 197/ Km² rank as the 67th worldwide.

Only about 47.2 millions Nigeria inhabitants live in the towns/cities that have a population over 100,000 inhabitants in the 73 towns/cities. This is about 26% of the total population. Not all inhabitants of these towns/cities have roofs over their heads. There is gross inadequate housing stock in the Nigerian urban centres. With rising in cost of building materials daily, the solution is not foreseen in the nearest future.

According to the World Bank (2012), Nigeria needs an annual housing stock of 720,000 units for the next 20 years in order to overcome the deficiency of about 14-16 million units. Regrettably, she builds less than 20,000 units annually as housing is a commercial venture in Nigeria.

The squatter settlements, slums and shanties and overhead bridges in the cities of the developing nations continue to provide affordable shelters for the large class of urban dwellers. Their cities are theatres of inefficient and overstretched services, facilities and infrastructures due to rapid population growth and uneven regional socio-economic development among other factors. Their problem of rural housing is qualitative while urban housing problems are both qualitative and quantitative. The available housing stock in Nigeria is only 2 dwelling units per thousand people compared with the required rate of about 8-10 dwelling units per 1,000 population recommended by the United Nations.

The Construction Industry is a major segment and the highest employer of labour in any economy. This means that for every adjustment in the economy, the Construction Industry will be most affected. Nigeria, a nation that has not been having a stable economy in the recent time, could not have stable development as a result of low activity in the construction industry.

HOUSING AND DEVELOPMENT PROBLEMS IN NIGERIA

Nigerian population has been growing in a way that has no definite correlation with the growth of her economy and other basic infrastructure. Resultant economic growth in this country has been a non-significant parameter to the basic needs of the population. As such, all effort to alleviate sufferings of the masses has not provided a fruitful result.

The problem of housing in Nigeria is not different from other developmental problems facing the nation. Various past governments both at States and Federal levels, have been trying to make sure that the average Nigerian is given decent accommodation. Many policies have been put in place to get all these problems solved, but without success.

The New Partnership for African’s Development (NEPAD) was adopted at the African Union’s 37th session of the Assembly of Heads of State and Government in July 2001 in Lusaka, Zambia. NEPAD aims to provide an overarching vision and policy framework for accelerating economic co-operation and integration among African countries. The Assembly set a NEPAD city goal which fully recognized the role which the cities can play in the economic revival of Africa. The characteristics set for NEPAD city are as follows:

a) Functional, economically efficient, equitable, environmentally safe and secured;
b) Liveable and well managed city in which most of the services are available and accessible;
c) Conducive environment for attracting capital;
d) Private sector investment, and
e) Ecological balance and symbiotic relationship with its hinterland.

At the 1st City Consultative Forum hosted by the Lagos State Government between 11th and 13th May 2004, on the Sustainable NEPAD Cities Programme, several challenges on sustainable human settlements management were identified. These include:

a) Effective management of rapid urbanization and addressing the urbanization of poverty;
b) Promoting full urban employment;
c) Provision of adequate urban infrastructure;
d) Slum upgrading to combat the proliferation of slums;
e) Mobilizing adequate finance for municipal development, and
f) Making necessary connections and linkage to overcome the problem of isolation among cities:

Reviewing the development in Nigeria since NEPAD had set the goals no physical development had been carried out.

NIGERIA SOCIO-ECONOMIC STATISTICS

According to Wikipedia 2015, Nigeria is the world's 20th largest economy, worth more than $500 billion and $1 trillion in terms of normal GDP and purchasing power parity respectively. It overtook South Africa to become Africa's largest economy in 2014. Also, the debt-to-GDP ratio is only 11 percent, which is 8 percent below the 2012 ratio. Nigeria is considered to be an emerging market by the World Bank. It has been identified as a regional power on the African continent, a middle power in international affairs, and has also been identified as an emerging global power. Nigeria is a member of the MINT (Malaysia, India, Nigeria, Turkey) group of countries, which are widely seen as the globe's next "BRIC-like" economy. It is also listed among the "Next Eleven" economies set to become among the biggest in the world. Nigeria is a founding member of the Commonwealth of Nations, the African Union, OPEC, and the United Nations amongst other international organisations.

Urban poverty remains one of the enduring problems of urbanization in Nigeria. This problem keeps worsening daily due to acute unemployment brought about by ailing economy. This down-turn in economic performance has not only led to a shortage of new jobs but has also led to mass retrenchment of workers both in private and public sectors.

The corresponding urbanization growth rate in the years 2013, 2014 and 2015 are 1.99%, 1.64% and 1.30% respectively. Apart from the ancient cities that have grown up to the extent that we can call the urban centres in Nigeria, such cities are Zaria, Bussa, Ile-Ife, Ogbomoso, Oyo, Sagamu, Onitsha, Ikot-ekpene, Warri, Umuahia and the likes, only the state capitals and one other town in most states are urban cities. Lagos, the Commercial nerve centre of the nation was assumed to be world 6th most populous city with an estimated population of about 13.4million (but Lagos State Government has a figure of 17.55million based on the enumeration conducted for social planning in 2006) expected to have reached over 25 million by the end of year 2015 to become the world 3rd largest urban agglomeration.
Abuja the administrative capital is not having any database on the population growth because of the uncoordinated nature of migration that exists. As such a great Socio-Economic developmental problem is currently exhibiting itself in the capital city.

The reasons for the high levels of poverty in Nigeria are the fact that the informal sector provides about 70% or more of urban employment. Studies show that in many developing countries, informal sector is characterized by low productivity and incomes. So long as most urban employees are in this sector, so long will it be difficult to break out of the poverty trap. Another reason is the poor economic performance of the last decade which has caused mass unemployment and led to the excessive natural devaluation of the Naira.

Other reason is the rural-urban migration. Many of these migrants have no skills for any meaningful jobs. This also added to the poverty problems in the cities.

With these levels of urban poverty in Nigeria, it was projected to be reduced by half by 2015 as stipulated by the United Nations in the Millennium Development Goals (MDGs). This was not achieved.

Uneven regional development

The socio-economic development dichotomy between the rural and urban centers will continue to provide the impetus for the continuing massive rural-urban drift putting intense pressure on the limited urban housing stock, services, facilities and infrastructures. All the three tiers of Government in Nigeria concentrate their infrastructural development programme on the very few urban centres leaving the very large rural areas to find their levels. Even the urban development programme by these governments is not capable of taking care of the existing urban dwellers not to talk of the new migrants who seek employment to the urban centres. Not all the 73 cities in Table1 above could be called urban centres. In as much as these cities could inhabit more than 100,000 citizens, development is expected to be given to them so that few urban centres will be relieved of the over stretched facilities being provided.

Dwindling land stock

The urban land stock is fast dwindling in face of the competing urban land-use requirements resulting from the high rate of urbanization. The situation is further worsened by the failure to decongest the inner cities of the large population in the urban slums and squatters’ habitations through redevelopment schemes and development of the suburbs. These suburbs are developed in an uncoordinated manner and create more slums and ghetto than satellite towns. They are all around Lagos and Abuja.

Unemployment

According to the National Bureau of Statistics (NBS), Nigeria’s unemployment figure is currently 45.5m or 24.7% of the total population. It was 20.3m representing 23.9% of the total population in 2011. The percentage is 21.1 in 2010 and 19.7 in 2009. The “Nigerian unemployment report 2011” shows that the rate is higher in the rural areas (25.6%) than in the urban areas (17.1%). The report also shows that persons aged 0 to 14 years constituted 39.6%, those aged between 15 and 64 (the economically active population), constituted 56.3%, while those aged 65 years and above constituted 4.2%. This means that only 31.6% is employed out of 56.3% that are supposed to be
economically active. This report is contrary to the recorded Gross Domestic Product (GDP), growth rates in the country.

Notwithstanding, the influx of rural dwellers with little or no skill or formal training in any trade in search of non-existent “Golden Fleece” in the urban centers continues. This phenomenon depopulates the rural area and consequently reducing the labour force available for agriculture in the rural area and increases the urban population. The current rate is supposed to be higher since no measure has been taken to arrest the situation.

High cost of housing finance

The urban dwellers in the developing nations use 60% of their income for housing as against 20-30% recommended by the United Nations. In Nigeria, the interest on mortgage loan is too high and also too difficult to access. Only about 5% of the 13.7 million housing units in Nigeria currently financed with a mortgage. Most residential mortgage loans in Nigeria are provided by the commercial banks, Primary Mortgage Institutions (PMIs), and some, usually institutional, employers. By June 2011, the total consolidated assets of PMIs had increased by 0.3% to N360 billion. Mortgage finance is thus limited – the Mortgage Bankers Association of Nigeria estimates that the unmet mortgage finance requirement in the country could be conservatively put at between N20-N30 trillion. Constraints in addressing this challenge include the limited availability of long-term funds and a critical need to enhance the capital and resource base of PMIs and the FMBN; poor product design that fails to meet the affordability constraints of the majority; difficulty in accessing land and secure title; an inadequate legal framework and poor housing market infrastructure; and constraints in the housing construction sector. Mortgage interest rates are also high (18-24 %), undermining household affordability and access to mortgage finance.

High cost of materials

The high cost of the traditional building materials including cement arising from the inequality in demand and supply of the materials, the high level of non-local content of the building materials, the sub-standard quality of some locally produced building components and the lack of tested alternative local building materials. Investment on building materials has not gotten any government blessing. Private sectors that invest are multinationals that are highly profit oriented. There is no government subsidy to this area of investment or encouragement as such; no effort has ever been put in place to control the abnormal increase in the cost of building materials.

SOCIAL HOUSING AND URBAN DEVELOPMENT IN NIGERIA

Development of Housing sector alone is a catalyst in the national development. Goal 7 Target 11 of the Millennium Development Goals (MDGs) is to reduce poverty housing through slum eradication. In 2012, the Ministry of Lands, Housing and Urban Development was allocated N24.9 billion amounting to 3% of the national budget. However, more than 60% is for recurring expenditure. Nigeria’s 20-20-20 development strategy includes a vision to build 10,398,650 housing units between 2012 and 2020. Up until this moment, no concrete effort has been made to realize this goal.

The current Minister of Power, Works and Housing has made a pronouncement that 40 blocks of 12 units of housing will be developed in the 36 states and Abuja within
the next 4 years. The total number of this will be 17,760 units. This is grossly inadequate provision from the federal Government.

All the various identified cities could be used by the three tiers of governments to establish the social housing through direct execution and/or Public-Private-Partnership. This will reduce the burdens of the few urban centres in the country and will create mass employment in all these 73 cities. The Socio-Economic effect of this will go a very long way. Not only will the people in the construction industry feel the impact, but also the whole of the economy.

The idea of creating, recreating and renaming a Ministry in charge of Housing by each of the various Governments is not only to provide Housing for the citizenry, but to stimulate the national economy and development around the country. Provision of housing to citizens creates employment and develops the economic activities of the area where it is situated. The only way that mass housing development can be achieved in the Developing Nations is through a Social Housing Scheme. There are also various Ministries that will have to work round the clock to compliment the effort of any Ministry that is given the responsibility of providing Housing and Urban Development. These are:

**Ministry of Science & Technology:**
To achieve mass production of houses within a short period especially around the rural areas, there should be a research into the production of existing materials and equipment e.g. the block moulding machines, which have been producing 500 blocks per day could be made to produce about 6,000 per day with little or no extra energy.

The development of precast concrete elements has to be developed so that components will be available in large quantities and the assemblage will be carried out in a short period.

The research in the usage of local materials to enhance the economic development will have to be given a priority. The idea of importing building materials has to be discarded. The production of most building materials should be done locally, those that are already done be improved upon, so as to produce them in large quantities. This will improve the economy and more employment opportunity will be created.

**Ministry of Works**
Development of mass housing in the rural areas will have to go along with the provisions of infrastructure. There should be a lot of site and services plots for allocation in the rural areas which this Ministry must have serviced. These are road networks, bridges, electricity, portable water supply, parks and the like so as not to overstretch the existing ones in the urban centres (if ever they exist). This ministry will have to execute all these infrastructural facilities to compliment the production of mass houses to be provided through this Ministry of Housing.

**Ministry of Education**
Establishment of more schools at every level is imperative in the rural areas where development of housing is springing up. Ministry of Education will have to establish more schools to accommodate the new development. With the establishment of more schools, the enrolment numbers will increase thereby solving the problem of low intake in schools in the rural areas. More teaching and non-teaching staff will gain employment in schools.
Ministry of Sports

The establishment of recreational facilities such as playgrounds or mini-stadia as the case may be should be an automatic assignment for this ministry, as an idle hand is a devil’s workshop. Sports are now used for socio-economic development globally. Nigeria should be part of this development.

Ministry of Economic Planning

The establishment of statistical data of the units of housing to be provided to project the new population of the new developing areas where ministry of housing will be developing is of utmost importance. This will guide in the preparation of budget for the Ministry so as to accomplish the required goals and also to redistribute wealth in favour of such areas.

One of the impediments that can affect the Ministry of Housing from performing is the financial drought. Housing delivery is a huge capital business. So adequate funding through national budget is very important.

Ministry of Finance/Central Bank of Nigeria (CBN)

If a mass housing delivery is to be meaningful in the rural areas, an established financial assistance has to be provided which the general populace can have access to. A special mortgage arrangement is very important at this point. CBN will have to redirect the focus of the existing mortgage banks. A special fund needs to be provided without any of the bottleneck which currently exist in the National Housing fund. Tax relief for the major manufacturers involving in the mass production of Housing is very important. This is part of the social outlook of the Mass Housing delivery.

Ministry of Labour

Ministry of Labour will have to be strengthened if the ministry in charge of housing is to achieve the production of mass housing throughout the federation. The number of skilled labour that exists in the construction industry is far below that which is required to build the total housing units that are expected to be produced in the country. This is one of the problems facing the mass production of houses in urban centres especially in Lagos and Abuja. This has increased the cost of skilled labour beyond any allowable budget.

The training and development of skilled labour in the construction industry should be seriously looked into. The establishment of training centres and other skilled acquisition centres should be addressed.

There are many more various government agencies and institutions, formal and informal, private and public establishments, which are involved in mass housing delivery. This process is a chain reaction and the result is the upgrading and/or the provision of the basic facilities which develop the nation socially and economically.

CONCLUSION AND RECOMMENDATION

Developing countries like Nigeria do not exploit the possibilities of developing their cities evenly, thereby solving their development problem through housing development. Social housing could be used as a means of development in the developing nations such as Nigeria, so as to reduce unemployment rates and also develop rural activities, but only if:
Provision of housing is regarded as social services

There is need for provision of quality housing for the citizenry to be seen as part of social service rather than a profit-generating venture. The different tiers of government should provide the required subsidy to ensure that all Nigerians have access to quality houses not only in the Urban Centres, but also in the Rural Areas. All the cities throughout the federation should be strengthened through Social Mass Housing Development to create wealth through the employment opportunities of this medium tagged "Social Housing Scheme".

Rural Development is Not Neglected

Rural housing with adequate infrastructure should be developed to reduce urban migration, which in turn exerts enormous pressure on the inadequate facilities in the urban areas. The various rural development programmes of the different tiers of government should be coordinated and invigorated with providing essential services; facilities and infrastructures for the rural folks to dissuade them from believing that good things of life abound only in the cities. This will slow down and eventually reduce drastically the high rate of Rural-Urban migration as such, reducing present pressures on the urban centres.

Housing Finance is Re-defined

There should be a difference between housing finance and business finance. Financing housing project is a long term affair. This is supposed to be on a single digit interest rate. Easy access to funds for financing both public and private mass housing projects is necessary in view of the capital-intensive nature of housing projects. There is a need for necessary legislation to enable all tiers of government and private developers to access low-interest loans for execution of housing projects.

The insurance, banking and other financial sectors are encouraged

This sector of the economy should be encouraged to make a substantial level of investment in the housing sector as follows:

- The Insurance Companies with long term savings in form of endowment or annuity can do much on housing finance on a long term basis;
- Pension Fund Managers can be legislated to invest a higher percentage of the long term fund in their custody on the housing providers than we have now.
- Decentralization of Activities of NHF: The NHF could be decentralized, just as the pension funds, to be managed by the primary mortgage banks. This will solve the problem of the bottleneck that is being faced at the FMBN. The primary mortgage banks will be receiving and managing it for all the subscribers.
- Government Incentives on Housing Funds: The financial institution involved in housing delivery should be well funded and encouraged to perform better. For instance, investors in precast slab elements could be given tax relief and other incentives to encourage them. Access to loan should also be made easy since the land and the building under construction are enough collateral for the loan.
- Housing Infrastructure to be funded By Government: Government to provide infrastructure to the private estates especially in the developing or less developed areas. This will reduce the cost of housing units which the
developers are selling now. The cost of infrastructure alone is more than 40% of the cost of housing.

- Job Creation Potential to reinvigorate: The training of artisans and craftsmen should be well organized to make the production of mass housing possible. This will increase the numbers of skilled labour in the industry and create wealth for both individual and the nation as a whole.

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FRAMING AFFORDABLE HOUSING GOVERNANCE FOR THE NIGERIAN PROPERTY MARKETS

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This paper reports the initial part of an ongoing research that addresses the shortage of housing in Nigeria. Nigeria has less than 30 million houses, most of which were constructed by the informal sector. Public agencies for housing finance and housing construction are inadequate in function. Nigeria has a housing deficit of 30 million units. With the current rate of production, and with homeownership of less than 20%, the deficits are projected to persist over the next 300 years. The housing crisis will lead to poor standards of living, unaffordable housing prices, high mortgage payments, abandonment, dilapidation, and high costs of maintenance. The problems in housing governance have more to do with policy-making, regulations, and legal issues, and much less to do with cost of materials and components. In order to close the housing gap in year 2050 annual home production rate must be 21 times it current production. In an effort to improve affordable housing delivery, this study presents a housing governance framework as part of the initial findings.

Keywords: Procurement planning, Homeownership, Government, Median income.

INTRODUCTION

Nigeria population stood at 178 million in 2014, and was estimated to increase to 205 million by 2020 (IMF, 2015). With an annual growth rate of 2.7% (World Bank, the population will exceed 300 million in 2050). The per capita income is USD5,710, with a high rate of urbanisation. The World Bank (2015) estimates the rate of urbanisation to be 4.5%. The average household size is reported to as five persons per household (NBS, 2012). Studies on housing crises and measures to reduce the crisis are well documented (Kadir, 2004, Waziri and Roosli, 2013, Oladapo, 2006, NBS, 2015). However, despite the various policies, regulations and legislations introduced by governments, the housing gaps are widening. However, the widening housing gap is largely attributable to the fragmented policies and strategies adopted by the stakeholders and successive governments. Another problem within the existing measure both in academic literature and practice is lack of collective engagement. Hence, the initial question to ask, is what measures are available to address the lingering housing crisis. Towards this end, a possible solution in the form of a housing governance framework was proposed by Olanrewaju and Paul (2015). They argued that it will be positive to use ‘housing governance’ to rethink the challenge of housing supply. Using a web based survey, it was inferred that the prospect of affordable

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delivery hinge on government policies, engagement with material manufacturers, housing associations/householders and professionals in the construction sectors.

**BACKGROUND AND THEORETICAL FRAMEWORK**

In 2014, the Nigerian GDP was ₦67,977,459.22 of which, the real estate accounted for ₦5,155,727.95 (or 8%) (NBS, 2015b). In 2015, the GDP posted ₦69,780,692.72 during the same year, the real estate was valued at ₦5,264,695.89 or 7.55 % (NBS, 2015a). In 2013, the real estate sector contributed 8.03% to the GDP (NBS, 2014), see Table 1. In 2014, the Nigeria property market was valued at US$41 billion, (CAHF, 2014). Though the growth rate of the real estate of 9.18% in the third quarter is lower compared to the period in 2014 and with the high rate in the second quarter of 2015, the performance of the real estate industry is considered low compared with the rate of urbanisation. The real estate and food segments are the most active in the services sector. As part of the Gross Capital Formation (GCF), housing constituted 18.99%, 24.48% and 28.07% in 2010, 2011, and 2012 respectively (NBS, 2015a).

*Table 1 Domestic Product at 1990 Constant Basic Prices (₦ Billion)*

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<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>495.0</td>
<td>527.6</td>
<td>561.9</td>
<td>595.8</td>
<td>634.3</td>
<td>672.2</td>
<td>719.0</td>
<td>776.3</td>
<td>834.0</td>
<td>888.9</td>
<td>950.1</td>
</tr>
</tbody>
</table>

CBN, 2015b

The Nigerian real-estate sector is grouped into five main asset types comprising; residential building, non-residential buildings, office furniture, machinery and equipment, and transport equipment (NBS, 2015b). The NBS statistics show that the residential segment shared ₦484,739.80 of the ₦1,150,946.76 million. Residential building or housing or includes the construction of private homes, flats, condominium and apartment buildings. In the developing countries, housing is often funded by the private individual whereas in the developed countries, it is generally funded by the developers. Government also provide substantial part of the housing, through partnerships with the developers, housing associations or providing loans to the private owners or housing associations that meet certain criteria. In Nigeria, housing deficits has remained a tropical issue despite government interventions through policies, regulations and controls. For instance, according to the World Bank, the estimated cost of building a house in South Africa is USD36,000, USD26,000 in India but it is USD50,000 in Nigeria (NBS, 2015a). Furthermore, while housing prices has increased globally over the past decade, the case in Nigeria is remarkable. While the monthly rental price for 4 executive house is USD 8,500 in Nigeria (Abuja), in other major Africa cities like Cairo (Egypt), Accra (Ghana) Cape Town (South Africa) and Algiers (Algeria) is USD 3,500; USD 5,000; USD 5,000 and USD 5,000 respectively (Knight Frank, 2015). For instance, from 2001 to 2011, house price has increased by 284%, 209% and 161%, in India, Russia and South Africa respectively (The Lloyds TSB International Global Housing Market Review, 2012). In Nigeria, over the same period, house price has increased by up to 500 % (The Lloyds TSB International Global Housing Market Review, 2012). The increase in house prices has outpaced income by a significant margin, leaving most in medium and lower-income groups without access to affordable homes. Consequently, the housing gap is widening further, gradually building up to a crisis. However, there is a lack of accurate
estimates on the size of the housing deficit, with many sources (including the government) quoting conflicting and unrealistic figures. In the following paragraphs, the quantity of housing shortages is established based.

**Estimating Nigerian Housing Deficits**

As of 2012, the number of housing units in Nigeria was 28,900,492 (NBS, 2012). However, in a previous appraisal, with an assumption of annual home production of 100,000 units it was estimated that by 2015, the number of the housing units would near 29,200,492 (Olanrewaju and Paul, 2015). The author also assumed that the 28,900,492 was obtained based on survey conducted in 2011. However, latest data shows that the total additional units for 2010, 2011 and 2012 were 39,817, 47,093 and 48,800 respectively (NBS, 2015a). From these figures, there was an increase of 18.27% from 2010 to 2011, but from 2011 to 2012, the increase was only 3.62%. In other words, the size of the housing unit will be about a million less as compared to 28,200,492. But even at the 29,200,492, these statistics exposed the weaknesses in the various housing policies and a portend severity in the nation’s real estate markets and to prospective home owners and buyers. For instance, if this figure is contrasted with the current population of 178 million, it implies there are approximately 6 persons per housing unit. This statistics also means that, home ownership is theoretically 17%. The 6 per dwelling is consistent with information from the National Population Commission that found that about 30% of the homes are occupied by more than six persons (National Population Commission, 2013). However, this is double more than the standard of 3 persons per home, based on the international standard.

The interpretation of the annual home production rate is that less than one housing unit per 1000 of population is built annually. Whereas, based on UN recommendations, developing countries ought to build at least eight units per 1000 population annually (see Gurusamy, 2009). Furthermore, a rule of 70 analyses indicates that if 100,000 units are produced annually it will take many decades for the housing gap to close. However, if the 48,800 for 2012 is considered, it is certain that the deficit will never be closed. But, while this growth rate is not sustainable, the 48,800 housing units is quite small considering the Nigerian population. For instance, Malaysia, a country of 31 million people has an annual home production of 110,000 units (NAPIC, 2014). Therefore, deductively for Nigeria to provide housing for its 178 million population it requires 60 million housing units to accommodate her existing populations against the 29 million it presently has. This is in contrast with the often cited deficit of 17 million units claimed not only by Nigerian media and government (NBS, 2015a).

With a difference of more than 30 million housing units, and contrasted with the home production that is even less than 50,000 annually, theoretically it implies that it will take about 300 years to close the widening housing gaps. In order to close the gap by the year 2050, home production will need to be 21 times its current rate. That is about 1 million housing units per year is required. But, with annual population growth rate of 2.8 since 2010 and with the estimation that the population would exceed 300 million in 2050, it an indicative that even the 1 million homes production will be few than adequate towards the 2050. Based on the three persons per home principle, the 30-million figure means that at least 90 million Nigerians either have no decent homes, or are homeless. But the intermediate question is so where do those people lives? Some immediate answers are, in the major cities, some will take roommates, the young will continue to stay with their parents instead of moving out; marriage is
delayed; births are delayed; and productivity will reduce as workforce reduces, demand for health care facilities for senior citizens will rise.

However, Table 2 suggests that close to 70% of Nigerians own their house. However, these data are strongly skewed by ownership in rural areas. In fact, as may be seen from the table only less than 40% of Nigerians living in the cities own their house. Yet, an analytical insight drawn from Table 3 implies that on average, 60% of the housing units owned are either a single room, a flat, or a duplex. Therefore, even if 68% Nigerians actually owned their house, it is generally not more than two rooms which accommodate six or more occupants. This conjecture could be supported by the argument that over 50 per cent of Nigerian is either homeless or live in inadequate houses (The Nigerian-British Chamber of Commerce, 2015). Furthermore, a number of studies have also concluded that Nigerian home-owners are not satisfied with their homes (Odum, 2015). For example, only 20% of the households reported using a water-closet for toilet facilities, only 15% used pipe-borne water, and less than 2% used electricity or gas for cooking (NBS, 2012). An anecdotal observation suggests that more than 80% of the housing units are individually-funded (personally-financed).

Table 2 Percentage Distribution of Household by Type of Housing Tenure 2010

<table>
<thead>
<tr>
<th>Tenureship</th>
<th>Urban</th>
<th>Rural</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owned</td>
<td>39.1</td>
<td>76.6</td>
<td>68</td>
</tr>
<tr>
<td>Employer Provides</td>
<td>1.9</td>
<td>1.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Free, Authorised</td>
<td>15.6</td>
<td>12</td>
<td>12.9</td>
</tr>
<tr>
<td>Free, Not Authorised</td>
<td>2.1</td>
<td>1.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Rented</td>
<td>41.3</td>
<td>8.6</td>
<td>16.1</td>
</tr>
</tbody>
</table>

(NBS, 2013)

Table 3 Percentage Distribution of Households by Type of Housing Unit, 2009

<table>
<thead>
<tr>
<th>Unit</th>
<th>Urban</th>
<th>Rural</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single room</td>
<td>65.8</td>
<td>55.4</td>
<td>59.2</td>
</tr>
<tr>
<td>Flat</td>
<td>12.7</td>
<td>4.1</td>
<td>7.2</td>
</tr>
<tr>
<td>Duplex</td>
<td>0.7</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Whole Building</td>
<td>19.9</td>
<td>39.6</td>
<td>32.4</td>
</tr>
<tr>
<td>Other Types</td>
<td>0.9</td>
<td>0.7</td>
<td>0.8</td>
</tr>
</tbody>
</table>

(NBS, 2013)

Table 4 presents the consumer price index of selected goods/services in Nigeria. Over the last ten years, the price of housing has increased at a rate faster than other goods/services. The 2014 cost of housing was almost three times the price that it was in 2004 (an increase of 200%), whereas income has only increased by about 10%. While income is relatively uniform across the country, housing prices are much less so; in most major cities, the actual increase is much higher than the aforementioned threefold.
### Table 4 Consumer Price Index at December (All Urban Centres) 2000 – 2014

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All Items</td>
<td>57.1</td>
<td>67.66</td>
<td>74.65</td>
<td>83.3</td>
<td>92.77</td>
<td>101.4</td>
<td>112.2</td>
<td>122.3</td>
<td>140.0</td>
<td>151.4</td>
<td>163.4</td>
</tr>
<tr>
<td>Food</td>
<td>55.01</td>
<td>70.85</td>
<td>72.34</td>
<td>78.88</td>
<td>89.62</td>
<td>101.6</td>
<td>113.4</td>
<td>124.5</td>
<td>137.6</td>
<td>151.0</td>
<td>165.4</td>
</tr>
<tr>
<td>Clothing and Footwear</td>
<td>67.4</td>
<td>71.96</td>
<td>90.31</td>
<td>93.98</td>
<td>98.49</td>
<td>100.9</td>
<td>113.8</td>
<td>120.2</td>
<td>141.2</td>
<td>152.19</td>
<td>162.9</td>
</tr>
<tr>
<td>Housing, Water, Electricity, Gas and Other Fuel</td>
<td>60.0</td>
<td>58.55</td>
<td>74.8</td>
<td>88.31</td>
<td>96.19</td>
<td>100.8</td>
<td>111.5</td>
<td>119.2</td>
<td>132.1</td>
<td>139.76</td>
<td>151.6</td>
</tr>
<tr>
<td>Furnishings &amp; Household Equipment Maintenance</td>
<td>60.12</td>
<td>68.86</td>
<td>76.8</td>
<td>89.89</td>
<td>96.19</td>
<td>100.8</td>
<td>111.5</td>
<td>119.2</td>
<td>132.1</td>
<td>139.76</td>
<td>151.6</td>
</tr>
<tr>
<td>Health</td>
<td>63.22</td>
<td>79.12</td>
<td>89.23</td>
<td>91.22</td>
<td>95.87</td>
<td>101.6</td>
<td>112.9</td>
<td>122.1</td>
<td>133.6</td>
<td>142.74</td>
<td>152.7</td>
</tr>
<tr>
<td>Transport</td>
<td>61.43</td>
<td>69.28</td>
<td>85.12</td>
<td>98.59</td>
<td>93.87</td>
<td>102</td>
<td>111.7</td>
<td>128.2</td>
<td>143.1</td>
<td>153.43</td>
<td>164.0</td>
</tr>
<tr>
<td>Communication</td>
<td>100.59</td>
<td>99.09</td>
<td>97.82</td>
<td>101.41</td>
<td>99.3</td>
<td>99.2</td>
<td>100.8</td>
<td>104.6</td>
<td>113.8</td>
<td>118.65</td>
<td>123.5</td>
</tr>
<tr>
<td>Recreation &amp; Culture</td>
<td>78.27</td>
<td>80.86</td>
<td>99.35</td>
<td>98.42</td>
<td>98.57</td>
<td>104.2</td>
<td>109.2</td>
<td>107.9</td>
<td>122.8</td>
<td>131.14</td>
<td>141.7</td>
</tr>
<tr>
<td>Education</td>
<td>54.82</td>
<td>61.45</td>
<td>69.26</td>
<td>86.16</td>
<td>90.91</td>
<td>100.7</td>
<td>109.3</td>
<td>114.6</td>
<td>129</td>
<td>137.72</td>
<td>147.4</td>
</tr>
<tr>
<td>Restaurant &amp; Hotels</td>
<td>52.37</td>
<td>49.05</td>
<td>77.23</td>
<td>91.03</td>
<td>102.69</td>
<td>103.2</td>
<td>111.3</td>
<td>121.1</td>
<td>127.3</td>
<td>135.89</td>
<td>146.4</td>
</tr>
<tr>
<td>Year-on (%)</td>
<td>11.76</td>
<td>18.41</td>
<td>10.34</td>
<td>11.59</td>
<td>11.37</td>
<td>9.30</td>
<td>10.70</td>
<td>9.00</td>
<td>14.50</td>
<td>8.12</td>
<td>7.9</td>
</tr>
</tbody>
</table>

CBN (2015)

### Issues in Nigerian Housing Prices

Many reasons are cited for the Nigerian housing deficit. Generally, these include the supply as well as demand side factors. Primarily, the reasons for deficit include: lack of access to finance, poor capital and budgetary allocation, poor monitoring of mortgage institutions, an inefficient land market, a disproportionate number of speculators, poor infrastructure (i.e. roads, electricity, water, and telecommunication), and tedious and often conflicting legal requirements. Additionally, the performance of the Nigerian construction sector has a negative impact on the provision of housing. The construction sector is characterised by cost and time overruns, poor workmanship, and high cost of materials. Table 5 presents the cost of construction materials in 2016 compared to their costs in 1999. On the average, the prices of the selected items had increased by some 120% over the last 16 years. Prices of ordinary plywood and blocks experience the worst increase while that of louver windows was mild. The price of cement has remained stable in the last twelve months in comparison to other building materials. This is largely due to government intervention to ensure it remains below the rate of inflation. In fact, cement sold at ₦2500 in 2014. Though, there are improvements in both the financial and capital markets with the establishments of more various institutions, the accessibility to housing loan is very small, only less than 1% of Nigerians have mortgage to finance their homes and mortgage rate could be up to 30% (CAHF, 2014). The ratio of mortgage to GDP in Nigeria is one of the lowest in Africa at 0.58%, whereas in South Africa, Namibia, and Morocco is 22.04%, 18.21% and 13.85% respectively (CAHF, 2014). This leaves most Nigerians to self-finance their homes. As a pointer to this, more than 90% of existing houses were constructed through unstructured self-help (Kumo, 2014). These exacerbate the situation of the already obscure residential housing market.
Table 5 Construction material basic prices (Lagos Zone)

<table>
<thead>
<tr>
<th>Material</th>
<th>Prices (₦)</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement /50kg</td>
<td>460</td>
<td>1,400</td>
</tr>
<tr>
<td>Mild steel bar / ton</td>
<td>31,000</td>
<td>148,800</td>
</tr>
<tr>
<td>High tensile bar / ton</td>
<td>32,000</td>
<td>111,600</td>
</tr>
<tr>
<td>100mm sand Crete hollow block (450mm long x225mm high)</td>
<td>28</td>
<td>150</td>
</tr>
<tr>
<td>Super lightweight corrugated asbestos cement roofing sheet1.8m long 1.05 wide</td>
<td>420</td>
<td>4,200</td>
</tr>
<tr>
<td>Hardwood size 50 x 50 x 3600mm per length</td>
<td>90</td>
<td>300</td>
</tr>
<tr>
<td>Ordinary plywood size for 6x 1200 x 2400</td>
<td>500</td>
<td>4,500</td>
</tr>
<tr>
<td>14mm hollow cored flush door size 835mm x 2025 or 750 x 1950mm</td>
<td>1200</td>
<td>12,000</td>
</tr>
<tr>
<td>Mild steel Louvre carrier for 4 no. blades per pair</td>
<td>340</td>
<td>850</td>
</tr>
<tr>
<td>Emulsion paint/ 4 litter tin</td>
<td>610</td>
<td>900</td>
</tr>
<tr>
<td>13mm diameter 6m length galvanized mild steel pipe</td>
<td>700</td>
<td>2,400</td>
</tr>
<tr>
<td>13mm dia. 6m length PVC pressure pipe</td>
<td>190</td>
<td>1,200</td>
</tr>
<tr>
<td>Ceramic floor tile size 200x200mm, 25pieces/crate</td>
<td>800</td>
<td>1,350</td>
</tr>
</tbody>
</table>

$1 = ₦199.03 (https://finance.yahoo.com/currency-converter/#from=USD;to=NGN;amt=1)

To increase the housing supply, the government has intervened in a number of ways. The federal government has established: the National Housing Fund, National Housing Scheme, the establishment the Federal Mortgage Bank, the Nigeria Housing Finance Programme, Liquidated Federal Mortgage Finance Limited, Informal Sector Cooperative Housing Loan Scheme, Federal Housing Authority, and the Nigerian Mortgage Refinance Company. The Nigerian Mortgage Refinance Company is driven by substantial private sector participation consisting of commercial banks, primary mortgage banks, insurance companies, private equity investors and other stakeholders. Different states have developed various initiatives toward affordable housing provisions.

However, government efforts on housing delivery are still rather low and inactive. For example, between 2007 and 2011, the expenditure on the housing segment remains very low at around 2% of the total capital expenditure (Table 6). In 2007 and 2008, it was less than 1%. There are evidences to shows that the situation has not changed. For instance, in 2014, out of the ₦18.5 billion allocated to the Ministry of Lands, Housing and Urban Development, only ₦13.5 billion is allocated for capital expenditure on housing and urban development (CAHF, 2014). Assuming this amount was wholly committed to providing more homes, at ₦7 million per homes, only less than 3000 of two-bedroom bungalows could be provided in urban centres. A 3 bed rooms flat, excluding the cost of land, costs minimum of ₦8 million in Kaduna, ₦10 million in Abuja, ₦10million in Port Harcourt, ₦11 million in Lagos. However, the household income of more than 75% Nigerians is less than ₦20,000 (NBS, 2012). Contextualising the 30/40 rule on affordable housing into the Nigeria situation simply means more than 80% of Nigerians are unable to own a home. For instance, in the urban areas, the average rental value is ₦77,760 annually.

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1 The percentage is determined based on mid-value calculation
2 The Quantity Surveyor, 1999
3 Market survey by authors, 2016
Table 6 Federal Government Capital Expenditure, 2007 – 2011 Billion Naira

<table>
<thead>
<tr>
<th>Period</th>
<th>Housing</th>
<th>Road and Construction</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>5.8</td>
<td>105.7</td>
<td>759.3</td>
</tr>
<tr>
<td>2008</td>
<td>8.9</td>
<td>126.9</td>
<td>960.9</td>
</tr>
<tr>
<td>2009</td>
<td>0</td>
<td>138.5</td>
<td>1,152.80</td>
</tr>
<tr>
<td>2010</td>
<td>20.4</td>
<td>195.4</td>
<td>883.9</td>
</tr>
<tr>
<td>2011</td>
<td>22</td>
<td>150.7</td>
<td>918.5</td>
</tr>
</tbody>
</table>

(NBS, 2012)

Under the National Housing Programme of 1993, homebuyers were expected to deposit 40% of the total building cost. Yet, as of 1995, only 18,500 of the promised 121,000 units were constructed while houses prices had increased by 350% from 70,000 to 350,000 naira (UN, 1998). Also, because of poor policies formulations, the various governments are not meeting their expectations. The Federal Housing Authority launched to provide affordable housing, however, it supplied less than 1000 units annually since it existence. The National Housing Programme was constrained by the poor conceptualisation and ineffective processes in the acquisition of land.

Concept of affordable housing - housing the low and middle income groups

The concept of affordable housing is defined variously. There are several indices to measure the affordability of housing in a country. But, two of these indices are more commonly cited and applied than the rest. According to the first (the “30/40”) housing is affordable if it does not cost for more than 30% of the household income. This principle evolved from the United States National Housing Act of 1937 (Schwartz and Wilson, 2008). For rental purposes, the 30% would include rental cost and associated interests, bills for electricity, water, gas, sewage and garbage collection. In case of the mortgage, the amount includes the actual payment, tax, insurance, utilities and maintenance costs. by implication spending more than 30% of household income on housing is considered as “cost-burdened”. According to the second index, affordable housing is also defined in terms of the ‘median multiplier’ (Demographia, 2014). Based on the annual International Housing Affordability Survey, in order to measure the affordability of housing, Demographia compares median house price to median household income. Based on either of these definitions, housing in all major cities in Nigeria is ‘severely unaffordable’ to both medium as well as low-income earners (Demographia, 2015). For instance, cumulatively, annual expenditure for the rental in the cities is ₦77,762 or 30.7% of the household monthly income (NBS, 2013). This is excluding utilities bills and maintenance of the homes. With utilities bills, the figure goes up to more than 40% of household income. Due to lack of accuracy on the median income, the mean income is used as proxy here. The mean income is 41,000 for more than 90% of Nigeria or 11,000 for more than 75% of Nigerian (NBS, 2012).

Preliminary Findings on Components of Housing Governance

Housing governance is the framing within which housing delivery is implemented to ensure housing provision and client requirements are achieved. Housing governance comprises mechanisms, processes, and institutions through which the different stakeholders’ in the housing market articulate their interests, exercise their legal rights, achieve their housing needs, and reconcile the problems face in meeting the their housing requirements. The housing governance framework defines the
mechanisms and interactions through which governance is put into action, can be an important tool for the government to enhance their efforts in providing home to the Nigerians. Because of space limitation, an overview of the initial results is presented in this manuscript while detail balance will follow in other manuscripts. Based on an extensive literature review, 58 factors that potentially account for the current situation of housing in Nigeria were found (Olanrewaju and Anavhe, 2015). The factors were measured on a Likert scale of 1-5. The survey was administered on construction and property professionals, 78 completed survey forms were analysed. The respondents includes estate surveyors and valuers (42%), architects (24%), quantity surveyor (18%), engineers (12%) lawyers (3%). More than 80% them have more than 5 years working experience. The respondents were drawn from the government, contracting firms, material suppliers, developers and consultants. Based on weightage mean calculation, the top ten factors are: lack of construction management skills (0.921); harsh housing regulatory/legal framework (0.898); High interest rate on mortgage (0.895); poorly configured vocational training for the construction professional (0.895); lack of appropriate pricing mechanisms (0.895); sub-standard materials (0.887); nonconformance to design specifications (0.887); lack of effective implementations of the housing policies (0.887); lack of continuity in government policies (0.885), and poor consideration of sustainability in housing delivery (0.885). Details observations on the results suggest that the factors can be classified into, sector based, government policy based, economy factors and external factors. However, most of the factors have been investigated and considered in proffering measures to the housing crisis by governments’ and previous researchers in Nigeria. Therefore, the concluding question that may be asked is why then is the housing gap widening? The concluding answer includes, the major problem lies with the compartmentalisation of the factors. These factors have not been considered together, but on ‘piecemeal’ bases and only on an ad hoc basis. To move towards addressing the Nigerian housing deficits, systemic considerations of the complex factors is required involving the major stakeholders including the government, developers, banks, home buyers/owners and, manufacturers. In order to ensure housing provision and meeting of client requirements, housing delivery needs to be implemented within the framework of housing governance. Figure 1 graphs a framework for housing governance based on the outcomes of the survey (see also Olanrewaju and Paul, 2015).

![Figure 1: Housing Governance- Hgovernance](image-url)
CONCLUSIONS AND FURTHER RESEARCH

With this paper, we have begun to propose alternative solutions to the housing deficit, by focusing on the complexity of issues on both the supply as well as demand sides. Though the conclusion presented here is at the preliminaries stage, but even at this stage, we are able to arrive at some important conclusions. First, the problems in the housing delivery extend beyond the supply and demand theories, with the current production rate, housing deficits will forever remain. In relative as well as absolute terms, the annual growth rate is low. Also we have quantified and modelled a more reliable estimate for housing shortages. While our conclusions are based on sound arguments and indeed compelling, it is still incomplete. We need to model the housing market operations and this requires more data from the stakeholders. Knowledge of operation of the market will enhance understanding and help provide robust solutions. As previously argued, this does implies that solution is fully within the markets, rather government policies are required. While regulations and policies are not enough, there is a need for definite policies and regulations that stressed engagements with households, manufacturers, financial institutions and housing associations. To stimulate the housing delivery, government will have to provide the necessary infrastructures like roads, water and electricity supply especially at the suburbs. This should be supported by a good transport system. Therefore, we need to answer the following questions: how does the government formulate policies? How are the objectives of the policies achieved? What applicable instruments does the government formulate? We also seek to investigate as to why economic theories have been unsuccessful in the present case. Why has the market been unable to correct the housing shortage? Is the market even capable of correcting housing shortage? The market seems to have failed affordable housing supply, and there is need for government intervention.

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END
EFFECTIVE FACILITIES MANAGEMENT OF RESIDENTIAL PROPERTIES: A LITERATURE REVIEW

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It is pertinent that buildings are livable, safe and productive. However, buildings, through occupancy, are subjected to degradation which poses unique challenges with regard to the security, health and productivity of the occupants; thus, impacting on the immediate environment and economy at large. The paper presents a review of barriers to effective maintenance of residential building facilities. Findings revealed that poor or non-existent pre-construction facility management provisions, financial constraints, lack of government support and late implementation of facilities management, hinder regular and efficient management of dwellings. Other barriers identified are the utilisation of non-professional facility managers and poor administration of a service charge account. The study provides evidence for professionals in the real estate sector to take necessary pre-emptive actions against mismanagement of residential buildings and facilities so as to prevent degradation.

Keywords: facilities, management, occupants, residential buildings.

INTRODUCTION

Facilities management (FM), as known today, is an important aspect in the built environment, dating back to the 1980s when railway companies in the United States of America (USA) conceived the idea of providing facilities-related services as opposed to providing buildings (Ikediashi et al., 2013). Since then, the concept and definitions have been evolving and many organizations have different views. The definition and scope of FM remains a contentious issue and definitions depend on the local culture, organization’s interest and people’s personal interest (Nor et al., 2014). The International Facilities Management Association (IFMA) and the British Institute of Facilities Management (BIFM) similarly defined FM as the practice of coordinating the physical workplace with the people and work of an organisation (Mustapa et al., 2008; Aliyu et al., 2015). This implies that FM incorporates human resource, space, and services management. The South African Facilities Management Association (SAFMA) defines FM as an enabler of sustainable enterprise performance through the whole life management of productive workplaces and effective business support services (SAFMA, 2016). However, these definitions do not explicitly incorporate the management and/or maintenance of structures. A more explicit and workable definition given by Mustapa et al. (2008) identified FM as an integrated approach to operating, maintaining, improving and adapting the buildings and infrastructure of an

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organization in order to create an environment that supports the primary objectives of the organisation.

In addition to being an integral part of a business organisation, FM is indispensable in ensuring that built environments are livable, safe and productive. Inadequate or inefficient FM, not only renders physical structures and their immediate ambience unattractive, unhealthy and unsafe to inhabitants, but also renders occupants unproductive as a result of ill-health from degraded dwellings. The scope of FM activities is very large, including the management of real estate, of finance, of change, and of human resources, in addition to services maintenance, domestic services, utilities supplies, security, safety and health and contract management, all of the non-core activities of the organization. In relation to the requirements of the occupancy and the kind of occupants to whom means and services must be delivered, a detailed, tailor made package must be created up, especially for maintenance. However, certain factors hinder the realisation of effective delivery (Mustapa et al., 2008).

Despite the importance of FM in sustaining the built environment, the concept of sustainable FM is grossly under-researched, especially in Nigeria, where awareness is abysmally low and attitude towards it is inadequate (Ikediashi et al., 2013).

Research exists on the potential factors which hinder effective implementation of FM. However, previous literature either dwelt on challenges in a specific country (Mustapa et al., ibid.), or broadly incorporated the implications of variations in house ownership and the roles and relations of tenants, owners, administrators and operators in implementing sustainable strategic management (Nielsen et al., 2012). Likewise, Ikediashi et al. (2013) explored sustainability in terms of functionality and economic terms and employed mixed methods to establish sustainable FM practice in Nigeria, with particular focus on oil and gas projects. More recently, Aliyu et al. (2015) focused on application of FM principles in commercial high-rise buildings in one Nigerian state.

The present paper presents a review of international and Nigerian context with the aim of identifying barriers to effective maintenance management of residential buildings and facilities to sustain their functionality. Maintenance is defined as activities required to keep a facility in as-built condition, while continuing to maintain its original productivity (Wang et al., 2013). The objective of the paper is therefore to identify barriers and potential solutions to effective management of dwellings. To achieve this objective, a distillation of related literature from online databases including Google, Google Scholar, Emerald Insight, Ebsco Host and Science Direct, was done. Various sources including accredited journals, conference proceedings, theses and company reports were consulted. The succeeding sections present a review of related literature on the subject, summary of findings, conclusion and recommendations.

LITERATURE REVIEW

Facilities management in relation to sustainability

The classic definition of sustainability is given by the World Commission on Environment and Development (WCED) in their report, *Our Common Future*, that sustainable development is development that “meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987,
cited in Low et al., 2010)." Mustapa et al. (2008) summarises FM as encompassing the integral managing and execution of housing, services and other means, which contribute to a better performance of the primary process (in relation to effectiveness, flexibility, efficiency and creativity) in changing surrounding (primary process, market, social and technological). This implies that for dwellings to be sustainable, they need to remain effective to serve their intended functional services/purposes. Nielsen et al. (2012) defined sustainable facilities management in terms of environmental performance of buildings and stressed incorporation of environmentally friendly and safe building materials and components such as low energy windows, low flush toilets, low energy bulbs, etcetera, during the design and construction of buildings. However, existing buildings which have not been designed and/or built with such facilities (example, old buildings) still need to be maintained to preserve their use.

Ikediashi et al. (2013) opined that the evolution of sustainable FM practice has consistently been driven by the need to contribute to a reduction in the impact of built environment (construction and real estate related projects and actions on the environment), thereby advancing the sustainability agenda across the three bottom lines of economic, environmental and social sustainability, measured by substantial reduction in wastes (waste management), increased productivity through efficient work practices and reduction in energy consumption. This implies that FM should commence at the design and construction stages of a building and not just implemented at upon completion/occupation of the property, a view supported by Enoma (2005), Wang et al. (2013) and Jawdeh (2013) who stressed that the implementation of FM at the design stage of building and facilities development makes provisions for future maintenance, reduces incidence of reworks, thereby ensuring consumer satisfaction and good value for money in the long-run. The author further stated that FM at the design stage of construction ensures less rework and lower maintenance costs. Basically, sustainability entails ‘to keep in existence; to maintain in order to remain continuously available, present and the future’ (Low et al., 2010).

**Overview of facilities management practice**

According to Mustapa et al. (2008), FM in Asian countries such as Hong Kong, Malaysia and Singapore is basically oriented towards research, practice and education. The practice of FM in Malaysia at present is undertaken by real estate companies due to the fact that buildings such as high rise office towers are managed by property consultants, who basically provide property and building management services as well as simple operations and maintenance. In addition, most companies manage a limited range and number of properties and therefore provide services related to their core employer’s area of expertise. There are no designated facilities management firms. Computerised systems are used to provide integrated functions to allow management to control aspects involving property management, building operation and services management, space management, data monitoring, security, maintenance tracking, as well as monitoring energy consumption by occupants (Mustapa et al., ibid.).

A qualitative study which employed site observations and interviews of facility and maintenance managers compared FM implementation at the development stage of construction of high-rise buildings in Sri Lanka and revealed that in the United Kingdom (UK), the government policies integrate strong ties between construction and FM, for instance, Private Finance Initiative (PFI) contracts, where design,
construction, finance and operation of projects are consolidated, have demonstrated the strong links between construction and operation (de Silva, 2011). However, this integration of FM in the development phase is unpopular in Sri Lanka due to a lack of awareness of this profession in the local industry as it is still in its adolescent stage and the absence of designated facilities manager in most government buildings and FM functions are usually outsourced in many private organizations. In addition, with the aging and increasing rate of development of high-rise buildings, maintainability recently became a heavy burden, a situation also reported in Mustapa et al. (2008).

Koleoso et al. (2012) reported that in Sweden, facilities managers are not different from traditional building support service providers such as property managers, asset and maintenance managers and that the use of the title of facilities manager is more of a marketing strategy. According to the authors, in some parts of Asia and Europe, FM is yet to integrate the strategic FM, and in the UK, FM is mostly cost-focused and operational. Koleoso et al. employed quantitative methods to compare FM practices in Nigeria and other regions where FM evolved, with emphasis on building support services.

Similar studies conducted in Nigeria revealed that the practice of FM is still in its infancy but growing due to the country’s rising profile as one of the fastest growing entities in the emerging market economies (Ikediashi et al., 2013). A recent study which dwelt on properties, albeit commercial revealed that facilities provided in the studied high-rise buildings were in poor condition due to the “below-average” level of FM practice (Aliyu et al., 2015). Aliyu et al.’s study, which employed quantitative research methods to investigate the application of FM practices in high-rise commercial properties in Jos, Nigeria, revealed various tools including outsourcing, in-house sourcing and co-sourcing, used in practice. Effective FM could entail assigning some activities or functions, usually non-core activities, to external service providers in order to focus on core functions in an enterprise, termed outsourcing (Kurdi et al., 2011).

**Barriers to effective management**

Panoply of factors was identified as barriers to effective implementation of FM. These are discussed hereunder.

*Poor or non-existent pre-construction FM provisions*

According to Enoma (2005), de Silva (2011) and Jawdeh (2013), pre-construction provisions which articulate end-uses’ needs at the design stage hardly exist. As a result, quality is compromised and rework is needed, in some cases. Inclusion of FM at the development phase minimizes maintainability problems at the occupancy phase (de Silva, 2011). De Silva’s qualitative study in Sri Lanka identified critical, but preventable, maintainability problems (such as defects in floor components, plaster and tiles, etcetera) which originated during the development phase of the sampled high-rise buildings and which escalated management costs as a result. The lack of attention for future maintenance requirements was the most critical factor that gave rise to the problems, for instance, future needs with regard to frequency, method and access systems of cleaning and maintenance, budget, etcetera, should be considered at the pre-construction stage.
Use of non-professional personnel
The nature of FM requires professional competence and input in such areas as formulating and communicating facility policy, planning and designing for continuous improvement of service quality, identifying business needs and user/customer requirements, negotiating service level agreements, establishing effective purchasing and contract strategies, creating service partnership and creating systematic service appraisal in terms of quality, value and risks. However, Mustapa et al. (2008) opined that in Malaysia, FM services are being undertaken by operatives who are traditionally blue-collar employees with limited training. This view was supported in a similar study in which the essence of competent facility managers was stressed (Ikediashi et al., 2013). Interestingly, Ikediashi et al. (2013) explained that the sustainability of the FM services rendered was negatively affected by the dearth of trained FM professionals to handle intelligent and green buildings. The situation is compounded by a lack of tools for appropriate training and response to emergency maintenance needs (Mustapa et al., 2008; Ikediashi et al., 2013).

Poor administration of a service charge account
A major challenge of service charge administration stems from the competence or lack thereof of the managing agent regarding service charge administration. The challenges of service charge administration in Nigeria as identified by Okpala (2013) stems from improper budget practice, lack of consideration of service charge items with heavy price fluctuation, and above all lack of excellent communication and reward system resulting from weak budgetary control. The study recommended that budgetary control should be intensified to motivate employees to embark on service cost minimization to gain savings or at least achieve a state of break-even in order to promote tenancy relationship and achievement of financial objective. This study however, investigated FM from the view of managing operatives and the commercial/economic value of properties.

Lack of government support/incentives and inadequate infrastructure
A lack of incentives and support from the government makes it difficult for organisations to commit and create routines around environmental issues (Nielsen et al., 2012; Ikediashi et al., 2013). In agreement with this view, Mustapa et al. (2008), opined that the lack of funding support exacerbates a situation of uncertainty about benefits from FM as most building managers claim that their profits are not as much as expected and in order to adopt an integrated FM system, funding support is required. This suggests that another factor hindering the advancement of FM practices is uncertainty of benefits and outcomes. According to Ikediashi et al. (2013), as it is today in Nigeria, inadequate infrastructure base and organisational resources at federal and state levels means that even with the existence of laws and regulations, it would be difficult to achieve compliance.

Late implementation of facilities management
Implementation of FM is late for most buildings, especially aging buildings with high level of deterioration (Mustapa et al., 2008; Nielsen et al., 2012). However, FM may help in standardising future maintenance allocation required albeit maintenance costs may be higher as building services in poor condition, due to improper maintenance carried out in the past, may be more expensive to maintain.
Non-existence of standards to measure performance and relevant laws and regulations

Lack of relevant laws and regulations to guide FM practice hinders effective implementation. The non-existence of standards that can be used to measure the quality and performance of both traditional and integrated FM applied by the building/property management is a major challenge in FM. Depending on the services provided or practices applied for the buildings, practices may vary from one firm to another. Laws and standards should ideally guide FM practices. The slow pace of regulating appropriate FM standard or regulation in Malaysia hinders FM (Mustapa et al., 2008). The situation is even more important where political class distinction is rife. Enforcement remains weak and ineffective where political bickering among the political class slows down the legislative process (Ikediashi et al., 2013). Furthermore, performance of properties should be measured in order to identify potential for improvement. As Roka-Madarasz (2011) aptly stated, benchmark metrics and standards should be available to identify early warning signs of obsolescence in buildings, to help prioritise maintenance or remodeling works and to assist in achieving value for money (on the part of the end-users).

Financial constraints

Due to the high costs of maintenance of degrading properties, finance for maintenance is a problem (Ikediashi et al., 2013). A high financial cost involved in the management of facilities was one of the identified difficulties encountered in the FM of high rise commercial properties (Aliyu et al., 2015). In addition, due to high initial costs, the lack of software development or computerized systems for integrated FM is a major challenge (Mustapa et al., 2008).

The above factors were identified as major barriers to effective FM in management of buildings. Other factors including housing administrators having too little time and too few resources, limited data on energy consumption, limited knowledge about environmental themes, lack of consensus and focus about sustainability, lack of senior management commitment, were also indicated (Nielsen et al., 2012). However, although Nielsen et al.’s study dwelt on sustainability of buildings in terms of energy conservation and climatic considerations, it is noteworthy that the indicated factors are relatable to sustainability of residential buildings in terms of functionality.

DISCUSSION

A plethora of factors was identified as barriers to effective management of residential properties. These barriers could cause conflicts between the property owners, the occupiers and the facilities managers. As part of its regulatory function, the Royal Institution of Chartered Surveyors (RICS) has developed a code for the administration of service charge in residential and commercial properties which can be adopted by facility managers. By formulating this code, one of the aims of the RICS is to improve the general standards of practice, encourage uniformity, fairness and transparency in the management and administration of service charge (RICS, 2014). Though the code was developed to be used in England, specifically, aspects of the provisions can be adopted in different geographical locations. There is a need for promulgation of relevant laws and regulatory framework to guide stakeholders generally, particularly foreign investors, who are investing in the national economies (Ikediashi et al., 2013).
Innovation management principles should be incorporated at all levels - strategic, tactic and operational (Scupola, 2012).

CONCLUSION

The study set out to establish barriers to effective implementation of FM in dwellings with a view to sustaining their functionality as healthy and habitable. The study found that non-existent pre-construction facility management provisions, financial constraints, lack of government support and late implementation of facilities management, hinder regular and efficient management of dwellings, use of non-professional facility managers and poor administration of a service charge account hinders effective facilities management. By highlighting potential barriers to efficient management of residential buildings and their facilities, the study adds to the body of knowledge on literature regarding facilities management. In addition, the study provides evidence base for professionals in the real estate sector to take necessary preemptive actions towards prevention of mismanagement of residential buildings and facilities, thereby preventing degradation. Attention to these identified barriers, especially in Nigeria, where the concept is fast-growing is vital to ensure effective maintenance of residential properties. Adequate tools, training and incentives could be provided to support the FM building services.

Owing to time constraints, the present paper presented a synthesis of literature. A survey research is needed to establish the perceptions of practicing facility managers on the hindrances they encounter in the course of their work. Further studies could also explore the relationship between facilities management and sustainability of buildings in terms of preserving commercial or market value, since the present paper dwelt on satisfaction and productivity of residential estate occupants.

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END
CONSTRUCTION
THE IMPLEMENTATION AND ASSESSMENT OF DISTRIBUTED LEADERSHIP IN UAE CONSTRUCTION

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The United Arab Emirates (UAE) and most of the wider Middle East have recently witnessed a boom in development and infrastructure which is focused on strategic vision. The success of the increased volume of construction activities therein is partly underpinned by ‘effective leadership’. A study of some aspects of leadership in UAE construction was carried out and its objectives included: an evaluation of the traits of leadership styles; the impact of culture on the types of leadership; the influence of leadership on project outcomes and the implementation of distributed leadership. The current paper concentrates on distributed leadership while the findings of the other objectives are being considered for dissemination elsewhere. The theory of leadership is reviewed to highlight many approaches following which a quantitative research approach to achieve the foregoing objectives is described. Data was empirically collected from 90 respondents, mostly project managers, using a questionnaire. The data was analysed by inferential statistics to establish the perceptions of the respondents on inter alia the efficacy and achievements of distributed leadership in construction project implementation. Findings show mixed but more favourable responses to the understanding, efficacy and desirability of the concept of distributed (joint) project leadership in construction as well as its positive impact on project outcomes. More respondents felt the concept contributes to some positive project outcomes and does not necessarily lead to delays. However, more respondents felt its implementation contributes to lengthy decision making and greater overhead costs.

Keywords: Construction Projects, Culture, Leadership, Project success, UAE.

INTRODUCTION

A leadership scenario is often found where there are people (Tannenbaum and Schmidt, 1973). The process and role of leadership is to apply knowledge and skills to influence a group of individuals to achieve a common goal (Northouse, 2016). The type and style of leadership can crucially impact on the way people understand and respond to situations (Hughes et al., 1996). Consequently, leadership influences the success of many endeavours including construction projects. Several factors can influence the appropriateness of effective leadership style e.g. culture and social values etc. Accordingly, Fatehi (1996) argued that what constitutes a good leader in one culture may not be assessed so in other scenarios. In this regard, the perception of joint-leadership in ‘United Arab Emirates’ (UAE) construction projects is examined empirically.

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The UAE has a group oriented culture which is based on values and ethics that focus on family, friends, society, honor and religion (Rohm Jr, 2010). It is plausible that this communal approach is being extended to construction where a project can be led by two project managers, i.e. joint-leadership. This practice was investigated empirically to assess the perceptions of project participants on the efficacy, impact and way forward of implementing joint-leadership in construction projects in the UAE. This paper dwells more on the perception of some practitioners regarding the impact of joint-leadership on project outcomes.

The next section provides a review of literature and after that, the research method used is explained. The analyses and findings are then presented and discussed while the last section presents the conclusions and recommendations.

**LITERATURE REVIEW**

**Leadership**

There are many definitions of leadership (Bass, 1990). The concept has been defined in terms of traits, behaviour, influence, interactional patterns and role relationships; and most definitions assume that leadership involves a process whereby intentional influence is exerted by one person over other people in order to guide, structure, and facilitate their activities towards achieving common goals (Yukl, 2006; Northouse, 2016).

Leadership has been a major interest of people throughout human history, especially during the early twentieth century. In a review of leadership from the early 20th to 21st century, Higgs (2003) identified six major schools of thought: trait, behaviour, contingency, visionary, emotional intelligence, and competency. In addition to these, Müller and Turner (2007) added the three historical schools of Confucius, Aristotle and Barnard.

Within the different schools of thought, different classifications of leadership types are theorized in literature. What is tending towards a more universally accepted nomenclature is a two-fold macro-level classification of leadership e.g. Randeree and Chaudhry (2012) considered the main categories of: style and behaviour or attitude of the leader. Similarly, the two-fold categorization of: task-oriented (directive) and behavioural or relationship-oriented (supportive) leadership have also been reported (by: Bass and Avolio, 1994; Brown, 2003; Burke et al., 2006; Tuuli et al., 2012). There is a breadth and depth to the discussions of the types of leadership but that is beyond the scope of the present paper.

**The joint leadership model**

Leadership can be administered by either one person, known as a focussed or vertical approach; or several individuals, known as: ‘shared’ or ‘distributed’ leadership (Carson et al., 2007), ‘self-management’ (Barry, 1991) or ‘complementary-leadership’ (Miles and Watkins, 2007). While vertical leadership is top-down, shared leadership evolves within a team (Ensley et al., 2006) and is related to but distinct from a simple cooperation between individuals (Carson et al., 2007). The phrases shared leadership, distributed leadership and especially joint leadership are often used interchangeably in literature (see list of references) and has been adopted in this study to refer to a situation where more than one person is steering the course of a construction project.
In shared leadership teams, those involved complement each other in terms of strengths, contributions and roles (Miles and Watkins, 2007). Knowledge from anyone in a leadership team is allowed to thrive. The concept can also be implemented such that leadership can shift to different members over time (Carson et al., 2007). It is ideal for individual skills or strengths to show forth as needs arise or demands are placed on a shared leadership team. Thus distributed leadership or self-management teams can evolve more organically (Barry, 1991).

The two elements of shared leadership are: the leadership is provided by members of a team collectively; and members rely on each other (Carson et al., 2007). However the right roles or skills need to be present at the right time (Barry, 1991) and synchronisation amongst members is crucial (Zaccaro et al., 2001). The balance in their dynamics can be disrupted detrimentally when people move up or out of a leadership team (Miles and Watkins, 2007).

Distributed leadership can be used in sub-groups within an organisation and in projects as well (Barry, 1991). Also, in situations of distributed leadership, one individual is often needed to be the visibility or representation of the group (Barry, 1991). “Today, complementary-leadership structures are common and, in some cases, even institutionalized” (Miles and Watkins, 2007). However empirical studies of these are rather more recent (Carson et al., 2007) particularly in construction. This paper concerns an empirical study of shared leadership in UAE construction.

In DL it is crucial that the right roles or skills are present at the right time for efficacy (Barry, 1991). Thus, DL can face a setback when one leader departs as his/her unique strengths may be missed before a replacement is found. Synchronisation amongst joint-leaders is very important too (Zaccaro, Rittman and Marks 2001). The process of decision making in DL can take longer, as a group usually listens to its many voices prior to a resolution. In contrast an individual leader can make a quicker decision even when he/she has to take on board the suggestions of others. However the benefits of DL can be harnessed to overshadow these drawbacks.

There was some anecdotal evidence of the use of joint-leadership in UAE construction at the project manager level. The lead researcher had witnessed this practice. The research team was able to visit a few project sites to actually observe two project managers operating simultaneously. This was an inspection visit and not the main research itself. During this inspection visit, the team spoke with a few project managers about distributed leadership (DL). Meanwhile, the general acceptability, performance and impact of DL at project manager level was unreported in literature. Thus building on the work of Randeree and Chaudhry (2012) who studied leadership styles in the UAE, the research team decided to explore the impacts of distributed-leadership on project outcomes. In this regard, the team inquired from the few project managers they had met during the inspection visit if they were aware of the impacts of their organisation’s approach to the use of DL in project management. They answered affirmatively. They also indicated their willingness to answer further questions in a full-fledged study. The team was thus encouraged to pursue this line of empirical enquiry.

Leadership versus management

Notably there is a distinction between leadership and management. While leaders are good at providing direction, solving problems and making strategic decisions, managers are good at working within established guidelines and often implement the decisions of leaders (Sweeney, 2001). People would voluntarily follow a leader on the basis of his/her characteristics while they
may follow a manager on the basis of formal authority. Some people may be very good leaders while others are very good managers but the gap between these two is ever narrowing. In this regard, you would find good leaders with management skills and good managers with some leadership skills (Plucknette, 2014). The term leader-manager is being used to describe people with the two sets of skills.

In the context of the last paragraph, a construction project manager can be described as a leader-manager. To foremen, gang leaders and operatives on site, the project manager is their leader. To an organization, the project manager may be a manager who implements the decisions of his/her superiors. So the project manager could be studied in terms of leadership or management. This study concerned the former (leadership) wherein two project managers operating side by side in one project were studied.

**RESEARCH METHOD**

A questionnaire was used to collect data from people involved in leadership roles on construction projects in the UAE. The data was mainly quantitative. A particular emphasis of the investigation was the efficacy of joint-leadership in UAE construction and its impact on project outcomes. A big client in the UAE, the Abu Dhabi Police (ADP), uses two project managers in its construction projects and thus provided an inroad for the study. ADP’s project managers who had experience of distributed leadership where studied.

The questionnaire was developed on the basis of findings from the literature review and concerned the research objectives. The questions and sections of the questionnaire included demographic and general information, leadership style and type of project managers, and impacts of culture and joint leadership on construction project success in the UAE. Some sections of the questionnaire, i.e. leadership type and style, were adapted from Buchen (2005), Lunenburg (2011) and Kotterman (2006). Apart from the section on demographic information, the other sections were calibrated on a 5-point scale where answers were mostly a choice of: strongly agree, agree, neutral, disagree and strongly disagree.

Ethical permission to administer the questionnaire was sought from both the University of Wolverhampton and Abu Dhabi Police. In respect of the later, especially, the process was jointly used to pilot-test the final version of the questionnaire. In this regard, three senior personnel of Abu Dhabi Police vetted and okayed the questionnaire, namely: Manager Projects Administration; Manager, Building Maintenance Administration and Manager, Design and Operations Administration. In addition to this trio, three project managers who had discussions with the research team during the inspection visit were shown the questionnaire and they too felt the contents were understandable and okay. They did not recommend any changes. These three project managers are actively involved in projects where DL is implemented. On the basis of this pilot-testing, the questionnaire was utilised.

145 questionnaires were sent out and 90 acceptable responses were obtained in return, representing a 62% response rate. 83% of the respondents were male and 17% were female. 44% of the respondents have over 10 years of construction work experience. 37% of the respondents were line managers, 41% were middle-level managers and 10% were top-level managers. 41% of the respondents described themselves as project managers, 16% as project engineers, 9% as
design managers, 2% as cost control managers, 1% as quality manager and 26% as other
category. 48% of the respondents were UAE nationals, 43% from other Arab countries and 9% from other and non-Arab countries.

The questionnaire did ask respondents to answer most questions on a 5-point Likert scale that was calibrated as: strongly agree, agree, neutral, disagree and strongly disagree. Their responses were collated on these 5 nominal points. In this paper, the responses have been grouped into 3 categories where the affirmative (yes) responses of strongly agree and agree have been pooled together; likewise the two contrast answers (No) of disagree and strongly disagree have been pooled into one group. This paper thus presents the responses in the three categories of: Yes, No and Neutral.

RESULTS

Different statistics were used to assess the perceptions of the respondents about the concept of distributed-leadership in construction projects in the UAE. This paper reports some of the findings of the investigation.

Use of joint-leadership in UAE construction

In the research investigation, 75% of the respondents indicated they were familiar with the concept of distributed leadership and had been involved in construction projects where it was utilized. However, some respondents felt that the concept is not yet well understood by other project participants (see Figure 1). All the same, 36% of the respondents disagreed to the proposition that the concept was unnecessary (Figure 2). So a few people are yet to understand the concept fully but many more respondents felt its implementation was worthwhile.

Figure 1: The concept of joint-leadership is well understood in the UAE construction sector
How key stakeholders perceive joint-leadership

When asked to rate if certain stakeholders liked the use of joint-leadership in projects some respondents chose to be neutral on these assessments, as illustrated in Table 1. While some of those who proffered an opinion felt that the concept was liked, others felt otherwise. The neutral answer was chosen by more people in this line of inquiry.

The impacts of joint-leadership on the duration of decision making, delays to projects, overhead costs and project success were assessed by the respondents as in Table 2. Again the neutral response was favoured by some people.

Association between perceptions and demographic data

A multiple linear regression model was conducted to explore if the demographic information of the respondents could be related to their assessment of the impact of DL on the outcomes of construction projects in the UAE. These demographic variables included gender, age and education level respondent, length of construction experience in the UAE, nationality, spoken language, job cadre, job title, number of people you lead in construction, duration of leadership in construction, and leadership success rating. A level of significance of 0.05 was used in this analysis.

Table 1: The likability of joint-leadership of projects in UAE construction

<table>
<thead>
<tr>
<th>.... do not like the concept of joint-leadership of projects in the UAE</th>
<th>Breakdown of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yeah</td>
</tr>
<tr>
<td>Construction workers</td>
<td>30%</td>
</tr>
<tr>
<td>Construction Contractors</td>
<td>32%</td>
</tr>
</tbody>
</table>
Table 2: Impact of joint-leadership on project features

<table>
<thead>
<tr>
<th>Please rate:</th>
<th>Responses: Number (percentage) of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint-leadership (use of two or more project managers) in UAE construction leads to …</td>
<td>Yeah</td>
</tr>
<tr>
<td>Lengthy decision making processes</td>
<td>47%</td>
</tr>
<tr>
<td>More project delays</td>
<td>33%</td>
</tr>
<tr>
<td>More project overhead costs</td>
<td>36%</td>
</tr>
<tr>
<td>Greater project success</td>
<td>47%</td>
</tr>
</tbody>
</table>

On the impact of DL on project overhead costs for instance, the 11 independent demographic variables accounted for only 14% of the variance in the dependent variable, i.e. the impact of these demographic variables was very low. Similarly, no high statistical association could be established between these demographic variables and the other attributes in Table 2.

**Benefits of DL in the context of UAE practice**

In an open question, the respondents were asked to identify the major benefits which DL contributes to construction Projects in the UAE. The answers provided were collated and matched against each other to avoid duplication. Some suggestions were made by two or three respondents while a few others were made by more respondents.

The benefits generated from the responses included:

- Increase in Quality
- Improved and enhanced customer satisfaction with the project handover
- Improved development within the project team
- Good services and products delivery
- It provides a learning opportunity for an inexperienced project manager
- Project stability when one manager is absent
- More minds on project issues and possibly better management outcome
- Less mistakes and higher accuracy
- Double checks of actions (checks & balances)
- Sharing of opinions and responsibilities: Better, wider thought-out decisions and more ideas. You get the combined optimum from each project manager
- Understanding the different stakeholders’ interests better.
- An alternative approach
- Satisfying our client
- Saving cost through greater control
- Higher speed of Work
- Project handed over on time
• Higher safety
• Helps in reducing stress to project managers

Challenges of DL in the context of UAE practice
In another open question, the respondents opined challenges with DL which included:
• It adds more to the project overhead costs
• It routinely leads to delays while managers confer
• Sometimes a responsibility is not well assigned to a specific project manager.
• Possible duplication of work
• Not very well understood by stakeholders
• One of the managers may be more adept at decision making this can lead to friction and a lack of cooperation
• Project managers may disagree on important issues
• Lack of clarity: Final decision is made by which project manager?
• Confusion for employees: they should respond to which project manager?
• Potential of having scope gap between different project managers which is not easy to control during project life cycle.
• Coordination is the key challenge for any joint management project
• Every one claims success but when there is any failure they start the blame game.

DISCUSSION AND CONCLUSION
The concept of distributed leadership is highly used by ADP and most of the survey respondents are either involved in it or at least aware of it. There is no uniformity amongst the participants on the influence of joint- leadership on project outcomes. Perhaps the challenges highlighted in the foregoing section underpin the reservations of some of the respondents. However, the respondents could assess and comment on the application of DL by ADP in the UAE. A surprising outcome of the responses was the high number of ‘neutral’ given to many questions. Some responses were scored neutral by over 40% of the respondents. The pattern of neutral responses is quite striking and suggests an underlying reason. It could be: some respondents were less enthusiastic about completing the questionnaire, some participants were holding back due to e.g. fear, or they did not know the precise answers like the impact of DL on cost.

While a few people commented that projects managed by means of DL were completed on time, a few others pointed to the contrasting aspect of delays. Such a contrast of opinion cannot be resolved with the current amount of data. The results are haphazard and cannot be pinned down to any factor statistically. It was prudent for the research to explore into the rationale of the differing views, especially that most questions had a high return for the Neutral category. This was done in a second phase survey where a focus group forum was used to validate and discuss the results as well as explore ways forward for more effective implementation of distributed leadership. The focus group explored deep into the rationale of the Yeah, Nay and Neutral answers. The focus group felt that the yeah, nay and neutral responses were plausible and opined reasons for these three categories of answers. However, the details and results of this focus group investigation are beyond the scope of the current paper.
Subsequent studies are now being considered to explore deep into the different streams of findings highlighted in this paper. Apart from leadership, other factors may contribute to project success. Thus, the exact impact of DL on project outcomes cannot be claimed at this stage but its indicative influence can be surmised.

REFERENCES


END
IMPACT OF QUALITY MANAGEMENT TECHNIQUES ON CONSTRUCTION PROJECTS: A CASE STUDY OF HARTLAND CONSTRUCTION COMPANY, AUCHI, EDO STATE

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The increased desire for stakeholders’ satisfaction in Nigerian construction industry has prompted the need to deliver high performance project and implement effective quality management. This study therefore evaluated the impact of quality management techniques on construction projects with the view to achieving customer satisfaction, cost effectiveness, and defect-free work. The target population were management staff, Engineers, Quantity Surveyors, Quality control officers and Supervising Officers. The respondents were staff of Hartland Construction Company, Auchi, Edo State. Oral interviews and questionnaires were used to collect date from the respondents. Out of 40 questionnaires administered to the respondents, only 26 were retrieved and found suitable for the analysis. Stratified sampling technique, a type of probability sampling technique was adopted. The data were analyzed using percentage and mean score ranking. The result from the analysis revealed the cost benefit analysis, control chart, histogram check sheet, six sigma, stratification, scatter diagram, five ways, pareto analysis, and just-in-time were identified as quality management techniques in the order of severity. Customer satisfaction, enhanced productivity, reduce waste, increase revenue, product performance, reducing quality cost, and avoiding delays were the major identified impact of quality management techniques on construction firms. The study revealed lack of training, inability to change the organizational culture, lack of team work, competition and fraudulent practices, negligence and irresponsibility as the major challenges facing implementation of quality management techniques. Based on the findings, the study recommends that construction management team should ensure that team work and training must be targeted for every level of the company. The study also recommended that management should drive and change the altitudinal culture that quality control is only the responsibility of management.

Keyword: Construction Products, Management, Quality, Techniques.

INTRODUCTION

The construction industry also known as the built environment constitutes a large part of the economy of many nations with a significant contribution to gross domestic product (GDP) of countries (Ofori, 2012). During the past decades, the construction industry has been criticized for its poor performance and productivity in relation to other industries (Hoonakker, Carayon, Loushine, & Smith; Nesan, & Holt; Oglesby, Parker, & Howell’s study as cited in Hoonakker, Carayon, Loushine, 2010). Many of the management practices used to support construction organizations are being challenged because clients are demanding improved service quality,
faster building and innovations in technology. Also, construction companies in developing countries are challenged with many managerial related issues such as planning, effective communication, customer satisfaction, availability of materials and equipment, health and safety consciousness, low level of skilled personnel, lack of teamwork, poor coordination and scheduling and controlling techniques (Ofori, 2012). Additionally, in spite of efforts of government to stem corruption, the practice remains endemic in developing countries of which Nigeria is not exception (Ebekozien, 2012).

Perhaps, in an attempt to meet up with clients demand, the construction companies have turned to the manufacturing sector as a point of reference and source of innovation. There are successful concept associated with the manufacturing sector, such as total quality management (TQM), lean production and reengineering are being adopted and integrated into the construction industry (Hoonakker et al., 2010). Quality management is not derived from a single idea or person. It is a collection of ideas, and has been called by various names and acronyms TQM, total quality management, COU, continuous quality management, SOC, statistical quality control, TQC, total quality control, etc. however each of these ideas encompasses the underlying idea of productivity initiatives that increase profit by improving the product.

Quality management is a business principle that ensures excellence in a company’s products services and internal processes. Companies that implement quality management programs use the information from then to identify weaknesses, faults, areas for improvement and strengths. This gives the company the ability to set standards, make adjustments as needed to offer greater value overall to their customer base (Taylor, 2015). Although the approach to solving quality issues varies with different programs, the goal remains the same to create a high quality, high-performing product or service that meets and exceed internal and external customer expectations. When companies focus on quality management, they create a plan for success.

Several authors have research in this direction. Tam and Abdul-Rahman (2011) identified several hindrances for implementation total quality management techniques on construction sites; Kheni and Ackon (2015) highlighted benefits associated with total quality management using selected construction companies in Ghana. Also, Saeed and Hasan (2012) identified the effects of total quality management on construction project using some selected construction firms in Yemen. Ibironke (2011) studies identified factors affecting quality management on building construction. Therefore, this study examines the effects of quality management techniques on construction projects with a view to achieving customer satisfaction, cost effectiveness, and defect-free works, using Hartland Construction Company as a case study.

The study seeks to assist contractors in identifying the positive effects for the implementation of quality management techniques.

Saeed and Hasan (2012) opined that implementing quality management requires a major organizational change that would transform the culture, process, strategies priorities and belief in an organization. Apart from commitment, top management must educate its employees on the need of quality management so that it will help to reduce the amount of work for employees if they no longer need to attend the customer complaints and defect problems. Many authors argue that quality management can be a solution for the problems (that is cost, productivity, occupational safety and health) that the construction industry encountered on a daily basis (Kanji
& Wong, 1998). Quality management has increasingly been adopted by construction companies as an initiative to solve quality problems and meet the needs of the final customer.

**LITERATURE REVIEW**

The concept of quality management is to ensure efforts to achieve the required level of quality for the product which are well planned and organized. From the perspective of a construction company, quality management in construction projects should mean maintaining the quality of construction works at the required standard so as to obtain customers’ satisfaction that would bring long term competitiveness and business survival for the companies (Tom and Abdul-Rahman, 2011). Arditi and Gunaydin (1997) states that quality management is an effort that involves every organization in the industry on the effort to improve performance. The central theme of the concept stresses three principles i.e. customer satisfaction, employer involvement and process improvement. This is achieved through an integrated effort among personnel at all levels to increase customer satisfaction by continuously improving performances. This is achievable because it provides the culture and climate essential for innovation and for technology advancement.

**Quality Management Techniques (QMTs)**

Quality management (QM) is an integrative management philosophy for continuous improvement of the quality of an organization’s products and processes in order to meet or exceed customer expectations. There are several QMTs used to improve construction management systems. Considering the practices of quality management (QM) as discussed in Cua, Mckone and Schroeder’s study as cited in Boundless (2015) identified most commonly QMT as: Gross-functional product design, process management, supplier quality management, customer involvement, information and feedback, committed leadership, strategic planning, gross-functional training, and employee involvement.

Some authors such as Saeed and Hasan (2012) identified the above as critical success factors of total quality management (TQM) for construction industry.

Boundless (2015) opined that there are some other important and widely used techniques that drew aspiration from quality management with their focus on quality and control. They are:

i. Six sigma: Focuses on improving the quality of process outputs by identifying and removing the causes of defects while minimizing the variability in manufacturing and business processes.

ii. Just-in-time: is a production strategy for improving return on investment by reducing in-process inventory and associated carrying costs.

iii. Pareto Analysis: is a statistical technique used to identify a limited number of tasks that combine to produce a significant overall effect.

iv. Five ways: is a question-asking technique used to explore the cause-and-effect relationships underlying a particular problem.

Similarly Tague (2005) identified seven basic quality tools for process improvement.

5. Cause-and-effect diagram (also called Ishikawa or Fishbone chart): Identifies many possible causes for an effect or problem and sorts ideas into useful categories.

6. Check sheet: A structured, prepared from for collecting and analyzing data, a generic tool that can be adopted for a wide variety of purposes.
7. Control charts: Graphs used to study how is process changes over time.
8. Histogram: The most commonly used graph for showing frequency distributions or how often each different value in a set of data occurs.
9. Pareto chart: Shows on a bar graph which factors are more significant.
10. Scatter diagram: Graphs parts of numerical data one variable on each axis to look for a relationship.
11. Stratification: A technique that separates data gathered from a variety of sources so that patterns can be seen.

Free-Management Ebooks (2015) asserts that there are several technique that can be used in the quality planning process but it is very unlikely that any individual project manager would be expected to be skilled in using all of them. A cost-benefit analysis is by far the most important decision making tool and involves nothing more than common sense and judgment based on experience (Boundless, 2015). All quality management activities have a related cost and that cost must be justified in terms of benefit to the project sponsor and the organization as a whole. No activities should be performed that would equal or cost more than the expected benefits.

**Impact of Quality Management Techniques [QMTS] on Construction Projects.**

QM as a management philosophy developed to improve organizational processes and quality control. It is an integrative management philosophy for continuous improvement of the quality of an organisation’s products and processes in order to meet or exceed customer expectations. Quality management techniques when well utilized provides sustained benefits by achieving customer satisfaction, improving employer quality awareness and consciousness, reducing quality costs, decreasing wastage, avoiding delays, improving organizational performances and closer relationships with sub-contractors and suppliers, and offers firms competitive advantage (Babshalt & Al-Atiq’s study as cited in Kheni & Ackon, 2015).

Similarly, Taylor (2015) opined that the positive effort of a quality management techniques on construction project cannot be over emphasized. The author identified product performance, customer satisfaction, reduce waste, enhanced productivity, and increased revenues among the major of QM on construction products.

**Challenges Facing Implementation of QM in Construction Sites**

There is no gain over-emphasizing the benefits of QMTs if and when fully implemented. However, due to the nature of the construction industry, with a myriad of issues, there are challenges facing the implementation of QMTs on construction site. Tam and Abdul-Raham (2011) noticed several hindrance for implementing QMT on construction site, i.e., too mainly paper work, transient nature of workforce, field employees regard QM as irrelevant, difficulty on measuring result, low bid subcontracting, and subcontractors and suppliers not interested in QM. Similarly, in the view of Aiditi and Gunaydin (1997), the hindrances facing the implementation of quality management are: lack of management commitment, inability to change the organizational culture, improper planning, lack of training, organizational structure problems and isolated individual or department, ineffective measurement and lack of data, inadequate attention to internal and external customers, inadequate empowerment, lack of teamwork. However, Taylor (2015) identified hindrances as follows; lack of education, corruption and
fraudulent practices, negligence, irresponsibility, contractor apprehensive, contractors myopic view, planning and scheduling deficiencies, and absence of clear evaluation standards.

**RESEARCH METHODOLOGY**

The study adopted a survey research technique and was limited to view of a convenient sample of professionals within the study area (Hartland Construction Company, Auchi, Edo State, Nigeria). Hartland Nigeria Limited was founded 1994 and started with haulage of aggregates and other construction materials. It later diversified into civil engineering construction in the year 2009 with headquarter in Abuja and branch offices in more than five states within Nigeria. The staff strength is over 1000, with expatriates over 20 or even more. The target population were: management staff, Engineers, Quantity Surveyors, Quality Control Officers, and Supervisory Officers within the company. These respondents were selected to accommodate both the policy makers and those implementing the policies. The method used to collect data were questionnaires and oral interview while the data collected were subjected to descriptive statistical analysis using percentage, mean score and frequency. The oral interview was carried out through structured oral questions that were directed to the quality control and supervising officers respectively. However, out of the 40 questionnaires administrated to respondents, only 26 questionnaires were retrieved and found suitable for the analysis. Stratified sampling technique, a type of probability sampling technique was adopted for the study.

**DATA PRESENTATION AND DISCUSSION**

Table 1 reveals trend of retrieved questionnaires and respondents designation. From Table 1, it is evident that key staff and professionals that handle quality management related issues were reached. The table indicates that both policy makers and implementing officers of the policies were the respondents to the study.

*Table 1: Pattern of Retrieved Questionnaire and Respondents Designation*

<table>
<thead>
<tr>
<th>Respondents Designation</th>
<th>Nos</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management staff</td>
<td>2</td>
<td>7.7</td>
</tr>
<tr>
<td>Engineers</td>
<td>8</td>
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</tr>
<tr>
<td>Quantity Surveyors</td>
<td>3</td>
<td>11.5</td>
</tr>
<tr>
<td>Quality Control Officers</td>
<td>3</td>
<td>11.5</td>
</tr>
<tr>
<td>Supervising Officers</td>
<td>10</td>
<td>38.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>26</td>
<td><strong>100</strong></td>
</tr>
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</table>
### Table 2: Identified Quality Management Techniques (QMTs)

<table>
<thead>
<tr>
<th>Identified QTMs</th>
<th>Mgt staff Mean</th>
<th>Rank</th>
<th>Engrs Mean</th>
<th>Rank</th>
<th>Q.S Mean</th>
<th>Rank</th>
<th>Qty Control Mean</th>
<th>Rank</th>
<th>Supervising Mean</th>
<th>Rank</th>
<th>Overall Mean</th>
<th>Rank</th>
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</thead>
<tbody>
<tr>
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<td>5.00</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
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<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
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<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
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<td>5.00</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
</tr>
<tr>
<td>Control charts</td>
<td>4.50</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>4.88</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>5.00</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>5.00</td>
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<td>4.88</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
</tr>
<tr>
<td>Histogram</td>
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<td>4.88</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>4.67</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>4.67</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>4.40</td>
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<td>4.62</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
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<td>Check sheet</td>
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<td>4.75</td>
<td>5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>4.67</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>4.00</td>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
<td>4.40</td>
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<td>4.46</td>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>Sox. Sigma</td>
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<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>4.50</td>
<td>5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>4.00</td>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
<td>4.00</td>
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<td>4.10</td>
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<td>4.22</td>
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<td>Stratification</td>
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<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>3.63</td>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>3.99</td>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>Scatter diagram</td>
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<td>3.63</td>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>3.65</td>
<td>8&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>Free ways (cause and effect)</td>
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<td>7&lt;sup&gt;th&lt;/sup&gt;</td>
<td>3.63</td>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
<td>4.00</td>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>3.65</td>
<td>8&lt;sup&gt;th&lt;/sup&gt;</td>
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<tr>
<td>Pareto Analysis</td>
<td>3.50</td>
<td>9&lt;sup&gt;th&lt;/sup&gt;</td>
<td>3.50</td>
<td>9&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>3.31</td>
<td>9&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>Just-in-time</td>
<td>3.50</td>
<td>9&lt;sup&gt;th&lt;/sup&gt;</td>
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<td>9&lt;sup&gt;th&lt;/sup&gt;</td>
<td>3.00</td>
<td>9&lt;sup&gt;th&lt;/sup&gt;</td>
<td>3.33</td>
<td>8&lt;sup&gt;th&lt;/sup&gt;</td>
<td>3.00</td>
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<td>3.27</td>
<td>10&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

### Table 3: Identified Impact of Quality Management on Construction Company

<table>
<thead>
<tr>
<th>Identified Impacts</th>
<th>Mgt staff Mean</th>
<th>Rank</th>
<th>Engrs Mean</th>
<th>Rank</th>
<th>Q.S Mean</th>
<th>Rank</th>
<th>Qty Control Mean</th>
<th>Rank</th>
<th>Supervising Mean</th>
<th>Rank</th>
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<tbody>
<tr>
<td>Customer satisfaction</td>
<td>5.00</td>
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<td>5.00</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
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<td>5.00</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
</tr>
<tr>
<td>Enhanced productivity</td>
<td>5.00</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>4.75</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>4.67</td>
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<tr>
<td>Identified Challenges</td>
<td>Mgt staff Rank Mean</td>
<td>Engrs Rank Mean</td>
<td>Q/S Rank Mean</td>
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<td>Supervising Rank Mean</td>
<td>Overall Rank Mean</td>
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<tr>
<td>Lack of training</td>
<td>5.00 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>4.88 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>5.00 1&lt;sup&gt;st&lt;/sup&gt;</td>
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<tr>
<td>Inability to change the organization culture</td>
<td>5.00 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>4.63 2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>4.67 2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>5.00 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>4.40 2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>4.24 2&lt;sup&gt;nd&lt;/sup&gt;</td>
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<tr>
<td>Issue</td>
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<td>Score</td>
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<td>2nd</td>
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<tr>
<td>Lack of teamwork</td>
<td>1st</td>
<td>5.00</td>
<td>4.63</td>
<td>2nd</td>
<td>4.67</td>
<td>2nd</td>
<td>5.00</td>
<td>1st</td>
<td>3.80</td>
<td>3rd</td>
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<tr>
<td>Corruption and fraudulent practices</td>
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<td>5.00</td>
<td>4.38</td>
<td>4th</td>
<td>4.33</td>
<td>4th</td>
<td>4.67</td>
<td>4th</td>
<td>3.80</td>
<td>3rd</td>
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<tr>
<td>Negligence and irresponsibility</td>
<td>5th</td>
<td>4.50</td>
<td>4.38</td>
<td>4th</td>
<td>4.00</td>
<td>5th</td>
<td>4.33</td>
<td>5th</td>
<td>3.60</td>
<td>5th</td>
</tr>
<tr>
<td>Contractors and sub contractors apprehensive</td>
<td>5th</td>
<td>4.50</td>
<td>4.13</td>
<td>6th</td>
<td>3.67</td>
<td>6th</td>
<td>4.00</td>
<td>6th</td>
<td>3.10</td>
<td>6th</td>
</tr>
<tr>
<td>Improper planning and scheduling</td>
<td>5th</td>
<td>4.50</td>
<td>3.50</td>
<td>7th</td>
<td>3.33</td>
<td>7th</td>
<td>3.67</td>
<td>7th</td>
<td>2.90</td>
<td>7th</td>
</tr>
<tr>
<td>Lack of management commitment</td>
<td>8th</td>
<td>4.00</td>
<td>3.25</td>
<td>8th</td>
<td>3.33</td>
<td>7th</td>
<td>3.33</td>
<td>8th</td>
<td>2.90</td>
<td>7th</td>
</tr>
<tr>
<td>Difficult in measuring result and lack of data</td>
<td>8th</td>
<td>4.00</td>
<td>2.88</td>
<td>9th</td>
<td>3.00</td>
<td>9th</td>
<td>3.33</td>
<td>8th</td>
<td>2.40</td>
<td>9th</td>
</tr>
<tr>
<td>Transient nature of workforce</td>
<td>10th</td>
<td>3.50</td>
<td>2.75</td>
<td>10th</td>
<td>2.67</td>
<td>10th</td>
<td>3.00</td>
<td>10th</td>
<td>2.30</td>
<td>10th</td>
</tr>
<tr>
<td>Contractor myopic view</td>
<td>11th</td>
<td>3.00</td>
<td>2.50</td>
<td>11th</td>
<td>2.33</td>
<td>11th</td>
<td>2.67</td>
<td>11th</td>
<td>2.10</td>
<td>11th</td>
</tr>
</tbody>
</table>
Table 2 reveals the ranking of identified quality management techniques. It indicates that on the average cost benefit analysis was ranked first as the most significant quality management technique in use, others identified in the order of severity were: control charts with overall mean score of 4.88, histogram with overall mean score of 4.62, others were check sheet six sigma, stratification, scatter diagram, five ways, pare to analysis and lastly just-in-time. However, during the oral interview, it was revealed that most of these identified techniques although known to most of the respondents, the level of usage in their organization has been low. Therefore, there is need to create the enabling environment and set the motion in place for staff with a view to fully commerce application.

Table 3 present the ranking of the identified impacts of quality management technique on construction company from the respondents viewpoints. The analysis reveals that customer satisfaction, enhanced productivity, reduce waste, increased revenues, product performance, and reducing quality cost are the most significant impact of quality management techniques on construction. Even the least identified, improving organizational performance with overall mean score of 3.16. This is an indication that all identified impacts are significantly important and could enhance client satisfaction, productivity, and profitability of the construction company if fully implemented. Even with the challenges facing full implementation, yet the company has been able to achieve a lot.

Table 4 reveals the ranking of the identified challenges facing implementation of quality management techniques in the construction industry. It shows that on the overall mean score, lack of training with mean score of 4.98 was ranked first as the most important challenge facing implementation of identified quality management techniques. From the oral interview, apart from the management staff and few others, most staff that are supposed to implement the techniques on site do not have adequate knowledge of how it operate. Moreover, it was revealed that inability to change the organizational culture with the mean score of 4.74, lack of teamwork with mean score of 4.62, corruption and fraudulent practice with mean score of 4.44, and negligence and irresponsibility with mean score of 4.16 were other important hindrances identified facing implementation of quality management techniques.

These identified hindrances in this analysis agreed with major hindrances of Arditi and Gunaydin (1997). This finding also agreed with the assertion by Tayor (2015) that lack of training and teamwork, and inability to change the organizational culture to mention a few are basically the hindrances that determine the level of implementation of quality management techniques in construction.

CONCLUSION

Quality management is critically required for a construction company to sustain in current construction market which is highly challenging and competitive with a view to providing quality products and service in the construction industry. This will result to customer satisfaction, enhanced productivity, and profit making for the construction industry, in addition to other benefits that cannot be overemphasized.
RECOMMENDATIONS

Based on the above findings and conclusion, the following recommendations are proffered among others. The construction management team should ensure that training must be targeted for every level of the company. Also, management should drive and change attitudinal culture that quality control is only the responsibility of management but instead, it should be everyone’s responsibility and a culture and philosophy that must permeate an organization as the method of management. Lastly, management team should create enabling environment for teamwork and operators should be ready to take responsibility for their action/decision.

REFERENCES


EFFECT OF REWORK ON PUBLIC BUILDING PROJECTS: A CASE STUDY OF AUCHI POLYTECHNIC, EDO STATE AND FEDERAL POLYTECHNIC, NEKEDE, IMO STATE, NIGERIA

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Rework is a common occurrence in construction projects and has been identified as one of the factors that can degrade project performance. This study assessed the effects of rework on public building project with a view of proffering remedies to mitigate the causes, and resultant effect of reducing cost and time on building projects delivery. Relevant texts, journals, personal interviews and administered questionnaire were used to obtain data from the stratified randomly sampled population from the two study areas. The target population were construction professionals within Auchi Polytechnic and Federal Polytechnic, Nekede respectively. Out of the 45 questionnaires administrated to respondents in each study area only 28 questionnaires from Auchi Polytechnic and 22 questionnaires from Federal Polytechnic, Nekede, respectively were retrieved and found suitable for the analysis. Stratified sampling technique, a type of probability sampling techniques was adopted. Percentage, frequency and mean score ranking were the statistical tool used to analyse the data collected. The study revealed that poor workmanship, incomplete contract drawings, non-compliance with specifications and corruption, incompetent supervision, and lack of quality assurance/control were identified as most significant causes of rework in public building projects. Cost overrun, time overrun, dispute and litigation, materials and human resources wastage, avoidable claims and variation were identified as major significant effect of rework on the public building projects. Based on the findings, the study recommended the need to encourage application of building information modelling (BIM) and value management (VM) during the pre-contract, encourage team work among stakeholders, and training and retraining of construction professionals among others.

Keywords: Construction Project, Project Performance, Public Building, Rework.

INTRODUCTION

The building industry plays a major role in national development. Hence, there is need to improve the performance of the industry with a view to solving the problems of the industry Oyewobi et al. (2011) opined that cost and time overruns have become a cankerworm with the Nigerian building industry today. This result to lack of good quality work of its end product which do not provide many of the client’s value for money. Love

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(2005) asserts that rework is a major contributor to cost and time overruns in construction project delivery process.

Rework is a common occurrence in construction projects and has been identified as one of the major factors that can degrade project performance (Oyewobi et al., 2011). Perhaps, rework in a construction process has been seen as a wasteful activity. Most times, this occurred as a result of inefficiency. Rework may occur in any conceived construction project at both the design and construction stages. Several researchers (both local and international) such as: Love (2005), Palaneeswaran (2006), Otubu (2013), Oyelola (2010), Oyewobi et al. (2011), just to mention a few, have attempted to identify and evaluate the causes and effect of rework on construction project. None of the author related their study to public building projects. Therefore, assessing the effect of rework on public building projects in higher institutions is timely now that the major source of government revenue, that is the crude oil price, is depreciating day by day. Also it will give stakeholders better understanding and proffer remedies with a view to mitigating rework.

**LITERATURE REVIEW**

The Construction Industry Institute (2001) defined rework as “activities in the field that have to be done more than once in the field of activities that remove work previously installed as part of the project”. Rework in development projects can significantly degrade project cost and schedule performance. Previous studies shows that rework in the construction phase could increase costs by 4% to 12% of the construction contract amount (Hwang et al., 2009; Josephson et al., 2002; Love, 2005). Most times the proportion of money and time spent on rework in the design phase is usually higher than that of the construction phase, as design is an iterative process during which design team try to solve coupled problems with complex relationship.

Love and Edward (2004) classified major causes of rework into four categories. They are:

- **v. Client - Related Factors**: These includes: lack of experience and knowledge of design and construction process, lack of client involvement in the project, lack of funding allocated for site investigation, inadequate briefing, inadequacies in contract and documentation, and poor communication among design team.

- **vi. Design-Related Factors**: These include: ineffective use of quality management practice, poor coordination between different design team members, ineffective use of information technologies, incomplete design at the time of tender and inadequate client brief to prepare detailed contract documentation.

- **vii. Sub-Contractor-Related Factors**: These include; Poor workmanship, use of poor quality materials and supervision, inadequate skills and specific problems associated with multi-layered subcontracting.

- **viii. Other Factors**: These include; setting out errors, changes in construction methods to improve constructability and failure to provide protection to construction works.

Otubu (2013) identified major negative impact of rework on public building projects as follows:
i. Project abandonment
ii. Dispute and litigation
iii. Materials and human resources wastage
iv. Cost over run
v. Time over run
vi. Avoidable claim variations by contractor

Love and Edward (2004), Palaneeswaran (2006) identified factors that will mitigate or eliminate rework occurrence in building projects. They are: changes to the design have to be reduced at construction stage, encourage application of value management principles at the pre-contract stage, encourage the application of building information modelling (BIM) during the pre-contract stage of the project, formal training and retraining of supervisors, design of blue print of quality control plan and application at each stage of the work, and lastly engagement of design team at post contract stage.

RESEARCH METHODOLOGY

The study adopted a survey research technique and was limited to two higher institution from two different locations, one from South-South (Auchi Polytechnic, Auchi, Edo State) and the second from South-East (Federal Polytechnic, Nekede, Owerri, Imo State). The target population for this study were; Architects, Civil Engineers, Quantity Surveyors, Professional Builders and selected clients within the study areas. Prior to data collection, a preliminary survey was carried out to determine respondents within the study population that have been involved in rework in public building projects within the two study areas. Since the population obtained from the preliminary survey conducted to determine total respondents that have been involved in rework in public building projects was less than 200, a census of the preliminary survey was adopted as the sample size of the study (Yamene’s study as cited in Ebekozien, 2012).

The data for the study were collected through the use of questionnaires survey and selected oral interview. Therefore a multi-stage sampling strategy was adopted for the purpose of administering questionnaire. Both judgmental and stratified sampling techniques were adopted. When a researcher chooses the sampling size based on pilot study, the researcher is said to be involved in judgment sampling (Fellows & Liu, 2008). However, out of the 90 questionnaires administered to respondents only 50 questionnaires were retrieved and found suitable for the analysis. Percentage and mean score ranking were the statistical tools used to analyse the data collected.

DATA PRESENTATION AND DISCUSSION

Table 1: Trend of Retrieved Questionnaire from the Two Study Areas

<table>
<thead>
<tr>
<th>S/Nos</th>
<th>Respondents</th>
<th>Auchi</th>
<th>Nekedi</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Architects</td>
<td>3</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Engineers</td>
<td>13</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>Quantity Surveyors</td>
<td>8</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>Professional Builders</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>28</td>
<td>22</td>
<td>50</td>
</tr>
</tbody>
</table>
Table 1 reveals trend of retrieved questionnaires from the two study areas: Federal Polytechnic, Nekede, Imo State; and Auchi Polytechnic, Auchi, Edo State respectively. The researchers decided to restrict the study area to their primary constituency where they work. With this, it was easy to collect data from the respondents. From Table 1, it is evident that the two study areas are well represented and covered properly. Respondents from Auchi Polytechnic (South South) represent 56% while Federal Polytechnic, Nekede (South East) represent 44% respectively.

Table 2 shows identified major causes of rework in public building projects in their order of severity. From Table 2, it is evident that poor workmanship was ranked first in the overall with a mean score of 4.33, although ranked 2nd by Quantity Surveyors and Builders respondents respectively. Second on the overall was incomplete contract documents followed by noncompliance with specification and corruption with a mean score of 3.83. Others on the identified list in the order of severity were: incompetent supervision, poor communication within stakeholders, lack of quality assurance / control, ineffective management of project team, and lastly lack of end user’s contribution at pre and post contract stages. The above findings deviated from Love and Edward (2004) that categorized the factors that causes rework into client-related, design-related, subcontractor-related and lastly others factors respectively.

Table 3 reveals that cost over-run was ranked 1st with a mean score of 4.68 as the most significant effect of rework on public building projects. The uniqueness of this is that it was ranked first in all the groups. Second on the overall was time overrun followed by dispute and litigation with a mean score of 4.25. Others on the identified list in the order of severity were: material and human resources wastage, avoidable claims and variations, and lastly project abandonment with a mean score of 3.11. The above findings deviated from Love and Edward (2004) that identified project abandonment as the most significant impact of rework on building projects. Finding from this study and oral interview reveals that rework in most cases do not lead to project abandonment except there are other outstanding issues from the parties involved.

Table 4 identified ways of mitigating reworks in public building projects in their order of severity. From Table 4, it is evident that application of building information modelling (BIM) was ranked 1st with overall mean score of 4.54, although ranked 2nd by clients respondents. Second on the overall was design of quality control plan and application, followed by team work among construction professionals with a mean score of 4.00. Others on the identified list in the order of severity were: application of value management, formal training and retraining of construction professionals and discourage unnecessary, change during construction with a mean score of 3.04.
### Table 2: Identified Major Causes of Rework in Public Building Projects

<table>
<thead>
<tr>
<th>Identified Causes</th>
<th>Architects Rank Mean</th>
<th>Engineers Rank Mean</th>
<th>Q.S Rank Mean</th>
<th>Builders Rank Mean</th>
<th>Clients Rank Mean</th>
<th>Overall Rank Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor workmanship</td>
<td>4.37</td>
<td>4.25</td>
<td>4.21</td>
<td>4.32</td>
<td>4.50</td>
<td>4.33</td>
<td>1st</td>
</tr>
<tr>
<td>Incomplete contract documents</td>
<td>4.20</td>
<td>4.01</td>
<td>4.25</td>
<td>4.40</td>
<td>4.20</td>
<td>4.21</td>
<td>2nd</td>
</tr>
<tr>
<td>Noncompliance with specifications and corruption</td>
<td>3.50</td>
<td>3.70</td>
<td>3.95</td>
<td>3.10</td>
<td>3.90</td>
<td>3.83</td>
<td>3rd</td>
</tr>
<tr>
<td>Incompetent supervision</td>
<td>3.90</td>
<td>3.95</td>
<td>3.40</td>
<td>3.85</td>
<td>3.40</td>
<td>3.70</td>
<td>4th</td>
</tr>
<tr>
<td>Poor communication within stakeholders</td>
<td>3.15</td>
<td>3.30</td>
<td>3.21</td>
<td>3.37</td>
<td>3.25</td>
<td>3.26</td>
<td>5th</td>
</tr>
<tr>
<td>Lack of quality assurance/control</td>
<td>3.15</td>
<td>3.01</td>
<td>3.05</td>
<td>3.18</td>
<td>3.09</td>
<td>3.10</td>
<td>6th</td>
</tr>
<tr>
<td>Ineffective management of project team</td>
<td>3.01</td>
<td>3.01</td>
<td>2.87</td>
<td>2.95</td>
<td>2.81</td>
<td>2.93</td>
<td>7th</td>
</tr>
<tr>
<td>Lack of end user’s contribution at pre and post contract stages.</td>
<td>2.95</td>
<td>2.81</td>
<td>2.61</td>
<td>2.71</td>
<td>2.70</td>
<td>2.76</td>
<td>8th</td>
</tr>
</tbody>
</table>

### Table 3: Identified Effects of Rework on Public Building Projects

<table>
<thead>
<tr>
<th>Identified Effects</th>
<th>Architects Rank Mean</th>
<th>Engineers Rank Mean</th>
<th>Q.S Rank Mean</th>
<th>Builders Rank Mean</th>
<th>Clients Rank Mean</th>
<th>Overall Rank Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost overrun</td>
<td>4.85</td>
<td>4.58</td>
<td>4.70</td>
<td>4.75</td>
<td>4.50</td>
<td>4.68</td>
<td>1st</td>
</tr>
<tr>
<td>Time overrun</td>
<td>4.85</td>
<td>4.35</td>
<td>4.70</td>
<td>4.35</td>
<td>4.35</td>
<td>4.52</td>
<td>2nd</td>
</tr>
<tr>
<td>Dispute and litigation</td>
<td>4.35</td>
<td>4.10</td>
<td>4.44</td>
<td>4.25</td>
<td>4.10</td>
<td>4.25</td>
<td>3rd</td>
</tr>
<tr>
<td>Material and human resources waste</td>
<td>4.10</td>
<td>3.81</td>
<td>4.50</td>
<td>4.30</td>
<td>4.10</td>
<td>4.16</td>
<td>4th</td>
</tr>
<tr>
<td>Avoidable claims and</td>
<td>3.65</td>
<td>3.15</td>
<td>4.01</td>
<td>3.85</td>
<td>3.50</td>
<td>3.63</td>
<td>5th</td>
</tr>
</tbody>
</table>
## Identified Ways of Mitigating Rework in Public Building Projects

<table>
<thead>
<tr>
<th>Identified Ways</th>
<th>Architects Rank Mean</th>
<th>Architects Rank</th>
<th>Engineers Rank Mean</th>
<th>Engineers Rank</th>
<th>Q.S Rank Mean</th>
<th>Q.S Rank</th>
<th>Builders Rank Mean</th>
<th>Builders Rank</th>
<th>Clients Rank Mean</th>
<th>Clients Rank</th>
<th>Overall Rank Mean</th>
<th>Overall Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encourage application of building information modelling (BIM)</td>
<td>4.52</td>
<td>1st</td>
<td>4.71</td>
<td>1st</td>
<td>4.58</td>
<td>1st</td>
<td>4.67</td>
<td>1st</td>
<td>4.20</td>
<td>2nd</td>
<td>4.54</td>
<td>1st</td>
</tr>
<tr>
<td>Design of quality control plan and application</td>
<td>4.31</td>
<td>2nd</td>
<td>4.33</td>
<td>2nd</td>
<td>4.10</td>
<td>3rd</td>
<td>4.35</td>
<td>2nd</td>
<td>4.35</td>
<td>1st</td>
<td>4.29</td>
<td>2nd</td>
</tr>
<tr>
<td>Encourage team work among stakeholders</td>
<td>4.31</td>
<td>2nd</td>
<td>4.33</td>
<td>2nd</td>
<td>3.80</td>
<td>4th</td>
<td>3.80</td>
<td>3rd</td>
<td>3.70</td>
<td>3rd</td>
<td>4.00</td>
<td>3rd</td>
</tr>
<tr>
<td>Encourage application of value management</td>
<td>3.68</td>
<td>5th</td>
<td>3.70</td>
<td>4th</td>
<td>4.25</td>
<td>2nd</td>
<td>3.80</td>
<td>3rd</td>
<td>3.17</td>
<td>4th</td>
<td>3.72</td>
<td>4th</td>
</tr>
<tr>
<td>Formal training and retraining of construction professional</td>
<td>3.84</td>
<td>4th</td>
<td>3.50</td>
<td>5th</td>
<td>3.51</td>
<td>5th</td>
<td>3.20</td>
<td>5th</td>
<td>2.90</td>
<td>5th</td>
<td>3.39</td>
<td>5th</td>
</tr>
<tr>
<td>Discourage unnecessary change during construction</td>
<td>3.33</td>
<td>6th</td>
<td>3.20</td>
<td>6th</td>
<td>3.18</td>
<td>6th</td>
<td>2.80</td>
<td>6th</td>
<td>2.70</td>
<td>6th</td>
<td>3.04</td>
<td>6th</td>
</tr>
</tbody>
</table>
CONCLUSION

The study has been able to discuss the concept of ‘rework’ which is one of the factors that can degrade building project performance. The study evaluates reworks in higher education institution building projects, a case study of Federal Polytechnic, Nekede, Imo State (South-East) and Auchi Polytechnic, Edo State (South-South). The study identified major impact of rework on public building projects in the order of severity as cost overrun, time overrun, dispute and litigation, material and human resources wastage, avoidable claims and variations, and project abandonment. The study proffer the following: encourage application of building information modelling, design of quality control plan and application, encourage team work among stakeholders, and encourage application of value management, among others as ways to mitigating reworks.

RECOMMENDATIONS

Based on the findings of this research, the following policy recommendations are proposed among others: public building projects should be subjected to building information modelling (BIM). The design of quality control plan and application should not be over-emphasized in any public building project; implementation should be to the letter. Team work should be encouraged among construction professionals and there is need for training and retraining of construction professionals on new trend and technology in the industry.

REFERENCES


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proceedings of the one day seminar on recent developments in project management in
Hong Kong, pp43-44.
CROSS JURISDICTION ENFORCEMENT OF INTERIM MEASURES IN INTERNATIONAL ARBITRATION – PROBLEMS AND PROSPECTS

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The advent of globalization in the world’s business environment in the past few decades is a major factor causing an upward swing in the volume and complexity of international commercial activities. It is not surprising that commercial disputes are following a similar trend. Contracting parties have traditionally sought resolution of their disputes from the national courts, but in the context of commercial business disputes, parties are increasingly turning to arbitration as a favourable alternative. This is because it provides a number of benefits such as awards being enforceable in most countries in the world; ability of the parties to select a neutral forum to resolve disputes; arbitration awards are final and not ordinarily subject to appeal etc. The effectiveness of arbitration in achieving these benefits may be weakened if a party’s ability to destroy evidence or dissipate assets during an arbitration proceeding is not prevented. A claimant’s desire to get justice may be undermined due to unwillingness or reluctance of courts at the place of enforcement to enforce interim measures issued by foreign jurisdictions. This paper reviews the different legal regimes for international arbitration and case laws and finds that international legal frameworks for arbitration contain unclear or no provisions for interim measures. This encourages inconsistent approaches to availability of interim measures and enforcement inter and / or intra jurisdictions; while some jurisdictions place restrictions on enforcement of foreign interim measures, others allow such measures. It concludes that there are prospects for recognition and enforcement of foreign interim measures if the international legal regimes are strengthened to minimise the unclear provisions and include additional provisions for contracting nations to enforce interim measures.

Keywords: Arbitration, Award, Enforcement, Interim measures, Public Policy

INTRODUCTION

The advent of globalization into the world’s business environment in the past few decades has led to an upward swing in the volume and complexity of international commercial activities (Lynch, 2003; Ojeniyi, 2011). Not surprisingly, this has resulted in an increasing number of disputes (Wang, 2003). Parties have traditionally sought resolution of their disputes from the national courts, but in the context of commercial business disputes, parties are increasingly turning to arbitration as a favourable alternative (Carbonneau, 2002). This is because arbitration provides a number of benefits not available through litigation, such as enforceability, neutrality, confidentiality, flexibility of procedures and finality of arbitration awards (Ferguson, 2003).

The duration of an international arbitration may be one year or longer. A party acting in bad faith may, within this timeframe, destroy evidence to weaken the other party’s...
position or dissipate assets to render enforcement of the award impossible. Interim measures pending the final resolution of the dispute may be necessary to prevent such obstructions to arbitral process. Sometimes a party’s aspiration to get justice from arbitration may be undermined due to difficulties related to unwillingness or reluctance on the part of the court at the place of enforcement to enforce interim measures ordered by the arbitral tribunal or the supporting national court of a foreign jurisdiction. A reason that is frequently given for such reluctance is the lack of universal consensus on cross-border enforcement of interim measures (UNCITRAL, 1983). This paper reviews the different legal regimes for international arbitration: Convention on the Recognition and Enforcement of Foreign Arbitral Awards (The New York Convention or NYC); Convention on the Settlement of Investment Disputes between States and Nationals of Other States 1965 (The Washington Convention), and; The Council Regulation (EC) No. 44/2001 on Jurisdiction and the Recognition and Enforcement of Judgements in Civil and Commercial Matters etc. It finds that these legal regimes do not have enough provisions to support recognition and enforcement of foreign interim measures. This paper also reviews the relevant laws of some selected common law and civil code jurisdictions including the United Kingdom, United States of America, Italy and Germany and finds that the different jurisdictions have applied its national law in different ways to permit or prohibit enforcement of foreign ordered interim measures. This paper recommends an amendment to strengthen the inherent weaknesses of the international legal regimes in the area of recognition and enforcement of foreign interim measures. The paper concludes that there are more prospects for recognition and enforcement of foreign interim measures if the international legal regimes are strengthened to minimise the unclear provisions and additional provisions are included to mandate contracting nations to enforce interim measures.

INTERIM MEASURE – WHAT IS IT?

There is no universally adopted definition for the term ‘interim measure’. Renee (2010) defines it as a form of temporary relief ordered by an arbitral tribunal or a competent court to safeguard the rights of the parties until the final award is rendered.

It is similar in function to a court injunction in that it may mandate a party to continue performance of an action or prohibit a party from taking certain actions that may frustrate the dispute resolution.

An interim measure is also known as provisional, protective, conservatory, urgent, precautionary or interim measure, depending on jurisdiction. There are many types of interim measures which vary greatly between jurisdictions, but may functionally be classified into measures relating to preservation of evidence, measures regulating the conduct of the parties during arbitral proceedings, and measures aimed at facilitating enforcement of the final award (Yesilirmak, 2005). Some common types of measures include an order for a party to provide security for costs, anti-suit injunction, search order, and attaching or freezing assets injunction etc. Such measures may be issued ex-parte upon a claimant’s application or upon notice and fair hearing of a defendant.

PROBLEMS FROM INTERNATIONAL LEGAL FRAMEWORKS

This section will examine the interim measures recognition and enforcement provisions in some of the key international legal regimes that have a huge influence on
the recognition and enforcement of interim measures in international arbitration with a view to highlighting their inherent problems.

**Convention on the Recognition and Enforcement of Foreign Arbitral Awards (The New York Convention or NYC)**

The NYC Article III mandates each Contracting State to recognise and enforce arbitral awards rendered in any other Contracting State (UNCITRAL, 1958). However, it does not provide any rules of procedure for recognition and enforcement, which leaves the place of recognition and enforcement with the discretion to apply its own rules of procedure. These may have encouraged inconsistencies of approach to the recognition and enforcement arbitral awards.

Furthermore, the rule only applies to enforcement of ‘arbitral awards’ but is silent on interim measures. The convention does not define the exact meaning of ‘arbitral award’ but left it for national courts to determine the meaning (Van den Berg, 2009). Some courts have held that ‘arbitral awards’ under the NYC regime only apply to final awards, consequently, they would neither recognise nor enforce interim measures.

One of such courts is the Supreme Court of Queensland in Resort Condominiums International Inc. v Bolwell, [1995] that refused to enforce an interlocutory injunction issued by an Indiana State Court on the basis that it was not an ‘arbitral award’ within the meaning of the New York Convention. Other courts have interpreted that the term encompasses interim measures and would recognise and enforce them. An example of such courts is the United States District Court for the Southern District of New York which in Sperry International Trade v Government of Israel (1982) held that an arbitral interim measure to pay a security deposit into an escrow account to protect a final award under the NYC Convention is enforceable.

Article V gives non-compliance of an award with the national law (public policy) as a ground upon which a party can request the court to resist recognition and enforcement of an award. Again, the NYC has by virtue of this provision subject recognition and enforcement of arbitral awards to the dictates of national laws. But as there is no uniformity in the national laws, different jurisdictions would apply different criteria when deciding the question of recognition and enforcement of arbitral awards, and may arrive at inconsistent decisions. For example, in Societe PT Putrabali Adyamulia v Societe Rena Holding et Societe Mnogutia Est Epices, the French Court de Cassation, in enforcing an award that had been set aside in England held that an international arbitral award must be examined according to the applicable rules of the country where its recognition and enforcement are sought. Some courts may extend this position to disallow enforcement of foreign interim measures.

**Convention on the Settlement of Investment Disputes between States and Nationals of Other States 1965 (The Washington Convention)**

Article 54 (1) mandates each Contracting State to recognise and enforce an award, within its territories, as if it were a final judgment of the court.

The definition of an award in this Convention is not very clear as it fails to clarify whether ‘award’ encompasses provisional measures. Also, it subjects the enforcement of an award to the test of national laws. These potentially could create problems as various jurisdictions would approach the issue differently, due to lack of uniformity of national laws as discussed earlier.
The European Union Legal Regime


The Regulation provides for a party to seek provisional or protective, as may be available under the State law. The Regulation clarifies the scope of judgment to cover order of provisional and protective measures. Articles 33 (1) and 36 provide that a judgment given in a Member State shall be recognised and enforced in another Member State, without any special procedure being required.

Although this Regulation expressly provides in Article 1(2) (d), as in Article 1(4) of the Brussels and Lugano Conventions that the scope shall not apply to arbitration, the European Court of Justice (ECJ), in Van Uden v Deco-Line [1998], clarifies that provisional measures to facilitate arbitral process are enforceable. It should be noted that the ECJ decision applies to court ordered interim measures in support of arbitration, which does not appear to cover arbitral tribunal ordered interim measures.

Article 27 of the Regulation says courts of a Member State may not issue an anti-suit injunction to restrain proceedings which have already been brought in another Member State, that other Member State being first seised. This position is further established by the European Court of Justice (ECJ) in the case of Allianz SpA, Generali Assicurazioni Generali SpA v West Tankers [2009] (West Tankers). In this case, the parties entered into a charterparty containing a clause to arbitrate in London, and to be governed by English law. The vessel involved was owned by West Tankers and chartered to Erg Petroli SpA (Erg.), an Italian company. The vessel collided with and damaged Erg’s jetty, and Erg subsequently claimed on its insurance for its losses, and later commenced arbitration proceedings in London against West Tankers for the excess. Erg’s insurers commenced proceedings against West Tankers in the Italian courts to recover the amounts paid to Erg under the insurance policy. West Tankers obtained an anti-suit injunction from an English court restraining the insurers from proceeding with their claim in Italy, on the basis that the dispute before the Italian courts had arisen out of the charter party covered by the agreement to arbitrate in London. The case was appealed to the House of Lords who then referred the case to the ECJ to determine if the anti-suit injunction was consistent with the Regulation. The ECJ held that anti-suit injunction is not allowed under the Regulation.

The decision of the ECJ in this regard is not consistent with the provision of Article II (3) of the NYC that court of a Contracting state should refer parties to arbitration.

Similarly, ex-parte measures issued by a court are not permissible in any jurisdiction within the Regulation. A landmark decision invalidating ex-parte injunction within the EU is established in the case of Bernard Denilauler v SNC Couchet Frères [1980]. In this case a creditor, Couchet Frères, and its debtor, Denilauler, a regional Court of Montbrison, France at the request of the creditor, and without the other party having been put on notice, made an order authorising the creditor to freeze the account of the debtor, as security for a debt. The President of the Regional Court Wiesbaden ordered enforcement. The debtor immediately appealed against the order before the Oberlandesgericht Frankfurt AM Main, which later referred to the ECJ the question
whether an ex-parte interim measures of the judicial authorities of a Contracting State may be recognised and made enforceable in another Contracting State under the Brussels Convention of 1968. The ECJ held that ex-parte measures are not enforceable within the system of recognition and enforcement provided for by Title III of the Convention.

This restrictive position of the ECJ undermines the “surprise effect” of interim measures.

PROBLEMS ARISING FROM NATIONAL LAWS

The United States of America

Article II (3) of the NYC restrains the court from interfering unduly into arbitration and directs the court to refer parties to arbitration. The scope of courts’ restriction has been a subject of controversies in the USA where some courts have adopted a broad interpretation. For example, in McCreary Tire & Rubber Co. v CEAT SpA (1974), the Court of Appeals for the Third Circuit in Philadelphia reasoned that it cannot allow attachments in cases within the remit of the NYC, which mandated courts to ‘refer’ the parties to arbitration. The decision by the Federal Court of Appeals in McCreary was followed by the New York Court of Appeals in Cooper v Ateliers de la Motobecane (1982). The Federal District court in California departed from McCreary in Carolina Power & Light Co v Uranex (1977). It describes the reasoning in McCreary as unpersuasive and held that it would not be against the NYC for the court to maintain the attachment pending arbitration.

The above shows that some courts sharing a similar view to the decision in Carolina Power & Light Co v Uranex may be inclined to enforce interim measures while others that are more persuaded with the decision in McCreary may not enforce interim measures or even entertain any case that is arbitration related.

Italy

Italian Code of Civil Procedure (ICCP, 2006) Articles 806 to 840 contains the Italian law on arbitration. Italy is a party to the NYC, the Washington Convention, the Brussels and Lugano Conventions and the Regulation. Italy has a separate law on the recognition and enforcement of foreign judgments from non-EU States (Law of 31 May 1995 No.218).

Recognition and enforcement of court-ordered interim measures within the judicial area of the Regulation are regulated by Article 47 of the Regulation and the ECJ decision on recognition and enforcement as earlier discussed under the EU legal regime will apply.

In Italy, recognition and enforcement of interim measures ordered by non-EU courts would be administered under the rules of Italian private international law (Law of 31 May 1995, No. 218). Articles 64-67 of this law specifically dealt with recognition and enforcement of a non-EU foreign judgment. Under Article 64 of the private law, a judgment must satisfy the requirements of a fair hearing of both parties and finality to qualify for recognition and enforcement. Interim measures by its nature would not satisfy the test finality, and as the other party would not have been heard, an ex-parte injunction would likely not pass the qualifying tests. Another condition under Article 64 of the private law is that a non-EU judgment must satisfy the requirements that the judgment is not inconsistent with another judgment rendered in Italy (public policy),
and there should be no pending proceedings between the same parties on the same matter before an Italian court, which is consistent with Italian public policy.

An anti-suit injunction is likely to fail the prescribed tests for recognition and enforcement as the matter that is before the Italian court would be the same one that an anti-suit injunction is being sought to against.

In view of the ECJ’s decisions against an ex-parte injunction and an anti-suit injunction under the Brussels Convention and Regulation (by implication) as earlier discussed, Italian courts may not be inclined to recognise or an enforce ex-parte or an anti-suit injunction.

Article 818 of the ICCP prohibits arbitral tribunal from ordering interim measures. Therefore, Italian court will not enforce any arbitral interim measures be it foreign or local. This position is supported in Emanuele and Molfa (2011) citing the Italian Supreme Court, judgment No. 9909 of April 27 2009 which made a declaration that any mutual agreement conferring power to arbitrators to order interim measures would be wholly ineffective, and such orders would be unenforceable.

**Germany**

German Arbitration Law is contained in Book Ten of the Code of Civil Procedure (GCCP, 2006). The GCCP adopts the provisions of the Model Law almost literally (Schaefer, 1997). Germany is a Member State under the New York Convention, the Washington ICSID Convention, the Lugano and Brussels Conventions and the Regulation on recognition and enforcement of foreign (EU) judgments.

The competent court for enforcement of foreign arbitral interim measures is the Court of Appeal as stated under Section 1062 (1) (3) of the GCCP. Upon application for enforcement of an arbitral order by a claimant, the court may grant enforcement if the application meets defined criteria of whether there is a valid arbitration agreement, and that the order will not wholly threaten the continued exercise of the defendant’s business.

The GCCP s.1041 provides that court may exercise its discretion to recast or transpose a foreign arbitral order to make it accord to the German-style.

A party with a foreign interim measure issued by a court within the Regulation judicial area would need to apply to the Competent Court for enforcement under the Regulation or the Brussels Conventions. The Competent Court for this purpose is the Court of Appeal, as stated in Article 39 (1) and Annex II of the Regulation.

Sections 328, 722 and 723 of the GCCP contains the relevant provision for recognition and enforcement of a foreign judgment from outside the Regulation area, which may also include court ordered interim measures as seen in the Van Uden case discussed earlier. Foreign court ordered interim measures may not qualify for recognition and enforcement in Germany as interim measures by their nature may not meet the criteria prescribed in Section 328 that any foreign decision for recognition and enforcement must not have been ordered ex-parte; be final (res judicata); be a civil matter and has been made by a court with an appropriate jurisdiction.

However, the court has allowed exceptions to the general rules. For example when the German Constitutional Court in its decision as to whether an ex-parte order granted by a judge upsets Article 103 (1), which bears semblance to Article 1042 (1) of the GCCP concerning fair hearing, affirms that an ex-parte order does not offend this
provision of the constitution if an ex-parte procedure was necessary to secure interests that would otherwise be endangered.

The German position on anti-suit injunction is summed up in the ruling of the Dusseldorf Regional Appeal Court of Germany, which was quoted in the House of Lords case of West Tankers v Ras Riunione Adriatica di Sicurta SpA (2009) as follows:

“Such injunctions constitute an infringement of the jurisdiction of Germany because the German courts alone decide, in accordance with the procedural laws governing them and in accordance with the existing international agreements, whether they are competent to adjudicate on a matter or whether they must respect the jurisdiction of another domestic or foreign court (including arbitration courts). Furthermore, foreign courts cannot issue instructions as to whether and, if so, to what extent (in relation to time-limits and issues) a German court can and may take action in a particular case”.

It is obvious from the above that German courts cherish their sovereignty, and would not allow its infringement. This position agrees with the ECJ decision in Van Uden, on an anti-suit injunction, as discussed earlier.

England and Wales

The England and Wales Arbitration Act of 1996 applies to all arbitral proceedings where the seat is within the territory of England and Wales or Northern Ireland. Sections 9 to 11 and Section 66 of the Act - Stay of proceedings etc. and Enforcement of arbitral awards respectively, is applicable even where the seat is outside England and Wales or Northern Ireland or where no seat has been designated. England and Wales are Member States under the New York Convention, the Washington Convention, the Lugano and Brussels Conventions and the Regulation.

Foreign court ordered interim measures from within the Brussels and Lugano Conventions and the Regulation area are enforceable under the English law. English law allows enforcement of a judgment obtained from a Superior Court in any Member State under the Foreign Judgments (Reciprocal Enforcement) Act 1933. A party seeking to enforce foreign court ordered interim measures would likely fail as interim measures by their nature may not meet the criteria prescribed in the Act such as finality, fair hearing, and that the measures do not go against the public policy.

The Act of 1996 is not applicable if arbitration is seated outside the territory of England and Wales or Northern Ireland. Consequently, interim measures ordered by arbitrators handling an arbitration with its juridical seat outside England and Wales would not qualify for enforcement in the English court.

The approach of English law in this regard is similar to that in Italy that disallow enforcement of foreign arbitrator-ordered interim measures but is contrary to the position under the German law that is receptive to arbitral interim measures from foreign jurisdictions, as discussed earlier.

It appears from the discussions above that interim measures obtained ex-parte from foreign courts, whether from the EU or beyond, would not qualify for enforcement under the English law since such measures would have been ordered without the opposing party being put on notice.

The English court regards anti-suit injunction to enforce an agreement to arbitrate as giving efficacy to the wishes of the parties to have their disputes settled by arbitration
as against the court (Tan, 2005). This principle is established in Welex A.G. v Rosa Maritime Ltd. (2002). In view of the ECJ decision in West Tankers that renders court-ordered anti-suit injunction not enforceable in the EU Member States, it is still unclear whether English Court would enforce a foreign anti-suit injunction in support of arbitration proceedings.

PROSPECTS FOR RECOGNITION AND ENFORCEMENT

The EU Member States recognised the problems associated with the recognition and enforcement of interim measures in international arbitration and have through the ECJ interpreted the Brussels and Lugano Conventions and the Regulation in favour of recognition and enforcement of interim measures, despite the fact that arbitration is excluded from the regimes of the Regional treaties. But there remains a problem created by these legal instruments, as they only cover interim orders from courts of Member States under the EU Conventions and Regulation. Most States within the EU are restrictive to recognition and enforcement of interim orders from States not covered by the Conventions or the Regulation. Notwithstanding such restrictions, the position of the ECJ shows there are prospects for recognition and enforcement of interim measures as courts in jurisdictions beyond the Lugano and Brussels Conventions and the Regulation may be persuaded by the ECJ decision to enforce such measures in their jurisdictions.

The recognition and enforcement problems discussed above could be minimised, and efficacy of foreign interim measures improved if the following recommendations are implemented at the appropriate level:

Amendments to the NYC to give an arbitral tribunal power to order Interim measures as it deems fit. This would give legitimacy to the power of the arbitral tribunal to order interim measures, even without hearing the opposing party (ex-parte). Such amendments should also include for setting a procedure for cross-border enforcement of arbitral interim measures; power of an enforcement court to recast or amend interim measures to fit national laws; and power to order security for cost so that a party that obtained an unjustified interim measure is obliged to compensate the other party for any damages arising from enforcement of such measure. Such amendments would serve to remove the existing dichotomy surrounding whether a court has the power to intervene or interfere with arbitration, especially in the United States and minimise the inconsistencies regarding recognition and enforcement of foreign interim measures.

It should be recognised that the process of negotiating an amendment to the NYC and other international conventions may not be as simple as it sounds. Some of the many nations that are signatory to the Conventions may oppose any amendment that is not consistent with their national law. However, a better common ground than the present position is not impossible to achieve through negotiations.

Amendment to the Brussels and Lugano Conventions and the Regulation so as to make them applicable to international arbitration. The amendments proposed under the NYC above should be worked into these legal documents.

CONCLUSION

The present position on recognition and enforcement of interim measures in international arbitration under the various international legal regimes and national laws are so diverse and unclear that claimants are usually left in doubt as to whether the interim measures they obtain from a supporting court or arbitral tribunal at the seat
of arbitration would be enforced in a foreign jurisdiction where the defendant has its assets. The NYC failed to define the term ‘arbitral awards’, or make any other provision for recognition and enforcement of interim measures. This has led to inconsistencies in courts of various jurisdictions within the Contracting States as to whether the term ‘arbitral awards’ also covers interim measures. Some nations interpret that the term covers interim measures and have been enforcing interim measures while others interpret otherwise and have refused to recognise or enforce interim measures. To date, there is still no consensus on this matter. This creates problems in terms of where and what interim measures can be enforced in the contracting states under the New York convention.

The problems arising from the interplay between the national laws, regional conventions, international arbitration rules and international conventions may be minimised through harmonisation of the various laws concerning recognition and enforcement of interim measures, in order to comply with the principle of legal certainty, which is key to litigation as well as arbitration, and to promote predictability and commonly acceptable interpretations. Such harmonisation may be achieved through amendment to the NYC and similar treaties, and extending the legal regimes of the Brussels and Lugano Conventions and the Regulation to cover international Arbitration.

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END
The paper examined the impact of public procurement reforms on project delivery, identified and assessed the level of awareness of the public procurement reforms and the level of adoption of the reforms in Southwestern Nigeria with a view to enhancing project delivery. The study area comprised Oyo, Osun and Ekiti States and the respondents were construction professionals including Architects, Builders, Quantity Surveyors and Engineers who were purposively selected. The total number of questionnaire administered was 366 and 238 were suitable for analysis, representing 65.03% response rate. The data collected included level of awareness of public procurement reforms, adoption of public procurement reforms and public building projects executed from 1999 to 2011. The data obtained were analysed using Mean Item Score (MIS), percentiles, factor analysis and T-test. The result of the analysis showed that the level of awareness of the public procurement reforms was high in the three states studied (Ekiti State = 79.24%, Oyo State = 80.52% and Osun State = 85.18%). The rate of adoption of public procurement reform was above average (Oyo State = 64.94%, Ekiti State = 83.02% and Osun State = 87.04%). The application of all sections of the Public Procurement Act was as follows: Osun State =48.16%, Ekiti State =60.38% and Oyo State = 70.13%. The result also showed that procurement reform has not been effective in public building projects delivery in Southwestern Nigeria as there was no statistically significant difference between the pre and post reform periods (p=0.514 >0.05) in terms of cost and time. The study concluded that the rate of adoption of public procurement reforms is high with Osun State having the highest adoption rate but the procurement reforms has not been effective in public building projects delivery in terms of cost and time in Southwestern Nigeria.

Keywords: public procurement reforms, Nigeria, project delivery.

INTRODUCTION

Nigerian construction industry makes significant contribution to the environmental development and the natural economy (Enshassi, Lisk, Sawalhi and Radwan, 2003). Its contribution to the latter is often referred to when considering the contribution of the various sectors of the economy to the Gross Domestic Products (GDP), Gross National Product and such like indices of economy measurement. Public procurement is simply the process by which government acquires goods, works and services required in the course of governance (Anuku, 2011). To some it is the process of public budget implementation, but often it means and includes a little more. As defined by the Wikipedia Encyclopaedia, it is “the acquisition of goods and or services at the best possible cost of ownership, in the right quantity and quality at the right time, in the right place, for the direct benefit or use of government, corporation or individuals, generally via a contract.

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It has been alleged that, the procedure of award of construction contracts in the country is characterized with unethical and corrupt practices. The significance of this is noticed in the waste of public funds, abandoned projects and badly executed projects (Wahab, 2005). Public procurement has undoubtedly become an increasingly important issue in economic and business circles globally. This is evidenced by the growing interest of donors, governments, civil society, professional organisations, the private sector and the general public on matters of public procurement (Odbiambo and Kamau, 2003).

Public procurement is an important function of government for several reasons (Callender and Mathews, 2000). Public procurement has been utilized as an important tool for achieving economic, social and other objectives (Arrowsmith, 1998; Thai, 2001). State and Federal Procurement Laws seek to ensure that public money is not wasted as a result of undue influence, favourism or fraud. These rules restore the belief that all suitors for public and private works/contracts should be treated fairly yet on examination of public procurement system (BMPIU, 2005).

Obama (2009) in his procurement reform efforts for the United States of America was of the opinion that people's money must be spent to advance their priorities and not to line the pockets of contractors or to maintain projects that don't work. He further said that the reform was targeted at putting an end to unnecessary no-bid and cost-plus contracts that run up a bill that is paid by the American people. This he said would strengthen oversight to maximize transparency and accountability and can save the American people up to $40 billion each year. In Ghana, huge and unsustainable foreign debt, excessive budget deficits, huge contractual payment arrears, poor construction performance, corruption and pressure from international financial institutions, forced the government to commit to a reform of public procurement, which culminated in the passing of the Public Procurement Act, 2003 (Steven, 2006).

The proliferation of procurement systems and the many delivery techniques, at least, are a reflection of the determination of the global construction industry to walk towards a brighter future and to address long-known and recognised problems. A survey conducted in year 2000 revealed that before 1999, Nigeria was losing an average of N40billion annually through various kinds of manipulations of the procedure for award and execution of public contracts (Wahab, 2006).

The launching of the ambitious national development plan (1970-74) and the expedient use of contract awards for execution of national projects helped in breeding social ills in the economy (Ekpo 2004). These include the culture of excessive costs, corrupt management and ill-considered contracts. From being a middle income country in the 1970s Nigeria has fallen to be amongst the poorest nations in the world. It should be noted that in the 1960s and early 1970s, Nigeria, Malaysia, Indonesia, Taiwan, Singapore and South Korea had similar income per capital, GDP growth rates and under-developed political structure (Ekpo, 2004). Obasanjo (2003) also stated that “the Due Process Mechanism has saved Nigeria over N102 billion in two years arising from various Federal Government’s over-bloated contracts”.

However, developed and developing countries have need for a well-functioning public procurement system and this is particularly true for developing countries, where
procurement usually accounts for a high proportion of total expenditure (Agaba et al., 2006). Consequently, the pressure to reform may not have been as strong and some developing countries retained a procurement system that differed little from that which was in place during colonial times. However, in recent years, the impetus for reform has increased, partly in consequence of requirements set by the World Bank and other donor organisations as conditions for providing development aid but principally because the inefficiencies of the unreformed systems have become self-evident. The World Bank’s Procurement Loans and Credits specifies the following four major concerns or objectives of public procurement for projects funded by its loans:

- Ensuring that the loan is used to buy only those goods and services needed for the project;
- Ensuring fair competition for all qualified bidders from the World Bank’s eligible countries;
- Promoting transparency or integrity; and
- Encouraging development of indigenous contractors and manufacturers by allowing local buyers to build in a margin of preference for local contractors and manufacturers (Tucker, 1998).

Most donors consider that a well-functioning procurement system is an essential requirement if their funds are to be used effectively to promote development. As most developing countries prefer the flexibility that comes with receiving development aid through budget support, they have an incentive to reform their public procurement and financial management systems.

Hunja (2003) stated that reform programme in many developing countries is to establish a strong and well-functioning procurement system that is governed by a clear legal framework establishing rules for transparency, efficiency and mechanisms of enforcement, coupled with an institutional arrangement that ensures consistency in overall policy formulation and implementation.

PROBLEM STATEMENT

Despite the introduction of public procurement reforms, some shortcomings on issues such as the existence of abandoned and poorly executed projects in the country have continued to raise questions on the impact of this process in construction industry since its establishment (Adewunmi, 2011). It has also been observed that there is abuse of the procurement process, for example, contracts are being awarded to companies other than the best evaluated bidder, retrospective approvals for contracts, inconsistencies in tender evaluation and interference in the contract award process by unauthorised parties (Adewunmi, 2011). In the late 1990s the failure of the existing procurement system to cope with the expansion in government procurement requirements and to deliver value for money had become generally accepted among government and donor partners. In order to reduce the challenges of the contract procurement method, public procurement reform was introduced (Wittig, 1999). Each country has its own economic, social, cultural and political environment, and each country’s public procurement practitioners face different types of challenges, or the same types of challenges but at different levels from their counterparts in other countries (Thai, 2006).
Since the introduction of the reform, several studies have been carried out in this regard. However, none of these studies above have considered the impact of the public procurement reforms especially in Southwestern Nigeria. Thus this paper examined how effective the public procurement reforms have been in the construction industry in Nigeria with a view to enhancing project delivery in the industry. In this regard, this study responded to the following questions:

12. What is the level of awareness of public procurement reforms?
13. What is the rate of adoption of the public procurement reforms in the construction industry in Southwestern Nigeria?
14. What are the impacts of the public procurement reforms on project delivery in the study area?

Aim and Objectives
This study is aimed at appraising the impact of the public procurement reforms in the construction industry in Southwestern Nigeria with a view to enhancing project delivery. In order to achieve this aim, the objectives of the study are to:

vii. identify and examine the level of awareness of public procurement reforms in Southwestern Nigeria;
viii. identify the rate of adoption of the public procurement reform in construction industry in the study area; and
ix. determine the impact of the public procurement reforms adopted on project delivery in the study area.

LITERATURE REVIEW
Construction Procurement Process
Watermeyer (2000) stated that procurement is a process documenting a succession of logically related actions occurring or performed in definite manner which cumulates in the completion of a major deliverable or the attainment of a milestone. The Aqua Group (1999) described procurement as the process of obtaining or acquiring goods and services from another for some consideration. Public procurement is broadly defined as the purchasing, hiring or obtaining by any other contractual means of goods, construction works and services by the public sector (Odiambo and Kamau, 2003).

Masterman (1996) described project procurement as the organizational structure needed to design and build construction projects for a specific client. It is in a sense very true because the process of “obtaining” a building by a client involves a group of people who are brought together and organized systematically in term of their roles, duties, responsibilities and interrelationship between them. The procurement of construction project is vast in scope because it involves the gathering and organizing of myriads of separate individuals, firms and companies to design, manage and build construction products such as houses, office buildings, shopping complex, roads, bridges etc. for specific clients. Procurement comes from the word procure which literally means “to obtain by care or effort”; “to bring about” and “to acquire”. System is about “organized method, approach, technique, processes or procedures”. In this
context, project procurement is very much concerned with the organized methods or process and procedure of obtaining or acquiring a construction product such as a house, shopping complex or road and jetty. It also involves arranging and coordinating people to achieve prescribed goals or objectives.

Procurement is the full range of activities related to purchasing goods, services and works (Watermeyer, 2000). The fact is that just about everyone engages in the act of procurement. In its most basic form, procurement is nothing more than the steps that are used in the acquisition of works, goods and services. From this perspective, all consumers participate in the process of procurement. The first step in the process of procurement is the recognition that there is a need or want for a particular good or service (Ekpenkhio, 2003). Before there is a chance for the acquisition of goods, there has to be the desire to actually gain possession of something, in particular Commonwealth, State and Territorial governments recognize that procurement is a strategic activity that supports the delivery of government goods and services. The Australian Procurement and Construction Council (APCC, 2003) opined that the adoption of national procurement reform principles will assist to generate significant annual savings and efficiencies by encompassing primary drivers such as value for money, risk management, probity and accountability in procurement process.

Construction Procurement Process in Nigeria

According to Ekpenkhio (2003) reforms began shortly after the dawn of democracy through efforts of the President in 1999 who observed that the time-tested method in conducting government business had degenerated to such an extent that the Public Service Rules, Financial Regulations and Ethics and Norms of the Service were jettisoned either due to sheer ignorance or for selfish reasons. Attah (2011) was of the opinion that all the elements that enhance efficiency, reliability and continuity of the system have been tampered with resulting in major and severe set backs for the conduct of Government business.

On the instructions of the President in the year 2000, the Federal Government commissioned the World Bank in collaboration with some Nigerian Private Sector Specialists to undertake studies of its Financial Systems and general procurement related activities (Ekpenkhio 2003). Specifically, the World Bank was requested to assist the Nigerian Government with a process of enthroning efficiency, accountability, integrity and transparency in Government Procurement and Financial Management Systems. The clear objective was and still is to reduce the scope of corruption in public procurement and so improve the efficiency in the management of Nigeria’s public expenditures. At the end of the exercise, two reports, namely the Country Report on the Financial Systems and the Country Procurement Assessment Report (CPAR) was produced. The comprehensive review of the country’s public procurement system covered the existing legal framework; organizational responsibilities and capabilities within government; present procedures and practices; the reliability of government accounting systems and the effectiveness of budgeting systems in directing resources for intended purposes. Comparisons were made in each of these areas on how practices in Nigeria differ from established international best practice. A participatory approach was used for the review, which involved all key stakeholders including Federal, State and Local Governments together with representatives of the private sector. The Task Force created for this purpose was assisted by international and national consultants, financed by the World Bank. Two
Workshops were held and finally the Country Procurement Assessment Report (CPAR) was produced. The report identified five major weaknesses in the existing procurement systems in Nigeria that:

x. Nigeria lacks a modern law on Public Procurement and permanent oversight body to provide guidance and monitor purchasing entities;

xi. the Finance (Control and Management) Act, 1958, together with the Financial Regulations which set basic rules for managing public expenditure have gaps, deficiencies and faulty implementation of existing regulations on procurement (e.g. lack of permanent arrangements for control and surveillance) which create opportunities for bribery and corruption;

xii. due to inflation and lack of regular adjustments on the thresholds of the approving limits of the Tender Boards, their authorization were constantly being eroded resulting in abuses, prominent among which is splitting of contracts;

xiii. there was proliferation of tender boards which were perceived by the private sector as sources of delays and non transparency. In addition, these tender boards appeared to have limited mandates with powers to decide contracts de facto resting with the Permanent Secretary and the Minister/ Commissioner;

xiv. Customs systems and procedures were cumbersome and major causes of delay in clearing goods, and hence a source of corruption; and

xv. Procurement is often carried out by staff who substantially lack relevant training.

The main recommendations of the Country Procurement Assessment Report (CPAR 2000) which were aimed at correcting these identified weaknesses in the procurement environment, focused on six main areas, viz:

- g) the need for a procurement law based on UNCITRAL, the United Nations Commission for International Trade Law model;
- h) the need to establish a Public Procurement Commission (PPC) to serve as the regulatory and oversight body on Public Sector Procurements;
- i) the revision of key areas of the Financial Regulations to make them more transparent;
- j) the streamlining of Tender Boards and strengthening their functional authority, including powers to award contracts;
- k) a critical need to rebuild procurement and financial management capacity in the public sector; and
- l) a comprehensive review of the businesses related to export, import and transit regulations, procedures and practices.

**Public Procurement Reforms**

This study focused on the construction industry in Nigeria. Such a focus provides a comprehensive case history of Nigeria’s procurement reform journey, which makes it easier to model, compare with other construction industries and evaluate the suitability/applicability of strategies developed in other countries. However, there is considerable evidence to suggest that the case histories enacted here are representative of the situations in many Sub-Saharan African countries in particular [Aniekwu and Okpala, 1988; Rwelamila and Meyer, 1996; Lopes, 1998; Rwelamila et al., 1999]. Similar comparators can be drawn in Asia [Kumaraswamy 1994]. The inadequacy of, or deficits in, existing infrastructure services and a rapidly increasing population have left the public sectors in these countries struggling to cope. The infrastructure services
required are invariably basic in nature - housing, hospitals, schools, water, and sanitation. These harsh realities have intensified the search for more innovative means of delivering public services and the need to demonstrate value for money in public construction procurement.

Attah (2011) defined Public Procurement as the acquisition by any means of goods, works and services by the Government. By virtue of the provisions of Section 55(2) of Public Procurement Act 2007, a Public Procurement Entity (PPE) is also a Public Disposal Entity (PDE) which by implication means that public procurement also include the disposal of all government assets (whether tangible or intangible, serviceable or non serviceable). According to Arrowsmith and Trybus (2003), the last decade of the twentieth century had witnessed the start of a ‘global revolution’ in the regulation of public procurement. Procurement reforms occur constantly in all countries, developed as well as whole procurement system if the system is completely dysfunctional such as the on-going procurement in Sierra Leone after a long civil war (Elliott, 2004) and the successful reform in Gambia or fixing some narrow areas in a well-developed procurement system in developed countries.

The aim of the reform programme in many developing countries is to establish a strong and well-functioning procurement system that is governed by a clear legal framework establishing rules for transparency, efficiency and mechanisms of enforcement, coupled with an institutional arrangement that ensures consistency in overall policy formulation and implementation (Hunja, 2003). Uganda’s experience of a centralized procurement system being unable to cope with the demands of a developing economy is shared by several other African countries, including the neighbouring countries of Tanzania and Kenya, both of which have adopted a similar model of decentralised practice subject to central regulation (Agaba and Shipman, 2006).

While some countries maintain successful procurement systems through administrative instructions to civil servants, supported by a few general references to procurement in the Public Finance Regulations, the problems of enforcement and the temptations of malpractice in developing African countries are greater and consequently a comprehensive public procurement law is an essential requirement to reinforce government policy. Even with a procurement law in place, supported by regulations, guidelines and standard bidding documentation, enforcing compliance will continue to be a formidable challenge (Agaba and Shipman, 2006).

**Conditions of Public Building Projects’ Delivery Prior to the Procurement Reform**

The challenges of the construction industry in Nigeria have not been different from that of many other developing nations. Most of these difficulties relate to lack of fiscal transparency and public accountability, in addition to the inadequacy of resources for providing public infrastructures.

For example, in Nigeria, prior to the re-emergence of the democratic governance in 1999, public building projects delivery has been subject to several irregularities which resulted in frequent projects failure. These included poor project planning, insufficient budgeting plans, unnecessary project fragmentation, initial bids inflation and over invoicing, gross change orders during project execution, adoption of inappropriate procurement methods, contract allocation as opposed to competitive tendering, proliferation of incompetent contractors in projects’ delivery, poor documentation and
general lack of transparency in the tendering process and deteriorating ethical standards of public construction practitioners.

According to Ayangade, Wahab and Alake (2009), these anomalies resulted in high project time and cost overruns, job abandonment, improper contract determination, conflicts and litigations, defective job performances and building collapses. Olatunji (2008) stated that contractor selection was not based on value and merits of bid but on tender price and initial lowest bid. The consequence was that Nigeria ranked highest worldwide in the cost of public projects execution (Budget Monitoring and Price Intelligence Unit, 2005). This made the need for the procurement reform in Nigeria to become pertinent. The continual inadequacy of infrastructural facilities to meet the needs of the Nigerian economy coupled with the poor fiscal realities necessitated the dire need for optimal utilization of scarce resources appropriated for the public building projects delivery.

Furthermore, with globalization and advances in information technology, citizens began to demand for greater accountability and efficiency from government and the demands and expectations of the global economy on improving transparency and competition in government procurement added the need to align and harmonize Nigeria’s procurement practices with that of the United Nation Commission for International Trade Law (UNCITRAL) model and the World Bank guidelines. Thus the Public Procurement Reform was introduced to improve service delivery generally in the public sector through focusing on principles and procedures in procurement that would place the country firmly on the path of economic growth. In the public building sector, the reform is expected to promote a sustainable built environment through the application of competition in tendering, effective planning and budgeting for projects and the promotion of global best practices and ethical standards in order to achieve value for money on public building projects (Wahab, 2005). In order to achieve this goal, there is need to take a look at the political situations that surrounds the procurement process.

METHODOLOGY
The target respondents for the study were professionals in the construction industry which included Architects, Quantity Surveyors, Builders and Engineers. Total numbers of 366 questionnaires were administered comprising 69 Architects, 60 Quantity Surveyors, 33 Builders and 204 Engineers. This was based on their involvement in Public Projects, Years of working experience, professional qualification of respondent. From all the questionnaires administered, a total of 241 questionnaires were retrieved. However, after checking through the completed questionnaires, 238 questionnaires were found to be suitable for data analysis which represented 65.03% response rate.

Factor analysis was carried out to reduce many variables of public procurement compliance factors to few conceptually meaningful, relatively independent factors, each of which represents some combination of original variables by factors extraction. Mean Item score was also used to rank the collected data to get the average of the public procurement reforms compliance criteria.

RESULTS
The first objective identified and examined the level of awareness of respondents in the public procurement reforms in Southwestern Nigeria. In Osun State as reflected in the table 1, it showed that 55.55% of the respondents have a high awareness and
knowledge of the Public Procurement Act, the respondents with very high knowledge of the Act accounted for 10.19%, the respondents with average awareness and knowledge of the Act are 19.44% while the respondents with low knowledge and awareness of the Act are 9.26%. Although, the respondent that claimed to know very little about the Act accounted for 5.56% of the total respondents, however, the aim of the public procurement reform is that all concerned should be aware of it so as to have a transformed system. The result indicated that the respondents with high awareness and knowledge of the Public Procurement Act in Osun State have the largest percentage of 55.55%. From the analysis, the respondent with either average, high or very high awareness or knowledge of the Procurement Act in Osun State is 85.18%. This is in order with PPDC (2011) which observed that the number of ministries, departments, and agencies that have established procurement departments with designated procurement personnel is rising, but that, there is also need to step up awareness and compliance levels in the zones, which are currently much lower than in the FCT.

Table 1: Awareness and knowledge of Procurement Act, 2007

<table>
<thead>
<tr>
<th>Level of awareness</th>
<th>Osun Frequency</th>
<th>Percent</th>
<th>Ekiti Frequency</th>
<th>Percent</th>
<th>Oyo Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low</td>
<td>6</td>
<td>5.56%</td>
<td>4</td>
<td>7.55%</td>
<td>5</td>
<td>6.49%</td>
</tr>
<tr>
<td>Low</td>
<td>10</td>
<td>9.26%</td>
<td>7</td>
<td>13.21%</td>
<td>10</td>
<td>12.99%</td>
</tr>
<tr>
<td>Average</td>
<td>21</td>
<td>19.44%</td>
<td>13</td>
<td>24.53%</td>
<td>30</td>
<td>38.96%</td>
</tr>
<tr>
<td>High</td>
<td>60</td>
<td>55.55%</td>
<td>20</td>
<td>37.74%</td>
<td>25</td>
<td>32.47%</td>
</tr>
<tr>
<td>Very High</td>
<td>11</td>
<td>10.19%</td>
<td>9</td>
<td>16.97%</td>
<td>7</td>
<td>9.09%</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100.0%</td>
<td>53</td>
<td>100.0%</td>
<td>77</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Application of all sections of Public Procurement Act

Table 2 showed the response of the respondents from the three states on the application of all sections of the Procurement Act. From the table it can be observed that in Osun State, the respondents who indicated that their organizations always apply all sections of the Procurement Act were 48.16% of the total respondents from the State, 43.52% indicated that their organizations sometimes apply all sections of the Act while only 4.63% indicated never and 2.78% claimed to be indifferent. In Ekiti State, 60.38% of the respondents always apply all sections of the Procurement Act, 37.75% sometimes apply all sections of the Procurement Act, while 1.89% were indifferent. In Oyo state, 70.13% always apply all sections of the Procurement Act, while 22.08% of the respondents sometimes apply all sections of the Procurement Act. This survey indicated that the respondents in Osun Oyo and Ekiti States who always apply all sections of the Public Procurement Act have the highest percentage. PPDC (2011) established that number of public organizations that applied the Public Procurement Act in their procurement process were more than those who do not apply it.

Table 2: Application of all the sections of the Procurement Act

<table>
<thead>
<tr>
<th>States</th>
<th>No Response</th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
<th>Indifferent</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osun</td>
<td>1</td>
<td>52</td>
<td>47</td>
<td>5</td>
<td>3</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>0.93%</td>
<td>48.16%</td>
<td>43.52%</td>
<td>4.63%</td>
<td>2.78%</td>
<td>45.38%</td>
</tr>
</tbody>
</table>
Extent of compliance of organizations with the provisions of the Procurement Act

The second objective examined the rate of adoption of public procurement reforms in the construction industry in line with the level of compliance with the provisions of the procurement Act. The survey report on the extent of compliance of organizations with the provisions of the Procurement Act in Osun Ekiti and Oyo States are presented in Table 3.

From the table, 48.15% of the respondents in Osun State ascertained that their organisations had 60-79% compliance with the provisions of the Act, which is above average, while 38.89% claimed 80-100% compliance with the provisions of the Act. In Ekiti State, 62.26% of the respondents indicated that their organizations had 60-79% compliance with the provisions of the Act, while 20.76% claimed 80-100% compliance. In Oyo State, 62.34% of the respondents have 60-79% compliance with the provisions of the Act while 23.38% indicated 20-39% compliance with the provisions of the Procurement Act. This shows that the organisations had been complying with the provisions of the Procurement Act. The findings also confirmed the opinion of PPDC (2011) by establishing that there is high compliance of procuring entities with the provisions of the Act.

Table 3: Extent of compliance of respondents’ organizations with the provisions of the Procurement Act

<table>
<thead>
<tr>
<th>State</th>
<th>0-19</th>
<th>20-39%</th>
<th>40-59%</th>
<th>60-79%</th>
<th>80-100%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osun</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>52</td>
<td>42</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>0.93%</td>
<td>3.70%</td>
<td>8.33%</td>
<td>48.15%</td>
<td>38.89%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>.4%</td>
<td>1.7%</td>
<td>3.8%</td>
<td>21.8%</td>
<td>17.6%</td>
<td>45.4%</td>
</tr>
<tr>
<td>Ekiti</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>33</td>
<td>11</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
<td>11.32%</td>
<td>5.66%</td>
<td>62.26%</td>
<td>20.76%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>.0%</td>
<td>2.5%</td>
<td>1.3%</td>
<td>13.9%</td>
<td>4.6%</td>
<td>22.3%</td>
</tr>
<tr>
<td>Oyo</td>
<td>6</td>
<td>18</td>
<td>3</td>
<td>48</td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>7.78%</td>
<td>23.38%</td>
<td>3.90%</td>
<td>62.34%</td>
<td>2.60%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.5%</td>
<td>7.6%</td>
<td>1.3%</td>
<td>20.2%</td>
<td>.8%</td>
<td>32.4%</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>28</td>
<td>15</td>
<td>133</td>
<td>55</td>
<td>238</td>
</tr>
<tr>
<td></td>
<td>2.9%</td>
<td>11.8%</td>
<td>6.3%</td>
<td>55.9%</td>
<td>23.1%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Public procurement reforms compliance Criteria

Criteria for public procurement reform were assessed by the respondents using ranking and their responses were subjected to analysis using Mean Item Score (MIS). The result was as presented in Table 4. For the purpose of this study, all factors with MIS value of 2.0 and above were considered to be factors associated with public procurement reforms highly complied with while those below 2.00 were considered to be not significantly complied with.

Table 4 Public Procurement Act Compliance Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>MIS</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existence and functioning of Procurement planning Committees</td>
<td>2.2257</td>
<td>1</td>
</tr>
<tr>
<td>Advertisements contain clear conditions for qualification of bidders in accordance with the act</td>
<td>2.1903</td>
<td>2</td>
</tr>
<tr>
<td>Transparency of bid opening procedure</td>
<td>2.177</td>
<td>3</td>
</tr>
<tr>
<td>Advertisements contain technical description of goods, works or service required</td>
<td>2.1549</td>
<td>4</td>
</tr>
<tr>
<td>Existence of prior budgetary appropriations</td>
<td>2.146</td>
<td>5</td>
</tr>
<tr>
<td>Appointment of sub technical committee of the Tenders board</td>
<td>2.1416</td>
<td>6</td>
</tr>
<tr>
<td>Existence and functioning of Tender Boards</td>
<td>2.1239</td>
<td>7</td>
</tr>
<tr>
<td>Transparency of bid evaluation process</td>
<td>2.0973</td>
<td>8</td>
</tr>
<tr>
<td>Existence of prior procurement plans</td>
<td>2.0929</td>
<td>9</td>
</tr>
<tr>
<td>Written Notification of Bid Winners</td>
<td>2.0885</td>
<td>10</td>
</tr>
<tr>
<td>Use of direct procurement</td>
<td>2.0708</td>
<td>11</td>
</tr>
<tr>
<td>Compliance of Bid Submission procedure</td>
<td>2.0708</td>
<td>12</td>
</tr>
<tr>
<td>Bid examination Procedure</td>
<td>2.0664</td>
<td>13</td>
</tr>
<tr>
<td>Use of open competitive Bidding</td>
<td>2.0221</td>
<td>14</td>
</tr>
<tr>
<td>Implementation of procurement in accordance with procurement plans</td>
<td>1.9779</td>
<td>15</td>
</tr>
<tr>
<td>Mode of advertising and soliciting for bids</td>
<td>1.9558</td>
<td>16</td>
</tr>
<tr>
<td>Solicitations contain clear criteria for selection of winning bidder</td>
<td>1.9027</td>
<td>17</td>
</tr>
<tr>
<td>Use of selective tendering</td>
<td>1.8451</td>
<td>18</td>
</tr>
<tr>
<td>Appropriateness of procurement methods used</td>
<td>1.7832</td>
<td>19</td>
</tr>
<tr>
<td>Level of public access to information</td>
<td>1.4956</td>
<td>20</td>
</tr>
</tbody>
</table>

Project Delivery Performance Before and After the Procurement Reform was Introduced

The third objective of this study was set to determine the impact of the public procurement reforms adopted on project delivery in Southwestern Nigeria. Secondary data on projects executed from 1999 to 2011 were obtained. Data collected on the projects included: project title, date of award, estimated project cost, estimated completion period, final project cost, final completion period, location of the project, procurement process used, reasons for variation in cost and reasons for variation in completion period. The total number of projects collected were sixty five (65). From the data collected on the projects, the time overrun and cost overrun were determined so also the effects on project delivery.

Table 5 showed the cost and time overrun on each project as well as the percentage cost and time differences.

Table 5 Cost and time overrun
<table>
<thead>
<tr>
<th></th>
<th>Project Performance</th>
<th>N</th>
<th>Mean</th>
<th>Std Deviation</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost Overrun</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre reform</td>
<td>16</td>
<td>3.48</td>
<td>1.0501</td>
<td>2.2500</td>
<td></td>
</tr>
<tr>
<td>Post reform</td>
<td>49</td>
<td>2.57</td>
<td>6.1340</td>
<td>1.0051</td>
<td></td>
</tr>
<tr>
<td><strong>Time Overrun</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre reform</td>
<td>16</td>
<td>91.55</td>
<td>148.674</td>
<td>33.034</td>
<td></td>
</tr>
<tr>
<td>Post reform</td>
<td>49</td>
<td>128.33</td>
<td>77.5680</td>
<td>17.566</td>
<td></td>
</tr>
</tbody>
</table>

**Hypothesis 1**

**H₀**: There is no statistically significant difference between the cost overrun at the pre-reform period and post-reform period.

**H₁**: There is statistically significant difference between the cost overrun at the pre-reform period and post-reform period.

**Hypothesis 2**

**H₀**: There is no statistically significant difference between the time overrun at the pre-reform period and post-reform period.

**H₁**: There is statistically significant difference between the time overrun at the pre-reform period and post-reform period.

To examine if the difference in these means are statistically significant at 0.05 value, the Levene’s test is further used. The analysis of the cost overruns as presented in table 6 showed that the value is not statistically significant at (0.521 > 0.05). The second row of column labelled sig. (2tailed) shows there is no statistically significant difference between the two eras because the significance level is 0.358, \( p > 0.05 \), hence there is no statistically significant difference between the means of data on cost overruns before and after the reforms.

In order to test if there is significant difference in the means of data collected on time overruns, at value of 0.05, the column sig in the Levene’s test is 0.448. The value is not statistically significant at assumed. The column labelled sig. (2 tailed) shows the null hypothesis is also supported, \( p = 0.514 < 0.05 \). As identified by Shwarka and Anigbogu (2012), the mean scores on data on time overruns on public building projects in both the pre and post reform era are not statistically significantly different, \( p > 0.05 \), thus equal variances are assumed. The column labelled sig. (2 tailed) shows the null hypothesis is also supported, \( p = 0.514 > 0.05 \). The analysis shows that there is no significant difference in the situation before and after the reforms.

However, with the level of awareness and compliance with public procurement reforms in the study area, it is expected that there would have been significant difference in the outcome on project delivery. This implies that there is need to ensure that there is an improvement in the current level of awareness and compliance with all sections of the procurement Act so as to achieve the desired result on project delivery. There is also the need to pay more attention to the compliance criteria rated below 2.00 by the respondents which include: level of public access to information (MIS value =1.50), appropriateness of procurement methods used (MIS value =1.78), use of selective tendering (MIS value =1.84), solicitations contain clear criteria for selection of winning bidder (MIS value =1.90), mode of advertising and soliciting for bids (MIS
value = 1.96) and Implementation of procurement in accordance with procurement plans (MIS value = 1.98). This implies that there must be considerable effort in achieving high outcome of the public procurement reforms in order to see the significant impact on project delivery.

Table 6: Test of Independent

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>Sig</th>
<th>T</th>
<th>Df</th>
<th>Sig (2-tailed)</th>
<th>Mean Diff.</th>
<th>Std Error Diff</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost Overrun</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances assumed</td>
<td>.541</td>
<td>.521</td>
<td>.705</td>
<td>33</td>
<td>.21</td>
<td>-2.44</td>
<td>2.12</td>
<td>-7.54</td>
<td>3.56</td>
</tr>
<tr>
<td>Equal Variances not assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Time Overrun</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal Variances assumed</td>
<td>.469</td>
<td>.448</td>
<td>.602</td>
<td>33</td>
<td>.514</td>
<td>30.44</td>
<td>51.59</td>
<td>-47.53</td>
<td>117.33</td>
</tr>
<tr>
<td>Equal Variances not assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONCLUSION

It was concluded that the level of awareness of the public procurement reforms in the study area was high in Osun, Oyo and Ekiti States. The perception of the respondents on the rate of adoption and compliance with the criteria for the Public Procurement Reform was above average. This study concluded that the rate of adoption of the public procurement reforms is high with Osun State having the highest compliance rate. However, despite the fact that there is much awareness of the public procurement reforms and the adoption of the reform in procurement process is high with high percentage of application of the sections of the procurement Act, this study concluded that the procurement reform has not been effective in public building projects delivery in Southwestern Nigeria. There is no statistically significant difference from the situations that existed before and after the introduction of the reforms.

There is also the need to pay more attention to the compliance criteria as rated by the respondents which may be the reasons for the non-impact of the reforms on project delivery. The four criteria rated least include: level of public access to information, appropriateness of procurement method used, soliciting for bids and Implementation in accordance with procurement plans. In order to achieve the desired impact,
procuring entities need to ensure strict compliance with the Public procurement reforms criteria.

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END
INTEGRATION OF FORMAL RISK MANAGEMENT APPROACH INTO PROCUREMENT RULES TOWARDS A SUSTAINABLE HIGHWAY INFRASTRUCTURE IN NIGERIA

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Conditions of physical and hard infrastructure have a direct relationship with economic growth and stability of developing and developed countries. A comprehensive and formal risk management guidelines is required to be included into the procurement regulations and rules to ensure effective and efficient provision and rehabilitation of highway infrastructure. This research aimed at deriving adequate and sustainable highway infrastructure in Nigeria through integration of a comprehensive formal risk management practice into highway procurement regulations and rules in Nigeria. The paper reviewed relevant literatures and undertook questionnaire survey of the time performance of 16 Design Bid and Build (DBB) procured highway rehabilitation contracts in Nigeria. Total road density in Nigeria was found to be very low, inadequate and unsustainable compared with the developed countries in Europe and Asian. Numerous provisions/rules of the procurement Act 2007 and Due process rules of contracting games in Nigeria are sources of uncertain conditions and events on the delivery of highway projects. Average time overrun on the 16 highway rehabilitation projects was very high and it is over 142.66\%. Thus, this paper presents a two dimensional risk assessment framework that integrates the techniques in the existing risk assessment models with the techniques adopted in the existing risk management maturity models for effective assessment of time related risk factors on highway rehabilitation projects. The proposed risk assessment framework provides comprehensive formal risk assessment guidelines that could be integrated into the ‘Due process rules of contracting games’ in Nigeria. Application of this framework would reduce the impact of risks on time performance on highway projects and then enhance the condition of highway infrastructure in Nigeria.

Keywords: high way rehabilitation, risk assessment models, risk management maturity models, uncertainties and time overrun.

INTRODUCTION

Infrastructure is described as the basic physical and organisational structure needed for the operation of society or enterprise (Onyiewu, 2011). Jerome (2009) grouped all basic physical infrastructure into two broad classifications namely: social and economic infrastructure. Social infrastructure are the structures built and or operated to support the provision of public social services. It includes: health, market, school, prisons and housing infrastructural facilities. Economic infrastructure are structures built and or operated to support economic growth of a country. It is classified into: transport infrastructure, utilities infrastructure (water, gas and energy), sanitation/sewer, irrigation, information and communication technology (ICT) infrastructure.

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Transport infrastructure includes highways, bridges, tunnels, railways, airports, mass transit, seaports/maritime infrastructure (Deng, 2013). Jones (2006) provides a strong international evidence that transport infrastructure investment is related to overall gross domestic product, sustainable and improved economic growth of a country. Hence, adequate fund for the provision and rehabilitation of highway infrastructure is required to improve highway conditions and the economic growth of a country.

To improve the condition of highway infrastructure and enhance economic development in Nigeria, eight economic development plans has been developed and implemented. Focus of the aspect of highway infrastructure development in the 2nd national development plan include: widening, straightening and surfacing of Trunk ‘A’ roads; construction of new Niger bridge from Onitsha to Asaba and construction of a second Mainland bridge in Lagos (Ighodaro, 2008). The 3rd development plan focused on the rehabilitation of roads that were seriously affected by the Biafran/ Nigeria civil war. It also aimed at the provision of primary and secondary arteries outcross the existing Trunk A and B. The primary road network are to link major cities in the country and the ocean terminals while the secondary will link important centres and installations to the primary. The states are to provide and maintain roads to link the primary and secondary road networks (Ighodaro, 2008).

In 2007, the 7th development plan termed “Nigeria Vision 20: 2020” was presented with the goal of propelling the country into the league of the top 20 economies in the world by the year 2020, with a minimum GDP of $900 billion and a per capita income of no less than $4000 per annum (NV20:2020). The first phase of the Vision 20:2020 covering four years from 2009 to 2013 was planned for the rehabilitation, upgrading and expansion of seven thousand kilometres (7,000km) of the existing highways and completion of the on-going new highway construction projects (Usman, 2010). These economic development programs seemed to have made insignificant improvement to the total length of road network and condition of existing road network in Nigeria.

Between 2008 and 2013, total budgetary allocations of over one trillion Naira (N1, 062,840,000,000) was appropriated for Federal highway rehabilitation and construction projects in Nigeria. Despite the huge highway investments, the procurement regulations and rules in the Due process rules of contracting games in Nigeria lack adequate guidelines for formal risk assessment on the highway projects. Very few project specific research on time performance in highway rehabilitation projects are existing. Okonjo-Iwealla (2013) asserted that highway rehabilitation and construction projects in Nigeria experiences time and cost overrun. Time and cost overrun could be reduced by adopting procurement regulations and rules that involve comprehensive formal risk management practice (Zhang, 2007).

Consequently, the aim of this paper was achieved by comparing the condition of highway infrastructure in Nigeria with what is obtainable in some developed and developing countries in Europe and Asia. Determine the time performance of design, bid and build (DBB) highway rehabilitation projects in Nigeria. The paper also assessed the suitability of the procurement regulations and rules governing ‘DBB’ highway rehabilitation projects in Nigeria for comprehensive risk assessment. Finally, a two dimensional risk assessment framework for highway rehabilitation projects in Nigeria is proposed. This study reviewed related literatures and undertook questionnaire survey of 16 Federal highway rehabilitation projects in the south-west of Nigeria. Time performance on the Federal highway rehabilitation projects was assessed as percentage of time overrun over the initial contract period. Application of
the proposed risk assessment framework in highway procurement would reduce the impact of risks on time performance in highway projects and consequently help to derive sustainable highway infrastructure.

**Conditions of highway infrastructure in Nigeria compared with some developed and developing countries**

Conditions of highway infrastructure in Nigeria are examined in terms of the road density. Total and paved road density is the proportion of the total and paved road length to the geographical land area surface of the countries. Total road length and density between 1904 and 2010 in Nigeria are shown in Table 1. As shown in Table 1, the total road length and road density in Nigeria as at 2010 are 193,233km and 0.212Km/Km² respectively. 65,000km out of the total road length are paved. Table 2 shows that total road density in Japan, Indian and Korea Republic are 3.32, 1.53 and 1.08 km/km² respectively. In France, Germany and United Kingdom, total road density are 1.88, 1.86 and 1.63km/km² respectively. Average total road density for the sampled ten European and nine Asian countries are 1.32 and 0.61 respectively. This implies that provision of paved/unpaved highway infrastructure are too low and inadequate when compared with the developed and developing countries in Europe and Asia.

**Table 1: Total road length, paved and unpaved surface in Nigeria between 1904 & 2010**

<table>
<thead>
<tr>
<th>Date</th>
<th>Locations</th>
<th>Paved Surface</th>
<th>Unpaved Surface</th>
<th>Total road length</th>
<th>Total road density</th>
</tr>
</thead>
<tbody>
<tr>
<td>1904</td>
<td>Zaria-Zungeru</td>
<td>Mule road</td>
<td>21km</td>
<td>0.000Km/Km²</td>
<td></td>
</tr>
<tr>
<td>1906</td>
<td>Oyo-Ibadan</td>
<td>56km</td>
<td>56km</td>
<td>0.000Km/Km²</td>
<td></td>
</tr>
<tr>
<td>1937</td>
<td>Various locations</td>
<td>6,160km</td>
<td>6,160km</td>
<td>0.007Km/Km²</td>
<td></td>
</tr>
<tr>
<td>1939</td>
<td>Various locations</td>
<td>-</td>
<td>9,453km</td>
<td>0.010Km/Km²</td>
<td></td>
</tr>
<tr>
<td>1951</td>
<td>Various locations</td>
<td>1,782</td>
<td>42430</td>
<td>0.049Km/Km²</td>
<td></td>
</tr>
<tr>
<td>1962</td>
<td>Various locations</td>
<td></td>
<td>71,870</td>
<td>0.079Km/Km²</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>Various locations</td>
<td>28,632</td>
<td>86,136</td>
<td>0.126Km/Km²</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>Various locations</td>
<td>65,000</td>
<td>128,233</td>
<td>0.212Km/Km²</td>
<td></td>
</tr>
</tbody>
</table>


**Table 2: Condition of highway Infrastructure in Major Asian and European Countries between 2010**

<table>
<thead>
<tr>
<th>Asian Countries</th>
<th>Total Road density</th>
<th>paved road density</th>
<th>European Countries</th>
<th>Total Road density</th>
<th>paved road density</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>0.44</td>
<td>0.37</td>
<td>Sweden</td>
<td>1.42</td>
<td>0.332</td>
</tr>
<tr>
<td>India</td>
<td>1.53</td>
<td>0.854</td>
<td>Spain</td>
<td>1.368</td>
<td>1.368</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.28</td>
<td>0.156</td>
<td>U.K</td>
<td>1.63</td>
<td>1.63</td>
</tr>
<tr>
<td>Malaysia</td>
<td>0.434</td>
<td>0.353</td>
<td>Brazil</td>
<td>0.189</td>
<td>0.025</td>
</tr>
<tr>
<td>Iran</td>
<td>0.46</td>
<td>0.369</td>
<td>Italy</td>
<td>1.67</td>
<td>1.67</td>
</tr>
<tr>
<td>Japan</td>
<td>3.32</td>
<td>2.67</td>
<td>France</td>
<td>1.88</td>
<td>1.88</td>
</tr>
<tr>
<td>Korea Rep</td>
<td>1.08</td>
<td>0.856</td>
<td>USA</td>
<td>0.72</td>
<td>0.471</td>
</tr>
<tr>
<td>Pakistan</td>
<td>0.245</td>
<td>0.337</td>
<td>Germany</td>
<td>1.86</td>
<td>1.86</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.35</td>
<td>0.34</td>
<td>Poland</td>
<td>1.34</td>
<td>0.915</td>
</tr>
<tr>
<td>Average</td>
<td><strong>0.61</strong></td>
<td><strong>0.43</strong></td>
<td>Canada</td>
<td>0.114</td>
<td>0.046</td>
</tr>
<tr>
<td>Average</td>
<td><strong>1.32</strong></td>
<td><strong>1.12</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Central Intelligence Agency (2014)

The condition of highway infrastructure in Nigeria could be significantly improved upon if performances on the delivery of highway rehabilitation and construction projects is effective. Effective performances on highway projects require proper
assessment and management of time and cost related risk events and conditions. However, Iyer and Jha (2006) asserted that major part of cost overrun on construction projects could be contained if risk factors causing time overrun are properly managed. Hence, time performance on the delivery of highway rehabilitation projects in Nigeria is examined.

**Time Performance on Highway Rehabilitation Projects in Nigeria**

Over 90% of highway projects in Nigeria are rehabilitation projects (Salawu, 2016). Hence, time performance on 16 Federal highway rehabilitation projects executed in five states in the South-west of Nigeria was assessed through a questionnaire survey of the opinion of 65 construction professionals who are directly involved in the execution of the 16 highway rehabilitation projects. The professionals comprises of the 5 Federal Controller of works/ Engineer Representative and 16 Chief Engineers/Project Engineers; 5 contracts managers for each of the 5 construction companies and 16 project managers/project engineers/project quantity surveyors. The professionals also include the 7 principal/associate partners and 16 senior engineers/senior managers from the 7 consulting firms that supervised the studied 16 highway rehabilitation projects. Data collected were analysed and time performance on the projects were computed as percentage of time overrun over the original/initial contract period. The percentage time overrun was computed using formula: 

$$P_{to} = \frac{T_o}{A_{scp}} \times 100$$

Where $P_{to}$ = percentage time overrun, $T_o$ = time overrun which is the difference between the actual construction period and the initial contract period and $A_{scp}$ = initial contract period. The results of the computation as shown in Table 3 indicated an average time overrun of 142.33% on highway rehabilitation projects. The percentage time overrun ranges from 20% to 440%, but over 62% of the studied highway rehabilitation projects experienced more than 100% time overrun. One out of every four highway rehabilitation projects had percentage time overrun in the range of 67% and 83.33% and two highway projects experienced 342% and 440%. One out of the sixteen highway rehabilitation project experienced only 20% time overrun.

The result of time performance on the highway rehabilitation projects in the South West of Nigeria suggests that delivery of highway rehabilitation projects is ineffective and so the suitability of the procurement regulations and rules for the procurement of the design, bid and build (DBB) highway rehabilitation projects are examined.

**Table 3: Percentage time overrun on Federal highway rehabilitation projects in five States, Nigeria (Contract sums in billions of Naira)**

<table>
<thead>
<tr>
<th>S/N</th>
<th>Project Locations</th>
<th>Contract sums</th>
<th>Starting Date</th>
<th>Contract period in months</th>
<th>Time overrun in months</th>
<th>Project status in Dec 2013</th>
<th>% time overrun</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lagos</td>
<td>6.24 Billion</td>
<td>13-12-10</td>
<td>12</td>
<td>10</td>
<td>100%</td>
<td>83.3%</td>
</tr>
<tr>
<td>2</td>
<td>Lagos</td>
<td>8.66 Billion</td>
<td>12-11-09</td>
<td>27</td>
<td>22</td>
<td>61%</td>
<td>81.5%</td>
</tr>
<tr>
<td>3</td>
<td>Lagos</td>
<td>9.60 Billion</td>
<td>20-05-07</td>
<td>14</td>
<td>22</td>
<td>100%</td>
<td>157.1%</td>
</tr>
<tr>
<td>4</td>
<td>Lagos</td>
<td>10.6 Billion</td>
<td>04-03-11</td>
<td>15</td>
<td>10</td>
<td>60%</td>
<td>66.7%</td>
</tr>
<tr>
<td>5</td>
<td>Ogun</td>
<td>1.09 Billion</td>
<td>05-06-06</td>
<td>12</td>
<td>41</td>
<td>100%</td>
<td>342%</td>
</tr>
<tr>
<td>6</td>
<td>Ogun</td>
<td>0.86 Billion</td>
<td>04-08-09</td>
<td>20</td>
<td>34</td>
<td>100%</td>
<td>170%</td>
</tr>
<tr>
<td>7</td>
<td>Ogun</td>
<td>3.44 Billion</td>
<td>28-05-09</td>
<td>18</td>
<td>15</td>
<td>100%</td>
<td>83.33%</td>
</tr>
<tr>
<td>8</td>
<td>Ogun</td>
<td>3.99 Billion</td>
<td>13-12-10</td>
<td>15</td>
<td>21</td>
<td>67%</td>
<td>140%</td>
</tr>
<tr>
<td>9</td>
<td>Ondo</td>
<td>9.75 Billion</td>
<td>28-05-09</td>
<td>30</td>
<td>6</td>
<td>100%</td>
<td>20%</td>
</tr>
<tr>
<td>10</td>
<td>Ondo</td>
<td>60.0 Billion</td>
<td>Oct 2012</td>
<td>35</td>
<td>00</td>
<td>60%</td>
<td>no delay</td>
</tr>
<tr>
<td>11</td>
<td>Ondo</td>
<td>2.28 Billion</td>
<td>16-12-09</td>
<td>20</td>
<td>26</td>
<td>93%</td>
<td>130%</td>
</tr>
</tbody>
</table>
Procurement Regulations and Rules for Highway Rehabilitation Projects in Nigeria

In Nigeria, procurement of DBB highway contracts are regulated by the procurement Act 2007 and ‘Due process rules of contracting games’ formulated by 'Budget monitoring and price intelligent unit' (BMPIU). Some of the provisions in the procurement Act 2007 are sources of uncertainties and potential risk factors that are capable of leading to time and cost overrun on highway rehabilitation projects. These includes the open competitive bidding procedure stipulated for the procurement of ‘DBB’ highway construction and rehabilitation projects. This bidding approach could lead to the award of projects to lesser qualified contractor (Ogunsemi, 2011) and then constitute source of uncertain conditions. The procurement Act expressly prohibit the involvement of potential bidder from participating in the preparation of tender procedure, this could prevent the procuring entity from enjoying benefits of collaborative procurement method and there could be problem of constructability (Ogunsemi, 2011). Other source of uncertainties in the procurement Act 2007 is the provision for the award of highway contract to the lowest evaluated responsive bid. This could aggravate commercial misalignment among the client, contractors and consultants (Ibrahim (2011). The result of such misalignment are: lack of commitment of the contractor to deliver his best, considerable time and effort would be spent on resolving disputes and unlimited request for claims. These are sources of risk to highway rehabilitation projects and the risks have to be properly managed.

In addition, selecting a competent contractor is essential to successful performance on highway construction projects (Cheung et al., 2006). To select a competent contractors for highway construction projects in Nigeria, ‘Due process rules of contracting games’ specified criteria for prequalifying contractors (Budget Monitoring and Price Intelligent Unit, 2005). These criteria and their ratings are described in Table 4.

<table>
<thead>
<tr>
<th>Prequalification criteria</th>
<th>Criteria ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial capability and banking supports</td>
<td>15%</td>
</tr>
<tr>
<td>Management capability</td>
<td>25%</td>
</tr>
<tr>
<td>Experience in similar projects and evidence of knowledge of the industry</td>
<td>20%</td>
</tr>
<tr>
<td>Equipment and technology capacity</td>
<td>20%</td>
</tr>
<tr>
<td>Annual VAT registration and evidence of past VAT remittance</td>
<td>5%</td>
</tr>
<tr>
<td>Annual turnover 5%, evidence of local content emphasis</td>
<td>5%</td>
</tr>
<tr>
<td>Evidence of local content emphasis</td>
<td>5%</td>
</tr>
<tr>
<td>Community social responsibility in support of federal government’s local contents’ policy</td>
<td>5%</td>
</tr>
</tbody>
</table>

The 15% rating for financial capability and banking supports indicated high importance of this criteria but Benson and Victor (2012) observed that Nigeria Naira has been depreciating since 1980’s and suffers significant depreciation from N111.93/US$ in 2001 to N199.06/US$ in 2015. Similarly, interest rate on bank loans in Nigeria between 1986 and 2015 has been high and is on the average of 20% per
annum. In addition the trend of the depreciation of Nigeria Naira against US Dollar between 1986 and 2015 indicated that Nigeria Naira has been very unstable. Consequently, the unpredictable exchange rates, and unpredictable inflation, high interest rate and taxation on imported materials are sources of uncertain events and conditions that can influence contractors’ financial capability and degree of banking support. Therefore, these sources of uncontrollable uncertainties has to be properly managed for effective delivery of highway rehabilitation projects in Nigeria.

Similarly, 25% rating for ‘management capability criteria’ implies that the criteria is very significant in the selection of competent contractor to submit tenders. Hence, Aje et al. (2009) concluded that assessment of contractors’ management capability is critical to enhancing performance on construction projects. However, Wong and Holt (2003) opined that contractors’ management capability assessment involves the consideration of the risk management capability, control and monitoring procedure, information technology knowledge and supervision. Thus assessing risk management capability of contractors is very important for effective selection of competent contractor and then for successful delivery of highway rehabilitation projects.

However, the Nigeria ‘Due process rules of contracting games’ and the procurement Act 2007 did not expressly require the practice of formal risk management process at any stage of the highway projects’ life cycle. Thus it is most likely that uncertainties and potential risks on highway rehabilitation projects are informally planned, identified, assessed and controlled. This is evidenced from the list of documents that procuring entity is required to submit to Budget Monitoring and Price Intelligent Unit (BMPIU) for due process compliance review, certification and award of contract (BMPIU, 2005). Anago (2011) listed these documents to include:

- Technical and financial documents: bill of quantity, contract drawings and engineering design financial summary and statement and project reports.
- Internal cost estimates.
- Evidence of advertisement as prescribed in the due process rule of contracting games.
- Pre-qualification exercise and the objective criteria for short listing the pre-qualified bidders
- Pre-qualification evaluation report.
- Tender evaluation report and analysis of the financial bids for all the pre-qualified bidders.
- Appropriation/source of fund.

None of these documents relates to the practice of formal risk management process. This implies that formal risk management practice are considered insignificant for effective determination of the contract period and sums for DBB highway rehabilitation projects in Nigeria. The contract period and sums of the highway rehabilitation projects are determined without proper assessment and integration of the potential risk factors and uncertainties on the projects. Therefore experienced time overrun on highway rehabilitation projects as shown Table 3 could be related to the absence of provisions for formal risk management practice in the Due process rules of contracting games in Nigeria. Consequently, a two dimensional risk assessment framework is proposed as guide for integrating formal risk management practice into ‘Due process rule of contracting game’ in Nigeria.
The Proposed Two Dimensional Risk Assessment Framework

Literatures have shown that a complete and accurate risk assessment require the integration of the probability-severity measures of risks with organisations’ risk management capability measures (Zhang, 2007; Mafakheri et al 2012). Hence, a two dimensional risk assessment framework was proposed in this paper and this involves:

- Determination of the probability-severity indices of the significant risk factors on highway rehabilitation projects.
- Systematic and comprehensive procedure for assessing risk management capability of the contractors to be pre-qualified for highway rehabilitation projects.
- Systematic and comprehensive procedure for combining the organisational risk management capability measures with the probability-severity measures.

Impact of risk events on projects time performances could be drastically reduced if the projects is been handled by contractor that highly matured in risk management practice (Mafakheri et al 2012). The existing risk management standards such as Australia New Zealand risk management standard and the existing risk assessment models did not recognise and consider this fact. Hence, this paper proposed 6 phases risk assessment framework that comprises of four phases which are adopted from the Australia/New Zealand risk management standard and assessment models and two other phases that were added to accommodate organisational risk management capability assessment. The adopted four phases are: risk management context, risk identification and structuring, project risk analysis and project risk evaluation. Phase 5 was added to assess risk management maturity levels of the contractors and phase 6 is the phase that combines the maturity indices with the probability-severity indices of the significant risk factors on highway rehabilitation projects.

**Risk Management Context (Phase 1)**

Risk management context phase in the proposed framework is the planning phase, the phase involves the development of a structure which risk identification and assessment tasks will follow. At this phase of the proposed risk assessment framework, the required inputs that must be provided are: culture, structure, risk management policies and procedures of the organization and nature of the project. These are used to determine the objectives of the risk assessment exercise. At the end of this context phase, risk management plan is produced.

**Risk identification and Structuring (Phase 2)**

This phase tries to find out events and conditions that could happen and affect the project key objectives. Such events are called risks (PMI, 2004). The phase aimed at identifying the right risks that will represent the effects of risk throughout the project life cycle. Risks that are not identified cannot be treated at risk assessment stage and controlled at risk response stage. Therefore risk identification process should be systematic. Potential risks on highway rehabilitation projects can then be identified using techniques such as: documentation review, information gathering technique (surveys), brainstorming in group workshop, interview and focus group discussion.
Figure 1: Proposed Risk Assessment Framework for highway Rehabilitation Projects

Technique, Collective Note Book and work breakdown structure analysis, fishbone diagrams and SWOT analysis (Baloi, 2002; Ebrahimnejad et al., 2010). The choice of any of the risk identification technique depends upon the experience of risk management group, scope, type and size of the project. Outcomes of the risk identification exercise are documented in the risk register which should include a list of identified potential risks, their root causes and uncertain project assumptions. Identified potential risk factors are structured and then analysed.

Project Risk Analysis (Phase 3)
This phase aimed at focusing management resources on uncertain events that appears to be the most important individual risks. It involves screening all the identified potential risk factors to determine those that have significant impact on key project objectives. This shall be done based on the risk management plan and hierarchical risk breakdown structure developed at the previous phases. Impact of all the potential risk factors are computed from the product of probability and severity estimates, and then normalise the impact values. All risk factors that have normalized value equal or
greater than 0.50 are regarded to be significant in this framework. The significant risk factors derived at this phase are prioritized based on their normalised values.

*Project Risk Evaluation (Phase 4)*

Project risk evaluation phase aimed providing risk information that will enable projects and the owning organization optimize risk response. To carry out this phase effectively list of significant risk factors and the hierarchical risk breakdown structure shall be made available and then the linguistic values/descriptive scale of the probability and severity parameters; descriptive scale/nominal values of probability-severity index and fuzzy rule base are determined. The phase involves the application of fuzzy inference evaluation technique to derive probability-severity indices of the significant risk factors, risk groups and overall project risk level. Data on the probability and severity parameters of the significant risk factors are collected and the data are subjected to fuzzy inference evaluation technique to derive the crisp value of probability-severity indices.

*Organisational Risk Management Capability Evaluation (Phase 5)*

This phase assess the risk management maturity level of the contractors. The proposed framework provides a list of 4 attributes and 19 dimensions of risk management capability and hierarchical structure that relate the dimensions, attributes and organizational risk management capability. The hierarchical structure will facilitate a systematic and comprehensive assessment of the risk management capability. The phase involves the use of fuzzy synthetic evaluation approach to derive the risk management maturity level of each of the contractors. Data on 4 attributes and 19 dimensions of risk management capability could be collected in the questionnaire survey and subjected to fuzzy synthetic evaluation to derive the attribute indices as well as the risk management maturity indices. These indices are classified into four maturity levels namely: naïve, novice managed and optimised.

*Project Risk Magnitude Assessment (Phase 6)*

Focusing on the risk event-consequence link only represents a half risk analysis (Zhang, 2007). A project with vulnerabilities could not cope well with risk events and the vulnerabilities might arise from organizational entities such as activities and artefacts in the early stages. Hence, project risk magnitude assessment phase in this framework determines the overall impact of significant risk factors on highway rehabilitation projects by combining the probability-severity indices of the overall project level risks in phase 4 with the risk management maturity indices of the contractors in phase 5. A decision matrix for combining the organisation risk management maturity indices with overall risk indices have to be developed. The six phases of the proposed two dimensional risk assessment framework and the inputs requirements for effective implementation of the risk assessment activities are illustrated in Figure 1.

**CONCLUSIONS**

Total road density in Nigeria is very low and inadequate compared with the developed countries in Europe and Asian. Time performance on highway rehabilitation projects in Nigeria is poor. Percentage time overruns are very high and the average time overrun is 142.6%. Nigeria procurement regulations and Due process rules of contracting games are unsuitable for effective delivery of highway rehabilitation projects. Some of the provisions in the procurement Act 2007 are sources of uncertain events and conditions and ‘Due process rules of contracting games’ provides no clear
guidelines for formal risk management practice on the procurement of design, bid and build (DBB) highway rehabilitation contracts. Thus, this paper presents a two dimensional risk assessment framework that provides comprehensive guidelines for integrating formal risk management approach into the ‘Due process rules of contracting games’ in Nigeria. Integration of the formal risk management approach into the procurement rules would enhance performance on highway rehabilitation projects and then lead to a sustainable highway infrastructure in Nigeria.

REFERENCES


END
URBAN MANAGEMENT
IMPROVING URBAN MANAGEMENT IN NIGERIA

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The Constitution of Nigeria implies that there is currently no city-specific administration for any city in the country (apart from an experimental situation in Enugu that brings together the Local Governments for the core area of that city under a ‘Capital Territory Development Authority’). This has led generally to poorly planned urban growth, together with serious urban infrastructure deficits throughout the country. This paper describes the establishment of the first all embracing, dedicated, City Development Authority (CDA) in Nigeria, being the case study CDA for the City of Metropolitan Kaduna, the Capital of Kaduna State. Although the authors, working as the Nigeria Infrastructure Advisory Facility (NIAF) ‘Effective Cities’ advisers to the Kaduna State Government, have direct development experience in Metropolitan Kaduna alongside the city Master-planners - the Nigerian Max Lock Consultancy, the rate of growth of the city has outstripped all current administrative provision and capacity, and this calls for an entirely new, and radical, approach to city management and administration, which the State Government is keen to adopt. The establishment of a CDA will still need to take the legal / constitutional situation into account, and this will be addressed through new state legislation to be approved by the State House of Assembly, thus enabling the Governor to implement the plan with all MDAs in support. Better urban management is a national priority as Nigeria continues to urbanise rapidly. The Kaduna State Government will submit the approach outlined in this paper to the annual meeting of the National Council on Lands, Housing and Urban Development in order to highlight the issue to all State Governments, and thus propose this approach as a template that can be replicated nationally.

Keywords: commonwealth, cities, management, governance, and urban.

INTRODUCTION

The Constitution of Nigeria implies that there is currently no city-specific administration for any city in the country. This has led generally to poorly planned urban growth, together with serious urban infrastructure deficits throughout the country. Rapid sub-urbanization leading to more costly supply of public services is
another challenge that has undermined the productive capacities of cities. As an example, in Metropolitan Kaduna, the rate of growth of the city has outstripped all current administrative provision and capacity and like in many cities, has justified calls for an entirely new and radical approach to city management and administration, which the State Government is keen to adopt (see Lock, 1967; and updated at Max Lock Consultants Nigeria, 2015). The paper describes the case study of forming a new City Development Authority for Metropolitan Kaduna as the capital city of Kaduna State. As a novel city-specific administration it will for the first time afford Kaduna a focal point for the city, similar to a Mayor, as the official spokesperson and leader for the development of the city. This would also be the first time such an administration would be adopted in Nigeria.

PLUGGING THE GAPS FOR CITY ADMINISTRATIONS

In almost the whole of Nigeria, responsibility for managing cities belongs to nobody. The Constitution and Land Use Acts identify the role of Governors as the ‘keepers of the land’ on behalf of the State’s citizens, with each Nigerian being entitled to a plot of land for their own personal development – free of charge except to have the plot surveyed, beioned, and any existing economic crops being compensated through the Local Government Area Council mechanisms. Implied in this, urban governance issues are considered generally to be matters of land use and development control.

Of significance to the absence of a governance structure and responsibility for cities is the failure to coordinate the provision of infrastructure and services and to respond to the challenges of growth management. In the absence of coordinated management, most cities in Nigeria are characterised by series of chronic deficits in social, institutional and infrastructural facilities, while poverty, insecurity and conflicts are very common (Ahmed, 2009, 2016).

Reconfiguring urban administration to deal with the array of development challenges confronting cities generally requires new legal and administrative frameworks to allow for the establishment of urban management structures, in this case defined as City Development Authorities (CDA’s). Creating the CDAs implies not only accommodating existing principles, but going further in identifying the city boundary, its constituent Local Governments, and bringing all the development ministries and agencies of the State Government to bear on implementing the City Master Plan in an organised and timely fashion. In other words it brings a city-specific development process together under one roof, rather than the State Government merely being the keeper of all urban development across the entire state (Mutter and Leffler 2015a).

In this respect it is interesting to note some existing examples of this kind of institutional arrangement for the city. For example the Enugu Capital Territory Development Authority was set up by State Law in 2009 and directly incorporates the activities of the three constituent local government areas. However, the requirement for other participating Ministries, Departments and Agencies (MDAs) that have a bearing on the development of the city, is only on an informal Board basis, rather than be mandatorily coordinated. It thus falls short of expectations. However, there is also no mechanism for directly consulting the citizenry in the development design process. Another example in the Kampala Capital City Authority has a much more developed set of mechanisms that brings the working of local government into play with the Authority. It is comprehensive in outlook. However, this is primarily in recognition of its role as a national institution in the makeup of Uganda.
So in Nigeria, where should we look for local governance and any recognition of the role of citizens? Local Government Areas, their elected Councils, and Chairmen are a feature of the Federal Capital Territory of Nigeria and the constituent Area Councils. However, once again this is then placed under the control of the Federal Capital Territory Administration for all budget support for development activity, again with no role for the citizens, apart from a web-based comment process.

The example being developed for Kaduna State can be observed in Figure 1 for Metropolitan Kaduna (see also Mutter and Leffler, 2015a). This is experimental and is being conducted with assistance from the DFID funded Nigeria Infrastructure Advisory Facility’s ‘Effective Cities’ sector. State legislation will define its geographic area of jurisdiction, and the roles to be played by both the Authority itself, and by the contributing MDAs. It is expected that each major city in the State and indeed in other States would follow suit.

As discussed at the African Regional Conference for Habitat III, just concluded here in Abuja (24-26 February 2016) the cultural identity of African cities require that the African family be recognised within the kind of city that is appropriate in Africa. A ‘Resilience’ approach is at the core of the best practice planning principles (see also Hague and Mutter 2012). It involves its citizens as well as the professional planning processes to determine how best to grow, and at the same time withstand the shocks of external factors that need to be withstood. This is becoming increasingly recognised as the way in which city authorities need to understand the nature of their cities, and the aspirations of their people. It serves the investors in the city with confidence building.

The idea for the establishment of a City Development Authority with ‘Resilience’ at its heart is currently being pursued by the Kaduna State Government for Metropolitan Kaduna as the capital city of the State, utilising NIAF assistance (See Figure 1 for the way in which this becomes an integrated development paradigm). Important is the role of the citizens in participating in the process, and this can be seen by utilising a ‘cloud-based’ website for community interaction. The process of consultation is shown in Figure 1.

THE CORE CONCERNS AND INSTRUMENTS FOR EFFECTIVE URBAN MANAGEMENT

Coping strategies are required for planning ahead in real terms – and in determining how best to attract investment, both from government and from institutions and the private sector. Critical infrastructure is required, but one asks, by how much, with what priorities, and being financed by what mechanisms? See Mutter (2003), and also concepts for housing in Mutter (1994), World Bank (2013, 2015b, 2015c) and in Venables (2015).

Firstly, City Master Plans are seen as a basis for the long-term investment approach for the future make-up of the city. However, it is rare to see City Master Plans being kept up-to-date. An exception is the Master Plan for Kaduna - which has recently been updated with very detailed data gathering in terms of land use, physical conditions, the status of the citizens, and taking into account the environmental concerns, and the long-term growth strategies. The City Master Plan is an amalgam of each contributing sector, so incorporating for example the Transport Master Plan, and

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Strategies for Investment in infrastructure, and for business development. These will amend over time, and so it is important that the overall City Master Plan is seen as a ‘living’ document, for all to see and relate to, and amend accordingly (Mutter 2008, Lloyd-Jones and Rakodi 2002 See also processes described in Mutter (2006, 2008) and in Mutter (2001, 2002 and 2003).

Secondly, the methodology for City Development Strategies (CDS) is a framework for the continuous assessment of ideas and proposals that can affect the city and its well-being. The CDS concept has indeed stood the test of time where it has been instigated – see for example the Cape Town CDS on-line for a continuing process for involving people- and investment-centred city development strategies that have been produced for phased development processes (Mutter and Adenekan, 2015b).

The CDS considers where are the returns for investors? Growth and investments for Employment – the enhanced jobs scenarios; greater trading patterns within the city and between cities; and the long-term strategies for growth. These are fundamental to the principles of the “Habitat Agenda” (UN-Habitat 1996, 2012, and as described in the flagship reports of 2006, 2008, and 2010). For the Commonwealth, it is relevant to refer to CHEC/CCGHS 1999, describing the Commonwealth Development Framework adopted by the Commonwealth Consultative group on Human Settlements at their meeting in Nairobi in 1999; and the publication “The State of Cities in the Commonwealth”, Com-Habitat 2009.


**FINANCING THE CITY DEVELOPMENT AUTHORITY MODEL**

Financing a growing city requires planning combined with ingenuity. Experienced negotiators are required to make these scenarios work effectively. Too often political brakes are applied, often when the ‘status-quo’ is being challenged. A degree of independence for these negotiations is required so that the best value can be obtained for the city as a living being.

Many options are available to effective and continuous financing of the city. For example, expanding the ‘ground-rent’ option so that plot-holders (in Nigeria this means those with Certificates of Occupancy – ‘C of O’s) can share the financial burden of their place in the city. Expanding the ‘C of O’ to the majority of residential areas, and to businesses and enterprise is key to the ‘fairer urban society’. Ground rent can be made ‘pro-rata’ to size of plot, and the degree of multiple-occupancy. Such revenue would then pay for all common good municipal services. Job creation and the role of Enterprise Zones funded under PPP mechanisms, whereby the Government provides the land in a Joint Venture with the private sector investor/operator are additional good examples of these processes in action.
However, we believe that further incentive mechanisms for city development need to be explored more systematically, and on a national basis. Cities are after all, the engines of economic growth for the nation as a whole. Although there are many...
existing funding mechanisms on offer to nations as a whole, the sub-national level is more complex since the offer of any ‘sovereign guarantee’ would still need negotiating at the national level. Nevertheless, there are good examples of this approach working effectively. In this respect, a National City Investment Strategy, within a new cities-led National Urban Policy regime is called for, so that the best options for the nation can be exploited, utilising the individual city development prospects as the key drivers.

CONCLUSIONS

In conclusion we can say that ‘Urbanisation’ is good for the country, it is the most fundamental key economic driver. However, it does require a comprehensive national cities investment plan in order to derive the greatest benefit to the nation as a whole. In addition, cities need to be able to identify themselves as defined entities, with their own administrative structures, encompassing their constituent Local Government Areas and their Councils, but importantly to be able to act with a single ‘Leader’, the equivalent of a Mayor, who can be the single point-of-contact for the specific city, and its promoter. The work being undertaken to establish such an Authority for Metropolitan Kaduna, as the Capital City of Kaduna State, is a case in point. It should serve as a model for other cities in the Federation to follow.

REFERENCES


END
EQUITABLE AND SUSTAINABLE CONSIDERATIONS IN PERI-URBAN LAND MANAGEMENT IN GHANA

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Urban areas in Ghana are expanding at an annual rate of 3.5 percent. An estimated 53 percent of the population in Ghana is living in urban areas, compared to the average for West Africa (45 percent) and the rest of Sub-Saharan Africa (38 percent). Urbanisation could be a desirable spatial change because urban centres are globally seen as the hotspot of economic development and rapid technological advancement. However in Ghana, this is yet to be meaningfully realised. This is because urbanisation is largely proceeding on an unplanned and unsustainable basis without the needed basic infrastructure and socio-economic interlinkages. Significantly, this development has far reaching implications, especially for the livelihood and socio-economic survival of the peri-urban land users. Peri-urban areas refer to the confluence of rural and urban land uses where there is rapid conversion of rural agricultural lands for more urban land uses such as residential developments. To respond to the twin problems of unplanned land allocation and inequitable distribution of benefits which are increasingly becoming associated with peri-urbanisation, there is the need to re-think strategies for peri-urban land management.

By drawing lessons from selected cases over the years, this paper argues that integrating the core principles and propositions of the land management mechanism of Land Pooling, has the potential to respond to some of the current challenges. Land Pooling acts as a containment strategy to prevent the sprawling of existing unplanned settlements whilst ensuring that future expansion of urban areas which occurs mainly in the urban fringe, proceeds according to plan. This paper further proffers innovative, fairer and intergenerational benefits sharing models which respond to the current challenges.

Keywords: Peri-Urban, Land Management, Land pooling, Intergenerational Sustainability, Ghana.

INTRODUCTION

Land is an asset with multifaceted attributes. Economically, it serves as direct or indirect source of livelihood for many, particularly those in an agrarian context. It is also a source of cultural and social identity around which many ethno-tribal groups are organized. Land also represents the spatial dimension of economic development. In this regard, the ability of land to provide space for economic activities as well as human habitation is critical. Demand for land is derived from population pressures. Therefore, there is corresponding surge in demand for land for various purposes in the context of rising population. According to Oppong and Yeboah (2013), when the first census was conducted in the Gold Coast (now Ghana) in 1921, the total population was 2,298,000. Out of this, 7.8 percent were classified as urban dwellers with the

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remaining 92.2 percent living in rural areas. The population of Ghana is presently estimated at 27,000,000 and this represents almost a twelve-fold increase within a little over eight decades. Within the same period, Ghana has moved from a predominantly rural country to an urban society with 53 percent of the population officially classified as urban dwellers (UN-DESA, 2015), making population growth and urbanisation phenomenal.

The rapid rate of urbanization in Ghana could be a desirable situation, considering that urban centers have over the years become the hotspots of economic development. Yet in Ghana, the embedded potential in urbanization has not been meaningfully realized. This is because urbanization is proceeding on a rapid and unplanned basis. Outcomes of this trend have been dire with peri-urban communities increasingly being subjected to some of the harsh effects of urbanization. Peri-urban areas are areas in the urban periphery which are undergoing dynamic transition from rural to urban land uses. The growth of urban areas in Ghana has been characterized by sprawling and accretion and this raises two main concerns. First, the rapid rate of growth of such urban areas far outstrips efforts at land use planning, thus creating the situation where settlements in the peri-urban areas are in effect devoid of any sound land use planning. Secondly, the unplanned nature of expansion in human settlement subjects peri-urban farmers to market driven displacement and in the process curtails their livelihoods and sources of economic survival.

This trend has become a common feature of urbanization in Ghana and this has triggered calls for more equitable and sustainable models to respond to this trend. How can peri-urban areas be better planned in order to provide a more coherent basis that will guide urban growth? How do we provide some economic safeguards to people who are increasingly losing their land and livelihoods as a result of conversion of agricultural lands in the urban fringe? How do we ensure that interventions to achieve this are equitable and sustainable in order to achieve lasting impacts? The paper seeks to interrogate these and other related issues in order to contribute to the ongoing discussions on improved management of peri-urban land in Ghana. This paper is developed based on the experiences of the author and critical reflection on some works (Repetto, 1986; Yeboah and Shaw, 2013 and Ballaney, 2008). It is therefore an attempt to share a view point in order to trigger discussions on matters of sustainable peri-urban land management practices. The rest of the paper is segmented into four main parts. The next chapter situates the paper in Ghana before examining the regulatory environment for planning delivery, its challenges and some outcomes of the ineffective planning system. This is then followed with discussion on the concept of sustainability, before moving to discuss some innovative options to improve the current state of affairs. The final section reflects, draws out lessons and shares direction on how proposals and recommendations could be implemented.

**SETTING THE CONTEXT**

**Population and Urbanisation**

Ghana is a West African Country with an estimated population of 27 million people of whom 48 percent are male. Ghana shares a border with Burkina Faso (in the north), Cote D’Ivoire (in the west), Togo (on the east) and the Atlantic Ocean in the south.
Ghana has a total land mass of about 240,000 sq km. It is a rapidly urbanising country with 53 percent of the population presently living in urban areas (UN-DESA, 2015). Politically, Ghana practices constitutional democracy and has enjoyed relative political stability for the past two decades.

The legal environment is pluralistic because customs and statues, as well as various degrees of hybrids along the customary/statutory continuum, are recognised as valid laws, as long as they are consistent with the Constitution. One of the areas where such plurality becomes more pronounced is land ownership and tenure types.

**Land Ownership Typologies**

The land ownership and tenure systems in Ghana reflect the established customs and norms, the colonial past and the dynamics of contemporary society. These eventually split out into three categories of land ownership in the country. These are customary, state/public and vested lands. **Public lands** are those lands which are collectively owned by the entire citizenry of Ghana. According to Article 257(1) of the 1992 Constitution, ‘all public lands in Ghana shall be vested in the President on behalf of and in trust for, the people of Ghana’. Article 257 (1a) tasks the Lands Commission to manage public lands. The Public and Vested Land Division of the Lands Commission is specifically assigned with the duties of managing public lands under section 23 of the Lands Commission Act, 2008 (Act 767).

**Customary lands**, on the other hand, involve land which is owned collectively by ethno-tribal entities such as a family, an ethnic group, a tribe or a kingdom. With customary lands, each member of the land owning group has an inherent right in the jointly owned resource. One common feature with customary lands is that there is a designated leader – either a chief, a family head or a clan leader who acts as a trustee of such land. Between state lands and customary land is another variant of land ownership. This is known as **vested lands**. Vesting is an arrangement that allows the state to take over management of customary lands. The community maintains ownership of the land and the Lands Commission is obliged to ensure that benefits from the land are transferred to the land owning community (Kasanga and Kotey, 2001). Thus, the ownership and management of vested lands are split between the customary landholding group and the Lands Commission.

**The legal and institutional environment for planning and management of peri-urban lands**

Under the Directive Principles of State Policy, as enshrined in the 1992 Constitution, the State is under obligation to take appropriate measures needed to protect and safeguard the national environment for posterity (Article 36,9). Flowing from this, there are various legislations and institutions which have been established to contribute to effective planning and management of the environment and human settlements in order to achieve this State objective. The institutional framework for land use planning includes the totality of public and quasi-public agencies which are involved in formulating, implementing and evaluating planning policies (Njoh, 2003). This may include bodies at the local, regional and national levels which are linked for the purpose of planning delivery. In Ghana, the Local Government Act, 1993 (Act 462) tasks decentralized local government agencies, be it district, municipal or
metropolitan authorities, as the planning authority for their respective jurisdiction. Such agencies are expected to work closely with the Town and Country Planning Department and other institutions, such as the Environmental Protection Agency, Traditional Authorities, and other recognized stakeholders, to plan, implement and enforce land use planning regulations. In this regard, legislations, such as the Town and Country Planning Ordinance, 1945 (CAP 84) and the Lands Commission Act, 2008 (Act 767), are equally important because they respectively provide peri-urban land management responsibilities to the Town and Country Planning Department and Lands Commission and other allied agencies. The National Development Planning Commission (Systems) Act, 1994 (Act 480) and the National Development Commission Act, 1994 (Act 479) also jointly provide and define roles for various organs, such as Regional Coordinating Councils and the National Development Planning Commission, to harmonise and streamline interventions which would ensure effective spatial planning and management of urban, peri-urban and even rural contexts. In effect, multiple laws and institutions come together to create the existing framework for land use planning in Ghana. But to what extent has the existing framework achieved its stated objectives of ensuring that human settlements grow on planned and sustainable basis?

INEFFECTIVE LAND USE PLANNING IN GHANA AND OUTCOMES

Demand for land is derived from population pressures especially as a result of urbanisation. Therefore, with increasing population, there is corresponding increase in demand for housing, agriculture, manufacturing and other economic activities. The supply of land is restricted despite the sustained rise in demand. There is the need to manage the environment in order to reconcile competing claims for the use of limited land. It is in this realm that land use planning or what Margo Huxley and Oren Yaftachel describe as ‘spatial public policies and practices…as well as specific zoning and development controls, which mediate and shape urban and regional land use under the auspices of the modern state’ (Huxley and Yaftachel 2000, p.334) becomes pertinent. Planning is primarily concerned with managing the layout of the environment by providing the right site at the right time, in the right place for the right people (Ratcliffe and Stubbs, 1996, p.2) so that the society can gain mastery over itself and shape its collective future by the power of reasoning (Friedmann, 1959).

Urbanisation and agricultural lands are in close competition since urbanisation in Ghana largely occurs through accumulated accretion (Yeboah and Shaw, 2013). This means land in the urban periphery is in constant demand by people who are seeking to develop properties. There is therefore land use transition, with agricultural lands giving way to property development. It is important to note that ownership of peri-urban lands tend to be highly fragmented as a result of the prevailing customary tenure regime and this makes effective coordination by both chiefs and state institutions for planning delivery difficult. Ordinarily, granting out land by custodians for property development should not be a worrying development. However, it is important to examine the driving motives behind such practices. To begin with, the Local Government Act 1993 (Act 462) mandates local government agencies as the sole authorities for planning and sub-dividing land to guide the growth of human
settlements. However in many peri-urban areas across the country, chiefs take the lead by sub dividing and allocating land. Such land allocation is almost in all instances the decision of chiefs and local elites. When peri-urban lands are converted for property development, it results in market driven displacement of previously peri-urban farmers and they lose their livelihoods in the process. Further, this development contributes to urban poverty and the emergence of slums and informal settlements.

This trend has become common over the years because chiefs and other custodians of customary lands are continuously altering existing land-use plans and policy, sometimes feigning ignorance of any knowledge of existing plans. Also, chiefs prepare makeshift ‘plans’ for fast urbanising areas without the knowledge or endorsement of the designated planning authorities. These practices are endemic across the country, despite being unlawful. The driving force in all these has been to maximise monetary benefits. Worryingly, such financial gains are not necessarily shared equitably or used in a way to benefit the broader community, especially the expropriated land owners. Custodians of customary lands are in effect behaving like ‘super landlords’. Alden Wily and Hammond (2001, pp. 44, 69–73) describe this as the curtailment of communal property rights through a form of “feudalisation of land relations”.

The underlining causes of this development are varied. Yet various authors (Yeboah and Obeng-Odoom; Yeboah and Shaw, 2013) are clear that issues, such as funding inadequacies, weak laws and regulatory framework, shortage of the requisite human resource capacity, both in term of numbers and skill, as well as the prevailing customary land tenure practices are significant factors. The outcome of this trend has been far reaching. Settlements proceed largely on unplanned and unsustainable basis; a situation that significantly contributes to urban poverty and the proliferation of informal settlements.

Ghana continues to receive rave reviews about its governance and democratic credentials. It has been variously described as ‘Africa’s star of democracy’¹, ‘a poster child of Africa’s democracy’ and ‘West Africa’s haven of stability’². Yet Ghana continues to be confronted with the challenge of slums and informal settlements. As at 1990, 65 percent of the urban population lived in slums. This has witnessed some reduction over the years and the current slum population is estimated at 37.9 percent³. This is a welcoming statistics, although it can hide some harsh practical realities under the current dispensation. Ghana has an estimated population of 27 million, of which an estimated 53 percent presently live in urban areas⁴. This means, about 14million people are presently living in urban centres. Of this, 37.9 percent or 5.42 million are officially classified as slum dwellers. Thus 20 percent or 1 in every 5 persons living in Ghana is trapped in poorly planned, overcrowded and insanitary conditions. In effect, Ghana’s rate of urbanisation is largely a case of ‘urbanisation of slums, informal settlements and poverty (Yeboah and Shaw, 2013). All these are outcomes of weak planning and land management regimes, especially in the inner city and the urban

² http://www.theguardian.com/world/2013/oct/30/ghana-west-africa-haven-own-share-problems
⁴ UN-DESA, 2016
periphery. This is despite the fact that there has been heavy investment in interventions, such as the Ghana Land Administration Project. This state of affairs calls for interventions in order to ensure greater equity in the sustainability of the management of peri-urban lands.

CONCEPTUALIZING SUSTAINABILITY

Sustainability has become a buzz word in the development literature since the Earth Summit, in Rio de Janeiro in 1992. Prior to this Summit, the World Commission on Environment and Development, in what has now become popularly known as the Brundland Report 1987, raised the need to integrate sustainability considerations in environmental and developmental considerations. This report defined sustainable development as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs”. At the Earth Summit in Rio, 178 Governments signed up to Agenda 21, which aimed at “devising integrated strategies that would halt and reverse the negative impact of human behaviour on the physical environment and promote environmentally sustainable economic development in all countries”. The influential Economist, Robert Repetto, similarly defines sustainability as “sustainable development is a development strategy that manages all assets, natural resources, and human resources, as well as financial and physical assets, for increasing long-term health and well-being. Sustainable development, as a goal rejects policies and practices that support current living standards by depleting the productive base, including natural resources, and that leaves future generations with poorer prospects and greater risks than our own”. (Repetto, 1986). A synthesis of these issues brings to the fore that sustainable splits into three broad considerations - economic, social and environmental, as illustrated below.

Figure 1: The Concept of Sustainability illustrated

The above figure represents the integrated model of sustainable development where there is the need to prioritise the trilogy of economic, social and environmental considerations in land management. As a strategy, sustainable development should ensure effective management of all assets, natural resources, and human resources, as well as financial and physical assets, for increasing long-term health and well-being. Sustainable development should ensure that there is both intra-generational, as well as inter-generational equity. Intra-generational equity implies justice to the socially disadvantaged people. For example power imbalance between customary leaders and their subjects can create opportunities for those in entrusted positions to exploit what should be collective benefits for their parochial interests. In this regard, intra-generation equity is lost and people, especially those who derive their livelihoods from peri-urban agriculture, become more vulnerable in the process. Inter-generation
equity on the other hand implies fairness to the future generation in the use of natural resources. The next generation should have at least equal access to the same resources as the present generation. To achieve both intra and inter-generational equity in the management of peri-urban lands, there is the need to explore for innovative approaches which offer practical and pragmatic solutions to the current bottlenecks. Such possible alternatives are examined below.

TOWARDS EQUITABLE AND SUSTAINABLE PERI-URBAN LAND MANAGEMENT - A CASE FOR LAND POOLING

The current state of unplanned accretion of urban areas into peri-urban farmlands is the outcome of several factors. These include inadequate funding and capacity on the part of city managers and state authorities to effectively plan ahead of urban expansion. Chiefs and traditional authorities, who have the customary mandate to help manage land, effectively have over the years done little to help improve the state of affairs. Driven by the desire to maximise financial returns, some of these customary leaders have become a hindrance in the quest to ensure effective land management. Power imbalance and lack of adequate opportunities to demand downward social accountability by the citizenry have jointly contributed over the years to strengthen the position of such traditional authorities. Considering all these challenges, strategies to improve the current state of affairs should be self-financing to a large extent, must provide opportunities for meaningful public participation, whilst putting in place mechanisms to ensuring equitable benefit sharing and targeted investments in order to ensure sustainable livelihoods. The ensuing sections below examine opportunities to achieve these.

Peri-urban areas include land adjacent to urban areas, along and peripheral to the urban edge and they form a transition zone between urban residential areas and rural agricultural areas. The peri-urban is a transitional zone which experiences tensions and conflict between property development and agricultural use. Therefore, one of the first attempts at resolving land conflicts could start by planning for the peri-urban zone. This will serve two purposes. First, planning the peri-urban area helps to check expansion of settlements on an unplanned basis. Secondly, it also ensures that future expansion of urban areas which occurs mainly in the urban fringe, proceeds according to plan.

Under the land pooling model, a public planning agency or development authority temporarily brings together a group of peri-urban landowners for the purpose of planning (Ballaney, 2008). Land pooling involves the consolidation of separate private landholdings into urban fringe areas so that they may be planned, serviced, and subdivided, as a single estate. In land pooling projects, land owners contribute a portion of their land for the benefit of the entire project, and in return get greater utility and value for the remaining portion through better access, more developable building sites and/or improved public facilities and infrastructure (Karki, 2004; Home, 2007). Thus planning authorities could manage settlement growth by preparing development plans and planning schemes for the agricultural land at the periphery of the cities and towns, or smaller settlements that are not yet urbanised, in anticipation
of urban or non-agricultural uses. The owners would contribute land for communal uses such as roads, open spaces, schools, and hospitals, and the remaining land would be ‘readjusted’ into suitable parcels for development. Also, services, such as improved water supply, roads, water, and electricity, would be provided from the revenues which are generated from the sale of the parcels of land which have been contributed.

The concept of land pooling is an urban management tool that has largely proved successful in the Middle East, Asia and parts of Europe. In areas like Nepal, India, Japan, Israel, where land pooling has extensively been used, it has proved effective in managing urban growth (Home, 2007). Rob Home (2007) has observed that there is a striking international diffusion of land and urban policies owing to the fact that the underlining causes of most of the challenges of rapid urbanisation are shared. Therefore, it is perfectly acceptable to adopt a policy from one area and apply in another. The caveat is however that no two areas are exactly the same in terms of their spatial, cultural and governmental characteristics. Therefore, in adopting policy from one area, researchers should be diligent in identifying the contextual variations with the aim of modifying such policies to suit the needs of their own area. The study accordingly adopts, contextualises and subsequently makes recommendations for the application of land pooling in Ghana.

Earlier analyses by Acharya (1988) and Archer (1988) have provided a review of the strengths of land pooling and adjustment. More recent studies by Gurumukhi (2003), Karki (2004), Home (2007), and Ballaney (2008) have further illuminated the success of this model. Ballaney (2008) has observed (correctly) that land pooling delivers developable lands with regular shape, improvement in accessibility, increased potential for development, the availability of social and physical infrastructure in the neighbourhood, better linkages with other parts of the city and improvements in the living environment. The land pooling technique thus helps to ensure systematic delivery of planned and serviced lands for developers.

Land pooling can be self-financing and, hence, more likely to be sustainable. Resolving land conflicts through the planning and servicing of peri-urban lands usually enhances land values. In countries such as Germany, the Netherlands and India, where land pooling has been intensively applied, Conellan (2002) found that local authorities imposed betterment charges on developers. This practice gave the planning authorities a revolving fund for additional land pooling projects. This ability to self-finance would be especially welcome in the Ghanaian case where funding for planning activities has been identified by various researchers (Yeboah and Obeng-Odoom 2010; Boamah et al 2012) as woefully inadequate.

Home (2007), for example, has reported of the ability of land pooling to generate enough funding to meeting the cost of planning delivery. In his analysis, an individual plot of 0.4 hectare included in a scheme of 3.6 hectares comprised 11% of the land area. Its value in existing use (agricultural) was £4,000 per hectare (£1,600 for the plot), while serviced development land was worth £200,000 per hectare. In the land pooling process, 40% of the land was taken without compensation for the purpose of
providing roads, open space and schools among others. Part of the 40% of land was also sold as a means of raising capital to fund the planning process without resorting to the local or central government. After the land pooling exercise, the land owner received back 0.24 hectare, which was now valued at £48,000, and representing a big capital gain. Land pooling thus represents a win-win situation towards resolving urban land conflicts in Ghana.

The Need for Equitable Revenue Sharing

Under the current practices, peri-urban land holders who are displaced as a result of urbanisation hardly ever get compensated. This has often become a source of major livelihood squeeze for the peri-urban dwellers. It is important to note that, as an economic asset, land is expected to provide sustainable source of livelihood to people who have recognised interest in it. The phenomenal rate of urbanisation means that, in the face of the weak institutional framework for spatial planning and management, the loss of lands’ livelihoods are inevitable in the peri-urban areas. There is therefore the need for more equitable means of distributing proceeds from selling peri-urban lands for property development. However, every recommendation should be made in the context that the revered position of chiefs and other traditional custodians of customary lands are duly recognised and are allocated a fair proportion of the proceeds from the land sales. Secondly, there is the need to create opportunities that will equip and empower displaced peri-urban farmers to attain alternative livelihood sources. Finally, it is important to adequately compensate those who have lost their land. These issues require that gains from alienating peri-urban lands should be split into three folds. Part of the amount could provide immediate relief to those whose livelihoods may be curtailed, whilst long term investment in alternative livelihoods presents opportunity to ensure that people continue to derive their source of economic survival from land. In this way, there is the opportunity for all to benefit from sustainable development.

REFLECTION AND CONCLUSION

For urbanisation to expedite economic development in Ghana, it must be underpinned by strong consideration for equitable and sustainable land management, especially in the peri-urban areas. Existing strategies, through the conventional land use planning approaches and city management interventions, have failed to ensure adequate linkages between urbanisation, better planning and economic development. Ghana’s urbanisation has thus become largely associated with poverty, informal settlements and poor supply of basic services and infrastructure. This paper argues that there is the need for a new paradigm in conceptualising and responding to the incidental land management challenges associated with urbanisation and options have been proffered. Ongoing opportunities, such as the Ghana Land Administration Project, could consider these recommendations, subject them to further debate and integrate the same in order to ensure that urbanisation proceeds on a planned basis and yields mutually rewarding economic outcomes, socially responsive and environmentally sustainable goals.

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END
MANAGING FLOOD DISASTERS IN THE SOUTH EASTERN REGION OF NIGERIA: ISSUES AND STRATEGIES TOWARDS ENVIRONMENTAL SUSTAINABILITY IN NATIONAL DEVELOPMENT

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Floods are among the most devastating natural disasters in the world, claiming more lives and causing more property damage than anyone would imagine. In Nigeria, though not leading in terms of claiming lives, flood affects and displaces more people than any other disaster; it also causes more damage to properties. At least 20 per cent of the population is at risk from one form of flooding or another. More often, sovereign states and national governments adopt remedial reaction, that is, a post disaster reaction where relief materials are supplied to the affected victims. The paper emphasizes on prevention/mitigation than post-disaster measure. Causes of flooding in Nigeria and by extension south eastern region, Nigeria are discussed. The approach in this study also attempt to describe the application of remote sensing and GIS in an environmental issue such as flooding in a developing country. A database was created using both cartographic and attributes data collected from these and other sources. Spatial analyses were carried out using ArcGIS Desktop 10.1 and its Arc Hydro extension. In Nigeria, flood disaster has been perilous to people, communities and institutions. Between July and October 2012, flooding in Nigeria pushed rivers over their banks and submerged hundreds of thousands of acres of farmlands. By mid-October, the floods had forced 1.3 million people from their homes and claimed 431 lives, according to Nigeria’s National Emergency Management Agency (NEMA). It shattered both the built-environment and the undeveloped areas. One prominent feature about flood is that it does not discriminate, but marginalizes whosoever refuses to prepare for its occurrence. The results obtained in this study implicated that dumpsites within the river channel as well as structural development within the floodplain and high amount of rainfall are the major causes of inundation in the region, especially, in the wet season. The study concluded that the use of geoinformation technology, if well implemented, would provide adequate decision support information to planners and decision makers. Recommendations are made toward flood disaster management in the south eastern region of Nigeria.

Keywords: Flood disaster, mitigation, awareness, GIS, South-East.

INTRODUCTION

There is no doubt that the world is under serious threat from the environment: From China to Mexico, Indonesia, United States of America, United Kingdom and Nigeria, analysts have argued that the environment was only responding to the abuses heaped on it by man’s activities (Christopherson, 1997 p.423). The concern is that the world may be getting close to extinction through natural disasters unless immediate actions are taken; and the signs are just too apparent to be ignored (Christopherson, 1997 and

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In May 2008, floods triggered by torrential rains killed dozens of people across China, while thousands of others were victims of landslides caused by the downpours. China is not alone. In the United States of America, the Mississippi River caused damages put at several millions of dollars when it overflowed its banks, flooding some cities, towns, farmlands and major industrial installations over a distance of about 250km and ravaging Iowa before it heaped downstream. Apart from the Mississippi-Missouri River Systems of 1993, and that of 1995, world records of flood have it that recently severe floods were experienced in Norway, China, Bangladesh, Ghana, The Netherlands and South Florida. In February 2000, cyclone Leon-Eline swept across Mozambique which left some 950,000 people homeless as floods devastated huge areas of low-lying lands. Roads, homes, bridges and crops were destroyed. It is over 14 million Indians that were victims to the flood of August 2007 in Sathya Sai Baba, a major human settlement, of that region. The nation’s government could not organize any emergency relief immediately. Rather, it spent over $1.6 billion on Hawk Jets. Hunger and diseases stalked the India children and the poor in the region. In a similar writing, Wright (2011) reports the devastating flood of Lahore, Pakistan in July 2011 where transportation systems were halted and businesses were closed down for days.

With increase in constructions along rivers and concentration of population around submergeable areas, the flood-induced damages are increasing. The complete flood protection with installation of great flood control structures like flood dams are not justified due to its high cost. It is not environmentally, socially and economically an optimum idea either. For this reason, the flood forecasting system can have a considerable role in flood management through logical utilization of weir gates and dam reservoirs. In this direction, different systems have been innovated in different countries around the world (Williams, 1994; Xiaoliu, 2000).

Preventing river floods is important to prevent probable loss of life and to reduce damage to sites of high economic importance. Floods occur when soil becomes saturated and its infiltration capacity is zero; runoffs cannot be contained in stream channels, natural ponds and constructed reservoirs, and the land surface becomes submerged, sweeping away all its content. Periodic floods, resulting during heavy rains, occur naturally on many rivers, forming an area known as the flood plain. The river floods often cause the rivers to overflow their banks, sometimes with a velocity and enormously destructive surge. History has also recorded that flood disaster is not recent, and its destruction are sometimes enormous. For instance, the Johnston flood of May 31, 1889 in Johnston, Pennsylvania, USA left about two third of Johnstown submerged under water, its rail and telegraph lines washed out.

In Nigeria, apart from the Ogunpa Stream in Ibadan that killed several people and completely grounded socio-economic activities in 1980. In August 2008, the residents of Makurdi were thrown out of their residences and their farmlands left impoverished after two days of heavy downpour of rainfall. It was described as very disastrous, (Taiwo, 2008).

Occurrences of floods in the cities and towns of Nigeria in recent times have been a great concern and challenge to the people, Governments and researchers, (Akintola, 1982, Aderogba, 2012 and Aderogba et al., 2012). There have been journalistic and
non-quantitative reports of flood for several parts of Nigeria. But they are superficial and lack directions for professionals and policy makers (Aderogba, 2011). The works of Adeaga (2008), Oyegbile (2008) and Oyebande (1990 and 2005) are paraphrasing, disjointed or sectional. The flood events in most southern cities in Nigeria are so prominent that some inhabitants in many of these settlements have often described it as ‘an act of God’. However, flood events in many capital cities in Nigeria, are mostly due to the poor consciousness of the inhabitants on environmental information, inadequate (or sometimes absolute lack) of spatial information on the flood prone areas, waste dump and construction of buildings (both commercial and residential, even public offices) on river channel without adequate measure for water flow.

On the other hand, floods are natural returning hydrological phenomena that affect human lives. Hazards of flash floods, chiefly in urban regions, are vital from both human settlement and economical perspectives. Recently, the estimation of flood hazardous impacts and the development of GIS-based flood inundation maps have been considered a crucial demand. (Khalid A. AL-GHAMDI et al., 2012). The causes of floods and flood-intensifying conditions is illustrated in figure 1 while table 1 shows a review of some flood disaster cases in Nigeria.
Fig. 1: The causes of floods and flood-intensifying conditions

Table 1: A Review of some flood disaster cases in Nigeria

<table>
<thead>
<tr>
<th>Year</th>
<th>Location</th>
<th>Cause</th>
<th>Estimated Damages</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>Abia, Adamawa, Akwa-Ibom States</td>
<td>Rainfall</td>
<td>5000 people affected</td>
<td>Famous Obebi 2012</td>
</tr>
<tr>
<td>2001</td>
<td>Zamfara State</td>
<td>Rainfall</td>
<td>12,300 persons displaced</td>
<td>Wikipedia downloaded on 19/10/14</td>
</tr>
<tr>
<td>2005</td>
<td>Taraba State</td>
<td>Rainfall</td>
<td>50,000 people displaced</td>
<td>Vanguard newspaper 24/9/08</td>
</tr>
<tr>
<td>2008</td>
<td>Imo State (Awo-idemili)</td>
<td>Rainfall</td>
<td>12,250 people displaced</td>
<td>Vanguard newspaper 23/9/08</td>
</tr>
<tr>
<td>2008</td>
<td>Edo State (Benin City)</td>
<td>Rainfall</td>
<td>20 houses collapsed &amp; four dead</td>
<td>Vanguard newspaper 23/9/08</td>
</tr>
<tr>
<td>2008</td>
<td>Benue State</td>
<td>Rain Storm</td>
<td>Destroyed 350 houses</td>
<td>Vanguard newspaper 27/9/08</td>
</tr>
<tr>
<td>2012</td>
<td>Plateau State (Jos)</td>
<td>Rainfall leading to overflow of Lamingo dam</td>
<td>39 people died 200 homes submerged 3000 people displaced</td>
<td>Wikipedia downloaded on 19/10/14</td>
</tr>
</tbody>
</table>

Relating table 1 to figure 1 it showed that the major causes of flooding in Nigeria and in the south eastern region in particular is climatological.

Disaster Management Process

Disaster management involves many diverse activities. These activities can be grouped into five main stages viz: assessment, mitigation, preparedness, response, and recovery, Lemons, (2005). The first three activities are performed before the occurrence of disaster, while the fourth and fifth take place during and after the occurrence of disasters respectively.

Assessment: This involves inventorying (identification and recording) the sensitivity and vulnerability of a region to certain types of hazards. At this stage the levels of risks, the danger to human life, environment and structures are considered and determined. The assessment will provide identification of development that increase them, thus establishing the culture of prevention.

Mitigation: This entails making necessary provisions to ensure that the region is less vulnerable to known risks and danger. Mitigation activities may include; land use and planning; moving settlement away from areas susceptible to such risks and dangers such as flood and storm areas; and the establishment and enforcement of building code etc.

Preparedness: This involves planning of emergency aid, development of scenarios and monitoring systems, and establishment of early warning system, public information and awareness of likely hazards, community involvement in disaster management programmes, establishment of disaster management and reduction at local, state and national levels and establishment of proper communication channels.

Response: This happens after the occurrence of the disaster which would have caused untold human suffering and damages to the environment. At this stage rescue teams will attempt to save lives, injured people will be cured and nursed and relief will be
supplied to traumatized survivors. This is the most sensational stage of disaster reduction and management system.

**Recovery:** This stage involves assessment of damages, rehabilitation, cleaning of the environment and social and economic reconstruction. It also entails the first three stages of disaster management process viz; assessment, mitigation and preparedness, all of which are central to strategic development aimed at preventing or minimizing the effect of future disasters.

**STUDY AREA**

The south eastern geopolitical region of Nigeria (Study area) is comprised of five states namely; Abia, Anambra, Ebonyi, Enugu and Imo States (Figure 2). It is the home of the Igbo speaking people of Nigeria. It lies between latitudes 4° 47’ 35”N and 7° 7’ 44”N, and longitudes 7° 54’ 26”E and 8° 27” 10”E in the tropical rain forest zone of Nigeria, with mean maximum temperature of 27°C. It covers a total land area of 28,658.795Km² and total annual rainfall exceeding 2500mm. The region is largely agrarian and this has increased the dependence on land resources, due to its dense population which is averaged to about 1,000 people/Km² (Nwilo et al 2013).

![Map of Study area](image)

**DATA AND METHODOLOGY**

A SPOT 5 (2.5m resolution) satellite imagery covering the study area was digitized in the ArcGIS Desktop 10.1 environment to extract the road networks, built-up areas,
water courses and water bodies in the area. In addition, geographic coordinates (X, Y, Z) of some sites, including road junctions, drainages, culverts and sites of indiscriminate waste disposal along the river channel were collected using a handheld GPS. The grid coordinates acquired were converted from geographic grid to UTM standard coordinates, using GEOCALC software, for universality. Additionally, a 90-meter resolution Digital Elevation Model (DEM) for the study area was obtained from United States Geological Survey (USGS). The Arc GIS Desktop 10.1, along with the Arc Hydro extension, has been used in this present study to combine all obtainable data in a unique environment, and to delineate the flow accumulation and subsequently flood risk map of the study area (fig.10). The processing phase includes: enhancing the satellite imagery, digitizing, unifying the spatial reference frames for all datasets, performing statistical and spatial analysis; and flood estimation. Analysis and queries were then permitted on both databases at the same time. In creating the tables however, a relational database structure was adopted. Relational database structure is adequately explained by Dale (1995).

![Diagram of data structure format for the study](image)

**Fig 3: Diagram representing the data structure format for the study**

*Source: A. O. Eludoyin et al., (2007) (Modified)*

**Thematic Layer Preparation**

The SRTM (DEM) (Figure 4) was used to generate the slope map in degrees (see figure 6). It is important to note that the DEM was pre-processed before being used for the various analysis. The flow accumulation map was generated in the ArcMap environment (Figure 9). In addition; the distance from drainage was calculated using the topographic database. The soil map delineating six soil types was obtained from Nwilo et al., (2013) (Figure 6). Land use/cover map was classified using Landsat
image employing an unsupervised classification method in the Erdas Imagine environment. The land use/cover map was classified into seven classes namely; Thick forest, Light forest, built environment, Agricultural Land, Bare land, swamp and Water body (see figure 7). Finally, precipitation data which was obtained from World Climate data Centre were compiled using precipitation records from 1950 to 2000 (Hijmans et al., 2005) thus it is expected that they are representatives of the rainfall regimes in the area (see figure 5).

Fig. 4: Elevations of South eastern region

Source: 90m SRTM DEM covering the study area
**Fig. 5:** Annual Rainfall in the South eastern region from 1950 to 2000  
*Source: Hijmans et al., (2005)*

**Fig. 6:** Soil Map of the south eastern region  
*Source: Nwilo et al., (2013)*
Fig. 7: Land use/Cover Map of the south eastern region
Source: Landsat ETM 2014

Fig. 8: Slope Map of the south eastern region
Source: 90m SRTM DEM covering the study area
RESULTS AND DISCUSSION

Flood risk analysis takes into consideration flood vulnerability factors such as; land use/cover information, settlement data, transportation networks, and social economic data in deriving risk categories: low risk, medium risk, high risk and extreme risk. In the flood vulnerability map, the potential event and its probability of occurrence were combined (See figure 10). The vulnerability categories are expressed as probability in qualitative forms (e.g. low, moderate, high and extreme). Figure 10 shows that there are a number of extreme flood risk areas namely (but not limited to): Ohafia, Aba north and South L.G.A’s in Abia state; Aguata, Idemili south and Idemili north L.G.A’s in Anambra state; Ezza south and Ezza north L.G.A’s in Ebonyi state; Uzo-uwani, Nsukka, Udenu and Enugu north in Enugu state and; Owerri municipal, Oguta, Orlu and Ideato south L.G.A’s in Imo state. These areas with extreme severity correlated with areas of high flow accumulation as well as some known flood prone areas. These high risk areas need to be brought to the notice of the public so that people can realize the possibility of future floods. This could save their properties and lives. These results can be used as basic data to assist flood mitigation and landuse planning. The methodology utilized in this study is valid for generalized planning and assessment purposes. Recently, flood hazard mapping has shown a great deal of importance for suitable urban developments. The results shown in this paper can help the developers, planners and engineers for slope management and land-use planning.
Need For Flood Disaster Management

In view of the frequency and devastating nature of flood disaster worldwide, emphasis is now being shifted from post disaster reaction or response to pre-disaster reaction. This means that National Governments are shifting focus from relief (money and materials) distribution to flood disaster victims to prevention and/or mitigations. This is in response to the United Nations (UN) DECLARATION in 1989 which designed 1989 to 2000 as international Decade for Natural Disaster Reduction (IDNDR) [Verstapen, 1991, Adeniran, 2001]. The intention of the UN is that member countries within the space of ten years should have put in place:

- Assessment of risk posed by environmental hazards (such as flooding)
- Long term preparedness and prevention plans and
- Warning systems

The recent decisions of the Federal ministry of Water Resources under the auspices of the Hydrological Services Agency (NIHSA) to organize a colloquium in 2012 on flood disaster in Nigeria amongst stakeholders on environmental issues is a welcomed development.

However, there are tools needed to mitigate flood disaster in Owerri. These are:

- Topographical Maps for the terrain configuration
- Land Use Map for land use pattern and
- Meteorological map for climate factors such as rainfall, temperature etc.

Topographical Maps

Topographical maps on a scales of 1:10,000, 1:5,000 or less are very necessary for a meaningful and result oriented flood disaster management.

Fig. 10: Flood Risk Map of the south eastern region
If possible to use terrain information from satellite imageries with high resolution. Igbokwe (2005) in the study of Onitsha used the Nigerian Sat 1 with ground resolution of 32m to update the existing topographical map.

**Land Use Maps**

Maps that will show land use pattern are very essential tools for flood disaster management. This could be in either analog or digital form. However, the latter is more preferable.

**Meteorological Data**

Floods occur either as a result of high rainfall intensity within a few hours or low rainfall intensity for a longer period (Ward 1978). Other factors such as surface characteristics and the mobility of the ground surface to absorb precipitation as rapidly as the rate of rainfall contribute to the degree of flood occurrence.

(Ward 1978) says that real time weather information can be readily provided from meteorological satellites (SMS) a proto-type of the Geostational Environmental Satellites (GOES). Isoyet maps also produce rainfall data (quantity).

**CONCLUSIONS**

Spatial data information is one of the core subjects in disaster prevention and emergency aid. For instance, to guarantee speedy and efficiency of rescue operations all information should be available at a glance in the control unit and in the mobile rescue unit (FIG No. 38, 2006). Thus far, effort has been made in this paper to establish the fact that it is better to mitigate flood hazards than supplying relief materials to affected victims of flooding. Decision-making is effective when it is adequately informed. The flooding in south east is increasing with the passage of time. Reliable spatial data for the mitigation should be taken seriously. There is need for total commitment on the part of Government and citizens of the south eastern states particularly the urban dwellers to achieve a sustainable environmental development. In this study, geographic information system has been identified as knowledge based technique with the capacity to collect, store, analyse and present information for decision-making process. Here, high rainfall as well as structural development within the floodplain were identified as possible causes of inundation in the south east, especially in the wet season.

It is concluded that the utilization of GIS in flood hazard estimation is quite powerful and provides an effective technical tool that helps in analysing and understanding such phenomena.

**RECOMMENDATIONS**

This paper seeks to recommend certain planning and management measures which can be employed to mitigate flooding in the south eastern region.

- Governments of south eastern region should continuously monitor on annual basis of flood areas through satellite mapping of the potential floodplains in order to enable the identification of long term historical record of flood prone areas for prediction and development planning purposes.
- The State Governments in collaboration with their various Ministries of Lands, Survey and Urban Planning, Ministry of Agriculture should ensure an up-to-date large scale topographical maps in analog and digital form.
• Governments should establish appropriate number of rainfall stations within each hydrological basin in order to enable the quantification of, not only the effective rainfall intensity and duration within the drainage area, but also the spatial and temporal distribution within the catchment area.

• Development of extensive public awareness programmes by the Ministry of Information and Orientation to inform the public about flood hazards. Measures such as:
  m) Proper disposal of solid waste and not building structures to the block run-off should be maintained.
  n) Avoid known flood plains or green belt areas in the respective states for housing projects.

• Establishment of restrictive development regulations to ensure that any development meets stipulated standards that take flood hazards into consideration.

• Timely evacuation of materials scooped from the gutters will help instead of allowing the refuse stay unattended to which results in pushing back into the gutter when it rains.

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END
LAND SURVEYING AND MANAGEMENT
THE EFFECT OF INCREASE IN LAND-IN-DISPUTE IN EASTERN PART OF NIGERIA

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Many communities in Eastern part of Nigeria have land ownership crises today because of the non-compliance to both the traditional land tenure system and the Land Use Act. To eliminate the crises arising from land ownership under land tenure system, the Federal Republic of Nigeria enacted Land Use Act in 1978 to provide the opportunity to all interested citizens to own land anywhere in Nigeria irrespective of his/her status. In the entire South East and South of Nigeria, there are increases in land crises because the rich tends to take over what belongs to the poor in most rural areas. In cities, developed and developing urban areas, the allocation of land is more to the rich than to the poor but even after allocating small percentage to the low-income earners, some rich people or politicians deliberately trespass into the land of underprivileged ones. The methods employed for this study include a review of past land disputes in Eastern Nigeria as well as international land dispute between Nigeria and neighbouring Cameroon. The study shows that the major causes of land in dispute are: problem of fake or no land documents, deliberate trespass or encroachment, bonafide claim of right over land, and open acquisition with intention to dispossess the rightful owner(s). These factors generate crises between the two parties, which can lead to loss of lives, and properties.

Keywords: Dispute, Tenure system, Land, Ownership, Demarcation.

INTRODUCTION

Land and its Ownership

Land is the physical material of Earth’s crust that supports all life. For purpose of ownership and use, land is divided into parcels. Each parcel represents a defined area of land surface set off by boundaries and owned by a particular individual, group, organization or government. In rural areas where farming activities are going on, parcels range from one hectare to many hectares of land for individuals or groups. In urban areas, parcels range from one plot to many plots of land, depending on the user and the purpose.

Land is an object of capital value capable of being owned and used by its owners to maximize economic return. In this way, land becomes a “bundle of rights and obligation” that are defined and protected by the legal system of the country or community where land is located. It is the owner who determines how to use his land for economic, geographic, legal and personal circumstance. The owner determines
when a change in existing land use should occur. In Nigeria, land could be classified as public and private. Land and its resources are held in some form of common tenure, held by kindred, hamlets, villages, communities or organizations/societal groups (Mabogunje, 2002).

Legally, surveyors should demarcate both public and private land to reduce unnecessary encroachment.

**Land-in-Dispute**

Land-in-dispute is disagreement between different interest parties who owns a particular portion of land. It occurs when the portion of the earth’s physical surface which one party has certain rights, is threatened or interfered with by another party, (Didigwu, 2009). Land-in-dispute is one of the major problems threatening one family with another; one Village with another; one community with another; one Local Government Area with another; one State with another and one country with another. It causes war in some cases if not well managed. For example the boundary dispute between Nigeria and Cameroon at Bakassi Dennissula is a case study. Others examples are crises in communities of Aguleri and Umuleri in Anambra State, Ezza and Ezilo in Ebonyi State and Brass in Bayelsa and Nembe in Rivers State.

Land-in-dispute Survey is the operation of determining the preliminary boundaries of the claimed owner of the portion of the earth’s physical surface and fixing all the necessary details that can help the owner to prove beyond any reasonable doubts his ownership of the area in dispute. The survey plan enables the Court to come to judgment without necessarily conducting a locus in quo. Surveyors define land as a measurable entity, a portion of the physical earth surface, which is divisible into plots by means of mathematical process of surveying (Onyeka, 2004). It is the roles of surveyors to legally define/demarcate boundaries of countries, States, Local Government Areas, communities and villages, etc, and provides a survey plan as required.

**Land Tenure System in Southern Nigeria**

Before the Land Use Act of 1978, land was classified in Southern Nigeria as State land, customary land, and non-customary land (Didigwu, 2010). State land was considered to include all public land in the Federation, which were invested in the President for the benefit of the Federal Republic of Nigeria and all land held or acquired by any authority of the Federation for any public purpose. Customary land tenure was land held under customary land tenure system and comprises of communal land, family land and individual land. Communal land, which still exists, is land owned by a community. The head of village and or the traditional Ruler of the community has supervisory and administration authority over this land. No individual had sole authority over any portion of land used (Udo, 1990). Family land meant that the title was vested in members of the family as a corporate group. It was the major form of land holding in major parts of Southern Nigeria. Every member of the family had the freedom to use the land, under the supervision of the head of the family. Individual land holding includes land assigned by partitioning of family land to individual member, acquisition of virgin forest for farming activities by individual member, and gift or sale to an individual. Even at present, land can be transferred from one group to another as a way of gift or outright sale (Asoegwu, 1983).
Causes of Land – in – Dispute

The Causes of Land – in – dispute include the following:

i. Illegal Transfer of Title.
Land speculators or vendors fraudulently sell properties belonging to their Kindreds, lineages or even community for their own selfish gain. These properties are secretly sold so that other members of the family are not aware of the transfer of title. The buyer of this property (ies) only understands that he has been duped by the time he wants to develop the property and the original owner stops the process. This action has cost the lives of some innocent Nigerians because of the disputes and harassment that follows when the real titleholders become aware of the transaction (Mabogunje, 2002).

ii. Desperate Desire for Landed Property.
There are cases where a person with very rich background takes over the land of another person of poor background for his private use without the owner’s proper consent. The rich man may bribe some elders to obtain what he wants at that material time, but when the poor man’s children became adults and get what it takes to recover one’s property, the elders who have knowledge of the transaction may show them their father’s land boundaries. If the children of the poor person whose land was depossessed by force request to take over their land, crises may start, resulting to land – in – dispute.

iii. Ignorance of Actual Boundaries of Land Between Communities.
Communities or villages with common boundaries clash; because communities and villages do not use legal marks to mark their boundaries, rather they use perennial trees, hills and valleys as boundary marks. When trees fall down and valleys filled up with sand, they do not have any other mark as boundary line. This can lead to guess work in the determination of actual boundaries, which sometimes causes crises; resulting to land – in – dispute. Land – in – dispute has caused a lot of problems between communities or villages, which sometimes result to death of people involved. (Mabogunje, 2002)

iv. Land Used to Obtain Loan
Parcels of land are used to obtain loan to solve one problem or the other. The descendants of the person who gave the money to solve the problem sometimes treat parcel of land used to obtain loan as inherited land. In some cases the descendants of the land beneficiary might have occupied the parcel of land for over one hundred years before the land loaner’s descendants find out that the parcel of land belongs to them.

When the loaner’s descendants get enough evidence on how the land was transferred, they may attempt to recover it, this attempt may be resisted by the present occupier; which could result to land – in – dispute. In most cases, this type of transfer of parcel of land is not properly documented because there may be no specific duration of loan. When the duration of a loan is ten years, for example, the loanee who has occupied the parcel of land for one hundred years stands as the owner.
v. Land Given as Gift to Relation
In the olden days, parents sometimes settled their daughters with parcel of land to accommodate her and her husband. Some gave land to their Cousins or even friends to build houses and farm. Others exchanged land may be because of location.

In some of these examples, people have occupied the land for over five hundred years. All these transfers were not documented legally but of oral history. In some places, the Youths from the claimed owner may contest the ownership of the said land, thereby causing enormous misunderstanding and dispute. The Ezillo and Ezza-Ezillo in Ebonyi State of 31st December 2010 land–in–dispute exist which cost many lives, including non-indigenes of mentioned towns is a case of this type (Researchers field study 2011). This type of land transfer and Land – in – dispute exists in different parts of Eastern Nigeria.

vi. Ceasure of Communal Land for Private Use by the Eldest Man in a Kindred.
In the Eastern part of Nigeria, the land tenure system was practiced such that land was owned by lineages or extended families. Individuals have only rights of use on such family land. The family head or the eldest man in the family or kindred takes charge of the entire land, and has the right to assign part of parcel of land to any member of the kindred.

This system was practiced well in the past but at present some of the family heads abuse the rights of holding the title on behalf of others. In this case they give their children the impression that the land he is holding belongs to his immediate direct family and as a result assigns parcels of land only to his children and oppose the idea of any other member of the kindred who has interest in any part of the parcel of land. This claim leads to land crises or dispute, ones other members of the kindred observe that the family head is using the land for private use. Some of these kindred or villages’ head do sell part of the land without approval by the entire family or villages.

vii. Land reserved for shrine or masquerade
In some communities, parcel of land are reserved for shrines or Masquerades. These parcels of land originally belong to some people. In recent times, most part of the East are dominated by Christianity and with the development that came with Christianity, many of the so called ‘Evil Forests have been converted to Christian centers as places of worship to God.

Land becomes a scarce commodity recently because of the number of people that are developing interest to own land. Land has been valued so high because of the business like of the people of the area who wish to invest on land. As the original owners of such reserved areas encourage Government, Non-Governmental Organizations and Churches to take over the “Evil Forests”, the idol or masquerade Worshippers frown at such moves, resulting to Land – in – dispute.

viii. Claims of Ownership of Mineral Resource(s)
Land crises arise between one village and another, one community and another, one Local Government Area and another, one State and another, and one country and another because of the suspected existing mineral resources.

The dispute between Nigeria and Cameroon, which went to world Court was because of claims of ownership of mineral resource (Onyeka, 2004).
In 2014, there were ownership crises of a portion of land where mineral resources were discovered between Igah community in Enugu State and Omasi community in Anambra State. In Ihekwu-enu Aku Autonomous community of Igbo-Etiti L.G.A of Enugu State, there is a dispute between Offienyi Village and Umu-Ezike Village because of the mineral suspected at ‘Ujere Hill”. (Researcher’s field Survey, 2014)

**Experts to Land-in-dispute**

There are three major stakeholders in land–in – dispute determination. They include Surveyors, Lawyers and Judges.

*i. Surveyors*

The two common principles that apply to methods of Land–in–dispute Survey are carefully applied by Surveyors. These principles include:

Laying down of an overall system of stations; the position of which is determined to a fairly high degree of accuracy. This is the establishment of boundary points. After this, the survey of details between these points is carried out by less elaborate methods.

The second principle is that all survey measurements must be subject to check so that all the gross errors must be apparent before the Survey is completed (Ramsay, 1977).

Land-in-dispute Survey is an aspect of Survey where the boundaries between the Surveyors Client and other adjoining boundaries are demarcated by method of compass traverse. Successive bearings and distances are measured using a compass and a steel tape respectively. Details are fixed at every station (point) as appropriate. The purpose of Land-in-dispute survey is to determine the right of ownership of a particular parcel of Land-in-dispute. The surveyor is the expert witness in the determination of the rightfully owner of any disputed parcel of land. He produces the dispute Survey plan of his Client and interprets every detail on the plan to the understanding of the judge who finally determines the rightful owner of the parcel of land based on evidences before him.

*ii. Lawyers*

Lawyers take active part in Land-in-dispute because they stand for both the plaintiffs and the defendants. That is one lawyer or group of lawyers with a leading counsel representing the plaintiff for the presentation of the matter in the court, and one lawyer or group of lawyers with a leading counsel representing the defendants for the defense of all the allegations against him. The arguments for and against in a Land-in-Dispute can drag a boundary matter for so many years without judgment. Lawyer’s allowances are paid as long as the matter remains in Court. Some cases are withdrawn for out of Court settlement after many years of litigation without judgment.

*iii. Judges*

A judge is a public official whose duty is to administer the law, especially by presiding over trials and rendering judgments. Any Judge who the case of Land-in-dispute is assigned to, listens to both the plaintiffs and defendants arguments, considers the opinions of witnesses before he passes his judgment. A judge takes very good time to study any case under his trial before judgment to avoid mistakes. The law Courts are usually considered as the last resort for rural dwellers. Again, Court verdicts and judgments more often than not lead bitterness, rancour and perpetual enmity, between the disputants. The delay in the judicial system, high cost of
litigation, technicalities of the process, etc. makes the need to shop for alternative means of disputes resolution.

The effects of Land-in-dispute on the society

i. Endless Crises and loss of lives.
Unresolved boundary problems create tension between the two parties whenever one party trespasses to the portion of land claimed by the other party. Most of these disputes came about over ownership of Land (farming, fishing, oil deposit, solid mineral deposit etc.) and defence of community properties. (Nwanegbo, 2009)

Sometimes they claim that the Court is wasting their time and as a result take law into their lands. This may result to fighting between the two, which may eventually cause the death of some disputants.

There is always hatred and ill fighting between the communities, Villages or families, involved. This can bring setbacks to cultural, social and economic relationships. For example, there could be ban on inter-marriages between the two parties (communities or Villages etc). It causes fear in movement between the two communities because one may lose his life in attempt to visit a friend from the other side.

ii. Underdevelopment
When two communities with adjoining boundaries are having land crises, it affects the infrastructural development of the two communities. Development that could cover the two communities may be restricted to one community because of staled relationship.

Government and private investors find it difficult to locate industries in area where security of lives and properties are not assured. Sometimes, existing physical facilities/infrastructures are destroyed by Youths during land Crises. The absence of industries and trades increases the number of unemployed Youths in such areas.

iii. Political Crises
Most communities who have staled relationship because of the existing Land-in-dispute crises and belong to one State constituency or Federal Constituency do not have mutual agreement on who will represent them at either the State House of Assembly or Federal House of Representatives. The party primaries always become a do or die affair. If one community has more political wards than the other, the communities with less political wards do not have representation as winner takes all. This non-representation increases the acrimony between the two communities.

Implementation of Existing and New Solutions to End Land-in-dispute in our Environment

i. Existing Solutions

- Land cadastral boundaries and title holdings shall be demarcated legally in such a way that communities, villages, hamlets and individual parcel of land will be recognizable.
- Government, using standard beacons, shall demarcate hamlets, Villages and communities boundaries.
• A registered Surveyor shall carry out all land demarcations with a registered office known to corporate Affairs commission.
• There shall be an arbitration/adjudication mechanism for land ownership conflicts resolution. (SURCON, 2009).
• One of the most effective means of asserting ownership over one’s portion(s) of land is by effective occupation of that portion, either by farming from time to time or living in those areas. If the boundary is between one country and another; one State and another or one Local Government Area and another, there shall be physical development to such border areas.
• Another way of securing property is by fencing one’s portion(s) of land. Fences, if not challenged at the course of erection can settle boundary positions permanently. When fencing involves largely populated areas, enough controlled openings are arranged in order not to obstruct the movement of people and trade in those areas.

ii. Suggested New Solutions
• The individual’s possessory rights should be determined using best practices and appropriate technology.
• Plan or map of any demarcated portion of the land should be produced with all the important details of features therein.
• There should be security network constituted to patrol to all the border areas of the country or States. This team should be made up of surveyors, soldiers, SSS and the Civil Defense (Onyeka, 2004).
• Access roads should be provided to major boundary border to enable security patrol team to take off from one point on the boundary and drive to another point along the boundary.
• Land rights to children of deceased brother should not be deprived. There shall be a special Court to try any offence emanating from deprivation of land rights of children.
• The elders of every community should show their Youths their Land Boundaries early enough.

CONCLUSIONS
At one time or the other the communities of the nine states that make up Eastern Region (South-East and major part of South-South) have been involved in land-in-disputes. For example: the communities of Aguleri and Umuleri in Anambra State, Ezza and Eziolo in Ebonyi State, Brass in Bayelsa State and Nembe (Rivers State, etc, have lingering land dispute.

Boundaries should be made for human convenience and not for conflicts where people lose their lives in protest of the actual boundaries. Family and communal land disputes in Eastern Nigeria are as a result of competition over access to land and natural resources. Most of these disputes can be resolved using traditional institutions or Government organ responsible for that.

There should be legally survey marks at every change in direction of the boundary line to serve as physical rights of citizens. Any parcel of land, bounded by survey beacons shall have survey plan which contains the name of the owner of the parcel, the location, the origin, the scale, the shape of the parcel of land, and live signature of the Surveyor and date of survey. Every occupier of a parcel of land should obtain either a Statutory Right of Occupancy or Customary Right of Occupancy. There should be
physical development around the boundary to prevent unnecessary trespasses. Each State and Local Government Areas should have up-to-date maps, which can be used to trace boundary lines in case of physical destruction or removal of survey beacons. Title transfer of any type shall be documented and duration clearly stated to avoid incessant Land-in-dispute.

REFERENCES


END
LAND DISPUTES: SURVEYOR AS AN EXPERT WITNESS IN COURT

Olufemi Ayoade Olunlade


Land transaction and governance in Nigeria are administered principally by the Land Use Act of 1978, herein referred to as the LUA. The old land tenure system in the southern Nigeria differed from that of the north extensively, and the transfer of the ‘assets and liabilities’ of the old tenure system (or rather the super imposition of the old tenure system upon the Land Use Act) has facilitated many land related court cases in Nigeria, especially in the southern Nigeria. Certainly, every developing nation requires land, upon which all developmental structures are emplaced. Issues on land that eventually develop into dispute retard development, and hence should be properly addressed. This paper tends to examine the essence of a Surveyor as an expert witness vis-à-vis land related court cases, especially in Nigeria. The effect of trespassing upon another’s landed property thereby causing dispute is also highlighted. What are the expected professional roles of the Surveyor as an Expert Witness and/or as a Surveyor-advocate, especially as they pertain to field duties, production of dispute plan/map, and giving of expert evidence under oath in the Court of law? Some recommendations were also made as regards the official recognition of Alternate Dispute Resolution Techniques (ADR) to the Surveyors’ body and the professional arm, as well as the professional who would be expected to mount the witness box in court.

Keywords: alternate dispute resolution (ADR), land use act (LUA), surveyor.

INTRODUCTION

It is usually said that when a purchaser pays for a landed property, he has succeeded in paying for a ‘right’ to use the land appropriately as the law of the land permits. Legal rights of persons on land could be ownership, possession, or occupation, or even a combination of any two of such, or the three types afore-mentioned. Land owners have the right to keep unwanted intruders off their property, using wall fences (or row of trees), digging straight ridges, or simply by chasing trespassers away. Surveying methods and products have been employed as veritable instrument authentic enough to serve as a proper un-alloyed demarcation between contiguous landed properties. Where serious treats persist, the owner reserves the right to call the police, who might make an arrest and charge the trespasser to a magistrate court for disturbance of public peace, libel (where applicable), or some other magistrate-chargeable offences. However, it is the right of the perceived owner who has been disturbed from taking proper possession of his property (or part thereof) to charge the trespasser(s) to the High Court of Justice in the jurisdiction of the landed property. In such a case, the person seeking redress is the plaintiff/appellant, while the trespasser is the defendant/respondent.

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Land is a very important asset that any community would depend upon for any development. In retrospect, the old tenure system in the southern Nigeria was such that traditional entities (called towns or cities) fought wars and won landed properties with clearly defined traditional boundaries. The fluidity of such boundaries became apparent since wars continued and any victory on one side would bring an expansion in the territory, while any loss at battle would bring a deficit in the claimed area of that community. As time went on, and there was a halt to wars in the nineteen century (or there about), the administrative D.O.’s encouraged every community to hold unto the extent of land they had as at then. Lack of proper education of southern Nigeria’s leaders actually added to the ambiguities in defining boundaries even after the colonialists’ intervention. It is necessary to give kudos to the engineers amongst the colonial masters who surveyed many community boundaries in the south west Nigeria, evidence of which is still available today in some quarters (Nigerian Institution of Surveyors 2013).

The old tenure system in the northern Nigeria generally put the governance of land mainly on the traditional head. The advent of the Land Use Act (LUA) would not have any serious defect on the general masses since the LUA also places the governance of land on the Head of Government. When the LUA came into effect in 1978, there was the ‘transfer’ of ownership of all land to the federal government. However, communities still held on to ownership (de facto) of land as historical evidences confirmed. Individual families (and individuals within families) began to lay claims to their “inheritance”, which was supported by law. How then would individuals share inheritance that they knew little or nothing about without quarrels? How would communities ascertain the correctness of their common boundaries without cheating? Once cheating comes in, quarrel ensues, thus leading to dispute.

In summary, prospective land owners would not want to wait for an intruder to enjoy a permanent trespass on his/her property undisturbed, as that could lead to Adverse Possession. It might be surprising to learn that under certain circumstances, a trespasser could come onto your land, occupy it, and gain legal ownership of it, either through an honest professional mistake, or intentional ignorance modulated with evil genius hypocrisy.

**MAIN CAUSES OF LAND DISPUTES**

When the right of a decent owner is trampled upon forcefully, unintentionally, legally or otherwise, he reserves the right to seek for a redress in an appropriate Court of Law where his prayer would be legally considered, and his right restored. It is a common fact that in most parts of the southern Nigeria, indecent owners sometimes go to Court to seek redress on properties that are not theirs hitherto. Hence, it is the responsibility of every individual person/family/community to be watchful and not allow indecent land speculators to legally grab the ownership status on a landed property that is not theirs. It might have a dangerous consequence thereafter.

The presence of immense mineral deposit near the border of any country is another main source of dispute between countries. It is a common fact that neighbour country sometimes annex such area either through a legal means (as was the case with Bakassi peninsula in the Cameroon legal battle with Nigeria) or through a forceful means (like it is the case with Russia in the Creamea region of Ukraine).
USUAL PERSONALITIES INVOLVED IN LAND RELATED CASES

Land related court cases could be inter personal, inter or intra family, inter or intra community, inter or intra states (Osun State vs Ondo State both in Nigeria), inter or intra countries (Nigeria vs Cameroon in Bakassi Penninsula case), inter or intra continent. It is a usual court practice that the plaintiff proceed to produce a dispute survey plan or map showing the extent of land owned, used/occupied, possessed where necessary by each, and trespassed upon by the other party. This would form the basis of the Lawyer’s argument in Court. Experience shows that some persons apply to be joined in certain suits.

EXPERT WITNESS

An expert witness is regarded as a professional witness or judicial expert, who by virtue of education, training, skill, or experience is believed to have expertise and specialised knowledge in a particular subject beyond that of the average person, sufficient that others may officially and legally rely upon the witness’s specialized opinion about an evidence issue within the scope of his expertise, referred to as expert opinion, which eventually acts as an assistance to the Court.

Whenever there is a dispute where the identity of the land in question is actually in dispute, it is the duty of the appellant to establish the identity of the land on which he is requesting for claims. This literally leads him to prepare a dispute survey plan that would be attached as a working tool and legal instrument in the consideration of his case. The dispute survey plan remains an instrument of the court, and hence it is not usable for further technical consideration unless it is re-prepared for such purpose. Hence, the Court recognises the Surveyor as a very important stake holder in the dispensation of equitable justice regarding land related cases. It is usually at this junction that the parties begin to look for Surveyors to prepare suitable plans for them. What then would be the roles of the Surveyor?

Before giving his evidence, the attorney for the party calling the expert must make a showing of the necessary background of the expert through questions in court, to prove beyond reasonable doubt that the expert is really an expert according to law. Where such proof was not made, and/or not adequate to satisfy the court, the trial judge has the discretion to rule that the witness is not an expert or he is an expert on limited pedigree and subjects. Experts are usually paid for their work on the case, as judgments generally are hinged on the outcome of the results of the experts’ work. In most jurisdictions in the United States, both parties must exchange names and addresses of proposed experts to allow what is termed pre-trial depositions. Solutions to knotty issues have always been found while Surveyor advocates (expert witness) and Attorneys check both dispute survey plans produced by the two experts. Such an action is not common in Nigeria, until recently when Alternate Dispute Resolution ADR is being encouraged by learned jurists on cases, especially land related issues.

ROLES OF A SURVEYOR AS EXPERT WITNESS

Field duties:

Identification of land claimed is very important. A particular dispute survey plan presented by the plaintiff in a case was found to be defective in orientation, scale and positioning. When re-prepared by the defendant’s surveyor (Olunlade 2002), the
differences were clearly revealed. This probably further disabled the line of argument of the prosecuting lawyer, and hence technically knocked out the plaintiff’s claim. It is settled law that in a claim for declaration of title to land, the onus is on the plaintiff to prove clearly the boundaries of the land claimed. This he can do by specific and unequivocal evidence as to boundaries of the land in dispute. Proving title to a defined area actually means proving the boundaries thereof. One of the ways of showing specific areas claimed is to file a (dispute survey) plan of the area, with such plan being properly orientated, drawn to scale and accurate and reflecting the boundary’s features. In Omoregie v. Idugiemwanve, the Supreme Court confirmed that ‘court will not grant a decree of declaration of title in respect of an undefined area’. Sometimes, the defendant also prepare a defense dispute survey plan to further his argument, as in the case mentioned above.

Where a claimant desires to draw a dispute survey plan, such a plan must show clearly the dimensions of the land, the boundaries, and other salient features. See Arabe v. Asanlu. The demand for this is in consonant with the maxim “That is certain which can be made certain, but that is most certain which is certain on the face of it”.

Depending on the extent of land involved in the dispute, it is the responsibility of the client (plaintiff or defendant) to take the Surveyor advocate to site and show him the boundaries involved in the dispute, and all such other boundaries that would lead the attorneys to a favourable and successful conclusion. Situations had arisen whereby clients refused to lead the surveyor round the boundary of the land parcel in dispute. In a particular case, the opponents threatened to harm the defendant if he ever tried to appear on site. The survey was done under police cover, and results were shown in court. Such a visitation to site would enable the Surveyor to know the type of instrument to employ for the task, and the safe route to and fro the site. It is advisable that client should take the lead while survey field work is going on.

As much as practicable, survey methods must be used to derive the survey plan. The dispute survey plan needs not have cadastral pillar numbers, but peg positions must be correctly observed and referenced appropriately. All details must be picked and annotated on the plan as applicable. Areas liable to flooding as well as rocky portions must be highlighted. A surveyor was quizzed for almost an hour on the meaning of ‘virgin land’ which he wrote as part of details in a dispute plan. It was a costly mistake in that the opposing lawyer struck through the loophole by arguing that some Fulani herdsmen had been on that site and hence it could not have been a virgin land. The witness surveyor is expected to therefore watch whatever would be written as details, and make sure they have no ambiguous meanings.

If possible, the least equipment to be used on site for production of dispute survey plan should be hand held GPS. In community boundary issues, a combination of static GPS and total station instrument should be used to prepare the plan/map (Olunlade, 2008). Where the lines of dispute are very long (as in the case of Nigeria vs Cameroon), high order surveying methods should be employed. Field work for dispute survey work is no less tasking than the normal surveying operation. Many uninformed client would claim that after all, ordinary tape and compass was used. In fact, efforts should be made to prepare a well articulate dispute plan presentation, devoid of mistakes.
Independent investigation:

- The Surveyor advocate has the right to ask many questions from his client, especially regarding the parcel in dispute. When it comes to inter community boundary, the Surveyor’s professional expertise should be brought into play. Usually in the south western Nigeria, features defining boundaries between any two communities include rivers, notable streams, row of rocks, etc. A community client once pointed at a row of cassava plants as a boundary between the other community and his community. The state government jury visited the site and later confirmed the truth from a third community sharing boundary with the two. The Surveyor advocate could investigate even if possible from other sources so as to authenticate the claims of his clients. Though a school of thought believe that the surveyor has no business going into investigation, another argument proved that since the surveyor cannot run away from working on land to earn his living, the onus lies on him to make opposing party recognise that he is not an enemy at all, and that he could as well work for them on another task in future.

- It is the duty of the Surveyor to draw decent, correct, dispute survey plan that would serve as expert evidence, hence, such plan should be devoid of ambiguities.

Office computation & plan preparation

The office computation must be error free, as any unchecked error could be misinterpreted as intentional. The Surveyor should make sure all computations are made to higher accuracy than required for dispute survey. Surveyor advocate has to liaise with the attorney of his client regarding the titling of the dispute survey plan. The advent of AutoCAD and similar software has made detailed and colourful production of dispute survey plan possible, in convenient scale.

Efforts should be made by Surveyor advocate, who will eventually give expert evidence regarding the disputed property to link up directly with the client: no proxy, no agent in between. This could be helpful during cross examination of expert witness under oath. If it was proved beyond reasonable doubt that the Surveyor was not commissioned by the client, the opposing attorney could succeed in encouraging the court to admit that the expert witness’ claims be jettisoned. At no time should the Surveyor’s computational data be found in the hands of proxy agents. The Surveyor’s seal and live signature are equally important items required by law on the prepared plan. Litigation survey should be taken very serious by Surveyors as the law will not be kind to any professional found falsifying data on plans.

Working with the lawyer on the case

The Surveyor advocate / expert witness should work hand-in-hand with the Lawyer without compromising his professional standard in order to bring sanity to the case. This cannot be over emphasized. Where parties to a dispute both claim possession of a land in dispute, possession is given to a party that has title, or holds a better title. This is a settled principle of law. See Danjuma Tanko v Osita Echendu (Supreme Court 2010). The question comes to the ordinary man: how can I get a title or a better title on my landed property? The survey plan (cadastral, not dispute) is a veritable tool for obtaining a better title (C of O) on land. Hence, the Surveyor, as a Consultant is a principal stake holder in this matter. Services of the Surveyor should therefore enjoy massive publicity. In land dispute, a survey plan is usually very helpful in determining
the extent to which the claim is made, but that does not apply to all cases, particularly where the identity of land is not disputed.

**Defense of produced plan/map & testifying expert**

While giving evidence and testifying under oath, the Surveyor – Advocate should be mindful of the usage of certain surveying terminologies which could be misunderstood by lawyers. On cross examination by a lawyer, a surveyor once talked about the measurement he had in the field, as well as the adjustment techniques used in obtaining the final coordinates. On hearing “adjustment”, the prosecuting attorney changed the tone of his argument. Though the court was re-oriented back to normalcy, the Hon Justice advised the Surveyor to be mindful of using professional terminologies with ambiguous meanings in explaining his testimonies. The overriding duty of a Surveyor as an expert witness is to the Court to which the expert evidence is given. This duty overrides any contractual duty to your client. It is expected that a factual, truthful, impartial and independent opinion covering all relevant matters on the said parcel would be obtained from the Surveyor. It even does not matter whether it would favour your client or not, and whether the evidence is being given under oath or affirmation.

Surveyor must be careful not to twist professional evidence in favour of the client paying for his services. The Surveyor must be able to show that he has full knowledge of the duties relating to the role of an expert witness when giving evidence. The Surveyor is entitled to accept instruction from his employer and to give expert evidence on behalf of that employer. It is therefore the responsibility of the Surveyor to make his employer understands that his primary duty in giving evidence is to the Court and that this may mean a conflict of opinion between the employer’s view and the reality as his professional calling demands. Where the Surveyor realises that there would be a conflict of interest which would professionally interrupt his impartial, truthful and factual evidence, he is required to consider and decide on his continued appearance for such an employer to avoid professional misconduct and/or irresponsibility.

As an expert witness, a Surveyor should not malign the professional competence of another expert witness, especially in the public or Court domain. A Surveyor is advised to only accept giving expert evidence in field of study where he has the experience, knowledge, and expertise appropriate for the assignment as well as the resources to complete the assignment within the required timescales and required standard. Surveyors should no longer undertake any expert witness appointment on any form of contingency or success-based arrangement. All communications regarding the request for an expert witness by the client, the acceptance thereof by the Surveyor, subsequent instructions regarding the evidential facts as advised by the attorney, etc. must all be transparently filed and kept. An expert witness Surveyor advocate should neither express an opinion outside the scope of his field, nor accept any instruction to do so.

Many courts in Nigeria now operate the ‘front loading’ method for land related cases. The surveyor deponent puts down his statement of claim which would be submitted along with the testimonies of other witnesses. He thereafter signs the declaration, which also serves as an introduction of his person and his witness. However, the RICS requires every expert witness to end his report with a Statement of Truth and a signed declaration, a sample of which has been designed by the Institute and published
accordingly (RICS Dispute Toolkit). The Expert witness could either be an educating witness, and/or a reporting witness. While standing as an expert witness, the Surveyor is estopped from presenting himself as a client’s witness.

**ALTERNATE DISPUTE RESOLUTION METHOD**

A generally acceptable means of settling land disputes outside the court room is the Alternate Dispute Resolution ADR technique. Many Nigerian juries have gone through mandatory seminars on ADR both locally and internationally. In a land dispute case, the plaintiff (a pastor) bought an acre of land from the traditional customary owner, who incidentally happened to be a royal family in the ancient town. Few years after, the defendant (the chief Imam) entered on the same land and claimed that his great grand-father had been an ancient occupier of the land, and therefore, he remained a customary tenant on the said property. There were about twelve adjournments with no results. It was the defendant’s lawyer who sought for ADR to resolve the case. The Hon. Justice agreed when the plaintiff gave a positive nod about the request, but gave a two month window within which resolution was expected and results should be passed to her. The issues were resolved amicably and all parties were satisfied.

Almost all disputes are resolvable by dialogue. A situation whereby cases of disputes on land are held as “in-progress” in courts is not acceptable, as justice delayed is justice denied. Presently there are lots of literatures on ADR. The reader is hereby referred to such articles. Recent possible adoption of ADR in many Nigerian courts is highly commendable. However, it is advisable that each nation compile similar kits as devised by RICS for England and the Wales regarding land dispute resolution.

**CONCLUSIONS & RECOMMENDATIONS**

- The remuneration of the expert witness Surveyor (as presented in page 18 of the NIS professional scale of fees 2008) regarding Court Appearance, should be periodically reviewed upward with time.
- The Surveying Regulatory body (SURCON) should be encouraged to publish a practice statement and guidance notes on Surveyors as Expert Witness and Professional Advocate, as is applicable in other parts of the world.
- The proposal of Atilola (Atilola 2010) for a national mapping policy should be nationally adopted, financed and executed as it is expected to define the surveying and geo information goals and assure the coordination of geo-spatial information for sustainable national development (issues of land dispute would have reduced significantly)
- Of importance is the issue of safety of the crew members. Field operation of dispute survey could be very dangerous sometimes hence safety of equipment and personnel must be taken very seriously. If possible, a trained first aider should be among the crew.
- It is advisable that the Surveyor and the Lawyer standing for a particular client should meet regularly and discuss before the court date.
- The MCPD of the Surveying profession should include Alternate Dispute Resolution lessons from experts in the field. The fear of remuneration should be cast off, as appropriate fees should be attached to successful resolutions through ADR.
ACKNOWLEDGEMENTS

- Nigerian Institution of Surveyors, Osun State Branch – Platform on which I served as Chairman (2011-2013)
- Nigerian Institution of Surveyors, Ondo State Branch APPSN

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END
The impacts of climate change have become a major concern globally in recent years, although perhaps less so in many developing countries, which face a plethora of developmental challenges that have been considered to have only limited connections to climate change. Because of low adaptive capacities and the projected impacts of climate change, a consensus has emerged that developing countries are more vulnerable to climate change than developed countries. The south eastern geopolitical region of Nigeria is known to be particularly vulnerable because of its fragile ecosystem and human activities that have heightened the tendency of climate change and its impacts in the region. A negative change in the climate, always have its corresponding dysfunctional impacts on man and the ecosystem either globally or locally. This study sought to examine the impacts of land use/land cover and climate change in the south eastern geopolitical region of Nigeria. 30 arc seconds climate data of both current conditions (interpolations of observed data, representative of 1950-2000 in the region) and future conditions: downscaled global climate model (GCM) data from CMIP5 (Intergovernmental Panel on Climate Change fifth assessment), obtained from the World Climate data Centre (http://www.worldclim.org/) to model the climate change. The results show that while temperature increased, rainfall decreased. Cloud free Landsat TM and ETM+ images covering the study area were obtained from Global Land Cover Facility and pre-processed and classified to prepare land use/land cover maps for a period of 29 years (1986–2015), change detection was also employed to analyse the changes that has occurred overtime which shows that vegetation has been reduced while the built-up area has increased, the agricultural land also reduced significantly. The information presented in this study accentuates the need for governments at all levels to adequately fund geo information production and cultivate the culture of its usage for monitoring and proactive response to sustainable environmental management and national development.

Keywords: Climate change, GCM, Remote sensing, South-eastern Nigeria, GIS, LULC, Change detection

INTRODUCTION
Climate change has become one of the defining issues of our time. It is now more certain than ever, based on many lines of evidence, that humans are changing Earth’s temperature. The atmosphere and oceans have warmed, accompanied by sea-level rise, a strong decline in Arctic sea ice, and other climate-related changes.

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The intergovernmental panel on climate change (IPCC) 2007 defines climate change as statistically significant variations that persist for an extended period, typically decades or longer. It includes shifts in the frequency and magnitude of sporadic weather events as well as the slow continuous rise in global mean surface temperature.

Understanding how climate change may cause impacts at the local scale, on land, and on land use, is crucial for the development of long-term adaptation and mitigation strategies that may minimize any negative impacts of climate change within the context of a country and a people undergoing rapid development.

Recently many developing economies thought that the issue of climate change was not of particular importance as they had far greater challenges in terms of economic development to consider (Rod Lefroy et al., 2010). For many, economic growth and extravagant use of fossil fuels during the industrialization of the developed world contributed to the problem. Thus, it was a developed world problem, and especially as far as mitigation was concerned. More recently, the likely impact of climate change on agriculture and forestry has stimulated more countries in the developing world to take a greater interest in climate change.

Climate change scenarios for Nigeria, including the south eastern geopolitical region, indicate that the climatic variability currently being experienced is likely to increase and intensify. Droughts, floods and storms are likely to increase in both frequency and intensity. Changes in precipitation levels and patterns are also likely to occur (Conference of Parties (COP) 15 2009). Temperatures are expected to increase across the board, exacerbating other climatic impacts. For example, in thirty years over ninety percent (90%) of Lake Chad has been lost. In coastal areas, sea level rise and rising sea temperatures has continue to threaten coastal areas and ecosystems (COP 15 2009). According to the Global Resource information database of the United Nation’s environment programme It shrank as much as 95% from 1963 to 1998 (http://en.m.wikipedia.org/wiki/Lake_Chad). The prospective impacts on society and economies across the region are huge, potentially affecting all sectors and all groups of people in a negative way. The poor and the marginalized are expected to be most affected (COP 15 2009).

Many specialised institutions and organisations have been established at international and national levels to research climate change, predict likely changes, assess likely impacts, and propose responses in terms of adaptation to climate change and mitigation to reduce the likely rate of change, and all from scientific, economic, social, and political stand points. Perhaps the most influential of these international organisations is the Intergovernmental Panel on Climate Change (IPCC), which was established in 1988 by two United Nations organizations, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP). The IPCC monitors the researches undertaken by a wide range of scientific groups and publishes reports that tend to drive the social and political debates, especially those associated with the United Nations Framework Convention on Climate Change (UNFCC), which was a treaty that came out of the 1992 Earth Summit.

Global temperatures from January – June 2015 exceeded that of January – June 2010 which was known to be the warmest half of the year (http://www.weather.com NASA’s Goddard institute for space studies & NOAA’s National Data Center). Thus, there can no longer be any doubt; the earth’s climate is changing.
Causes of Climate Change

The Intergovernmental Panel on Climate Change (IPCC) says that human activity is the main cause of the changes seen in climate. This it does through activities that cause emissions of greenhouse gases (which consist mainly of carbon dioxide, water vapour, methane and nitrous oxide). The competition for natural resources including agricultural and grazing lands, water and mineral resources, land tenure/fragmentation and shorter lengths of fallow period is higher in densely populated rural regions such as the south eastern geopolitical region of Nigeria. In turn, these have increased the rate of deforestation for fuel wood collection and construction, accelerate soil erosion and expose fragile arable land to desertification. While in the urban areas, management of generated wastes (most of which are of non-biodegradable), road traffic effects and industrial activities are the main contributors to climate change. They result in hazards especially floods and increased concentration of Green House Gases (GHGs). However, studies of long-term climate change have discovered a connection between the concentrations of carbon dioxide in the atmosphere and mean global temperature. Carbon dioxide (Co2) is said to be one of the main gases responsible for the greenhouse effect (http://www3.epa.gov/gases).

Other main causes of Climate Change through population concentration are:

- **Agricultural practices:** The agro-ecological conditions of Nigeria support subsistence agriculture practices for the production of food and cash crops in order to provide food for the growing population, employment for rural dwellers, supply of essential agro-industrial raw materials which serves as source of foreign exchange earnings. Food production has been declining relative to population growth (Ojo, 1991). This is due to poor land preparation and management, continuous cropping on same meager plots mostly inherited by land tenure system, decreasing fertility from erosion and leaching. The sector is often neglected by the government due to inadequate mitigation policies and implementation. It is causing forced rural-urban migration.

- **Air quality Degradation:** Though least documented in the country, air quality degradation is localized mostly and low compared with developed countries. Highest values are around urban centers and areas of oil exploration. For example, Lagos has vehicular density of over 222 vehicles/km, the air pollution load is about 51,800 metric tonnes and the major emissions are sulphur dioxide (37.6%), Nitrogen Oxides (31.5%) and Particulates (26.5%) (Soneye, 2012a).

- **Oil and Gas Production:** As a main contributor to the Nation’s GDP, the sector is a major contributor to GHGs emissions, global warming and climate change through clearing of natural ecosystem areas for production facilities, flaring of associated gases and high reliance on pollution-enhanced road transportation that use leaded fuels.

**STUDY AREA**

The south eastern geopolitical region of Nigeria (Study area) is comprised of five states namely; Abia, Anambra, Ebonyi, Enugu and Imo States (Figure 1). It is the home of the Igbo speaking people of Nigeria. It lies between latitudes 4° 47’ 35’’N and 7° 7’ 44’’N, and longitudes 7° 54’ 26”E and 8° 27” 10”E in the tropical rain forest zone of Nigeria, with mean maximum temperature of 27°C. It covers a total land area of 28,658.795Km² and total annual rainfall exceeding 2500mm. The region is largely
agrarian and this has increased the dependence on land resources, due to its dense population which is averaged to about 1,000 people/Km$^2$ (Nwilo et al 2013).

![Map of South east Geopolitical region of Nigeria (Study area)](image)

**Figure 1:** Map of South east Geopolitical region of Nigeria (Study area)

**Source:** Author (2016)

## METHODOLOGY

### Data and Pre-processing

The data utilized in this study include: administrative map of Nigeria delineating the south eastern geopolitical region, Bioclimatic data, and 3 epochs of Landsat images (1986, 2000 and 2015) covering the study area. The administrative map was obtained from the office of the surveyor general of the federation (OSGOF) and the 30 arc seconds bioclimatic data, obtained from the World Climate data Centre (http://www.worldclim.org/), The Landsat images were obtained from Global land cover facilities (http://glcfapp.glcf.umd.edu/). The Landsat scenes covering the study area were mosaicked into one composite image before being cropped with the administrative map delineating the south eastern region.

### Reconstruction of the current climate of the South eastern region of Nigeria

The dataset obtained from World Climate data Centre compiled by Hijmans et al., (2005) and methodology adopted from New et al., (2000) were used to reconstruct south eastern climate from 1950 to 2000 (this is a representation of the 20th century climate). The climate of the South eastern region from 1950 to 2000, was reconstructed for nine climatic variables, namely annual mean temperature, minimum temperature of coldest month and maximum temperature of warmest month, annual precipitation and precipitation of wettest month, and monthly precipitation for April, June, July and October.
Projected changes in the climate of the South Eastern Region to 2030 and 2050

Assessing how much the climate is likely to change involves the projection of data from the Global Climate Model (GCM) on to the areas that cover the south eastern region. The data utilized in this regard were based on the mean of seven GCMs that were used in the IPCC 5th Assessment Report (IPCC, 2013) for two time periods, namely for 2030 (short-horizon) and for 2050 (medium horizon).

The data were downloaded originally from the IPCC data portal and re-processed using a spline interpolation algorithm of the anomalies and the current distribution of climates from the WorldClim database developed by Hijmans et al., (2005a). It is assumed that the geographies of changes in climate variables do not vary too much at regional scales and that the relationships between the different variables will remain basically the same in the future Rod Lefroy et al., (2010).
RESULTS AND DISCUSSION

Analysis of the current climate

The south eastern climate is highly variable, especially the rainfall patterns. Analysis of the south eastern climate from 1950 to 2000 highlighted this variability, especially in rainfall, but also did show some significant trends in the climate variables. During the 1950 – 2000 period, the minimum, mean, and maximum temperatures increased throughout the region, but particularly in Imo state. Minimum and mean temperatures rose by between 1.5°C and 1.4°C, and maximum temperatures rose by 1.6°C. Local experience supported these data.

There were significant trends in precipitation patterns over the 50 year period, but even these trends remained within the range of the highly variable precipitation patterns. In addition to annual precipitation, the precipitation in April, June, July and October were assessed as these are the critical periods at the beginning and the end of the wet season, respectively. The trends varied for different parts of the region. The main change over the 50 year period was a reduction in the rainfall in July, by between 16mm and 35mm, and an increase in the precipitation in April, by between 4 and 17mm. This resulted in a slight delay in the wet season. In some parts of the region there was a slight increase in April precipitation, but with a trend for declining precipitation in July, rather than signalling an earlier start to the wet season it may constitute a greater risk of a false start to the wet season. Total rainfall tended to increase by up to 115mm in the lower north and upper central part of the region, and decrease by up to 200mm in the upper north, lower central, and south of the region.

Projections of the future climate

Using the mean projections of seven Global Climate Models and based on the A1B IPCC emission scenario, the changes in climate were predicted for 2030 and 2050. By 2050, the minimum and mean temperatures are predicted to increase by up to 2°C and the maximum is predicted to increase by up to 5°C.

The predictions for rainfall suggest that rainfall in the early wet season, in July, will decrease and rainfall at the very start of the wet season in April and the end of the wet season in October, will increase. This is a continuation of the trend seen in the 20th
century for a delay in the main wet season, in June to October, and perhaps an increased in the risk of a false start to the wet season, with more rain in April, but less rain in July. Thus rainfall variability remains the critical issue.

**Land Use Changes**

The analysis of land use and land use change indicated large changes in land use/cover in recent times, and specifically for the period from 1986 to 2015. The area of agricultural land has increased significantly, and this, at least in part, explains the reduction in vegetation cover seen across the south eastern region through analysis of the Landsat satellite images. Other causes for reductions in vegetation cover are deforestation and urban development. All of these changes are being driven by population growth and economic development, both within the south eastern region and in the neighbouring states.

**Impacts of Climate Change**

Climate change have the potential to lead to large local-to-regional disruptions in ecosystems and also has adverse impacts on food security, fresh water resources, human health, settlements etc. resulting in increased loss of life and property. This study focused on the impacts of climate change on agriculture and land resources.

**Impacts of Climate Change on Agriculture**

Agriculture remains a major source of food and raw materials for industries. Agricultural practice in the country, particularly in the south eastern region is dominantly rain-fed and therefore particularly vulnerable to the impacts of climate change. Crops and livestock varieties are grown in diverse climates, regions, and soils. But no matter the region, weather and climate factors such as temperature, precipitation, CO2 concentrations, and water availability directly impact the health and well-being of plants, pasture, rangeland, and livestock (Rachel Hauser et al., 2009). Variation in yield among years is related to growing season weather for any agricultural commodity; weather also influences insects, disease, and weeds, which in turn affect agricultural production.

**Impacts of Climate Change on Land Resources**

It is clear that climate strongly influences productivity and species composition in forests. Some climate change-related effects include:

- Changes in temperature and precipitation will very likely decrease the cover of vegetation that protects the ground surface from wind and water erosion.
- Tropical forests are highly vulnerable to changes brought about by lower rainfall and higher temperatures.

**CONCLUSIONS**

There is no evidence that the changes that have occurred in the climate, especially from the last decade of the 20th century, has had any direct effect on land use change. Similarly, with the main drivers of land use change – population growth and economic development – showing no sign of reducing in the next years, and in fact more likely to continue to increase, there is no evidence that the predicted changes in climate to
2050 will have major effect on land use change compared to the effects of these other major drivers. This does not mean that both land use and climate should not be monitored carefully, nor that some adaptation strategies to cope with current climate variability and projected climate change should not be considered as relatively high priority, but, in comparison to other drivers, it is unlikely that climate change will affect land use change directly or significantly.

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assessed on [28th March, 2016]
DEVELOPMENT CONTROL: A PANACEA TO MANMADE DISASTERS IN RESIDENTIAL NEIGHBOURHOOD

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The high spate of manmade disasters particularly fire incidents that destroyed life and property worth millions of naira in Nigeria is worrisome. For instance, in 2014 after a gas retail outlet exploded in a residential neighbourhood of Akure there were other 46 fire incidents within Ondo State, Nigeria. Steps to forestall similar incidents in future are paramount. Hence, this paper assesses the impact of developmental control as a remedy to incessant fire incidents in residential neighbourhood of Akure as a case study. Questionnaires were purposively administered to 70 residents of the neighbourhoods where there were recent cases of fire disasters within Akure. A separate designed questionnaire was administered to 20 planning officers in the Ondo State Housing and Urban Development. Descriptive analysis was used in analysing the data collected. Findings from the analysis showed that bureaucratic bottlenecks, underfunding and poorly trained personnel were some of the challenges confronting development control agency. Also, bureaucratic delays, weak enforcement of planning laws, increasing urban poverty, lack of fire code for building materials, absence of fire safety measures in homes, non-engagement of qualified professionals during building design, construction and supervision, wrong design of building and non-compliance with existing town planning laws by home owners as well as illegal approval by corrupt officers are development control factors to blame for the frequent fire outbreaks. The paper concludes that adequate training of planning officers, regulation of developments and public education are paramount in mitigating the devastating effects of fire disasters in residential neighbourhood.

Keywords: Development control, Disaster, Fire, Manmade, Residential neighbourhood.

INTRODUCTION

Olayiwola (2006) described disaster as a sting of nature or repercussion of manmade actions, causing losses of both natural and manmade resources in affected areas. It is a disruption in the normal functioning of the society which leads to loss of human life, property and environmental resources, and which exceeds the ability of the affected communities to cope unsupported. It has therefore continued to be an incidence of apprehension all over the world. Natural occurring hazards tend to reoccur over time whereas human caused events tend to change as technology changes and as our way of doing things change.

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Nigeria, like the rest of the world, is exposed to a wide range of natural and human induced disasters. These occur in form of drought, desertification, flooding, epidemics, coastal erosion, dam failure, building collapse, oil spillage, bomb explosion, communal clash, fire, boat mishap and air crashes, amongst others. Of specific interest to this study is fire as a form of manmade disaster in residential neighborhoods. The prevalence of home fire disasters with its attendant consequence in Nigerian cities has heightened anxieties. Each time fire disaster occurs, high turnover of casualties in terms of human lives, as well as properties worth millions of Naira are recorded. According to the World Fire Statistics Bulletin (2012), the costs due to losses from fire are in tens of billions globally, and have been roughly estimated as approximately one per cent of global GDP per annum.

According to Zhang et al. (2006) fire outbreak causes about 300,000 deaths globally and most of these occur in homes each year. Amoako (2014) avows that about 80% of mass-casualty home fires are caused in residential environment. Though fire disaster is often times due to human negligence or carelessness, Africa Adaptation Programme on Climate Change (2012) has attributed disaster occurrences especially in the urban cities and towns largely to lack of adherence to building code regulations and the weak enforcement of planning laws by the relevant organizations. For instance, there is often construction of buildings in violation of building approvals, lack of adherence to building code regulations, development of properties on public utility setback, incompatible or unplanned land use and indiscriminate conversion of residential property to commercial premises. The link between disasters and development control is thus essential to ensure effective precautions that will avert future fire disasters or at least lessen them. The need for this study therefore, became imperative when measured against the frequency of fire disaster incidence and the increasing risk for people’s lives and properties in the study area.

LITERATURE REVIEW

Development control is set by legislation to regulate physical development on land and building. It is a specialized activity carried out by town planners in order to ensure compliance with the approved master plan thus maintaining orderliness, standard and reduces the negative effect accompanying physical development (Aluko, 2011). Ugonabo and Emoh (2013) identified two levels of development control to be macro and micro. The objective of macro level is to regulate the subdivision of land such that area plan are drawn at the suitable scale and specifics. The micro level, on the other hand, regulates the improvement of the individual plot and structure within the area. Development control at individual level basically requires the preparation of building plan to fulfil stated standards and confirming actual development follows the approved plan.

The 1992 Planning Law provides for the establishment of Development Control Department and saddled it with control processes which include the usage of Land use zoning and Land planning standards. Development control Departments checks new developments, fencing, demolitions, repairs and renovation, change of design, change of land use clause, contraventions, illegal occupation and revalidation of development permit, as well as certificate of fitness and habitation. The monitoring and routine check on the site is to see that the development is not illegal and that building is according to the zoning and approved standards (Obabori et.al, 2007).
Development control is a strong tool for city management as it ensures continual growth and management of a city in terms of orderliness, improved city image, health and aesthetics. It as well ensures that the environmental challenges as a result of city growth are reduced to tolerable levels (Aluko, 2011). Unplanned and unregulated land uses, uncontrolled change of use of property, non-compliance with space standards and approved design, unguided and ineffective enforcement of building regulations as well as development-linked problems increases the vulnerability of people, property, and infrastructure to fire disaster. Junaidu and Sanni (2008) opined that communities in different parts of the world as a result of this have suffered huge economic losses, psychological imbalance and destruction from fire disaster. Fire disaster according to Olayiwola (2006) produces a combination of shocks, loss of lives and properties. About 80 percent of the loss emanating from fire outbreak is said to occur in residential apartments (Australian Bureau of Statistics, 2000).

However, a yet to be answered question is why those saddled with the responsibility of ensuring that structures are erected in line with town planning regulation are yet to come up with a convincing justification of the increasing number of certain developments at odd locations (Osinbajo, 2004). For instance, the enormity of the current trend in the proliferation of filling stations and retail gas outlets in Nigerian cities have become issues of serious concern to government and residents. These filling stations are established without recourse to regulation on proximity and environmental impact assessment between residential areas. Residential neighborhoods are clustered with great numbers of these filling stations and gas retail outlets that compete with them. This poses a danger to those living in close proximity to these stations and had led to fire outbreak in certain instances. Recent incidents in Ondo state is the 2014 retail outlet gas explosion in Akure and the 2015 Okitipupa filling station fire disasters within residential neighborhoods.

Moreover, the approval of these developments by government officials to members of the public is bewildering. The town planning, regulatory law specifies a minimum distance of about 50 meters between petrol stations and residential buildings and 100 meters for other amenities such as hospitals, industries and schools. Yet a key question remains to be faced. Why is this not strictly followed? Also, proprietors of the filling stations and gas retail outlets often claimed that necessary approvals are sought in and around residential neighborhoods. Besides, the timeliness of these incompatible developments to respond to fire disaster in residential areas in most cases is uncertain. Hence, it is essential that building plans agree with land use location as designed in the layout plan to ensure sanity.

**METHODOLOGY**

Using four purposively selected neighborhoods where there were recent cases of fire disasters within Akure, Nigeria namely; Oluwatuyi, Arakale, Oba-Adesida road and Araromi, a cross-sectional research design was adopted for the study. Adopting random sampling technique, structured questionnaires were administered on 70 residents of the purposively selected neighborhoods and 20 planning officers in the study area. The questionnaire was place on likert scale and contains questions primarily on problems of development control, factors affecting development control, relevance of development control, characteristics of development control violations and the challenges in the Ministry of Housing and Urban Development who are
directly in charge of development control in the study area. Data obtained from the field were analyzed using quantitative techniques.

**RESULTS AND DISCUSSION**

Only Sixty nine (69) out of a total of Seventy (70) questionnaires administered to the resident of the purposively selected neighborhoods were retrieved while all the questionnaires administered to the Planning officers were retrieved and found suitable for analysis.

Table 1: Factors affecting development control and space standards in the study area

<table>
<thead>
<tr>
<th>S/N</th>
<th>Factors</th>
<th>Mean</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Procedural delays</td>
<td>4.41</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Weak enforcement of planning laws</td>
<td>4.38</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Increasing urban poverty</td>
<td>4.38</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>Inadequate information on land</td>
<td>4.32</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Lack of fire code for building materials</td>
<td>4.26</td>
<td>5</td>
</tr>
<tr>
<td>6.</td>
<td>Non-engagement of qualified professionals during building design,</td>
<td>4.25</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>construction and Supervision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Poor title registration and tenure security</td>
<td>4.20</td>
<td>7</td>
</tr>
<tr>
<td>8.</td>
<td>Absence of fire safety measures in homes</td>
<td>4.17</td>
<td>8</td>
</tr>
<tr>
<td>9.</td>
<td>Proliferation of imported building materials in the market</td>
<td>4.06</td>
<td>9</td>
</tr>
<tr>
<td>10.</td>
<td>Wrong design of building</td>
<td>3.71</td>
<td>10</td>
</tr>
<tr>
<td>11.</td>
<td>Corruption by enforcement officers</td>
<td>3.16</td>
<td>11</td>
</tr>
<tr>
<td>12.</td>
<td>Inadequate laws /inadequate rules and regulations</td>
<td>2.71</td>
<td>12</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2014

Table 1 shows the factors affecting development control and space standards in the study area. Bureaucratic delays were the most important factor. This was evident from its mean score of 4.41, while weak enforcement of planning laws and increasing urban poverty ranked second with the mean scores of 4.38. This suggests that bureaucratic delays remain a main issue that needs to be addressed.

Table 2: Characteristics of development control violations in the study area

<table>
<thead>
<tr>
<th>S/N</th>
<th>Characteristics</th>
<th>Mean</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Lack of adherence to building code regulations and non-compliance with existing</td>
<td>4.25</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>town planning laws by home owners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Building setbacks taken over by front shops and a variety of unappealing</td>
<td>4.25</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Construction of buildings in violation of building approvals</td>
<td>4.25</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Conversion of residential property to commercial premises</td>
<td>4.10</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Contravention of approved building plan</td>
<td>4.05</td>
<td>5</td>
</tr>
<tr>
<td>6.</td>
<td>Erection of structures without approved building plan</td>
<td>4.05</td>
<td>6</td>
</tr>
<tr>
<td>7.</td>
<td>Mixed/unplanned land use</td>
<td>3.65</td>
<td>7</td>
</tr>
<tr>
<td>8.</td>
<td>Construction of properties on public utility setback</td>
<td>3.60</td>
<td>8</td>
</tr>
<tr>
<td>9.</td>
<td>Encroachment on public rights of way, open spaces and road reservation</td>
<td>3.25</td>
<td>9</td>
</tr>
</tbody>
</table>
As tabulated in Table 2, ‘lack of adherence to building code regulations and non-compliance with existing town planning laws by home owners’, building setbacks taken over by front shops and a variety of unappealing development’ and ‘construction of buildings in violation of building approvals’ ranked the highest among the features of development control violations in the study area with the mean score of 4.25. ‘Conversion of residential property to commercial premises’ came next.

From Figure 1, when asked as to whether they are aware of development control, 65% of the respondents agreed that they are aware of development control while the remaining 35% established their unawareness of development control. This implies that considerable number of the respondents are aware of development control.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Relevance</th>
<th>Mean</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Promotion of spatial harmony</td>
<td>4.40</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Enforcement of control</td>
<td>4.28</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Realization of balanced land use pattern</td>
<td>4.26</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Creation of safety and healthy environment</td>
<td>4.22</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Establishment of a physical and socio-economic environment which is favorable</td>
<td>4.21</td>
<td>5</td>
</tr>
<tr>
<td>6.</td>
<td>Provision of adequate and suitable location of spaces for various land uses and activities</td>
<td>4.20</td>
<td>6</td>
</tr>
<tr>
<td>7.</td>
<td>Provision for an easy access to developments and to achieve an efficient circulation within the developed areas</td>
<td>4.09</td>
<td>7</td>
</tr>
<tr>
<td>8.</td>
<td>Ensuring effective and efficient use of both capital and natural resources</td>
<td>3.73</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 3 shows the relevance of development control as identified by the respondents. The respondents agreed that, the main importance of development control were;
promotion of spatial harmony, enforcement of control and realization of balanced land use pattern. The lowest score on the listed importance was on the factor that development control ensures effective and efficient use of both capital and natural resources.

Table 4: Challenges of the Planning institution (The Ondo State Housing and Urban Development)

<table>
<thead>
<tr>
<th>S/N</th>
<th>Challenges</th>
<th>Mean</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Shortage of qualified manpower</td>
<td>4.25</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Poorly trained personnel</td>
<td>4.20</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Poor and Inadequate Funding</td>
<td>4.15</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Inadequate facilities such as motor vehicles and motorcycles</td>
<td>3.95</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>Bureaucratic bottlenecks</td>
<td>3.60</td>
<td>5</td>
</tr>
<tr>
<td>6.</td>
<td>Lack of coordination of activities</td>
<td>3.10</td>
<td>6</td>
</tr>
<tr>
<td>7.</td>
<td>Non Adoption and Utilization of Modern Planning Approaches</td>
<td>2.15</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2014

As shown in Table 4, the majority of respondents agreed that shortage of qualified manpower was the main challenge faced by the planning agency (The Ondo State Housing and Urban Development). This was evident from the mean score of 4.25 which was the most extreme among the seven challenges while “Poorly trained personnel” achieved 4.20 mean score.

CONCLUSIONS

Ondo State has been witnessing series of fire disasters, some are human induced while some are due to lack of adherence to development regulations, contravention and the weak enforcement of planning laws. This study made an attempt to assess development control as a remedy to fire incidents as a form of manmade disasters in residential neighborhood. The result revealed a number of factors affecting development control. These include, procedural delays, weak enforcement of planning laws, increasing urban poverty and inadequate information on land. It was also found that lack of adherence to building code regulations and non-compliance with existing town planning laws by home owners, building setbacks taken over by front shops and a variety of unappealing development, and construction of structures in violation of building approvals were the main features of development control in the study area. Generally, the factors affecting development control and various characteristics of development control produce a lot of negative impact that could result in incessant fire outbreak in the study area. Lack of fire code for building materials, absence of fire safety measures in homes, non-engagement of qualified professionals during building design, construction and supervision, wrong design of building remains the main issue that needs to be addressed by the government and her agencies to circumvent persistent fire outbreak in residential neighborhood.

In view of the foregoing, it is recommended that:

- There should be strict regulation of developments by relevant government agencies.
- To circumvent fire disaster enlightenment of the general public on the need for development control is crucial.
- Sensitization of the general public to construct their buildings to standard, consult professionals and avoid substandard materials for the construction of their abodes.
- More funds, vehicles, personnel and the security of monitoring and enforcement staff should be safeguarded.

ACKNOWLEDGEMENTS

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REFERENCES


END
AN EVALUATION OF GEOMETRIC DATA ACQUISITION USING LANDSAT IMAGERY

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The implementation of appropriate digital image processing method is crucial for deriving urban land cover maps of acceptable accuracy and cost. This study examines the effect of acquiring images in various spectral regions (bands), the impact of some image processing techniques on the combination of the different bands and the acceptable mode in which the features of the image could be classified using unsupervised classification (clustering) and supervised classification based on four different hard classifiers. Four different filter types were experimented on the colour composite images before classifying the images into different distinct land spectral classes. The Integrated Land and Water Information System (ILWIS) software was used to classify LandsAT 7 image of 2001, part 189r053, zone 32, bands 1 (Blue), 2 (Green), 3 (Red), 4 (Near infrared), 5 and 7 (Middle infrared) wavelength. From the study, it was observed that AVG 3x3 filter type is the most preferred. Colour composite of bands 5, 4, 3 in the RGB planes gave the best representation of the features of the image and that Box classifier, Minimum Distance to Mean Classifier and Maximum Likelihood classifier are excellent classifiers for image supervised classification.

Keywords: Image Processing, Landsat satellite imagery, Spectral regions, Colour composite, Geometric Data Acquisition.

INTRODUCTION

Image Processing is a technique that seeks to enhance raw images received from cameras/sensors placed on satellites, space probes and aircrafts or pictures taken in normal day-today life for various applications (Rao, 1991). Since a digital image is an array of real numbers represented by a finite number of bits, the term digital image processing can be defined as the processing of a two-dimensional picture by a digital computer (Anil, 1989; Gonzaleze, 2002). There exist several image processing techniques, some of which include Image representation, Image pre-processing, Image enhancement, Image classification, Image restoration, Image analysis, Image reconstruction and Image data compression (Rao, 1991). Of these image processing techniques, Image enhancement and classification has been examined in the course of this research and as such our discourse shall be restricted to them.
In image enhancement, the goal is to accentuate certain image features for subsequent analysis or for image display (Kenneth, 1996; Jensen, 2003). Examples of such techniques used for image enhancement include contrast stretching, density slicing, colour composite, edge enhancement, noise or spatial filtering, histogram equalization and band rationing. Spatial Filtering and Colour composite were the major image enhancement techniques considered and experimented in this research.

Images acquired through modern sensors may be contaminated by a variety of noise sources. Noise (referring to stochastic variations as opposed to deterministic distortions such as shading or lack of focus) can be said to be any unwanted disturbance in a digital image data due to limitations in the sensing system, signal digitization, data record process or a combination of some or all of these sources. The process of removing noise from an image is known as spatial filtering.

LandSAT 7 images are composed of seven different spectral bands, each representing a different portion of the electromagnetic spectrum. The characteristics of the various spectral bands of the LandSAT imagery has been lucidly examined and presented by (GIF, 2008). To visually interpret digital data such as satellite images, individual spectral bands must be displayed simultaneously in the form of a colour composite. For example, Landsat TM bands 1, 2 and 3 broadly represent the blue, green and red region of the electromagnetic spectrum (ES). When these bands are fed through the corresponding blue, green and red “colour bands” of a computer monitor, the resulting image strongly resembles what our eyes would see from the sensor’s vantage point. We thus have an intuitive understanding of the colours presented and can usually make an informed interpretation of the scene (e.g. dark blue probably represents deep water), such images are called true colour composites (TCC).

Image Classification is the primary method used to transform remotely sensed data into a thematic land cover map (Jensen, 2005). A variety of computer algorithms have been developed that essentially attempt to mimic an experienced human analyst to examine the image and recognize patterns, then assign portions of the image to predetermined classes. Consequently, these methods can be characterized as computer-aided thematic information extraction systems. In general, methods of image classification can be grouped into two main categories: pixel-based and object-based. Conventional or traditional classification approaches operate on a per-pixel basis. These methods examine each pixel of the source image independently and assign class membership based on the spectral data available in that pixel. The most common categorization of per-pixel methods are supervised classification and unsupervised classification.

Due to the poor spatial resolution of LandSAT 7 images (30m for bands 1, 2, 3, 4, 5 and 7 and 60m for band 6), application of image enhancement and image classification (which groups image into distinctive land spectral classes or features) are very important for better visual perception, feature identification, image interpretation and acquisition of spatially referenced data from them. Therefore, this paper evaluates the significance of filtering on LandSAT images. To that effect, analysis of the performance level of four different filter types, colour composite (combination of three different image bands in RGB), as well as the performance level of clustering (unsupervised) with four other different (supervised) hard classifiers has been conducted. The considered filter types for this study are Laplace, Shadow, AVG
3x3 and Edge Enhancement filter types while the examined and experimented hard classifiers are Maximum likelihood Classifier, Minimum distance to mean classifier, Box classifier and Minimum Mehananobis Distance classifier. All image processing operations and analysis were carried out using the ILWIS software.

In the next section (Section 2), a brief overview of spatial filtering and classification of digital imagery is presented. The methodology for the study is discussed in Section 3; the results from the study are given in Section 4. While Section 5 discusses the results, in Section 6, the paper was concluded.

**Brief Background on Image Processing and Classifications**

Different algorithms have been developed for spatial filtering of digital images some of which have been lucidly examined in Chandel and Gupta (2003), Le Meur (2011) etc. In the last few years, there has been an effort to develop methods of restoration and filtering of images while using atmospheric optical transfer functions (MTF and phase transfer function) in order to compensate for image blur and distortions (Arbel et al., 2004). Digital restoration results for Landsat TM imagery using the atmospheric Wiener filter which corrects for turbulence blur, aerosol blur, and path radiance simultaneously were investigated and presented in Sadot et al. (1995), Arbel et al. (1998), Arbel et al. (1999), Arbel and Kopeika (2000). Arbel et al. (2004) also implemented a Kalman filter as an atmospheric filter, which corrects for turbulence blur, aerosol blur, and path radiance simultaneously.

Research efforts in colour composite generation include works by Carmelita (2002) who carried out comparison of false colour composites in mapping and discriminating between salt-affected soils in Kings County, California. Patra et al. (2002) presented a technique for generating natural colour images from false colour composite images using spectral transformation method to establish a relationship between false colour and true colour image pairs provided by a sensor with all the four bands, which has a broader spectral coverage. Vladimir et al. (2013) also proposed a method for generating natural colour from false colour images based on Normalized Difference Vegetative Index (NDVI) clustering. Rao (1991) followed a systematic visual interpretation approach using the False Colour Composite of TM bands 2, 3 and 4 for mapping two categories, moderately and strongly sodic soils.

Supervised and Unsupervised classification; the two major classification techniques were explored by Krishna (2009) in the Classification of Land uses of a mountainous watershed named Galadu / Pokhare Khola, situated in Dhading district of Nepal, so as to scientifically evaluate the impact of modification of the original bands and integration of ancillary data in digital image classification in the improvement of the accuracy of land use/Land cover classification result. Using 12 feature sets containing Landsat MSS, TM and IRS etc. The Supervised Classification approach produced a result with better accuracy than the unsupervised approach. The colour composite and band rationing result also reported that the bands ration R4/3, R5/4 and R4/7 ranked the highest in terms of accuracy (82.86%) while the combination of bands 2, 3 and 4 ranked the lowest with 45.29%.

In a supervised classification procedure the analyst first identifies representative example (training sites) for each class of interest, and then the software processes the image to match pixels to the defined training examples. Several classification algorithms are available to determine to which class a pixel should belong. These algorithms (or classifiers) include Maximum Likelihood, Parallelepiped, Nearest
Neighbour, Minimum Distance to Means, Neural Network and others. The Maximum Likelihood Classifier (MLC) is a parametric statistical algorithm that works best with training class data that is normally distributed. Other classifiers are non-parametric and do not assume normal distributions of class populations (Jensen, 2005). A problem commonly observed with the output of supervised per-pixel classification is that of isolated pixels, also called speckling or the “salt & pepper effect”. Because each pixel is analysed independently, the spectral data of a given pixel may vary enough from its immediate neighbours that it gets assigned to a different class and thus stands alone. For many purposes it may be desirable to reduce this effect and produce a map with greater homogeneity. Post-classification processing, using smoothing filters or other techniques, has been done with some success to reduce speckling and increase overall classification accuracy (Aplin, 1999; Barr and Barnsley, 2000).

Aloke et al. (2014) proposed and tested the strength of unsupervised band elimination method in reducing the dimensionality of hyperspectral image analysis. This method iteratively eliminates one band from the pair of most correlated neighbourhood bands depending on the discriminating capability of the bands. The experiment showed promising results compared to three other experimented state-of-the-art approaches.

**METHODOLOGY**

**Data Used**

The data used for this study is a geo-referenced LandSat image of 2001, part 189r053, zone 32, bands 1 (Blue), 2 (Green), 3 (Red), 4 (Near infrared), 5 and 7 (Middle infrared) wavelength obtained from Regional Centre for Training in Aerospace Survey (RECTAS) Ile-Ife. The image covers major States of the North Central Geo-political zone of Nigeria. Other data acquired include the x and y co-ordinates of four corner boundaries of Minna, Niger State used in selection of training site and validation of results obtained.

**Data Processing**

The Methodology of the data processing has been given in Figure 1. The acquired image was processed using ILWIS 3.1 Academic software. The geo-referenced Landsat image was imported into the ILWIS environment Via Geo Gateway. Sub map was created and used to identify the area from which ground truth information was obtained for effective classification. The impact of Filtering and the efficiency of different filter types were examined before performing colour composite operation. The composite image was classified using supervised classification techniques and four different hard classifiers while some of the geometric features of the area used for ground truthing were digitized from the classified image.
Evaluation Process

In order to verify the impact of filtering on the spatial resolution of the image, bands 2, 3 and 4 were Layer Stacked and consequently filtered using AVG 3x3 Filter type, the evaluation was performed by comparing the filtered and unfiltered composite image.

However, for colour composite, three bands were combined together in one colour composite map for visual assessment of the reality on ground. Therefore, colour composite was created by combining three (3) different bands of the raster image. One band is displayed in shades of red, one in shades of green and the third in shades of blue respectively.

On the other hand, in supervised classification, the analyst provides a statistical description of the manner in which the expected land cover classes should appear in the imagery and a tool known as classifier is used to evaluate the likelihood that each pixel belong to one of these classes. The classification was carried out using four different classifiers. The image was classified into six (6) land cover types or spectral classes. The classes are built up areas, dams, rivers, rock outcrops, uncovered areas (bare surface), and vegetation.

In order to validate the integrity of the classification processes, ground truthing was conducted in Minna, Niger State. The features of the classified image were then compared with the data obtained from the ground truth operation.
RESULT AND ANALYSIS

Filtering

The result of the unfiltered composite image is presented in Figures 2a and 2c while Figures 2b and 2d presents the result of the filtered composite Image.

Figure 2a: Unfiltered Colour composite (Band234)  
Figure 2b: Filtered Colour composite (Band234)

Figure 2c: Unfiltered Colour composite (Band357)  
Figure 2d: Filtered Colour composite (Band357)

Further attempt was made to investigate the reliability of the filter types used in the course of the study with the aim of suggesting the filter type that best filters the image without reducing the integrity of the image geometric and radiometric resolution. LAPLACE, Shadow, Edge Enhancement and Average 3x3 Filter types were considered and the results obtained are presented in Figures 3a, 3b, 3c and 3d respectively.

Figure 3a: Filtered image band 5 using LAPLACE  
Figure 3b: Filtered image band 5 using SHADOW
Colour Composite

Combining the three bands together in one colour composite map gives a better visual impression of the reality on the ground than by displaying one band at a time. The result obtained for the colour composite of bands 543, 157, 237 and 712 were as shown in Figures 4 a-d respectively.

Supervised Classification

The results of the supervised classification using Maximum Likelihood classifier, Box Classifier, Minimum Distance-to-Mean Classifier and the Minimum Mehalanobis Classifier are herein presented in Figures 5a, 6a, 7a and 8a respectively. The histogram representation showing the different classes in their number of pixels occupied of these classifiers are also shown in Figures 5b, 6b, 7b and 8b respectively.
Figure 5a: Classification using MaxLike classifier

Figure 5b: Histogram of the classification

Figure 6a: Result of Box classifier

Figure 6b: Histogram of the classes

Figure 7a: Result of MINDIST classifier

Figure 7b: Result of MINDIST Histogram

Figure 8a: Result of MINMEH DIST Classifier

Figure 8b: Result of MINMEH DIST Histogram
Percentage of the Land Cover of the various Spectral Classes obtained from the supervised classification is summarized in Table 1. Table 2 presents the relationship between results obtained from each of the classifiers and their agreement with ground truth information.

### Table 1: Percentage Summary of the Land Use/Land Cover.

<table>
<thead>
<tr>
<th>Features</th>
<th>Max. Like. (%)</th>
<th>Box (%)</th>
<th>Min. Dist. (%)</th>
<th>Min Meh Dist (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bare surface</td>
<td>45.34</td>
<td>49.19</td>
<td>45.47</td>
<td>4.43</td>
</tr>
<tr>
<td>Built-up areas</td>
<td>0</td>
<td>17.4</td>
<td>15.22</td>
<td>47.27</td>
</tr>
<tr>
<td>Dam</td>
<td>0.99</td>
<td>0.91</td>
<td>1.04</td>
<td>0.99</td>
</tr>
<tr>
<td>Rivers</td>
<td>0.39</td>
<td>0.29</td>
<td>0.4</td>
<td>0.36</td>
</tr>
<tr>
<td>Rock outcrop</td>
<td>16.16</td>
<td>16.22</td>
<td>4.39</td>
<td>5.98</td>
</tr>
<tr>
<td>Vegetation</td>
<td>37.12</td>
<td>15.99</td>
<td>33.48</td>
<td>40.97</td>
</tr>
</tbody>
</table>


### Table 2: Summary of the relationship between the ground truth information and results obtained from each classifier

<table>
<thead>
<tr>
<th>Classifier Type</th>
<th>Features</th>
<th>Percentage Cover (%)</th>
<th>Agreement with ground truth information</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Likelihood Classifier</td>
<td>Bare surface</td>
<td>45.34</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Built-up areas</td>
<td>0</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dam</td>
<td>0.99</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rivers</td>
<td>0.39</td>
<td>Yes</td>
<td></td>
</tr>
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<td></td>
<td>Rock outcrop</td>
<td>16.16</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vegetation</td>
<td>37.12</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Box Classifier</td>
<td>Bare surface</td>
<td>49.19</td>
<td>Near Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Built-up areas</td>
<td>17.4</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dam</td>
<td>0.91</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rivers</td>
<td>0.29</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rock outcrop</td>
<td>16.22</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vegetation</td>
<td>15.99</td>
<td>Near Yes</td>
<td></td>
</tr>
<tr>
<td>Minimum Distance to Mean Classifier</td>
<td>Bare surface</td>
<td>45.47</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Built-up areas</td>
<td>15.22</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dam</td>
<td>1.04</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rivers</td>
<td>0.4</td>
<td>Yes</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Vegetation</td>
<td>33.48</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Minimum Mehanobis</td>
<td>Bare surface</td>
<td>4.43</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Built-up areas</td>
<td>47.27</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
The area used for the acquisition of the ground truth information (Minna, Niger State) was sub-mapped from the image (Figure 4a). Some of the features of the area were digitized in the ILWIS Software environment. The result obtained is as shown in Figure 9.

DISCUSSION OF RESULT

In the process of evaluating the filtering operation on an image, attempt was made to perform colour composite on both the filtered and the unfiltered image, it was discovered that there were slight differences between the filtered colour composite results (Figures 2b & 2d) and the unfiltered colour composite results (Figures 2a & 2c). It could be inferred that the spectral reflectance of the satellite image before filtering was enhanced after the filtering process, the noise in the image has been reduced and that the image has been smoothed by the AVG filter that was used. Since it has been established that Filtering improves the resolution of the image, it is important to also
investigate which of the filter type best filters the image while still ensuring the integrity of geometry of the resulting image.

Four different filter types were used to filter the band 5 of the LandSAT Image viz: LAPLACE, SHADOW, EDGE ENHANCEMENT and AVERAGE 3x3 filter types. The result of this operation was presented in Figures 3a-d. Close examination of the results revealed that there was distinctive difference in the output of the four filter types. LAPLACE and SHADOW filter types (Figure 3a and 3b respectively) were discarded because of their poor representation of image features and gross distortion of the image’s geometric and radiometric integrity, EDGE ENHANCEMENT and AVG 3x3 Filter types (Figures 3c and 3d respectively) were further considered because of their excellent representation of features which contribute to the accurate classification of the image. AVG 3x3 filter type was selected as being more efficient.

After series of different band combinations as colour composite, it was discovered that the combination of bands 543 of RGB planes of the electromagnetic spectrum (Figure 4a) gives the best representation of the features on the image based on the ground truth information. Colour Composite images of bands 157, 237 and 712 (Figures 4b, 4c and 4d respectively) were discarded due to their inability to depict the ground features in their true colour. The Composite image of Figure 4a was then used for the supervised classification and the digitization of some features within the area used for ground truthing.

Based on the results obtained from the Supervised Classification process (See Table 1 and Table 2), it was discovered that Minimum Mehalanobis Distance classifier classified that “Built up areas” has the highest percentage of pixels (Figure 10b) which is not in agreement with our ground truth information and it is also against the submission of the three other classifiers which agreed that bare surface has the highest percentage of pixels. Also, Minimum Mehalanobis Distance classifier (Figures. 10a and 10b) and Minimum Distance-to-Mean classifier (Figures 9a and 9b) submitted that the percentage of pixels that belongs to “rock outcrop” in the image is 5.98% and 4.39% respectively. This is contrary to the findings of the analyst as the percentage of the pixels that belongs to “rock outcrop” should be more than that based on the ground truth information. Maximum Likelihood classifier (Figures 7a and 7b) and Box classifier (Figures. 8a and 8b) gave a more reliable result as they agreed that rock outcrop covers 16.16% and 16.22% respectively.

Furthermore, Maximum Likelihood Classifier submitted that there is no “built-up area” on the whole image by allocating 0% to the “Built-up area” spectral class. This was contrary to our groundtruth information and even the submission of the three other classifiers i.e. Minimum Distance-to-mean, Minimum Mehalanobis and Box classifiers which submitted that 15.22%, 47.27% and 17.4% respectively of the entire image was occupied by “built-up areas” even though the 47.27% voted by Minimum Mehalanobis classifier is outrageous.

Base on these, the analysts indicated that Box classifier, Minimum Distance to Mean Classifier and Maximum Likelihood classifier can be more effective and better suited for classification of multi-featured images than the other three classifiers for accurate and reliable image interpretation.
CONCLUSION

This research has evaluated the significance of spatial filtering, Colour composite and classifier types on LandSAT images. After the analysis, it was observed that proved to AVG 3x3 filter type was the best filter type for LANDSAT multi-featured images while colour composite of bands 3, 4, 5 gave the best representation of the features of the image. The Box classifier, Minimum Distance to Mean Classifier and Maximum Likelihood classifier also proved to be excellent classifiers and are more suitable for this type of image classification. Though we do not have enough scientific proof, it is opined that one of the perceived influential factors of the performance level of each of these algorithm is their sensitivity to different image features. The authors are currently carrying out a research to validate this claim.

REFERENCES


Healthy urban planning

Rapid urbanisation brings with it both risks to health and the opportunity to improve it. Healthy urban planning can help tackle existing problems and create healthier communities for the future. It can reduce future health care costs.

The integrated working of built environment, transport and urban design professionals and experts from public health can produce results that are good for people, the environment and the economy.

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The World Health Organisation (WHO) Collaborating Centre at UWE Bristol has substantial experience in helping cities and communities address many of the problems arising in towns and cities from urban development. Our integrated team of public health and built environment specialists works with communities, planners, health authorities and urban government to produce the approaches and plans needed for creating ‘liveable’ cities and towns. Our focus lies in tackling the rise in non-communicable disease so often exacerbated through poor urban development.
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Experience of working with and visiting towns and cities across Europe and the rest of the world is central to the work of the WHO Collaborating Centre. The WHO Collaborating Centre has supported the development of the healthy cities movement in Europe and advised both individual and groups of cities on how to adopt the principles of Healthy Urban Planning and incorporate them into their routine planning processes. The academic and professional staff in the Centre have made an impressive contribution to spreading the understanding of urban planning for health using design of the built and natural environment. This is illustrated by the development of the ‘Health Map’, a conceptual tool that has been translated into over 32 languages and used worldwide. The health map is a starting point for health impact assessment, training professionals in healthy urban planning and developing more robust city policies for supporting healthy populations.

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At UWE Bristol we are able to offer a wide range of bespoke packages to suit the needs of your organisation. This can include CPD, training or consultancy in the following areas:

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- Full developmental review for organisations (public or private) with recommendations for governance, leadership and skills to support better healthy urban planning.
- Masterplan review service based on desktop or participatory health impact.
- Leadership study tours for senior staff development and learning for healthy and sustainable urban development.
- Design and facilitation of engagement and professional development packages in the field of healthy urban development.
- Development of bespoke guidance and tools for healthy urban planning.

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“Their work has changed the nature of political and professional debate about how cities incorporate health issues into their spatial and transport planning.”

Dr Agis Tsouris,
Director, Division of Policy and Governance for Health and Well-being
World Health Organization
Regional Office for Europe
Copenhagen
The Centre for Floods, Communities and Resilience (CFCR) focuses on a range of flood-specific themes reflecting the diversity and interdisciplinary nature of issues concerning the development of resilient communities. Our mission is to promote resilient futures through a world-class programme of interdisciplinary research on floods and communities.

This is delivered through an integrated portfolio of world-class research, knowledge exchange and co-generation, science communication, community engagement and training for decision makers at all levels. Work of the Centre embraces and integrates local, national and international perspectives on community flood risk management.
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- Flood recovery and resilient communities.
- Property and community level flood adaptation.
- Community flood education.
- Planning flood receptive neighbourhoods.
- Interaction of flood policy and governance with communities.
- Capacity building for stakeholders in community flood risk management.

Water science and engineering
- Flooding and integrated water management.
- Catchment processes.
- Changing risk.
- Human intervention and climate change.
- Complexity and uncertainty.
- Prediction.
- Assets and defences.
- Management of property.
- Non-structural approaches.
- Sustainable Drainage Systems (SUDs).

Policy and governance
- Insurance.
- Flood risk management strategies.
- Institutional structures.
- Funding mechanisms.
- Localism.
- Regulatory frameworks.
- Community lead adaptation planning.
- Issues of compensation.
- Property rights aspects of flooding and flood management.
- Compulsory purchase.
- Flooding and environmental regulation.

Representation, perception and behaviour
- Psychology of risk.
- Risk perception.
- Memory and place.

What we can offer
We currently deliver the only dedicated FdSc and BSc(Hons) programmes in River and Coastal Engineering in England and Wales. These programmes are training the next generation of River and Coastal Engineers for the Environment Agency and Local Authorities in the United Kingdom.

We can also provide bespoke training and CPD aligned to our research themes. This can be based at UWE Bristol or undertaken as in-house training internationally. We welcome applications for research degrees (MPhil, PhD) in any of the thematic areas mentioned above.

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