Sustainable Development Goals: a time for innovations and investment in land administration and management

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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 Institution of Surveyors of Tanzania (IST), The Tanzanian Institution of Valuers & Estate Surveyors and several surveying professional bodies in sub-Saharan Africa have been members of CASLE for some years, and have made a welcome contribution to CASLE.

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 for their support and assistance:

- Members of IST and TIVEA
- The Local Organising Committee in Tanzania for this conference
- Members of the CASLE Conferences Scientific Committee
- CASLE Management Board and Task Force
- Trustees of the Aubrey Barker Fund
- esri Eastern Africa
- Professor Paul Olomolaiye, University of the West of England

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
Foreword by the CASLE President, Mr Joseph Olusegun Ajanlekoko

It is two years 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 Dar es Salaam is a follow-up event to the conference in Abuja (Nigeria) in 2016, and I am very pleased that Mr James Dadson, CASLE Africa President, and other CASLE officials will also be representing CASLE.

The conference is therefore an affirmation of the CASLE’s Management Board 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 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:

- The Institution of Surveyors of Tanzania (IST).
- The Tanzanian Institution of Valuers & Estate Surveyors (TIVEA).
- Paul Olomolaiye, University of the West of England.
- 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.
- Trustees of the Aubrey Barker Fund
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LAND PRESSURES AND LAND ACCESS VULNERABILITIES ACROSS THE RURAL-URBAN CONTINUUM IN GHANA

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This is a point-of-view paper that identifies the critical drivers of land access change and vulnerabilities in rural, peri-urban and urban areas of Accra, the capital city of Ghana. Based on the author’s extensive technical and professional experience and field interaction with relevant actors in the area of land administration and management in Ghana over the years, the paper establishes that access to land for agricultural purposes in rural areas is changing from customary channels to more market based approaches. Peri-urban areas are hotspots for land conversion, with property development replacing agricultural uses. This is resulting in loss of livelihoods and triggering new wave of rural-urban migration with its concomitant effects. In the urban areas, land access for housing is hardly ever pro-poor and this is contributing to the proliferation of slums and informal settlements across the major cities. Conclusions drawn in the paper are informed by highlights from disaggregated analysis in the paper and review of recent empirical studies in the field of the paper. The paper concludes by offering an analytical framework in a form of guiding principles that are likely to inform practitioners and policy makers to be more responsive in designing pro-poor interventions that will safeguard the interest of all in the face of mounting pressures on land. The conclusions are relevant considering that the Sustainable Development Goals (SDGs) have renewed the emphasis on land as a productive and wealth creating asset which should be central in driving the economic transformation of many developing countries.

Keywords: Land Access, Vulnerabilities, Land Pressures, Urbanization, Ghana.

INTRODUCTION

There is a growing need to safeguard land rights for all, especially the poor and the marginalized as a result of growing pressures on land in many developing countries. The pressures, which are unprecedented, are from multiple sources that include more macro sources such as globalization, market liberalization and climate change. Other sources include localized drivers such as population growth, illegal mining and large-scale land based investments. Ghana, mirroring the trend in many sub-Saharan African countries is currently experiencing these pressures. Increasing land pressures is systematically weakening the various safety nets which are inherent under customary land ownership systems. This state of affairs is redefining how land is

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accessed by both indigenes and migrants. New forms of vulnerabilities are resulting from the growing pressures and existing ones are being amplified. All these are increasingly happening within a period where Ghana has embarked on a Land Administration Project (LAP) that started in 2003.

Over a decade of implementation of the LAP, access to land especially for the vulnerable remains a major challenge considering various efforts aimed at ensuring security of tenure, occupancy and use of land in rural, peri-urban and urban areas. This development appears to be eroding the tenets and principles of land administration, which is defined as “the processes for determining, recording and disseminating information about ownership, value, use and development of land ...“ (UN/ECE, 1996). Thus, adequately guaranteed access to land in the rural, peri-urban and urban areas remains a huge challenge in the country. Furthermore, there is no doubt that the issue is perpetuating poverty and food insecurity along the rural-urban continuum in the country.

Even in situations where a parcel of land is covered by formal title, one is not guaranteed security of title and unrestrained access to land. Cost of accessing the judiciary system, inter and intra chieftaincy and clan conflicts, indeterminate boundaries, excessive pressure on land due to rapid population growth, a weak land administration enforcement system and competing uses for land, as a finite asset among others, appear to contribute to the creation of challenges with access to land by the vulnerable. Arguably, this state of affairs has festered for far too long and requires immediate and appropriate policy responses. Several of the policy responses identified in extant literature appears to have failed to profer guiding principles that are likely to inform practitioners and policy makers to be more responsive in designing a coherent pro-poor guiding principles for policy interventions, especially with respect to Ghana.

In terms of methodology adopted to achieve the objective of the paper, the paper draws on two main sources of knowledge to help identify key factors contributing to land access vulnerabilities in Ghana. First and foremost, the paper draws on the author’s point-of-view based on industry experience and second, draws on research findings in extant literature. The paper presents discussions and analyses of land access vulnerabilities in rural, peri-urban and urban areas. This rural-urban continuum analysis was adopted with the aim to provide the backdrop to mapping out the various drivers and their effects to land access vulnerabilities.

Drivers of land pressure and implications for tenure vulnerabilities
Land tenure systems define how land is owned, accessed, held and utilised (Kasanga and Kotey, 2001). Like any social construct, land tenure systems are responsive to changes from an array of factors such as demographic dynamics, legal and policy changes. One change effecting factor or driver may shape the prevailing land tenure practice although it is typical for multiple drivers to concurrently be at play. Arguably, when multiple drivers are mutually contributing to shape land issues, it may result in a complex web of tenurial changes because each driver may affect given institutions or actors differently at the same time. Thus, there is almost a universal consensus from the growing body of literature that land issues, particularly in the rural
and peri-urban areas are fast changing (Cotula, 2007). But what issues are driving the change? The ensuing discussions attempts to identify and highlight some key drivers to land access vulnerabilities.

Causative factors of inadequate guaranteed access to land

Industry experience suggests that the challenges to land access vulnerabilities can be attributed to the following:

1. The prevalence of an informal land tenure system especially in rural communities
2. Lack of awareness and non-enforcement of the fiduciary relationship between stool occupants who have allodial title and their subjects
3. Lack of a clear cut government policy on the procedure for large-scale land acquisition which secures the mutual interest of parties to a transaction
4. Low income levels of the vulnerable which causes them to accept economically unrealistic payments for the sale of their lands
5. A legal regime that is not pro-poor and possibly the absence of a Land Bill, Survey Council Bill and Estate Agency Bill among others to safeguard the interest of all sectors of society.
6. The high cost of land due to insecurity of title to land, multiple claims and other forms of litigation, documentation and registration including survey fees and legal fees.
7. Prevalence of a low level of recorded reliable information on occupancy and ownership of land.

Thus, the paper discusses how the issues are being tackled and proposes some guiding principles that can be considered for how best land access vulnerabilities can be addressed.

Access to land for agricultural purposes in the rural areas

Generally, land in Ghana can be accessed through both formal and informal land markets. This is within an environment where about 80% of lands are under management of customary landowners and 20% under the management of the state (Kasanga and Kotey, 2001; Teboah and Shaw, 2013; Adiaba, 2014). Irrespective of the market, the 1992 Constitution of the Republic of Ghana recognises universal access to land and property ownership. Article 12(2) of the Constitution provides that “Every person in Ghana, whatever his race, place of origin, political opinion, colour, religion, creed or gender shall be entitled to the fundamental human rights and freedoms of the individual contained in this chapter but subject to respect for the rights and freedoms of others and for the public interest“.

Notwithstanding this provision among others by the supreme law of Ghana, evidence abounds that natives, subsistence farmers, customary usufructs and many rural, peri-urban and urban dwellers have lost their rights and access to land with little or no compensation paid. Indeed within the urban areas there is a consistent rise in the rate of conversion of indigenous neighbourhoods into modern high class developments. Most of these areas are turned into mainly commercial developments such as luxury apartments, supermarkets and fuel service stations for the high income earners. The
displaced indigenes are forced to move out to remote areas with the social fabric completely broken.

The phenomenon can be partly attributed to alienation of land by the allodial title holders to large scale investors without recourse to the subjects and occupants of these lands who become vulnerable to landlessness and homelessness among others. In some situations where natives and tenant farmers have been given alternative lands for their own settlement and livelihood, these lands tend to be less fertile, unattractive terrain and have little or no access to markets, educational, infrastructure and health facilities. These challenges are common irrespective of whether land is accessed through the formal and informal channels.

In response to some of the challenges mentioned, a Guideline for Large Scale Land Transactions in Ghana has been developed and awaiting Ministerial approval. The Guidelines aims to instill a more market based approach to large scale land acquisitions for real estate, commercial agriculture, industrial and commercial uses. The Guidelines provide for open and transparent engagements and consultations with land owning community leaders and members including the vulnerable groups such as women, aged, the youth and land users in all land dealings. The guidelines further seeks to safeguard landlessness on the part of community members and also the mutual interests of the land owning communities and investors.

Access to land in the peri-urban areas

Using Accra, the capital city of Ghana as an example, the outward expansion of the city into peri-urban area has contributed to changes in the land use pattern with the dire consequences on peri-urban land use rights and decisions (Appiah et al., 2014; Awuah, 2016). The process has largely been driven by urban residents acquiring prime agricultural lands outside the city for residential and commercial purposes (Appiah, 2012; Appiah et al., 2014). These land acquisitions and conversions are being driven by forces that include demand for housing for growing population, deteriorating housing conditions and inadequate urban services (Acheampong and Anokye, 2013; Appiah et al., 2014).

With respect to inadequate urban services, Awuah (2016) reports there is lack of access to well-planned and secured land and properties, orderly developments and good property address system among others. These are due to poorly defined land ownership rights and land claims, complex land registration procedures and requirement, multiple sales of same parcels of land, inadequate master and subdivision plans, delays with planning approval processes and non-compliance with planning requirements (Awuah, 2016). Notwithstanding these challenges, land values in the peri-urban areas of Accra have been on the increase up to a maximum growth values of 50% between 2011 and 2016 with land speculation being a contributory factor to the increasing prices (Awuah, 2016). This suggests that the vulnerable and low income earners as well as prime agricultural land users and owners are being priced out and such lands eventually converted to other uses.

Arguably, there is an erosion of economic livelihood as one can observe a systematic breakdown of the social fabric of extended family units as vulnerable family units may have to move out of their abode to other areas without a guarantee that they may all afford to be accommodated at the same place. Displaced individuals and families also face dangers of having “land guards” whose activities affect the security of life and property due to landlessness.
Access to land in the urban areas

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, where an urban area is defined as a settlement with a minimum population of 5,000 (Obeng-Odoom, 2013), the potential of urban centres serving as catalysts to rapid economic development is yet to be meaningfully realised. This is because, urbanisation is largely proceeding on unplanned and unsustainable basis without the needed basic infrastructure (Awual, 2016). Indeed, it has been observed that Ghana’s rate of urbanisation is largely a case of ‘urbanisation of slums and poverty’ (Awumbila et al, 2014). In addition, urbanisation and agricultural lands are in close competition since urbanisation in Ghana largely occurs through accumulated accretion (Yeboah and Shaw, 2013). Thus, the urban economy and dynamics can be argued as a reinforcing driver contributing to land access vulnerabilities in Accra.

Apart from the documented evidence of challenges within the urban land markets in Ghana (Ministry of Lands and Forestry, 1999), it is common knowledge that land and property values in urban areas particularly with respect to Accra are astronomically high. This is one factor that has made it extremely difficult for the vulnerable and low-income earners to access, acquire land and maintain access to land. Not much focus has been placed on this key cause.

The author’s own survey revealed that currently the cost of land including title and development permit, is currently between 30% - 65% of the total cost of development. Arguably, this is a major challenge to affordability for low income earners. For instance, it is common knowledge that land values are rising with land values quoted in US Dollars ($) and Ghana Cedis (¢) in Accra. Following this, Awuah (2016) reports that the former is mostly in government land areas with a minimum per acre land value of $430,000.00 and a maximum value of $4,000,000.00 with mean value of $501,667.00. The report suggests that between 2011 and 2016, the land value growth rates within the US Dollar ($) market areas were between 15% and 47%. Indeed, this market is out of reach of the low and middle-income earners.

For the Cedi (¢) market areas, which were communities within the urban and the peri-urban areas, the minimum per acre land value was GH¢30,000.00 and maximum per acre value was GH¢600,000.00. The growth rates in value between 2011 and 2016 were between 30% and 50%. In broad terms, the rates of land value growth within both US Dollars and Ghana Cedi denominated markets were quite similar even though the growth in GH¢ market appeared a little bit relatively higher (Awuah, 2016). Thus, both markets are out of reach of the poor and low-income earners. The striking aspect of these high land values within Accra is that the state is unable to derive the relevant benefits from the high prices through a land value capture mechanism as a source of revenue mobilization to help develop other deprived communities.

Another factor that impedes the vulnerable and low-income earners to access to land is the cost of registration. For example, a consultancy report for the Ministry of Lands and Natural Resources (2017) reveals that excluding stamp duty and other taxes, the cost of registration of parcel of land in Rwanda is US$32.42, Nigeria is US$81.87, Egypt is US$109.99 while that of Ghana is US$130.23. This is notwithstanding that the cost of registration of land in Tunisia and Cote d’Ivoire are US$147.33 and 200.16
respectively and are higher than that of Ghana. With the introduction of a Land Administration Project that began in 2003 and has been implemented in two phases already, it is anticipated that the next phase of the Project can help reduce the cost of land registration and make the registration system pro-poor.

**CONCLUSIONS**

The paper has highlighted key vulnerabilities that are likely to be associated with the phenomenon of land pressures and access to land in Accra within the rural, peri-urban and urban contexts. Land pressures across the rural, peri-urban and urban continuum in Accra and the country are resulting in squeezing land access and livelihoods of the vulnerable land users. With urbanisation and other pressures still on the rise, the plight of the vulnerable people could worsen in the absence of appropriate policy responses. Thus, from the discussions and findings, it is convincing to conclude from the paper that certain guiding principles are outlined for consideration as mitigation measures to land pressures and vulnerabilities across the rural-urban continuum in Ghana. The proposed guiding principles include:

i. Awareness creation, sensitization and continuous education of the vulnerable land owners and users of their land and human rights;

ii. Enforcement of the fiduciary relations between allodial title holders and their subject;

iii. Building the capacity of the vulnerable to be able to gain realistic economic returns from the use of the land;

iv. Developing the capacity of indigenes to be able to put their land asset to economically viable uses to strengthen their financial base and social security;

v. Enforcement of an appropriate legal regime for land administration and management;

vi. Introduction of land value capture for revenue mobilization to develop other deprived areas; and

vii. Reforms in the land policy to cater for large scale land acquisition which supports the interests of the subject usufructs and all title holders.

The guiding principles proposed above, when considered and effectively implemented, are likely to contribute in mitigating the effects of land pressures on land access vulnerabilities across the rural-urban continuum in Ghana and possibly in other Africa countries.

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END
THE EFFECT OF LACK OF PUBLIC PARTICIPATION AND INSTITUTIONAL COORDINATION ON URBAN PLANNING AND MANAGEMENT IN DAR-ES-SALAAM

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This paper examines how the lack of public participation and the lack of institutional coordination in the planning process contribute into the failure of urban planning and management in Dar-es-Salaam. In doing so, the paper analyses planning schemes which considered public participation, collaborative working and consensus among stakeholders as a key to improve the capacity of the local authority to plan, coordinate and manage urban development in Dar-es-Salaam. The method used in this study included literature reviews, key informants interviews and focus group discussions with key institutions and local residents’ organisations linked to urban development and management in Dar-es-Salaam. The results have shown that urban planning and management activity in Dar-es-Salaam continues to face challenges of poor public participation and inadequate institutional coordination. In general, the activity of planning excludes a range of stakeholders essential in urban development and management. This weakness has significantly contributed to the failure of urban planning and management to tackle urban planning related problems as the city develops. This paper suggests that searching for a mechanism of public participation and a framework of institutional coordination is crucial for improving urban planning and management in Dar-es-Salaam. Public participation should include all types of citizens, including women, children, the elderly, the disabled and street vendors in the planning process. Similarly, a framework of coordination should involve all sectors concerned with urban planning in Dar-es-Salaam.

Key words: Public participation, Institutional coordination, Dar-es-Salaam, Urban planning and management.

INTRODUCTION

Urban Planning and Management in African cities faces formidable challenges. This is partly attributed to the fact that the majority of the cities are generally young and represent new frontiers of urban development in their systems. Many of the cities emerged under world colonialism and settler regimes. They exhibit common experiences in political and civil development and share the burdens and hopes that are inextricably linked to Africa’s unique position within the world economic and political systems (El-Shakhs, 1997). Urbanisation in these cities is characterised by a high concentration of population, economic activities and traffic congestion in one or very few major cities that are expanding rapidly in size and population. These have caused problems such as poor housing, inadequate public transport, air pollution and inadequate provision of services and facilities (Kanyama and Cars, 2009). These

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problems should be viewed within the context of the process of urbanisation where cities are growing faster than cities in other continents (El-Shakhs, 1997). However, according to the World Bank, (2002), cities in Africa are characterised by poorly developed institutional, fiscal and regulatory arrangements at local government levels. Due to the rapid pace of change and delayed planning intervention, many improvements become either inadequate or obsoleste by the time they are completed. Thus, the governments end up playing a catch-up game in addressing emerging problems in urban areas (El-Shakhs, 1997). These weaknesses have been a concern for the inadequacy of urban planning and management in Dar-es-Salaam (Kanyama and Cars, 2009). The city of Dar-es-Salaam has had three master plans, the first of which was prepared in 1948 followed by another one in 1968, and the latest was approved and adopted for implementation in 1979. The Town and Country Planning Act in Tanzania provides for review of such General Planning Schemes every after five years to match with the dynamics of urban development. However, none of these plans were reviewed within the stipulated period of time of 5 years, thus rendering master plans ineffective to address fast emerging urban planning related problems in Dar-es-Salaam. The earliest any of these plans was reviewed was after 10 years (Nnkya, 1999). Accordingly, Dar-es-Salaam city experienced a myriad of problems linked to unguided growth of the city including 70 per cent of its population living in unplanned settlements either without basic services or with inadequate services, roads being heavily congested with traffic and overall poor provision of utilities and services in the city (Kanyama and Cars, 2009).

In view of this ineffective urban planning and management, in the 1990s, the city of Dar-es-Salaam, assisted by UN Habitat under the Sustainable Cities programme (SCP), designed a new approach through which planning could be carried out, based on a revision of the 1979 Dar-es-Salaam Master Plan. UN Habitat emphasised that the urban management problems facing the city required an approach that was stakeholder-driven, focusing especially on the interaction between environment and development, and with a major emphasis on cross-sectoral and inter-agency coordination. It thus proposed the application of an Environmental Planning and Management Approach (EPM) to improve the capacity of the local authorities to plan, coordinate and manage urban development in a manner that optimised the use of available resources, including manpower and natural resources (Kanyama et al., 2004). Through the EPM approach, a Strategic Urban Development Plan (SUDP) was formed and was intended to be the product of a partnership between residents, private companies, utility companies, central government departments and Dar-es-Salaam City Council (DCC). The objective of this paper is twofold: (i) to examine the application of public participation and institutional coordination in dynamic planning of the city of Dar-es-Salaam and (ii) the effect of lack public participation and institutional coordination on SUDP and urban development and management processes in Dar-es-Salaam.

**METHODODOLOGY**

This paper was approached through examination of the impact of public participation and institution coordination on urban planning and management in Dar-es-Salaam. More specifically, it focuses on how the issues of public transportation and land use
planning are anchored on public participation and institutional coordination. The analysis of this paper draws on qualitative interviews, whereas data collection methods included literature review, focus group discussions and key informants interviews in Dar-es-Salaam. Key informants interviews involved the Dar-es-Salaam City Council, the Traffic Police Department, Ministry of Transport and Communication, Surface and Martine Transport Authority (Sumatra), Temekte Municipality officer and the Ward executive officials at Ilala Boma. Focus groups discussions involved residents in a neighbourhood at Ilala Boma, including street vendors, disabled and elderly people. Secondary data was collected by using documents obtained from institutions relevant in this study. Qualitative data was coded and analyzed by employing factual and logical interpretation of the study findings.

RESULTS AND DISCUSSION

Public/Citizen Participation in Dar-es-Salaam

In examining concerns of public or citizen participation in urban planning for the city of Dar-es-Salaam, it is crucial to make reference to the framework of urban planning in Tanzania, specifically Section 78 of the 1956 Town and Country Ordinance. This framework provides that a master plan has the force of law behind it and no plans for development of land or construction would be permitted unless they conform to the regulations. However, Tanzanian urban planning framework owes its framework to the British planning system of 1947 which, in Britain, was changed in 1968 while remaining unchanged in Tanzania (Kanyama, 1995). The 1947 British planning system was implicitly built around the belief that society has basic values and goals in common that became the basis for identifying the general public interest on which the government or authorities could act (Healey, 1983). Actually, over the years, public participation has been seen as a cornerstone of the urban planning process in the city of Dar-es-Salaam (Kanyama et al., 2004). However, this emphasis has remained implicit, for example, according to the City Planner in Dar-es-Salaam, there was no legal mandate to support land use planning that emphasized strong stakeholder participation. The city planner felt that this weakness was the main constraint in planning for urban development in Dar-es-Salaam and was caused by the old town planning law of 1956, which did not solidly incorporate the modern principle of public participation. In addition, the City Planner felt that the lack of public participation was due to the culture of relying solely on experts, where there was little recognition that planning was the business of ordinary citizens. On the other hand, the City Planner felt that ordinary people had low motivation to participate in the planning process because of socio-economic reasons. “People value attending activities to generate revenue for their daily livelihood more than participation in public planning meetings. They see attendance at such meetings as a waste of time.”

The City Planner underscored further that people at local levels did not know how to participate in the planning process because planners and other professionals lacked proper training on how to involve citizens in such processes.
Residents at Ilala Boma felt that they were rarely consulted by authorities in the planning processes. At times, they saw projects/activities being planned or carried out in their area without their prior knowledge. Some of these schemes have been inappropriately located or having less relevance to their neighbourhood - “we are seeing inappropriately located bus stops and petrol stations in our neighbourhoods”.

Interview with Sub-Ward leaders and a Ward Executive Officer at Ilala Boma, showed that although there were leaders overseeing development schemes at the grassroots level, they were not entirely involved in some decisions of development at their local area. ‘The tendency is more of receiving orders from above and acting, or of just seeing schemes being implemented as decided from above.’

Specifically, the grassroots leaders expressed frustration with how land use planning and development was carried out in their area. “Sometimes we see building activities occurring in an unsystematic way in our area. Even government officials violate their own plans…. This office building (the one in which we conducted the interview) is a vivid example of violation of the Dar-es-Salaam master plan because according to the plan, the area should have been an open space, but higher authority took the decision to build the Ward office here”. Furthermore, the Ward and Sub-Ward Officers gave the example of the Kilwa market in Dar-es-Salaam, which they thought was built by the government without public consultation. “People simply did not like the location and could not utilise the facility! This could have been avoided if citizens were consulted in the planning phase.”

According to a sub-ward leader, he convenes a meeting of sub-ward residents once every two months to discuss matters pertaining to development in their sub-ward area and submit resolutions to the Ward Executive Officer, who was then to transmit further to higher levels, i.e. the District Commissioner, Municipal Officers etc. The Ward Executive Officer felt that responses at higher levels were often muted. “Usually the Ward Executive Officer (WEO) submits all the agenda to the Municipal Director. When the municipal officials receive our resolutions they promise that they will do something, but in reality they do nothing”. Owing to such inadequate response from the higher level of governance, the Sub-Ward Officer felt that the status of sub-ward leadership was being ignored: “We leaders at the lowest levels of the society are disregarded by people at the top. We are in some way considered as uneducated and, in some way, I sense that our work is considered as unimportant to the society.”

In Dar-es-Salaam, small business firms, service and shops tend to be established close to where people are living, near roads, bus stations or on empty land suitable for trade and warehousing. Most often, this type of ‘land occupation’ persists for a long time, with great disadvantages concerning safety, transport and health. Interviews with street vendors showed that they pleaded to the city authorities to be allocated areas conducive to carrying out their commercial activities without much success. They felt that they were simply not wanted within the city area. “Our issues are raised by politicians only when they blame us and they do not approach us to know our problems. We have never participated in any decision making.” Street vendors expressed willingness to participate in making decisions to solve their predicament of constantly changing business locations.
Interviews with disabled people focused on how they viewed public transport in Dar-es-Salaam. They pointed out problems they commonly face on ‘daladala’ buses as being refusal to be picked up, not being given enough time to cross the roads by drivers, occasionally being pushed and harassed in the buses, being hurried to dismount irrespective of their disabilities and abusive language by the operators. They expressed that they have never been involved in decision-making at grassroot levels to address the problems they face with public transport. ‘One of our main desires in participation in planning would be, for example, to stress building of bus stops near to places where we live to minimize long walking distances.’ Just like the disabled people, interviews with elderly people showed that none had ever been involved in any planning activity although they had a strong desire to do so. ‘We want to participate in the planning process to promote our concerns, such as, free public transport for the elderly, being treated respectfully by ‘daladala’ bus operators and improvement of roads and bus routes near our homes.’

Institutional coordination

Different approaches to institutional coordination and levels of formality are in use in various parts of the world that affect the quality of the planning process. These can range from totally informal/no formality to completely formal and integrated approaches. The decision-making process of formal coordination can range from centralised control by a single organisation to a collaborative, consensus-based format (Miller and Lam, 2003). Viewing institutional coordination from an urban public transport planning perspective, many actors have now become involved in the public transport sector, thus effective planning of this sector will depend on cohesion between the various sectors - public, private, voluntary, community - and relies on the development of structures and processes that support coordination (Kanyama and Cars 2009). In Tanzania, the Ministry of Transport and Communication oversees the implementation of the national transport policy in order to achieve a safer, more effective and environmentally friendly transport system (URT, 2003). However, over many years, Dar-es-Salaam city has been facing public transport related problems, yet the Ministry of Transportation and Communication response has been ambivalent on how to work with the Dar-es-Salaam City Council to address the situation (Kanyama et al., 2004). According to the Director of Planning and Research in the Ministry of Transport and Communication, although the Ministry is at the centre of urban transport issues, it has not been actively engaged in overseeing and coordinating the implementation of the national transport policy. Citing the City Council of Dar-es-Salaam, the Director observed that: ‘‘When the City Council designed the pilot project of 20,000 plots for residential use on the outskirts of Dar-es-Salaam, they neither involved our Ministry nor adhered to the national transport policy. Now the need to provide future transportation in these areas has become apparent.’’

The interview with the Ministry of Transport and Communication showed that there was overlapping and fragmentation of roles in the transport sector which inhibited performance: ‘‘Now there are about ten ministries all dealing with components of transportation.’’ Acknowledging this weakness, the Special Zone Regional Police Officer in Dar-es-Salaam felt that different institutions perform various public transport related tasks but, each with different professional cultures and with different
systems of accountability and separate autonomy. “The Traffic Police Authority tests vehicles and issues vehicle road worthiness permits; Sumatra issues licenses and allocates bus routes to bus operators; the City Council earmarks parking areas and collects tax. However, these authorities do not have a coordination mechanism to discuss areas of overlapping responsibilities”.

According to the Special Zone Regional Police Officer in Dar-es-Salaam, there was no true and effective institutional coordination in planning for public transport largely because there was no framework to effect institutional coordination. If any form of coordination occurred, it was impromptu in character at the discretion of involved institutions. The Police Officer thought that this weakness undermined collective planning for better public transport in Dar-es-Salaam.

In interviews with the Surface and Maritime Transport Agency (Sumatra), officials highlighted that the Transport Act of 1971 of Tanzania requires coordination among stakeholders in planning and managing transport, yet this has been difficult in practice. Elaborating on some challenges, a Sumatra official observed that: “Police participation is very minimal in promoting good public transportation at present due to corruption. City planners are also inefficient because they simply disregard the involvement of Sumatra in their planning. As a result, the design of road infrastructure does not suit the purposes of road users. For example, many bus stops are too far apart, making it hard for commuters to travel.”

Concerns for public health were raised in an interview with the Municipal Health Officer of Temeke district in Dar-es-Salaam and showed that the health sector was ignored as a major stakeholder in planning for public transport. The interviewees emphasized that they had useful knowledge to contribute to such planning: “We are a direct referral point whenever road accidents happen. We are also responsible for treating the victims of air pollution. Our medical role gives us a wide exposure to public transport issues, but when it comes to decision-making, we are not approached to give our contributions.”

The Health Officer stressed that there was no mandatory institutional follow-up to inspect vehicles’ worthiness during operation, such as inspecting that the windows are in proper condition for adequate air circulation or that seats are well fitted for passenger comfort, etc. The Health Officer underscored that The Township Act of 1956, Chapter 101, paragraph 32, provides for guideline standards governing public gatherings, including how many people are supposed to travel in a vehicle. The Health Officer felt that they should be given the role of inspecting vehicles (buses) to ensure that vehicles meet public health standards. Furthermore, the Health Officer felt that the health sector has continually been excluded from collaborating with other sectors in improving public transportation because the general public does not clearly understand the link between public transport and health issues.

Discussion

Results have shown that there is both inadequate public participation and institutional coordination in urban planning and management in Dar-es-Salaam. The lack of public participation in urban planning and management has been underscored by the City Council officials, WEO, and the residents at Ilala Boma. Other studies have specifically shown that the lack of involvement in planning in Dar-es-Salaam is also significant for women and school children (Lindén et al., 2006). Overall, results have shown that the reasons for the lack of participation include planning resolutions.
agreed at grassroots by communities being ignored during planning by planning authorities, apathy at grassroots by communities and people not knowing how to participate in the planning process. The City Council Planner in Dar-es-Salaam felt that some urban planning professionals do not know how to satisfactorily involve citizens in planning processes. Such inadequacy in citizen participation in urban planning and management is not only confined to Tanzania alone, but rather it is a widespread phenomenon in African countries. According to Rakodi (1997), since the inception of the post-independence era, the African elite is still orientated toward colonial paternalism, which often conditions state policies and the attitudes of the elites toward the masses. Thus, the governing elite has been unable to support citizen participation as well as other power-sharing arrangements that would empower civil society vis-à-vis the state (Afoaku (2005).

An interview with the Sub-Ward officer at Ilala Boma in Dar-es-Salaam has shown that occasionally grassroots resolutions for matters of urban development in their local areas were ignored and not taken seriously by higher authorities. According to Afoaku (2005), such kinds of weakness discourage people’s engagement in urban development discourses and thinking that their involvement in planning activities is a waste of their valuable time. This concern relates to what the City Planner in Dar-es-Salaam underscored that people value attending activities to generate revenue for their daily livelihood more than attending public participation planning meetings. Again, seeing apathy from an African wide perspective, it has resulted in the majority of the residents in the cities continuing to pursue a wide range of informal solutions to consolidate their position within the city, thus rendering their engagement with their cities out of view (UN Habitat, 2002). Given widespread insecurity in cities – in terms of services availability, livelihood, and personal safety – many residents have been reluctant to invest time and resources in institutionalising a sense of place. The difficulty lies in making poor people accept the costs of engaging in action. Instead, a way of being and operating in the city that relies upon the provisional has dominated. As a result, important and stable assets are hidden, rather than being mobilised for physical or social infrastructure development (ibid). For example, in Dar-es-Salaam, different neighbourhoods experience floods repeatedly over the years during rain seasons due to poor infrastructure development, yet the spirit of local communities to engage in solving such a problem in their neighbourhoods has remained low.

Results have shown that the lack of institutional coordination in urban planning and management is significant in Dar-es-Salaam. For example, the first national transport policy in Tanzania was produced in 2004, spelling out the requirement for a safer, more effective and environmentally friendly transport system. Despite the continuing transport problems in Dar-es-Salaam, there is no meaningful coordination among institutions to tackle the problems. The Special Zone Regional Police Officer in Dar-es-Salaam was specific to spell out that there was no true and effective institutional coordination in planning for public transport in Tanzania largely because there was no framework to effect institutional coordination. The lack of institutional coordination can also be viewed from an African wide perspective where it is a common phenomenon in urban planning and management (Kanyama and Cars 2009). This is traceable from the way governments in the area have handled urban development during the post-colonial era, neglecting to formulate any comprehensive policies for urban development (Torsten et al., 2001). Myriad problems in urban areas in African
cities, which arose out of this weakness, have compelled others to conclude that ‘African cities are in crisis’ (White, 1989). This crisis is not only caused by explosive urban growth and adverse economic circumstances, but is also the result of the failure in government. The inability of governments to provide institutional and legal frameworks for the overall development of cities has led to obstructionist legal norms, corrupt civil servants and pervasive informality (Torsten et al., 2001). Local authorities have until recently been unresponsive to the mounting urban crisis. They have not been able to devise new regulatory frameworks which would serve urban residents better in their pursuit for livelihood, shelter and services (ibid.). For that reason, local authorities are often engaged in crisis management and strategic decision-making is limited, plans are out of date and decisions made without prior consultations (Kanyama and Cars 2009). It has therefore been hard for different sectors to identify themselves with urban planning and management for a credible institution coordination in planning to be initiated.

Results have also shown that different institutions are excluded in one way or another in urban planning and management, thus making it hard for institutional coordination to address urban problems in Dar-es-Salaam. This exclusion can be traced from the model of urban planning and management inherited from the colonial period. The traditional model of management has always been dominated by the public sector investment programme, despite the increasing involvement of private actors in the running and operation of different urban sectors in African cities. This dominance of central authority in the development paradigm hampered involvement of other actors and undermined local autonomy (Wekwete, 1997). However, urban management thinking in sub-Saharan Africa has been significantly shaped by trends in the broader development debates, where there is a de-emphasis on state intervention and much more faith put on market forces. The 1992 Rio Conference on Environment and Development (UNCED), and Agenda 21 in particular, underlined the importance of involving multi-stakeholder groups in decision-making. It is now widely recognised that the main stakeholders in urban management include central government, local government, non-governmental agencies, private sector business, urban households, and the various segments of civil society (Kanyama and Cars 2009). Along this spirit, African cities, such as Ibadan, Accra, and Dar-es-Salaam, embarked on a Sustainable Cities Programme (SCP) to strengthen urban planning and management capacities of urban government under the auspices of UN Habitat (Wekwete, 1997). Through the SCP, a Sustainable Dar-es-Salaam Project (SDP) formed a Strategic Urban Development Plan (SUDP) which was intended to be the product of a partnership between residents, private companies, utility companies, central government departments and Dar-es-Salaam City Council (Kanyama and Cars, 2009).

On the whole, the results in this paper have shown that there is a systemic lack of both institutional coordination and public participation in urban planning and management in Dar-es-Salaam. These persistent weaknesses stood against the ideals of SUDP and could not enable SUDP to be an effective tool for planning to tackle the problems of urban development in Dar-es-Salaam (Kanyama and Cars, 2009, Kanyama et.al. 2004, Nnkya, 1999). Although, the SUDP was intended to be the product of a partnership between residents, private companies, central government departments and the Dar-es-Salaam City Council (DCC) the influence of various stakeholders on planning was
still very limited. Government-controlled urban development planning policy and practice remained inflexible and restrictive and run by experts. The new SUDP scheme for the city designed to promote participation of different stakeholders in planning process failed because it lacked a legal mandate and a framework for stakeholder participation (Kanyama and Cars 2009). This has rendered many urban planning and management related problems in Dar-es-Salaam unsolved.

CONCLUSIONS

This paper has shown that there is lack of both public participation and institutional coordination in urban planning and management in Dar-es-Salaam. Furthermore, the paper has shown how these weaknesses occur and the way they affect negatively urban planning and management. As a result, there is no effective remedy for the urban problems which keep on increasing in Dar-es-Salaam. The SUDP, which was intended as a tool to improve urban planning and management in Dar-es-Salaam, could not be sustained due to a systemic lack of both public participation and institutional coordination in urban planning and management. This paper recommends that improving urban planning and management is crucial in Dar-es-Salaam by incorporating effective ways of public participation and institutional coordination in the planning process in order to address effectively emerging urban planning problems. Public participation should include all types of citizens, including women, children, the elderly, the disabled, street vendors, etc., and institutional coordination should provide effective mechanism for involvement of different institutions/sectors in urban planning and management in Dar-es-Salaam.

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END
COMPENSATION THEORIES AND EXPROPRIATION OF CUSTOMARY PROPERTY RIGHTS: A CRITICAL REVIEW

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Market value is commonly used as a compensation basis for expropriation of both private and customary property rights. Private property rights naturally are definite and exchangeable in property markets while customary property rights are basically not as definite and conceptually not exchangeable. This paper uses existing literature to analyse the applicability of existing compensation theories principally framed for private property rights to customary property rights and the methodologies used to achieve the desired compensation when expropriated. The analysis concludes that generally, current compensation theories are applicable to customary property rights but the methodologies used are deficient and generate inadequate compensation for customary property rights.

Keywords: Compensation, Customary property rights, Expropriation, Market value, Private property rights.

INTRODUCTION

Expropriation of property rights requires compensation to the affected person to restore him to his previous status. According to Barnes (2014), the law, in most jurisdictions, compels people to surrender their property, but subject to compensation for the value of the property taken. Existing compensation theories consider property as a well-defined and exchangeable bundle of rights with a value. For private property, this is true. Customary property rights, on the other hand, are not well-defined and mostly inalienable. How then, is compensation assessed for such properties guided by existing compensation theories? In addressing this question, this paper critically analyses the applicability of current compensation theories to customary property rights and their challenges.

The paper has five sections. The following section discusses the broad categories of compensation theories, followed by compensation objectives. In section three, the paper looks at the nature of customary property, before analysing the applicability of existing compensation theories to customary properties and their challenges in assessing compensation. A conclusion closes the analysis.

COMPENSATION THEORIES

Compensation theories and compensation scope

Indemnity and taker’s gain form the two main classes of compensation theories, based on compensation scope covered to meet different compensation goals. Indemnity theory desires compensation that wholly covers the full range of losses suffered by affected people to restore them (Denyer-Green, 2009). Typically, this requires compensation amounting to the market value of the property taken, plus additional compensation for severance and injurious affection, disturbance and solatium (and/or special

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value). Compensation is thus measured by considering owner’s losses, and not purchaser’s gains (Baum et al., 2008). Compensation concepts like adequate compensation, appropriate compensation, commensurate compensation, fair compensation, full compensation, equivalent compensation, and full indemnification, among others, fall under indemnity theory.

Market value of property taken is the principal compensation item. Severance and injurious affection are also based on market or rental value. Severance is loss in value of remaining property in fractional takings while injurious affection is the depreciation in value of remaining property caused by the proposed projects (Barnes, 2014). Generally, depreciation in market value of remaining land is the compensation amount for severance and injurious affection. Disturbance compensation is based on financial calculation and includes profit/income and business losses; costs for relocation and transport, legal and valuation services, among many others (Baum et al., 2008). Solatium, as a consolation for expropriation, is given as a lump sum or percentage of the agreed compensation sum (Baum et al., 2008). Special value depends on sentimental attachment and benefits of property to owners besides market value (Keon-Cohen, 2002), and it is based on a percentage or agreed upon by the parties (Fortes, 2005). Thus, indemnity theory desires compensation that constitutes market value of property taken, severance and injurious affection, disturbance, solatium and/or special value to restore expropriated people.

Taker’s gain theory, on the other hand, focuses on expropriated property. It reasons that compensating additional items exhausts public resources (Benson, 2010) and enriches affected people. Since it is property that is taken, then government should compensate for that at its market value and nothing else. Taker’s gain compensation is measured by the gains to the taker, and not expropriated owner’s losses, and usually consists of market value of the property taken, which also measures compensation adequacy to restore affected people. Compensation serves several aims and the following sections discuss some of the major ones. Principally, societies require compensation to defend property from idiosyncratic government decisions (Nosal, 2001). Further, property is strongly attached to its owners and gives them identity and contextuality, while connecting intricately with the individual, family and community (Radin, 1982; Benson, 2010). As such, many national constitutions knowingly contain compensation principles to protect property from predatory authorities (Food and Agricultural Organisation, 2012), and expropriation without compensation would not be permissible (Denyer-Green, 1989). The sheer need for compensation therefore provides and increases property protection.

Further, where private property rights are allowed and government wants to expropriate such property, then it must pay prevailing prices to prevent arbitrary deprivation and gains (Du Plessis, 2009). Blackstone (1872) contended that in this setting, government is an individual dealing with another individual for an exchange at a reasonable price. Principally, government can acquire any private property, but in exchange for an equivalent price as in an arm’s length transaction, and not otherwise (Benson, 2008). Ruling prices discourage government from getting property by using its advantageous position, and essentially deters arbitrary purchases and gains.

On the other hand, a dispossessed property owner seemingly replaces lost property using the compensation received. Theoretically, compensation that satisfies and guarantees anxious and unwilling persons of replacement properties compels them to surrender their properties keenly (Denyer-Green, 1989, p. 109). Thus, the owner’s monetary loss must be ascertained by determining the pecuniary value of the property taken and not below market prices (Denyer-Green, 2009), and fully compensated. However, insufficient government resources, saving agendas or not wanting to appear as paying too much compensation, undermine acceptable restoration and impoverish affected persons (Kaufman, 2010, p. 77).

Compensation aims

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Compensation assessment basis and methods

Market value is the general basis for compensation. According to the International Valuation Standards Council (2017, paragraph 30), market value is the estimated amount for which an asset or liability should exchange on the valuation date between a willing buyer and a willing seller in an arm’s length transaction, after proper marketing and where the parties had each acted knowledgeably, prudently and without compulsion.
Market value clearly describes property value and the valuation process, and is thus considered as a good basis. It is presumably assessed objectively and authenticated externally through market evidence. It is argued that market value achieves fair and efficient expropriation, as expropriated persons get compensation that is adequate to replace lost properties (Denyer-Green, 1989, 2009). Further, the market is considered as a neutral measure for property values. Ironically, Kelly (2006, p. 6) argues that it is difficult to determine how much owners value their properties, as market value ignores some real aspects of the property, such as historical and family value (Kaufman, 2010, p. 86). Thus, market value does not always equal owner’s real loss and insufficiently indemnifies loss of private property.

Technically, expropriation has one buyer, the acquiring authority, to whom property owners are to sell. Practically, market value assessment uses comparison, income and cost methods that are market reliant. Comparison methods compare subject property with similar properties traded recently in the market to estimate value. Use of direct comparable transactions reduces uncertainties as in other methods (Blackledge, 2009). Income methods capitalise income into value. Capitalisation translates income into a present amount by using a suitable discount rate (Scarrett, 2008). In principle, value is found through dividing the property’s net income by discount rate. For cost techniques, property value is the sum of land value and depreciated current cost of reproducing or replacing the improvement (Blackledge, 2009). Cost methods are used when the other approaches are unsuitable or to supplement them.

**ONTOGY OF CUSTOMARY PROPERTY RIGHTS**

Property rights are generally classified into customary, private and public. For the purposes of this paper, only customary and private properties are discussed.

**Customary property rights**

Customary property rights are fashioned and guaranteed by customary norms and generally held as individual, communal or common/open access and rarely registered. Allodial interest is the highest proprietary bundle, normally entrusted with the community or chiefs (Adu-Gyamfi, 2012). Individuals are mostly believed to have user rights while permanent alienation rights remain with chiefs. According to Cotula and Vermeulen (2011), various governments consider most customary properties as public property.

Customary land is broadly acquired through allocations by community or family heads, inheritance (Tschirhart et al., 2016) and direct exchanges (Haruna et al., 2013). Inheritance follows traditional practices while allocation to outsiders require community consent. Some communities, like the Yoruba (Nigeria), consider land as the basis of creation, stories, religion, spirituality, art and culture; relationships with living people, the dead and future generations (Aluko et al., 2008), with less tangible values like inheritance, initiation and ritual sites, burial areas and religious sites (Anuar and Daud, 2012). Abstractly, communal rights also protect people through cultural membership (Xanthaki, 2003).

Customary tenure prevails in most developing countries and exhibits a strong person-property attachment (Aluko et al., 2008; Cotula and Vermeulen, 2011; Mitchell et al., 2015). However, customary property systems are modernising with increasing pecuniary exchanges (Cotula, 2004; Haruna et al., 2013). Because customary property rights are rarely registered, information relating to the nature of the property, ownership and any transactions, is hardly available and therefore, not conducive for competitive property markets. De Soto (2000) argues that inadequate records of property rights means that such properties are technically invisible to the larger market.

**Private property rights**

Private ownership guarantees a known bundle of property rights with individual property title, certified and protected by government (Alston et al., 1999). Freehold is the highest bundle under private ownership, from which other lesser interests, such as leasehold, are created (Jacobus, 2006). Besley and Ghatak (2009) indicate that individual title supports exchanging and mortgaging for financial facilities, thereby assuring property’s optimal value (De Soto, 2000). Such systems catalyse competitive property markets that provide information on ownership, land details, prices and rentals that support valuation for different aims (Mooya, 2009). Market data availability for private property thus supports objective market transactions (Furubotn and Richter, 1998), expropriation and compensation assessment (Baum et al., 2008).
COMPENSATION THEORIES AND CUSTOMARY PROPERTY RIGHTS

Where vital transaction evidence is handy, market value is broadly achievable and provides reasonable compensation basis. But, does the application of compensation theories based on market value to customary property achieve the same aims as for private properties?

Compensation aims and customary property rights

Protect customary property

Fundamentally, customary properties enjoy less legal recognition and consequently have weak ownership and compensation claims against government. Intangible attributes of customary property are hardly known to outsiders, including valuers (Anuar and Daud, 2012). How are lost social networks, religious ties, family values and other benefits emanating from customary property safeguarded? It is imperative to establish the constituent values of specific property rights in specific circumstances during expropriation (Sheehan, 2000, pp. 45-46). Achieving satisfactory protection for customary property through compensation, more especially where compensation disregards some values, is challenging. The claim by government that customary land is public property and not compensable (Cotula and Vermeulen, 2011), weakens compensation rights and protection.

Deter arbitrary acquisition

Presumably, in functional property markets, government competes, like other market participants, for resources. In expropriation, government is the only buyer and competes with itself, and usually imposes prices for expropriated properties authoritatively. This is further complicated as government assesses compensation for its own purchases, generally using outdated rates and inappropriate data, and attain unfitting values, as observed by Msangi (2011) and Alemu (2013). Rarity of credible data for compensation assessment of customary properties yields unsuitable sums. Besides, intricate bundles of rights to value, assessment basis and methods muddle the situation further (Sulle and Nelson, 2009; Anuar and Daud, 2012). Generally, existing compensation procedures realise lower compensation that inspires government to expropriate more customary land than required, against expectations of an arm’s length exchange based on an equivalent price, thereby achieving arbitrary expropriation.

Restore expropriated customary property owners

Restoring the previous status of an expropriated person is problematic because market value-based compensation ignores various non-marketable improvements and values. Where indemnity principle applies, compensation at market value is difficult for customary land owing to several aspects. Monetisation of the material land and intangible aspects challenges valuers, as necessary market information may not be available. Restoration of customary property owners is hard as compensation received cannot buy them comparable bundles of property rights and traditional use rights, identity, contextuality and protection; loss of communal, tribal and familial ties and inheritance rights; loss of cultural treasures and heritage, and many other less tangible benefits. In many instances, customary property rights are misinterpreted and hence undervalued, because they do not comply with the common standards of evidence (as cited in Sheehan, 2000, p. 47). As Kaufman (2010) contends, the primary compensation goal of averting expropriated persons from impoverishment by maintaining their previous status quo frequently fails as offered compensation does not cover owner’s losses fully.

Assessment of compensation for customary property

Market value, an autonomous amount realised from objective valuation using market evidence, hardly exists as essential market conditions are non-existent (Mooya, 2009). Evans (2004) attributes this situation to availability and high costs for obtaining needed market data, even in well-established private property markets.
In customary property settings, inadequate documentation generally suppress property markets (De Soto, 2000). Available market evidence related to private property exchanges is generally unfit as substitutions for customary property valuation. Thus, market value fails as a fair basis and measure for compensation for customary property, as it lacks independent validation. In thin property markets, the market is no longer a neutral measure of property values and market value cannot be a fairness and efficiency criterion.

Technically, market value considers buyers and sellers as willing when exchanging their private and customary properties. For expropriation, the parties are unwilling since the transaction emanates from the existence of a public purpose. The buyer (government) is legally ordered to acquire any property for public purposes, while the owner had no plans to alienate the property at that particular juncture. Statutes force property owners to relinquish their property rights against their will. Thus, both taker and owner are under statutory duress to exchange, and so settings for the willing seller principle and expected market value of acquired private and customary properties, hardly obtain. For customary property, the situation is even more difficulty as it is not generally a commodified asset.

Also, market value considers physical conditions of subject properties during assessment (Baum et al., 2008), and ignores many less tangible values. Kaufman (2010) stresses that non-compensation of various real values inherent in properties, like historical and religious values, among many, hurts many expropriated property owners. It is unsurprising that such intangible values are ignored in determining market values since valuers are not trained to predict their prices in the market (Kakulu, 2008; Mitchell et al., 2015). So, similar to private property, market value does not equal owner’s loss for customary property.

For compensation quantum, in most customary settings, land is either entirely omitted from compensation packages or partially considered, arguing that it is public property and replaceable by the community. According to Benson (2008), customary land was not compensated in former British colonies because it was easily replaceable. This is impractical nowadays as land is largely scarce and valuable. However, Pachai (1978) and Mitchell et al. (2015) argue that compensation for customary land is ignored because of difficulties in establishing its true possessors and the actual bundle of property rights to value since such rights are not bounded on a plot by plot basis (as cited in Sheehan, 2000, p. 47).

Where injury to land is compensable in partial acquisitions, information rarity and ontology of customary property make reconciliation of acquired and retained land challenging and calculation of severance and injuries to land, and hence compensation, daunting. For common resources (such as grazing wetland), each community member has an attached benefit and hence who gets compensated for the loss of the property? These questions complicate quantification of losses, identification of beneficiaries and assessment of appropriate compensation for customary properties and challenge market-based methodologies and valuers alike.

For disturbance compensation, it is possible to calculate amounts for most aspects since they are financially computed. Solatium is elusive where land is not compensable, since it is a proportion of the total compensation. Sometimes special value is required where special community assets like graves, sacred places, shrines and temples, and other aspects are concerned. Akijuru and Ruddock (2014) highlight that affected rural people consider compensation adequate when their social and cultural values to property are covered. However, these aspects are rarely considered in compensation.

Practically, market data for customary properties or where property markets are underdeveloped, is scarce (Kakulu, 2008; Larbi, 2008; Msangi, 2011; Alemu, 2013). Exchanges of customary properties are done under traditional practices (Msangi, 2011; Ambaye, 2013; Haruna et al., 2013), and transactional data is hardly available and costly to get. Compensation valuation using comparative methods is therefore hard. On the other hand, customary properties rarely produce necessary tenancy, income, rental, expense and capitalisation data since they are mainly under own use. Application of income methods to customary property is thus difficult. Cost methods use comparable land values to estimate acquired land compensation. This data is difficult for customary properties. To calculate building estimates, costs of building materials or similar, newly completed buildings are required. Information on fees for professional work and labour is also needed. Paradoxically, most customary properties use traditional materials that lack known costs, professional fees and labour charges. Depreciation data for such building materials as grass, trees and bamboos, among others, is non-existent. Such data gaps complicate use of cost approaches in valuing customary properties, obtaining
compensation quanta without reasonable representation of the actual property. Generally, customary property rights are difficult to quantify and monetise into reliable values that would represent the lost properties during expropriation (Small and Sheehan, 2008), using these market dependent methods.

CONCLUSION AND RECOMMENDATIONS

Hypothetically, current compensation theories, whose primary goal is to maintain expropriated people in their previous status as if expropriation never happened, and hence prevent them from impoverishment, are applicable to customary property. Methodologically, the assessment of compensation for customary properties is based on market value, just like private property rights. This basis is challenging owing to the ontology and prevalence of customary property rights (or underdeveloped property markets) in most developing countries, and differing value schemes attached to property based on customary and western concepts (Sheehan, 2000). Additionally, the determination of the market values for compensation purposes for customary property is commonly conducted using market dependent methods, even though these property rights are normally considered as conceptually non-marketable assets. Technically, these valuation methods are lacking where market evidence to support the determination of knowable market values, is hardly available. And this is often the status quo in most environments where property rights are under customary holdings. Generally, the application of market value as a basis and market dependent methods in assessing compensation for expropriated customary properties, results in inadequate compensation.

Consequently, this paper recommends that a comparative study to analyse the challenges of valuing for compensation purposes, customary property rights with those of private property rights, be carried out; an empirical research to examine key factors and challenges that affect the achievement of appropriate compensation in expropriation of customary property rights and how valuers deal with them; and a research to look at alternative bases to market value for assessing compensation for customary properties, and other methods of valuation that are more suitable for compensation assessment in environments where customary property dominates.

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END
MIGRATING THE CENTRAL BUSINESS DISTRICT: ASSESSING GABORONE’S CENTRAL BUSINESS DISTRICT MASTER PLAN

Neltah Tshepiso Mosimanegape

The aim of this study is to investigate the relocation of Gaborone’s (the capital city of Botswana) Central Business District (CBD), from the Old Mall, by the urban strategy employed by Gaborone’s Department of Town and Regional Planning (DTRP). The paper will also examine the city’s Master Plan as it migrates from the Old Mall, also referred to as the old CBD. Additionally, the study examines how the Master Plan has affected Gaborone’s property market from a development, land management and valuation viewpoint. The method adapted to achieve this research aim integrates techniques of acclimatizing secondary investigation of the 1963 Master Plan and the 1995 Master Plan; the latter of which is currently in implementation. Furthermore, qualitative interviews were conducted with urban and landscape design consultants from Department of Town and Regional Planning, property agents and property experts on how the migration has altered the city’s infrastructural landscape and also how it has affected the property market. The preliminary study shows that rental rates have been adversely affected by the CBD migration, with most office enclaves experiencing a decline in their rental rates. The findings also show that there is a lack of adequate open space in the CBD and due to the exponential growth of Gaborone, in two decades there is a possibility of expanding or migrating the current CBD yet again. Based on the findings, the study recommends that town planners should commence research related to the forecasted population and whether there might be a need for a new CBD in two decades. This should take into consideration the mishaps and design errors from previous Master Plans in order to produce a flawless Master Plan.

Keywords: Central Business District, Gaborone, Migration, Master Plan

INTRODUCTION

The exponential growth of Botswana’s capital city, Gaborone, has produced a spread-out population of 20,000 over a period of 20 years from 1963. This is most likely a result of rural-urban migration. The unforeseen population growth in 1991 to 133,468 from 59,657 in 1981 (Central Statistics Office, 2010) has resulted in the migration of the Central Business District, as predicted and prepared by the Gaborone CBD Master Plan of December 1995 (Department of Town and Regional Planning, 1995). In a bid to lessen overpopulation and market saturation, the CBD has been relocated to minimise the potential risks associated with market saturation.

Botswana is frequently classified as one of the fastest growing economies in the world (The World Bank, 2016). Currently, the infrastructure development of the country, in particular its capital city, requires careful planning especially taking into account the population and commercial growth, which, predictably, leads to the need for more infrastructure development.

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The theory and plan of shifting CBDs from one locality to the other, is one that has not been extensively explored. Its effects for Gaborone, in particular, have not been analysed; Gaborone’s new CBD has had reports of oversupply of commercial office space since 2015 (Benza, 2015) as a result of the infrastructural development during the same period of time. The article further references how the Old Malls’ rental rates have been affected by insufficient parking space available, hence forcing landlords to reduce their rates in a bid to retain tenants.

Given this background, the research aim of this study is to jointly analyse the Gaborone Master Plan model and investigate its procedural, segmentation design. It is also envisaged to examine the current plan in implementation; whilst describing the effect on the Gaborone’s property market, feasible policy implications and recommendations from a valuation perspective.

Research questions

- What challenges, in urban design and planning, arose when designing the new Master Plan?
- Is a new migration of the Central Business District in the coming two decades a probability?
- How has the valuation of property been affected after the migration?

Significance of the study

It is anticipated that the results from this study will assist the Department of Town and Regional Planning (DTRP) to identify errors and avoid pitfalls while compiling the Master Plan framework. The study will also appraise the real estate industry on the effects of CBD migration on the property market and valuation. Finally, it will also identify mitigation strategies that can be put in place to address challenges experienced in order to minimize the shock to the industry.

Areas of study

The Master Plan is based on Gaborone’s CBD and the Old Mall. Therefore, this will be the main area of the study. The new CBD is identified west of Nelson Mandela Drive and north of Molepolole Road (Department of Town and Regional Planning, 1979), while the Old Mall is identified as the old CBD. The map below highlights the focus sites (in particular the CBD) for the study.
Limitations of the study

Few significant data exists for the study. The paper has sourced data from the 1995 Master Plan, Research Reports from real estate companies and newspaper articles. It was intended for primary data with the relevant authorities will augment the already existing secondary data as stated above.

LITERATURE REVIEW

Definition and development of the Central Business District

The CBD, is often used interchangeably with ‘The Commercial Business District’. However, for this specific paper we use it to define ‘the Central Business District’. The CBD has further been referred to as the heart of a city containing firms and office employment, which invariably drives the growth of the city (Tang, et al., 3).

At current, Botswana has implemented two Master Plans for two separate CBDs; the earlier in 1963, which identified the Gaborone Mall as the primary commercial centre of the city. The site for the new CBD was identified in 1977 under the ‘Gaborone West Structure Plan’. The process of master planning typically depends on the time, process and size of the development and of course, financial resources (Mandanpour, 2006).

Among other functions, according to the 1995 Master Plan, the Plan serves as guide to applying policy framework at a regional and national level. It also directs and co-ordinates the use of public and private land use in the CBD. Most importantly, it validated how the relevant stakeholders such as developers, the authorities, investors and land owners are expected to participate in the development of the CBD.

Disparities between the former and current Master Plan

When the Gaborone Master Plan was implemented, in 1963, Botswana was 3 years away from gaining its independence. The Gaborone CBD Master Plan was included in the Town and Country Planning Act of 1977 (Government of Botswana, 1977). Analysing the previous CBD Planning efforts, the Master Plan placed a major significance on housing and a minor concentration on the commercial zone of the
The current Master Plan has a significantly well-rounded focus on commercial, residential and government departments.

The following are other noticeable discrepancies between the two Master Plans:

- The previous Master Plan layout is constructed on the development of land use, circulation schemes, blocks and detailed streets. The current existing plans’ land use is based on the Civic and Community Land use, Commercial Land Use, Recreation and Open Space Land Use and Transport Land Use. The latter proves to be more modern and detailed than the prior Plan.

- Low cost and high cost housing was taken into strong consideration in the old Master Plan, whilst the new Master Plan focuses more on commercial development to fuel the economic growth of the country.

*Application of the 'bid rent gradient' on Gaborone’s CBD*

Town and urban planning has birthed a singularity model called the ‘bid rent gradient model’ that relates the relationship between distance from the CBD and rental costs (Trussell, 2010). The theory hypothesises that rent escalates as one approaches the city centre; thus, maximum distance results in lower rentals. This economic model is illustrated below in Figure 2.

![Bid Rent Function](image)

*Figure 2: Bid rent theory graph (Source: Authors’ own drawing)*

It has been explicitly observed and confirmed by real estate experts in Gaborone, that the development of the CBD has negatively affected the rental rates and desirability by tenants to rent out in secondary locations (Knight Frank, 2012). On the same accord, high rental rates have been observed in the CBD, while secondary locations, including the old CBD enclaves, have drastically reduced their rates in a bid to retain tenants (considering relocating to the CBD) and remain competitive.

*Utilities and infrastructures*

General discussions have been undertaken by planning experts on the planning and development of the Gaborone CBD, some even considering it a failure (Tsimane, 2013). In particular, utility provisions have not been thoroughly considered. For instance, the Master Plan did not make provision for streetlights. It is only recently in 2016 that the installation of streetlights in and within the CBD commenced. The CBD mainly consists of high-rise buildings, with the highest, iTowers, being 28
Another concern was the lack of a proper public transport system and pedestrian accesses to compliment the design of the CBD (Tsimane, 2013).

RESEARCH METHODOLOGY

Through this study, the author examined existing data on the CBD migration through the Master Plans, Town and Regional Planning Act, research reports, discussions with property agents and interviews. Unfortunately the DTRP did not respond to the authors’ request to participate in the study, which provided a limitation to the study. Their input in the research would have possibly positively improved the results of the study. The author engaged property agents; Knight Frank and Stocker Fleetwoodbird for their input on the city’s commercial rental rates. The Master Plan released by the DTRP provided detailed information which includes the history and plan of the CBD based on the structural development in Gaborone.

This research was undertaken to determine the challenges facing the new CBD as a result of the Master Plan. It is anticipated that the results from the conclusion of this study will assist the DTRP to identify errors and avoid pitfalls while compiling the Master Plan framework. The study will also appraise the real estate industry on the effects of CBD migration on the property market and valuation and how to mitigate the challenges experienced in order to minimize the shock to the industry.

The Master Plan is based on Gaborone’s CBD, therefore, this will be the main area of the study. The new CBD is identified west of Nelson Mandela Drive and north of Molepolole Road (Department of Town and Regional Planning, 1979), while the Gaborone Mall is identified as the old CBD. The map below, Figure 2, highlight the focus sites (in particular the CBD) for the study.

![Figure 2: 2012 Gaborone Office Market (Source: Knight Frank annual report, 2012)](image)
Extensive studying of the Master Plan, comments from urban planning experts and a published report from the internationally-renowned property company, Knight Frank was carried out to create a base from which to determine the following:

- The inconsistencies that exist between the Master Plan and actual CBD design;
- Examples of how rental rates have been affected prior and after the development of the CBD;
- And forecasts of the future property market

RESULTS AND DISCUSSION

The findings and implications of this study have been compiled from the literary discussion and the sources listed above to answer the research questions of this study.

Gaborone has been estimated to be one of the fastest growing sub-Saharan cities in Africa (Mosha, 1996). With the exponential growth in rural-urban migration, it is further projected that by 2021, the urbanisation rate of the country will be at a population of 6.2% (Government of Botswana, Ministry of Local Government Lands and Housing; Gaborone City Council; et al, 1996). Predictably, the CBD will be affected and possibly its location as well.

How has the valuation of property been affected after the migration?

![Figure 4: Rental rates before and after the CBD boom (Source: Knight Frank and Stocker Fleetwoodbird, 2017)](image)

- The rentals before the CBD boom, have been averaged from two different rental agencies (Knight Frank and Stocker Fleetwoodbird) in Gaborone.
- Note that the price per square metre may increase as the size of the office increases.
**Analysis of the rental rates graph**

The table below illustrates the decrease in rental rates in other areas after the CBD Boom.

**Table 1: Decrease in rental rates after the CBD Boom (Source: Knight Frank and Stocker Fleetwoodbird, 2017)**

<table>
<thead>
<tr>
<th>CBD</th>
<th>COMMERCE PARK</th>
<th>FAIRGROUNDS</th>
<th>MAIN MALL</th>
<th>FINANCE PARK</th>
<th>TOTAL RATES DECREASE FROM 2012 TO 2016/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.67%</td>
<td>13.5%</td>
<td>4.5%</td>
<td>16.3%</td>
<td>16.1%</td>
<td>57.1%</td>
</tr>
</tbody>
</table>

How has the migration to the CBD affected the value of property?

The growth of the CBD can be traced back to 2012. Even though at that point, the concern of oversupply was subverted. By the year 2015/6, the issue became more prominent (Knight Frank, 2012). The effect of the migration to the CBD is clearly noted in several ways:

- According to Knight Frank, the value of some properties’ have declined by 50%.
- Figure 3 above makes comparisons between the rental rates in 2012 and those noted in 2016.
- As evidently shown, rates in 2012 were higher than those in 2016/2017.
- The most noteworthy change, is the main mall (Old CBD), which has the highest percentage decrease out of all the office enclaves. This confirms the migration of offices, from other enclaves as well. The summary of this section and Figure 3, also confirms the bid rent theory. Noticeably, the CBD has the highest rental rates, with areas such as Commerce Park and Finance Park, which are further away from the city centre, have much lower rates.

What challenges, in urban design and planning arose, when designing the new Master Plan?

- In hindsight a few errors can be noted from the initial planning and designing of the CBD through the Master plan. Furthermore, a few challenges were anticipated by the design team; for instance population growth was not thoroughly taken into consideration.
- The preliminary study due to be produced in March 1991 proved futile and was then relegated to the DTRP.
- The location of the railway line has presented one physical constraint to the design and planning as the team attempted to improve entrance to the CBD from the east (Scott, 1992).
- The CBD does not have a sufficient number of open spaces within the vicinity, which is usually common in CBDs in other localities. As stated by Mandanpour (2006) open spaces are a way of bringing together all the other structures in the CBD; something that was not intensely considered by the designers.
• Besides property-related challenges, we also need to consider environmental problems due to development not only of the CBD but other projects. For instance, no consideration was taken on the loss of agricultural land, air pollution, especially with the population increase and deforestation (Keiner & Marco, 2004).

CONCLUSIONS

Is a new migration of the Central Business District in the coming two decades a probability?

The World Bank estimates that Botswana will have a population of 2,334,486 by 2030 (World Bank, 2008). It is also further estimated that in two decades, there will be half a million inhabitants in the city of Gaborone. (Keiner & Marco, 2004). This raises the question of whether the new CBD will be relocated to a new locality, just as the old one was, or whether the current setting will be sufficient to for the city dwellers.

Although a thorough investigation has not been carried out, it is more than likely that the CBD will be relocated. A consideration of expanding the current locality is one that comes to mind, however amenities such as the railway and the flyover, may hinder expansion plans and force for a new location to be identified.

Finally, urban planners need to investigate this matter at this current moment to ensure that the mishaps that occurred in the previous Plans are avoided. The author wishes to undertake another study forecasting the probability of a new migration. Other studies that can be undertaken is carrying out an assessment of the pros and cons of expanding the CBD and the implications it will have on compensation of current structure owners on the north side of the current CBD.

ACKNOWLEDGEMENTS

Contributions by property agents, Mr. Moalosi Moesi from Knight Frank and Kago Kepaletswe from Stocker Fleetwood Bird are hereby acknowledged.

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Consumers are expecting more from their retail experience. This highlights the fact that in the future it is important that retailers can connect with consumers in a meaningful way. This connection allows both retailers and landlords alike to better understand consumer behaviour, and serves as a means to further attract and retain customers, as well as enhance positive retail spending. This need to understand consumer behaviour has given rise to the development of new cell phone (specifically smartphone) technology that can be used to detect consumer behaviour by monitoring shoppers’ Wi-Fi devices throughout a shopping centre. In this digital age, more consumers are using an online platform to shop. Brick and mortar retailers are under pressure to evolve in order to keep up with the surge of online shopping. The use of mobile beacon and geo-locational technology integrated through mobile smart phone technology in brick and mortar retail outlets has only begun to gain popularity in developed countries within the last 2-3 years. Mobile smart phone technology within the retail sector has by and large been used for e-commerce purposes, loyalty creation amongst customers through loyalty applications as well as serving as a marketing tool. Mobile smart phones have only recently been identified as a tool for data collection for the purposes of consumer profiling and shopper segmentation. Through the use of mobile smart phones and associated apps as well as wireless technology, theoretically a seamless platform is set for a multi-faceted data collection method tracking not only a shopper’s movements but also an all-encompassing demographical data capturing capability combining loyalty creation and mobile marketing under one umbrella. Property management aims to ensure an increase in shopping centre profitability. Therefore keeping shoppers’ happy and maximising shopper spending is essential. The use of cell phone technology assists with this. Currently, tenants and landlords of malls that have implemented the system are reaping various benefits.

Keywords: Retail Property, Cell phone, Technology, Consumer, Profiling, Behaviour.
a means to further attract and retain customers, as well as enhance positive retail spending and results in generating higher turnover.

South Africa has the biggest retail market in sub-Saharan Africa (PWC, 2012:2). It is clear that understanding consumer behaviour within a South African context is important and other countries can benefit from the knowledge gained in South Africa.

This need to understand consumer behaviour has given rise to the development of new cell phone (specifically smartphone) technology that can be used to detect consumer behaviour by monitoring shoppers’ Wi-Fi devices throughout a shopping centre. This technology thus enables tenants, retailers and landlords to understand, influence and engage with their shoppers through multiple media channels (Fatti, 2016).

In this digital age, more consumers are using an online platform to shop. In 2013 it was estimated that online shopping accounts for 6% of retail industry growth in the USA, and 39% in the UK (Ampcapital, 2013). Factors contributing to the rise in online shopping include speed of transaction, greater selection of products, price comparison, convenience, time and space neutrality and the ease and comfort of obtaining information about products and services (Prasad & Aryasri, 2009:73).

The impact of online shopping on traditional brick and mortar shopping centres is marked. These include deteriorating retail sales, rising online sales and modestly growing retail space, thus leading to a reduced sales density (Ampcapital, 2013).

Brick and mortar retailers are under pressure to evolve in order to keep up with the surge of online shopping. The retail response has thus been towards stronger engagement with consumers in order to provide a personalised shopping experience (Ampcapital, 2013). Landlords need to provide tenants with high-value shopping centres that actively attract and engage customers, and a better understanding of consumers is perhaps now more important than ever. The managing director of one of the leading cell phone consumer profiling companies, say that “fierce competition from internet and other shopping channels, coupled with the increasing expectation for a memorable shopping experience, means that shopping centres now need to do better to succeed” (Atterbury, 2015).

Aiding to this research document and in defining and analysing the use of cell phone technology to track consumer behaviour in shopping centres, is a leading South African information technology company.

The company was developed approximately two and a half years ago by the second respondent on the list of interviewees. Having first developed the technology for a leading property development and management company in Pretoria, South Africa, the company today focusses on Wi-Fi technology in the retail environment.

Online shopping enables consumers to spend more money quicker because of the advertisements integral to this form of retail. Because online retailers make use of cookies, they know how often you visit a web page, what your previous searches and interests are and can therefore “push” advertisements that are pertinent and specific to a particular online consumer.

Research objectives

A literature review was conducted, aiming to identify and evaluate the information on cell phone technology and consumer profiling currently available in the industry. To obtain current and available information, the literature review utilised articles, books, academic journals, published papers and other applicable sources. The information gathered enabled the researchers to gain in-depth knowledge about the research topic and to make rational conclusions.

Secondly, empirical research was conducted through interviews with industry experts aimed at obtaining inputs on the effectiveness and possible use of the cell phone technology in the South African retail environment.

RESEARCH METHOD

Approach

The researchers refined the broad set of topics to be covered and generated an appropriate set of questions that is unique to this study’s research topic of the effective
use of cell phone signals to gather consumer profiling data in South African retail centres.

The research focused on the use of cell phone signals to track consumers’ movement patterns in shopping centres in South Africa and the use thereof to obtain important consumer profile information. The research attempt to identify and analyse the cell phone technology being used, how it compares to traditional consumer analysis technology, whether or not the cell phone technology contributes to the enhancement of the South African retail environment and its operation and what benefits can be derived from using this technology for landlords, tenants and consumers.

A thorough literature review was conducted in order to obtain information about the need for consumer profile information and the use of cell phone technology in South African retail centres to gather such information.

Method of data collection

The data collection process can be described as the manner in which information is gathered. The choice of method is influenced by the data collection strategy, the type of questions asked and variables for which data is collected, the level of accuracy required, the collection point, and the skill of the enumerator.

A qualitative research method was adopted for this study. In additional to the literature research, the researchers made use of personal interviews and e-mail correspondence.

Firstly, face-to-face interviews and focus groups were conducted and held with several selected industry experts to obtain qualitative data on the use of cell phone technology in South African retail centres. Wyse (2011), describes qualitative research as primarily exploratory research which is used to gain an understanding of underlying reasons, opinions and motivations. The interviews and focus groups will provide insight into the research questions which will enable the researchers to make enlightened conclusions.

An interview schedule was created to identify the researchers’ basic line of investigation, with the aim of assessing the respondents’ views on a range of topics pertaining to the use of cell phone technology to gather consumer profile information in South African shopping centres. The following respondents were interviewed:

1. Respondent 1 – Founder and Director of an electrical and electronic engineering consulting firm in South Africa.
2. Respondent 2 – Founder and Managing Director of a leading consumer profiling company in South Africa.

The candidates were interviewed separately at suitable times according to their schedules. The interviews were aimed at collecting information concerning the views that professionals have about consumer profiling and also what their thoughts were on the new cell phone technology to obtain consumer profiling information. There were two researchers present during each interview that allows for one to conduct the interview, while the other makes sure that the recording equipment is working throughout the process. Moreover, this ensures that an ethical standard complies with the minimised opportunities for data tampering or misrepresentation.
During each interview, open-ended and non-leading questions were asked. The researchers’ also used non-verbal cues, namely eye-contact and maintaining appropriate postures. Elaboration probes were applied to acquire the full picture by asking respondents to give examples or elaborate on answers where necessary. Also, clarification probes were used to make sure that an accurate understanding was gained of what was said during each interview.

**Audio recordings**

The interviews and focus groups were recorded on two devices, where one served as a backup recording device. The main purpose of voice recordings is to conduct the interview without the pressure to write everything down. This allows the person conducting the interview to focus on the interviewee who in turn will foster rapport between the interviewer and interviewee as jotting down notes will interrupt the process; interviews will be more interactive, corrections can be made on the spot, respondents can also reflect on questions before answering, and it prompts attentive responses.

**Validity and Reliability**

In this regard, this research paper may be considered reliable or trustworthy in so far as the principle source of information on the effective use of cell phone technology in South African retail centres is the interview with founder and managing director of a leading South African information technology company responsible for first implementing the technology in South Africa. An interview with a third party not related to the former confirmed the findings of the former. And thirdly, several sources of literature were consulted which not only provides the basis for empirical research but also supports the findings of the empirical research. This was done to establish and add to the reliability and validity of the study.

**RESULTS**

**Three pillars of excellence**

According to the respondent, the company is built around three pillars of excellence: detection, analysis and engagement, with the end result of attracting the right person at the right time in the right place in the shopping centre.

**Detection**

The first pillar talks about understanding the location of a specific person in the shopping centre at a specific point in time (in order to provide that person with the right information for that place and point in time). According to the first respondent, electrical engineer and co-founder of a leading electrical and electronic consulting engineering firm specialising in the building sector, the detection is done by detecting Wi-Fi devices through a Wi-Fi network installed in the shopping centre. Each Wi-Fi device has a unique hardware number, called a Media Access Control or MAC address (Techtarget, 2005) which is detected by the local area network once the device enters the network. This MAC address is in turn associated with the person carrying the Wi-Fi device. This enables shopping centres to obtain foot-counts (among other benefits) in an easier and more effective manner.

According to the GSMA’s (2016) mobile economy report, the number of smartphone connections has nearly doubled in Africa over the past two years reaching a total of 226 million connections. South Africa is listed as one of the four major uptake contributors of new smartphone connections in Africa. Egypt, Kenya, Nigeria and South Africa account for a quarter of the total African connections. The well-established mobile networks of these countries provide a fertile landscape for the uptake of new smartphone connections. It is estimated that nearly half a billion new smartphone connections will be made in Sub-Saharan Africa by the year 2020, driven largely by the increasing availability of low-cost devices.

In conclusion, the current smartphone market penetration in South Africa is a likely limitation to the adoption of consumer profiling retail and Wi-Fi technology. The evidence above however suggests that this limitation is likely to decrease as time passes. The effect of the smartphone market penetration limitation in South Africa plays a more significant role when applied across the entire population, in a holistic sense.
The second respondent states that the Wi-Fi network required for this technology to function properly is much more extensive than what is required for an office or home network. This is due to the fact that large numbers of people (compared to an office or home environment) are continually moving and due to the fact that Wi-Fi devices’ MAC number changes every 8 seconds. The hardware architecture is thus designed in two phases: (1) a single channel network is required in order to take control of which access point the handset talks in order to maintain the legitimacy of the statistics and (2) 30-40% more access points [APs] are required than is needed for a normal data network to enable the network to do trilateration, i.e. pin-pointing a Wi-Fi device’s position by making use of three (or more) reference points (a device’s position can be determined more accurately with more reference points (antennas)).

A normal data network will, in addition to the problem of the roaming MAC, only provide a very high level of information by indicating the number of people (Wi-Fi devices) and dwell time. In order to gather information on the behavioural patterns of people, a network specifically designed for analytics thus needs to be employed.

**Analysis**

According to the second respondent, the real value of the company lies in the analysis of data gathered: “only once you turn the data into analytics do you understand what the value is”. The company thus not only delivers a technological service to landlords, tenants and consumers but also an analytical service. “This enables landlords and tenants to drive consumer spend more effectively and makes it easier for consumers to purchase products.”

The second respondent continues to state that a significant amount of time is spent to clean up the data gathered as part of the analytical component of the system. This is due to the fact that more than a million lines of data per minute per centre is generated through the system. This data includes data on weather patterns, traffic conditions and many other external factors that influence the shopping behaviour of consumers.

Once the data has been “cleaned up” and analysed, it is presented to the tenants in a format and report that is easy to understand and which makes sense to retailers. There are however limits and regulations when it comes to the gathering and distribution of personal data through this system.

**POPI Act**

In South Africa, this processes of gathering and distribution of data is governed by the Protection of Personal Information Act No. 4 of 2013 or POPI Act. The Act was passed -

To promote the protection of personal information processed by public and private bodies; to introduce certain conditions so as to establish minimum requirements for the processing of personal information; to provide for the establishment of an Information Regulator to exercise certain powers and to perform certain duties and functions in terms of this Act and the Promotion of Access to Information Act, 2000; to provide for the issuing of codes of conduct; to provide for the rights of persons regarding unsolicited electronic communications and automated decision making; to regulate the flow of personal information across the borders of the Republic; and to provide for matters connected therewith (Preamble of the Protection of Personal Information Act No. 4 of 2013) (hereafter referred to as the Act).

According to the Act, the company is not allowed to gather personal data from a consumer unless that consumer authorises such data to be gathered. The second respondent states that this may be provided by logging into the Wi-Fi network and accepting the terms and conditions or by downloading and making use of the company’s app. In addition, the Act also regulates the distribution of the gathered data. To this extent, the company may provide data on consumers to a tenant as long as that particular consumer enters that particular shop. Data on consumers may not be distributed to a tenant if a consumer has not entered a tenant’s shop.

**Engagement**

The third pillar of excellence is engagement. According to the second respondent, engagement with consumers is primarily done through a mobile application which allows tenants to communicate with consumers through a process called hyper locational push marketing. Hyper locational push marketing is the process whereby a retailer/tenant advertises to a specific prospective customer based on that person’s location at that specific time. In this regard, a tenant can for example create a marketing campaign to inform prospective consumers of a promotion and then “push” or send that campaign to
consumers that are logged into the Wi-Fi network and/or making use of the mobile app. This marketing can be done in the form of an SMS or graphic presentations such as video and image marketing.

An important consideration here, says the second respondent, is to be selective in and conscious of how often push marketing is done. If consumers received advertisements every minute or as soon as they approach a new shop in the mall, everyone would turn off their Wi-Fi. “Having the customer for a long term is much more important than making quick money by sending too many notifications and eventually losing the client”, says the second respondent. In addition, the amount of marketing that may be done through the app is regulated by the POPI Act and the mobile operating systems (Android and iOS). The second respondent stated that a maximum of four promotions per visitor per visit to the mall may be done and that a specified amount of time must expire between promotions.

**BENEFITS TO LANDLORDS, TENANTS AND CONSUMERS**

One of the first and most recognisable benefits derived from this technology is the ability to gather foot counts and generate heat maps from the foot counts. The first respondent states that, prior to the use of cell phone technology and Wi-Fi, landlords and centre managers had to gather foot counts first by manually counting each person that enters the mall and later, due to the progress of technology, by way of foot counters installed at the entrances of a mall. These processes are time consuming and do not provide very accurate foot counts. The new Wi-Fi technology however eliminates many of the problems and shortcoming associated with the earlier methods of obtaining foot counts. The generation of heat maps to indicate where consumers spend most of their time in the mall is also done much easier and with greater accuracy.

According to the second respondent, another very important benefit derived from this technology is the ability to calculate density flow. Forming part of the analytical pillar of excellence, density flow is the amount of people that is present at a particular place at a particular point in time. The second respondent states that many people standing in one place for a short period of time is more important than a few people standing in one place for a long period of time. Having the ability to track Wi-Fi devices and calculate the density flow in certain areas of the mall enables the landlord and centre manager to identify areas with poor and good density flow and position marketing strategies to enhance or rectify the density flow in that area.

The second respondent also mentions the security benefit associated with the technology. Using a jewellery store robbery in a shopping centre in Pretoria where this technology has been implemented as a case study, the second respondent explains that, by way of reverse tracking, this technology has the possibility and benefit of identifying persons responsible for misdemeanours. By knowing which MAC numbers and/or which persons were present at the time of the robbery, one can eliminate persons from the pool of suspects based on where they (their Wi-Fi devices) were at that time. The remaining MAC numbers will be flagged and every time any one of those particular MAC numbers re-enters the shopping centre, a warning signal will appear on the centre manager’s control room dashboard thus enabling them to identify and monitor possible culprits and pre-empt any misdemeanours.

Cell phone technology holds benefits to property owners and property managers. Foot counts, heat maps, calculation density flows and security can add to tenant success and increase sales. In turn, successful retail management lead to successful property management.

*Is the information provided by this technology currently being used?*

The second respondent states that the company has implemented the Wi-Fi technology in several shopping centres in South Africa as well as other countries across the globe. In South Africa, Newtown Junction, Lynnwood Bridge, Glen Fair Shopping Centre, The Grove and most recently the Mall of Africa are currently making use of this technology.

In addition to the shopping centre application, three of South Africa’s largest supermarket chain stores (Checkers, Pick ‘n Pay and Spar) have also asked for the implementation of this technology in some of their stores.

Outside the borders of South Africa, the technology has been implemented in Ghana, Cyprus, Serbia and six different malls in Mauritius. The second respondent states that the company has also expanded to the UK and several Nordic regions where, along with partners, this technology is being applied not only to traditional shopping centres but also to railway stations and airports. The second respondent
hopes to also apply the technology at South African Gautrain stations, sport stadiums and schools, thereby testifying to the wide spread benefits and applications of this technology.

CONCLUSIONS

Traditional brick and mortar retailers still account for the vast majority of the retail sector’s economic contributions in South Africa. The importance of traditional brick and mortar retailing spills over and benefits numerous other facets of industry through the creation of the physical space, the management thereof as well as labour contributions. The onus is thus placed on existing and future brick and mortar retailers to adapt to the modern consumer and evolving retail landscape. A retailer’s competitive edge is always sharpened through a better understanding of its consumers. The analytical luxuries afforded to online retailers with regards to consumer profiling and shopper patterns are significant when compared to real time retailers.

Available technologies available to physical retailers have been limited to a large degree in their effectiveness, accuracy and cost. This is no longer the case. In efforts to combat the competition imposed by online retailers and to appeal to modern shopper behaviours and preferences, the ability of traditional retailers to better understand and engage with their consumers is greatly enhanced through technology. With the ownership and capabilities of smartphones on the rise, new opportunities are available for the purposes of consumer profiling and shopping behaviour monitoring, as well as consumer interaction and marketing.

South Africa presents a fertile ground for the implementation and adoption of new retail technologies due to the relative maturity of its retail sector and spatial offerings thereof. Furthermore, the relative maturity of South Africa’s mobile phone market and supporting infrastructure complement the adoption and incorporation thereof within the retail technology context. However cognisance needs to be taken of the limitation in terms of the current smartphone market penetration in South Africa. As discussed previously, this limitation is being increasingly mitigated through more affordable pricing of smartphones, giving consumers greater accessibility. It is worth further exploring the hypothesis previously mentioned in this document that there is an assumed directly proportional relationship between smartphone ownership concentration and retail node catchment areas.

The increasing expectation by shoppers to enjoy free Wi-Fi access during their visits to retail outlets has resulted in numerous shopping centres across South Africa offering the service. The already existing hardware and infrastructure provides a convenient backbone for landlords to explore the possibilities of integration with smartphones. Not to say though that integration is always possible without additional costs or modifications. As was mentioned by respondent two, the hardware costs involved with establishing a Wi-Fi network suitable for the purposes of locational tracking are negligible when taken into account with overall development costs.

Given the infancy of utilizing smartphones as a means of consumer profiling in South Africa, it is important to note that the information available in determining the effectiveness thereof is limited and biased. The information is closely guarded by those implementing the technology and processes. Exact pricing of the capital and operational expenditures were not disclosed. In due course, objective determination of the effectiveness of the technology will need to be ascertained by reviewing aspects such as accuracy and reliability of the technology, benefits to tenants, applicability to different tenant types, the cost to tenants for the information provided, the adoption
willingness by landlords and tenants and the actual increase in turnover directly attributable to the data gathered to name but a few. Opportunities for extensive research into the associated technologies will become available in the near future.

The primary limitation is likely to fall within the realm of ethics and privacy. Legalities need to be explored and current legislation needs to be reviewed. Effective measures need to be established in order to prevent unauthorised access to personal data and devices. The willingness of consumers to adopt and engage in new technologies and divulge personal information will hinge greatly on the confidentiality and security of such data. Maintaining consumer trust in this regard is vital. Extensive research is required in this field.

In conclusion, smartphones and associated technologies for the purposes of consumer profiling and tracking do present novel data capturing opportunities for the traditional brick and mortar retailer in South Africa. Cognisance of the limitations mentioned above need to be kept in mind when further research is conducted in the field in years to come, once the technology has been tried and tested and objective data is available. Landlords and property managers need to consider implementing such systems in shopping centres. The benefits may lead to increased profitability.

What are the shortcomings of this technology?

At this present moment, it is difficult to objectively assess both the shortcomings and benefits alike of the associated technology for the following reasons:

- The implementation and operation of the technology within South Africa is still in its infancy
- Apparent lack of academic and peer reviewed papers and articles on the topic specifically
- Hesitancy of current technology implementers to divulge concrete data in connection with pricing, costs and feasibilities
- Unbiased feedback from all parties involved including landlords, tenants, developers, property managers and technology implementers
- Unknown willingness of shoppers to adopt such and make use of such technology

For the reasons stated above, one can only speculate at this point what the actual shortcomings may be. Some of the areas requiring future research are:

- Cost benefits and effects on turnover specifically linked to the information provided by associated technologies
- Effective ability of retailers and landlords to make adjustments to their offerings based on the information provided to them
- Transparency and honesty with regards to information presented to landlords and tenants reflecting actual unaltered raw data mined
- Actual effectiveness, accuracy and reliability of the data captured through control testing
- Actual security and confidentiality risk of mined consumer data including possible unauthorised malicious access to shopper devices
- Lifespan and relevance of the technology, relative to upcoming technological advancements

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END
CONTRIBUTIONS OF REAL ESTATE DEVELOPERS ASSOCIATION OF NIGERIA (REDAN) TO HOUSING PROVISION IN LAGOS STATE, NIGERIA

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This paper examined the contributions of members of Real Estate Development Association of Nigeria (REDAN) to the housing provision in Lagos State with a view to ascertain the level of the contributions of the REDAN members to the housing provision in Lagos state. Primary data utilized for the study was sourced through the use of a questionnaire on developers who are members of real estate development association of Nigeria in Lagos. Total enumeration of the 87 registered members of REDAN firms was carried out. Data collected was analysed with the aid of descriptive analysis such as frequency count and percentages, while findings were displayed with the use of tables. The study revealed that Members of REDAN participation in housing provision were rated average. Duplex and Bungalow were the building developed most in the study area, while almost all the developers in the study area developed more than ten (10) housing units in a year. Also, the perceptual opinion of the developer showed that the level of their contributions of REDAN members rated less sufficient in the study area compared to the population of the area. The study will enable both Government and Individuals to know the level of contributions of REDAN members to the housing provision in the study area and thereby helps in formulation of the housing provision policies, programmes and level of housing deficit. The study concluded that Duplex and Bungalow were the building type developed most, while almost all the developers in the study area developed more than ten (10) housing units in a year. REDAN’s contributions were rated less sufficient and Government should make effort by motivating members of REDAN through provision of housing incentives and thereby increase the level of participation and contributions of REDAN members towards solving housing problems in Nigeria.

Keywords: Contribution, Housing Provision, Participation, Lagos, REDAN.

INTRODUCTION

Housing can be said to have significant impacts on people’s lives as well as on the socio-economic development of a nation. With better housing facilities, community growth and stability, improved health conditions, increased safety and education among the citizens which in turn leads to the development of a country are achieved (United Nations, 1992; Assaf, Bubshairt and Al-Muwasheer, 2010; Ademiluyi, 2010; Aribigbola, 2011). In addition, the availability and quality of housing are important to

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the welfare, survival and health of individuals (Aribigbola, 2011), the reason why government at all levels had continued to take strong efforts in addressing its problem. Also, housing expresses people’s culture, symbol of pride; for others, it is a symbol of inferior social status and poverty and it seems that a house and neighborhood present possibilities for preferences or design choices as a living symbol of a way of life and the subsequent values that the residents want to be associated with (Blauw, 1994; Bhatti and Church, 2004) cited in (Dwijendra, 2013).

The importance of housing as an indicator of a person’s standard of living and place in the society (Jiboye, 2009) suggests that housing implies more than just a dwelling, but includes all that is within the dwelling and the creation of a conducive environment in which people live and grow. Its importance in man’s life makes it a global phenomenon requiring input from stakeholders in order to achieve its realisation.

However, studies such as Aribigbola (2011) and Ademiluyi (2010) have documented international concern over the deteriorating housing conditions in urban areas of developing nations, as well as Central and Eastern Europe. Also, solving housing problems as well as the formulation of housing policies are the concerns of academics, professionals and decision makers in many developing countries towards ensuring housing provision to people.

In Nigeria, as in many other developing nations, various legislations, policies, strategies and reforms were adopted to solve housing inadequacies. Between 1950 and 2000, governments have engaged in different housing programs and provision strategies to reduce housing deficits (Akinmoladun and Oluwoye, 2007; Ademiluyi and Raji, 2008). Nevertheless, housing has remained a mirage to all and especially low-income earners which constitute a majority in the society (Bala and Bustani, 2009). In evaluating the efforts of the government studies such as Aribigbola, (2008); Ibem, (2011) and Nubi and Oyalowo, (2010) concluded that even though the desired objective of housing for all by the Nigerian government has resulted into launching of several housing programmes to address housing problems in the country, yet, the objectives are yet be achieved.

As a result of the inability of government to adequately meet the housing demand of the populace, stakeholders in building industries have advised government to act as a partner, enabler and facilitator of housing process through various policies and good regulatory environment necessary for effective Private Developers participation in housing provision (National Housing Policy, 2006; Henshaw, 2010), government has decided to leave housing provision in the hands of private sector. As such, policy emphasis on housing provision shifted from state provision towards the encouragement of private sector participation in a housing development (World Bank, 1988; Israel, 1990). This, according to Ogu and Ogbuozobe (2001), becomes necessary because provider oriented approaches, such as public housing strategies, have failed to meet the housing needs of the vulnerable low-income households; the sets of people who require accommodation most. Thus confirming the need for private developers participation in housing provision.

The realisation that urban housing is better produced by private developers to meet the high housing demand created by rural- urban migration, which accounts for 65% of urban population growth made Nigerian government took various steps to encourage private developers as a way to solve the housing problems. A major step taken to motivate private developers in housing provision is the formation of the Real Estate
Development Association of Nigeria (REDAN) to champion the goal of private housing.

With the motivations to provide housing to meet the needs of the society, several studies such as Akinmoladun and Oluwoye (2007); Ademiluyi and Raji (2008); Kabir (2004), Greene and Rojas (2008); Yusof; Shafiei, Yahya, and Ridzuan (2010) and Tim (2011), have shown that private developers have continuously engaged in housing provision in the county with the expectation that private developers will be able to bridge the existing gap between the housing demand and in view of this, there is need to evaluate the contributions of REDAN members to the housing provision in the country especially Lagos State in order to bring the housing provision shortage to minimum.

HOUSING PROVISION AND HOUSING NEED

With the prediction by the United Nation that Nigeria’s population would reach 289 million by 2050 (Kabir and Bustani, 2010), to become the 8th most populous country in the world (Encarta, 2007), housing problem is likely going to be more critical with the obvious manifestation of overcrowding in houses. more so that many Nigerians make towns and cities their homes (Raji, 2008). As such, meeting the housing deficit of 15 million houses that will require N12 trillion to finance is a big task (Mabogunje, 2007).

Studies such as Onyike (2007), Nubi, (2008), Kabir and Bustani, (2010), Ademiluyi (2010) and Aribigbola and Ayeniyo (2012) commenting on past government efforts concluded that requiring 35 trillion naira to fund a housing deficit of 14 million housing units indicates that government will not be able to meet the housing needs of the people. The situation is made worse as it is established that no public servant in Nigeria below salary grade level 13 in the Federal Civil Service can afford a property worst N4.75million on a 25-year mortgage at 6% if he devotes 50% of his salary per annum to the housing (Onyike, 2007). Yet it is estimated that an annual rate of housing construction of 8 to 10 housing units per 1,000 persons is needed in developing countries such as Nigeria to overcome existing deficiencies and to meet future needs. Therefore confirming the need for private developers involvement in housing delivery. Who then is a private developer?

PRIVATE DEVELOPERS’ PARTICIPATION IN HOUSING DELIVERY IN NIGERIA

A real estate developer can be said to be an entrepreneur who is committed to assuming the risks of mass housing production in advance of the sale (Mabogunje, 2002, Kabir and Ikem 2013). He often has an interest in a property, initiates its development and ensures that this is carried out (for occupation, investment or dealing) and, from the onset, accepts the ultimate responsibility’ for providing or procuring the funds needed to finance the whole project (Otegbulu, 2007). This category includes state and federal government ministries, local government councils, and statutory bodies registered with the Real Estate Development Association of Nigeria (REDAN).
With the motive for making a profit, they are expected to mobilise the factors of production; land, labour and capital as effectively and as efficiently as their capacity permits in order to produce housing in a competitive manner among other estate developers. Most private developers utilise the ‘subscriber system’ whereby money for projects is generated from individual intending buyers as a deposit before construction starts. In some other instances, loans are obtained from banks and corporate establishments, especially for the provision of services like roads, drainage and electricity that will serve the estate.

Private estate developers could also be classified as land developers, merchant builders and Developer-investor (Gumel, 2000, Kabir and Ikem, 2013). In any case, they should generally be Individuals, cooperatives bodies, corporate bodies and estate developers/agents.

In recognition of the contribution of the private developers to the housing provision, Freedman (1969), Agbola (1998) and Adegun and Taiwo (2011) recommended that housing delivery could be left to the private sector to manage.

**RESEARCH METHODS**

The study of Contributions of Real Estate Developers Association of Nigeria’s (REDAN) to Housing Provision is examined in Lagos State, Nigeria. The focus on Lagos metropolis is justifiable because of the data collection. Most developers’ with experience in property development have offices located in Lagos. The experience of these developers will produce sufficient data for this study. Also, studies revealed that Lagos State housing deficits stood at 8 million as at 2003 (Windapo, 2007) revealing the level of homelessness in the country and Lagos state in particular.

Primary data were obtained through structured questionnaires that were designed to elicit response from members of REDAN only.

The eighty-seven (87) registered and practising real estate development firms in Lagos Metropolis as contained in the current directory of members of REDAN. With 59 returned completed, the study had 67.82% response rate. The data obtained were analysed using descriptive statistics such as frequency count and percentages, while findings were displayed with the use of tables.

**DISCUSSION OF FINDINGS**

This section examines the profile and contributions of members of Real Estate Developers Association of Nigeria to housing provision in the study area, i.e. housing developed, types of building, units and level of participation of REDAN members.

<table>
<thead>
<tr>
<th>Socio-economic profiles</th>
<th>Characteristics</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Mainland</td>
<td>34</td>
<td>57.63</td>
</tr>
<tr>
<td></td>
<td>Island</td>
<td>25</td>
<td>42.37</td>
</tr>
<tr>
<td>Asset Base of the Developers (Equity Capital)</td>
<td>Below 100 Million</td>
<td>10</td>
<td>16.9</td>
</tr>
<tr>
<td></td>
<td>100 – 250 Million</td>
<td>12</td>
<td>20.3</td>
</tr>
<tr>
<td></td>
<td>251 – 400 Million</td>
<td>5</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>401 – 550 Million</td>
<td>12</td>
<td>20.3</td>
</tr>
<tr>
<td></td>
<td>551 – 700 Million</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>701 – 850 Million</td>
<td>1</td>
<td>1.7</td>
</tr>
</tbody>
</table>
The profile of the respondents shows that 34(57.63%) of the respondents were located in the mainland of Lagos, while 25(42.37%) were in Island of Lagos State. The majority of respondent firms 29(49.15%) were established between the year 2001 and 2010. This is followed by 14(23.73%) of firms that had been in operation between the year 1991 and 2000. Also, 12(20.34%) of the firms were established between 2011 and 2015 while the remaining 4(6.78%) were established between 1980 and 1990. This suggests that majority of respondents firms were established after registration and recognition of Real Estate Developers Association of Nigeria by Federal Government of Nigeria in the year 2002. The association drive to grow her membership strength by way of enlightenment and provision of incentives to members of the government could have encouraged the establishment of more firms. In addition, the respondent firms could be said to have sufficient years of experience and were knowledgeable so as to respond competently to the issues raised in the questionnaire survey.

On the mode of ownership, Table 1, reveals that 30(50.85%) of the developer firms were owned as a sole proprietorship, 14(23.73%) of the respondent firms were owned jointly. Also, 6(10.17%) of respondent firms were limited liability company, with a
further 5(8.47%) owned by partners. The further result shows that 23(39%) firms were registered with REDAN between the year 2002 and 2006, 24(40.7%) between 2007 and 2011, while the remaining 12(20.3) respondent firms became members between the year 2012 and 2015. The fact that majority of the development’s firm registered between the year 2002 and 2011 could be as a result of benefits such as loan and subsidized building materials to be enjoyed as a member of the association from the government.

The result in respect of staff strength showed that 7(11.9%) of the respondents had a staff strength ranging from 1 to 5, 10(16%) had between 6 and 10, 4(6.8%) employed between 11 and 15, while 14(23.7%) and 24(40.7%) had between 16 and 20 and above 20 staff respectively. The analysis showed that most of the real estate development organisations had fewer numbers of staff which could be the nature of the property development which is capital intensive which made most of the organisations to engage contractors to handled their works for them and not necessarily be on their pay roll but whose activities are supervised by their staff. The asset base of the respondent ranged between ₦ 1million and ₦ 1billion Naira.

Altogether all the respondent had a minimum of HND/B.SC as educational qualification, while majority of the respondent were directors and a few were general managers

The professional affiliation of the respondents shows that 22(37.3%) of respondents were members of Estate Surveying profession, 6(10.2%) belonged to Building, 9(15.3%), 2(3.4%) and 8(13.6%) were members of Engineering, Quantity Surveying and Architecture respectively, while others with 12(20.2%) responses belonged to another profession. This suggests that as a result of the academic and practical training received by these professionals qualified them to engage in the housing business. The minimum years of experience had by the respondents was 5 years while the maximum years of experience were 25 years; thus showing that respondents had sufficient housing experience and hence information that will be provided and their opinion could be reliable.

Also, analysis of the various professional services rendered by the respondent to their clients besides property development revealed that 16.98% of members of real estate developers engaged in property management, 17.45% involved in the agency, 7.08% rendered valuation services to their clients. Others services rendered include property consultancy, facility management and project management with 21.70%, 13.68 and 22.17% responses respectively, while 0.94% respondents engaged in other services. It can be inferred that respondents rendered various professional services to their clients apart from property development, which made them be an expert in the housing industry and indicator that respondents had enough experience in the housing industry.

| Table 2: Level of Participation of REDAN members in Housing Provision in Lagos State |
| --- | --- | --- |
| Level | Frequency | Percentage | % |
| Very high | 5 | 8.5 |
| High | 11 | 18.6 |
| Average | 35 | 59.3 |
| Low | 8 | 13.6 |
| None | 0 | 0.0 |
| Total | 59 | 100.0 |
The result in respect of the level of participation of developers in housing provision as contained in Table 2 shows that the level of participation of 5(8.5%) of the respondents was very high, the level of participation of 11(18.6%) was high, while majority submitted with 35(59.3%) responses that developers participated at the average level. The remaining 8(13.6%) respondents indicated low and insufficient participation. It can be generally be inferred that developers participated averagely and they should be able to provide sufficient information about their contributions to the housing provision in term of type and units they have provided.

Table 3: Types of building developed/Units of Housing developed between 2007 and 2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Type of building developed</th>
<th>Frequency</th>
<th>Percentage %</th>
<th>Units of building developed</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>Bungalow</td>
<td>9</td>
<td>15.3</td>
<td>&lt;10</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>Duplex</td>
<td>2</td>
<td>3.4</td>
<td>11-20</td>
<td>6</td>
<td>10.2</td>
</tr>
<tr>
<td></td>
<td>Block of flats</td>
<td>2</td>
<td>3.4</td>
<td>21-30</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>Duplex/Road</td>
<td>1</td>
<td>1.7</td>
<td>51 &gt;</td>
<td>4</td>
<td>6.8</td>
</tr>
<tr>
<td></td>
<td>No development</td>
<td>45</td>
<td>76.3</td>
<td>No development</td>
<td>45</td>
<td>76.3</td>
</tr>
<tr>
<td>2008</td>
<td>Bungalow</td>
<td>4</td>
<td>6.8</td>
<td>&lt;10</td>
<td>5</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>Duplex/Bungalow</td>
<td>4</td>
<td>6.8</td>
<td>11-20</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>Block of flats</td>
<td>2</td>
<td>3.4</td>
<td>21-30</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>Duplex/Bridges</td>
<td>1</td>
<td>1.7</td>
<td>51 &gt;</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>No development</td>
<td>48</td>
<td>81.4</td>
<td>No development</td>
<td>48</td>
<td>81.4</td>
</tr>
<tr>
<td>2009</td>
<td>Bungalow</td>
<td>2</td>
<td>3.4</td>
<td>&lt;10</td>
<td>4</td>
<td>6.8</td>
</tr>
<tr>
<td></td>
<td>Duplex</td>
<td>4</td>
<td>6.8</td>
<td>11-20</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>Offices</td>
<td>1</td>
<td>1.7</td>
<td>41-50</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>2010</td>
<td>Bungalow</td>
<td>5</td>
<td>8.5</td>
<td>&lt;10</td>
<td>8</td>
<td>44.4</td>
</tr>
<tr>
<td></td>
<td>Duplex</td>
<td>12</td>
<td>20.4</td>
<td>11-20</td>
<td>4</td>
<td>6.8</td>
</tr>
<tr>
<td></td>
<td>Block of flats</td>
<td>1</td>
<td>1.7</td>
<td>21-30</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>No development</td>
<td>41</td>
<td>1.7</td>
<td>41-50</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>51 &gt;</td>
<td>4</td>
<td>6.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No development</td>
<td>41</td>
<td>69.5</td>
</tr>
<tr>
<td>2011</td>
<td>Bungalow</td>
<td>1</td>
<td>1.7</td>
<td>&lt;10</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>Duplex</td>
<td>9</td>
<td>15.3</td>
<td>11-20</td>
<td>3</td>
<td>5.1</td>
</tr>
<tr>
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<td>Duplex/ Block of flats</td>
<td>4</td>
<td>6.8</td>
<td>21-30</td>
<td>3</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>Block of flats</td>
<td>6</td>
<td>10.2</td>
<td>31-40</td>
<td>5</td>
<td>8.5</td>
</tr>
<tr>
<td></td>
<td>No development</td>
<td>39</td>
<td>66.1</td>
<td>51 &gt;</td>
<td>8</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No development</td>
<td>39</td>
<td>66.1</td>
</tr>
<tr>
<td>2012</td>
<td>Bungalow</td>
<td>11</td>
<td>18.7</td>
<td>&lt;10</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>Duplex</td>
<td>10</td>
<td>16.9</td>
<td>11-20</td>
<td>12</td>
<td>20.3</td>
</tr>
<tr>
<td></td>
<td>Duplex/ Block of flats</td>
<td>2</td>
<td>3.4</td>
<td>21-30</td>
<td>3</td>
<td>5.1</td>
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<td></td>
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<td>5</td>
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<td>31-40</td>
<td>3</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>No development</td>
<td>31</td>
<td>52.5</td>
<td>51 &gt;</td>
<td>9</td>
<td>15.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No development</td>
<td>31</td>
<td>52.5</td>
</tr>
<tr>
<td>2013</td>
<td>Bungalow</td>
<td>9</td>
<td>15.3</td>
<td>&lt;10</td>
<td>8</td>
<td>13.6</td>
</tr>
<tr>
<td></td>
<td>Duplex</td>
<td>8</td>
<td>13.6</td>
<td>11-20</td>
<td>8</td>
<td>13.6</td>
</tr>
</tbody>
</table>
Table 4: Summary of Types of building developed/Units of Housing developed and Number of developers that developed between 2007 and 2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of developers that developed</th>
<th>Type of building</th>
<th>Units of housing developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>14</td>
<td>Bungalow</td>
<td>&gt;10</td>
</tr>
<tr>
<td>2008</td>
<td>11</td>
<td>Duplex/Bungalow, Bungalow</td>
<td>&gt;10</td>
</tr>
<tr>
<td>2009</td>
<td>7</td>
<td>Duplex</td>
<td>&lt;10</td>
</tr>
<tr>
<td>2010</td>
<td>18</td>
<td>Duplex</td>
<td>&gt;10</td>
</tr>
<tr>
<td>2011</td>
<td>20</td>
<td>Duplex</td>
<td>&gt;20</td>
</tr>
<tr>
<td>2012</td>
<td>28</td>
<td>Bungalow, Duplex</td>
<td>&gt;10</td>
</tr>
<tr>
<td>2013</td>
<td>28</td>
<td>Bungalow, Duplex</td>
<td>&gt;20</td>
</tr>
<tr>
<td>2014</td>
<td>34</td>
<td>Bungalow, Duplex / Block of flats</td>
<td>&gt;20</td>
</tr>
<tr>
<td>2015</td>
<td>42</td>
<td>Duplex</td>
<td>&gt;10</td>
</tr>
<tr>
<td>2016</td>
<td>35</td>
<td>Duplex, Duplex / Block of flats, Duplex / Bungalow</td>
<td>&gt;10</td>
</tr>
</tbody>
</table>
The analysis in Tables 3 and 4 show the contributions of developers to the housing provision in the study area. The result indicated that in the year 2007, Bungalow was developed by most of the developers with 9(15.3%) responses, majority developed more than 10 units of accommodation and 45(76.3%) of the respondents did not develop in the year. In the year 2008, Duplex/Bungalow and Bungalow were developed most with 4(6.8%) response rates each. 60% of the respondent organisations, developed more than 10 housing units and 48(81.4%) could not develop. The duplex was developed most and less than 10 housing units were developed by REDAN members in 2009 with 3(5.1%) and 2(3.4%) responses rate respectively. The duplex was developed most and majority developed more than 10 units of accommodation in the year 2010.

Analysis of data collected in the year 2011 showed that duplex was developed most by developers with 9(15.3%) responses, while the majority of the respondents’ organisation developed more than 20 housing units. Bungalow ranked 1st in the year 2012 followed by Duplex as the highest building developed with 11(18.7%) and 10(16.9%) responses and the majority of developers developed more than 10 housing units.

In the year 2013, most of the developers developed more of Bungalow and Duplex with 9(15.3%) and 8(13.6%) responses rate respectively. Also, the majority of the developers built more than 20 units of accommodation. Bungalow and Duplex / Block of flats were the highest category of buildings developed with 13(22.0%) and 11(18.6%) responses respectively, while the majority of respondents organisation developed more than 20 housing units in the year 2014. The duplex was developed mostly in the year 2015, with 19(32.2%) responses and majority developed more than 10 units of accommodation.

Duplex, Duplex/Block of flats and Duplex / Bungalow ranked 1st, 2nd and 3rd in the year 2016 as the type of the building developed with 11(18.6%), 10(16.9%) and 7(11.9%) responses respectively. Also, the majority of the developers built more than 10 units of accommodation. It can be inferred that most of the developers increased the number of housing units developed every year, may be as a result of the importance of housing and high demand rate from masses, also it may be due to the viability of the investment and motivating factors such as housing loan. Also Duplex and Bungalow were the most building developed most in the study area because most young people who are agile now preferred duplex as their taste where middle age people preferred bungalow because of old age. Almost all the developers in the study area developed more than ten (10) units as a result of an increase in the population of the study area, increase demand for housing unit and viability of the housing provision in the area.

Table 5: Rate of REDAN member’s Contribution to the housing provision in Lagos State

<table>
<thead>
<tr>
<th>Contributions</th>
<th>Frequency</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Sufficient</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td>Sufficient</td>
<td>13</td>
<td>22</td>
</tr>
</tbody>
</table>
The result in Table 5 shows that majority of the developers rated the contributions of the REDAN members in the study area as not sufficient compared to the population of the Lagos state. It can be concluded that developers have a lot to do to increase the level of their contributions in housing provision in the study area.

CONCLUSION

The study has examined the contributions of REDAN members to housing provision in Lagos State and established that Members of REDAN participation in housing provision were rated average. Duplex and Bungalow were the highest categories of building developed in the study area, while almost all the developers in the study area developed more than ten (10) housing units in a year. Also, the perceptual opinion of the developers showed that the level of contributions of REDAN members was less sufficient in the study area compared to the population of the area.

This requires that Government should encourage the private developers in the building industry by motivating them with the incentives that can encourage them to increase their level of participation. This should be followed up by making the process of acquiring land less cumbersome and making the loan available to the developers at a low-interest rate supporting with necessary enabling laws.

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ACCESS TO LAND IN URBAN AND RURAL AREAS OF BOTSWANA: TOWARDS AN INCLUSIVE LAND TENURE SYSTEM

Aloysius Clemence Mosha

University of Botswana

It is commonly assumed that Botswana’s land resources, (amounting to over 500,000 km² but with a population of just over 2 million today), are abundant, but over the years it has become evident that some definite limits will be widely experienced quite soon. Most visibly, the increasing shortage of land manifests itself both in the rural and urban areas. In the rural areas there are households, both female headed, male-headed and even the youth, who are experiencing problems accessing land; pasture land is deteriorating and access to arable land has also become seriously limited in several areas. In the urban areas too, in spite of many strategies that have been adopted over the years, access to land for housing and commerce is a major challenge, with the main issue being affordability and lack of finance.

Key words: Land Tenure, Land Policy, Accessibility, Urban, Rural and Equity.

INTRODUCTION

Botswana got its independence from Britain in 1966 with a very fragile economy and limited social services. To-day, ninety percent of the population has access to clean water, education, and health care. Botswana has one of Africa’s highest per capita incomes at US $7080 in 2015, yet also one of the world’s highest rates of income inequality with a GINI index of 65.8. Forty-seven percent of the population lives below the poverty line, and 97% of all poor people live in rural areas. Botswana is a semi-arid country with harsh climatic conditions and a fragile ecosystem. Arable land is extremely limited, and livestock is the primary source of subsistence and income for two-thirds of rural households. The government has a robust land policy that endeavours equitable access for all and is frequently revised to meet current situations. Botswana’s population is becoming more sedentary and concentrated in its urban areas. Demands for food, land, and fuel are increasing. Threats to natural resources include rangeland degradation, soil erosion, loss of grazing habitat, deforestation, over-exploitation of wildlife and wood, water pollution, bush fires, and conflicts between people and wildlife (USAID 2015).

Background

Botswana has one of the most progressive and successful land policies in Southern Africa. Part of this owes to the fact that upon independence Botswana did not inherit the same kinds of problems that South Africa, Zimbabwe and Namibia did, notably

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the massive land ownership inequalities owing to dispossession of African populations by European settlers.

Botswana’s land institutions are often held up as a model of democratic development. As periodic land policy reviews have revealed, there have been both successes and failures, but after investigation and discussion, problems have generally been acknowledged and rectified. (Notable exceptions are issues relating to the land rights of the San and other minorities and the related problem of privatization of the commons for ranching). In no other country in the region has land been so judiciously administered as an essential component of good governance. Some would argue that Botswana has little to offer in the way of lessons to the region because it is unrepresentative. Its population is modest in size and ethnically relatively homogeneous. By comparison with neighbouring countries, it is relatively wealthy and has no impairing legacy of colonial settlement. These points have some validity, but it should be noted that Botswana set out to democratize its land administration shortly after its independence in 1968, when it was still one of the poorest countries in Africa (Robin P. 2007).

However, the success of Botswana's land policy also stems from its innovative features and its decidedly pro-poor bearing. The latter is nowhere more obvious than in the official principle that each and every Motswana has a right to land for residential and agricultural purposes. Within customary tenure areas, which comprise 79% of all land and which are controlled through a decentralized system of locally elected Land Boards, land is allocated for free. Hence access to land is not such a great issue as hyped by land activists.

However, this is not to say that Botswana has no land problems. Indeed it does, and they are becoming more acute. Despite the abundance of land in the country as a whole, intense land scarcity has emerged in those few areas where people perceive there to be job prospects, particularly in and around the major urban towns and cities like Gaborone. Consequently, in contradiction to the policy of free land allocations in communal areas, a market has developed for land in those areas that happen to abut city boundaries. It is largely an illegal market.

In this paper we cover the main issues related to inclusivity in land resources in the country including: legislative aspects; land policy; past and present land management aspects; the major ways of accessing land in both urban and rural areas; and challenges faced. The paper concludes by putting forward possible strategies to make land available to all groups of society in Botswana.

LITERATURE REVIEW: OVERVIEW OF LAND TENURE SYSTEMS IN SOUTHERN AFRICA.

According to Malope et. al (2016), Southern Africa is one the regions in Africa that was colonised by European settlers for a considerably longer period than other parts of the continent. At the time of independence African countries inherited legal systems from their former colonisers. The Anglophone countries adopted the Roman-Dutch law while Portuguese speaking countries of Angola and Mozambique adopted the
Portuguese Civil Law, but all do use customary law as well. The dual legal systems of the southern African countries are the basis for the regions’ two principal land tenure systems – statutory and customary tenure. The dual land tenure system was a racially-based land tenure system introduced by colonial governments (Adams, et al., 1999; ECA, 2004). Statutory and customary tenure were established in urban and rural areas respectively along white and black population segregating their residential and commercial activities. Statutory tenure existed in the rural areas only where there was commercial farming by whites.

Further, Malope (ibid) states that customary land tenure is governed by the traditional rules (that are often unwritten) and is administered by traditional leadership (ECA, 2003). In many of the African countries “customary lands are essentially state land and cannot be transferred through the market system” (ECA, 2004:22). Moreover, customary land cannot be used as collateral for loans (ECA, 2003). Tenure security was not guaranteed under customary land tenure system. The land belonged to the state and whenever the state desired occupation and use of land could be withdrawn at any time without reference to the law (ECA, 2004). Although the fundamental principles and practices governing customary land tenure are similar in the region, there are some exceptions. For instance, in Botswana customary land tenure system has been removed from traditional leadership and is bestowed under the Land Boards in trust for the community.

The statutory land tenure system is premised on freehold and leasehold land tenure systems. Freehold is considered the most secure land tenure in which land rights are held in perpetuity and provides absolute ownership rights with the owner able to “control, manage, use and dispose of property” (ECA, 2004:21). Leasehold with its 99-year leases is considered to confer the same land rights and tenure security similar to that of freehold. Land tenure under freehold and leasehold in Africa have mainly been associated with large scale commercial farming and elite land ownership (ECA, 2004, Adams, et.al 1999 and De Vries and Lewis,2009).

METHODOLOGY

Research began with a literature review of relevant documents on land administration and management in order to understand the roles that the various government agencies have been involved in issues of land governance in Botswana. Following the literature review, consultations with central and local government agencies were undertaken to get empirical data on what is happening on the ground. A large number of interviews were conducted with the purpose of getting stakeholders’ views on land problems in the country. In addition, four focus group discussions were held with primary and secondary key land boards, the Land Tribunal and the Department of Lands, in order to get their take/perspectives on land administration and governance issues and challenges to access land. Data collected from both secondary and primary data sources was analysed using appropriate techniques such as content analysis. The main findings, are hereby presented in this paper.
LAND USE IN BOTSWANA

Botswana is a large country with a small population. Botswana has a total land area of 566,700 square kilometers and had an estimated 2015 population of nearly 2.262 million people, 58% of whom were urban and 42% rural. Eighty percent of the population, settlements, and economic activity are concentrated along a 200-kilometer-wide strip along the country’s eastern border, where the most fertile soil and transportation corridors are located. Botswana’s GDP in 2015 was US $14.39 billion, 47% of which related to industry, 51% to services, and 2% to agriculture. Forty-four percent of the economically active population (57% of which is female) works in agriculture. Per capita income was US $7080.2 in 2015 (World Bank 2016; ROB 2008b; FAO 2005; Anderson 2005).

Most of Botswana is flat, arid land with unreliable, low rainfall. Roughly 46% of the total land area is classified as agricultural land, although only 5% is suitable for cultivation and only 1% was cultivated in 2002. Approximately 0.3% of cropland was irrigated in 2003. The Kalahari Desert, much of which is savanna grassland and sparse woodland, covers two-thirds of the land area and supports large herds of cattle, goats, and wildlife. Twenty-one percent of total land area is forest land and 31% designated as nationally-protected areas. (World Bank 2003; FAO 2005). Agriculture includes commercial and traditional farms, with the vast majority of farmers engaged in low-input, rain fed subsistence farming.

Commercial enterprises are primarily devoted to the production of cattle, with some cultivation of cereals and pulses. Botswana is unable to produce sufficient food to feed itself and has in some years had to import up to 80% of its food. Growth of the sector is limited by poor infrastructure and difficult production and market conditions (USAID 2016; ROB 2010a; Taylor 2007; FAO 2005).

LAND DISTRIBUTION

The Tswana (originally belonging to eight separate tribes) are Botswana’s majority ethnic group, making up 40% of the population. Another 37 tribes, constituting 60% of the population, live in the country. The Tswana are among the most educated and wealthiest in the population; the non-Tswana (including the Basarwa or San Bushmen) tend to be less educated and reside in smaller and more remote villages where infrastructure is limited and economic opportunities few. These isolated populations, whose hunting and gathering activities often range over large areas, live in extreme poverty and are highly dependent on access to land and other natural resources for their livelihoods (Adams and Palmer 2007; Adams et al. 2003).

Most of Botswana’s farms (about 63,000) average roughly 5 hectares and are devoted to rain fed farming. The country has about 112 farms larger than 150 hectares. Commercial farms represent less than 1% of all farms in the country and use 8% of the total land area. The enterprises are responsible for 20% of cattle production and 40% of the cereals and pulses produced. Roughly 50% of the large cattle-owners are absentee and have little incentive to manage the rangeland resources sustainably. Most
traditional farmers cultivate individually-managed holdings and run livestock on communal land. (ROB 2010a; Taylor 2007; FAO 2005).

THE LEGAL FRAMEWORK GOVERNING LAND IN BOTSWANA.

The legal framework governing Botswana’s land is a mixture of formal and customary laws, with much of the formal law reflecting longstanding principles of customary law. There are about 17 laws that relate to land administration. The six major pieces of formal legislation include: The State Land Act, 1966, provides for management of state land (urban land, parks and forest reserves) by the central government and local government councils, and allocation of urban land to individuals and entities. The Tribal Land Act, 1968 (amended 1993), vests tribal land in the citizens of Botswana and grants administrative power (formerly held by chiefs and headmen) over the land to one of the 12 district Land Boards. The Land Boards can allocate land, cancel customary rights, and rezone agricultural land for commercial, residential, and industrial uses. The Tribal Land Act also introduced certificates evidencing grants of rights to wells, borehole drilling, and individual residential plots, and allows people to apply for common-law leases of land, which they use to obtain mortgages (COHRE 2004; Adams et al. 2003; ROB 2008a; Taylor 2007).

The Tribal Grazing Lands Policy, 1975, allows for the privatization of grazing land by vesting the Land Boards with the authority to grant private individuals and entities exclusive leasehold rights to tracts of formerly unfenced, communal land regardless of tribal affiliation. The Town and Country Planning Act, 1977, governs the development of rural and urban land (Adams et al. 2003; Taylor 2007).

The National Agricultural Development Policy, 1991, permits owners of boreholes to apply for 50-year leases to an area of 6400 square hectares around their boreholes. Leaseholders are permitted to fence the area and have exclusive rights to all natural resources within the area. The Sectional Titles Act, 1999, allows for the transfer of rights to sections of developments and properties (COHRE 2004; Adams et al. 2003; ROB 2008a; Taylor 2007; ROB 2010b).

Customary law in Botswana provides tribe members with a right of avail, which is the right to be allocated residential (urban or rural), arable, and grazing land based on tribal membership. Tribal members receive land at no cost and have continuing rights to the land so long as they use it in accordance with the purpose of the allocation. (Adams et al. 2003; ROB 2002).

TYPES OF LAND TENURE

Seventy percent of land in Botswana is tribal land, 25% is state land, and 5% privately-owned freehold land (ROB 2002). The following are the recognized tenure types:

Private ownership.

Individuals and entities can obtain private ownership rights to individual parcels of land through land purchase. Most freehold land is located in urban areas although
some large cattle ranches (over 100,000 hectares) are freehold land. Ownership rights are held in perpetuity or for 999 years (USAID 2015, ROB 2008a; Adams et al. 2003).

**Leaseholds.**

The state leases urban land to individuals and entities under Fixed Period State Grants for 50-year terms for commercial purposes and 99-year terms for residential purposes. At the end of the term, the land and all improvements revert to the state without compensation. Leaseholders can transfer their rights to a third party, subject to the terms of the primary lease. The state has also granted Certificates of Rights to serviced urban plots for the purpose of erecting owner-occupied houses. The owners receive unregistered perpetual occupancy rights. This category of land right is currently suspended (ROB 2008a; Adams et al. 2003).

**Customary rights to tribal land.**

Most land in Botswana is rural tribal land, to which eligible citizens can obtain rights through the Land Board. Citizens can obtain either land grants or leases that allow them to occupy and use allocated parcels of land. The land is heritable but not saleable (Burgess 2002; Adams et al. 2003).

**TENURE SECURITY/PROPERTY RIGHTS**

All citizens of Botswana are entitled to receive an allocation of tribal land from the district Land Boards. The 1993 amendment to the Tribal Land Act permits any citizen, regardless of tribal affiliation, to apply for any land, and extends the right to women. In addition to the tribal land allocations, all citizens are also eligible for two serviced plots in urban areas of the country, whether for residential, commercial, or industrial use. The grant is usually fixed for a period of 50 (commercial & industrial) and 99 years for residential. Citizens in squatter areas can own the land under a Certificate of rights which can also be upgraded to a Fixed Period Grant. Only citizens of Botswana are entitled to land grants under the Tribal Land Act and the State Land Allocation Policy, and the allocated land rights pass through inheritance within families (Adams et al. 2003; ROB 2002; COHRE 2004, Malatsi, B and Finnström, A (2013, 2011)).

Tenure security in all classifications of land is generally high among Tswana landholders and other tribes with large populations and political power. Freehold land rights are registered with the Registry Office under the Deeds Registry (Amendment) Act, 1996. Assuming continued use of the land, tribal land allocations are perpetual, and lease terms for tribal and state land are standardized. In contrast, the rights of the urban poor, smallholders, and others who are unable to compete with large livestock-owners for grazing land leases are far less secure. Poor migrants to urban areas are increasingly developing informal settlements on the outskirts of cities, and the government has a practice of destroying unauthorized settlements (ROB 2008a; Adams et al. 2003; Taylor 2007; ROB 2002).

In rural areas, smallholders and nomadic tribes have lost access to roughly 8% of communal grazing land. Critics have accused the Land Boards of evicting isolated groups such as the Basarwa from the Central Kalahari Games Reserve and allocating rangeland used by poor stockholders to elite ranchers and foreign interests (Taylor 2007; Ng’Nyati-Ramahobo 2007).
LAND ADMINISTRATION AND INSTITUTIONS

The Ministry of Land Management, Water and Sanitation is responsible for the management of land and the delivery of housing throughout the country. The Department of Lands administers state land, regulates freehold land through the Land Control Act, 1975, and provides technical advice on tribal land matters. The Department includes four divisions: Administration; Estates and Land Valuation; Land Inventory and Management; and Land Use and Development (USAID 2015). Additional departments within the Ministry are the Department of Town and Regional Planning, established to manage urbanization and provide for the efficient utilization of public and private land, and the Settlement Planning Division, which prepares and implements development plans for urban areas and villages (ROB 2008a; Anderson 2005; Adams et al. 2003).

The Land Board derives its authority over tribal land from the Tribal Land Act of 1968. Land Boards grant rights to use tribal land, authorize and transfer tribal land rights, and manage any repossession of tribal land. The Land Boards are required to maintain registries of land grants. The Ministry of Land Management, Water and Sanitation oversees the rule-based allocation of both State and Tribal land and is responsible for appointing members of the Land Boards, with input from Land Board staff.

LAND POLICY

The use and management of land in Botswana has been driven by a number of policies which are centered on the settlement of people and their socio-economic activities. The first National Settlement Policy was developed in 1998. It was revised in 2004 in response to the proliferation of settlements, which tested the ability of government to adequately provide communities with amenities. Traditionally, Batswana are farmers, especially of cattle. Thus, there are policies that relate to the development of the agricultural sector with a view to optimizing production and developing sustainable livelihoods, including the Tribal Grazing Land Policy (TGLP) of 1975, National Policy on Agricultural Development of 1991 and the National Master Plan for Arable Agriculture and Dairy Development of 2002. Other policies relate to wildlife and other natural resource conservation that provide key inputs for the tourism sector as well as for livelihoods, especially for people in rural areas.

Over the years, the tourism sector has increased its share of GDP, and it plays an important role in employment creation. Relevant policies to that sector include the National Tourism Policy of 1990, National Conservation Strategy of 1990, Wildlife Conservation Policy of 1986 and the Community-Based Natural Resource Management Policy of 2007. As two important economic activities, agriculture and wildlife conservation have often resulted in conflicts between the needs of humans and wildlife (Government of Botswana, 1997).

The main policy instrument governing the implementation of the land tenure system in Botswana is the Botswana Land Policy of 2015 (Republic of Botswana, 2015). This policy whose development involved a national consultative process recognizes the
importance of land in all its uses in the modern age. It aims to ensure that emerging land management issues, including access to land by everyone, improved security of tenure, protection of land rights, recognition of the vulnerability of certain groups, improved land management in all tenures, improved land markets, decentralized functions to local and land authorities, enhanced institutional capacity and efficient land information management systems. The new policy places a premium on effective implementation, as this is where people will feel the results.

**LAND TENURE SYSTEMS AND THE YOUTH**

Youth are often marginalized in land allocation in most countries. However, Botswana Government has identified youth specifically as a disadvantaged group in terms of access to land and has made provisions for them in the land policy. The 2015 Botswana Land Policy advocates reserving a quota for youth where land is available for public tender as well as instating special measures to expedite land allocation for youth groups to facilitate their access to special funding.

**LAND TENURE SYSTEMS AND WOMEN**

In terms of agricultural holdings by gender, women own 46 percent, representing 41 percent of the country’s total land area. Women also held the same amount of planted land holdings (46 percent) (Statistics Botswana, 2013). Thus, ownership of arable land by gender in Botswana is not as skewed as in other African countries. However, the same cannot be said of ownership of residential plots, owing to the patriarchal nature of Botswana society, where men are regarded as the head of family, and residential plots are likely to be held in their names. A similar pattern is expected for commercial farms and boreholes for livestock watering, as tending to livestock is predominately a male activity (Bahta and Malope, 2015).

To improve women’s ownership of property, including land, Botswana abolished the marital power act so that men and women hold the same status under marital law. Women married in community of property (probably the majority of women) are equal partners in the couple’s property, including land. The problem will only arise if a couple is not married, and the man is the one who owns the land parcel. There are many disputes where couples cohabitate, with women and children often losing out. The new land policy prescribes one plot per person, with a married couple treated as a single entity. This has raised concerns, mostly from women, who argue that they are being discriminated against, as unmarried people can own a piece of land each. The Tswana law of inheritance - especially the inheritance of boreholes for cattle farming disadvantages women irrespective of whether they are widows.

**ACCESS TO LAND BY MINORITY, INDIGENOUS AND VULNERABLE GROUPS.**

There are certain minority groups in Botswana, such as the Basarwa (nomadic tribe), who’s way of life has placed them at a disadvantage with respect to land rights. However, recent developments have forced them to set up permanent residence and live a life that they are not accustomed to. Many were evicted from places where they freely practiced their hunter-gatherer lifestyles or were forced to abandon their way of life because of laws prohibiting hunting, especially in national parks. They were settled in permanent settlements with social services, but still they have lost
subsistence income and seen their entire economic support system destroyed. However, recently government has begun providing services to Basarwa on the Central Kalahari Game Reserve. (Taylor and Mokhawa 2003; ROB 2002).

Other vulnerable groups that are offered protection in the policy are orphans (especially youth) and widows. The land policy seeks to ensure that both are protected from being dispossessed of their land rights by relatives or guardians.

**ACCESS TO LAND FOR URBAN LOW INCOME AND THE POOR.**

Normally, in urban areas, residential plots are offered at a price based on cost recovery for first-time buyers, affordable prices for low-income groups and market prices for those seeking plots for investment. Commercial and industrial land is allocated at market prices. (Mosha 2012, Kalabamu 2006). This shows positive discrimination for the low-income groups through cross-subsidy by the high-income groups. Further, the Government has instituted a mechanism to allocate land for the low-income groups through its site and service and self-help housing programme, dubbed SHHA programme introduced in 1973.

**LAND MARKETS AND INVESTMENTS**

The land market in Botswana is dominated by land transactions relating to private and state land (as opposed to tribal land). Botswana has an active formal market in private freehold land rights, including sales, leases, assignments, and mortgages. Deeds evidencing all transactions of private and state land must be recorded at the Registry Office pursuant to the provisions of the Deeds Registry Act, 1996 (as amended) (USAID 2015; Ng’ong’ola 1998).

Tribal land is generally available for allocation by Land Boards, but good-quality land is scarce and efforts to systematically record land information, until recently have been slow. Land plots in urban centers (both private and state land) are recorded in the State Land Integrated Management System.

Parallel to the formal land markets, is an emergence of illegal land markets especially in peri-urban areas due to lack of access to land in the towns and cities.

**COMPULSORY ACQUISITION OF PRIVATE PROPERTY RIGHTS BY GOVERNMENT**

Article 8 of Botswana’s Constitution provides that the government can acquire property under the following circumstances: (1) in the interests of defense, public safety, public order, public morality, public health, town and country planning or land settlement; (2) in order to secure the development or utilization of property for a beneficial community purpose; and (3) in order to develop or utilize mineral resources. Landholders are entitled to prompt payment of adequate compensation for the land rights acquired, and have a right to seek the judgment of the High Court on the rights held, the legality of the
acquisition, the amount of compensation, and payment of compensation (USAID 2015; ROB 1966).

The Tribal Lands Act authorizes the Land Boards to acquire, repossess, and rezone tribal land necessary for development. The Acquisition of Property Act authorizes the state to acquire private land for public purposes up on payment of fair compensation.

**LAND DISPUTES AND CONFLICTS**

Land disputes over access to urban and peri-urban land, grazing land, and forests are increasing in frequency. For tribal land, Land Boards serve as an initial forum to hear disputes and complaints. The Tribal Land (Establishment of Land Tribunals) Order of 1995 provides for the establishment of tribunals to hear appeals of decisions made by the Land Board. The tribunal is a three-member team chaired by a president who is also a lawyer. The tribunal proceedings are open to the public, and parties may appear with or without separate representation. Parties can appeal the decision of the Land Tribunal to the High Court. There is no separate tribunal dedicated to cases involving private or state urban land, and disputes over the land are increasing. Any cases are dealt with in the courts of law.

**LAND SHORTAGE IN THE COUNTRY.**

Curiously, Botswana has a population of nearly 2 million and a land area of 566,700 sq.km, one person, yet there is talk of a serious land shortage as newspaper and other media headlines scream time and again. With a population density of about 3.7 per sq.km, Botswana remains sparsely populated. The key question then what is driving the scramble for land, especially in the urban areas like Gaborone and surrounding villages?

The most obvious reason is (a) rural-urban migration with people looking for better jobs. The urban population in 2015 was 57.4% of the total population and the rate of urbanization was 1.29% annual rate of change (CIA Fact Book 2017), (b) secondly, the failure of rural development policies has created structural imbalances. The government has invested heavily in the major cities like Gaborone much to the detriment of other towns and villages (c) The third reason is lack of statistics and poor record keeping. The lack of proper record keeping has led to maladministration, corruption and unfair allocation of land. (d) Land speculation is rampant. Waiting lists in the country (with a population of 2.26mil) have skyrocketed, though, by and large these are not realistic. For example, in 2016, the Minister of Land Management, Water and Sanitation, stated that there were 1,062,158 applicants in the waiting list as maintained and published by various Land Boards and the Department of Lands (Business Weekly, 2016). The long lists are primarily long because people have applied in various land boards, whereby, for example, one name can appear in another ten land boards, as stated by the Principal Secretary for the Ministry (e) A shortage of serviced land especially in urban areas coupled with the excessive infrastructure costs has greatly hampered both public and private developers' efforts in the provision of urban in housing in the major urban centres. (f) Bad planning by government, red tape and endless negotiations with field owners, who rightfully refuse to give their land to the government for a pittance are the hallmark of government’s failure (g) The government and land boards have also been slow in plot repossession of undeveloped
land (h) Restrictive lending habits banks. For example, it is easier for a Botswana bank to loan a young person a million Pula to buy an expensive car, than to lend the same person the same amount to buy land and build (i) Land Boards are too strict when it comes to change of land use, which would allow families who own land in the proximity of cities like Gaborone to use it for housing and finally, (j) A surge in immigration (foreign rich) in the last two decades has forced the existing population to compete with newcomers for land. The foreigners have money and do not often care to negotiate down when purchasing land.

KEY LAND ISSUES AND GOVERNMENT INTERVENTIONS

The government manages the country with the aid of six-year plans known as National Development Plans (NDPs). In preparing the just ended NDP 10 (2010–2016) land sector strategy, the government identified as its primary concern in the land sector the limited availability of land for development. Barriers to making land available for development include limited private-sector involvement due to lack of basic infrastructure, a shortage of funds for the provision of services to available land, an increase in development costs, encroachment of agricultural land, lengthy land-acquisition processes for freehold land, and land speculation.

The NPD 10 outlines four programs to make land available for development. The first is a land acquisition and allocation program under which the government will purchase freehold land for village expansion and other residential, commercial, and industrial purposes. The government will purchase land on a “willing seller-willing buyer” basis as it becomes available and will not purchase land suitable for agriculture for this program. The second program, aimed at land information management, will create a comprehensive land resource database through the computerization of all land records, including those filed with the Land Boards and the Department of Lands Deeds Registry, and the creation of a Physical Planning Portal. The third initiative is a spatial information management program that will produce maps of the entire country and facilitate the surveying of plots. The fourth is a land management program that facilitates the preparation of settlement development plans by local authorities, including demarcation of boundaries between state and customary land and delineation of districts. The program will also generate studies to determine economic rentals for tourism areas, improvement of capacity-building systems, and an integration of land administration procedures and processes (ROB 2010a).

CONCLUSIONS AND POLICY RECOMMENDATIONS

The findings of this study show that by and large Botswana has been a trend setter in dealing with land challenges/issues in the country. A review of various land issues has shown that land administration and governance in Botswana has undergone a number of changes in order to address challenges that emerged from time to time. Land administration and governance in Botswana has been guided by a number of policies supported by legislations. It is clear that Botswana has chosen to deal with challenges and problems in land governance and administration as they occurred in a piece meal fashion, until the Land Administration Procedures Capacity and Systems (LAPCAS) project of 2009 which is the first attempt by land authorities to tackle the problems besieging land administration in a holistic manner.
Public confidence in government management of land resources needs to be rebuilt, through better public awareness of the general social benefits of an orderly land delivery and land market process, reducing risk, disputes and other inefficiencies. The community should be proud that the government has gone a long way in the development of an inclusive land system that strives to cater for the needs of all in the country.

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CONSTRUCTION
INFLUENCES OF TIME BUFFER USAGE IN THE CONSTRUCTION INDUSTRY

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One of the issues confronting the construction industry is the continuous inability to deliver construction projects to contract at agreed time. In view of this, various techniques and innovations have been introduced by concerned stakeholders in the quest of delivering projects to the satisfaction of clients and customers, and one of them is the adoption of time buffer. This study therefore examine various factors influencing the adoption of time buffer in construction projects with a view to promoting and maximizing the benefits of the practice in architecture, engineering and construction industry. From existing literature materials, 12 major factors influencing the usage of time buffer for construction projects were identified and adopted. Using purposive sampling, primary data were collected from architects, construction manager, quantity surveyors, engineers and project managers with emphasis on their knowledge and understanding of construction process and the concept of time buffer. Out of the 50 questionnaires administered to these professionals practicing in government, contracting, consulting and client establishment, 48 were completed and analysed accordingly. The most important factors influencing the adoption of time buffer in the South African construction are the availability of necessary equipment and tools as well as various work and jobsite conditions. Other factors include level of details of the design or adopted working method, type and strength of labour force as well as level of coordination, management and supervision of construction activities. It is therefore necessary that contractors make available necessary and adequate equipment, tools and machines while also ensuring favourable working conditions for employees, site workers and other individuals on the construction site. This study will be useful for construction educators, scholars, practitioners, professionals as well as bodies shouldered with the responsibilities of managing and regulating construction process and activities in the quest of adopting time buffer to improve project performance.

Keywords: Buffering, Construction process, Project performance, Productivity.

INTRODUCTION

Construction projects have some type and amount of uncertainty as a result of the complex and intrinsic nature of the construction industry. This uncertainty are most likely to end up to variation in the project duties and tasks from what was originally scheduled. Subsequently, construction workers should adjust for the uncertainty by adding time by means of hours and days to get rid of variations in the work plan (Russell, et al., 2013). Time buffer is defined as the amount of time included in the task durations to compensate for uncertainty and to protect against variations (Miller
et al., 2000). Variation can be described as any change to the works, which is instructed or approved as a variation under a section between the planned and actual task duration of the physical work whether quantity or quality required to be carried out under the contract (Russell et al., 2013).

Buffering is common practice in project planning, it protects the planned project schedule from uncertainty irrespective of how complex the construction process and project may be (Lee, et al., 2006). Ballard and Howell (1995) outlined such things as absence of multiple participants, constraining and standardization as factors that makes construction projects more difficult to complete their goal. However having to include this complexity is the high mark of interdependency intrinsic to the construction process. According to Poshdar et al. (2016), time buffer on construction project reduces the improbability caused by changes and errors particularly when a similar design of construction is applied to an infrastructure project, however buffering is an active tool used to protect the planned performance of construction projects. Lee, et al. (2006) stated that applying time buffer on construction projects will help to evaluate the time effectiveness and the amount of hidden errors, therefore latent changes will be reduced and the flexibly located time buffer will help to identify the errors and changes in parallel to the design and construction. This study examines the factors influencing the adoption and usage of time buffer in the construction industry with a view to promoting the application of the concept for improve project performance.

CONCEPT OF TIME BUFFER IN CONSTRUCTION

Ballard and Howell (1995) highlighted that the usual custom in construction projects is to add time buffer on each projects to ensure stability and reduce variability. Buffers in production such as deliberate delays, excess inventory and added capacity, are commonly utilised to protect against instability. Poshdar et al. (2016) stated that possibly and essentially, buffers cover the bases of instability that make them needed. However there are numerous types of buffers, but the emphasis and focus of this research study is the examination of administration of time buffer which can be extra hours or days added to individual construction project duties within the planned period by construction personnel to adjust for instability and probable variation. Furthermore, Russell et al. (2013) highlighted that addressing and understanding the foundation of time buffer will assist to assign them where they are needed most and therefore reduce project duration and cost of the project.

The effectiveness of buffer time in a construction project acts as a cushion that protect the planned project schedule from uncertainty, but there is no rule as to how much time should be added, and how to manage them (Rogalska and Hejducki, 2007). Therefore to estimate without hidden safety margins the following must be assumed; people have everything they need to perform a task; the task is completed without unforeseen problems; and work is focused on the task, without interruption or multi-tasking. Russell et al., (2014) noted buffer time can be most effective when the location of the buffer time is naturally at the beginning of the activity in the executing process, it is much more critical to give successor a reliable precedence than to worry about delays that still do not arise however in the executing phase, it means that the location of buffer time has to move from the end of the project in the contract buffer time to the front of each activity.
According to Wambeke, et al., (2010), variability in construction projects usually leads to schedule delays, cost overruns and productivity losses therefore, the use of buffer time is a common approach to handle variability and to protect production processes from its negative impact. Rogalska and Hejducki (2006) further elaborated that when projects are delayed, they are either accelerated or have their duration extended beyond the scheduled completion date and these are not without some cost consequences therefore the conventional approach to manage the extra cost is to include a percentage of the project cost as contingency in the pre-contract budget. Wambeke et al., (2011) also concluded that project size and its complexity have a huge effect when dealing with buffer time on projects because the time added on project task on a large project can mislead the planner by adding a smaller time that will be less than the expect time to finish the task and this will result a delay in a project.

Rogalska and Hejducki (2007) highlighted that the preparation of projects when time buffers are involved and the continuity of construction processes is most definitely maintained therefore the least time is adopted as the benchmark for selecting an organisational design. The following risk factors were also highlighted amongst numerous factors affecting the project buffer size; errors on design; weather change; equipment failures; disorganized contractors; irregular financing; administrative-legal disturbances; and disturbances in the supply of materials and equipment.

Yang (2007) stated that making use of linear scheduling with time buffer on construction projects speed up and fast track the project duration. Ryu et al. (2007) identifies that linear scheduling has its roots in the manufacturing industry while Russell et al. (2013) suggested that scheduling technique is particularly well suited for projects where the activities are of a similar nature. They are also suitable for types of construction projects that lend themselves to linear scheduling because of the physically horizontal type of project such as railroads, pipelines, highways, rather than vertical projects, even though some components and processes of high-rise buildings and even residential construction could be scheduled with linear scheduling methods due to the similar nature of some of those project components. Therefore, the main objective of linear scheduling is to help project managers better envisage time and space conflicts between activities.

FACTORS NECESSITATING THE USE OF TIME BUFFER

In the construction industry, buffers are used to accommodate variation and delays produced by the essential difficulty and uncertainty present in construction projects (Russell et al., 2013). Factors that have impact on construction productivity are equally imperative in a developed detailed list of factors for examination and inspection, however construction projects are complex actions, as nearly every single project is unique. Unforeseen consequences result from the interaction of multiple variables that can reduce project performance and the standard practice is to try to build as much buffer as possible into the duration of the project in consideration (Yang, 2007). The complex nature of construction is combined with the ever growing economic demand to deliver projects more speedily while decreasing costs, resulting in uncertainty as a characteristic component of construction (Russell et al., 2014). According to Lee et al. (2006), uncertainty here is a consequence of changeability, lack of assurance or reliability or doubt. Construction personnel involved with project planning have a natural tendency to compensate for the uncertainty in the construction
environment by adding buffer to project duration to absorb the resulting variations in the work plan. Influences of buffer time on construction projects are further explained in subsequent sub-sections.

Project characteristics

Project characteristics include such things as contract duration, size of project and complication of the project, that is, interdependency of activities. Hammad et al. (2011) also noted that project characteristics and complexity are basic factors that necessitate the use of time buffer because complexity of the task for a trade which can be a point of struggle or nature of the work in the project. It is the instability about characteristics specific to a project and a given skill (Poshdar et al., 2016).

Prerequisite works

These are tasks that must be accomplished before other activities. If there is an instability that the item permits, prerequisite work, or rework on a prerequisite task will not be finished on time, then contemplate the extent to which one’s duration estimate is affected. This can also be thought of as confidence in the schedule or work plan (Poshdar et al., 2016).

Detailed design or working method

This is related to the concerns or doubt about having precise and obtainable design and a possible working technique to finish the required task (Poshdar et al., 2016). Furthermore, Russell et al., (2013) explained working method or detailed design as the quality of documents that indicates design errors and omissions in the project, different conditions on site and issues requiring additional time as the factor that necessitate the use of time buffer.

Labour force

Poshdar et al. (2016) explained labour force as a factor that concerns or gives doubt about capability, availability and reliability of the labourers to complete the required job in the project. However, Yank (2007) stated that reliability of labour force becomes an issue only when labourers’ absenteeism is too high, people arriving late and/or leaving early at work, lack of motivation, low confidence as well as language barrier among workforces and managers.

Equipment and tools

According to Poshdar et al., (2016), equipment and tools are the factors that necessitate the use of time buffer in construction industry because it is the concerns or uncertainty about the availability of the tools and equipment in the project and reliability in terms of whether the tools and equipment can be reliable to perform the task in the project. According to Russell et al., (2013), equipment and tools have the tendency to breakdown or wear out when they are old, hence a suggestion was made that a register of equipment and tools must be made for maintenance that will be done by the construction company owning the tools and equipment. Furthermore, time must be allocated to accommodate the repair of equipment if a breakdown occurs as well as time to change equipment if failure occurs.

Materials and components

According to Hopp and Spearman (2008), material and components are the factors that necessitate the use of time buffer because this factors concerns about getting the
correct and needed materials from service providers when and where you need them as well as receiving materials for task not later than scheduled. This can be said as trust or confidence in one’s service provider. However, Poshdar et al. (2016) stated that getting or receiving incorrect quantity and quality of materials, receiving inappropriate material or receiving broken materials necessitate the use of time buffer in the project to avoid delays that can lead to extension of time from the original contract period.

Work or jobsite conditions

According to Poshdar et al. (2016), working condition is a factor that necessitate the use of time buffer due to fear of the physical space available to accomplish one’s duty and overcrowded or disorderly work area which is usually delay progress of construction projects. Therefore, Omran et al. (2011) stated that difficult access to work area delays the project and suggested the ways which material transfer on site is required from receiving area to task location is through the crane, construction elevator or hand carry, therefore the space of material transfer required from getting site area to undertake a duty must be permissible.

Management, supervision and information flow

Omran et al. (2011) highlighted management and supervision as factors that necessitate the use of time buffer, they are concerns about the supervision system issues related in getting questions answered when they arise, they can include such issues as changes, trust, and communication,. However, Russelle et al. (2013) stated that preparing for duration negotiation with management with the knowledge that will request the task to be done in shorter time during the course of the project leads to buffer time and trust in supervisor which is based on their reputation, knowledge, and experience you have had with them and lastly the changes in scope of work by clients leads to buffer time.

Weather

According to Hopp and Spearman (2008), weather is the factor that necessitate the use of time buffer in the construction industry because it is the indecision about the climate at the site of the project and the predominant weather circumstances, such as wind, rain and temperature can cause the delay in the projects. Poshdar et al. (2016) highlighted that typical weather conditions such as temperature, rain, and wind associated with the location of the project necessitate the use of time buffer to compensate for the time lost during the bad weather which delayed the project duration as planned.

RESEARCH METHODOLOGY

A descriptive survey design and quantitative approach was adopted in the research thus, questionnaires were designed and distributed to appropriate respondents. This study was carried out in North West province, South Africa, targeting construction professionals that have been involved in not less than five construction projects and are presently involved in at least one of such. The respondents for the study included Engineers, Contractors, Quantity Surveyors, Architects, Construction Managers and Project Managers that are registered with their various professional bodies in the
country. They were classified into two categories, those practicing with clients, government and consultants in one group while professionals from the contracting firms formed the other group. Mean item score (MIS) and standard deviation (SD) were adopted in the analysis and ranking of various factors influencing time buffer in the construction industry.

**FINDINGS AND DISCUSSION**

Table 1 shows the importance of various factors that necessitate the use of time buffer in the construction industry. The respondents were grouped into two, the first include Government, client and consultants (GCC) while the other group are contractors. Therefore, the first factors that necessitate the use of time buffer are equipment and tools as well as work/jobsite conditions both with the MIS=4.65 and SD=9.90 (GCC with MIS=4.72 and SD=7.88 and the contractors with MIS= 4.57 and SD=2.12). The second important factor are detailed designs or working method with MIS of 4.52 and SD= 13.23, this is followed by labour force with MIS=4.46 and SD=2.83, management or supervision or information flow with MIS=4.44 and SD=4.24. The table further reveal other factors that necessitate the use of time buffer and they are as follows; material and components, weather, prerequisite work and size of project. The less important ones include such factors as work area access with MIS=4.10 and SD=6.00, quality of documents was with MIS of 4.04 and SD=1.00 and project characteristics with MIS=4.00 and SD= 2.59.

According to the rankings (R), together with the calculated standard deviation (SD) and mean item score (MIS), it was found out that the most important factors that necessitate the use of time buffer in South African construction industry are Equipment and tools as well as work/jobsite condition which were ranked as the first factors that necessitate the use of time buffer. The combined MIS of both factors was 4.65 and SD=9.90. These findings are in agreement with the study of Poshdar et al., (2016) where project characteristics, prerequisite work and Work condition were the major factors that necessitate the use of time buffer on construction projects. However, the study of Wambeke et al. (2011) as well as that of Rogalska and Hejducki (2007) identified project complexity as the first major factor that necessitate the use of time buffer in the construction industry followed by quality of documents, weather and size of project. In addition, Russel et al. (2013) highlighted that the most important factor is communication and labour force capabilities because the individual causes loaded on this factor pertained to either the labour force in terms of the reliability, availability and skill morale as well as communication between construction personnel in the project. But these were not the case of the South African Construction Industry. The findings implies that these factors have positive impact in necessitating the use of time buffer in order for a project to be delivered and handed over on the scheduled date.

Table 1: Factors that necessitate the use of time buffer

<table>
<thead>
<tr>
<th>Factors</th>
<th>Overall</th>
<th>GCC</th>
<th>Contractor</th>
<th>MIS Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIS</td>
<td>SD</td>
<td>R</td>
<td>MIS</td>
</tr>
<tr>
<td>Equipment and tools</td>
<td>4.65</td>
<td>9.90</td>
<td>1</td>
<td>4.72</td>
</tr>
<tr>
<td>Work/jobsite conditions</td>
<td>4.65</td>
<td>9.90</td>
<td>1</td>
<td>4.72</td>
</tr>
<tr>
<td>Detailed design or working method</td>
<td>4.52</td>
<td>1.33</td>
<td>2</td>
<td>4.42</td>
</tr>
<tr>
<td>Labour force</td>
<td>4.46</td>
<td>2.83</td>
<td>3</td>
<td>4.35</td>
</tr>
<tr>
<td>Management/supervision/information flow</td>
<td>4.44</td>
<td>4.24</td>
<td>4</td>
<td>4.48</td>
</tr>
<tr>
<td>Material and components</td>
<td>4.33</td>
<td>1.13</td>
<td>5</td>
<td>4.36</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------</td>
<td>------</td>
<td>---</td>
<td>------</td>
</tr>
<tr>
<td>Weather</td>
<td>4.31</td>
<td>1.04</td>
<td>6</td>
<td>4.33</td>
</tr>
<tr>
<td>Prerequisite work</td>
<td>4.21</td>
<td>1.47</td>
<td>7</td>
<td>4.24</td>
</tr>
<tr>
<td>Size of Project</td>
<td>4.13</td>
<td>3.00</td>
<td>8</td>
<td>4.07</td>
</tr>
<tr>
<td>Work Area Access</td>
<td>4.10</td>
<td>6.00</td>
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<td>4.08</td>
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<tr>
<td>Quality of Documents</td>
<td>4.04</td>
<td>1.00</td>
<td>10</td>
<td>4.11</td>
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<tr>
<td>Project Characteristics</td>
<td>4.00</td>
<td>2.59</td>
<td>11</td>
<td>3.97</td>
</tr>
</tbody>
</table>

GCC=Government, Client & Consultant, MIS=Mean Item Score, SD=Standard Deviation, R=Rank

CONCLUSION AND RECOMMENDATION

Existing literature materials indicated a number of factors that necessitate the use of time buffer and they include such things as project characteristics, detailed design or working method, labour force, equipment and tools, materials and components, weather and size of projects. From the findings of the survey from this study, project characteristics, prerequisite work, detailed design or working method, labour force, equipment and tools, material and components, work or jobsite conditions were the major factors that necessitate the use of time buffer in the study area. Therefore, it can be concluded that the project characteristics, prerequisite and detailed design of the projects are major factors that necessitate the use of time buffer. In view of this, construction projects should be adequately planned and scheduled according to the given duration. More so, material, equipment, labour force and human resources should be available when required and to the correct specification and quantity. Risk management must be conducted to ensure the successful implementation of a construction project, as risk can lead to delays and cost overruns. Further research should be conducted on how to identify and formulate the location of time buffer on individual projects, to allow for better benchmarking and progress measurement, resulting in improved project delivery.

REFERENCES


END
DRIVERS FOR THE APPLICATION OF AUTOMATION IN CONSTRUCTION ACTIVITIES

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The complex nature of the architectural, engineering and construction industry and increasing demand for innovative and technical construction projects by clients, have resulted in increasing adoption and application of information technology at the design, construction and post-construction phases. One of the current innovative technological method is automation, which has gained popularity in some sectors of the economy like manufacturing, banking and entertainment, among others. To promote the usage of this technique in the construction industry, this study examines a number of success factors for the adoption of automation for various activities and processes involved in execution of construction projects. Using survey method, a close-ended questionnaire was designed around 18 drivers obtained from existing and related literature materials on automation and construction process. The research instrument were thereafter administered to 50 construction professionals including architects, engineers, construction managers, quantity surveyors and construction project managers. Information from the retrieved and completed 40 questionnaires revealed that change in the attitude of construction companies and other stakeholders from traditional way of achieving tasks as well as adequate knowledge and training on automation are the major drivers for the adoption of automation concept in the construction industry. The onus therefore lies on the stakeholders tasked with the obligation to manage, control and regulate construction activities, to continuously organise training and development programmes for construction personnel especially the semi-skilled and skilled. This will increase the level of implementation of automation and other information technology methods in the industry, thereby enhancing personnel productivity and overall performance of construction projects.

Keywords: Automated machine, Construction industry, Project performance, Robotics.

INTRODUCTION

Construction automation is described as an interesting field that focused on applying computer-controlled processes and mechanisation concepts in the construction industry (Ardiny et al., 2015). Basically, in simple terms, it is the use of robotics in the construction industry. Since construction is labour-intensive and the work is done in unsafe/harsh conditions with the scope of work changing frequently, robots in the construction are then used widely to help workers on construction sites (Ellatter, 2008). This can be seen as an advantage/benefit for both the workers and the construction company, because several construction works are seen as hazardous or strenuous to the individuals performing the works (Cottle, 2014).
Slaughter (1997) stated that dangerous construction works include duties where the workers face the potential of fatal injuries during the performance of these works, these works would include lifting heavy objects, working in uncomfortable positions or labour that is physically exhausting. Construction automation aims to minimise these fatal injuries in the construction industry by using machinery/robotics to do the work (Tambi, et al. 2014; Mistri and Rathod, 2015; Momin, et al. 2015; Ruggiero, et al. 2016). This is due to the fact that changes in building are crucial if the construction world is to improve. Therefore, having appropriate alternative construction methods would help manage the intense rapid growth and need of infrastructure that is needed. There are a lot of benefits of using construction automation; therefore, this research project was designed to examine various drivers of integrating and using construction automation in everyday construction works for all relevant parties involved in the construction industry.

INGREDIENTS FOR AUTOMATION IN CONSTRUCTION

Investigating construction activities which can benefit the most from construction automation could be seen as the first step of implementing automation, as this helps identify which areas can and cannot be automated and in turn makes it easier for it to be tackled. Some aspects are significant and will affect the adaptation of the concept (Balaguer and Abderrahim 2008; Mistri and Rathod, 2015; Momin, et al. 2015), these include:

- Construction companies need to change their attitudes, the industry of machines, centres for research and the government Research and Development officials. This is to develop new high-tech commercial products and pass the phase of prototypes.
- Implementing new IT and telecommunication technologies is already changing the work process in all the social segments, including the construction people. Today’s forms of work were unimaginable only a few years ago.
- Adaptation of commercial structures and globalisation of the market introduces a high level of competitiveness in today’s construction section. This means companies need to adopt more efficient and automated means.

Integration

This is a key issue that need to be united, being “from architect’s desk to site robots”. Three actions should be taken into account for this purpose.

- Erection, transportation and different phases of development procedures, considering prefabrication, assembly, acquiring feedback for the designs.
- Assorted qualities of the plan utilising the most elevated number of the comparable standard pre-assembled components, regarding building diverse houses with similar parts.
- Programming institutionalisation which allow the simple and quick information trade between professionals.

Presentation of automation, and even mechanical autonomy, into the construction cycle to enhance performance, require cautious supervision of dangers and commercial imperative needs to be comprehended by the client or his expert.
(professional) advisor at an early stage in the planning procedure (Cusack, 1994; Tambi et al. 2014; Momin, et al. 2015).

Prefabrication

According to Vähä et al. (2013), prefabrication can be described as the practice of assembling and collecting parts of a structure in a plant or other assembling site, and transporting whole assemblies or sub-assemblies to the development site where the structure is to be situated. The term “prefabrication” is utilised to differentiate it from the more ordinary construction routine of transporting essential parts and materials to the site where component manufacture and assembly are done. Expanding this technology would mean covering other materials either than concrete (including composites), and by so it should boost productivity.

According to Kim, et al (2015) as well as Momin, et al. (2015), needed actions may include the following;

- Large scale manufacturing using prefabrication in order to choose the parts from a catalogue. This means a Computer Integrated Manufacturing (CIM) concept must be introduced, including Just in Time (JIT) production.
- Standardisation of the maximum number of parts through the use of grid dimensions, common joints, and connections.
- New materials for prefabricated parts which make them lighter, maintaining the same mechanical features.

Vähä et al. (2012) further stated that automation relating to the prefab construction sector typically falls into one of the three categories:

- The prefab segments making process, (parts, panels, pre-cast, formwork) which manages the development of the building pieces;
- The assembly procedure, in which the building segments are installed to create buildings, houses or structures, by a range of sub-contractors.
- The building business procedures that characterises both the support and business procedures.

Robotics and automated machine

According to Struková and Líška (2013), a range of automation and mechanical autonomy applications in construction robots and automation include three groups: improvement to current building plants and equipment’s, task specific machines, and intelligent or cognitive technologies. Improvement to current building plants and equipment’s can be acknowledged through the connection of sensors and navigational guides, to give enhanced input to the operator (Mistri et al. 2015; Ruggerio, et al. 2016). As soon as the machine positioned in front of the working area, excavating and setting of soil should be done consequently through sensors and controls added to allow program-controlled operation. Laser controls and ultrasound is commonly used. Task specific, dedicated robots, mostly developed in Japan, usually work under tele-operation or program control. The robots perform well defined tasks, they are normally utilised within a particular area of the building procedure. There are several examples in these categories: machines for structural work (concrete work, steelwork positioning and lifting), machines for finishing work (external spraying of walls, wall
or ceiling panel handling and positioning) and machines for maintenance work (window and floor cleaning).

Intelligent machines present the least developed category, most are still under research. Other applications include the Computer Aided Design/Manufacturing (CAD/CAM) technologies, which its application is not only restricted to the design stage but is connected to and supports application in different stages of development (Tambi et al 2014; Momin, et al. 2015). This is also observed where the advancements have been extended to comprise different functions such as project management, planning and scheduling.

Generally, the importance of computer-aided design and assembling systems comprises of three parts: a digital interactive design and investigation environment for making computerised geometric models of the object to be ultimately produced; a computer-aided manufacturing programme wherein the operator stipulates how the computerised design model is to be really made and makes a series of digital instructions for controlling certain machines; and one or more CNC machines and related tools that interpret these digital commands into actual machines operations that make the object (Mahbub, 2012).

The use of machines and highly automated robots is the key issue, since the utilisation of these guarantees high level of efficiency. Part of the main functions are:

- Robots that are easy to utilise. Create durable robots which are anything but difficult to control and program through friendly human machines interfaces.
- Creating cheap robots which cover single type of use, being not general. This allows the increase of sales of the units.
- Increasing the level of automation of machinery that already exists. Adjust the predictable building machines (cranes, compactors, etc) keeping in mind the end goal to change them into robotic/automated systems.

Investments in research and development

More research and created interest in R&C, in essential and applied research through national and universal focused programs, for example EU research frameworks. One of the key objectives has to be targeted also at changing the culture of the operators directly involved in the building procedure, through education and training. Generally, the operators would oppose the introduction of innovation.

There are other factors that are necessary in incorporating automation for construction activities (Tambi et al, 2014; Kim et al. 2015; Mistri and Rathod, 2015; Ruggiero, et al. 2016), they include such things as selecting important applications, economic feasibility studies, prototype development and field testing, conceptual designs, lab testing, pathfinder development, site implementation, training and lastly manufacturing.

RESEARCH METHODOLOGY

Survey design was adopted for this study through the distribution of questionnaire to construction professionals working with construction and consulting firms in Gauteng region of South Africa. These include project managers, quantity surveyors, architects and construction managers. Purposive sampling was adopted by ensuring that
respondents have adequate knowledge of automation and robotics as well as good knowledge of the construction industry.

The questionnaire was designed in two parts: the first address necessary background information while the main part was designed to obtain information from respondents on the drivers of automation in the construction industry. Identified influences from literature were highlighted in a table and 5-point Likert scale was adopted to seek the opinions of respondents. Cronbach alpha value of 0.907 computed for the eighteen identified factors indicate that the adopted instrument and scale were satisfactory in measuring the opinions of respondents. Mean item score (MIS) and standard deviation (SD) were further calculated for each of the identified variables based on the adopted Likert scale, this was used to rank and determine the level of importance of the factors.

FINDINGS AND DISCUSSION

Table 1 shows various factors influencing the adoption of automation in the South African construction industry. A 5-point Likert scale of Strongly Disagree – Strong Agree was used for this question and from the results that were gathered, training and site implementation of automation was deemed the most important factor (MIS=4.03, SD=0.800, R=1). In addition, the results showed that a change of attitude in construction companies (MIS=4.00, SD=0.877, R=2), implementation of new IT and telecommunication technologies (MIS=3.78, SD=0.800, R=3) and manufacturing modular components (MIS=3.75, SD=1.006, R=4) were ranked amongst the top four drivers of CA in the South African construction industry. Other important drivers include such activities as increasing the level of existing machinery (MIS=3.65, SD=0.921, R=7), mass production using prefabrication (MIS=3.65, SD=0.700, R=8), prototype development and field testing (MIS=3.65, SD=0.700, R=8) and prefabrication of building components (MIS=3.63, SD=0.925, R=9). Furthermore, areas such as integration of information during the construction process (MIS=3.50, SD=0.784, R=12), pathfinder development and lab testing (MIS=3.48, SD=0.933, R=13), economic feasibility studies (MIS=3.45, SD=1.011, R=14) and conceptual designs (MIS=3.43, SD=0.874, R=15) were ranked as the least set of factors that would aid the adaptation of CA in the South African construction industry.

Table 1: Drivers of automation in the South African construction industry.

<table>
<thead>
<tr>
<th>Drivers</th>
<th>MIS</th>
<th>SD</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training and site implementation of automation</td>
<td>4.03</td>
<td>0.800</td>
<td>1</td>
</tr>
<tr>
<td>Change of attitude in construction companies</td>
<td>4.00</td>
<td>0.877</td>
<td>2</td>
</tr>
<tr>
<td>Implementation of new IT and telecommunication technologies</td>
<td>3.78</td>
<td>0.800</td>
<td>3</td>
</tr>
<tr>
<td>Manufacturing modular components</td>
<td>3.75</td>
<td>1.006</td>
<td>4</td>
</tr>
<tr>
<td>Frequent use of robots and automated machines</td>
<td>3.73</td>
<td>0.784</td>
<td>5</td>
</tr>
<tr>
<td>Urge companies to adopt more automated and efficient means</td>
<td>3.73</td>
<td>0.751</td>
<td>5</td>
</tr>
<tr>
<td>Investments in research and development</td>
<td>3.68</td>
<td>0.888</td>
<td>6</td>
</tr>
<tr>
<td>Increasing the level of existing machinery</td>
<td>3.65</td>
<td>0.921</td>
<td>7</td>
</tr>
<tr>
<td>Mass production using prefabrication</td>
<td>3.65</td>
<td>0.700</td>
<td>8</td>
</tr>
<tr>
<td>Prototype development and field testing</td>
<td>3.65</td>
<td>0.700</td>
<td>8</td>
</tr>
<tr>
<td>Prefabrication of building components</td>
<td>3.63</td>
<td>0.925</td>
<td>9</td>
</tr>
<tr>
<td>Using easy to use robots</td>
<td>3.58</td>
<td>0.874</td>
<td>10</td>
</tr>
</tbody>
</table>
Table 2 shows the comparison between respondents in contracting and consulting business on the factors influencing CA in the South African construction industry. A 5-point Likert scale of Strongly Disagree – Strongly Agree was used and from the results that were gathered, the professionals in contracting firms ranked the top five factors as increasing the level of existing machinery, implementation of new IT and telecommunication technologies, change of attitude in construction companies, training and site implementation of automation and selecting important applications to be automated. Results from the professionals in consulting firms show that the top five ranked factors are training and site implementation of automation, change of attitude in construction companies, urging companies to adopt more automated and efficient means, frequent use of robots and automated machines as well as manufacturing modular components.

Table 2: Opinions of groups of professionals on drivers of automation in construction.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Contracting</th>
<th>Consulting</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIS</td>
<td>SD</td>
<td>R</td>
</tr>
<tr>
<td>Increasing the level of existing machinery</td>
<td>4.18</td>
<td>0.883</td>
<td>1</td>
</tr>
<tr>
<td>Implementation of new IT and telecommunication technologies</td>
<td>4.18</td>
<td>0.883</td>
<td>1</td>
</tr>
<tr>
<td>Change of attitude in construction companies</td>
<td>4.12</td>
<td>1.166</td>
<td>2</td>
</tr>
<tr>
<td>Training and site implementation of automation</td>
<td>4.12</td>
<td>0.857</td>
<td>2</td>
</tr>
<tr>
<td>Selecting important applications to be automated</td>
<td>4.06</td>
<td>0.748</td>
<td>3</td>
</tr>
<tr>
<td>Investments in research and development</td>
<td>4.00</td>
<td>0.866</td>
<td>4</td>
</tr>
<tr>
<td>Prefabrication of building components</td>
<td>4.00</td>
<td>0.935</td>
<td>4</td>
</tr>
<tr>
<td>Manufacturing modular components</td>
<td>3.88</td>
<td>0.993</td>
<td>5</td>
</tr>
<tr>
<td>Frequent use of robots and automated machines</td>
<td>3.88</td>
<td>0.781</td>
<td>5</td>
</tr>
<tr>
<td>Mass production using prefabrication</td>
<td>3.88</td>
<td>0.600</td>
<td>5</td>
</tr>
<tr>
<td>Integration of information during the construction process</td>
<td>3.88</td>
<td>0.697</td>
<td>5</td>
</tr>
<tr>
<td>Prototype development and field testing</td>
<td>3.82</td>
<td>0.809</td>
<td>6</td>
</tr>
<tr>
<td>Urge companies to adopt more automated and efficient means</td>
<td>3.76</td>
<td>1.033</td>
<td>7</td>
</tr>
<tr>
<td>Globalisation of the market</td>
<td>3.71</td>
<td>0.686</td>
<td>8</td>
</tr>
<tr>
<td>Economic feasibility studies</td>
<td>3.71</td>
<td>1.047</td>
<td>8</td>
</tr>
<tr>
<td>Using easy to use robots</td>
<td>3.71</td>
<td>0.985</td>
<td>8</td>
</tr>
<tr>
<td>Conceptual Designs</td>
<td>3.59</td>
<td>1.004</td>
<td>9</td>
</tr>
<tr>
<td>Pathfinder development and lab testing</td>
<td>3.47</td>
<td>1.007</td>
<td>10</td>
</tr>
</tbody>
</table>

MIS=Mean Item Score, SD=Standard Deviation, R=Rank
Based on the ranking using the calculated MIS and the SD for the listed adaptation factors for CA in the South African construction industry. The results revealed that the dominant factors were; training and site implementation of automation, change of attitude in construction companies, implementation of new IT and telecommunication technologies, manufacturing modular components, and the frequent use of robots and automated machines. Balaguer and Abderrahim (2012) as well as Mistri and Rathod (2016) in their study, mentioned that companies need to change their attitudes and the implementation of new IT and telecommunication technologies which means the findings are in agreement.

Furthermore, using the calculated MIS and SD the results show that the contractors ranked the top five factors as increasing the level of existing machinery, implementation of new IT and telecommunication technologies, change of attitude in construction companies, training and site implementation of automation and selecting important applications to be automated. This is in line with the findings by Momin, et al (2015) and Tambi et al (2014). Results from the professionals show that the top five ranked factors are training and site implementation of automation, change of attitude in construction companies, urge companies to adopt more automated and efficient means, frequent use of robots and automated machines and manufacturing modular components.

CONCLUSION AND RECOMMENDATION

The adoption of fully automated system in the construction industry has various advantages for the level of productivity of workers as well as overall performance of construction projects. The findings from the study show that the top ten factors that need to be taken into account for the adaptation of CA in the South African construction are as follows: training and site implementation of automation, change of attitude in construction companies, implementation of new IT and telecommunication technologies, manufacturing modular components, frequent use of robots and automated machines, urge companies to adopt more automated and efficient means, investments in research and development, increasing the level of existing machinery, mass production using prefabrication and the prototype development and field testing.

The findings from the comparison between the contractors and professionals regarding factors that need to be taken into account for the adaptation of CA in the South African construction industry reveal that the contractors ranked the top five as: increasing the level of existing machinery, implementation of new IT and telecommunication technologies, change of attitude in construction companies, training and site implementation of automation and selecting important applications to be automated. The professionals revealed the top five factors as training and site implementation, change in attitude in construction companies, urge companies to adopt more automated and efficient means, frequent use of robots and automated machines and manufacturing modular components. It is therefore necessary for stakeholders in the construction industry to give attention to various identified drivers of automation in the quest of promoting the concept among clients and contractors. This is a view to ensure optimum use of resources for improved project performance.

The focus of this study are various drivers for general automation of construction activities. Further research can be focused on a form of automation such as building information modelling (BIM), CAD/CAM system, standardisation and prefabrication.
among others. Specific construction activities, processes or types such as residential, building, road, etc. can also be focused for a direct and better understanding of various drivers of automation.

REFERENCES


PRODUCTION & DOCUMENTATION PROCEDURE FOR CONSTRUCTION CONTRACTS AND IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT

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Due to the size of the financial flows involved, public procurement of goods, services and works remains the government activity most vulnerable to waste, fraud and corruption. The construction industry is a unique industry given the nature of its products and the huge financial requirements necessary for the actualization of these products. The role of the industry as an economic regulator cannot be overemphasized as evident in the amount of spending observed in the industry during periods of economic boom or recession; moreover, the product of the construction industry is consumed by virtually every other industry in the economy. To this end, this paper looks at procurement of public projects in the Nigerian construction industry using the experiences of some government Ministries, Departments and Agencies (MDAs) both at Federal and State levels in Anambra state south-east Nigeria together with the major challenges they encounter in using the guidelines provided by the Public Procurement Act 2007 especially with respect to construction products. This paper also attempted to draw a comparison between procurement in the construction industry and other industries in the economy given the nature of the construction industry and its products. The possible role of the Public Procurement Act in ensuring sustainable development was also examined. Data for this research was sourced from 110 respondents comprising members of the Nigerian Institute of Quantity Surveyors Anambra state chapter as well as other Construction industry professionals in the Ministry of Housing and Urban renewal, Faculty of Environment Sciences both at the Nnamdi Azikiwe University, Awka and Federal Polytechnic, Oko all in Anambra State (South East Nigeria) using structured questionnaires. The data collected were analyzed using mean scores and standard deviations. In conclusion, it was obvious that the greatest challenge of public procurement in Nigeria include Political interference in the process of contractor selection as well as Poor screening of technical and financial bids. Given the provisions of the Procurement Act, the authors are also convinced that there is a great need to create specific roles for construction industry professionals; this will ensure the increased utilization of construction industry professionals in the procurement process for public projects and pave way for achieving sustainable development.

Key words: Construction Industry, Economy, Procurement, Public Projects, Sustainable Development.

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INTRODUCTION
The public procurement practice and systems have been acclaimed, based on empirical evidence, as the best means of guaranteeing the provision of public goods to the Citizens and public expenditure management. The Nigerian public procurement practice, before the enactment of the Public Procurement Act, 2007, has been known to be unprofessional, inefficient and ineffective; as it was based on Treasury Circulars of 1958, which provided only guidelines on public expenditure management. The guidelines of these circulars on public procurement practice weregrossly inadequate and created opportunities for malpractices and high level corruption in contract management. According to BMPIU (2005), a diagnostic study conducted in 2001 into the state of Federal to underhand Government public procurement of projects aptly showed that Nigeria may have lost several hundreds of billions of naira over the last couple of decades as a result of flagrant abuse of procedures for award of public contracts, inflation of contract costs, lack of transparency, lack of competence based competition and merit as a fundamental criteria for award of public contracts. Emeka (2007) revealed that 60 kobo was lost out of every 1 naira spent by the government in Nigeria. This necessitated the setting up of the Budget and Monitoring and Price Intelligence Unit (BMPIU) in the Presidency.

On assumption of office in 1999, Chief Olusegun Obasanjo the then Nigerian president observed that the time tested approach for 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 (Ekpenkho 2003). The 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. Specifically, the World Bank was requested to assist Nigerian government with a process of enthroning efficiency, accountability, integrity and transparency in 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 expenditure. At the end of the exercise, two reports namely the Country Report on the Financial Systems and the Country Procurement Assessment Report were produced. According to World Bank (2000), the Country Procurement Assessment Report (CPAR) identified five major weaknesses in the existing procurement system in Nigeria, which includes among others the absence of a modern procurement law and consequent dependence on Finance Act of 1958 which creates room for corruption; the proliferation of tenders boards and inadequate manpower requirement.

Among the recommendations proposed by CPAR which are aimed at correcting the above identified weaknesses was a call for the enactment of a procurement law which would be based on the United Nations Commission for International Trade Law (UNCITRAL) model and oversight and the need to establish a Public Procurement Commission (PPC) to serve as the regulatory body on public sector procurements (World Bank, 2000).

PUBLIC PROCUREMENT ACT 2007
Olawole (2008), described procurement as the acquisition of goods and or services at the best possible total cost of ownership, in the right quantity and quality, at the right time, in the right place for the direct benefit or use of the government, corporations or individuals generally through contract. In Nigeria, public procurement is guided by the provisions of the Public Procurement Act, 2007. This Act established the National council on Public Procurement as the regulatory authority responsible for the monitoring and oversight of Public Procurement, harmonizing existing Government policies and practices by regulating, setting standards and determining the legal framework and professional capacity for public procurement in Nigeria and for related matters (Public Procurement Act, 2007). The Act also established the Bureau of Public Procurement.

Functions of the National Council
According to the PPA (2007), the Council which shall be chaired by the finance minister and have the Director-General of BPP as Secretary shall perform the following functions:
"a. Consider, approve and amend the monetary and prior review thresholds for the application of the provisions of the Act by procuring entities;"
b. Consider and approve policies on public procurement;
c. Approve the appointment of the directors of the bureau;
d. Receive and consider for approval the audited accounts of the bureau of public procurement; and
e. Approve changes in the procurement process to adapt to improvements in modern technology;
f. Give such other directives and perform such other functions as may be necessary to achieve the objectives of this Act.”

Bureau of Public Procurement

The Bureau of Public Procurement (BPP) is an agency established by the Public Procurement Act, 2007. It was established with the objective to:

1. Harmonise existing government policies and practices on public procurement and ensure probity, accountability and transparency in the procurement process;
2. Establish pricing standards and benchmarks;
3. Ensure the application of fair, competitive, transparent, value-for-money standards and practices for the procurement and disposal of public assets and services, and
4. Attain transparency, competitiveness, cost effectiveness and professionalism in the public sector system.”

The BPP is expected to among other things perform the functions of formulating general policies and guidelines relating to public sector procurement for the approval of the council as well as publicising the provisions of the Act and supervising the implementation of established procurement policies by maintaining a national data base of standard prices of tendered items. The BPP also coordinates relevant training programs to build institutional capacity, Prepare and update standard bidding and contract documents, prevent fraudulent and unfair procurement and applying administrative sanctions where necessary.

CONTRACT DOCUMENTATION

Contract documentation refers to all documents which when combined form the basis of the contract including all pre-tender, tender and contractual documentation (www.mbqld.com.au/contracts). The contract documentation will give you sufficient information that will enable you complete the building works and meet the services delivery requirement. George (1997) opined that the essential elements of documentation comprise three documents which define precisely what has to be provided by the contractor on the one hand and what obligations the client has on the other. These three essential documents are conditions of contract, contract drawings and specifications. However, there are other elements of documentation such as the bill of quantities which are considered desirable; while being very useful, they are not contractually essential (George, 1997).

Contract Documents
These imply all written and graphic documents concerning execution of a particular construction contract (www.dictionaryofconstruction.com). Documents that make up contract documentation include:

1. Form of Contract – The form of contract constitutes the formal agreement between the client and the contractor for the execution of the works in accordance with the other contract documents (Seeley, 1979). In the form of agreement, the contractor covenants to construct, complete and maintain the works in accordance with the contract, and the client covenants to pay the contractor at the times and manner prescribed by the contract. The type of contract used will depend on the size and complexity of the proposed project.

2. General Contract Conditions – These define the terms under which the work is to be undertaken, the relationship between the client, consultants and the
contractor. It highlights the legal rights, obligations and rules by which each party must abide and conduct themselves.

3. Special Contract Conditions – As suggested by the name, special conditions that are an extension of the general conditions and apply specifically to the particular project.

4. Bills of Quantities – A bill of Quantities consists of a schedule of items of work to be carried out under a contract, with quantities entered against each item (Seeley, 1979). This refers to a list of materials, parts and labour (together with their costs) that are included in the contract. The BOQ is helpful in valuing variations and assists in preparing project claims.

5. Drawings – These are pictorial representation of the project. Generally, it comprises the Architectural, Structural, Mechanical and Electrical drawings of the building. Contract drawings depict the nature and scope of the work to be carried out under the contract. They are usually prepared to a suitable scale and in sufficient detail to permit a contractor to price the bills of quantities and to carry out the work satisfactorily.

6. Specification – These amplify the information given in the contract drawings and the bills of quantities, it sets out the technical requirement of the work. They describe the project requirement for materials and workmanship and add clarity to the drawings.

THE CONSTRUCTION INDUSTRY

According to Seeley (1984) the construction industry embraces a wide range of loosely integrated organisations that collectively construct, alter and repair a wide range of different building and civil engineering structures. The industry has certain unique characteristics stemming mainly from the physical nature of the construction product and its demand. No two products are identical and site characteristics also vary extensively. Stone (1983) & Seeley (1984) described the construction industry as an industry which is essentially assembly in nature, where the products of other industries are assembled on site. The designer’s intentions are portrayed in drawings and other documents and skilled operatives undertake the work of construction and assembly of components on site. Construction work is usually carried out on site and is therefore subject to the vagaries of the weather and ground conditions.

Oforeh & Alufohai (2006) are of the opinion that the construction industry as a sub-sector of the economy is primarily constituted and functions basically around a quadrangular framework comprising the construction firms, the various professional bodies that operate within it and under the influence of some relevant aspects of the legal system especially those relating to land and property law, the law of torts, law of contract, insurance, arbitration and the client or employer. The construction industry is an important contributor to the economy (Chan & Chan, 2004). A wide range of economic factors influences the extent of activity in the industry and these include the general economic climate, interest rates, credit availability and extent of control of public sector spending. It is generally believed that housing tend to reflect the general position of the industry (Seeley, 1984).

Operational Procedure of the Construction Industry

The construction industry is a major sector of the national economy of any nation; especially less developed countries like Nigeria. The reason is because its products which are infrastructural goods are vital for the effective performance and increased output of other sectors of the economy and the
provision of social capital amenities (Oforeh, 2008). The procedure of price determination of construction goods is one aspect of the industry that makes it radically different from the other industries or sectors of the economy, typically, products are manufactured and prices fixed by the manufacturers before the products enter the market. This implies that production is concluded and price fixed before reaching the customer.

In the construction industry the reverse is the case as illustrated in the table below

**Table 1: Flow diagram for price determination of products in other industries**

<table>
<thead>
<tr>
<th>MANUFACTURER (PRODUCER)</th>
<th>MARKET ENVIRONMENT</th>
<th>END</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESIGN PRODUCT</td>
<td>PRODUCT</td>
<td>FINISHED GOODS</td>
</tr>
</tbody>
</table>

Source: Oforeh (2008)

**Table 2: Flow diagram for price determination of products in the construction industry**

<table>
<thead>
<tr>
<th>MARKET ENVIRONMENT</th>
<th>END</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSUMER</td>
<td>CONSUMER &amp; PRODUCER (Contractor)</td>
</tr>
<tr>
<td>DESIGN THE PRODUCT</td>
<td>PRICE THE PRODUCT (CONTRACT SUM)</td>
</tr>
<tr>
<td>PRODUCER (Contractor)</td>
<td>PRODUCE (Erect) FINISHED GOODS</td>
</tr>
</tbody>
</table>

Source: Oforeh (2008)

The table shown above reflects a comparison of the stages in the process of price determination in the construction industry and other sectors of the economy. Most principles of economic analysis are based on the procedure identified for the other sectors. Other critical factors that differentiate the products of the construction industry from those other industries include:

i. The products of the industry are large and may take time (months or years) to produce, unlike other general items where thousands or millions can be generated within days or weeks.

ii. They are not transferable or movable from one location to another

iii. The consumer of a product is known and also plays a crucial role in the design or nature of the product before production.

**SUSTAINABLE DEVELOPMENT**

According to Cunningham & Cunningham (2004) development means improving peoples lives while sustainable development means extending progress without exhausting scarce resources beyond the foreseeable future. Sustainable development involves maintaining our current rate of development while leaving suitable resources behind for later generations to continue to develop (Encyclopaedia of Sustainable Development).

The guiding principle of sustainable development is the development that meets the need of the present without compromising the ability of the future generations to meet their own needs. Sustainable development recognises the interdependence of environmental, social and economic system. While we cannot be sure of what the future may hold a preferable future is a more sustainable one. It is clear that the keywords in sustainable development are resources and future generations. This implies that while effort are made to save and judiciously utilize scarce resources, effort should also be made to ensure that the needs of the future generation is taken into account by way of ensuring that all developments in the built environment today shall continue to be relevant to future generations.
The whole essence of due process in the award of contracts as specified in the public procurement Act 2007 is to ensure sustainable development; and development can only be sustainable if structures erected today continue to be relevant to the future generations. If structures that are sub-standard in terms of quality, size, use and function are put up today then the implication is that the future generation will instead of focusing on new developmental structures that will improve the built environment still have to spend scarce resources on the sub-standard structure which was put up in the past. This tends to put a hog on the wheels of sustainable development especially for the construction industry.

5.1 Needs Assessment

Needs is an acronym for National Economic Empowerment and Development Strategy. The main purpose of the needs assessment is to identify skills and competency gaps in the required sector and thereafter provide government with recommendations on how the gaps could be addressed. The data gathered would assist the government to establish a matching system to mobilize and channel appropriate resources for national development. Part IV (Fundamental Principles for Procurement) of the PPA 2007, sub section 16(e) identifies one of the fundamental principles for procurement to be “with the aim of achieving value for money and fitness for purpose”. This implies that a project in addition to being financially acceptable also needs to be fit for the purpose for which it is meant. This is where needs assessment comes in. one needs to determine whether a particular project is capable of closing a gap in an establishment before embarking on such projects; this way only projects which are relevant to the requirements at any particular point in time are prioritized.

DATA PRESENTATION & ANALYSIS

This study adopted a descriptive survey research design whose aim according to Nworgu (2006) is to collect data and describe the characteristics, features or facts about a given population in a systematic manner. The population of this study comprises the members of the Nigerian Institute of Quantity Surveyors Anambra state chapter (64), Academic staff of Architecture, Building, Estate management, Surveying and Town planning departments at the Federal Polytechnic, Oko (59) and professional (Built Environment) staff of the Anambra State Ministry of Housing and Urban Renewal (12). This gives a total of one hundred and thirty five (135) persons out of which one hundred and ten (110) persons i.e. 81.48% duly completed and returned questionnaires distributed to them.

The proportionate multi stage sampling technique was adopted for this study. The rationale is in line with the assertion of Nwana (1982) that if the population of study is in a few hundreds that a sample of 40% or more would be required; if many hundreds, a 20% sample and if several thousand a sample of 5%. Since the population of this study amounts to 135 people which is less than a few hundreds, the entire population was selected.

The researchers developed a structured questionnaire titled Research Questionnaire. The instrument consisted of two sections namely an “introduction” and Clusters A, B and C. Cluster A connotes the question “What are the challenges of public procurement in Nigeria”, Cluster B connotes the question “Are there any significant difference between procurement in the construction industry compared to other industries” while Cluster C connotes the question “Can strict compliance to the provisions of the PPA translate to sustainable development”.

Mean scores was employed in answering questions. Limits of real number were used to determine the decision level with the mean range as follows: 0.05 to 1.49 for strongly disagree, 1.50 to 2.49 for disagree, 2.5 to 3.49 for undecided, 3.5 to 4.49 for agree and 4.50 to 5.00 for strongly agree. In analysing data, means greater than 3 implies a positive response while means less than 3 implies a negative response.

Study Question 1: What are the challenges of public procurement in Nigeria?

Fig 1: Bar chart showing the Challenges of Public Procurement in Nigeria
Fig 1 above also shows bar chart displaying the data in table 3. The chart also shows the proportionality of each individual response to the whole.

Table 3: What are the challenges of Public Procurement in Nigeria?

<table>
<thead>
<tr>
<th>S/N</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Mean±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2(1.8)</td>
<td>0(0.0)</td>
<td>2(1.8)</td>
<td>24(21.8)</td>
<td>82(63.1)</td>
<td>4.67±0.69</td>
</tr>
<tr>
<td>2</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>24(21.8)</td>
<td>36(32.7)</td>
<td>50(45.5)</td>
<td>4.24±0.79</td>
</tr>
<tr>
<td>3</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>2(1.8)</td>
<td>84(76.4)</td>
<td>24(21.8)</td>
<td>4.20±0.44</td>
</tr>
<tr>
<td>4</td>
<td>2(1.8)</td>
<td>24(21.8)</td>
<td>2(1.8)</td>
<td>54(49.1)</td>
<td>28(25.5)</td>
<td>3.75±1.12</td>
</tr>
<tr>
<td>5</td>
<td>0(0.0)</td>
<td>24(21.8)</td>
<td>24(21.8)</td>
<td>38(34.5)</td>
<td>24(21.8)</td>
<td>3.56±1.06</td>
</tr>
<tr>
<td>6</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>66(60.0)</td>
<td>28(25.5)</td>
<td>16(14.5)</td>
<td>3.55±0.73</td>
</tr>
<tr>
<td>7</td>
<td>2(1.8)</td>
<td>2(1.8)</td>
<td>72(65.5)</td>
<td>8(7.3)</td>
<td>26(23.6)</td>
<td>3.49±0.93</td>
</tr>
<tr>
<td>8</td>
<td>22(20.0)</td>
<td>16(14.5)</td>
<td>0(0.0)</td>
<td>36(32.7)</td>
<td>36(32.7)</td>
<td>3.44±1.55</td>
</tr>
<tr>
<td>9</td>
<td>22(20.0)</td>
<td>0(0.0)</td>
<td>24(21.8)</td>
<td>38(34.5)</td>
<td>26(23.6)</td>
<td>3.42±1.38</td>
</tr>
<tr>
<td>10</td>
<td>52(47.3)</td>
<td>2(1.8)</td>
<td>4(3.6)</td>
<td>26(23.6)</td>
<td>26(23.6)</td>
<td>2.75±1.74</td>
</tr>
</tbody>
</table>
From the above, selected possible challenges of public procurement in Nigeria were tested and the responses ranked from the challenge with the highest mean to the challenge with the lowest mean. From the responses, political interference in the process of contractor selection with a mean of 4.67 and standard deviation of 0.69 ranked highest while outright disregard for the provisions of the PPA 2007 with a mean of 3.42 and standard deviation of 1.38 had the lowest positive mean (3 and above); these indicate high mean values greater than the test value of 3, confirming the respondents positive response to the items all the positive responses were further ranked (see fig 1 above) by their mean values. However, Lack of trained manpower to handle procurement process has a mean of 2.75 and standard deviation of 1.74 suggesting that this does not constitute any significant challenge to Public Procurement in Nigeria.

Study Question 2: Are there any significant differences between procurement in the construction industry compared to other industries
From the responses received for this question in the field survey, 96 respondents representing 87.3% of the total respondents strongly agree that they are familiar with the nature of the construction industry. 4 (3.6%) agree while 2(1.8%) are undecided. 4(3.6%) of the respondents disagree while another 4(3.6%) strongly disagree. A very high mean of 4.67 and low standard deviation of 0.95 indicates a high level of agreement and low variability of responses respectively. On question 12 under this cluster, 4(3.6%) respondents strongly agree that the principle of procurement applicable in the manufacturing industry for instance should be applicable to the construction industry. 8 (7.3%) agree while 2(1.8%) are undecided. 56 respondents representing 50.9% disagreed while 40 (36.4%) strongly disagreed. A very low mean of 1.91 and low standard deviation of 0.79 indicates a high level of disagreement and low variability of responses respectively.

The above shows that there is significant difference between procurement in the construction industry and other industries in the economy given the nature of the industries and their products.

Study Question 3: Can strict adherence to the provisions of the PPA translate to Sustainable Development
From the field survey, 50 respondents representing 45.5% of the total respondents strongly agree that they are familiar with the extant laws that pertain to public procurement in Nigeria. 48 (43.6%) agree while 10(9.1%) are undecided. 2(1.8%) of the respondents disagree while none of the respondents strongly disagree. A very high mean of 4.33 and low standard deviation of 0.71 indicates a high level of agreement and low variability of responses respectively. On item serial number 14 on the questionnaire, 48 respondents representing 43.6% of the total respondents strongly agree that the provisions of the Act are sufficient for the purpose of sustainable development; 30 (27.3%) agree while 28(25.5%) are undecided. 4(3.6%) of the respondents disagree while none of the respondents strongly disagree. On item serial number 15, 70 respondents representing 63.6% of the total respondents strongly agree that adherence to the provisions of the Public Procurement Act (PPA) in the construction industry will translate to economic development; 32 (29.1%) agree while 8(7.3%) are undecided. None of the respondents disagreed or strongly disagreed. A very high mean of 4.56 and low standard deviation of 0.63 indicates a high level of agreement and low variability of responses respectively.

It can be safely concluded from the above that strict adherence to the provisions of the Public Procurement Act (PPA) will translate to Sustainable Development.

CONCLUSIONS
The challenges of Public Procurement in Nigeria from the outcome of our survey can be ranked in order of significance to include - political interference in the process of
contractor selection, poor screening of technical and financial bid, absence of needs assessment as a pre-requisite for project selection, splitting of contract to keep their value within approval threshold, inadequate information dissemination, Inability of graft agency to prosecute persons found wanting in relation to public procurement offences, Inability of the federal government to inaugurate the Council on public Procurement, Inadequate provision for capacity building for procurement officers and Outright disregard for the provisions of the PPA 2007.

There is a significant difference between the products of the construction industry and other industries as well as the procedure for actualizing these products. The procedure of price determination of construction goods is one aspect of the industry that makes it radically different from the other industries or sectors of the economy, typically, products are manufactured and prices fixed by the manufacturers before the products enter the market. This implies that production is concluded and price fixed before reaching the customer. The reverse is usually the case for the construction industry as prices are fixed and the consumer known before the products are finished.

Obviously, the whole essence of due process in procurement is to ensure sustainable development. Even though there are perceived lapses in the current procurement Act in use in Nigeria. Strict adherence to its provisions as it were can translate to sustainable development as evident in the amount of resources that has been saved since the Act came into operation. The action word here is “strict compliance”. It is also pertinent to mention that true gains cannot be realized from the procurement Act if stiff penalties are not stipulated and indeed seen to be imposed on people who engage in any form of underhand practices during the procurement of public projects no matter how highly placed they are.

In order to achieve the value for money and fitness for purpose provision of the Nigerian Public Procurement Act; the issue of the National Economic Empowerment and Development Strategy (NEEDS) assessment must be taken seriously. Before embarking on any project, it is important to determine what one needs at a particular point in time in order to decide whether a particular project is capable of closing a gap in an establishment. That way, only projects which are relevant to requirements at any particular point in time are prioritized.

This research shows that there no lack of trained manpower to handle procurement process in the Nigerian construction industry. However, there is a need for the Procurement Act to assign specific roles for construction industry professionals if sustainable development is desired; this way, procurement process as well as subsequent post contract services will be entrusted to suitably qualified professionals there by discouraging the current “anybody will do mentality” currently witnessed in the sector. There should also be prescribed sanctions for any professional found wanting in the discharge of statutorily assigned roles.

REFERENCES


HEALTH AND SAFETY MANAGEMENT FOR CONSTRUCTION PROJECTS IN NIGERIA: CONTRACTORS’ PERSPECTIVE

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2. Associate Professor and Head, Sustainable Human Settlement and Construction Research Centre, Department of Construction Management & Quantity Surveying, University of Johannesburg, South Africa

Against the backdrop of the increased cases of fatalities resulting from accidents and injuries on the construction site, this study investigates the state of H&S management practice by Nigerian contractors handling construction projects in the Niger Delta region. The specific objectives are to examine the frequency of various types of accidents on construction sites, assess the significant factors responsible for construction site accidents and mishaps, and examine the level of compliance to health and safety measures on construction sites. Using three strategic cities in the Niger Delta region, a quantitative field survey involving distribution of structured questionnaire to sample of 100 contractors was carried out. 65 respondents returned valid responses giving a cumulative response rate of 65%. Data collected were analysed using descriptive statistics. Findings among others reveal that the most common types of accidents on construction sites are fall from scaffolds and ladders, building collapse and fall from heights as the top three ranked accidents on construction sites. The study also reveals that unsafe working conditions, lack of provision of safety measures, workers’ negligence, poor maintenance of equipment, and lack of adequate supervision are the 5 top rated factors in that order. The results on the level of compliance to H&S management practices by contractors shows that availability of first aid on site ranked first, followed by provision of PPEs for workers and H&S risk management. The study recommends among others, that government and stakeholders in the construction industry should put in place necessary mechanisms by way of enacting and enforcing local regulations and legislations that could bolster best practice H&S management among construction workers in Nigeria.

Key words: Site accidents, Causes of accidents, H&S management practices, Contractors, Nigeria

INTRODUCTION

The construction industry worldwide is reputed to be one of the most hazardous places to work. This is due to the poor health and safety (H&S) performance of the industry which has continued to be a source of international concern (Haslam et al., 2005). The statistics is alarming. McKenzie et al. (1999) had in the recent past revealed that the industry alone produced 30% of all fatal industrial accidents across the European Union (EU), yet it employs only 10% of the working population. According to OSHA (1990), there are 60,000 fatal accidents annually on construction sites around the world. In the UK, although

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there is a measurable trend of H&S improvements (Manu et al., 2014), it is still said to be one of the worst industries in term of H&S performance (HSE, 2011). The economic cost has been huge in terms of depletion of the world’s gross domestic product (GDP). Agwu and Olele (2014) reported that it cost the United States 1.5% of GDP in 1998 and UK 2.6% of GDP. This situation is far from being better in the developing economies like Nigeria. As with other developed economies, construction is vital to its economic development which is why it produces nearly 70% of the nation’s fixed capital formation and accounts for 1.4% of the country’s GDP (VETITA, 2011, World Bank, 2013). However, the Nigerian construction industry has witnessed increased cases of H&S fatalities as statistics have indicated that there are 8 to 9 times as many construction related fatalities and accidents in developing countries as what is obtainable in Europe, US and Australia (Bust et al., 2004). This include falls from heights, struck by moving vehicles and flying objects during machine lifting of materials including concrete (Olutuase, 2014). Others are exposure to chemical, biological and physical hazards, and building collapse during construction, all of which have had unimaginable consequences on the nation’s economy. Expectedly, this is considered unacceptable and cannot improve the H&S status of the industry.

Nigeria has been unable to leverage on successes in H&S management from most other developed countries especially what is obtainable in Britain and America who have served as point of reference to other countries. Plausibly the reason could be as a result of unavailable and if available very unreliable data and statutory regulations on H&S to guide stakeholders especially contractors who are now left to use their intuition on such critical issues (Idoro, 2008). The consequence is that researchers are not able to build a robust and reliable body of knowledge that could bolster H&S performance while workers will continue to be constantly injured, maimed or even killed on site. Nevertheless, although previous studies have examined the concept of H&S management from Nigeria’s perspective, many gaps exist. For instance, Idoro (2008) examined the correlates of H&S management constructs on performance, Olutuase (2014) assessed performance level of installed safety management systems existing in the Nigerian construction industry, while Agwu and Olele (2014) examined nature of fatalities in the Nigerian construction industry from the perspective of safety culture. Most of these studies have their limitations. None of these studies have examined level of compliance to health and safety rules from the perspective of contractors. Although Idoro (2008) opined that contractors commit little resources to maintaining healthy and safe construction work environment, it is yet to be tested empirically. Diugwu et al. (2012) argued that in Nigeria as in many developing economies, statutory regulations capable of ensuring adoption and implementation of health and safety management systems by organisations seem inadequate or ineffective and this results in a general lack of awareness on important health and safety issues among Nigerian construction workers. This study builds on this by arguing that the issue of frequency of accidents and factors responsible for the rate of accidents among construction workers have not been examined empirically from the perspective of the oil rich Niger Delta. It is an area that plays host to major multinational, national and local construction companies who patronise multinational oil exploration and services firms on account of oil, the main stay of the nation’s economy. The volume of construction activities coupled with volatility and youth restiveness in the area make it highly vulnerable to incidents of injuries and accidents on construction site, hence the need for the study.

Given the background above, the study contained in this paper aims to investigate the state of H&S management practices in Nigeria. The specific objectives are to (1) examine the frequency of various types of accidents on construction sites, (2) assess the significant factors responsible for construction site accidents and mishaps, and (3) examine the level of compliance to health and safety measures on construction sites in three strategic states of Niger Delta. It is hoped that the outcome of the study will create awareness about best practice H&S management practices thereby improving the level of compliance to health and safety measures and ultimately bolster H&S performance. It will provide workable strategies for the implementation of health and safety plan on public building projects which can be generalised and used to triangulate research from other parts of the country.

LITERATURE REVIEW

Health and safety management practices

H&S management in the construction industry describes the process put in place by the contractor to mitigate the risk of injuries and accidents on a construction site. Alberta Labour (2011) classified H&S management practices at the work place into 8 components. These attributes include (1) identification and analysis of health and safety hazards at the work site (2) control measures to eliminate or reduce the risks to workers from hazards (3) clearly demonstrated and management commitment, and written
company policy (4) worker competency and training (5) inspection program (6) emergency response planning (7) incident reporting and investigation, and (8) management system administration. Although the practice components can be replicated in the construction industry, a research fully devoted to a construction site would give it a proper perspective. In an attempt to correlate H&S efforts with H&S performance on a construction site, Idoro (2008) conceptualised 6 attributes to measure H&S practices. These include compliance with H&S regulations, provision of H&S facilities, structures for managing H&S in head office, structures for managing H&S on site, provision of PPE and provision of H&S incentives. While the identification of these measures was an interesting contribution, this study builds on that body of knowledge by quantifying the level of compliance to these attributes by contractors in the study area.

Nature of site accidents and mishaps

Researchers have consistently argued that the construction worker is three times likely to be killed and twice as likely to be injured as workers in other occupations (Agwu and Olele, 2014). Some of the metrics found in the literature for measuring site accidents include falls from height, struck by something collapsing or overturning, struck by a moving vehicle, contact with electricity or electrical discharge, struck by flying/falling object during machine lifting of materials, contact with operating machinery or material being machined, exposure to hot or harmful substance or fire outbreak that engulfed their entire office premises (Idoro, 2004; Olutuase, 2014; Okoye and Okolie, 2014). According to ILO (2005), some other common personal physical hazards include: (1) Struck by falling objects, (2) Eyes endangered by sharp objects, particles, chemicals, (3) Skin damaged by sharp objects, chemicals; (4) Limbs or body crushed by heavy objects; (5) Struck by moving plant and equipment; (6) Hearing damaged by excessive noise; (7) Respiration impaired by poor air supply, particles, chemicals; (8) Physical damage caused by heat, cold, weather; (9) Physical damage caused by falls, trips, slips. Other types of construction site accidents identified from the literature include scaffold accidents, accidents due to slips, trips and falls, crane accidents, ladder accidents, electrocution and electrical accidents (Toole (2002); Abdulhamid and Abdmajid, 2008; Agwu and Olele, 2014).

While the common accidents have been clearly identified in the studies above, one argues that objective assessment of the nature of these accidents as they apply to the volatile oil rich Niger Delta area have not been carried out ostensibly due to lack of reliable data in the past. This is the intent of this study.

Factors Responsible for Site Accidents

Some of the factors responsible for construction site accidents as found in the literature are; unsafe working conditions or work environment, inappropriate use of tools and devices, lack of provision of safety measures by management, non-compliance to safety rules and regulations, lack of adequate supervision, lack of workers’ knowledge and skills, negative attitude of workers, improperly maintained and inadequate scaffolding (Aniekwu, 2007; Kadiri et al., 2014; Haslam et al., 2005). Besides, HSE (1988) identified causes of accidents to include failure to ensure safe systems of work, poor maintenance, poor supervision and training. Other factors include lack of awareness by workers, lack of concentration at work, and error in judgement (Kadiri et al., 2014). Whittington et al. (1992) in an in-depth analysis identified headquarter, site and individual factors as classifications of causes of accidents on construction site but quickly admitted limitations of the study to be small number of sampled accidents and incomplete information found in accidents records. Abdulhamid and Abdmajid (2008) worked on the Malaysian perspective and identified causes of accidents to include workers’ negligence, failure of workers to obey work procedures, work at high elevation, operating equipment without safety devices, poor site management, harsh work operation, low knowledge and skill level of workers, failure to use personal protective equipment and poor workers attitude about safety. Chi et al. (2005) examined 621 occupational fatal accidents in Taiwan and identified causes of accidents on construction sites to include lack of complying scaffold/platforms, unguarded openings, and lack of fixed barrier openings. Aulin and Agren (2012) analysed fatal and non-fatal accidents in Sweden and identified causes of accidents on construction sites to include loss of control, fall of person; collapse, fall, and breaking of materials; physical strain/pressure, electrical problems, fire and explosion; leak, outflow and overflow; shock, fright, violence, aggression and threat. While the intrinsic factors responsible for construction accidents have been identified above, we argue that full range of factors based on empirical analysis that addresses the peculiarity of the Niger Delta have been largely ignored in past studies.
RESEARCH METHODOLOGY

The study attempts to ascertain the significant factors responsible for accidents on the site and how they influence frequency of occurrence of identified nature of accidents. It also seeks to examine how the level of compliance to H&S practices has impacted frequency of occurrence of the accidents in the study which ultimately impacts H&S performance. Three groups of variables were used for the study. They include nature of accidents (7), factors responsible for accidents (20), and H&S practice (7).

In line with objectives of the study, a quantitative field survey involving distribution of structured questionnaire to sample of 100 contractors (RV=40, CR=30, AKW=30) handling major public construction projects in the Niger Delta states of Rivers, Cross River, and Akwa Ibom was carried out. The sample was drawn from the population of certified contractors in the data base of the Federation of Construction Industry of Nigeria (FCIN), which is the umbrella body of construction contractors in Nigeria. The sample which covered both multinational and indigenous contractors was selected by stratified sampling. Target respondents who are representatives of the contractors included project managers, site supervisors, and H&S managers. Efforts were made to ensure that only those who have specific knowledge of H&S provisions at their construction sites were used for the study. A total of 65 valid copies of the questionnaire (RV=30, CR=10, AKW= 25) were retrieved to give a cumulative response rate of 65%.

The questionnaire was divided into four parts. Section A captured the respondents’ demographic data (area of specialisation, qualification, job description, and years of experience). Section B contained structured questions on common types of accidents. Respondents were asked to rate frequency of occurrence of the accident types using a 5 point Likert scale that ranged from the lowest of 1=very low to the highest of 5=very high. Section C contained structured questions on factors responsible for high rates of accidents where respondents were asked to rate their level of agreement on a 5 point Likert scale that ranged from the lowest of 1=strongly disagree to the highest of 5=strongly agree. Section D was on H&S management practices where respondents were asked to rate the level of compliance of their firms to the practices on construction site using a scale of 1=poor, 2=fair, 3=average, 4=good and 5=excellent. Before administering the questionnaire, copies were piloted to 5 academics in the field of H&S management while group discussion section was held with 4 practitioners in the field of H&S to scrutinise contents of the questionnaire. The outcome of the pilot led to among others inclusion of “building collapse during construction” as types of accidents on the construction site. Data collected were analysed using basic descriptive and inferential statistical tools while Statistical package for social sciences (SPSS) version 22 was used to process the analysis.

RESULTS AND DISCUSSION OF FINDINGS

Ranking of types of accidents on construction site

In order to examine the frequency of occurrence of accidents on the construction site, respondents were requested to rate their companies’ view using a 5 point scale of 1 to 5, the highest being 5 and the lowest being 1. The results of analysis are presented in table 1.

Table 1: Result of analysis of types of accidents on the construction site

<table>
<thead>
<tr>
<th>Type of Accidents</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall from scaffolds &amp; ladders</td>
<td>4.385</td>
<td>0.804</td>
<td>1</td>
</tr>
<tr>
<td>Building collapse during construction</td>
<td>4.339</td>
<td>0.957</td>
<td>2</td>
</tr>
<tr>
<td>Fall from heights</td>
<td>3.831</td>
<td>1.069</td>
<td>3</td>
</tr>
<tr>
<td>Struck by falling objects</td>
<td>3.815</td>
<td>1.059</td>
<td>4</td>
</tr>
<tr>
<td>Skin damage by objects &amp; chemicals</td>
<td>3.739</td>
<td>1.094</td>
<td>5</td>
</tr>
<tr>
<td>Crushed by heavy objects</td>
<td>2.954</td>
<td>1.124</td>
<td>6</td>
</tr>
<tr>
<td>Electrocution &amp; electrical accidents</td>
<td>2.831</td>
<td>1.193</td>
<td>7</td>
</tr>
</tbody>
</table>

The results indicate that “fall from scaffolds and ladders” ranked first in contractor’s perception of the frequency of occurrence of accidents on construction sites. Building collapse ranked second, while “fall from heights” ranked third. Struck by falling objects ranked fourth while “skin damage by objects and chemicals” ranked fifth. The two least ranked accidents were “crushed by heavy objects” at the sixth and “electrocution and electrical related accidents” at the seventh position.
Factors responsible for construction site accidents

In order to achieve this objective, a group of factors responsible for construction related accidents were sourced from the literature and subjected to the views of respondents. They were asked to rate the factors using a 5 point scale of between 1 = strongly disagree and 5 = strongly agree in which 1 is the least weighted while 5 is the highest weighted. The results of the analysis is shown in table 2.

Table 2: Results of analysis for factors responsible for construction-related accidents

<table>
<thead>
<tr>
<th>Code</th>
<th>Variables</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>F004</td>
<td>Unsafe working conditions</td>
<td>4.600</td>
<td>0.806</td>
<td>1</td>
</tr>
<tr>
<td>F008</td>
<td>Lack of provision of safety measures</td>
<td>4.523</td>
<td>0.773</td>
<td>2</td>
</tr>
<tr>
<td>F007</td>
<td>Workers’ negligence</td>
<td>4.339</td>
<td>0.853</td>
<td>3</td>
</tr>
<tr>
<td>F002</td>
<td>Poor maintenance of equipment</td>
<td>4.231</td>
<td>0.948</td>
<td>4</td>
</tr>
<tr>
<td>F005</td>
<td>Lack of adequate supervision</td>
<td>4.077</td>
<td>1.108</td>
<td>5</td>
</tr>
<tr>
<td>F015</td>
<td>Use of substandard materials</td>
<td>4.061</td>
<td>1.059</td>
<td>6</td>
</tr>
<tr>
<td>F003</td>
<td>Lack of proper H&amp;S training</td>
<td>3.861</td>
<td>0.933</td>
<td>7</td>
</tr>
<tr>
<td>F001</td>
<td>Non-compliance to H&amp;S rules</td>
<td>3.846</td>
<td>1.278</td>
<td>8</td>
</tr>
<tr>
<td>F013</td>
<td>Error in judgement by workers</td>
<td>3.677</td>
<td>1.312</td>
<td>9</td>
</tr>
<tr>
<td>F009</td>
<td>Low maintenance &amp; Inadequate scaffolding</td>
<td>3.415</td>
<td>1.298</td>
<td>10</td>
</tr>
<tr>
<td>F011</td>
<td>Lack of awareness</td>
<td>3.154</td>
<td>1.265</td>
<td>11</td>
</tr>
<tr>
<td>F014</td>
<td>Bribery &amp; corruption</td>
<td>3.153</td>
<td>1.301</td>
<td>12</td>
</tr>
<tr>
<td>F010</td>
<td>Attitude of workers towards H&amp;S</td>
<td>3.092</td>
<td>1.128</td>
<td>13</td>
</tr>
<tr>
<td>F012</td>
<td>Weak regulation by government agencies</td>
<td>3.046</td>
<td>1.268</td>
<td>14</td>
</tr>
<tr>
<td>F006</td>
<td>Poor weather conditions</td>
<td>2.831</td>
<td>1.112</td>
<td>15</td>
</tr>
</tbody>
</table>

The results indicate that unsafe working conditions, lack of provision of safety measures, workers’ negligence, poor maintenance of equipment, and lack of adequate supervision were the 5 top rated factors. Poor weather conditions, weak regulations by government agencies, attitude of workers, towards H&S, bribery and corruption, and lack of awareness were rated as the least 5 factors in that order. However, a benchmark of 3 which is (1+2+3+4+5)/5 was used to decide the significant factors. It is a method adopted in previous studies such as Ikediashi et al. (2012), Chileshe and Kikwasi (2014) and Ikediashi and Ogunlana (2015). In a study to assess the significant risk factors influencing outsourcing decision for facilities management services in Nigeria’s public hospitals, Ikediashi and Ogunlana (2015) used a benchmark of 5 which (1+2+3+4+5+6+7)/7 to identify the significant risk factors. Therefore, the decision is that any factor with mean value greater than or equal to the benchmark of 3 is significant. To this end, 14 out of 15 factors used for the study were significant in explaining the factors responsible for accidents on the construction site from the contractors’ perspective.

Level of compliance to H&S management practices

The objective of examining the level of compliance to H&S management practices by sampled contractors involved asking respondents to rate the practices using a scale of 1 to 5, the highest being 5 and the lowest being 1. The results of analysis are presented in table 3.

Table 3: Results of analysis of level of compliance to H&S practices by contractors

<table>
<thead>
<tr>
<th>Code</th>
<th>H&amp;S Management Practices</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOC7</td>
<td>Availability of first aid on site</td>
<td>4.062</td>
<td>1.059</td>
<td>1</td>
</tr>
<tr>
<td>LOC5</td>
<td>Provision of PPE for workers</td>
<td>3.677</td>
<td>1.312</td>
<td>2</td>
</tr>
<tr>
<td>LOC1</td>
<td>H&amp;S risk management</td>
<td>3.415</td>
<td>1.297</td>
<td>3</td>
</tr>
<tr>
<td>LOC6</td>
<td>Availability of emergency procedures</td>
<td>3.154</td>
<td>1.302</td>
<td>4</td>
</tr>
<tr>
<td>LOC3</td>
<td>Availability of H&amp;S training &amp; incentives</td>
<td>3.153</td>
<td>1.265</td>
<td>5</td>
</tr>
<tr>
<td>LOC2</td>
<td>Provision of welfare facilities</td>
<td>3.092</td>
<td>1.128</td>
<td>6</td>
</tr>
<tr>
<td>LOC4</td>
<td>Compliance to H&amp;S regulations</td>
<td>3.046</td>
<td>1.267</td>
<td>7</td>
</tr>
</tbody>
</table>

Results from table 3 indicate that “availability of first aid on site” ranked first, followed by “provision of PPEs for workers” at the second place. H&S risk management was ranked third while “availability
of emergency procedures” was ranked fourth. Provision of welfare facilities and compliance to H&S regulations were the least rated at sixth and seventh respectively.

Discussion of findings

The results of this study reveal that “fall from scaffolds and ladders”, “building collapse” and “fall from heights” are the top three ranked accidents on construction sites. This is consistent with past studies of Toole (2002), Abdulhamid and Abdmajid (2008) and Agwu and Olele (2014). Nigeria has witnessed several fatalities arising from falls and building collapse and could be attributable to several factors which is a subject of the second objective of this study. It is worth reiterating that building collapse in Nigeria has remained unabated with obvious devastating consequences on the socio-economic development of the people. According to Windapo and Rotimi (2012), over 112 incidents of building collapse were reported in Lagos alone between December, 1978 and April, 2008. The trend has continued to rise even in the Niger Delta where the collapse of a church building under construction in Uyo, Akwa Ibom state led to the death of over 100 worshipers (Punch, 2016). However, the study also reveals that accidents resulting from electrocution and electrical installations as well as those from crushed by heavy objects are not common in the Niger Delta region.

H&S literature has established several factors as being responsible for cases of accidents and injuries on the construction site. However, findings from this study which mirrored on Nigeria’s perspective reveals that unsafe working conditions, lack of provision of safety measures, workers’ negligence, poor maintenance of equipment, and lack of adequate supervision were the 5 top rated factors in that order. Poor weather conditions, weak regulations by government agencies, attitude of workers, towards H&S, bribery and corruption, and lack of awareness were rated as the 5 least rate factors in that order. This is consistent with several studies. For instance, Abdulhamid and Abdmajid (2008) observed that unsafe working condition which include wrong procedures and work styles has led to several accidents in Malaysia. One argues that this, together with inability to provide workers with safety measures, poorly maintained plants and equipment as well as poor supervision of workers are clear responsibilities of the contractors who are the employers. It is therefore not surprising that previous research has acknowledged the important influence managers and supervisors (employers’ representatives) can have on safety of workers (Heinrich et al., 1980; Simard and Marchand, 1994; Haslam et al., 2005). It is also apparent from this research that poor weather conditions, and surprisingly weak regulations on account of endemic bribery and corruption are not top priority factors according to the view of the respondents.

This could be attributed to the fact that (1) there has been few if any cases of construction accidents resulting from adverse weather conditions in Nigeria, and (2) H&S regulations, practices and structures are non-existent in the Nigerian construction industry unlike other sectors such as manufacturing industry (Idoro, 2008).

The results on the level of compliance to H&S management practices by contractors shows that “availability of first aid on site” ranked first, followed by “provision of PPEs for workers” at the second place and H&S risk management at the third. Although the finding is encouraging given the effects it potentially has on H&S performance, the Nigerian contractor is primarily concerned with profit which is why these efforts have had no significant impact on injuries and accidents on construction site. The findings that “availability of emergency procedures”, “provision of welfare facilities” and “compliance to H&S regulations” were the least rated is an indication that contractors have not been effective in the critical area of providing site welfare facilities for their workforce. The dual issues of emergency procedures and compliance to H&S regulations is a problem facing the country on account of infrastructure challenge.

CONCLUSION

The study revealed that the most common types of accidents on construction sites are “fall from scaffolds and ladders”, “building collapse” and “fall from heights” as the top three ranked accidents on construction sites. It also revealed that unsafe working conditions, lack of provision of safety measures, workers’ negligence, poor maintenance of equipment, and lack of adequate supervision were the 5 top rated factors in that order. The results on the level of compliance to H&S management practices by contractors showed that “availability of first aid on site” ranked first, followed by “provision of PPEs for workers” at the second place and H&S risk management at the third.

More is now known about the most common cases of construction accidents and the significant factors responsible for such accidents. Besides, the study has built on previous knowledge on H&S on the construction site by providing insights into the level of compliance to H&S management practices by
contractors from the Niger Delta region of Nigeria which can now be a basis for comparison with other parts of the world. Although there is a low level of efforts when it comes to H&S on the construction sites in Nigeria, there is the need for the right synergy among the various professional bodies and government agencies concerned to work towards improving H&S for all sectors including the construction industry. Accordingly, government and stakeholders in the construction industry should put in place necessary mechanisms by way of enacting and enforcing local regulations and legislations that could bolster best practice H&S management among construction workers in Nigeria. Enacting the National Building Code (NBC) will be an encouraging step to kick-start it. Besides, government could also consider launching an advocacy towards zero accidents policy, and make a case for reference to H&S key performance indicators (KPIs) while considering contractor selection during the procurement process. It is expected that this will potentially bolster H&S performance. This is because contractors who have clear responsibilities for H&S policy formulation, execution, monitoring and evaluation using the KPIs are selected for construction projects. A major limitation of this study is that it relied on responses based on perceptions rather than actual practices and other hard data. A case study research involving collection of hard archival data is suggested to triangulate the outcome of the study.

REFERENCES


HSE (2011), Construction Work Related Injuries and Ill Health, HSE, Liverpool.


END
EFFECT OF CAMERA CALIBRATION ON THE ACCURATE GENERATION OF DIGITAL ELEVATION MODELS FROM UAV ACQUIRED LOW PERCENTAGE OVERLAPPING IMAGES

Oluibukun Gbenga Ajayi, Ifeanyi Jonathan Nwadialor, Ifeanyi Chukwudi Onuigbo, and Olurotimi Adebowale Kemiki.

Using low percentage overlapping images (15-20% sidelap and endlap) acquired from a DJI Phantom 3 Quadcopter UAV, and a 4K resolution digital camera (FC300X), an attempt has been made in this research to investigate the impact of camera calibration on the accuracy of Digital Elevation Models (DEMs) using four (4) possible case scenarios which are: (1) Processing without calibration, (2) Processing with calibration before optimization of camera alignment, (3) Processing with calibration during optimization of camera alignment and (4) Processing with calibration after optimization of camera alignment. The images were processed using Agisoft photoscan digital photogrammetric software. Eastings, Northings and Height coordinates of ground control points were extracted from the DEM generated based on these four conditions and compared with the coordinates of the same points established using Hi-Target Differential Global Positioning System (DGPS) receivers. Using the National Standard for Spatial Data Accuracy (NSSDA), the result obtained showed that though the impact was quite trivial on the Eastings and Northings coordinates extracted from the DEMs produced under these four camera calibration conditions (each producing a horizontal accuracy of 0.003786) and more evident on the height values, DEM generated by calibrating the camera before optimization of camera alignment yielded the best accuracy (with vertical accuracy of 0.08956) when compared to the other three conditions. It is thus recommended that the operation of camera calibration be performed before the optimization of camera alignment when processing UAV acquired image data for DEM production using Agisoft photoscan digital photogrammetric software.

Keywords: Camera calibration, UAV photogrammetry, 3D Elevation Models, Camera alignment, Calibration parameters, Optimization.

INTRODUCTION

Digital elevation models (DEMs) are vital resources for various applications such as climate impact studies, water and wildlife management, geological and hydrological modelling, geomorphology and landscape analysis, earth modelling etc. (Sulebak, 2000). They can be described as spatially geo-referenced data set, that continuously represent or depict

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the topography of an area effectively by elevation values and snapshot of landscape features (Isioye and Paul, 2011). They can be produced from aerial photographs (Toz and Erdogan, 2008) and satellite images (Bolstad and Stowe, 1994), etc.

With the gradual influx of technology in virtually all facets of human endeavours, photogrammetry has become more globally developed, migrating from the old age-long analogue method of data acquisition and processing to digital and computerised form. The Unmanned Aerial Vehicle (UAV) has greatly thrived on the wings of technology, providing a high scale, time-effective and low-cost facility for earth monitoring (Fonstad et al., 2013; Sammartano and Spanò, 2016). Its application is fast gaining wide and public acceptance in almost all fields of human endeavours, most especially in physical sciences (Ajayi et al., 2017), and when related more specifically to photogrammetry, it has led to photogrammetry (Birute et al., 2014).

Camera calibration is one of the major steps involved in the photogrammetric processing of overlapping images for the production of DEMs (Weng et al., 1992). It is the process of finding the internal characteristics of an auto camera and finding the camera's location in space with respect to a fixed object. This is very essential when lens distortion is to be corrected or the size of the object in world units is to be measured. Cameras can be calibrated beforehand, after the flight (Anuar, 2011) or through the flight mission (Eisenbeiss, 2009) in order to extract metric information from the 2D images (Zhang, 2004), correct for lens distortion, measure the size of an object in world units, or determine the location of the camera in the scene. Norhadija et al. (2013) also opined that camera calibration is expedient if accurate and reliable measurements or results must be obtained when using UAV for environmental or photogrammetric applications.

Many calibration methods have been developed in the last couple of years (Zhang et al., 2010; Douskos et al., 2007) but most of these methods do not experiment with UAV acquired images (Pérez et al., 2011). Ahmad et al. (2017), presented the result of investigating the accuracy of camera calibration at various UAV flying heights using a Sony NEX6 digital camera, 1.5m camera distance in the laboratory, 15m and 25m camera distances on the field with the most accurate camera parameters obtained from the 25m flying height which is also the optimum object distance. Fryskowska et al. (2016) experimented Image Master Calib, MATLAB - camera calibrator application and Agisoft Lens using Sony NEX 5 digital camera. The findings showed that Agisoft lens which automatically generates large numbers of tie points (Wierzbicki et al., 2015), based on Structure from Motion (SFM) algorithms (Westboy et al., 2012), using the Semi-Global Matching (SGM) algorithm (Hirschmüller, 2005) and Scale Invariant Feature Transform (SIFT) operator (Lowe, 2004), and also has the ability to perform self-calibration, gave optimal results together with the Image Master calib.

Thus, by extension, this research investigated the implication of not calibrating the camera, calibrating before the optimization of camera locations, calibrating during the optimization of camera locations and calibrating after the optimization of camera locations during the photogrammetric processing of UAV acquired images for DEM generation.

The imaging (study) area
The imaging area is part of the main campus of the Federal University of Technology (FUT), situated in Minna, Niger state, Nigeria. Geographically, the area lies between the boundaries of Northings 1055093.867mN and 1054587.539mN, and Eastings 217981.805mE and 220613.904mE. It can be better described as a stretch from the University’s Computer Based Test Center to the School of Agriculture and Agricultural Technology (SAAT) complex, encompassing the School of Environmental Technology (SET) and the University’s convocation square (see Figure 1), covering an approximate area of 11 hectares. The terrain configuration is relatively gentle and flat.
**METHODOLOGY**

The methodology adopted is subdivided into three major components viz: reconnaissance and flight planning, image data acquisition and image processing for DEM generation. During the reconnaissance, four ground control points (GCPs) were discovered to have been previously established within the study area (GPS3, GPS6, GPS7 and GPS 12) with the aid of a High-target DGPS receiver unit. Insitu test was conducted on these GCPs and they were found to be in true position. Since these four GCPs are not sufficient, thirteen (13) more control points were also established using the same DGPS receivers, bringing the total number of GCPs to seventeen (17). The GCPs were pre-marked with reflective materials for easy identification before the flight mission. These control points were established for georeferencing, optimization of camera locations and assessment and validation of the DEMs’ accuracy. DJI Phantom 3 professional; a rotary wing quadcopter UAV (see Figure 2 and Table 1 for its characteristics) was used for the image data acquisition in manual flight mode. The UAV was equipped with 12 megapixels, focal length of 2.8mm, and 4K resolution DJI FC300X camera. The camera has RGB band and operates in both manual and auto mode. The Quadcopter is powered by four (4) powerful brushless motors, with the arm span of 0.5m and weighs approximately 1.25kg including a payload of 0.75kg. To ensure a smooth and a safe flight mission, a pre-flight test was carried out to ascertain that every part of the UAV system functions properly and also, a flight plan (see figure 3) was designed to ensure total coverage of the entire imaging area and at the desired percentage overlap.
Figure 3: Flight map showing flight lines and direction of flight of the flight mission.

### Table 1: The characteristics of the used UAV

<table>
<thead>
<tr>
<th>AIRCRAFT</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (including battery and propellers)</td>
<td>1280g</td>
</tr>
<tr>
<td>Diagonal size (Excluding propellers)</td>
<td>350mm</td>
</tr>
<tr>
<td>Max Ascent Speed</td>
<td>5m/s</td>
</tr>
<tr>
<td>Max Descent Speed</td>
<td>3m/s</td>
</tr>
<tr>
<td>Max Speed</td>
<td>16m/s (ATTI mode, no wind)</td>
</tr>
<tr>
<td>GPS Mode</td>
<td>GPS/GLONASS</td>
</tr>
<tr>
<td>Max Flight Time</td>
<td>Approximately 23 minutes</td>
</tr>
</tbody>
</table>

**CAMERA**

- Sensor: Sony EXMOR 1/2.3’’ Effective pixels: 12.4 M (total pixels: 12.76 M)
- Lens: FOV 94° 20 mm f/2.8, focus at ∞
- Photo: JPEG, DNG

**GIMBAL**

- Controllable Range: Pitch -90° to +30°
- Stabilization: 3-axis (pitch, roll, yaw)

(Source: http://www.dji.com/phantom3pro).

A total of 92 images were captured in manual mode at 15-20% overlap (sidelap and endlap), and these images were all utilized for the image processing. 15-20% overlap was adopted since the imaging area is relatively small and gentle, and also, a fixed flying height was adopted. Each of the images cover an approximate area of 4004.96 m². The image processing procedure involved camera calibration, optimization of camera alignment, point cloud generation, dense cloud generation, auto-mosaicking and DSM/DEM generation, all performed using the Agisoft PhotoScan software. Figure 4 describes the process flow chart for generating the DEM, while the camera calibration parameters are presented in Table 2. These parameters include the computed principal distance or focal length (f) of the lens, parameters (xp, yp,) which denote the coordinates of the center of projection of the image (principal point), and lens distortion coefficients (k1, k2, k3, p1, p2) where the terms ki represent coefficients of radial lens distortion and pi terms represent coefficients of decentering distortion (Perez et al., 2011) caused by a lack of centering of lens elements. Radial and decentering distortions comprise the aberrations which affect the location of images (Fryer, 1996).

### Table 2: Camera calibration parameters.

<table>
<thead>
<tr>
<th>FC300X</th>
<th>Resolution: 4000 x 2250</th>
<th>Focal Length: 2.8 mm</th>
<th>Pixel Size: 4e+06 x 2.25e+06 um</th>
<th>Precalibrated: No</th>
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<tbody>
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<td>Type:</td>
<td>Frame</td>
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<td>-0.53316</td>
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<td>Fx:</td>
<td>2305.57</td>
<td>Cx:</td>
<td>1995.46</td>
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</tr>
<tr>
<td>Fy:</td>
<td>2302.89</td>
<td>Cy:</td>
<td>1123.9</td>
<td></td>
</tr>
<tr>
<td>K1:</td>
<td>-0.130998</td>
<td>P1:</td>
<td>-0.00043097</td>
<td></td>
</tr>
<tr>
<td>K2:</td>
<td>0.107868</td>
<td>P2:</td>
<td>-0.000115319</td>
<td></td>
</tr>
<tr>
<td>K3:</td>
<td>-0.0157875</td>
<td>P3:</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
RESULTS AND DISCUSSION OF RESULTS

Figure 5 is a pictorial representation of the location of the GCPs carefully densified across the study area while Figure 6 presents the camera locations and the error estimates. The DEM produced in case scenario (1) is presented in Figure 7. The DEM shows that the highest point in the study area has an elevation value of 267m while the height value of the lowest point is 230m. Figure 8 depicts the DEM generated in case scenario (2). The model shows that the lowest height and highest height on the imaged area is 229m and 263m respectively. The DEM produced in case scenario (3) shows that the study area has a lowest height and highest height of 229m and 263m respectively as shown in figure 9, while figure 10 presents the DEM produced in case scenario (4). It shows that the imaged area has a lowest height and highest height of 229m and 262m respectively. In order to ascertain the accuracy of each of the generated DEMs, northings, eastings and height coordinates of the ground control points earlier established were extracted from each of the DEMs. The values of these extracted coordinates were compared with the coordinate values of the same points acquired during the control establishment (GCPs). The discrepancy was computed and used for the computation of the horizontal and vertical accuracy. Table 3 contains the result obtained from case scenario (1), Table 4 contains the result obtained from case scenario (2). The result obtained from case scenarios (3) and (4) are presented in Tables 5 and 6 respectively while Table 7 contains the summary of the horizontal and vertical accuracies obtained for the four different case scenarios.
Figure 5: Location of GCPs on the imaging (study) area.

Figure 6: Camera locations and error estimates.
Figure 7: DEM produced without camera calibration and before optimization of camera alignment.

Figure 8: DEM generated by calibrating the camera optimization of camera alignment.
Figure 9: DEM generated by calibrating the camera during optimization of camera alignment.

Figure 10: DEM generated by calibrating the camera after optimization of camera alignment.
Table 3: Result obtained from DEM processed without camera calibration and optimization.

<table>
<thead>
<tr>
<th>GCPs</th>
<th>DGPS ACQUIRED COORDINATES</th>
<th>DEM EXTRACTED COORDINATES (PROCESSING WITH NO CALIBRATION AND NO OPTIMIZATION)</th>
<th>COMPUTED DIFFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E (m) N (m) H (m)</td>
<td>E (m) N (m) H (m)</td>
<td>ΔE (m) AN (m) ΔH (m)</td>
</tr>
<tr>
<td>PT1</td>
<td>220147.938 1055132.392 233.390</td>
<td>220149.271 1055131.338 234.575</td>
<td>-1.333 1.054 -1.185</td>
</tr>
<tr>
<td>PT2</td>
<td>220048.540 1055099.532 232.729</td>
<td>220050.103 1055098.187 232.652</td>
<td>-1.563 1.345 0.077</td>
</tr>
<tr>
<td>PT3</td>
<td>220181.813 1055047.861 236.146</td>
<td>220183.007 1055046.715 236.542</td>
<td>-1.195 1.146 -0.396</td>
</tr>
<tr>
<td>PT4</td>
<td>220230.519 1054946.114 237.100</td>
<td>220232.181 1054945.658 237.363</td>
<td>-1.662 0.456 -0.263</td>
</tr>
<tr>
<td>PT5</td>
<td>220104.176 1054920.376 236.357</td>
<td>220105.935 1054919.438 235.874</td>
<td>-1.759 0.938 0.483</td>
</tr>
<tr>
<td>PT6</td>
<td>220194.365 1054780.450 237.455</td>
<td>220196.442 1054779.801 236.869</td>
<td>-2.078 0.649 0.586</td>
</tr>
<tr>
<td>PT7</td>
<td>220291.062 1054855.215 237.790</td>
<td>220292.918 1054854.724 237.978</td>
<td>-1.856 0.491 -0.188</td>
</tr>
<tr>
<td>PT8</td>
<td>220300.149 1054749.919 238.512</td>
<td>220302.442 1054745.493 238.268</td>
<td>-2.293 0.426 0.244</td>
</tr>
<tr>
<td>PT9</td>
<td>220182.684 1054759.701 237.919</td>
<td>220202.748 1054759.550 237.351</td>
<td>-2.064 0.151 0.568</td>
</tr>
<tr>
<td>PT10</td>
<td>220230.353 1054814.547 237.387</td>
<td>220232.794 1054814.063 237.080</td>
<td>-2.441 0.484 0.307</td>
</tr>
<tr>
<td>PT11</td>
<td>220402.310 1054721.078 238.324</td>
<td>220404.502 1054721.238 238.408</td>
<td>-2.192 -0.16 -0.084</td>
</tr>
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<td>PT12</td>
<td>220427.333 1054633.069 238.563</td>
<td>220430.871 1054632.610 238.468</td>
<td>-3.538 0.459 0.095</td>
</tr>
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<td>PT13</td>
<td>220274.221 1054673.378 238.876</td>
<td>220276.910 1054672.761 238.472</td>
<td>-2.689 0.617 0.404</td>
</tr>
<tr>
<td>GPS 03</td>
<td>220479.550 1054694.690 238.015</td>
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<td>-2.428 -0.15 -0.065</td>
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<tr>
<td>GPS 06</td>
<td>220072.920 1054947.700 235.968</td>
<td>220074.561 1054946.622 235.074</td>
<td>-1.641 1.078 0.894</td>
</tr>
<tr>
<td>GPS 07</td>
<td>219981.297 1055090.510 231.988</td>
<td>219982.847 1055088.865 231.471</td>
<td>-1.55 1.645 0.517</td>
</tr>
<tr>
<td>GPS 12</td>
<td>220267.286 1054789.050 238.188</td>
<td>220269.502 1054788.464 237.798</td>
<td>-2.216 0.586 0.39</td>
</tr>
</tbody>
</table>

SUM                                                                                                          -34.500 11.22 2.383

Table 4: Result obtained from DEM processed with calibration before optimization of camera alignment.

<table>
<thead>
<tr>
<th>GCPs</th>
<th>DGPS ACQUIRED COORDINATES</th>
<th>DEM EXTRACTED COORDINATES (PROCESSING WITH CAMERA CALIBRATION BEFORE OPTIMIZATION OF CAMERA ALIGNMENT)</th>
<th>COMPUTED DIFFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E (m) N (m) H (m)</td>
<td>E (m) N (m) H (m)</td>
<td>ΔE (m) AN (m) ΔH (m)</td>
</tr>
<tr>
<td>PT1</td>
<td>220147.938 1055132.392 233.390</td>
<td>220147.943 1055132.413 233.857</td>
<td>-0.005 -0.02 -0.467</td>
</tr>
<tr>
<td>PT2</td>
<td>220048.540 1055099.532 232.729</td>
<td>220048.585 1055099.531 232.696</td>
<td>-0.045 1E-03 0.033</td>
</tr>
<tr>
<td>PT3</td>
<td>220181.813 1055047.861 236.146</td>
<td>220181.798 1055047.832 236.172</td>
<td>0.0145 0.029 -0.026</td>
</tr>
<tr>
<td>PT4</td>
<td>220230.519 1054946.114 237.100</td>
<td>220230.543 1054946.124 237.172</td>
<td>-0.024 -0.01 -0.072</td>
</tr>
<tr>
<td>PT5</td>
<td>220104.176 1054920.376 236.357</td>
<td>220104.163 1054920.410 236.415</td>
<td>0.013 -0.03 -0.058</td>
</tr>
<tr>
<td>PT6</td>
<td>220194.365 1054780.450 237.455</td>
<td>220194.215 1054780.288 237.47</td>
<td>0.1495 0.162 -0.015</td>
</tr>
<tr>
<td>PT7</td>
<td>220291.062 1054855.215 237.790</td>
<td>220290.986 1054855.225 237.763</td>
<td>0.0759 -0.01 0.027</td>
</tr>
<tr>
<td>PT8</td>
<td>220300.149 1054745.919 238.512</td>
<td>220300.182 1054745.948 238.471</td>
<td>-0.033 -0.03 0.041</td>
</tr>
<tr>
<td>PT9</td>
<td>220218.684 1054759.701 237.919</td>
<td>220218.592 1054759.963 237.856</td>
<td>0.0922 -0.26 0.063</td>
</tr>
<tr>
<td>PT10</td>
<td>220230.353 1054814.547 237.387</td>
<td>220230.624 1054814.565 237.377</td>
<td>-0.271 -0.02 0.01</td>
</tr>
<tr>
<td>PT11</td>
<td>220402.310 1054721.078 238.324</td>
<td>220402.235 1054721.158 238.306</td>
<td>0.0749 -0.08 0.018</td>
</tr>
<tr>
<td>PT12</td>
<td>220427.333 1054633.069 238.563</td>
<td>220427.425 1054632.989 238.547</td>
<td>-0.092 0.08 0.016</td>
</tr>
<tr>
<td>PT13</td>
<td>220274.221 1054673.378 238.876</td>
<td>220274.286 1054673.377 239.242</td>
<td>-0.065 1E-03 -0.366</td>
</tr>
</tbody>
</table>
### Table 5: Result obtained from DEM processed with calibration during optimization of camera alignment.

<table>
<thead>
<tr>
<th>GCPs</th>
<th>DGPS ACQUIRED COORDINATES</th>
<th>DEM EXTRACTED COORDINATES (PROCESSING WITH CAMERA CALIBRATION DURING OPTIMIZATION)</th>
<th>COMPUTED DIFFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (m)</td>
<td>H (m)</td>
<td>E (m)</td>
</tr>
<tr>
<td>PT1</td>
<td>20147.938</td>
<td>233.390</td>
<td>20147.943</td>
</tr>
<tr>
<td>PT2</td>
<td>20048.540</td>
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<td>20048.585</td>
</tr>
<tr>
<td>PT3</td>
<td>20181.813</td>
<td>236.146</td>
<td>20181.798</td>
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<tr>
<td>PT4</td>
<td>20230.519</td>
<td>237.100</td>
<td>20230.543</td>
</tr>
<tr>
<td>PT5</td>
<td>20104.176</td>
<td>236.357</td>
<td>20104.163</td>
</tr>
<tr>
<td>PT6</td>
<td>20194.365</td>
<td>237.455</td>
<td>20194.215</td>
</tr>
<tr>
<td>PT7</td>
<td>20291.062</td>
<td>237.790</td>
<td>20290.986</td>
</tr>
<tr>
<td>PT8</td>
<td>20300.149</td>
<td>238.512</td>
<td>20300.182</td>
</tr>
<tr>
<td>PT9</td>
<td>20218.684</td>
<td>237.919</td>
<td>20218.592</td>
</tr>
<tr>
<td>PT10</td>
<td>20230.353</td>
<td>237.387</td>
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<tr>
<td>PT11</td>
<td>20402.310</td>
<td>238.324</td>
<td>20402.235</td>
</tr>
<tr>
<td>PT12</td>
<td>20427.333</td>
<td>238.563</td>
<td>20427.425</td>
</tr>
<tr>
<td>PT13</td>
<td>20274.221</td>
<td>238.876</td>
<td>20274.286</td>
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<tr>
<td>GPS 03</td>
<td>20479.550</td>
<td>238.015</td>
<td>20479.473</td>
</tr>
<tr>
<td>GPS 06</td>
<td>20072.920</td>
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<td>20072.870</td>
</tr>
<tr>
<td>GPS 07</td>
<td>21981.297</td>
<td>231.988</td>
<td>21981.280</td>
</tr>
<tr>
<td>GPS 12</td>
<td>20267.286</td>
<td>238.188</td>
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</tr>
<tr>
<td>SUM</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 6: Result obtained from DEM processed with calibration after optimization of camera alignment.

<table>
<thead>
<tr>
<th>GCPs</th>
<th>DGPS ACQUIRED COORDINATES</th>
<th>DEM EXTRACTED COORDINATES (PROCESSING WITH CAMERA CALIBRATION AFTER OPTIMIZATION)</th>
<th>COMPUTED DIFFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E (m)</td>
<td>N (m)</td>
<td>H (m)</td>
</tr>
<tr>
<td>PT1</td>
<td>20147.938</td>
<td>1055132.392</td>
<td>233.390</td>
</tr>
<tr>
<td>PT2</td>
<td>20048.540</td>
<td>1055099.532</td>
<td>232.729</td>
</tr>
<tr>
<td>PT3</td>
<td>20181.813</td>
<td>1055047.861</td>
<td>236.146</td>
</tr>
<tr>
<td>PT4</td>
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<td>1054946.114</td>
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<tr>
<td>PT5</td>
<td>20104.176</td>
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<tr>
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</tr>
<tr>
<td>PT7</td>
<td>20291.062</td>
<td>1054855.215</td>
<td>237.790</td>
</tr>
<tr>
<td>PT8</td>
<td>20300.149</td>
<td>1054745.919</td>
<td>238.512</td>
</tr>
</tbody>
</table>
The Root Mean Square Error (RMSE) was calculated using the formula given in equation (1):

\[ RMSE = \sqrt{\frac{\sum(N_i - N_j)^2}{n}} \]  

(1)

Where \(N_i\) is observed values, \(N_j\) is reference values and \(n\) is number of points.

The horizontal and vertical accuracy was computed using the National Standard for Spatial Data Accuracy (NSSDA) method for map accuracy which is given as equations (2) and (3):

\[ \text{Horizontal Accuracy} = 1.7308 \times \text{RMSE}_r \]  

(2)

\[ \text{Vertical Accuracy} = 1.96 \times \text{RMSE}_z \]  

(3)

Where \(\text{RMSE}_r\) and \(\text{RMSE}_z\) are the Root mean square errors of the horizontal and vertical discrepancy respectively.

From the results obtained, it was discovered that case scenario (1) gave coordinate values that are of widest variance when compared with the coordinate values of DPGS observation. Change in Eastings (\(\Delta E\)) of -34.500m, Changes in Northings (\(\Delta N\)) of 11.22m and Height (\(\Delta H\)) of 2.383m were observed and recorded, while case scenario (2) gave the lowest discrepancy value with \(\Delta E\) of 0.0006m, \(\Delta N\) of -0.01m and \(\Delta H\) of -0.188m. Case scenarios (3) and (4) gave \(\Delta E\) and \(\Delta N\) values of 0.0006m and -0.009m respectively with a \(\Delta H\) value of 0.362m for case scenario (3) and \(\Delta H\) value of 0.5926m for case scenario (4). Also, a horizontal accuracy of 15.228 and vertical accuracy of 1.133 was obtained from the analysis of case scenario (1), horizontal accuracy of 0.003 was obtained from case scenarios (2), (3) and (4) respectively (see Table 7). This implies that the timing of camera calibration (before during or after the optimization of camera alignment) has no implication on the horizontal accuracy of the generated DEMs. Vertical accuracy of 0.089 was obtained from case scenario (2), while 0.171 was obtained from case scenario (3) and 0.281 obtained from case scenario (4). This shows that the timing of camera calibration (before, during or after the optimization of camera alignment) has a great impact on the obtainable vertical accuracy of DEMs even though the horizontal reliability of the generated DEM seems immune to this. From our results, the vertical accuracy obtained from case scenario (2) where the camera was calibrated before the optimization of camera alignment
was the lowest (closest to zero) and thus, most accurate of the four different case scenarios. This
was closely followed by case scenario (3) and then case scenario (4).

CONCLUSIONS

It was discovered from the obtained results that the coordinates extracted from the DEM
generated via a process where the camera was calibrated before the optimization of camera
alignment were closer to the coordinates obtained from the field observation using High-target
DGPS receivers when compared to the other three case scenarios. This method gave a horizontal
accuracy of 0.003 and a vertical accuracy of 0.089. It is thus necessary to ensure that the
operation of camera calibration is performed before the optimization of camera alignment when
processing image data of this nature for DEM production using the Agisoft photoscan digital
photogrammetric software. Also, it was discovered that the same horizontal accuracy was
obtained from the processes where the camera was calibrated before, during and after the
optimization of camera alignment which means that the timing of camera calibration has little or
no effect on the horizontal or planimetric integrity of the produced DEMs. Finally, the worst
(most inaccurate) result was obtained from case scenario (1) which means that camera
calibration is highly important in the production of DEMs from UAV acquired overlapping
images.

ACKNOWLEDGEMENT

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for their kind assistance during the image data acquisition and processing stages of this research.

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Topographic structure from motion: a new development in photogrammetric


MAINSTREAMING GOOD LAND GOVERNANCE IN SETTLEMENT FORMALIZATION IN MAKONGO JUU, DAR ES SALAAM CITY, TANZANIA

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2 P.O. Box 32241, Dar es Salaam, Tanzania.

Globally, there is a growing concern on how to mainstream good governance in making cities more inclusive and sustainable. This paper shows how a flexible and genuine political will rekindles a community-wide participatory and inclusive process among landholders in Makongo Juu informal settlement that is being regularized. The area, formerly a sisal estate, is located at about 17 kilometres to the north-west of Dar es Salaam City Centre and is a neighbour to institutions including three universities. Over years it has informally transformed into a residential/commercial area with a current population estimated at 15,700 people. With a growth rate of 4.3% per annum, it is among the fast growing sub urban areas in the City. In June 2015, the Minister of Lands Housing and Human Settlements Development visited the area, and at a meeting with the landholders, he noted their plea for land titles, and requested them to advise him on how best to formalize the settlement in a participatory and inclusive approach. Guided by that political will, the landholders designed a participatory process through which the settlement would be regularized. The Minister supported the process. Through collaboration between the landholders and the government players, resources were mobilized, standards flexibly applied, land parcel information acquired, a database created, detailed land use plan prepared and used to guide cadastral surveying, and titling. The social capital created, together with the improved capacity of the local government office, will contribute towards inclusive and transparent practices and thus enhance good land governance within the settlement.

Key Words: Accountability, Land, Governance, Formalization, Tenure.

INTRODUCTION

Makongo Juu Settlement (MJS) is located at about 17 kilometres to the north-west of Dar es Salaam City Centre. It's a neighbour to important two Universities and the Mlimani City modern commercial centre. Over the years, the MJS has transformed from a sisal estate first, into a resettlement area to accommodate people from other parts of the city (Burra, 2004) and later into a residential cum commercial area through unplanned land subdivisions. With an estimated population of about 15,700 people, growing at 4.3 per cent, (as of the 2012 National Population Census), it is one of the fast growing sub-urban areas of the City. Figure 1 shows the location of MJS in Kinondoni Municipality in the City of Dar es Salaam.

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Figure 1: The location of Makongo Juu in the City of Dar es Salaam

Given its spatial and social qualities, MJS continues to attract landholders and developers, policy makers and planners, all of whom are keen to upgrade the status of the settlement. The first upgrading attempt by the government was the planning order of 1985 leading to the first layout plan made in 1991 but not implemented. It was followed by another one in 1994, also not implemented. Both plans were rejected by the landholders because they ignored not only landholders’ views on how the settlement should be developed but also the rights and interests in their respective land parcels. The plans were superimposed on the settlement, resulting to plot boundaries and roads cutting through the existing buildings or across properties; indicating a need for demolitions! Meanwhile, individual landholders continued with land subdivisions that ignored the plans. Some of such land parcels have been surveyed and titled but without considering settlement level services and other spatial development elements.

Another attempt to formalise the MJS was introduced by the Ministry of Lands, Housing and Human Settlements development in 2012 largely following the 1990s, approach but with provision of road infrastructure. The plan included a financing modality by which the Ministry was to obtain a commercial loan to finance the implementation of the projects outlined in the plan. The loan was then to be paid by contributions from the landholders through what was then described as a Betterment Fee. Both the detailed layout plan and the amount of money to be contributed, (TZS 8,000/= per square metre), by each landholder scared the landholders and their local politicians who mobilized against the plan, calling for an inclusive and participatory planning process.

Literature shows that new informal and unregulated settlements emerged and the old ones degenerated into denser ones. This is so because the approach adopted to improve such settlements ignored the local landholders’ interests in the process; and
above all, did not strengthen the local institutional frameworks that are mandated to manage the day to day land use development processes and other aspects of the upgraded settlements. Moreover, measures to prevent creation of new informal/unregulated settlements were not adequately considered.

According to the Tanzania local government set up in urban areas, a *Mtaa* government is the basic administrative unit, which operates within a higher administrative unit, namely the Ward. The Wards, each represented by an elected Councillor, make up an urban council, such as the Kinondoni Municipal Council, which is the planning authority for MJS. A *Mtaa* government is headed by an elected chairperson and elected representatives (*wajumbe*). These *Mtaa* politicians are administratively served and supported by a civil servant, a *Mtaa* Executive Officer (*Afisa Miendaji wa Mtaa*), who is an employee of the respective urban council. The *Mtaa* Government played a major role in the process described in this paper.

In June 2015, the Minister for Lands, Housing and Human Settlements Development visited the Makongo Juu *Mtaa* office with the intention to announce the decision of the government to plan and survey all land parcels in the (MJS). At the public meeting organized by the *Mtaa* Government, the MJS landholders pleaded with the Minister to change the approach and to respect landholder’s interests in the implementation of the new policy. The Minister listened to their pleas and advised them to propose an alternative approach that takes into account their interests as well as those of the government in upgrading and formalizing the settlement. He emphasized that the new approach should be acceptable to all parties. This new position of the Ministry generated a high spirit and hopes among the landholders and it became the engine that is driving the on-going settlement formalization process discussed in this paper.

**THE KEY ELEMENTS OF THE NEW APPROACH**

The initiative to use locally driven participatory settlement formalization process in MJS is introduced with the understanding that good land governance must be mainstreamed into the formalization process. The process should, among other issues, observe and uphold policies, laws, and procedures relevant to human settlement development and ensure compliance, nurture and sustain trust among the key stakeholders in order to encourage and support full involvement, particularly to provide room for landholders to articulate their interests in the adjudication, planning, and titling process. It is argued that through trust and participation, landholders and other stakeholders will own the formalization process and its outcomes. It was thus considered that by ensuring transparency, accountability and responsiveness in the process, stakeholders will have confidence in the process, actively participate in influencing critical decisions and implementation as well as dealing with issues and conflicts that might arise from land and settlement development processes. Since the approach is new, it has to adopt an innovative and learning approach to allow stakeholders to learn and improve their strategies, as they steer the process towards agreed goals. In order not to fall in the trap of the previous attempts, where upgrading was seen as an event, this new attempt takes the process approach that includes introduction of measures to strengthen institutional and human capacity to contribute towards sustainable land and settlement development in the area.
CREATING AND SUSTAINING TRUST AMONG THE KEY STAKEHOLDERS

In the context of this paper, creating and sustaining trust means the approach in which the key stakeholders in the formalization process, especially landholders, developed confidence that their interests are taken into account and that they will be able to fully participate in making key decisions in the process. Thus, extra efforts were taken at the early stages of the process to give landholders confidence that their interests would not be ignored as it was in the past, and that they would be active members in the process. It is important to note that stakeholders’ participation is provided for by the Land Formalization Procedures of Tanzania (URT, 2001) and by observing such a provision, a formalization committee was formed at the start of the process. The first public meeting attended by the Settlement landholders and representatives of the key formalization process actors, including the Minister for Lands Housing and Human Settlement Development, elected 20 persons to form a local formalization committee known in Kiswahili as Kamati ya Uboreshaji wa Makazi ya Makongo Juu (KAUMAMA). In addition to those elected, members of KAUMAMA include representatives from the Mtaa office, Kinondoni Municipality, the Ministry of Lands, Housing and Human Settlement Development (MLHHSD), and Utilities (water, electricity, and roads). KAUMAMA was thus entrusted with the task of not only steering the formalization process but also linking the process with the respective government institutions that are relevant in ensuring that the Settlement is planned and land parcels titled in a participatory manner. To achieve this, KAUMAMA applied various strategies as outlined in this section.

Foremost, KAUMAMA created four sub-committees, namely; Finance and communications, Preparation of detailed layout plan, Cadastral surveying and titling, and Legal and administrative procedures compliance. The policy and final decision making level are the public meetings that include landholders and the KAUMAMA. The Mtaa Chairman organizes and chairs the public meetings and the Executive Officer is the secretary.

In accordance with the Local Government laws and regulations, the Mtaa is the institution mandated and accountable to the population at that level. This set up makes KAUMAMA accountable to the local community and not a central government committee as was the case in the previous failed attempts.

Through this set-up, it has been possible to ensure not only transparency but also accountability in decision making and implementation, which are critical to effective stakeholders’ participation and thus nurturing trust in the process. The sub-committees, being responsible for implementation, report progress to the KAUMAMA, which discusses the same and makes recommendations, which are presented to the landholders in public meetings for discussion and endorsement. From the time the process started in June 2015, six public meetings have so far been held and during such meetings key milestones were set and important decisions made in a participatory and transparent manner. Figure 2 are pictures of landholders at a public meeting, sharing views. KAUMAMA members ensure that meetings are interactive with more time allocated/used for questions and answers on various aspects of the formalization process.
The second public meeting was largely used to discuss and agree on the key objectives and targets of the formalization process. The KAUMAMA members with expertise in settlement formalization, made a presentation on what the process should look like to inform the landholders on their responsibilities in the process.

Invitations to the public meetings at the early stages of the process were done through advertisements placed at the *Mtaa* office, and at the two primary schools located in MJS through announcements in mosques and churches that operate within the area, as well as using a mobile public address system. After creating a landholders’ database, which includes names and phone numbers, invitations to meetings became much easier and cheaper through use of mobile phones. With the use of phones, landholders who reside out of the area could also be reached easily.

During the third public meeting the cost for layout plan preparation, cadastral surveying and titling was discussed and fixed at TZS 450,000 (1 USD TZS 2,200), per plot that had not been surveyed, and TZS 225,000 for a surveyed and titled plot. The payment by landholders with surveyed and titled plots was agreed upon as the cost of incorporating such plots into the overall detailed layout plan and coordinating the data in the overall approved survey plans for the area. In some situations the surveyed plot boundaries had to be adjusted to give room for plot access roads and other utilities. Through this decision, it was estimated that TZS 500,000,000 could be raised. On the basis of that amount, an overall project budget was worked out. Prior to this decision, various project expenses were effected through voluntary contributions by KAUMAMA members, and landholders at public meetings. The overall assessment on the extent to which stakeholders were involved in the process is summarised in Table 1, which shows the different stakeholders and forms of involvement and contributions.

**Table 1: Stakeholders’ contributions in the formalization process**

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Form of involvement and contributions</th>
</tr>
</thead>
</table>
| 1. MJS landholders                 | • Time: Participation in the process.  
  • Money: TZS 500,000,000/= was contributed by May 2017.  
  • Land: Access roads from 3 to 8 metres wide acquired without compensation. In total 110 pieces of roads of different lengths moved from private to public land. |
| 2. KAUMAMA and its Sub-Committee members | • Free Professional expertise: Accounting, Town Planning, Cadastral Surveying, Project Management, Legal aspects, and Office Management.  
  • Time: Participation in meetings, follow up on project implementation  
  • Financial contributions, plus the fixed cost per plot. |
3. **Mtaa Government**
   - Administrative support to KAUMAMA and participation in meetings.
   - Organizing public meetings and taking minutes.
   - Resolving land related conflicts.
   - Communicating with Stakeholders.

4. **Kinondoni Municipal Council**
   - Administrative support and endorsing layout plans.
   - Participation in public meetings.

5. **MLHHSD**
   - Administrative and professional support and approving plans.
   - Issuance of numbers for the land parcel boundary beacons.
   - Provided computer hardware and software, and printers for use in the KAUMAMA’s office.
   - Land registration and titling.

As the Mtaa Office space was limited, KAUMAMA rented a room adjacent to the Mtaa Office, furnished it, and made it a work place. Landholders and other stakeholders could have their views and suggestions registered at the office for the attention of the KAUMAMA. On a day to day basis, the office is attended to by three experts that are employed by the Mtaa government and are responsible to the KAUMAMA.

**COMPLIANCE WITH LAWS AND PROCEDURES**

Settlement upgrading through formalization involves a wide range of related sub-processes, including land and property adjudication, land acquisition and compensation, town planning, cadastral surveying, property valuation and land rent assessment, citizen participation, and land development control. These sub-processes are guided by the respective policy and legal frameworks, which had to be complied with as required by good land governance principles.

Among the steps taken by the Mtaa Government to ensure compliance with the laws and procedures in implementing the process, was to contract professionally qualified Town Planners and Land Surveyors through open tender. Furthermore, the sub-committee on Legal and administrative procedures kept a close follow-up on decision making and implementation to also ensure that decisions complied with the legal frameworks.

The Town planning layout plans were endorsed by the landholder’s public meeting in October 2016 and submitted by the Mtaa Government to the Kinondoni Municipal Council for scrutiny and endorsement. The Council endorsed the plans in November 2016 and submitted them to the Regional Administration for a similar procedure before submitting them to MLHHSD for approval. Figure 3(a) is a part of the 2012 layout plan that could not be implemented. Figure 3(b) is part of the 2017 plan that was drawn up under the initiatives of the landholders and approved by the respective authorities.

The approved layout plan was then the basis of the MLHHSD to issue survey instructions, which then allowed cadastral surveying in accordance with the laws and regulations. A private licensed Surveyor, residing in the area and who had been contracted to manage the project, submitted the cadastral survey plans and data to MLHHSD for examination and approval. The approved cadastral survey plans are the basis for the preparation of Deed Plans, used in the preparation of certificates of title. A total of 3,028 plots were surveyed and out of these about 2900 plots (96%) will be titled.
INNOVATIVE APPROACHES

Good land governance principles demand innovative approaches. Being a socio-political process, formalization is contextual and thus cannot be put into a strait jacket process. KAUMAMA successfully tried not to apply the ‘fit for all’ approaches as evidenced in the following examples:

Flexible Planning

There were situations where taking landholders’ interests into account, required flexibility in procedures and upholding standards. For instance, standards of plot sizes and widths of access roads were adjusted and adopted to the local conditions without undermining their functionality. Where a plot was too small (below 90 square meters) and thus difficult to provide access to each individual plot, the Unit Title\(^1\) approach was recommended.

Base Mapping

Following the conventional photogrammetric procedures, base map preparation would have been not only time consuming, but not affordable. To obtain a reliable base map, timely and within the available resources, high resolution satellite imagery was extracted and geo-referenced to the 1960 Arc datum and later processed to become a base map that was used in the process.

Systematic Surveying

Most of the surveys undertaken in urban areas of Tanzania are sporadic, and hardly based on comprehensive town planning concepts. This form of practice is prone to creating land parcel boundary conflicts and exorbitantly high unit cost of land delivery as well as provision of municipal services. KAUMAMA’s innovation was to adopt systematic land parcel adjudication, town planning, cadastral surveying and titling. This approach was relatively fast, inclusive, equitable and reasonably affordable by most of the MJS landholders. For instance the unit cost for the services of town planning, cadastral surveying and titling is about 10-20\% of the same service using sporadic approaches. FAO (2003), Lor

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\(^1\)Under the Unit Titles Act, 2008, various individuals own their units and they share the ownership of the common land, such as gardens and parks, passage ways, etc. Each Unit can have its separate certificate of title.
and Onkalo (2004), and Silayo (2005) separately report about similar costs in various surveying projects.

To support the systematic approach, a homogenous micro-geodetic framework of control points in the national grid was established in the whole of MJS. The control framework provided regular checks on the quality of the survey work, prevented land parcel overlaps, (overlapping land rights are a driver of land conflicts), speeded up survey fieldwork - thus lowering survey cost, gave a unique and accurate spatial locations of land parcels, and will facilitate development of a unified land information system. Furthermore, state of the art technology, including the use of Global positioning System (GPS), Total Station equipment and software, was deployed to speed up the work output.

Other Innovations

There were also other forms of innovation, notably in the areas of human and financial resources. For instance, using social media technology in calling for public meetings and the on-site manufacturing of precast concrete beacons, used for marking land parcel boundaries, reduced supervision and transport costs in the acquisition of the beacons.

STRENGTHENING THE CAPACITY OF THE MTAA GOVERNMENT

The regularization process has created new roles for the Mtaa Government, covering socio-political and technical issues. Under the socio-political sphere, the Mtaa Government is required to continue to promote good land governance principles, to sustain the created participatory spirit, as well as the trust among the landholders and the other stakeholders. In this regard, the Mtaa Government staff must uphold principles of at least transparency and accountability. Regarding the technical aspects, the Mtaa Government is expected to have capacity to use, maintain, and update the created plans and the database, which are critical for sustainable settlement management.

Sustainability of the already achieved results of the formalization process, entails strengthening the Mtaa Government capacity to maintain not only the results but also the participatory spirit of the project and to achieve even more results. In principle, the Mtaa Government requires improved capacities in human resource, working environment, and in organizational development in order to effectively perform the functions described above.

Under human resource, strengthening of the capacity of the Mtaa Government was in three areas. The first intervention was to recruit and train two graduates who were involved in the process. It is recommended that these two become part of the Mtaa Government technical staff to support the Mtaa Executive Officer. The second intervention was to involve the whole Mtaa Government team in various steps in the process, particularly in public meetings. The third measure was in skills development through various in-house training sessions, notably to the Mtaa Wajumbe.

Improvements in the working environment included renting an additional working space, acquisition of computer hardware and software, a printer, office furniture, and files. Relevant reference documents, including policies, laws, guidelines, plans, maps and copies of various forms to facilitate land development control operations were made available to the Mtaa office for their use.

Regarding the organizational development, the Mtaa office has an approved set of physical development plans, cadastral survey plans, and a document of official settlement development standards that should be used in guiding decision making in land development. The established bank account, specific for the project, becomes an important facility for, not only mobilizing financial resources, but also ensuring
transparency and accountability in financial management in Mtaa level development projects.

So far the two graduates have been fully integrated into the Mtaa set up and work together with the Mtaa Executive Officer in, for example, resolving land conflicts, which would have otherwise been subjects of long, legal processes in courts of law. The landholders now have access to expert advice in land use and property development available within the Settlement. Before this intervention, such service would require one to travel to the Kinondoni Municipality or to the MLHHSD head office.

CONCLUSION

Worldwide and in Tanzania in particular, it is increasingly being realized that human settlement management is a process that should involve, not only the central and local governments, but also the landholders, the local communities, and other stakeholders. This calls for an approach that is both inclusive and ensures sustainable land and settlement developments.

Based on the political will expressed by the Minister for Lands, Housing and Human Settlements Development in June 2015, the MJS community of land owners designed and implemented a participatory process by which uses of land were agreed upon, easements for access roads and other municipal services provided, and a land titling process carried out; thus enhancing security of land tenure and making the settlement a better living place than it was before.

Through collaboration between the landholders and the key local and central government players, local resources were mobilized, spatial planning development standards flexibly applied, existing land parcel information acquired, a database of landholders created, detailed land use plan prepared, and on the basis of such a plan, land survey boundary beacons erected, and human capacity of the local government office in the Mtaa government strengthened through their participation in the process and training.

There is clear evidence that in Dar es Salaam City, MJS is one of the urban settlements that has been regularised through a real participatory process with considerable involvement of the respective landholders in a transparent and more or less in an accountable manner. Through such an approach, the MJS residents, together with their local political leaders, have become significantly aware of the importance of upholding town planning principles and how these can sustain, not only the value of their individual plots, but also the overall spatial qualities of the whole settlement.

REFERENCES


END
Perfecting land title refers to the process of securing tenure on land. It refers to the assurance that the land one holds for an agreed period of time and purpose is certain. It requires a level of legitimacy. It is on record that agriculture, forestry and mining sectors constitute about 70% of Ghana’s gross domestic product. However, the lack of several large-scale plantations in Ghana can be partly attributed to the land tenure system. Land rights in rural communities are not secured in that the lands are not themselves well defined and rights are not documented. The study used modern survey methods to clearly map out farms in a systematic manner for farmers under a cooperative for rubber plantation development. The rights of tenant farmers and landholders are clearly and legally documented and registered into the formal land administration system. The spatial and attribute data are incorporated into a Geographic Information System (GIS) that serves as tool for data management on the farmers. The pilot study was successful in improving not only tenure security and data access, but also access to funding by participating farmers.

**Key words:** land tenure security, registration, spatial data, attribute data.

**INTRODUCTION**

Land tenure is a set of rules that determine how land is used, possessed, leveraged, sold or disposed of within societies. It is the right of individuals and groups of people to effective protection by their governments against forcible eviction (UN, 2007). “Secure rights create incentives for people to improve land management and agricultural production. Secure land is also a common form of collateral for acquiring a bank loan. Research shows that strengthening land tenure often results in improvements in land management, agricultural production and household welfare” (Veit, 2013). While many African countries recognize customary tenure arrangements over land and forests in their national laws, the process of on-the-ground implementation and protection of land right is slow.

“Only 10% of Africa’s rural land is registered. The remaining 90% is undocumented and informally administered- this makes rural land susceptible to land grabbing, expropriation without fair and adequate compensation and result in tenure insecurity” (World Bank, 2008). Poor people and disadvantaged groups therefore live in fear of losing their land (Arko-Adjei, 2011). Achieving land tenure reform is by no means an easy or quick process. However, the benefits over the long term can lead to substantial gains for smallholder farmers’ competitiveness (World Bank, 2008). One major reform that would help farmers across Africa is increased attention to problems of land tenure security.

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In Benin, Senegal, Burkina Faso, Madagascar and Niger, the French Development Agency (AFD) started pilot activities in 2012 to promote new perspective on land tenure based on recognition of multiple titles to land, including land use rights and cropping rights (Kabre, 2012). In Francophone countries like Burkina Faso, Benin, Cote d’Ivoire and Rwanda, case studies reveal process of “informal formalization” whereby land transactions are recorded on written documents signed by witnesses and validated by local administrative or customary authorities. These documents usually have little or no legal value because they are often incomplete and unclear as to their full terms and conditions (Lavigne D., 2002; Toulmin et al., 2002). Some African countries have embraced policies abrogating customary systems, as in Eritrea’s Land Proclamation of 1994 (Alden, 2003; FAO, 2002). In Tanzania, with the dismantling of traditional rulers at the time of independence in 1961 and in subsequent legislation (e.g. Act No.1 of 1965), the customary land tenure was left to die. The administration of rural lands is entrusted to Village Councils, though the management must be in compliance with the customary law of the respective area (Komu, 2003).

In Ghana, customary rules of land tenure predominate because stools, clans, families and individuals own 80% of the land with 20% going for the state (Larbi, 2006). However, most of these lands are not registered. The Land Administration Systems inherited by most African countries including Ghana are formal systems, which involve sophisticated survey and mapping techniques. The key to transforming assets into capital lies in instituting a system of property rights and information on property that is applied nationally and is legible to outsiders (World Bank, 2008). The government of Ghana through its Ministries, Agencies and Departments has tried to initiate policies, plans, strategies and programmes to improve the over all land administration system in the country (Government of Ghana, 2003).

The Ministry of Food and Agriculture (MOFA) in Ghana, with assistance from the German Development Cooperation, has instituted an Out-grower and Value Chain Fund (OVCF) to support schemes and integrate small holders into commercial agriculture. The Fund will provide medium to long-term loans (of at least 3 years). The Association of Eastern Region Rubber Out-growers (AERRO) has applied for funding from the Fund through a participating financial institution, called Financial Operator (FO). The project, involving about 1000 farmers, is to establish about 2200 ha of rubber over three (3) years and maintain same for eight (8) years. The farmers require the necessary collateral security in the form of land title deeds to back their loans. Unfortunately, the farmers have neither documented titles nor plans. Most of them are only tenants working for the landholders under customary arrangements that have not also been documented.

This study seeks to bring these rural undocumented lands into the formal Land Administration System in the country to improve land tenure security in rural communities. It captures the rights of 475 crop farmers in 12 Districts in the Eastern region of Ghana into the legal framework. The outcome is a secured tenure that ensures security to the farmer as well as landholder and creates an avenue to access capital for sustainable growth and wealth creation.

OBJECTIVES:

The objectives of the study are as follows:

- To establish clear unambiguous boundaries of parcels.
- To prepare cadastral plans for each farm through systematic survey and inventory.
- To document and register interests and integrate into the formal Land Administration System.

STUDY AREA

The study was conducted in the Eastern region of Ghana (Figure 1) where rubber plantation development was being promoted with assistance from the German Development agency, KfW. The study was piloted in 12 out of the currently demarcated 26 Districts (Figure 1).
The Eastern region has recently been divided into 26 Districts. The Afram Plains and Manya Krobo districts have each been split; Birim Central, Akyemansa and Kwahu East districts have also been created. However, the map for the 26 Districts has not been drawn yet. The region is the third most populated in the country and has a population of 2,633,154 and land size of 19,323sq.km (7,461sq. miles) (Ghana Statistical service, 2012). Table 1 shows the Districts where the pilots for the study with corresponding number of farms.

METHODOLOGY

Establishment of cooperative
Under a funding arrangement, farmers were brought together to form a cooperative: the Association of Eastern Region Rubber Out growers (AERRO). This group has the legal right to negotiate market prices for rubber produce. AERRO also represented the farmers on funding arrangements. This association was the platform to coordinate with the farmers and landholders. The leaders of this group were made up of people who understood the local customary land issues.

Education and Sensitization
Education and sensitization was carried out for stakeholders to appreciate the benefits of security of tenure to both landholders and farmers. Good governance practices must be followed in land administration if it aims to protect the rights of individuals and enterprises (Zakout et al, 2006). Good governance practices such as participation, transparency, inclusion and equity were employed in this study.
Evaluating existing customary tenure system
The study was carried out by first evaluating the existing customary land tenure system in the study area through literature review, interviews, interactions with customary owners, the District Assembly and farmers. Through stakeholders’ fora, there was education and sensitization to ensure the benefits of improving tenure was acceptable to landholders and tenant farmers. The processes of Alternative Dispute Resolution (ADR) mechanisms in resolving conflicts along boundaries and rights were discussed so that stakeholders understood that there could be better and less antagonistic means of resolving conflicts.

Survey of smallholder farmlands
Global Position System (GPS) technology was used to capture spatial data relating to farms (Figure 2). The corners of each farm were surveyed in the presence of owners of adjoining farms. A cadastral plan was prepared for each farm.

![Surveyors setting up a base station for systematic survey of parcels](image)

Fig 2: Surveyors setting up a base station for systematic survey of parcels

Administration of questionnaire
Questionnaires were administered to 475 farmers to fill with their landholders. This was to capture details of any undocumented agreement between farmer and landholder. From the questionnaires, the primary qualitative data relating to the farmer, landholder, land and tenure were derived.

Development of a Geo-database
The spatial and qualitative data (also known as attribute data) were linked to create a geo-database using Geographic Information System (GIS) software, ArcGIS (Figures 4, 5 and 6). The geo-database makes information on the rubber plantation, farmer and farm, landholder and customary arrangements readily accessible.

Validation workshop
From the database, the farmlands and their related attributes could easily be generated. Validation workshops were held for stakeholders (farmers, landholders, traditional authorities, Financial Operator, Rubber Buying company, MOFA officials) to identify with the system. The data had been obtained through the field survey of farms and data derived from the questionnaires. For example, a selected farmland could display attributes such as land size, district in which it is located, name of landholder, name of tenant farmer, gender, educational levels, age, type of tenancy agreement, date of commencement and expiry of tenancy etc.

Registration with Lands Commission
Registration into the formal Land Administration System was undertaken at the Lands Commission. The Lands Commission played the lead role in ensuring the registration of rights conformed to existing legal framework. Titles were prepared to secure the tenancy at the Lands Commission. Figure 3 shows the flow chart for the land registration process:

![Figure 3: land registration process](image)

- Cadastral plans are prepared in respect of farms
- Questionnaires are administered to farmers and landowners
- The LC legal department drafts tenancy agreements into an acceptable legal framework based on survey and questionnaires
- Draft leases are brought to AERRO for distribution and validation by farmers and landholders
- Draft leases come back to LC for final preparation and registration
- Errors are corrected (if any), drafts prepared for validation
- Copies of titles are given to tenant farmer, landholder and AERRO

**RESULTS**

The study successfully captured 475 farms making up 1541.73 acres (623.93 hectares) of rubber out growers. The boundaries were well marked out using GPS. The land sizes of farms are accurately known. A geo-database is available to easily access information relating to the lands and farms, (Figure 4)). A data base query can also be carried out for specific information and effective decision-making. For example, the data can give all farmers who are females; all farmers below a certain age or all farmers within a locality or district. This system helps in the provision of extension services to farmers, monitoring and evaluation, loan disbursement and repayment systems. Tables 1-5 show the distribution of farmers with respect to Districts, gender, age, educational level and tenure(ownership/cropping rights).

Table 1: Farm Distribution by Districts

<table>
<thead>
<tr>
<th>No.</th>
<th>Districts</th>
<th>Number of Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kwaeibirem</td>
<td>133</td>
</tr>
<tr>
<td>2.</td>
<td>West Akim</td>
<td>144</td>
</tr>
<tr>
<td>3.</td>
<td>Suhum Kraboa/ Coaltar</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>Birem Central</td>
<td>43</td>
</tr>
<tr>
<td>5.</td>
<td>Birem South</td>
<td>7</td>
</tr>
<tr>
<td>6.</td>
<td>Akuapem North</td>
<td>27</td>
</tr>
<tr>
<td>7.</td>
<td>Akuapem South</td>
<td>11</td>
</tr>
<tr>
<td>8.</td>
<td>Ayensuano</td>
<td>42</td>
</tr>
<tr>
<td>9.</td>
<td>East Akim</td>
<td>3</td>
</tr>
<tr>
<td>10.</td>
<td>Lower West Akim</td>
<td>43</td>
</tr>
<tr>
<td>No.</td>
<td>Place</td>
<td>Total no. of farms</td>
</tr>
<tr>
<td>-----</td>
<td>----------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>11.</td>
<td>Upper West Akim</td>
<td>9</td>
</tr>
<tr>
<td>12.</td>
<td>Akyeremansa</td>
<td>3</td>
</tr>
</tbody>
</table>

**Range of farm size:** $0.2 - 10\text{ha}$

**Total area:** $1541.73\text{ acres} = 623.93\text{ hectares}$

**Average size per farmer:** $3.25\text{ acres} (1.32\text{ha})$

**Table 2: Farmer Distribution by Gender**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>425</td>
<td>89.47</td>
</tr>
<tr>
<td>Female</td>
<td>50</td>
<td>10.53</td>
</tr>
<tr>
<td>TOTAL</td>
<td>475</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 3: Farmer distribution by Age**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>No.</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20 – 29</td>
<td>21</td>
<td>4.42</td>
</tr>
<tr>
<td>30 – 39</td>
<td>230</td>
<td>48.42</td>
</tr>
<tr>
<td>40 – 49</td>
<td>158</td>
<td>33.26</td>
</tr>
<tr>
<td>50 – 59</td>
<td>47</td>
<td>9.90</td>
</tr>
<tr>
<td>60 – 69</td>
<td>17</td>
<td>3.58</td>
</tr>
<tr>
<td>Above 70</td>
<td>2</td>
<td>0.42</td>
</tr>
<tr>
<td>TOTAL</td>
<td>475</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 4: Farmer Distribution by Educational level**

<table>
<thead>
<tr>
<th>Educational level</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to Basic level</td>
<td>330</td>
<td>69.47</td>
</tr>
<tr>
<td>Up to High School/Vocational</td>
<td>133</td>
<td>28.00</td>
</tr>
<tr>
<td>Tertiary</td>
<td>12</td>
<td>2.53</td>
</tr>
<tr>
<td>TOTAL</td>
<td>475</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table 5: Type of tenure of farmers**

<table>
<thead>
<tr>
<th>Type of Tenancy</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land holder/ Allodial owner</td>
<td>37</td>
<td>7.79</td>
</tr>
<tr>
<td>Tenant farmer</td>
<td>438</td>
<td>92.21</td>
</tr>
<tr>
<td>TOTAL</td>
<td>475</td>
<td>100</td>
</tr>
</tbody>
</table>
DISCUSSION

The security of tenure is important to funding agencies. It is the surest way for fund managers to secure loans and improve access. Without security of tenure, it would have been difficult for the farmers to access capital, especially when their rights in the land cannot be ascertained by way of plans and documents. In Africa, agriculture employs significant number of rural youth. For this reason, the World Bank approved $20billion to help farmers in Africa in 2009 (Scheere, 2009). However, this study shows the youth (20-30 years) formed just 4.42% though 52.84% were below 40 years. It was also observed from the study that a high number had education up to basic level (69%). Unfortunately, agriculture is not a major subject in the curriculum at the basic level in Ghana. The relatively larger land sizes in this study belonged to the elite who formed only 2.53%, most of whom stayed in urban areas and hired people to work on the farms. Low number of women (10.53%) were involved. Only 7.9% of the farmers owned or held alodial ownership rights to the land, though not documented. A large number (92.1%) were tenant farmers who were working on behalf of the landholders under various customary arrangements that had also not been documented. A total of 1,541 acres (623.93 hectares) of rubber is under cultivation in this project, with prospects of expansion to other Districts and regions in Ghana. The geo-database is a useful tool that helps AERRO to keep track of its members. The Financial Operator is in a better position to monitor, evaluate and extend assistance to the farmers as a result of the geo-database. Based on the accurate farm sizes, the Operator knows the limit of financial assistance to extend to the farmer. The extension officers at MOFA can use the system to track farmers and offer assistance without necessarily travelling to the field personally. This is because they have all relevant data about the farmers and their farms “on their desk” in the office. For example, the extension officers know the number of seedlings or fertilizer to supply a farmer based on the accurate farm size.

CHALLENGES

Accessibility to farms: Accessibility to some farmlands was a challenge due to bad roads. In some instances the survey team had to walk long distances with their instruments and pillars to carry out demarcation of farms.
Institutional bureaucracy: The bureaucracy at the Lands Commission continues to be a drawback. Officers, due to parochial interests create unnecessary delays. Innovations and reforms are not easily carried through by the state land administration agency. 

Inconsistent information: Some farmers and landholders provided different information at different times. For example, a farmer will provide a name other than that which is on his valid identity card. Landholders and farmers always exaggerated the farm sizes but the scientific survey always corrected such information by way of the plans produced.

Education level of farmers and landholders: The low educational level of most farmers was also a challenge and a lot of education had to take place in this study. People had to be recruited to assist in answering questionnaires. This increased the cost of the study.

CONCLUSION AND RECOMMENDATIONS

Systematic survey through the cooperative arrangement is a good practice that helps promote inclusiveness in land administration at the local level. When rural land tenure systems are effectively integrated into the formal land administration system, it provides adequate tenure security and promotes investor confidence. Agricultural productivity and growth are sustained and wealth is created. The application of modern survey methods is important in getting boundaries clearly demarcated. Introduction of modern technology like Geographic Information System (GIS) as in this study will help make data easily accessible.

Institutional reforms are recommended to facilitate rural customary tenure into the land administration system to protect rights of the vulnerable; women and farmers who do not own lands or have no land rights. Government must encourage cooperatives that can ensure the rights of farmers are protected. Capacity building at the District level is recommended so that land administration is decentralized.

ACKNOWLEDGEMENT

The German Development Cooperation, KfW through the National Investment Bank (NIB) of Ghana financed the project. The Out grower and Value Chain Fund (OVCF) of the Ministry of Food and Agriculture (MOFA), Ghana, played a coordinating role. The Association of Eastern Region Rubber Out grower (AERRO) was the cooperative organization that brought farmers together and played a facilitating role in education and sensitization. The Rubber Plantation Ghana Limited(RPGL) was the rubber purchasing company that provided technical services to farmers and provided the kind of attributes required to make the geo-database effective.

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THE POTENTIAL OF UNMANNED AERIAL VEHICLE (UAV) IMAGES IN GENERATION OF MAPS FOR LAND ADJUDICATION IN KENYA

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Land adjudication is one of the means by which rights to parcels are registered. Registration of land rights usually requires a cadastral map, which needs to be consistently coordinated. In Kenya, it is estimated that only 25% of land has been registered. The gap requires exploring new platforms and approaches fast and cost effective to produce documents for registration. The production of registration maps in Kenya is through ground survey methods and aerial photography. These methods have proved to be expensive and time-consuming hence few coverage of land in Kenya has been surveyed and registered. Currently, use of UAV is proving useful for the production of maps that can support land registration. This paper looks at the possibility of using UAV as a platform that can be integrated cadastral surveying in Kenya.

Keywords: Unmanned Aerial Vehicle (UAV), Cadastral Maps, Land adjudication, Land Registration.

INTRODUCTION

Land adjudication is one of the means by which rights to parcels are registered. Registration of land rights usually requires a cadastral map, which needs to be consistently coordinated. The preparation of cadastral maps for registration requires a method that is affordable, reliable, attainable and easily improves existing cadastral maps (Keith et al., 2014).

Despite the benefits of land registration, it is estimated that only thirty percent of land in most of the developing countries has been formally registered (Roberge, 2012; Enemark, 2013; UN-Habitat, 2012), hence there is a need to increase the extent of land registration. The big gap that requires a set of new tools and approach that can increase the extent of formalization within a shorter time at a cheaper cost (Zevenbergen et al., 2013). Furthermore, every country needs to recognize and respect all legitimate land ownership rights of the people by making every effort to identify and record them whether formally or not (FAO, 2012).

According to the Constitution of Kenya (Kenya, 2010), land in Kenya can be classified as public, private and community land. Private land consists of land held by individual persons and can either be freehold or leasehold ownership. Freehold ownership comprises of land held by persons after converting trust land through adjudication process while leaseholds ownership are interests granted to land for a specific period of time by the government.

Community land is land vested and held by communities identified on the basis of ethnicity, culture or similar interest. Community land is characterised by unsurveyed land owned by different communities.

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under customary laws. Kenya has a diverse ethnic composition, hence multiple customary tenure systems exist (Wayumba, 2013).

Public land is land vested in and held by the county government or national government in trust for the people of Kenya for example, land held, used or occupied by a state organ, national parks, government game reserves, water catchment areas, all rivers, lakes and other water bodies, and specially protected areas. Since most of the public institution lands were not registered, the national land policy has provided mechanisms of registering and repossessing and public land acquired legally or illegally.

LAND ADJUDICATION IN KENYA

One of the processes for determining tenure rights in Kenya is through land adjudication. According to (Nyadimo, 2006), land adjudication can be described as a process of ascertaining existing rights in a particular parcel of land. It is the major land tenure reform that has been in Kenya after independence (Ondulo et al., 2010). It was conceptualised as a large-scale project and the main aim was to register lands under African ownership in rural Kenya (Siriba, 2011).

During land adjudication in Kenya, the survey techniques were to be kept simple hence plane table survey, use of chain and aerial photography were used to generate maps and diagrams for registration. The survey was only carried out after parcel rights have been determined on the ground and confirmed in the register. To determine parcel boundaries on the ground, the boundaries were physically identified with the help elders or committee members and the demarcation officer planted the hedges. Once the hedges were airborne, aerial photography was taken at a scale of 1:12, 500 (Siriba, 2011).

To produce maps for land registration during the adjudication process, the aerial images were enlarged to a scale of 1:5,000 or 1:2,500 to enable tracing of the boundaries hence the production of Preliminary Index Diagrams (PIDs) (Ondulo, Wayumba & Aduol, 2010). Initially, the aerial photographs were meant to be upgraded through ortho-rectification to produce a more reliable representation of land parcel. This was to be achieved through a ‘re-fly’ process where photos were to be taken once the hedges had grown substantially to be airborne. However, the re-fly process was abandoned in 1967 after covering fewer areas due to the high cost of data acquisition and bureaucracy issues (Wayumba, 2013).

CADAstral BOUNDARIES USED IN KENYA

In Kenya, three types of boundary system are being used to demarcate extent of the land parcel. They include fixed boundary, general boundary and fix general boundary.

Fixed Boundary system

Fixed boundary is established through an accurate survey from mathematical measurements. Typically, fixed boundary is monumented on the ground using coordinated beacons at the turning point of the rectilinear boundary. All fixed boundaries in Kenya are examined and authenticated by the Director of Surveys. In fixed boundaries, bearings and distances are accurately indicated on the maps (Wayumba, 2013).

For registration of land under Registration of Title Act (Kenya, 2010), it is required that survey conducted under fixed boundary, a deed plan of the respective parcel must be prepared then forwarded to Commissioner of Lands for registration after being signed and sealed by the director of surveys. Fixed boundary survey is carried out for new grant allocation, Trust Lands that have been set apart for public use, Forest Reserves, National Parks and National Game Reserves, and company and cooperative farms where shareholders opt for a fixed survey (Wayumba, 2013). Moreover, the advantage of fixed boundary is that missing beacons (physical boundary marks) can be relocated and re-established.

General Boundary

The general boundary system is used to demarcate extent of land parcel whose exact location is undetermined but is expected to be represented by visible physical features such as hedges, walls, rivers or streams, coastlines, or any physical feature that may be found suitable for the definition of the position of the boundary. The concept of the general boundary was introduced in order to speed up registration of native reserves since the indigenous people had no received titles.
For general boundaries to be established, the landowners were required to plant hedges to demarcate the extent of their lands with the help of the Demarcation officers. One the hedges were air visible, aerial photography at a scale of 1:12,500 was carried out. The photographs were further enlarged to a scale of 1: 5000 or 1:2500 to enable tracing of the boundaries hence the production of Preliminary Index Diagrams which are still being used up to date.

Fixed-General Boundary

Under the Registration of Land Act, section 21 and 22, the land registrar is given the authority to fix general boundary to a level of fixed survey. Fixation of general boundary normally applies where interested person or client decides to improve his boundary. In fixation of the general boundary, the Registrar gives notice to the owners and occupiers of the land adjoining the boundaries in the question of the intention to ascertain and fix the boundaries. If any objection is raised, the matter is referred to Lands Controls Board, otherwise the survey is carried out the registrar certifies that the boundary is fixed. Once the survey plan has been produced, the Director of Survey checks and authenticate it according to the Survey Act. Fixation of general boundary improves the market value of the land, reduce land disputes that may arise, provides for easy re-establishment of missing beacons and generally, it improves tenure security.

LAND REGISTRATION DOCUMENTS IN KENYA

Currently, the types of registration maps being used for land registration in Kenya are deed plans, Registry Index Maps (RIMs), and interim registry index maps. These cadastral maps have varying positional accuracy and exist in either Universal Traverse Mercator or Cassini-Soldner coordinate system.

Deed plans are produced from fixed boundary survey. They have the highest positional accuracy since they are prepared from ground survey methods. In order to achieve high positional accuracy, precise equipment and techniques are employed to acquire accurate data. Always a survey plan typically shows bearings, distances, area, coordinate list, parcel number, folio register number, authentication date and the adjoining parcels (Wayumba, 2013).

According to Registration of Land Act of 2010 (Kenya, 2010), Registry Index Map is prepared for the first registration of land. RIM is usually prepared using ground survey or aerial photography methods for every registration district or registration sections identified by distinct names. The information contained in the RIM includes the location, sheet and index number, edition of the sheet, sheet history (amendments), plot numbers and scale. Since no boundary measurements are indicated on the RIM, map user uses scale ruler to scale of the distances from the map.

The Interim Registry Index Maps are provisional maps and were intended to speed up land registration pending preparation of more accurate documents, though they are still in use in Kenya. They include Registry Index Maps (Provisional), Preliminary Index Diagrams (PID) and the Registry Index Maps-Range (Provisional). In the adjudicated areas, PIDs have remained the basis of land registration. These PIDs were produced by taking aerial photography at a scale of 1:12,500. The non-rectified, mosaicked photographs are then enlarged to a scale of 1:2,500 or 1:5,000 to enable easy identification of the boundaries. Once the parcel boundaries have been identified and marked on the photographs with the help of photo interpreters, the parcels boundaries are traced to produce a temporary map for registration.

THE WEAKNESS OF REGISTRATION MAPS IN KENYA

The Kenya land registration system is faced with different challenges. The productions of registration documents were not completed hence provisional maps have remained the in use. The adjudicated areas mainly use PID for registration. The following challenges have been noted.
i. The RIMs for registration lack indications of boundary and area measurements. In the case of a subdivision, all the amendments are made on the sheet whose scale is fixed resulting into congestion due to continuous changes on consecutive resultant parcels that may lead to illegibility of the map (Siriba et al., 2011).

ii. The PIDs have non-uniformity of the scale within particular registry map sheet, unreliable areas and distortion of shapes of parcels since there are no standard specifications for boundary features for general boundaries. Continuous features, such as hedges and fences often mark boundaries, but quite often these features are missing. Though the approximate scale is indicated on PID map sheets, indication of grid lines on the sheets is avoided (Ondulo et al., 2010).

iii. In addition, Ondulo (2010) observed that the low accuracy of the registration maps can be attributed to:
   1. The field survey work is not carried out under the Survey Act and the direction and control of the Director of Surveys.
   2. The survey work is performed by junior survey assistants with minimal training from the Department of Land Adjudication. Their work performance depends on job training and field experience.
   3. The use of un-rectified aerial photographs. The areas derived from these enlarged photographs are not precise and have error margins of up to twenty-five percent.

POTENTIAL OF UAV IMAGES IN MAP PRODUCTION IN KENYA

UAV is a photogrammetric platform which is controlled remotely without a pilot in it. UAV is equipped with measurement system such as small video camera which allows registration and tracking of the position and orientation of the sensor in a World Geodetic Coordinate System. Therefore, UAV has opened a new application and introduces real time low-cost data acquisition alternatives to the traditional aerial photography. The advantage of using UAV is that it can be used in high-risk situations without causing any human problems also it works well in inaccessible areas at low altitude. Furthermore, UAV can work freely from cloud cover and free from the economic expense of a human pilot (Govorčin et al., 2014).

Furthermore, UAV technology offers an automated mapping technique that can benefit land registration. It provides a flexible means of capturing aerial images. Since UAV can fly at low altitudes, cloud cover does not affect its use hence more adaptable to environmental conditions. The resulting high-resolution image acquired by UAV can optionally be geo-referenced through the use of an integrated on-board GNSS receiver hence reducing the time for image acquisition and processing. In addition, UAV-derived high-resolution aerial imagery delivers extremely reliable information that can be easily interpreted (Kelm et al., 2014).

Increasing the extent of land registration, updating the existing land related information to represent current ownership and subdivision of land parcels require a new and efficient mapping approach. Use of images for parcel boundary delineation provides a graphical background that is a valuable historical evidence for solving current land issues such as boundary conflict. Using of UAV as a platform for mapping can support revision of current maps and increase the extent of land
registration in Kenya. The concentration of the study will particularly be on assessing the suitability of UAV as a tool in the production of Maps for land adjudication.

According to the Government of Kenya, through the Registered Land Act Cap 300, requires that all land registration records must be geo-referenced (Kenya, 2010). However, the act does not provide guidelines to support the geo-referencing of land registration data. PID maps are not geo-referenced which calls for PID maps to be updated with reference to a known datum. This can be achieved by utilising fast and cost effective advanced mapping technology in the production of Maps for land registration in Kenya. UAV’s are increasingly recognized as an attractive low-cost alternative to aerial photography due to their flexibility and readiness for application. UAV high-resolution images provide a quick overview as well as geo-referenced images that are suitable for the production of maps for land registration in Kenya.

CONCLUSION

The UAV technology has the potential to become an important tool in land administration and thereby increasing the number of people in the world who have access to more secure and inclusive property rights. In Kenya, the use UAV has not been deployed as a tool in cadastral or mapping surveys. Considering that only 25% of land in Kenya has access to secure tenure, it is apparent that the technology will be the equipment of choice in cadastral (particularly) adjudication surveys. Therefore, UAVs technology can provide an excellent platform for the acquisition of spatial data that can aid in increasing the extent of land registration and updating of the existing registration maps. For the adoption of UAV as a platform for image acquisition for land adjudication, the following need to be done.

Moreover, UAVs should be controlled by operation guidelines. So far, the legal and regulatory framework is still evolving, and since UAVs can be purchased and assembled at low costs, development partners should have minimum standards for safety and operations that take into account social consideration in the country context. These standards would set minimum standards related to equipment and operational safety; field mobilization procedures, privacy and data protection requirements, and respecting local sensitivity.

REFERENCES


AREN’T PLOTS OF LAND IN NIGERIA RESTRICTED TO SPECIFIC SIZES? A CASE STUDY

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The purpose of this paper is to clarify the meaning of the term “plot of land” (PoL) in relation to the practice of construction and land tenure law. Right from the era of British rule of Nigeria, pieces of land had been measured out in specific dimensions and allocated to individuals and groups for developmental purposes such as industrial, commercial or residential and the piece thus allocated were being referred to as a plot. Parties may have different understandings of the term.

Design/methodology/approach – The question emerges as to whether the term PoL has a definitive legal meaning in its own right aside the general English meaning. This study seeks to ascertain the definition of the term PoL within the construction industry through a review of the legal position regarding consensus ad idem between the transferor and transferee in the transference of ownership of land contracts and through the consideration of the decided case relating to this topic and the associated secondary sources of information. Findings – The study concludes by elucidating a clear interpretation of the term PoL and guidance of how it should be used in transfer of ownership of PoL. Originality/value – Recent cases and established authorities are considered together for the first time in this work which assists in unambiguous meaning and the development of legal meaning of PoL and the determination of how they apply to the built environment.

Keywords: Deed of conveyance, Interest in land, Land dispute, Non-suit, Plot of land.

INTRODUCTION

Prior to the decree on ownership of land in Nigeria (known as the Land Use Act of 1978 (LUA 1978)), individuals and organizations could buy a piece of land, own it permanently and make use of it as desired. However the advent of the LUA 1978 reverted ownership of land to the government – mainly the State and Local Governments. This Act vests ownership of all land in the Governor of each state or the Chairman of each local Government, who has the rights and privileges to allocate land through a leasehold system. The lease is generally for 99 years less one day. In reality, this right of occupancy (R of O) is legally backed-up with a Certificate of Occupancy (C of O) issued to the beneficiary (Agbola, 1987).

In the present dispensation (post-1978 era), individuals and organizations can only purchase an interest in the land. In many other countries such as the United Kingdom, individuals or organizations can buy registered or unregistered land (Smith and Keenan, 2004). In Nigeria however, one cannot buy land.

Purchase of interest in land in Nigeria is processed by:

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i. Paying an agreed sum of money to the current holder of interest on the land and obtain a receipt of the purchase. In the case of the current holder of interest being a government body (Local or State) it (the government body) doubles as both holder of interest and owner.

ii. Obtaining a written agreement signed by both parties and their witnesses (one each) on the transaction.

iii. Obtaining a government issued C of O on the piece of land indicating that the ownership of interest on the land has passed on to you.

All the three documents so obtained would carry the size dimensions of the piece of land in question. Of course other documents such as the site survey plan (drawing) would accompany items (i) and (ii) listed above before the C of O can be processed by the government. While documents (i) and (ii) above seem to confer on the transferee perpetual ownership of the land, document (iii) states clearly the period the interest of the new ‘owner’ of the land would expire. The Local government paper, R of O, is with maximum period for the use of the land being 50 years. The State Government C of O is for a maximum period of 99 years. Either of the papers is however renewable.

METHODOLOGY

Existing published information is a key element to this study, and predominantly consists of primary source material of recently decided cases and existing case law. Secondary sources such as journals and articles were used to supplement this and broaden the understanding. The research that has been adopted is therefore predominantly of a qualitative nature, and analyses of the existing material available. Qualitative research of a legal nature has two elements to it (Chynoweth, 2008). The first of these is doctrinal research, which is research in the law, and the other is interdisciplinary research, which is research about the law (Connell and Mason, 2015).

Doctrinal research is “concerned with the formulation of legal ‘doctrines’ through the analysis of legal rules” (Chynoweth, 2008), and has traditionally formed the research method adopted in studying law. This type of research involves the study and analysis of legal precedents, texts and publications through a normative, subjective and argument-based process and is similar to research within the humanities. Other areas of the built environment adopt the quantitative and causal research techniques that are usually used in the natural sciences.

Prior to investigating the legal situation with regard to transfer of ownership of land, it is necessary to understand the general principle regarding transference of ownership of land (Barrett, 2008; Smith and Keenan, 2004).

THE CASE STUDY

One Mr Philip Lawal in 1977, prior to the Land use Act of 1978, bought a parcel of land in Ilorin, Kwara State Nigeria, from a family whose head was one Abdulkadir Aliyu. Mr Lawal obtained the necessary papers stating that the piece of land so bought were two plots and the overall dimensions of the land were also stated in both the Agreement and the government papers.
In early 2011 the family, lead by the eldest son of Mr Aliyu, contested the size of the two plots, arguing that dimensions of two plots could not be that large. The family by its own definition said that two plots could not be more than 100 x 100 feet. They went ahead to take possession of the land unilaterally, leaving a little portion that they felt was sufficient to be two plots.

By mid-2011, Mr Lawal (by then Dr Lawal) took the matter to Kwara State High Court in Ilorin complaining that the Aliyu family was depriving him of his right to the land and that the court should help to clarify if the size of two plots of land must necessarily be restricted to 100 x 100 feet or its metric equivalent rather than the size given in the documents. On 30th September 2013, the trial judge of the State high court delivered his decision, wherein he refused Dr Lawal's application to admit the certified true copy of his deed of conveyance and instead made an order of non-suit in respect of the court action.

The trial judge of the State High Court premised his decision of Non-suit on the following grounds.

i. the claimant (Dr Lawal) has not established the actual size of the land he acquired from the defendant (Alhaji Aliyu).

ii. Though it is clear from Exhibit I that the claimant has been granted right of occupancy (by the state government) in respect of the land in covers, and that the defendant admit selling part of the land to the claimant as he further said the claimant fraudulently induced him to sign away a larger area of land than he agreed, the absence of the Deed of Conveyance with which the claimant bought the land has made it difficult to decide the actual size of land the claimant bought and whether he obtained R of O in excess of the land he bought. Clearly the claimant has right to the land but has only not proved the extent of the land.

iii. The defendant admits signing the Deed of Conveyance, though he claims that fraud was perpetuated on him that made him sign away a far greater piece of land than the one he sold. He lead no evidence of this beyond his Ipse dixit supported by the hearsay of his son whom he told. If the claimant failed to produce the Deed of Conveyance, should the defendant not tender it to establish the fraud practiced on him? The trial judge then concluded that the defendant was not entitled to Judgment of the court.

iv. Having found that the claimant has not established the extent of the land he bought in 1977 as against the land granted by the right of occupancy, and seeing that the defendant is not entitled to the Judgment of the Court, the trial Judge found that the appropriate order in the circumstance was an order of non-suit.

v. In the light of the foregoing grounds, the trial Judge ordered a non-suit against the claimant (Dr. Lawal) in respect of the claimant’s action.

The non-suit decision of the High Court judge was challenged in the Federal Court of Appeal (FCoA) by Dr Lawal. The procedure of the FCoA justices is narrated below.

What is non-suit?

It is a ruling by the judge in a lawsuit either, when the plaintiff (the party who filed the suit) does not proceed to trial at the appointed time or has presented all his/her/its evidence and, in the judge's opinion, there is no evidence which could prove the plaintiff's case. It is a court-ordered stoppage of a suit on the grounds that the plaintiff has failed to make a legal case or bring sufficient evidence. It is a broad term for any of several ways to terminate a legal action without an actual determination of the controversy on the merits. A nonsuit terminates the trial at that point (Legal dictionary, 2017).

In the light of the foregoing grounds, the trial Judge ordered a non-suit against the claimant (Dr. Lawal) in respect of the claimant’s action.

The non-suit decision of the High Court judge was challenged in the Federal Court of Appeal (FCoA) by Dr Lawal. The procedure of the FCoA justices is narrated below.
1. Should a plaintiff be allowed to discharge his burden of proof by relying on the weakness of the defense?
   A plaintiff succeeds on the strength of his case and not on the weakness of the defense. See, Elechi Kalu & 3 Ors vs. Chief Peter Onwuegbu (2008) All FWLR (Pt.435) 1713.

2. On whom lies the burden of proof?
The burden of proof lies on the appellant as he who asserts must prove. See, Sections 131 to 133 Evidence Act 2011 and the case of Network Security Ltd vs. Alhaji Umoru Dahiru & 2 Ors (2008) All FWLR (Pt. 419) 415

**Discretion of court:**

Do the grant of declaration of title and the order of non-suit involve the court's jurisdiction which must be judiciously exercised?
This issue is whether the order of non-suit was a proper exercise of discretion by the learned trial judge. It is trite that both the grant of declaratory title and an order of non-suit involve the exercise of discretion. However, this is a judicial discretion governed by judicious parameters and not to be exercised capriciously. See, the Nigerian Fishing Co. v. W.N.F Co. (1969) N.M.L.R. 164. Hence the power to order a non-suit should be exercised with utmost restraint and in accordance with well settled principles which have been developed over time. Each case being peculiar could be determined on its own facts. See Mandillas & Karaberis v. Oridota (1972) 2 S.C. 47.

**Duty of court:**

1. Is it the duty of a court/tribunal to embark on enquiry into a case outside the open court?
2. Is a court of law allowed to base its decision on mere speculation?
A judge is an adjudicator, not an investigator. This is because it is not the duty of a court or tribunal to embark upon cloistered justice by making enquiry into the case outside the open court not even by examination of documents which were in evidence but not examined in open court. See CAN v. Lamido (2012) All FWLR (Pt. 630) 1320 of pages 1338 - 1339, paras, G - B; Ivienagbor v. Bazuoye (1999) 6 SCNJ 235; (1999) 9 NWLR.

It behooves the learned trial judge to first find out the total size of the two plots measuring 100 feet by 100 feet each, which by simple mathematical calculation is 10,000 square feet and compare with 3342.45 square meters and bring out the difference, if any. This would have formed the basis upon which the learned trial judge could say whether there was any difference between the original size of the two pieces of land and the size of 3342.45 square meters as reflected in the survey plan. Anything short of this factual finding was nothing better than mere speculation. A court of law ought not to build its decision on mere speculation. In other words, the learned trial judge ought to have stated the total size of the 2 plots in square feet and the convert same from square feet to square meters. Without that geometrical calculation, it was tantamount to speculation to simply say, as the lower court did, that the size was increased. This informs the failure of the learned trial judge to state how much increase was made to the size of the purchased plots. There was overwhelming evidence before the trial court that the appellant or his father had purchased a piece of land that was clearly marked. The marked area, which splits into two parts by subsequent road construction, each measuring 100ft X 100ft, was the land in dispute, on which the appellant enjoyed ownership rights since purchase.

**Judgment and order - non-suit:**

The expression non-suit is used in civil proceedings to describe the judgment of the court in a variety of circumstances. Generally it is the exercise of discretion to relieve the plaintiff who has not totally failed to prove his claim on the merit, but it would, in the circumstances, be unjust and inequitable to dismiss the action. See Dada v Ogunremi & Anor (1967) N.M.L.R. 181. The intention is to enable the plaintiff to re-litigate the claim subsequently. The rationale for the exercise of the discretion by the judge is that the defendant is not in any way overreached as a result of the second opportunity given to the plaintiff to prove his case.

**Land law - title to land:**

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Is the existence of a duly executed deed of conveyance a sufficient evidence for the award of title in a land dispute?

In a land dispute, where there is a duly executed deed of conveyance it is sufficient evidence to support the award of title to the beneficiary thereof. See Oyebanji v. Lawanson (2008) All FWLR.

**Contract - written agreement:**

Where there is a dispute between parties to a written agreement, the only authoritative and legal source of the information for the purpose of resolving same is the written document executed by the parties (Richards, 2004). It is also the duty of the court to take into cognizance the comprehensive and unequivocal wordings of the agreement between the parties. See also Larmie v. Data Processing Maintenance & Services Limited (2005) 18 NWLR (Pt.958) 438; (2006) All FWLR.

The leading judgment:

This appeal was against the decision of the High Court of Kwara State, presided over by the lower court Judge delivered on 30th, September, 2013, wherein the learned trial judge ordered a non-suit against the claimant/appellant's suit. Dissatisfied with that decision, the appellant herein resorted to appealing by filing a notice of appeal premised on the following five grounds:

1. The learned trial judge erred in law in holding that though he did not agree with the defense Counsel that the application is an abuse of process, he agreed that it amounted to an attempt to overreach the defendant and on that score the application ought not to be granted. He therefore refused the application of the claimant to admit the Certified True Copy of the conveyance dated 15th July, 1977.

2. The learned trial judge erred in law in holding that although he had found that the claimant bought the land from the defendant, there was no evidence before the court of the actual size of the land that the claimant purchased from the defendant since the deed of conveyance was not before the court. Furthermore the case of the defendant was that it was only two plots measuring 100ft by 100ft that was sold to the claimant.

3. The learned trial judge erred in law in holding the view that in the light of that challenge by the defendant, it becomes important to establish the actual size of the land sold to the claimant. This is more so because the size of the land as contained in the R of O came about as a result of the survey that was undertaken several years after the land was acquired. The conclusion the lower court judge therefore come to was that the claimant had not established the actual size of the land he acquired from the defendant.

4. The learned trial judge erred in law in holding the view that "the claimant failed to establish the extent of the land, not out of any fault of his but for that of his counsel. The manner the Counsel to the Claimant has conducted this case has left much to be desired. He had document vital to his client's case but he did not tender it properly. He further demonstrated this failure to tender a letter written to his client by the defendants' solicitor which he claims is crucial to his client's case."

5. The learned trial judge erred in law in holding the view that "having found that the claimant has not established the extent of the land he bought in 1977 as against the land granted by the right of occupancy and seeing that the defendant is not entitled to the Judgment of the court, the appropriate order in the circumstance is an order of non-suit."

The appellant herein instituted this action at the court below as plaintiff against the respondent as defendant herein seeking for the following reliefs:
1. A declaration that the claimant is the owner of all that parcel of land situate, lying and being of Tanke village along University Road in Ilorin Local Government Area, Kwara State and measured up to about 3342.450 square metres and that the defendant's family has no subsisting title whatsoever to the said parcel of land.

2. An order of perpetual injunction restraining the defendant's family by themselves, agents, servants, privies and/or assigns whosoever from trespassing and/or asserting any claim to the said parcels of land of the claimant that is inconsistent with the claimant's title over the said parcels of land.

3. ₦2,000,000.00k (Two Million Naira) as general damages

The respondent, however, filed a counter claim and prayed that the claimant's suit be dismissed. Before the commencement of trial, the appellant applied to the trial court to amend his statement of claim to reflect that he would tender a photocopy of the deed of conveyance of the trial because the land office had retained the original document. That application was granted by the court on 26th January 2012, following which an amended statement of claim was filed incorporating an additional statement on oath of the appellant.

At the trial, the appellant testified for himself and tendered a copy of the deed of conveyance, the survey plan and the grant of R of O in respect of the land in dispute. The respondent and his son Abdulkadir Bolaji testified at the trial but did not tender any document.

The learned trial judge called for address of counsels on the admissibility of the documents tendered by the appellant, which were duly settled. In its ruling, the subject of this appeal, the court below admitted only the grant of right of occupancy exhibit 1 but rejected the copies of the Deed of Conveyance and the Survey Plan on the ground that they were not certified.

However before the date fixed for judgment, the appellant's counsel got the deed certified and brought an application, to tender a certified true copy of the said deed of conveyance. Upon that application, the court invited both counsel to address the court on the propriety of non-suiting the appellant's suit. On 30th September, 2013 the learned trial judge delivered his decision, the subject of this appeal, wherein he refused the appellant's application to admit the certified true copy of his deed of conveyance and instead made an order of non-suit in respect of the appellant's action.

Two similar issues were each raised by the appellant and the respondent. However, the appellant's issues which were considered more apt and devoid of repetition were adapted for the determination of the appeal. The two issues read thus:

1. Was the honourable trial court right in its judgment to hold that there is no evidence before the court of the actual size of the land that the claimant purchased from the defendant since the deed of conveyance was not before the court to entitle him to his claim?

2. Was the honourable trial court not wrong to make an order of non-suit after a full trial of this case? Arguing the first issue, the learned counsel for the appellant reiterated the well settled principle of law that in a land suit, where a defendant claims to be the owner thereof, title is automatically put in issue and for the plaintiff to succeed; he must establish a better title to the land in dispute than that of the defendant. See Adebyo V. Ighodalo (1996) 5 SCNJ 23 at 45; Amakor V. Obiefuna (1974) 3 SC 67 of 78.

**DISCUSSION**

It was submitted, for the appellant, that the respondent had woefully failed to establish better title to the land in dispute. Rather, the appellant deserved to be awarded the land on the preponderance of the evidence. It was submitted that the finding of the trial judge that "there is no evidence before the court of the actual size of the land that the claimant purchased from the defendant since the deed of conveyance is not before the court" radically belies the totality of evidence adduced by the appellant especially as it relates to all the documents tendered by the appellant in the course of trial.
At the beginning of the trial all the title documents on the land in dispute including copies of the deed of conveyance, survey plan and right of occupancy were tendered by the appellant. The learned counsel for appellant argued on the supposition, without conceding, that the deed of conveyance was inadmissible as held by the learned trial judge, there was nothing rendering the other documents attached thereto such as the survey plan inadmissible since it was original requiring no certification.

It was also submitted, for the appellant, that the effect of what the learned trial judge did in the ruling on the documents tendered was an investigation, which was not the responsibility of the court. A judge was said to be an adjudicator, not an investigator. This is because it is not the duty of a court or tribunal to embark upon cloistered justice by making enquiry into the case outside the open court not even by examination of documents which were in evidence but not examined in open court.

Moreover, the appellant was granted leave by the court to amend the statement of claim to plead the copies of the documents tendered, which the trial court admitted as exhibits during the trial proceedings but later rejected same in the judgment. The appellant had also gone a mile further to obtain and submit a certified true copy of the deed of conveyance through an application to the court to be informally received as evidence in order to do substantial justice.

It was further argued, for the appellant that there being both the original and copy of the title documents before the court, there was no ground for non-suit. The survey plan, being a professional document, more accurately delineates and describes the land and ought to have been relied upon as evidence on the identity of the land in dispute.

The right of occupancy admitted in this case has proved and justified the appellant's claim. Section 5(2) of the LUA78, which is substantially the same as Section 6(3) of the Land Tenure Law of Kwara State that creates a statutory revocation of all existing rights upon the grant of statutory R of O. It is also the duty of the court to take into cognizance the comprehensive and unequivocal wordings of the agreement between the parties (Yerokun, 2004).

Non-suit is no longer fair in Nigerian system

The learned counsel for the appellant noted that the principles of law on non-suit in a civil action were analogous to that of a no case submission in a criminal case. This connotes that prima facie, there is no offence known to law upon which the accused may stand trial. Conversely, the principle of law of non-suit in civil cases is triggered by a justiciable claim that is not supported by evidence.

If, as in this case, after evidence that had been adduced by both parties the plaintiff fails to prove his case, the proper order would have been that of dismissal and not a non-suit. It was submitted for the appellant that once parties have concluded their evidence before the court, non-suit is not proper as it is against the weight of evidence. The learned counsel for the respondent did not argue differently when he submitted that failure of a party, that rely on grant, to prove the extent of his grant is fatal to his claim and in such circumstance the claim is liable to be dismissed.

Non-suit is a decision against the Plaintiff because of his failure to show that he has a valid case. This procedure as a form of judgment has now been abolished. Non-suit is injudicious in that it is a system where a plaintiff who has totally failed to convince the court that he is entitled to judgment is unwillingly given another chance to institute another action in court.

The rationale for the exercise of the discretion by the judge is that the defendant was not in any way overreached as a result of the second opportunity given to the plaintiff to prove his case. The issue was whether the order of non-suit was a proper exercise of discretion by the learned trial judge or not. It is trite that both the grant of declaratory title and an order of non-suit involved the exercise of discretion.

In the peculiar circumstances of the instant case, where the non-suit order was based on the misconceived fact that the appellant had failed to adduce evidence on the size of the land in dispute
when there was ample documentary and oral evidence, to that effect including the respondent's own admission, it became a situation that called for judgment in favour of the claimant/appellant rather than non-suit. Accordingly, the appeal succeeded perforce and was allowed. The term ‘plot of land’ does not refer to any specific size of land. Going by the dictionary definition, it is a small piece of land that is used or intended for a special purpose (Turnbull, 2010).

The appellant was accordingly granted the following reliefs:

1. A declaration that the claimant/appellant was the owner of the right of occupancy in respect of the parcels of land situate of Tanke village along University Road in Ilorin Local Government Area, Kwarara State measuring approximately 3342.45 square meters and that the defendant/respondent's family had no subsisting title whatsoever to the said parcels of land.

2. It was ordered that the defendant/respondent's family be and were perpetually restrained, by themselves, agents, servants, privies and/or assigns whosoever from trespassing and/or asserting any claim to the said parcels of land inconsistent with the claimant/appellant's title thereto.

3. Though tagged as general damages, the appellant was awarded special damages in the guise of "general damages". The judge awarded to the appellant the sum of One Hundred Thousand Naira (₦100, 000.00) as general damages and a further sum of Fifty Thousand Naira (₦50, 000.00) as cost to the claimant/appellant against the defendant/respondent.

CONCLUSION

The current position in Nigerian law is that non-suit has become obsolete in civil matters and that it does not apply to criminal matters which include sale of land issues. A PoL is just a small piece of land whose dimensions are not restricted to any specific size. It is important to qualify that the findings in this paper are based on a study of one particular case where dimensions of a PoL was not restricted to a particular size thereby implementing the general English meaning of what a PoL is. Particular case must be treated on its own merit and with caution.

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END
LAND USE CONFLICTS: THE PLACE OF ADR IN LAND DISPUTES IN AFRICA

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Land administration and management in Africa are prone to disputes. Various issues such as those related to land administration, access to land, land use planning, restitution of historical injustices, the institutional framework and land information management system have always presented a challenge in land management. However, an expeditious and effective resolution of land administration and management issues is a critical requirement for sustainable recovery and growth of economies in Africa. We have various mechanisms through which to resolve these disputes including and not limited to Courts (most predominant method of resolving such disputes), tribunals, appeals boards, and land commissions. Whereas these institutions were established to hear and determine disputes relating to land; they have not only proved costly but also time consuming, technical, inefficient and bureaucratic. It’s from this background, that this paper seeks to demonstrate the need to resolve these disputes in a cost-effective, efficient and expeditious manner through the alternative dispute resolutions (ADR). The ADR mechanisms in the land sector that this paper will address include Arbitration, Mediation, Adjudication, Negotiation, and Expert determination. This paper considered various available literatures in Africa, legislations, regulations and various presentations that have been previously done on this dynamic area. This paper therefore presents an overview of ADR mechanisms as a means of resolving land disputes in Africa. It will take a look at the types of ADR used around Africa, the historical context for ADR in Africa; examining several country specific and regional mechanisms for resolving land disputes currently in existence. It will conclude that structures currently exist, however improvement, time, and legitimacy in the region is necessary for ADR to truly be effective in Africa. This Paper seeks to discuss the use of ADR as a viable tool in resolving land conflicts in Africa.

Keywords: Arbitration, Mediation, Adjudication, Africa, Land.

INTRODUCTION

Land is crucial to the attainment of economic, social and cultural development in Africa. Land disputes related to access, use and control of natural resources are common in Africa. These disputes have negative effects on certainty of land markets, tenure, food security, economic production and reduction of poverty. Resolution of such disputes in the past has been tedious and costly through courts, tribunals, appeals boards, and land commissions hence the need for promotion of ADR in resolving land disputes.

The term ADR comprises a variety of processes that provide alternatives to the traditional methods for resolving disputes through litigation that are generally characterized by informality, flexibility and control by the parties to a dispute. It has been highlighted as a more efficient way of doing business and resolving conflict.

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Since disputes are an inevitable product of some land transactions, resolutions of such disputes can become the difference between a continuing productive commercial relationship and termination of that relationship. ADR has been useful in resolving land disputes by providing speedier enforceable decisions.

PROBLEM STATEMENT- WHY ADR?

Unfortunately, in Africa, most land conflicts have seen their way to the court arena for resolution. This playground has overtime been characterized with foul play, corruption, inefficiency, delays, technicalities and solutions that mainly leave disputants as enemies at family and community level. Land disputes involve not only technical matters but mainly complex issues that relate to traditional and customary practices in the management and administration of land. The complexity calls for a change in the approach for resolving land disputes and ADRs are recommended as a first line approach.

Due to increasing domestic and foreign investment in land in Africa, there is an increased pressure for sufficient, fair, and organized ADR organizations within the continent. Foreign investors tend to have warranted suspicion about African national judicial systems, which are often beset by corruption, long and costly procedures, and lack of efficient enforcement of the law.

METHODOLOGY

The research architecture of this paper was designed mainly on literature review approach. Information was therefore gained through secondary sources that involved gathering data from published and published books, conference papers, magazines, journals and internet materials.

Limitations

In became clear while reviewing the literature that there has not been much documentation of the application of the customary practices in solving land disputes in Africa. Descriptions of customary land dispute resolution processes for land disputes in Africa which were available were published many years ago and a desk study could not ascertain whether the processes described are still in existence or have changed over time. To overcome the above limitations, it helped to have gone through literature on ADRs and have held conversations with various key stakeholders prior to writing this paper.

ADR METHODS

Negotiation

This is to confer, discuss, or bargain in order to reach to an agreement on a contract or another subject of common concern to the parties. Parties themselves attempt to settle their differences using a range of techniques from concession and compromise to coercion and confrontation. It is a voluntary and informal process in which the parties seek out the best options for each other. The result is usually a mutually acceptable agreement.

There are two negotiation theories: - positional negotiation and principled negotiation:

Positional negotiation strategy is essentially, a manipulative approach designed to intimidate the other party such that they lose confidence in their own case and are
Pressured into accepting the other side’s demands. Positional negotiation is characterized by high opening demands; threats, tension and pressure; stretching the facts; sticking to positions; being tight lipped; desire to outdo, out-maneuver the other side; desire for clear victory.

The recommended method in solving land disputes and especially in the Africa set-up is the principled negotiation approach which is interest-based, co-operative, and collaborative. In this approach we separate the people from the problem; focus on interests, not positions; invent options for mutual gain and select from among options by using objective criteria.

In land disputes, however, the parties are too involved emotionally or financially for them to be able to settle the dispute themselves. If each party had gone to a lawyer, letters will have been written, allegations will have been made and the parties will probably be more entrenched than they were when the dispute started. However, there is usually no limit to the argument, evidence, and interests that may be brought to the bargaining table and hence allowing land disputes to be resolved without a third party, thus providing for a more confidential agreement.

Conciliation

This involves direct discussion and bargaining between disputing parties to arrive at a mutually acceptable resolution of disputed issues (Parnika, 2008). A third party: a conciliator is appointed as an impartial person that assists the parties through the negotiation and then drafts a solution based on what they think to be a just compromise. Unlike arbitration the whole process is much less adversarial, in that the conciliator seeks to identify all the rights that have been violated or issues that have been breached and searches to find the optimal solution to cure the breach.

The conciliator plays a direct role in the resolution of the dispute and figures out the best solution for the parties and this becomes the drafted settlement. This helps parties in land disputes as there is a design in which a solution may be found. In effect, the conciliator may be regarded as a designer of the solution. This may be contrasted with mediation where the parties are guided to design their own solution (Parnika, 2008).

Mediation

This is usually a method sought out when parties to a dispute are ready to discuss the issues openly and honestly. It is an ADR method where a neutral and impartial third party mediator facilitates dialogue in a structured multi-stage process to help parties reach a conclusive and mutually satisfactory agreement. A mediator cannot impose a solution on the parties in the same way a conciliator or arbitrator can.

The principal characteristics of mediation are that mediation is a non-binding procedure controlled by the parties. Secondly, mediation is a confidential procedure and thirdly mediation is an interest-based procedure, implying it can be applied in resolving land disputes as the parties on land disputes are guided by their interests. Mediation depends upon the commitment of the disputants to solve their own problems. The mediator, also known as a facilitator, never imposes a decision upon the parties. Rather, the mediator's job is to keep the parties talking and to help move them through the more difficult points of contention.
There are different types of mediation which include Workplace mediation; Community mediation; Victim offender mediation (restorative justice); Civil/Commercial/Court-mandated mediation; Family mediation (Divorce and separation mediation); Peer mediation in schools; Mediation for law enforcement officers (Police); Environmental and land conflicts Mediation; and Mediation for constructions disputes. This indicates that there is a great unexploited opportunity for land disputes to be resolved through mediation.

In Kenya, there is an introduction of Court-Annexed Mediation, where Courts mandate parties to appear before an accredited Court Mediator from the Mediation Accreditation Committee. Several land-related disputes have been referred to the Court Annexed Mediation with a large percentage of cases reaching a mediation agreement while other parties are not able to reach an agreement and the matter is referred back to court. If the parties agree, the mediator records the agreement and presents a report back to Court.

Arbitration

It is a formal, private and binding process, where disputes are resolved by an Arbitral award made by an independent tribunal. The tribunal is either agreed to by the parties or nominated by a further independent body for example a court, or a professional institution like the Chartered Institute of Arbitrators, Law society of Kenya, Rwanda Bar Association, Burundi Bar Association, Uganda Law Society, Zanzibar Law Society, and Tanganyika Law Society.

Arbitration more closely resembles traditional litigation in that a neutral third party hears the disputants' arguments and imposes a final and binding decision that is enforceable by the courts. The difference is that in arbitration, the disputants generally agree to the procedure before the dispute arose; the disputants mutually decide who will hear their case; and the proceedings are typically less formal than in a court of law.

An arbitrator is a private extraordinary judge between two parties, chosen by mutual consent to determine controversies between them and arbitrators are so called because they have an arbitrary power; for if they observe the submission and keep within due bounds, their sentences are definite from which there lies no appeal.

Application of arbitration in Africa has been characterised by concern in the manner in which judges have been overturning arbitral awards on seemingly weak grounds and with almost every dispute referred to arbitration having to go to Court.

Med–Arb

This is a combination of mediation and arbitration where the parties agree to mediate but if that fails to achieve a settlement, the dispute is referred to arbitration. The same person may act as a mediator and arbitrator in this type of arrangement. As its name suggests, mediation-arbitration, or med-arb, combines mediation and arbitration. First, a mediator tries to bring the parties closer together and help them reach their own agreement. If the parties cannot compromise, they proceed to arbitration—before that same third party or before a different arbitrator—for a final and binding decision.
Neutral Evaluation

This is a private and non-binding technique where a neutral third party (often legally qualified) gives an opinion on the likely outcome at trial as a basis for settlement discussions.

An Early Neutral Evaluation (ENE) is used when one or both parties to a dispute seek the advice of an experienced individual, usually an advocate, concerning the strength of their cases. An objective evaluation by a knowledgeable outsider can sometimes move parties away from unrealistic positions, or at least provide them with more insight into their cases' strengths and weaknesses.

Expert Determination

These are long established procedures in English law and have been used across a number of industries. Examples include: accountants valuing shares in limited companies, valuers valuing the price of land and other forms of property. This method has been applied in resolving land disputes as various experts from surveyors, to valuers, to property managers have been called upon to resolve land-related disputes.

Adjudication

Adjudication is a procedure where power is given by the parties to an independent third party to make interim decisions on disputes between the parties arising under the contract.

This refers to statutory adjudication. Decisions of an adjudicator are binding on the parties until a further process is invoked (arbitration or litigation) It is common in construction disputes and has helped resolved several disputes that affect the surveying profession across the Africa region.

Traditional Dispute Resolution

This involves the application of traditional, ancient methods to resolve disputes and in this case the land disputes. Customary law is unwritten and one of its most commendable characteristics is its flexibility, apart from the fact that it is accepted norm of usage. In one famous Nigerian case of Lewis vs Bankole (1908) the court said, “One of the most striking features of West African native custom is its flexibility; it appears to have been always subject to motives of expediency, and it shows unquestionable adaptability to altered circumstances without entirely losing its character”. Of importance this process is still applicable in modern times to land and family disputes.

Traditional Dispute Resolution is mainly community focused and does not contemplate transactions where the parties are from different cultural backgrounds. The lack of privacy could be a disadvantage in that the parties might not want the community involved. Whereas some of the methods that were used may not be currently applicable, there exists methods that can still be applicable to date.

HISTORICAL CONTEXT OF ADR IN AFRICA

Within the Africa region, there is an increase of ADR organizations both in specific countries as well as regional centres which allows for ADR to take place where the current judicial system lacks the capacity, time and at times fairness. Alternative Dispute Resolution is an age long cultural phenomenon in most African Countries. Reconciliation is the traditional means of solving land disputes arising from a breach
in a relationship between two or more parties. In fact, traditionally, African societies have resolved land disputes through the use of a negotiated settlement. Unfortunately, as these countries became colonized, the government controlled dispute resolution mechanisms replaced the old customary law systems. Some of the traditional dispute resolution mechanisms survived only as informal systems and as lower courts in the judicial hierarchy (Kohlhagin, 2012)

In the traditional setting, (villages, hamlets, settlements, and towns), dispute resolution is almost as old as the traditions and customs of the people. Customary law is generally known to be the accepted norm in a community. The practise of ADR in West Africa has been on the rise with over 16 regional and ADR centres serving the investors and over 65 law firms already offering ADR Services (Sutherland and Sezneck, 2003). Resolution and reconciliation was and in some places still is major way of solving disputes under the indigenous system of governance. In Kenya, 51% of Kenyans prefer to report problems to community leaders rather than the police and 60% don’t ever use the courts (Brenda, 2007).

For example, the role of arbitrator or conciliator was taken up by the elders or the chief and all resolutions were meant to maintain social cohesion in the village or settlement. Any person who was concerned that a dispute between the parties threatened the peace of the community could initiate the process. In the process, parties have the opportunity to state their case and their expectation but the final decision is that of the elders. Customary arbitration is not private but is organized to socialize the whole society, therefore the community is present. Parties could arise from the whole process and maintain their relationship and where one party got an award the whole society was witness and saw to it that it was enforced. Social exclusion or ostracism was a potent sanction for any erring party therefore enforcement of an award was not a problem (Brenda, 2007).

This way of solving disputes showcases the ability for African countries to take hold of a traditional way of solving disputes and using it in a more directed and commercialized nature. (Brenda, 2007). In fact, it is already being seen in Uganda where the 1995 Constitution has incorporated traditional customary law into the trial process. It requires that parties be subject to reconciliation in all matters handled by the judiciary involving commercial disputes (including land disputes). The 2000 Arbitration and Conciliation Act allows for new judicial powers that can allow judges to submit cases to mediation for amicable resolution (Owasanoye, 2001).

Countries’ specific alternative dispute resolution mechanisms and progress

Several countries in the African region have taken initiative to develop ADR practices within their commercial industry which effectively assist in resolving land disputes. Some have even enacted legislation to establish ADR methods as a way of minimizing litigation in court. For instance, Tanzania has incorporated ADR into its legal system Tanzania amended its court procedures to encompass compulsory mediation for all cases filed in High Court (Brenda, 2006).

Although Uganda is still in the process of incorporating and embracing ADR, various entities have already started practicing ADR and even helped some of the land disputes especially in Central Uganda. For example, through the Independent Development Fund out of the 1,066 cases that were handled by their partners in 2016
using ADR mechanisms, 659 cases were successfully concluded showing a 60% successful completion of the cases received, compared to 77 cases successfully concluded in formal courts out of 297 (25% completion rate).

Rwanda have also reported success story of ADR in the informal structures; there is great evidence of success in the Gacaca courts where a community and leaders known for their integrity and wisdom gathered to discuss and resolve conflicts. The traditional dispute resolution system dealt with issues within or between families and members of the same community after the mass of genocide. The public elected the judges who were known as Inyangamugayo (people of integrity in their community) and who presided over the hearings in the Gacaca courts. These courts played a significant role in finding out what happened during the genocide but also greatly helped in clearing the backlog of court cases. They allowed communities across Rwanda to meet, face to face, and talk about the events of 1994. In this way, they laid the foundation for peace and reconciliation.

Resolving disputes using ADR mechanism has been practiced in Ethiopia since time immemorial. Most venerated traditional institutions such as the Shimagele, in central and northern Ethiopia and the Gadaa, in the west, central eastern and southern Ethiopia have served to resolve disputes among families, clans, tribes’ nations and nationalities. Disputes regarding claims on the use or ownership of individual or communal land, water, cattle, grazing area, local custom, and religious matters were often resolved through these institutions.

Ethiopian laws have been codified towards the end of 1950s and the beginning of 1960s so as to adopt laws for the recognition and modernization of ADR practices. However, the new laws governing ADR mainly focus on contractual disputes arising from contractual relations such as sales, loan of goods, works, services and the like. Disputes pertaining to marriage, divorce and succession are also other areas of modern laws in which resolution of disputes through ADR have been provided. This implies that even land disputes are accommodated in the Ethiopian regulations and legislations. By and large, ADR activities in most urban areas are either conducted by lawyers or with the participation of lawyers and other professionals with some practical or theoretical background. Therefore, in general, attempts are made to comply with the relevant prescription of national ADR laws or other rules and laws.

One of the countries in the region leading in ADR practice and especially in resolving land disputes is Kenya. The Country showcases the ultimate opportunity for ADR progress. The Arbitration Act, 1995, which is nearly identical to the UNCITRAL Model Arbitration Act, governs domestic and international arbitration in Kenya. The Act requires parties who desire to arbitrate to ‘formalize an arbitration agreement in writing, and any disputing parties can enter into such an agreement. The parties select an arbitrator (or an arbitral tribunal) who applies the substantive law of Kenya but controls the procedure and proceedings of the arbitration.

Further, there are arbitration rules formulated under the auspices of the Chartered Institute of Arbitrators to govern arbitral proceedings. Notwithstanding pro-ADR developments in the new Constitution (Article 159 (2) and Civil Procedure legislation, Kenya has not yet developed a comprehensive ADR framework or incorporated ADR into the court system in a systematic way. Brainch (2003) observes that the Arbitration Amendment Act in Kenya which is the regulating framework does not contain any reference to ADR, conciliation or mediation unlike the Arbitration and Conciliation
Act of 2000 of Uganda (Brenda, 2001). Mediation and arbitration remain useful in Commercial courts and proceedings and in the land dispute resolution bodies.

However, Kenya has been making steps in the direction with the recent gazettement of directions on Court-Annexed Mediation that seek to provide for the procedure to be followed in mediation and protects the mediator from being questioned thereafter about the proceedings of the process as it is confidential.

INSTITUTIONAL ARRANGEMENTS

There are various institutions that offer services and trainings of ADR in Africa region. These institutions are playing a pivotal role in resolving the land disputes in Kenya.

The Mediation Accreditation Committee established through a Kenya Gazette notice assists in accreditation and categorizing mediators to fall under the mediation process. The Committee was set up as a result of the Court Annexed Mediation Project where Courts can refer a matter to them for mediation.

Currently, the Chartered Institute of Arbitrators (“CIArb (K”)”, offers training in ADR methods including arbitration, mediation and adjudication. The Kenya Branch of the Chartered Institute of Arbitrators was established in 1984. It is an umbrella body that oversees, promotes and facilitates determination of disputes by Arbitration and other forms of ADR. The Kenya Branch has more than 300 registered members and maintains a register of knowledgeable and experienced Arbitrators and facilitates their appointment.

Kenya is also home to the Dispute Resolution Centre, which is an independent, non-profit organization which promotes the prompt effective and economic resolution of disputes through arbitration and ADR, predominately mediation, expert determination and early neutral evaluation. Moreover Kenya is also privilege to host the Mediation Training Institute which trains mediators and certifies them as professional mediators. MTI also offers mediation services, promotion of the mediation profession and public awareness on mediation.

The Nairobi Centre for International Arbitrators offers a neutral venue for the conduct of international arbitration with commitment to providing institutional support to the arbitral process. In addition the NCIA caters for domestic arbitration and other forms of dispute resolution such as mediation. Currently, more work needs to be done in the African region regarding legitimacy of the arbitral institutions and enforcement of awards by the judiciary. However, several initiatives within the country have been started to give ADR awareness training for the judiciary, legal professionals and academics.

In Ethiopia, we have the Addis Ababa Chamber Commerce and Sectoral Associations Arbitration Institute (AACCSSA AI) as an autonomous organ, legally authorized and mandated commercial disputes settlement body. It was established as a pioneer disputes settlement body in January 2002, with the generous support from the Netherland Embassy in Ethiopia. In Tanzania we have the Resolution Experts and the International Centre for Settlement of Investment Disputes (ICSID) leading training in ADR together with other institutions.

*East African Court of Justice* was established by the East African Community (“EAC”). The East African Community is a regional intergovernmental organization
comprising the Governments of Burundi, Kenya, Rwanda, Tanzania and Uganda with the aim of establishing the East African economic, social, cultural and political integration. Historically these countries have established several trade and customs unions in the region and the treaty in which the EAC as a result solidified the concerted effort of cooperation in the region. The community operates through several organs and institutions established under Article 9 of the treaty, the East African Court of Justice is one these institutions. Established in November 2001, the court operates on an ad hoc basis. It has 10 judges with 2 judges being appointed by each partner state.

The Court has jurisdiction over the interpretation and application of the treaty. It also has arbitral jurisdiction on matters arising from: a) an arbitration clause contained in a contract or agreement which confers such jurisdiction to which the Community or any of its institutions is a party; b) arising from a dispute between the Partner States regarding this Treaty if the dispute is submitted to it under a special agreement between the Partner States concerned; or c) arising from an arbitration clause contained in a commercial contract or agreement which the parties have conferred jurisdiction on the Court. This court has the potential of becoming a power house in the region in resolving cross border commercial disputes. It has promulgated its own set of arbitration rules and procedures which vary from other international and regional rules and standards.

CONCLUSION

Alternative Dispute Resolution mechanisms are gaining increasing importance within Africa. Though sometimes lacking in organization and financial resources, these efforts by countries to incorporate non-adversarial dispute resolution methods in the country is imperative to increasing foreign and domestic investment. The biggest challenge to the process is finding legitimacy within the current judicial framework especially in countries that have a pluralistic government, incorporating portions of civil, common and customary law. The usage of international arbitration rules such as UNICTRAL and the New York Convention may help heed the fears of enforcement by investors. However, it is imperative that the judicial system within a country is part of the process in order to ensure the success of enforcement and smooth transitions between arbitration, conciliation, mediation and actual enforcement.

There is also a need for introduction of key skills required for ADR. Those to be given the responsibilities to champion ADRs, must be empowered/ trained to be able to facilitate ADRs use in the land sector with particular attention to their important role in addressing land-related disputes.

Conflicts is endemic and can be dangerous in the society, individuals and groups. Its management is therefore very important. If left unmanaged, lots of damages could be caused particularly in the land sector. In view of this, the application of ADRs is one of the various land-related disputes resolution approaches to addressing land and land-related activities conflicts.

From the analysis in this paper it is clear that ADR has helped in resolving disputes even in the land sector. The surveying profession should continuously adopt alternative dispute resolution methods will be in resolving land disputes and also consider specialized training so as to be ADR practitioners.
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